EIS

ENVIRONMENTAL INVESTIGATION SERVICES

REPORT

TO

SYDNEY FISH MARKET PTY LTD AND LAND AND PROPERTY MANAGEMENT AUTHORITY

ON

ADDITIONAL ENVIRONMENTAL SITE ASSESSMENT AND REMEDIATION ACTION PLAN

FOR

PROPOSED REDEVELOPMENT

AT

SYDNEY FISH MARKETS, 56-60 PYRMONT BRIDGE ROAD, PYRMONT, NSW

AUGUST 2010

REF: E23982Krpt2

AS/NZS ISO 9001
Certified
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EXECUTIVE SUMMARY

Conybeare Morrison International Pty Ltd and Reilly Design Group (CM+ & R), acting on behalf of Sydney Fish Market Pty Ltd, commissioned Environmental Investigation Services (EIS), a division of Jeffery & Katauskas Pty Ltd (J&K), to undertake an additional environmental site assessment for the proposed redevelopment at Sydney Fish Markets (SFM), 56-60 Pyrmont Bridge Road, Pyrmont, NSW.

Subsequently, CM+ & R and Land and Property Management Authority commissioned EIS to prepare a remediation action plan (RAP) for the site based on the additional environmental site assessment and the previous EIS investigations undertaken at the site.

EIS understand that the development applications for the SFM redevelopment project have generally been divided into four separate areas:

1. RTA lease part 3A application;
2. SFM part 3A application;
3. SFM part 4 application; and
4. Waterfront works part 3A application.

EIS are not involved in the RTA lease part 3A application. For the purpose of this report, the proposed development (i.e. "the site") has been divided into two areas: the SFM part 3A and 4 area; and the waterfront works part 3A area (as shown on Figure 2).

The proposed development in SFM part 3A and 4 area is expected to be undertaken in four stages to reduce the potential for disruption to the existing fish market operations. Stage 1 of the development will comprise a single-storey extension to the west end of Building 34. We understand that the ground floor slab is to be built as a suspended slab. Excavation will only be required if necessary for new services trenches and footing construction.

Stages 2 and 3 will include demolition of the existing buildings in the east of the site and construction of a four-storey building. The ground floor of this building will have a delivery/pick up area over part of the ground floor. The first floor will be made up of both retail and parking areas, with the second and third floors also for parking.

Stage 4 will include further works to building 34 as well as building 35 in the north-east section of the site. These buildings will be two-storeys, and there will also be a new arrival forecourt. Excavation for the proposed new works will be to a maximum depth of about 1.5m to achieve the required ground floor level of RL 3.6m for the stages 2 to 4 buildings. Locally deeper excavation may be required if necessary for new services trenches, lift pits and footing construction.

Based on the details provided we understand the proposed redevelopment in the waterfront works part 3A area may include construction of a promenade, boardwalk, waterfront park and seawall. We have been advised that the works associated with the seawall construction are unlikely to include dredging of the sediments. The proposed waterfront redevelopment is unlikely to include significant excavation works. Some filling may be required in the vicinity of the proposed park in order to achieve the desired site levels.

EIS have previously undertaken several investigations at the site and the results are presented in two separate report documents. An acid sulfate soil management plan was also prepared for the site. These EIS reports should be read in conjunction with the RAP.

The primary objectives of the additional investigation were to:

- Better assess the soil and groundwater contamination conditions in the SFM part 3A and 4 area of the site;
- Assess the potential for the presence of underground storage tanks (USTs) in the vicinity of several previously identified contamination hotspots and the suspected USTs by undertaking a ground penetrating radar (GPR) survey of these areas;
- Assess the potential for tidal movements to effect the migration of the groundwater contamination in the vicinity of the EIS groundwater monitoring well MW517;
- Confirm the waste classification for the soils that may be excavated and disposed off-site during the proposed redevelopment and/or remediation works; and
- Prepare a report presenting the results of the additional assessment, together with a remedial strategy for the site.

The scope of work undertaken to achieve the objectives included:

- Review of EIS reports E23982Krpt, dated June 2010 and E24125Krpt, dated August 2010;
- GPR survey of three separate sections of the site;
- Installation of a groundwater data logger in MW517 for a period of approximately two weeks to record changes in the groundwater levels;
- Design and implementation of a field sampling program. This included sampling from a combination of: eight targeted boreholes in the vicinity of two previously identified contamination hotspots in the SFM part 3A and 4 area; and eight boreholes distributed in sections of the SFM part 3A and 4 area where sampling had not been undertaken previously;
- Installation of three additional groundwater monitoring wells at selected locations;
- Groundwater sampling from the three new groundwater monitoring wells, and from one of the monitoring wells installed previously in the SFM part 3A and 4 area;
- Laboratory analysis of selected soil and groundwater samples; and
- Preparation of a report presenting the results of the additional assessment together with a remedial strategy for the site.

The investigations undertaken at the site have indicated the following:

- The TPH (C_{10}-C_{36}) and TPH (C_9-C_9) contamination was relatively widespread within the fill soils in the central and central east sections of the site. The highest elevated concentrations were typically encountered in the vicinity of the suspected USTs and in the vicinity of the suspected former fuel processing facility/refinery;
- Arsenic and PAHs were encountered in the north section of the site in the vicinity of BH504 and BH704. The arsenic hotspot may have been contributing to the elevated arsenic concentrations in the groundwater;
- PAHs were encountered in the fill soils at several locations in the east section of the site;
- With the exception of the elevated concentrations of some PAH compounds encountered in BH606, the majority of the PAH contamination encountered in the fill soils was considered to be associated with ash and slag deposits. The PAHs associated with the ash and slag were generally considered to be relatively immobile;
- Concentrations of some heavy metals (including arsenic), were encountered in the groundwater samples;
- Elevated concentrations of TPH (C_{10}-C_{36}), TPH (C_6-C_9), oil and grease, and PAHs were also encountered in the groundwater at the site; and
- The groundwater levels in the vicinity of MW517 may be influenced by tidal movements. Although the fluctuations are relatively minor, they show some correlation with daily tidal variations.

The proposed site remediation includes a combination of strategies. These include:

- Removal of the suspected USTs identified during the EIS investigations;
- Excavation and off-site disposal of the worst of the contaminated soil where practical (based on contaminant concentrations and the potential for the contaminants to impact on the groundwater system);
- Cap and contain the remainder of the contaminated soil;
- On-going monitoring of the groundwater conditions; and
- Management of the site via the implementation of an environmental management plan (EMP).

An assessment of the health risks associated with the site contamination and the proposed cap and contain approach will be required prior to proceeding on this basis. This would require a quantitative health risk assessment to be undertaken by a suitably qualified consultant. EIS would expect a health risk consultant to be involved in the project prior to the commencement of remediation works. The risk assessment should be based on the proposed land use in the waterfront works part 3A area (i.e. parks and recreational open space) and the SFM part 3A and 4 area (i.e. commercial/industrial).

EIS consider that there is reasonable cause to notify the DECCW (EPA) of the site contamination under Section 60 of the CLM Amendment Act 2008. The site contamination is considered to meet the Notification Triggers specified in the *Guidelines on the Duty to Report Contamination* under the CLM Amendment Act 2008.

EIS consider that the site can be made suitable for the proposed development provided that the remediation and management measures outlined in this RAP are implemented.

The conclusions presented in this report have been made within the limitations of the scope of works undertaken for the investigations. The conclusions and recommendations should be read in conjunction with the limitations presented in the body of the report.

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Conybeare Morrison International Pty Ltd and Reilly Design Group (CM+ & R), acting on behalf of Sydney Fish Market Pty Ltd, commissioned Environmental Investigation Services (EIS), a division of Jeffery & Katauskas Pty Ltd (J&K), to undertake an additional environmental site assessment for the proposed redevelopment at Sydney Fish Markets (SFM), 56-60 Pyrmont Bridge Road, Pyrmont, NSW.

Subsequently, CM+ & R and Land and Property Management Authority commissioned EIS to prepare a remediation action plan (RAP) for the site based on the additional environmental site assessment and the previous EIS investigations (see Section 1.2 below).

The proposed redevelopment area (referred to as "the site" within this report) is identified as Lot 2 in DP827434, part of Lot 1 in DP835794, part of Lot 1 in DP734622, part of Lot1 in DP836351 and part of Lot 2 in DP125720. At the time of preparation of this report, the site was occupied by a car park, several buildings/processing facilities and public eating areas associated with the SFM. The site location is shown on Figure 1 and the investigation and RAP was confined to the site boundaries as shown on Figure2.

The additional investigation was undertaken generally in accordance with a revised EIS proposal (Ref: EP5028K2) of 19 July 2010 and written acceptance from CM+ & R, on behalf of Sydney Fish Market Pty Ltd of 21 July 2010. The RAP was prepared generally in accordance with an EIS proposal (Ref: EP5080K) of 18 August 2010, and written acceptance by CM+ & R.

1.1 Proposed Development Details

EIS understand that the development applications for the SFM redevelopment project have generally been divided into four separate areas:

1. RTA lease part 3A application;
2. SFM part 3A application;
3. SFM part 4 application; and
4. Waterfront works part 3A application.

EIS are not involved in the RTA lease part 3A application. For the purpose of this report, the proposed development (i.e. "the site") has been divided into two areas: the SFM part 3A and 4 area; and the waterfront works part 3A area (as shown on Figure 2). The proposed development details for each area are presented below:

SFM Part 3A and 4 Area

The proposed development in this area consists of four stages (Stages 1 to 4 inclusive as shown on Figure 2). Each stage will be undertaken in sequence to reduce the potential for disruption to the existing fish market operations.

Stage 1 of the development will comprise a single-storey extension to the west end of Building 34. The extension will have the same finished floor level (FFL) as the ground floor of Building 34, which is slightly above current ground levels within the proposed extension footprint. We understand that the ground floor slab is to be built as a suspended slab. Excavation will only be required if necessary for new services trenches and footing construction.

Stages 2 and 3 will include demolition of the existing buildings in the east of the site and construction of a four-storey building. The ground floor of this building will be at RL 3.6m and will have a delivery/pick up area over part of the ground floor. The first floor will be made up of both retail and parking areas, with the second and third floors also for parking. We have been advised that there is the possibility that a further two floors may be added to this building.

Stage 4 will include further works to building 34 as well as building 35 in the north-east section of the site. These buildings will be two-storeys, with the ground floor level for the building being at RL 3.6m. There will also be a new arrival forecourt which will be at approximately RL 6m.

Excavation for the proposed new works will be to a maximum depth of about 1.5m to achieve the required ground floor level of RL 3.6m for the stages 2 to 4 buildings. Locally deeper excavation may be required if necessary for new services trenches, lift pits and footing construction.

Waterfront Works Part 3A Area

Based on the details provided by Government Architects Office we understand the works in this area may include construction of a promenade, boardwalk, waterfront park and seawall. We have been advised that the works associated with the seawall construction are unlikely to include dredging of the sediments.

The proposed waterfront redevelopment is unlikely to include significant excavation works. Some filling may be required in the vicinity of the proposed park in order to achieve the desired site levels.

1.2 Previous Investigation Reports and Documents

EIS have previously undertaken two investigations at the site and the results are presented in the following documents:

- *"Report to Sydney Fish Market Pty Ltd on Environmental Site Assessment and Preliminary Acid Sulfate Soil Assessment for Proposed Redevelopment at Sydney Fish Markets, 56-60 Pyrmont Bridge Road, Pyrmont, NSW"* Ref: E23982Krpt, dated June 2010[1]; and
- *"Report to Land and Property Management Authority C/- Government Architects Office on Preliminary Environmental Site Assessment for Proposed Redevelopment - Waterfront at Sydney Fish Markets, 56-60 Pyrmont Bridge Road, Pyrmont, NSW"* Ref: E24125Krpt, dated August 2010[2];

A summary of the above referenced reports is included in Section 4 of this report. The EIS 2010a and EIS 2010b reports should also be read in conjunction with this report.

EIS have also prepared an acid sulfate soil management plan (ASSMP) for the site. The ASSMP should be read in conjunction with the RAP. The report is referenced as:

- *"Report to Land and Property Management Authority on Acid Sulfate Soil Management Plan for Proposed Redevelopment at Sydney Fish Markets, 56-60 Pyrmont Bridge Road, Pyrmont, NSW"* Ref: E24125KrptASSMP, dated August 2010[3].

An environmental investigation was previously undertaken at the site by ICF Pty Ltd in 1994, and AXIS Environmental Consultants Pty Ltd subsequently updated the ICF report later that year. A summary of the following reports is presented in Section 4:

- *"Environmental Assessment, Sydney Fish Markets, Prepared for City West Development Corporation by ICF Pty Ltd"* (dated 28 January 1994[4]); and
- *"Updated Environmental Assessment of the Sydney Fish Markets Site, Prepared for NSW Government and Sydney Fish Market Pty Ltd"* (dated 13 September 1994[5]).

A brief summary of the above referenced reports is included in Section 4.

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[1] *Environmental Site Assessment and Preliminary Acid Sulfate Soil Assessment,* EIS, June 2010 (EIS 2010a)

[2] *Preliminary Environmental Site Assessment,* EIS, August 2010 (EIS 2010b)

[3] *Acid Sulfate Soil Management Plan*, EIS, August 2010 (EIS ASSMP 2010)

[4] *Environmental Assessment for Sydney Fish Markets,* ICF Pty Ltd, 1994 (ICF 1994)

[5] *Updated Environmental Assessment for NSW Government and Sydney Fish Markets,* AXIS Environmental Consultants Pty Ltd, 1994 (AXIS Environmental 1994)

J&K has previously undertaken several geotechnical investigations at the site. Reference should be made to the EIS 2010a and EIS 2010b reports for further details.

2 OBJECTIVES AND SCOPE OF WORK

2.1 Objectives

The primary objectives of the additional investigation were to:

- Better assess the soil and groundwater contamination conditions in the SFM part 3A and 4 area of the site;
- Assess the potential for the presence of underground storage tanks (USTs) in the vicinity of several previously identified contamination hotspots and the suspected USTs by undertaking a ground penetrating radar (GPR) survey of these areas;
- Assess the potential for tidal movements to effect the migration of the groundwater contamination in the vicinity of the EIS groundwater monitoring well MW517;
- Confirm the waste classification for the soils that may be excavated and disposed off-site during the proposed redevelopment and/or remediation works;
- Prepare a report presenting the results of the additional assessment, together with a remedial strategy for the site, generally in accordance with the *NSW EPA (now DECCW) Guidelines for Consultants Reporting on Contaminated Sites (1997*[6]*)* and *State Environmental Planning Policy No.55 – Remediation of Land (1998*[7]*)*.

2.2 Scope of Work

The scope of work undertaken to achieve the objectives included:

- Review of EIS reports E23982Krpt, dated June 2010 and E24125Krpt, dated August 2010;
- GPR survey of three separate sections of the site;
- Installation of a groundwater data logger in MW517 for a period of approximately two weeks to record changes in the groundwater levels;
- Design and implementation of a field sampling program. This included sampling from a combination of: eight targeted boreholes in the vicinity of two previously identified contamination hotspots in the SFM part 3A and 4 area; and eight boreholes distributed in sections of the SFM part 3A and 4 area where sampling had not been undertaken previously;
- Installation of three additional groundwater monitoring wells at selected locations;

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[6] *Guidelines for Consultants Reporting on Contaminated Sites,* NSW EPA (now DECCW), 1997 (Reporting Guidelines 1997)

[7] *State Environmental Planning Policy No. 55 – Remediation of Land,* NSW Government, 1998 (SEPP55)

- Groundwater sampling from the three new groundwater monitoring wells, and from one of the monitoring wells installed previously in the SFM part 3A and 4 area;
- Laboratory analysis of selected soil and groundwater samples; and
- Preparation of a report presenting the results of the additional assessment together with a remedial strategy for the site.

Field work for the additional investigation was undertaken on the following dates:

- Drilling and soil sampling was undertaken on 29 and 30 July 2010, and 3 August 2010;
- Installation of the three additional groundwater monitoring wells was undertaken on 29 July 2010;
- The groundwater monitoring wells were developed on 2 August 2010; and
- Groundwater samples were obtained from the monitoring wells on 5 August 2010.

3 SITE INFORMATION

3.1 Site Identification

The site identification details are summarised in the following table:

Site Owner:	Various (including State Property Authority and Waterways Authority of NSW)
Site Address:	56-60 Pyrmont Bridge Road, Pyrmont, NSW
Lot & Deposited Plan:	Lot 2 in DP827434, part of Lot 1 in DP835794, part of Lot 1 in DP734622, part of Lot1 in DP836351 and part of Lot 2 in DP125720
Current Land Use:	Commercial/Retail
Proposed Land Use:	Commercial/Retail (SFM part 3A and 4 area), Commercial/Open Space (waterfront works part 3A area)
Local Government Authority:	City of Sydney Council
Current Zoning:	Residential-Business (Non-residential Development) – Ultimo-Pyrmont Zoning Map, City of Sydney LEP 2005
Site Area:	Approximately 25,000m^2 (7,000m^2 for the waterfront works part 3A area and 18,000m^2 for the SFM part 3A and 4 area)
AHD:	Approximately 1-3m
Geographical Location (MGA):	N: 6250550 E: 332780 (approximately)
Site Locality Plan:	Refer to Figure 1
Borehole Location Plan:	Refer to Figures 3-6

3.2 Site Description

The Sydney Fish Markets are situated on the eastern foreshore of Blackwattle Bay and are generally bounded by: the Hymix concrete batching plant to the north; Pyrmont Bridge Road to the south; Bank Street to the east; and Blackwattle Bay to the west.

For the purpose of the site description the site has been separated into the two redevelopment area as follows:

SFM Part 3A and 4 Area

The SFM part 3A and 4 area is located in the north section of the wider fish markets site, to the north of the main fish market building (as shown in Figure 2). Access to this area is via an access ramp off Bank Street at the north east end of the site. The ramp is supported by a concrete retaining wall which is approximately 1.3m in height at the west end and 3.5m in height towards Bank Street (i.e. the east end). The concrete wall abutted a sandstone outcrop which ran in a north-west to south-east direction, and supported the overflow car park (located beyond the site boundary to the north-east) which is at a similar level to Bank Street.

At the time of the investigation the majority of the SFM part 3A and 4 area was occupied by the fish markets car park. The car park area was predominantly paved with asphaltic concrete (AC) which was in relatively poor condition. Cracks, slumped areas, reinstated areas and large potholes were evident throughout the car park. A thorough visual assessment of the surface areas within the car park could not be undertaken due to the presence of parked cars at the site.

The north and east sections of the SFM part 3A and 4 area were occupied by various retail and wholesale outlets. The retail/wholesale buildings were generally of steel frame, concrete block or brick construction. An additional brick and steel frame building was located in the south-west section of this area. No obvious indicators of chemical or petroleum storage were observed within the buildings.

A timber retaining wall (approximately 1m in height) was located beyond the south-west corner of the building in the north section of the SFM part 3A and 4 area. The wall retained a portion of the site to accommodate the floor level of the building and the surrounding slope. A relatively large tree, estimated to be approximately 6-8m in height, was located at the top of the timber retaining wall and a steel plate (purpose unknown) was located at the base of the tree.

The north-west section of the SFM part 3A and 4 area was occupied by a pay booth and boom gates associated with the car park entrance/exit.

Waterfront Works Part 3A Area

The waterfront works part 3A area is a long, irregular shape and is located in the west section of the site, adjacent to Blackwattle Bay (as shown on Figure 2). Access to this area of the site is made via a public walkway off Pyrmont Bridge Road (in the south) or via the main car park which is accessed off Bank Street.

At the time of the investigation the north section of the waterfront works part 3A area was predominantly occupied by the fish markets car park. The car park area was paved with asphaltic concrete (AC) which was in relatively poor condition, similar to the SFM part 3A and 4 car park area. Similarly, a thorough visual assessment of the surface areas within the car park could not be undertaken due to the presence of parked cars at the site.

The site areas immediately adjacent to Blackwattle Bay in the north of the waterfront works part 3A area were used as a storage area and as a helipad. Various materials including ropes, chains, disused fridges, waste oil storage drums (labelled as containing engine oil) and a shipping container were located in this area. A waste engine oil storage area was located to the south-east of the helipad (as shown on Figure 5). The waste oil storage appeared to be in an above ground tank, however, this could not be confirmed. The seawall in this section of the site was constructed of timber and sandstone block, and was in relatively poor condition.

Two circular metal plates that appeared consistent with the presence of UST dip/fill points were located at the ground surface in the car park, approximately 30m to the north-east of the waste engine oil storage area (as shown on Figure 5). No other fuel infrastructure such as vent pipes or bowsers were evident. The dip/fill points are likely to be associated with two disused USTs located in this section of the site.

The central section of the waterfront works part 3A area was occupied by a seafood wholesaler/retailer and processing facility, together with several refrigeration rooms. No obvious indicators of chemical or petroleum storage were observed within the buildings.

The south section of the waterfront works part 3A area was occupied by part of a concrete driveway that extended along the west side of the SFM main Building. The areas to the west of the driveway were occupied by an astroturf surfaced picnic area. An elevated boardwalk with numerous chairs and tables was located further to the west, adjacent to Blackwattle Bay.

The only vegetation observed in the waterfront works part 3A area included several palm trees located in the vicinity of the picnic area. A small section of the ground surface was also grassed in the south section of the site.

During rain events, stormwater would be expected to flow into the on-site stormwater drains and into Blackwattle Bay. Some infiltration would be expected in the low lying or slumped area of the car park areas where the pavement is severely cracked or potholed.

3.2.1 On-site Services and Surrounding Land use

No plans were available detailing the on-site electrical, stormwater and sewer services. An electrical substation was located in the south-east section of the site, to the rear of the existing buildings. It was understood that the main electrical services extended from the vicinity of the substation along the south site boundary. Some on-site stormwater infrastructure was observed in the car park areas and overhead power/ telecommunications were observed in the vicinity of the buildings.

The surrounding land use included:

- A concrete batching plant to the north;
- The main Sydney Fish Markets building (predominantly used as a processing facility and by a number of seafood retailers) and Pyrmont Bridge Road to the south. Wentworth park was located further to the south, beyond Pyrmont Bridge Road;
- A paved overflow car park to the east, with Bank Street (and the elevated Western Distributor) located beyond the overflow car park. Areas further to the east were generally occupied by medium to high density residential buildings; and
- Blackwattle Bay and several piers to the west.

3.3 Topography

The regional topography is characterised by a hill slope that generally falls towards the south-west before levelling out in the vicinity of the site and Blackwattle Bay.

The site area was generally uneven and gently undulating. Surface slopes within the site generally ranged from 0° to 5° and predominantly fell towards the west, south and south-west.

3.4 Regional Geology

The geological map of Sydney (1983[8]) indicates the site to be located in the vicinity of two geological formations. Generally the areas towards Blackwattle Bay and the west portion of the site are mapped as being underlain by manmade fill which typically consists of dredged estuarine sand and mud, demolition rubble, industrial and household waste over Quaternary aged deposits of silty to peaty quartz sand, silt and clay with ferruginous and humic cementation and common shell layers.

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[8] *1:100,000 Geological Map of Sydney (Series 9130),* Department of Mineral Resources (1983) [now Department of Primary Industries]

The areas towards the north and east sections of the site are mapped as being underlain by Hawkesbury Sandstone, which typically consists of medium to coarse grained quartz sandstone with minor shale and laminite lenses.

3.5 Acid Sulfate Soil Risk Map

The acid sulfate soil risk maps indicate areas of high risk, low risk and no known occurrence of acid sulfate soils. The acid sulfate soil risk map for the Prospect/Parramatta area prepared by Department of Land and Soil Conservation (1997[9]) indicates that the site is located within an area of 'disturbed terrain' to depths of approximately 2-4m. The 'disturbed terrain' classification is adopted in large scale filled areas which often occur during reclamation of low lying swamps for urban development, in areas which may have been mined or dredged or have undergone heavy ground disturbance through general urban development or the construction of dams and levees.

3.6 Hydrogeology

NSW Office of Water (formerly Department of Water and Energy[10]) records were researched for the investigation and indicated that five registered groundwater bores lie within 1km of the site. The groundwater works summaries and a map indicating the location of the bores in relation to the site are attached in Appendix C. The details are summarised in the following table:

Ref No	Approximate Distance from site (m)	Approximate Direction from site	Gradient from site	Depth (m)	Registered Purpose
GW110370	200	South-west	Down	4.0	Monitoring
GW110371	200	South-west	Down	4.0	Monitoring
GW110372	200	South-west	Down	4.0	Monitoring
GW110373	200	South-west	Down	4.0	Monitoring
GW110374	200	South-west	Down	4.0	Monitoring

The stratigraphy of the site is expected to consist of manmade fill over relatively high permeability alluvial sandy soil. The stratigraphy in the north-east sections of the site may consist of residual clayey soils overlying relatively shallow bedrock. Based on these conditions and the results of the groundwater bore search groundwater is not considered to be a significant resource in the immediate area of the site.

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[9] *1:25,000 Acid Sulfate Soil Risk Map (Series 9130N3, Ed 2),* Department of Land and Soil Conservation (1997) [now NSW Land and Property Management Authority]

[10] http://www.waterinfo.nsw.gov.au/gw/ visited on 19 May 2010

3.7 Surface Water

The nearest surface water body is Blackwattle Bay which is located down gradient and immediately adjacent to the west site boundary. Based on the site levels and surrounding topography, excess surface water flows would be expected to flow directly into Blackwattle Bay. It is understood that wastewater from the seafood wholesalers/retailers flows through underground pipe work directly into Blackwattle Bay.

4 SUMMARY OF PREVIOUS INVESTIGATIONS

4.1 Environmental Site Assessment and Preliminary Acid Sulfate Soil Assessment (EIS 2010a)

The EIS 2010a investigation was undertaken in the SFM part 3A and 4 area of the site. The primary objectives of the investigation were to:

- Assess the potential risk of significant widespread contamination in the SFM part 3A and 4 area;
- Assess the soil and groundwater contamination conditions in the SFM part 3A and 4 area in relation to the proposed land use (commercial/industrial);
- Undertake a waste classification assessment for off-site disposal of excavated soil associated with the proposed development works;
- Assess the soil conditions for acid sulfate soil potential; and
- Prepare a report presenting the results of the assessment/investigation.

The scope undertaken to achieve the objectives generally included a site history assessment including review of: historical aerial photographs; historical land titles records; historical archives held by City of Sydney Council in relation to development applications and building approvals; and review of WorkCover records, search of the on-line DECCW databases regarding notices or licenses, review of regional geology and groundwater conditions, and a limited soil and groundwater investigation in conjunction with the J&K geotechnical assessment.

Samples were obtained from 17 sampling locations (BH501 to BH504 inclusive, BH506 to BH508 inclusive and BH510 to BH519 inclusive) for the EIS 2010a investigation. The boreholes were generally drilled on a systematic grid with a spacing of approximately 40m between sampling points. Monitoring wells were also installed in five boreholes.

A range of fill and natural samples were analysed for heavy metals, total petroleum hydrocarbons (TPH), monocyclic aromatic hydrocarbons (BTEX compounds), polycyclic aromatic hydrocarbons (PAHs), organochlorine and organophosphorus pesticides (OCPs and OPPs), polychlorinated biphenyls (PCBs) and asbestos. Selected fill and natural soil samples from six boreholes were also analysed for acid sulfate soil potential (sPOCAS testing). The soil contamination data was compared to the relevant site assessment criteria (SAC) for commercial/industrial land use.

Groundwater samples were analysed for heavy metals, PAHs (low level), TPH, volatile organic compounds (VOCs), oil and grease, and a range of background parameters.

The groundwater contamination data was compared to the relevant SAC for marine waters.

The search of historical information indicated the following:

- The site was leased by the British Imperial Oil Company Ltd and the Shell Company of Australia Ltd from around 1902 to 1930. The Shell Company of Australia continued to lease the site until the early 1960s. Site use during this period has not been confirmed, however it is considered likely that various activities associated with petroleum storage, distribution and possibly oil refining processes were undertaken at the site during this time;
- The 1930 aerial photograph indicated that the site was located within an industrial area. Several large industrial-type buildings and circular storage towers/silos (possibly associated with petroleum storage and/or refinery processes) were located in the south section of the site. The towers/silos and buildings remained at the site until at least 1961;
- The New South Wales Fish Authority progressively leased portions of the site from 1965. These leases were transferred to the Fish Marketing Authority in the early 1970s and leased by various companies associated with the sale and distribution of seafood;
- There are no recorded notices listed on the NSW DECCW CLM or POEO register; and
- WorkCover have no records of UST licenses issued for the site.

Elevated concentrations of contaminants were encountered in the fill soil and groundwater samples obtained during the EIS 2010a investigation at concentrations above the adopted SAC. In summary these included:

- Elevated concentrations of arsenic (1,300mg/kg), Total PAHs (149.7mg/kg) and benzo(a)pyrene (19mg/kg and 5.7mg/kg) in several soil samples obtained from BH504;
- Elevated concentrations of light fraction (C_6-C_9) TPH (ranging from 82mg/kg to 480mg/kg) in soil samples obtained from BH507, BH511 and BH517;
- Elevated concentrations of mid to heavy fraction (C_{10}-C_{36}) TPH (ranging from 1,070mg/kg to 15,370mg/kg) in soil samples obtained from BH503, BH507, BH508, BH511 and BH517;
- Elevated concentrations of mid to heavy fraction (C_{10}-C_{36}) TPH (1.3mg/L), light fraction (C_6-C_9) TPH (0.19mg/L) and oil and grease (57mg/kg) in the groundwater sample obtained from MW517;
- Elevated concentrations of phenanthrene (0.00452mg/L), fluoranthene (0.001mg/L) and total PAHs (0.0163mg/L) in the groundwater sample obtained from MW517;

- Elevated concentrations of arsenic in three of the five groundwater samples. The elevated arsenic concentrations ranged from 0.005mg/L in MW508 and MW512 to 0.012mg/L in MW517; and
- An elevated concentration of lead in MW516. The lead concentration was 0.071mg/L.

Potential acid sulfate soils were also identified at the site and were considered to be associated with the natural alluvial soils.

The soil and groundwater laboratory results summary tables for the EIS 2010a (contamination data only) investigation are presented in Tables I and J respectively.

The investigation included an assessment of the data quality against the PARCC parameters (precision, accuracy, representativeness, comparability and completeness). The quality assurance and quality control (QA/QC) component of the project, including the data quality indicators, was considered satisfactory.

In summary, the report recommended the following:

- An additional investigation that should include:
    - Additional soil sampling in the east and south sections of the site in order to meet the minimum sampling density specified by the EPA (now DECCW);
    - Additional investigation of the groundwater contamination in the vicinity of BH/MW517 to better assess the contamination conditions encountered. This should include (as a minimum) the installation of three additional groundwater monitoring wells: one in the far south-west corner of the site; one in between BH510 and BH/MW517; and one in the vicinity of BH507. The additional groundwater assessment should address the effects of tidal movements on the migration of the groundwater contaminants;
    - Additional soil sampling in the vicinity of BH504 to better assess the TPH and arsenic contamination;
    - Further detailed analysis should be included to assess the nature of the TPH contamination. This could include a silica gel cleanup of the samples to remove any false positive results that could arise from the presence of fats and oils associated with food processing; and speciation of the hydrocarbons to gain a greater understanding of the potential health impacts of the TPH contamination;
    - Ground penetrating radar (GPR) survey of the areas that surround BH/MW517 and BH503 to attempt to identify potential USTs; and

    - Further sampling and analysis around BH504 and BH517 in order to attempt to reduce the waste classification from Restricted Solid Waste to General Solid Waste, or minimise the volume of Restricted Solid Waste.
- Preparation of an ASSMP prior to commencement of the site works in order to reduce the potential adverse impacts from acid sulfate soils; and
- Preparation of a RAP for the site.

4.2 Preliminary Environmental Site Assessment (EIS 2010b)

The EIS 2010b investigation was undertaken in the waterfront works part 3A area of the site. The primary objectives of the investigation were to:

- Assess the soil and groundwater contamination conditions in the waterfront works part 3A area of the site in relation to the proposed land use (parks/open space);
- Assess the soil conditions in the waterfront works part 3A area for acid sulfate soil potential;
- Assess the contamination and acid sulfate soil conditions in the sediments of Blackwattle Bay, immediately adjacent to the existing seawall;
- Assess the harbour water contamination conditions in Blackwattle Bay, immediately adjacent to the seawall;
- Prepare preliminary waste classification documentation for off-site disposal of excavated soil associated with the proposed development works; and
- Prepare a report presenting the results of the preliminary assessment.

The scope undertaken to achieve the objectives generally included a site history assessment including review of: historical aerial photographs; historical land titles records; historical archives held by City of Sydney Council in relation to development applications and building approvals; and review of WorkCover records, search of the on-line DECCW databases regarding notices or licenses, review of regional geology and groundwater conditions, and a limited soil, sediment, harbour water and groundwater investigation.

Relevant historical information obtained during preparation of the EIS 2010a report was incorporated into the EIS 2010b report. The EIS 2010a report was prepared assuming that the EIS 2010a and 2010b reports would eventually be used to prepare a single RAP document for the combined waterfront works part 3A and SFM part 3A and 4 areas.

Samples were obtained from 10 sampling locations (BH601 to BH610 inclusive) for the waterfront works part 3A area investigation. The boreholes were generally drilled on a systematic sampling plan with a spacing of approximately 30m-40m between sampling points. Monitoring wells were also installed in three boreholes. The sediment and harbour water screening included sampling from three locations (SSA/SWA to SSC/SWC inclusive) immediately adjacent to the site. Sampling for the acid sulfate soil assessment was undertaken from four selected boreholes, together with the three sediment sampling locations.

A range of fill and natural samples were analysed for heavy metals, TPH/BTEX, PAHs, OCPs, OPPs, PCBs, cyanide and asbestos. Sediment samples were analysed for a similar suite of contaminants to those detailed above, however, additional analysis was also undertaken for tributyltin (TBT). Selected fill, natural soil and sediment samples were also analysed for acid sulfate soil potential (sPOCAS testing). The soil contamination data was compared to the relevant site assessment criteria (SAC) for commercial/industrial land use.

The groundwater and harbour water samples were analysed for heavy metals, PAHs (low level), TPH, VOCs, oil and grease (groundwater only) and tributyltin (harbour water only). The groundwater contamination data was compared to the relevant SAC for marine waters.

The search of historical information indicated the following:

- The historical aerial photographs indicated that the west section of the site (i.e. the Blackwattle Bay waterfront) has undergone significant changes since the 1930s. Shipping and transport associated with industrial activities appeared to be the most obvious land use;
- At least part of the site was leased by the British Imperial Oil Company Ltd and the Shell Company of Australia Ltd from around 1902 to 1930. The Shell Company of Australia continued to lease the site until the early 1960s. Site use during this period has not been confirmed, however it is considered likely that various activities associated with petroleum storage, distribution and possibly oil refining processes were undertaken either at the site or in the immediate vicinity during this time;
- The New South Wales Fish Authority progressively leased portions of the site from 1965. These leases were transferred to the Fish Marketing Authority in the early 1970s and in 2004 and leased by various companies associated with the sale and distribution of seafood;
- There are no recorded notices listed on the NSW DECCW CLM or POEO register; and
- WorkCover have no records of UST licenses issued for the site.

Elevated concentrations of contaminants were encountered in the fill soil, sediment, harbour water and groundwater samples obtained during the EIS 2010b investigation at concentrations above the adopted SAC. In summary these included:

- Elevated concentrations of heavy metals, TBT, PAHs and mid to heavy fraction (C_{10}-C_{36}) TPH in the sediment samples;
- An elevated concentration of lead (640mg/kg) in a fill soil sample obtained from BH601 (0.6m-0.95m);
- Elevated concentrations of total PAHs and/or benzo(a)pyrene in fill soil samples obtained from BH601, BH602, BH606, BH607 and BH610. The maximum total PAHs and benzo(a)pyrene concentrations in the soil samples were 249.9mg/kg and 24mg/kg respectively;
- Elevated concentrations of TPH (C_{10}-C_{36}) in the majority of the fill soil samples. The maximum TPH (C_{10}-C_{36}) concentration in the soil samples was 22,100mg/kg;
- Elevated concentrations of copper and zinc in all three of the harbour water samples;
- Marginally elevated concentrations of arsenic (ranging from 0.003mg/L to 0.004mg/L) in all three groundwater samples. Also, elevated concentrations of copper (0.057mg/L), lead (0.008mg/L) and zinc (0.17mg/L) in MW608;
- Elevated concentrations of TPH (C_{10}-C_{36}) in the groundwater samples obtained from MW606 and MW608. The maximum concentration of TPH (C_{10}-C_{36}) in the groundwater samples was 1.15mg/L (in MW606); and
- Elevated concentrations of the PAH compounds anthracene (0.0006mg/L) and phenanthrene (0.0029mg/L) in MW605, and pheneanthrene (0.0008mg/L) in MW606.

Potential acid sulfate soils were also identified at the site and were typically considered to be associated with the natural alluvial soils.

The soil and groundwater laboratory results summary tables for the EIS 2010b (contamination data only) investigation are presented in Tables K and L respectively.

The investigation included an assessment of the data quality against the PARCC parameters (precision, accuracy, representativeness, comparability and completeness). The quality assurance and quality control (QA/QC) component of the project, including the data quality indicators, was considered satisfactory.

The source of the TPH contamination was considered likely to be a result of three primary factors:

- The suspected USTs;
- Unidentified USTs; and/or

- Historical activities associated with use of the site for petroleum storage, distribution and/or refinery processes.

The highest TPH concentrations were encountered in BH606 which was located immediately adjacent to the suspected USTs in the central-north section of the site (see Figure 5). Contamination migration from the USTs may have contributed to the elevated TPH concentrations in adjacent boreholes.

The source of the PAHs (including the benzo(a)pyrene) in the fill samples was considered most likely to be associated with the ash and slag material encountered in the fill matrix. The PAHs that are commonly associated with ash and slag are usually the higher molecular weight compounds. The elevated lead concentration in BH601 (0.6m-0.95m) is also likely to be associated with the ash and slag material.

The source of the PAH contamination in BH606 may also be a result of contamination migration from the adjacent UST. The elevated concentrations of TPHs (C_{10}-C_{36}), together with significantly elevated concentrations of naphthalene and the higher molecular weight compounds such as benzo(a)pyrene, may be associated with fuel and/or an oil product(contained within the USTs). Alternatively the lower molecular weight PAHs such as naphthalene may be associated with fuel from the UST, and the higher molecular weight PAHs may be associated with ash and/or slag in the fill.

The report recommended that a RAP be prepared to address the soil and groundwater contamination issues prior to commencement of the proposed redevelopment works.

4.3 Environmental Assessment (ICF 1994)

The report was divided into two sub-sections that included a Stage 1 site assessment and Stage 2 site assessment. A summary of each section is presented below:

- The purpose of the Stage 1 site assessment was to evaluate past and present site uses with respect to potential soil and groundwater contamination;
- The assessment was divided into two separate areas, A and B. Area A incorporated the site area applicable to the EIS investigations;
- The site history assessment was based on a review of documentation/information provided by a number of sources that included City of Sydney Council, the Maritime Services Board (MSB), the Shell Company of Australia (Shell), Department of Planning, consultants' reports, the Heritage and Environment database and interviews with site personnel;
- At the time of the Stage 1 assessment the site was occupied by a car park and various retail/wholesale and seafood processing facilities;

- Based on the site inspection and the available historical information, the potential for contamination at the site was generally considered to be associated with:
    - Former use of the site by Shell which included petroleum distribution and storage;
    - The suspected UST(s) located on the vicinity of Blackwattle Bay (as shown in Figure 5); and
    - PCBs associated with the electrical substations (located in the far east section of the site);
    - Fill material beneath the pavement.
- The report generally recommended the following:
    - Completion of a geophysical (electro-magnetic) survey to establish the presence of any USTs;
    - Assess the soil and groundwater in the vicinity of the suspected USTs for TPH and BTEX compounds;
    - Assess the soil and groundwater conditions in the vicinity of the substation for PCBs;
    - Assess the fill material and groundwater for heavy metals and total organic carbon; and
    - Assess the buildings for the presence of asbestos containing building materials.
- The purpose of the Stage 2 assessment was to evaluate the nature, degree and extent of contamination associated with past site uses;
- The investigation included an electro-magnetic survey to assess the presence of possible USTs, soil sampling from a total of seven boreholes and groundwater sampling from three monitoring wells. An asbestos survey of the buildings was also undertaken;
- The sampling locations included four boreholes drilled in the vicinity of two potential USTs, two boreholes drilled in arbitrary locations to assess the fill material and one borehole drilled in the vicinity of the electrical substation. Drilling and sampling was undertaken on 20 and 21 December 1993;
- A total of 12 soil samples were analysed for various contaminants including heavy metals, TPH/BTEX and PCBs. Three groundwater samples were also analysed for TPH/BTEX and heavy metals. The results were compared to the concentrations specified in an Australia and New Zealand Environment and Conservation Council (ANZECC) document;
- Elevated concentrations of TPHs, above the ANZECC guidelines, were encountered in one of the boreholes drilled in the vicinity of the suspected UST (located in the vicinity of EIS BH606). Elevated concentrations of some heavy metals including copper, lead and mercury were also encountered, above the ANZECC guidelines, in the borehole drilled adjacent to the substation;

- Elevated concentrations of TPHs, above the ANZECC guidelines, were encountered in one groundwater sample obtained from a monitoring well in the south section of the site. Heavy metals, BTEX compounds and TPH were detected in the remaining samples at concentrations below the ANZECC guidelines;
- The report generally concluded the following:
    - The electro-magnetic survey detected several anomalies that may represent USTs, however non-homogenous backfill may have also contributed to these anomalies;
    - No PCB contamination was encountered in the vicinity of the substation;
    - Ash and bitumen encountered in the fill soils may be a potential source of PAH contamination;
    - Under the existing and proposed development scenario that included the site being sealed by bitumen or concrete pavement, the contamination identified during the investigation was not considered to represent a health risk to site occupants or visitors. However, if another development scenario was proposed, a health and environmental risk assessment would be required;
    - The environmental risk to inhabitants of the adjoining marine environment was not considered to be significant due to the low flow rate and flux associated with tidal movement into the bay, and the dilution of potential contaminants; and
    - Asbestos containing materials were present in the buildings.
- The Stage 2 assessment report recommended the following:
    - The USTs be removed and the surrounding soils be remediated/validated until the levels of contaminants are “acceptable”;
    - The asbestos identified in the buildings be removed and disposed of accordingly. This would require further assessment of inaccessible areas; and
    - In the event that there were any changes to the proposed development that may result in greater exposure of the workers or site users to the contaminants, a qualitative assessment of health and environmental risks be undertaken.

Site conditions may have changed since preparation of the ICF 1994 report and therefore EIS have not relied upon the soil and groundwater contamination data presented in the report. In addition, since 1995 there have been significant changes associated with the assessment of contaminated sites including changes to the site assessment guidelines, soil and groundwater assessment criteria, and the consultant guidelines for reporting. EIS note that the ICF 1994 report would not meet the criteria for a Stage 1 or Stage 2 environmental site assessment in accordance with the current guidelines.

4.4 Updated Environmental Assessment (AXIS Environmental 1994)

The purpose of the report was to update the Environmental Assessment report prepared by ICF 1994 and to examine any changes that had occurred since preparation of the report which may have affected the contaminated areas.

The AXIS Environmental 1994 report generally concluded the following:

- The ICF 1994 report did not delineate the full extent of soil and groundwater contamination. A detailed drilling and sampling program would be required to establish the full extent of the contamination;
- The ICF recommendation to remove the USTs was not acted upon;
- The report agreed that the potential health and environmental risks associated with the contamination were not significant given the current and proposed site use;
- As the contamination risks were considered minimal, remediation of the site was not considered necessary (at the time) provided that the current use continued and no site disturbance was undertaken that may change the exposure pathway for the contaminants;
- The current and future site activities of the SFM were not considered to cause additional contamination or impact the existing contamination provided that the areas remained covered;
- The construction workers would need to be protected from potential exposure to contamination during works;
- During works, additional sampling was recommended to confirm the conditions encountered during the ICF 1994 assessment and to develop a safety plan for the workers;
- No work had been undertaken to remove the asbestos containing building materials; and
- Provided there were no changes in site activities it could be assumed that any contamination associated with heavy metals or petroleum products found at the site now (1994) or in the future, resulted from past activities and hence would not be the responsibility of the operators of the site. Should the site activities change to include fuel storage or disposal of contaminated waste, this assumption would have to be reviewed.

In light of the regulatory changes that occurred with reference to environmental site assessments/investigations and remediation of contaminated land, EIS consider that

that some of the above conclusions are no longer applicable. Reference should be made to Section 7 of this report for further details regarding the current regulatory framework.

5 SUMMARY OF SITE HISTORY

5.1 Summary of Historical Site Use

The search of historical information undertaken as part of the EIS 2010a and EIS 2010b investigations has indicated the following:

- The historical aerial photographs indicated that the west section of the site (i.e. the Blackwattle Bay waterfront) has undergone significant changes since the 1930s. Shipping and transport associated with industrial activities appeared to be the most obvious land use;
- At least part of the site was leased by the British Imperial Oil Company Ltd and the Shell Company of Australia Ltd from around 1902 to 1930. The Shell Company of Australia continued to lease the site until the early 1960s. Site use during this period has not been confirmed, however it is considered likely that various activities associated with petroleum storage, distribution and possibly oil refining processes were undertaken during this time;
- Several large industrial-type buildings and circular storage towers/silos (possibly associated with petroleum storage and/or refinery processes) were located in the central east section of the site from at least 1930. The towers/silos and buildings remained until at least 1961;
- The New South Wales Fish Authority progressively leased portions of the site from 1965. These leases were transferred to the Fish Marketing Authority in the early 1970s and in 2004 and leased by various companies associated with the sale and distribution of seafood;
- There are no recorded notices listed on the NSW DECCW CLM or POEO register; and
- WorkCover have no records of UST licenses issued for the site.

6 POTENTIAL CONTAMINATION SOURCES

Potential contamination at the site would be anticipated to be associated with:

- Potentially contaminated, imported fill material;
- Potential asbestos contamination associated with demolition of the former site buildings/sheds;
- Potential use of the site for petroleum storage and refining processes;
- The suspected USTs;
- Unidentified USTs;
- Historical use of the site for unknown commercial/industrial purposes; and
- Historical activities such as use of pesticides.

6.1.1 Site Specific Soil Contaminants of Concern

The compounds identified as soil contaminants of concern at the site include:

- Heavy metals: arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc;
- TPH;
- BTEX;
- PAHs including benzo(a)pyrene;
- OCPs including Aldrin, dieldrin, chlordane, DDT, DDD, DDE and heptachlor;
- OPPs;
- PCBs; and
- Asbestos.

6.1.2 Site Specific Groundwater Contaminants of Concern

The compounds identified as groundwater contaminants of concern at the site include:

- TPH;
- BTEX;
- PAHs; and
- Oil and grease.

6.2 Potential Receptors

The main potential contamination receptors are considered to include:

- Blackwattle Bay located immediately adjacent to the west site boundary;
- Site visitors, site occupants, workers and adjacent property owners, who may come into contact with contaminated soil and/or be exposed to contaminated dust arising from construction activity; and

- Future site occupants.

6.3 Contaminant Laydown and Transport Mechanisms

At this site, mobile contaminants would be expected to move down to the rock surface or groundwater table and migrate laterally down-slope from the source. The movement of contaminants would generally be expected to be associated with groundwater flow and seepage at the top of the bedrock. The transport of contaminants may also be associated with tidal movement in the areas immediately adjacent to Blackwattle Bay.

7 ASSESSMENT CRITERIA

7.1 Regulatory Background

In 1997 the NSW Government introduced the CLM Act. This Act has recently been amended by the *Contaminated Land Management Amendment Act* (2008[11]).

The CLM Act 1997, associated regulations, SEPP55 and NSW DECCW (EPA) guidelines, were designed to provide uniform state-wide control of the management, investigation and remediation of contaminated land.

Prior to granting consent for any proposed rezoning or development, SEPP55 requires the consent authority to:

- Consider whether the land is contaminated;
- Consider whether the site is suitable, or if contaminated, can be made suitable by remediation, for the proposed land use; and
- Be satisfied that remediation works will be undertaken prior to use of the site for the proposed use.

Should the assessment indicate that the site poses a risk to human health or the environment, remediation of the site may be required prior to occupation of the proposed development. SEPP55 requires that the relevant local council be notified of all remediation works, whether or not development consent is required. Where development consent is not required, 30 days written notice of the proposed works must be provided to council. Details of validation of remediation work must also be submitted to Council within one month of completion of remediation works.

The consent authority may request that a site audit be undertaken during, or following the completion of the site assessment process. Under the terms of the CLM Act 1997 the NSW DECCW (EPA) Site Auditor Scheme was developed to provide a system of independent review for assessment reports. An accredited Contaminated Site Auditor is engaged to review reports prepared by suitably qualified consultants to ensure that the investigation has been undertaken in accordance with the guidelines and confirm that the sites are suitable for their intended use.

Section 59(2) of the CLM Act 1997 states that specific notation relating to contaminated land issues must be included on Section149 (s149) planning certificates prepared by Council where the land to which the certificate relates is:

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[11] *Contaminated Land Management Amendment Act,* NSW Government Legislation, 2008 (CLM Amendment Act 2008)

- Within an investigation or remediation area;
- Subject to an investigation or remediation order by the DECCW (EPA);
- The subject of a voluntary investigation or remediation proposal; and/or
- The subject of a site audit statement.

Submission of contaminated site investigation and validation reports to council as part of rezoning or development application submissions may also result in notation of actual or potential site contamination on future s149 certificates prepared for the site.

Section 60 of the CLM Amendment Act 2008 sets out a positive duty on a land owner, or person whose activities have caused contamination, to notify the DECCW if they are or become aware that contamination exists on a site that generally poses "*an unacceptable risk to human health or the environment, given the site's current or approved use*". This duty to report is based on trigger values, above which notification is required.

Off-site disposal of fill, contaminated material and excess soil/rock excavated as part of the proposed development works is regulated by the provisions of the *Protection of the Environment Operations Act* (1997[12]) and associated regulations and guidelines including the *NSW DECC (now DECCW) Waste Classification Guidelines - Part 1: Classifying Waste* (2009[13]). All materials should be classified in accordance with these guidelines prior to disposal.

Section 143 of the POEO Act 1997 states that if waste is transported to a place that cannot lawfully be used as a waste facility for that waste, then the transporter and owner of the waste are each guilty of an offence. The transporter and owner of the waste have a duty to ensure that the waste is disposed of in an appropriate manner.

7.2 Soil Contaminant Threshold Concentrations

The soil investigation levels adopted for this investigation are derived from the NSW DEC (now DECCW) document *Guidelines for the NSW Site Auditor Scheme, 2nd Edition* (2006[14]) and the National Environmental Protection Council document *National Environmental Protection (Assessment of Site Contamination) Measure* (1999[15]). The contaminant thresholds listed below are levels at which further investigation and

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[12] *Protection of Environment Operations Act,* NSW Government, 1997 (POEO Act 1997)

[13] *Waste Classification Guidelines, Part 1: Classifying Waste,* NSW DECC, 2009 (Waste Classification Guidelines 2009)

[14] *Guidelines for the NSW Site Auditor Scheme, 2nd ed.,* NSW DEC, 2006 (Site Auditor Guidelines 2006)

[15] *National Environmental Protection (Assessment of Site Contamination) Measure,* National Environment Protection Council (NEPC), 1999 (NEPM 1999)

evaluation is required to assess whether the site is considered suitable for the proposed urban land use.

To accommodate the range of human and ecological exposure settings, a number of generic settings are used on which the Health based Investigation Levels (HILs) can be based. Four categories of HILs are adopted for urban site assessments. Contaminant levels for a standard residential site with gardens and accessible soil (Column A in Table A-1) are based on protection of a young child resident at the site. The remaining categories (Columns D to F) present alternative exposure settings where there is reduced access to soil or reduced exposure time. These categories include residential land use with limited soil access, recreational and public open space and commercial/industrial use. Where the proposed land use will include more than one land use category (eg. mixed residential/commercial development) the exposure setting of the most "sensitive" land use is adopted for the site.

Threshold concentrations for petroleum hydrocarbon contaminants including total TPH and BTEX compounds have previously been established in the *NSW EPA (now DECCW) Contaminated Sites: Guidelines for Assessing Service Station Sites* (1994[16]) publication and this document is referenced in the Site Auditor Guidelines 2006. Heavy fraction petroleum hydrocarbon aliphatic/aromatic component threshold concentrations have also been introduced in NEPM 1999.

Soil samples for this investigation have been analysed for total recoverable hydrocarbons (TRH) rather than TPH. TRH analysis is undertaken without a preliminary silica gel clean-up of the sample. Consequently the TRH result may include other compounds such as phthalates, humic acids, fatty acids and sterols (if present). For comparative purposes in relation to the threshold concentrations, we have referred to TRH as TPH within this report.

7.2.1 Asbestos in Soil

NEPM 1999 does not provide numeric guidelines for the assessment of asbestos in soil. NSW DECCW (EPA) advice (2006) has indicated that consultants should use their 'professional judgement' regarding determination of appropriate investigation and remediation levels for asbestos in soils; however the NSW DECCW (EPA) have not published numerical guidelines for the assessment of asbestos in subsurface soils.

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[16] *Guidelines for Assessing Service Station Sites,* NSW EPA, 1994 (Service Station Guidelines 1994)

The WorkCover publication *Working with Asbestos Guide* (2008[17]) states that, where buried asbestos is encountered, "A competent occupational hygienist should assess the site to determine:

- If asbestos material is bonded or friable
- The extent of asbestos contamination
- Safe work procedures for the remediation of the site"

"Any asbestos cement products that have been subjected to weathering, or damaged by hail, fire or water blasting are considered to be friable asbestos and an asbestos removal contractor with a WorkCover license for friable asbestos removal is required for its removal". Under the *NSW Occupational Health and Safety (OHS) Regulations 2001*[18] and WorkCover requirements all necessary disturbance works associated with asbestos containing materials must be conducted by a licensed AS-1 Asbestos Removal Contractor.

7.2.2 Site Assessment Criteria (SAC) for Soil Contaminants

The 'commercial/industrial' (Column F) exposure setting has been adopted for the additional investigation and the appropriate soil criteria are listed in the following table:

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[17] *Working with Asbestos Guide,* NSW WorkCover, 2008 (WorkCover Working with Asbestos Guide 2008)

[18] *Occupational Health and Safety Regulation,* NSW Government, 2001 (NSW OH&S Regulation 2001)

Contaminant	SAC - HILs Column F (mg/kg)
Heavy Metals	
Arsenic (total)	500
Cadmium	100
Chromium (III)	60%
Copper	5000
Lead	1500
Mercury (inorganic)	75
Nickel	3000
Zinc	35000
Petroleum Hydrocarbons	
TPH (C_6-C_9)	65 [a]
TPH (C_{10}-C_{36})	1000 [a]
Benzene	1 [a]
Toluene	1.4 [a]
Ethylbenzene	3.1 [a]
Total Xylenes	14 [a]
PAHs	
Total PAHs	100
Benzo(a)pyrene	5
Pesticides (OCPs & OPPs)	
Aldrin + Dieldrin	50
Chlordane	250
DDT+ DDD + DDE	1000
Heptachlor	50
Total OPPs	0.1[b]
Others	
PCBs (Total)	50
Asbestos	NDLR [c]

Note:

[a] Service Station Guidelines 1994

[b] Due to the absence of locally endorsed guideline criteria, the laboratory practical quantitation limit (PQL) has been adopted.

[c] Not Detected at Limit of Reporting (NDLR)

7.2.3 Waste Classification Assessment Criteria

For the purpose of off-site disposal, the classification of soil into 'General Solid Waste (non-putrescible)', 'Restricted Solid Waste (non-putrescible)' and 'Hazardous Waste (non-putrescible)' categories is defined by chemical contaminant criteria outlined in the

Waste Classification Guidelines 2009. The contaminant criteria are summarised in Table A-2.

7.3 Evaluation of Soil Analysis Data and Contaminant Threshold Concentrations

Assessment of the soil analytical data using the soil contaminant threshold concentrations has been undertaken in accordance with the methodology outlined in the NEPM 1999 Schedule 7(a) and the statistical analysis methods outlined in the *NSW EPA (now DECCW) Contaminated Sites Sampling Design Guidelines* (1995[19]).

The following criteria have been adopted for assessment of the analytical data:

- For a site to be considered suitable for the proposed land use, the 95% Upper Confidence Limit (UCL) value of the arithmetic mean concentration of each contaminant should be less than the applicable contaminant threshold concentration;
- The relevance of localised elevated values must also be considered and should not be obscured by consideration only of the arithmetic mean of the results. The results must also meet the following criteria:
    - the standard deviation of the results must be less than 50% of the soil assessment criteria; and
    - no single value exceeds 250% of the relevant soil assessment criteria.
- Where the concentration of each contaminant is less than the applicable contaminant threshold concentration (site assessment criteria) in all samples, UCL calculations may not be required and the suitability of the site for the proposed use may be assessed based solely on individual analytical results.

7.4 Groundwater Contaminant Trigger Values

Groundwater resources in NSW are managed and regulated by environmental and planning legislation including the POEO Act 1997, *Environmental and Planning Assessment Act* (1979[20]) and the *Water Management Act* (2000[21]).

In 2000, Australian and New Zealand Environment Conservation Council (ANZECC) released the water quality guidelines document (ANZECC 2000) which superseded the previous guideline documents.

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[19] *Contaminated Sites Sampling Design Guidelines,* NSW EPA, 1995 (EPA Sampling Design Guidelines 1995)

[20] *Environmental and Planning Assessment Act,* NSW Government, 1979 (E&PAA 1979)

[21] *Water Management Act*, NSW Government, 2000 (Water Act 2000)

The ANZECC 2000 guidelines include a complete framework for the development of appropriate guidelines for aquifer assessment. The above guidelines provide water quality parameters at the point of use including aquatic ecosystems (fresh and marine waters), drinking water, industrial and agricultural/irrigation uses.

The National Health and Medical Research Council (NHMRC) released the *Australian Drinking Water Guidelines* (2004[22]). These guidelines are predominantly used to assess drinking water quality and have been referenced in some cases.

The appropriate settings for current and potential uses of groundwater should be identified in establishing applicable groundwater trigger values:

- raw drinking water source;
- agricultural use – stock watering;
- agricultural and domestic use – irrigation;
- protection of aquatic ecosystems – freshwater; and
- protection of aquatic ecosystems – marine.

The presence of elevated contaminant concentrations in groundwater triggers further investigation of aquifer conditions to assess the source(s) of contamination and the lateral and vertical extent of the contamination.

Guidance on the remediation and management of contaminated groundwater is presented in the document *NSW DECCW (EPA) Guidelines for the Assessment and Management of Groundwater Contamination (2007[23])*.

7.4.1 Petroleum Hydrocarbons in Groundwater

In the absence of locally endorsed guidelines for petroleum hydrocarbon compounds in water, the 'intervention value' concentration for mineral oil specified in the *Circular on Target Values and Intervention Values for Soil Remediation* (2000[24]) has been adopted.

It is noted that these guidelines have not been endorsed by NSW DECCW (EPA) and are used only as a preliminary screening tool.

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[22] *Australian Drinking Water Guidelines*, National Health and Medical Research Council, 2004 (NHMRC 2004)

[23] *Guidelines for the Assessment and Management of Groundwater Contamination,* NSW DECCW, 2007 (Groundwater Contamination Guidelines 2007)

[24] *Circular on Target Values and Intervention Values for Soil Remediation,* Ministry of Housing, Spatial Planning and Environment, 2000 (Dutch Guidelines 2000)

Initally, groundwater samples for this investigation were analysed for total recoverable hydrocarbons (TRH) rather than TPH. TRH analysis is undertaken without a preliminary silica gel clean-up of the sample. Consequently the TRH result may include other compounds such as phthalates, humic acids, fatty acids and sterols (if present).

TPH (with silica gel cleanup) was subsequently scheduled on two samples. This analysis has been referred to as TPH (with silica gel cleanup) within this report.

7.4.2 Site Assessment Criteria (SAC) for Groundwater Contaminants

The marine groundwater trigger values have been adopted along with other guideline values for this investigation as outlined in the following table:

Groundwater Contaminant Assessment Criteria (mg/L)	
Contaminant	**95% Trigger Value for Marine Water**
Inorganics	
Arsenic	0.0023^t
Cadmium	0.0055
Chromium	0.01^t
Copper	0.0013
Lead	0.0044
Mercury	0.0004
Nickel	0.07
Zinc	0.015
Organics	
Benzene	0.7
Toluene	0.18^t
Ethyl benzene	0.005^t
o-Xylene	0.35^t
m+p Xylene	0.275^t
Total Xylenes	0.38$^\#$
Naphthalene	0.16
Phenanthrene	0.0006^L
Anthracene	0.0004^t
Fluoranthene	0.001^L
Benzo(a)pyrene	0.0001^L
TPH C_{10}-C_{36}	0.6^c
Other	
Oil and grease	10$^\#$

Note:

[t] Moderate or low reliability trigger value adopted due to absence of high reliability value

[c] Due to the absence of locally endorsed criteria, the Dutch Guidelines 2000 have been adopted

[#] NSW EPA (now DECCW) Service Station Guidelines 1994

[L] 99% trigger values adopted due to potential for bioaccumulation

8 ASSESSMENT PLAN

8.1 Soil Sampling Density

The EPA Sampling Design Guidelines 1995 for contaminated site investigations state that samples should be obtained from a minimum of 35 evenly spaced sampling points for a site of this size (approximately 25,000m^2).

The additional investigation included the following:

- Drilling four targeted boreholes (BH701 to BH704 inclusive) in the vicinity of the previous EIS BH504. Sampling was not undertaken from one of these boreholes (BH703) due to the presence of a void and obstruction beneath the surficial pavement;
- Sampling from four targeted boreholes (BH707, and BH711 to BH713 inclusive) in the vicinity of previous EIS BH517; and
- Sampling from eight boreholes distributed in areas that were not previously sampled (BH705, BH706, BH708 to BH710 inclusive, and BH714 to BH716 inclusive).

In summary, the EIS investigations undertaken at the site to date have included:

- Sampling from a total of 35 sampling points distributed relatively evenly across the site;
- Sampling from a total of seven targeted boreholes in the vicinity of two selected contamination hotspots; and
- Sampling from 11 groundwater monitoring wells.

This sampling density and sampling plan was considered appropriate for the site investigation due to the following:

- The sensitivity of the proposed land use is in the lower risk categories in terms of the likelihood of exposure to potential site contamination;
- The sample locations and sample spacing were considered to adequately address the conditions in the vicinity of the suspected/known contaminant point sources (i.e. the USTs); and
- The distribution of contamination was also expected to be associated with imported potentially contaminated fill material and is therefore likely to be random.

8.2 Groundwater Sampling

The additional assessment included the installation of three groundwater monitoring wells (MW708, MW712 and MW713) in BH708, BH712 and BH713. The location of the groundwater monitoring wells is shown on Figure 4.

8.3 Data Quality Objectives (DQOs)

The DQOs for the additional assessment are outlined in the following table:

DQOs	
State the problem	The previous EIS 2010a investigation identified a number of contamination issues at the site. Further investigation was considered necessary in order to better assess the soil and groundwater contamination conditions. The principal soil contaminants of concern for the additional investigation included arsenic, PAHs and TPH/BTEX. However, additional samples were also analysed for heavy metals, TPH/BTEX, PAHs, OCPs, OPPs, PCBs, and asbestos in order to characterise the fill soils in the areas that were not assessed previously. The principal groundwater contaminants of concern included TPH/BTEX, oil and grease, and PAHs.
Identify the decision	The primary objectives of the additional investigation are outlined in Section 2.1.
Identify inputs into the decision	The following data will be reviewed to resolve the decision statement: • Previous site investigation results including site history information, soil and groundwater laboratory analysis data; and • Physical site data that includes topography and other relevant information. The additional soil contamination assessment included: • Drilling 16 boreholes (sampling was undertaken from 15 of these boreholes); • Laboratory analysis of: - Eleven fill and three natural soil samples for arsenic and PAHs; - Eight fill soil samples for heavy metals, TPH/BTEX, PAHs, OCPs, OPPs, PCBs and asbestos; - Sixteen additional fill and three additional natural soil samples for TPH/BTEX; and - Two selected soil samples for speciated hydrocarbons (aliphatic and aromatic constituents). The additional groundwater contamination assessment included: • Installation of three additional groundwater monitoring wells; • Sampling from the three additional groundwater monitoring wells, together with sampling from one of the wells previously installed at the site (MW517); • Laboratory analysis of four groundwater samples for the following contaminants

	and parameters: PAHs, TPH/BTEX, Oil and grease, pH and EC; and • Laboratory analysis of two selected samples for TPH (silica gel cleanup). Details of the field QA/QC adopted for the additional assessment is outlined in Section 8.4 below.
Study Boundaries	The additional soil and groundwater contamination assessment was confined to the SFM part 3A and 4 area as shown on Figures 2 and 3. The GPR survey incorporated an area of the site located within the waterfront works part 3A area as shown on Figure 2.
Develop a Decision Rule	The results of the laboratory analyses were compared with the SAC adopted for the investigation. The QA/QC program implemented for the project was assessed by comparison with the criteria outlined in Section 8.4.
Specify Limits on Decision Errors	Decision errors are false positive or false negative i.e. stating the site is clean when it is contaminated; or stating that the site is contaminated when it is not. The most significant of these is a false positive i.e. stating that the site is suitable for proposed use when, if fact, it is contaminated. This error could potentially impact on the health of the site users. This study has assumed that elevated concentrations of the contaminants of concern are present in the soils at the site unless demonstrated otherwise.
Optimise the Design for Obtaining data	The overall data set was optimised by reviewing the data as the project proceeded. When necessary, adjustments were made to the sampling or analytical program.

8.4 Data Quality Indicators (DQIs) and Quality Assurance (QA)

The validation, as part of the DQOs, involves the technical review of the data using defined QA Assessment Criteria. The success of the DQIs is based on assessment of the data set as a whole and not on individual acceptance or exceedance within the data set. The following table provides the DQIs and the methods adopted to achieve these.

DQIs	Method of Achievement
Documentation Completeness	• Review of previous investigation reports • Preparation of sampling location plan • Preparation of chain of custody (COC) records • Laboratory sample receipt information • NATA registered laboratory results
Data Completeness	• Appropriately distributed sampling • Sampling program with reference to the Sampling Design Guidelines 1995 • On-site visual and PID assessment of samples • Appropriate analysis for all potential contaminants of concern
Data Comparability	• The use of appropriate sampling techniques • The use of appropriate preservation, storage and transport methods • The use of NATA registered laboratories for all analyses
Data Representativeness	• Adequate coverage of sample locations across the site • Representative coverage of analysis for contaminants of concern
Data Precision and Accuracy	• Use of trained and qualified field staff • Appropriate industry standard sampling equipment and decontamination procedures • Field QA/QC including collection and analysis of the following for the contaminants of concern: ➢ approximately 5% of field soil samples as inter-laboratory duplicates; ➢ approximately 10% of field soil samples as intra-laboratory duplicates; ➢ field blank samples, rinsate samples of field equipment, and ➢ soil/water trip spike samples. • Acceptable RPDs for duplicate comparison. The RPD is calculated as the absolute value of the difference between the initial and repeat result divided by the average value, expressed as a percentage. The following acceptance criteria will be used to assess the RPD results: ➢ For results that were greater than 10 times the Practical Quantitation Limit (PQL) RPDs less than 50% were considered acceptable; ➢ For results that were between 5 and 10 times PQL RPDs less than 75% were considered acceptable; and ➢ For results that were less than 5 times the PQL RPDs less than 100% were considered acceptable. • Review of laboratory QA/QC data (including surrogate recovery, repeat analysis, duplicates, matrix spikes and method blanks) • Acceptable concentrations in blank samples • Check of laboratory quality control methods and results

9 INVESTIGATION PROCEDURE

9.1 Soil Sampling Methods

Subsurface investigation was undertaken using a truck or track mounted hydraulically operated drill rig equipped with spiral flight augers. Soil samples were obtained from a Standard Penetration Test (SPT) sampler or directly from the auger when conditions did not allow use of the SPT sampler.

The SPT sampler was washed with phosphate free detergent and rinsed following each sampling event. The spiral flight augers were decontaminated using a scrubbing brush and potable water and Decon 90 solution (phosphate free detergent) followed by rinsing with potable water. Details of the decontamination procedure adopted during sampling are presented in Appendix C.

Soil samples were obtained at various depths, based on observations made during the field investigation. During sampling, soil at selected depths was split into initial and duplicate samples for QA/QC assessment.

All samples for contamination testing were placed in glass jars with plastic caps and teflon seals with minimal headspace. Samples for asbestos analysis were placed in zip-lock plastic bags. Sampling personnel used disposable nitrile gloves during sampling activities.

During the investigation, soil samples were preserved by immediate storage in an insulated sample container with ice in accordance with AS 4482.1-2005[25] and AS 4482.2-1999[26] as summarised in the following table:

Analyte	Preservation	Storage
Heavy metals	Unpreserved glass jar with Teflon lined lid	Store at <4°, analysis within 28 days (mercury and Cr[VI]) and 180 days (other metals).
VOCs (TPH/BTEX)		Store at <4°, nil headspace, extract within 14 days, analysis within forty days
PAHs, OCP, OPP & PCBs		
Asbestos	Sealed plastic bag	None

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[25] *Guide to the Investigation and Sampling of sites with Potentially Contaminated Soil,* Standards Australia, 2005 (AS 2005)

[26] *Guide to the Sampling and Investigation of Potentially Contaminated Soil Part2: Volatile Substances,* Standards Australia, 1999 (AS 1999)

The samples were labelled with the job number, sampling location, sampling depth and date. All samples were recorded on the borehole logs presented in Appendix A and on the laboratory chain of custody (COC) record presented in Appendix B.

On completion of the fieldwork, the samples were delivered in the insulated sample container to a NATA registered laboratory for analysis under standard COC procedures. Detailed EIS field sampling protocols are included in Appendix C.

9.2 Photoionisation Detector (PID) Screening

A portable PID was used in this investigation to assist with selection of samples for laboratory hydrocarbon (TPH/BTEX) analysis. The sensitivity of the PID is dependent on the organic compound and varies for different mixtures of hydrocarbons. Some compounds give relatively high readings and some can be undetectable even though present in identical concentrations. The portable PID is best used semi-quantitatively to compare samples contaminated by the same hydrocarbon source.

The PID is calibrated before use by measurement of an isobutylene standard gas. All the PID measurements are quoted as parts per million (ppm) isobutylene equivalents.

PID screening of detectable volatile organic compounds (VOCs) was undertaken on soil samples using the soil sample headspace method. VOC data was obtained from partly filled zip-lock plastic bags following equilibration of the headspace gases. The PID headspace data is presented on the COC documents. PID calibration records are presented in Appendix D.

9.3 Groundwater Monitoring Well Installation

Three additional monitoring wells, MW708, MW712 and MW713, were installed in boreholes BH708, BH712 and BH713 respectively as shown on Figure 4. The monitoring well construction details are documented on appropriate borehole logs presented in Appendix A.

Applications to license the monitoring wells were submitted to The Department of Water and Energy (DWE) by EIS. Copies of the licenses will be forwarded to the client when received.

The well construction details for the three additional monitoring wells, together with the details for MW517, are summarised in the following table:

Borehole No.	Final Depth (m)	Un-slotted PVC[1] Casing (m)	Machine Slotted PVC[1] Screen (m)	Sand Filter Pack (m)	Bentonite Seal (m)	Well Finishing Details[2]
BH708	5.7	0-2.7	2.7-5.7	To 1.7	1.7-1.3	Gatic cover
BH712	6.0	0-3.0	3.0-6.0	To 1.5	1.5-1.0	Gatic cover
BH713	6.0	0-3.0	3.0-6.0	To 1.5	1.5-1.0	Gatic cover
BH517	5.5	0-2.5	2.5-5.5	To 1.5	1.5-0.3	Gatic cover

Notes:

[1] 50mm diameter Class 18 PVC has been used for the wells

[2] Concrete grout was used to seal the monitoring well

9.4 Monitoring Well Development

Groundwater was purged from the monitoring wells using a submersible electric pump. The pH, temperature, conductivity (EC), dissolved oxygen (DO) and redox potential (Eh) were monitored during development using calibrated field instruments to assess the development of steady state conditions.

Steady state conditions were considered to have been achieved when the difference in the pH measurements was less than 0.2 units and the difference in conductivity was less than 10%. Typically a minimum of 7L to 60L were purged to remove stagnant water and sediment from the monitoring well prior to sampling to obtain samples representative of the general aquifer conditions.

Due to the relatively slow infiltration of groundwater into MW713 and MW712, groundwater was removed from these wells until they were effectively 'dry'.

The monitoring well development sheets and the equipment calibration records are presented in Appendix D.

The monitoring wells were allowed to recharge prior to sampling. The pump and hose were flushed between sampling point with potable water. Details of the decontamination procedure adopted during sampling are presented in Appendix C.

Groundwater removed from the wells during purging was transported to EIS, where the water is stored in a holding drum prior to collection by licensed waste water contractors. When the drum is filled a sample is analysed to classify the water for disposal.

9.5 Groundwater Sampling

Groundwater samples were obtained from the monitoring wells using micro-purge sampling equipment to reduce the disturbance of the water column and loss of volatiles. The pH, temperature, EC, DO and Eh were monitored during sampling using calibrated field instruments to assess the development of steady state conditions.

The sampling data sheets and the calibration documentation for the instruments are presented in Appendix D.

Once steady state conditions were considered to have been achieved, groundwater samples were obtained directly from the pump tubing and placed in appropriate glass bottles, BTEX vials or plastic bottles.

Duplicate samples were obtained by alternate filling of sample containers. This technique was adopted to minimise disturbance of the samples and loss of volatile contaminants associated with mixing of liquids in secondary containers, etc.

The samples were preserved in accordance with water sampling requirements detailed in NEPM 1999 and placed in an insulated container with ice. During the investigation, groundwater samples were preserved by immediate storage in an insulated sample container with ice in accordance with AS/NZS 5667.1:1998[27] as summarised in the following table:

Analyte	Preservation	Storage Period
Heavy metals	45µm Filter, acidify with nitric acid to pH 1-2.	Store at <4°, analysis within 30 days
VOCs (TPH)	Zero headspace, teflon seal	Store at <4°, analysis within 7 days
VOCs (BTEX + Light TPH)	Zero headspace, Teflon seal, acidify with HCl to pH 1-2.	Store at <4°, analysis within 7 days
sVOCs (PAHs)	nil	Store at <4°, analysis within 7 days
Oil & grease	Some headspace, Teflon seal, acidify with H_2SO_4 or HCl to pH 1-2	Store at <4°, analysis within 30 days

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[27] *Water Quality – Part 1: Sampling, Guidance on the Design of Sampling Programs, Sampling Techniques and the Preservation and Handling of Samples,* Standards Australia, 1998 (AS/NZS 5667.1:1998)

On completion of the fieldwork, the samples were delivered in the insulated sample container to a NATA registered laboratory for analysis under standard chain of custody procedures.

9.6 Laboratory Analysis

Laboratory analysis was undertaken by Envirolab Services Pty Ltd (NATA Accreditation No. 2901) with additional Quality Control Analysis undertaken by SGS Environmental Services Pty Ltd (NATA Accreditation No. 2562).

9.6.1 Soil Samples

For this investigation selected soil and sediment samples were analysed for contaminants using the following laboratory techniques:

- Heavy metals – Nitric acid digestion. Analysis by ICP/AES;
- Low level mercury – cold vapour AAS;
- OC and OP pesticides and PCBs – Extracted with dichloromethane/acetone. Analysis by GC/ECD;
- PAHs – Soil extracted with dichloromethane/acetone. Analysis by GC/MS;
- TPH (volatile) – Soil extracted with methanol. Analysis by P&T GC/MS;
- TPH – Soil extracted with dichloromethane/acetone. Analysis by GC/FID;
- Speciated hydrocarbons - Soil extracted with dichloromethane/acetone. Analysis by GC-FID. Fractionation with pentane through silica gel column for aliphatics and DCM for aromatics;
- BTEX – Soil extracted with methanol. Analysis by P&T GC/MS; and
- Asbestos – Polarizing light microscopy.

Toxicity characteristic leaching procedure (TCLP) leachates were prepared by rotating soil samples in a mild acid solution for 18 hours (NSW EPA WD-3 Method). Leachates were analysed using the analytical procedures outlined above.

9.6.2 Groundwater Samples

For this investigation selected groundwater samples were analysed for contaminants and parameters using the following laboratory techniques:

- Heavy metals – Direct injection. Analysis by ICP-AES;
- Low level mercury – Direct injection. Analysis by flow injection AAS;
- PAHs – Triple solvent (dichloromethane) extraction. Analysis by GC/MS;
- TPH (volatile) – P&T. Analysis by GC/MS;
- TPH – Solvent (dichloromethane) extraction. Analysis GC/FID;
- BTEX – Direct P&T. Analysis by GC/MS;

- Oil & Grease – Gravimetric. Hexane Extractable; and
- pH – measured using pH meter and electrode in accordance with APHA4500;
- EC – measured using conductivity cell and meter in accordance with APHA 2510.

10 RESULTS OF INVESTIGATION

10.1 Subsurface Conditions

Borehole locations are shown on Figure 3. For details of the subsurface soil profile reference should be made to the borehole logs in Appendix A. A summary of the subsurface conditions encountered in the boreholes is presented below:

Pavement

Concrete pavement was encountered at the surface in BH710, BH711 and BH713 to BH716 inclusive. The pavement typically ranged in thickness from approximately 0.19m to 0.22m. Asphaltic concrete (AC) pavement was encountered at the surface in all remaining boreholes and typically ranged in thickness from approximately 0.03m to 0.1m. Secondary concrete slabs were encountered beneath the AC in several boreholes.

BH703 encountered AC pavement approximately 0.065m in thickness, over concrete pavement approximately 0.595m in thickness. A 1.5m deep void (believed to be a subsurface tunnel) was encountered beneath the pavement. BH703 was terminated at the base of the void at a depth of approximately 2.1m.

Fill

Fill material was encountered beneath the pavement in all boreholes except BH703. The fill material typically consisted of brown, red brown and/or grey silty sand, clayey sand and sandy gravel with inclusions of sandstone and igneous gravel, bricks/brick fragments, ash, slag, scrap metal. The fill material extended to depths ranging from approximately 2.2m in BH701 to 5m in BH713. BH710 was terminated in the fill material at a depth of approximately 0.7m due to an obstruction.

Natural Soils

Natural clayey sand, silty sand and/or silty clayey sand was encountered beneath the fill in all boreholes except BH703 and BH710. The natural soils were typically light to dark grey and/or brown. The boreholes were terminated in the natural soils at depths ranging from approximately 3.45m to 6m.

Groundwater

Groundwater seepage was encountered during drilling in most boreholes at depths of approximately 2m. Groundwater monitoring wells were installed in boreholes BH708, BH712 and BH713. Standing Water Level (SWL) measured in the monitoring wells (from existing ground level) during the investigation is presented in the following table:

Monitoring Well	**SWL (m) on 2.8.10***	**SWL (m) on 5.8.10***
MW708	2.19	2.21
MW712	2.38	2.35
MW713	1.38	1.39
MW517	2.49	2.50

*All SWLs are measured to metres below ground level (mbgl)

10.2 Data Logger

A data logger was installed in MW517 for a period of approximately 12 days (5 August 2010 to 16 August 2010). The minimum and maximum SWLs recorded during this period, together with the approximate corresponding groundwater RLs, are presented in the following table:

Monitoring Well	**Minimum SWL (mbgl)**	**Maximum SWL (mbgl)**	**Minimum groundwater RL (mAHD)**	**Maximum groundwater RL (mAHD)**
MW517	2.47	2.57	0.73	0.83

The data logger recorded a maximum variation in the groundwater level of approximately 0.1m over the 12 day period, with regular daily variations in the order of approximately 0.02m. A graph illustrating the SWLs over time is presented in Appendix F.

Based on these results, EIS considered that the groundwater levels in the vicinity of MW517 may be influenced by tidal movements. Although the fluctuations are relatively minor, they show some correlation with daily tidal variations.

Based on interpretation of the EC results encountered in MW517, it is unlikely that the tidal movements result in the significant influx of saline harbour water as far eastward as MW517. It is more likely that tidal changes have an effect on the rate of movement of the less saline groundwater towards Blackwattle Bay (at least in the vicinity of MW517).

10.3 Ground Penetrating Radar (GPR) Survey

Three selected areas of the site were surveyed using GPR in an attempt to establish whether USTs were present. These areas have been referred to as Area A, Area B and

Area C. The surveyed areas are shown on Figure 2 and a sketch of each area is presented in Figure 7.

It should be noted that that the GPR data is interpreted from a radar image that detects anomalies below the ground surface. The GPR may pick up other subsurface features such as underground slabs and fill material that may provide a false positive result for a UST to be present. False negative results may also occur as a result of absorption or scattering of the reflected data.

Area A

A suspected UST was encountered in the vicinity of Building 35. The suspected UST was approximately 5.5m long by 2.4m wide and was approximately 1m below the ground surface. No other fuel infrastructure was encountered in the immediate vicinity, however, a former breather vent may have been located on the side of a building approximately 10m to the north of the suspected UST.

Area B

Two suspected USTs were located in the vicinity of the two dip/fill points. The suspected USTs were approximately 2.5m long by 4.1m wide and were located to the north and south of the dip/fill points. No other obvious fuel infrastructure was encountered in the immediate vicinity.

Area C

A suspected UST was located to the north of BH517. The suspected UST was approximately 9m long by 5m wide. Of the three areas assessed by the GPR, Area C encountered the greatest variability beneath the surface. It was considered that the suspected UST may have been oval shaped.

10.4 Laboratory Results

The laboratory reports are presented in Appendix B. The results have been assessed against the SAC adopted for this investigation.

10.4.1 Soil Samples

The soil laboratory results are presented in Tables B, C and D. Statistical calculations have been undertaken using ProUCL version 3.0 (USEPA) and the reports are presented in Appendix E. The statistical analysis has been calculated using the data from the EIS 2010a investigation together with the data for the additional investigation. The results of the analyses are summarised below.

Heavy Metals

Eight fill soil samples were analysed for heavy metals. The results of the analyses were below the SAC.

Eleven additional fill samples and three additional natural soil samples were analysed for arsenic. A marginally elevated concentration of arsenic, above the SAC of 500mg/kg, was encountered in BH704 (1.6m-1.95m). The elevated arsenic concentration was 580mg/kg.

The upper 95% confidence limit (95% UCL) value was calculated using the arsenic data from the fill soil samples. The 95% UCL for lead was 422mg/kg which was below the SAC of 500mg/kg. The data followed a non-parametric distribution with a mean and standard deviation of 43mg/kg and 222mg/kg respectively.

Waste Classification:

The arsenic concentration in one fill sample, lead concentrations in three fill samples and nickel concentration in one fill sample exceeded the CT1 criteria outlined in the Waste Classification Guidelines 2009. The arsenic concentration in BH704 (1.6m-1.95m) also exceeded the SCC1 criterion. The remaining results were below the CT1 and SCC1 criteria.

TCLP leachates were prepared from the relevant fill samples and analysed for arsenic, lead and/or nickel. The results were less than the TCLP1 criteria outlined in the Waste Classification Guidelines 2009.

Petroleum Hydrocarbons (TPH) and Monocyclic Aromatic Hydrocarbons (BTEX)

PID soil sample headspace readings ranged from 0ppm to 553 ppm equivalent isobutylene. These results indicate that PID detectable volatile organic contaminants may be present in some samples. The highest PID readings were typically encountered in samples obtained from BH707 and BH712.

Twenty three fill and four natural soil samples were analysed for TPH and BTEX compounds. Elevated concentrations of mid to heavy fraction (C_{10}-C_{36}) TPH, above the SAC of 1,000mg/kg, were encountered in fill soil samples obtained from BH705, BH707, BH712 and BH713. The elevated TPH (C_{10}-C_{36}) concentrations ranged from 1,670mg/kg in BH712 (1.3m-1.5m) to 8,090mg/kg in BH707 (2.3m-2.5m).

Elevated concentrations of light fraction (C_6-C_9) TPH, above the SAC of 65mg/kg, were encountered in fill soil samples obtained from BH707, BH712 and BH713. The elevated TPH (C_6-C_9) concentrations ranged from 72mg/kg in BH712 (3.0-3.45) to 1,100mg/kg in BH707 (2.3m-2.5m). The remaining TPH and BTEX results were below the SAC.

The 97.5% UCL value was calculated using the TPH (C_{10}-C_{36}) data from the fill soil samples. The 97.5% UCL for TPH (C_{10}-C_{36}) was 3,415mg/kg which was above the SAC of 1,000mg/kg. The data followed a non-parametric distribution with a mean and standard deviation of 1,222mg/kg and 2,674mg/kg respectively.

The 97.5% UCL value was calculated using the TPH (C_6-C_9) data from the fill soil samples. The 97.5% UCL for TPH (C_6-C_9) was 198mg/kg which was above the SAC of 65mg/kg. The data followed a non-parametric distribution with a mean and standard deviation of 60mg/kg and 168mg/kg respectively.

Waste Classification:
The TPH (C_6-C_9) concentration in BH707 (2.3m-2.5m) exceeded the SCC1 criterion outlined in the Waste Classification Guidelines 2009. The results of the remaining analyses were less than the relevant CT1 and SCC1 criteria outlined in the Waste Classification Guidelines 2009.

Speciated Hydrocarbons

Fill soil samples obtained from BH705 (1.8m-1.95m) and BH712 (1.3m-1.5m) were analysed for speciated hydrocarbons. The concentration of $>C_{16}$-C_{35} aromatics in BH705 (1.8m-1.95m) exceeded the SAC of 450mg/kg. The $>C_{16}$-C_{35} aromatics concentration in the sample was 8,800mg/kg. The remaining results were below the SAC.

Polycyclic Aromatic Hydrocarbons (PAHs)

Ninteen fill and three natural soil samples were analysed for a range of PAHs including benzo(a)pyrene. Elevated concentrations of total PAHs, above the SAC of 100mg/kg, were encountered in two fill soil samples obtained from BH702 (0.3m-0.5m) and BH704 (0.7m-1.0m). The concentrations of total PAHs in these samples were 164.3mg/kg and 119.4mg/kg respectively.

Elevated concentrations of benzo(a)pyrene, above the SAC of 5mg/kg, were also encountered in the BH702 (0.3m-0.5m) and BH704 (0.7m-1.0m) samples. The elevated benzo(a)pyrene concentrations were 13mg/kg and 20mg/kg respectively. The results of the remaining analyses were below the SAC.

The 95% UCL values were calculated using the total PAH and benzo(a)pyrene data from the fill soil samples. The 95% UCL for total PAHs was 48mg/kg which was below the SAC of 100mg/kg. The data followed a non-parametric distribution with a mean and standard deviation of 16mg/kg and 37mg/kg respectively.

The 95% UCL for benzo(a)pyrene was 7.3mg/kg which was above the SAC of 5mg/kg. The benzo(a)pyrene data followed a non-parametric distribution with a mean and standard deviation of 1.7mg/kg and 4.2mg/kg respectively.

Waste Classification:

The benzo(a)pyrene concentrations in five fill samples exceeded the CT1 criterion outlined in the Waste Classification Guidelines 2009. The benzo(a)pyrene concentrations in BH702 (0.3m-0.5m) and BH704 (0.7m-1.0m) exceeded the SCC1 criterion.

TCLP leachates were prepared from the relevant fill samples and analysed for PAHs. The results were less than the TCLP1 criterion for benzo(a)pyrene.

Organochlorine (OCPs) and Organophosphorus (OPPs) Pesticides

Eight fill soil samples were analysed for a range of OCPs and OPPs. The results of the analyses were below the laboratory PQL and less than the SAC.

Waste Classification:

The results of all analyses were less than the SCC1 criterion outlined in the Waste Classification Guidelines 2009.

Polychlorinated Biphenyls (PCBs)

Eight fill soil samples were analysed for a range of PCBs. The results of the analyses were below the laboratory PQL and less than the SAC.

Waste Classification:

The results of all analyses were less than the SCC1 criterion outlined in the Waste Classification Guidelines 2009.

Asbestos

Eight fill soil samples were screened for the presence of asbestos fibres. The results of the analyses indicated that asbestos fibres were not encountered within the samples and no respirable fibres were detected.

10.4.2 Groundwater Samples

The groundwater laboratory results are presented in Table E. The results of the analysis are summarised below:

Petroleum Hydrocarbons (TPH) and Monocyclic Aromatic Hydrocarbons (BTEX)

The four groundwater samples (MW517, MW708, MW712 and MW713) were analysed for TPH and BTEX compounds. Elevated concentrations of TPH (C_{10}-C_{36}), above the SAC of 0.6mg/L, were encountered in MW517, MW712 and MW713. The elevated TPH (C_{10}-C_{36}) concentrations in these three samples were 0.61mg/L, 0.77mg/L and1.35mg/L respectively. The results of the BTEX analyses were below the SAC.

Detectable concentrations of TPH (C_6-C_9) were encountered in all four groundwater samples. The TPH (C_6-C_9) concentrations ranged from 0.012mg/L in MW713 to 0.078mg/L in MW712. There is no SAC for TPH (C_6-C_9).

TPH (silica gel cleanup)

The two groundwater samples obtained from MW712 and MW713 were subsequently analysed for TPH with silica gel cleanup. The TPH (with silica gel cleanup) concentrations in MW712 and MW713 were 0.32mg/L and 0.4mg/L respectively. These results were below the SAC of 0.6mg/kg.

Polycyclic Aromatic Hydrocarbons (PAHs)

The four groundwater samples were analysed for a range of PAHs including benzo(a)pyrene. Elevated concentrations of phenanthrene, above the SAC of 0.0006mg/L, were encountered in MW517, MW708 and MW713. The phenanthrene concentrations were 0.0024mg/L, 0.0006mg/L and 0.0012mg/L respectively. An elevated concentration of anthracene, equal to the SAC of 0.0004mg/L, was encountered in MW517.

Elevated concentrations of fluoranthene and benzo(a)pyrene, equal to or above the respective SAC of 0.001mg/L and 0.0001mg/L, were also encountered in MW713. The fluoranthene and benzo(a)pyrene concentrations were 0.001mg/L and 0.0002mg/L respectively. The results of the remaining PAH analyses were below the adopted SAC.

Oil and Grease

The four groundwater samples were analysed for oil and grease. An elevated oil and grease concentration, above the SAC of 10mg/L, was encountered in MW708/GW Dup AA. The oil and grease concentration was 11mg/L.

Other Parameters

Three groundwater samples were analysed for pH and EC. The results were as follows:

- pH ranged from 6.1 in MW713 to 6.8 in MW712. These results were outside the acceptable pH limits for south-east Australian estuaries; and
- EC ranged from 1.2mS/cm in MW708 to 2mS/cm in MW713. These results were considered to be in the range for brackish waters.

Field Measurements

Field measurements recorded during sampling were as follows:

- pH ranged from 5.91 to 6.97;
- EC ranged from 1.2mS/cm to 1.9mS/cm;
- Eh ranged from -61.9mV to 236.9mV; and
- DO ranged from 0.2ppm to 0.4ppm.

11 ASSESSMENT OF ANALYTICAL QA/QC

The DQOs and DQIs established for the investigation have been assessed in this section of the report. The assessment includes a review of the laboratory QA/QC procedure to assess whether the sample data is reliable.

The laboratory reports for this investigation have been checked and issued as final by:

- Envirolab Services Pty Ltd
  NATA Accreditation No. 2901
  Report numbers: 44203, 44203A, 44295, 44295A, 44406 (R01) and 44406A (R01); and
- SGS Laboratories Pty Ltd
  NATA Accreditation No. 2562
  Report numbers: SE80351 and SE80464.

A summary of the field QA/QC samples are specified in the following table:

Field QA/QC	Sample Details
Inter-laboratory duplicates	*Soil Samples:* Dup CC is a soil duplicate of sample BH704 (1.6m-1.95m) Dup II is a soil duplicate of sample BH715 (0.6m-0.95m) Dup JJ is a soil duplicate of sample BH716 (0.5m-0.8m) *Groundwater Samples:* GW Dup AA is a groundwater duplicate of sample MW708
Intra-laboratory duplicates	*Soil Samples:* Dup AA is a soil duplicate of sample BH701 (0.5m-0.8m) Dup BB is a soil duplicate of sample BH702 (1.5m-1.95m) Dup EE is a soil duplicate of sample BH706 (2.8m-3.0m) Dup HH is a soil duplicate of sample BH713 (0.4m-0.6m) Dup KK is a soil duplicate of sample BH705 (1.3m-1.5m) *Groundwater Samples:* GW Dup BB is a groundwater duplicate of sample MW517
Trip blanks	FB 1A is a sand blank taken on 29/7/10 FB 2A is a sand blank taken on 30/7/10 GW TB AA is a water blank taken on 5/8/10
Trip spikes	T Spike 1A (soil sampling) taken on 29/7/10 T Spike 2A (soil sampling) taken on 30/7/10

	GW TS AA (groundwater sampling) 5/8/10
Rinsate	Rinsate 1A is a field rinsate from the SPT decontamination process (29/7/10) Rinsate 2B is a field rinsate from the SPT decontamination process (30/7/10)

The laboratory analysis results for the inter-laboratory and intra-laboratory duplicate samples listed above are presented in Tables F and G. The analysis results for the trip blank, rinsate and trip spike samples are presented in Table H.

The following field staff completed the activities associated with this project:

- Brendan Page – Environmental Scientist – soil sampling and field testing activities; and
- Mitch Delaney – Environmental Scientist – groundwater sampling and field testing activities.

An assessment of the DQIs adopted for this investigation is summarised in the following table. A brief explanation of the individual DQI is presented in Appendix C.

DQI	Comments
Precision	Intra-laboratory RPD Results: The intra-laboratory RPD values for the soil samples indicated that field precision was acceptable. The RPD value for one PAH compound in Dup AA/BH701 was outside the acceptance criteria (refer to Table F). The RPD result was 100% and can be attributed to concentrations that are close to the laboratory PQL. The intra-laboratory RPD values of the groundwater sample indicated that the field precision was acceptable (refer to Table G). Inter-laboratory RPD Results: The inter-laboratory RPD values for the soil samples indicated that field precision was acceptable. The RPD value for one PAH compound in Dup II/BH715 was outside the acceptance criteria (refer to Table F). The RPD result was 56% and can be attributed to sample heterogeneity and the difficulties associated with obtaining homogenous duplicate samples of heterogenous matrices. The higher duplicate value has been adopted as a conservative measure for the statistical analysis. The inter-laboratory RPD values for the groundwater samples indicated that field precision was acceptable. The RPD values for a range of

	individual PAHs, and oil and grease were outside the acceptance criteria (refer to Table G). The results ranged from 100% to 156%. The RPD values outside the acceptable limits have been attributed to results that are close to the PQL. Where applicable, the higher duplicate value has been adopted as a conservative measure. <u>Laboratory Duplicate RPD Results:</u> Laboratory duplicate RPD results for the soil and groundwater analysis were generally within the acceptance criteria adopted by the laboratories. <u>Trip Spike Results:</u> The BTEX results for the trip spikes ranged from 72% to 100%, (refer to Table H) and indicated that field preservation methods were appropriate. <u>Field Rinsate Results:</u> The field rinsate samples (refer to Table H) did not identify any cross-contamination artefacts associated with sampling equipment. <u>Trip Blank Results:</u> The soil and water trip blank results did not encounter analyte concentrations above the laboratory PQLs.
Accuracy	<u>Matrix Spike Recovery:</u> Matrix spike recovery concentrations were within the acceptable limits of 60-140% for organics and 70-130% for inorganics. <u>Surrogate Spike Recovery:</u> Surrogate spike recovery concentrations were within the acceptable limits of 60-140% for organics and 70-130% for inorganics. It is noted that surrogate concentrations were not reported for TPH in some soil and groundwater samples, with the lack of results explained as matrix interference. <u>LCS Results:</u> LCS recovery concentrations were within the acceptable limits of 60-140% for organics and 70-130% for inorganics.
Representativeness	• Sample collection, handling, storage and preservation were considered appropriate; • No laboratory artefacts were detected; and • Samples extracted and analysed within holding time. <u>Laboratory Blank Results:</u> All laboratory blanks were found to be free of analyte concentrations above the PQLs.

Comparability	• Same sampling procedures and handling techniques were used; • Samples were obtained by qualified staff; • Samples were collected in appropriate containers; • No significant influence on sampling from climatic or sampling conditions were reported; and • Standard laboratory analytical methods were used.
Completeness	• Documentation (including site notes, borehole logs and COC etc) was correctly maintained; • Samples obtained were analysed for the contaminants of concern; and • Appropriate analytical methods used by the laboratory.

12 ADDITIONAL INVESTIGATION DISCUSSION

The additional environmental site assessment undertaken for the proposed redevelopment of the SFM waterfront was designed to address the objectives detailed in Section 2.1 of this report.

12.1 Summary of Soil Conditions

Soil samples obtained for the additional investigation were analysed for the potential contaminants of concern identified at the site. Elevated concentrations of contaminants were encountered in the fill soil samples above the SAC. The soil contamination data is shown on Figure 3. A summary of the elevated results from the additional investigation are presented in the following table:

Contaminant (mg/kg)	SAC	No. of Fill Samples Analysed	No. of Results above SAC	95% or 97.5% UCL*
TPH C_{10}-C_{36}	1,000	23	6	3415
TPH C_6-C_9	65	23	4	198
>C_{16}-C_{35} Aromatics	450	2	1	Not calculated
Arsenic	500	19	1	422
Total PAHs	100	19	2	48
B(a)P	5	19	2	7.3

*UCL calculations incorporated the fill data from the EIS 2010a investigation

The source of the arsenic contamination in the north section of the site has not been established. However, the additional investigation has indicated that the arsenic contamination is likely to be limited to the fill soils to a depth of approximately 2m-3m, in the vicinity of BH504 and BH704. Remediation of the arsenic hotspot will likely include excavation and off-site disposal of the impacted fill material. Further details regarding the remediation will be provided in the following sections of this report.

The source of the TPH contamination at the site is likely to be a result of three primary factors:

- The suspected USTs;
- Unidentified USTs; and/or
- Historical activities associated with use of the site for petroleum storage, distribution and/or refinery processes.

The highest TPH concentrations (encountered during the additional investigation) were encountered in BH707 which was located immediately adjacent to the suspected UST in south section of the SFM part 3A and 4 area (see Figures 2 and 3). The TPH contamination in the fill soils is considered to be relatively mobile and would be expected to migrate down to the rock surface and/or down to the groundwater table.

The source of the PAHs (including the benzo(a)pyrene) in the fill samples obtained around previous EIS BH504 are considered to be associated with the ash and slag material encountered in the fill matrix. The PAHs that are commonly associated with ash and slag are usually the higher molecular weight compounds.

Remediation/management of the PAH contamination will be required. Further details will be provided in the RAP.

12.1.1 Asbestos

Asbestos was not detected above the reporting limit in the soil samples analysed for the additional investigation.

12.2 Summary of Groundwater Conditions

Groundwater monitoring wells were installed in boreholes BH708, BH712 and BH713. MW517 was installed during the previous EIS 2010a investigation. Standing Water Level (SWL) measured in the monitoring wells (from existing ground level) during the investigation is presented in the following table:

Monitoring Well	SWL (m) on 2.8.10*	SWL (m) on 5.8.10*
MW708	2.19	2.21
MW712	2.38	2.35
MW713	1.38	1.39
MW517	2.49	2.50

*All SWLs are measured to metres below ground level (mbgl)

A data logger was installed in MW517 for a period of approximately 12 days (5 August 2010 to 16 August 2010). The data logger recorded a maximum variation in the groundwater level of approximately 0.1m over the 12 day period, with regular daily variations in the order of approximately 0.02m. A graph illustrating the SWLs over time is presented in Appendix F.

Based on these results, EIS considered that the groundwater levels in the vicinity of MW517 may be influenced by tidal movements. Although the fluctuations are relatively minor, they show some correlation with daily tidal variations.

Four groundwater samples were analysed for the potential contaminants of concern identified at the site.

Summary of Elevated Groundwater Results (mg/L)

Contaminant	Oil and grease	TPH C_{10}-C_{36}	Anthracene	Phenanthrene	fluoranthene	Benzo(a)pyrene
SAC	10	0.6	0.0004	0.0006	0.001	0.0001
MW708	11	-	-	0.0006	-	-
MW712	-	0.77	-	-	-	-
MW713	-	1.35	-	0.0012	0.001	0.0002
MW517	-	0.61	0.0004	0.0024	-	-

(-) indicates that the contaminant was below the SAC

The highest concentrations of PAHs and TPHs in the groundwater were in the south-west section of the SFM part 3A and 4 area. The TPH and PAH contamination in the groundwater is likely to be associated with former historical use of the site, the suspected USTs and/or unidentified USTs.

The TPH (silica gel cleanup) analysis demonstrated that there was a significant reduction in the TPH concentrations in two groundwater samples following the silica gel cleanup. This suggests that the elevated TPH (C_{10}-C_{36}) concentrations encountered during this investigation (and possibly during the EIS 2010a and 2010b investigations) may be partly due to other compounds such as phthalates, humic acids, fatty acids and sterols. The most likely source of compounds creating this discrepancy are oils and fats from fish processing and cooking on-site.

Due to the elevated concentrations of TPHs and PAHs in the groundwater, some remediation and/or management of the groundwater will be required. The options for groundwater remediation are discussed in the following sections of this report.

12.3 Waste Classification

12.3.1 Classification of Fill Soils

The investigation has shown that the fill material encountered at the site contains inclusions of ash and slag. The *General Approvals of Immobilisation* published in the NSW Government Gazette on 16 July 1999[28] includes an immobilisation approval for

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[28] *General Approvals of Immobilisation, Approval Numbers 05 and 07*, NSW Government Gazette, 1999 (GAI 1999)

metallurgical furnace slag contaminated materials (approval number 1999/07) and ash contaminated materials (approval number 1999/05). GAI 1999 states that metallurgical furnace slag and ash contaminated materials *"...can be classified according to their leachable concentration (TCLP) values alone."*, however, disposal restrictions indicate that the ash contaminated material can only be disposed of to a landfill with a leachate monitoring system. Treatment of this waste stream is not considered to be an economical option.

Based on the results of the additional assessment, the results presented in the EIS 2010a document and with reference to the EIS ASSMP (ref: E23982KrptASSMP, dated August 2010), the following waste classifications listed below apply to the material within the SFM part 3A and 4 area. Reference should also be made to the RAP for further details regarding the waste classifications for the soils in the waterfront works part 3A area and the extent of each waste stream:

- Fill soil in the vicinity of BH701 and BH704, to a depth of approximately 1.5m, is classified as 'restricted solid waste (non-putrescible)' according to the Waste Classification Guidelines 2009. Fill material below this depth (at this location) is likely to be classified as 'restricted solid waste (non-putrescible) containing treated acid sulfate soil'. However, additional testing of this material will be required following treatment (in accordance with the EIS ASSMP) to meet the requirements of the NSW DECC (now DECCW) Waste Classification Guidelines, Part 4: Acid Sulfate Soils[29];
- Fill soil in the vicinity of BH517 and BH707, to a depth of approximately 1.5m, is classified as 'restricted solid waste (non-putrescible)' according to the Waste Classification Guidelines 2009. Fill material below this depth (at this location) is likely to be classified as 'restricted solid waste (non-putrescible) containing treated acid sulfate soil'. However, additional testing of this material will be required following treatment (in accordance with the EIS ASSMP) to meet the requirements of the ASS Waste Classification Guidelines 2008; and
- Fill material across the remainder of the SFM part 3A and 4 area, to a depth of 1.5m, is classified as 'general solid waste (non-putrescible)' according to the Waste Classification Guidelines 2009 and GAI 1999. Fill material below this depth is likely to be classified as 'general solid waste (non-putrescible) containing treated acid sulfate soil'. However, additional testing of this material will be required following treatment (in accordance with the EIS ASSMP) to meet the requirements of the ASS Waste Classification Guidelines 2008.

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[29] *Waste Classification Guidelines, Part 4: Acid Sulfate Soils,* NSW DECC, 2008 (ASS Waste Classification Guidelines 2008)

As the site remediation works may include excavation of several contamination hotspots, the UCL values for the site have not been adopted for the purpose of the waste classification assessment (as they were calculated for the fill material from the entire site). Additional analysis of the material excavated during the proposed remediation works may be undertaken in an attempt to reduce the waste classification.

13 REMEDIATION ACTION PLAN

This RAP has been prepared for the waterfront works part 3A area and the SFM part 3A and 4 area ("the site") as shown on Figure 2. This RAP should be subject to review in the event circumstances are found to differ from those expected.

13.1 Aim and Objectives

The aim of the RAP is to prepare a methodology that can be implemented to remediate the site to a level acceptable for the proposed land use in accordance with NEPM 1999*,* Site Auditor Guidelines 2006 and the CLM Act 1997.

The objective of the RAP is to have a methodology that can be implemented to remove existing site facilities, potentially impacted fill material and natural soil, and other unexpected contaminants that may be encountered during site works. In general this will involve the following actions:

- Identify and assess the extent of any area(s) of contaminated material that exceed the SAC;
- Remove significant potential sources of surface and subsurface contamination;
- Remediate/manage contaminated fill, natural soils and rock which pose an environmental or health risk in relation to the intended site use;
- Validate excavated areas; and
- Prepare an environmental validation report and environmental management plan (EMP).

13.2 Summary of Contamination Conditions

13.2.1 EIS 2010a, EIS 2010b and EIS additional investigations

The previous investigations undertaken at the site have indicated the following:

- The TPH (C_{10}-C_{36}) and TPH (C_9-C_9) contamination was relatively widespread within the fill soils in the central and central east sections of the site. The highest elevated concentrations were typically encountered in the vicinity of the suspected USTs and in the vicinity of the suspected former fuel processing facility/refinery;
- Arsenic and PAHs were encountered in the north section of the site in the vicinity of BH504 and BH704. The arsenic hotspot may have been contributing to the elevated arsenic concentrations in the groundwater;
- PAHs were encountered in the fill soils at several locations in the east section of the site;

- With the exception of the elevated concentrations of some PAH compounds encountered in BH606, the majority of the PAH contamination encountered in the fill soils was considered to be associated with ash and slag deposits. The PAHs associated with the ash and slag were generally considered to be relatively immobile;
- Concentrations of some heavy metals (including arsenic), were encountered in the groundwater samples; and
- Elevated concentrations of TPH (C_{10}-C_{36}), TPH (C_6-C_9), oil and grease, and PAHs were also encountered in the groundwater at the site.

Reference should be made to Sections 4.1, 4.2 and 10.4 of this report for further details.

13.2.2 Summary of Contamination to be remediated

The potential point sources of contamination are the primary areas of concern at the site. These include:

- The suspected USTs in areas A, B and C (as shown on Figures 2 and 7); and
- The arsenic contamination hotspot in the vicinity of BH504 and BH704.

The approximate locations of the remediation areas are shown on Figures 8a, 8b and 8c.

Potential issues may also include additional fuel facilities encountered during excavation works at the site.

13.2.3 Site Specific Contaminants of Concern

The compounds identified in soil samples (in the remediation areas) at concentrations above the SAC at the subject site include:

- Arsenic;
- Total petroleum hydrocarbons (TPH);
- Total PAHs; and
- Benzo(a)pyrene.

The compounds identified in groundwater samples at concentrations above the SAC at the subject site include:

- Arsenic;
- Total petroleum hydrocarbons (TPHs);
- PAHs including phenanthrene, anthracene, fluoranthene and benzo(a)pyrene; and

- Oil and grease.

Lead, copper and zinc were also identified in the groundwater during the previous EIS investigations. However, these elevations were considered to be a result of regional factors and therefore these heavy metals have been excluded as contaminants of concern for the purpose of the RAP.

13.3 Soil Remediation Options

In order to render the site suitable for the proposed commercial land use, remediation of the site is necessary. The NSW DECCW (EPA) follows the ANZECC/NHMRC published hierarchy for the remediation of contaminated sites. The preferred order for soil remediation and management is as follows:

1. On-site treatment of soil so that the contaminant is either destroyed or the associated hazard is reduced to an acceptable level;
2. Off-site treatment of excavated material so that the contaminant is either destroyed or the associated hazard is reduced to an acceptable level, after which the soil is returned to the site;
3. Removal of contaminated material to an approved site or facility, followed where necessary by replacement with clean material; and
4. Consolidation and isolation of the soil on-site by containment within a properly designed barrier.

The soil remediation options available for consideration are outlined in the following table:

REMEDIATION OPTION	COMMENTS	SUITABILITY
Option 1 Do Nothing	This would include a risk assessment of the contamination at the site and would typically be relevant to sites where the contamination is at depth or capped beneath pavement and a low risk of migration.	Not considered suitable for the site
Option 2 On-site treatment of contaminated soil	On-site treatment provides a mechanism to reuse the processed material and in some instances, to avoid the need for large scale earthworks. Some of the treatment options include: Bio-remediation: Addition of oxygen and nutrient compounds to accelerate the natural process of organic compound decay within the environment. Soils require excavation and stockpiling prior to treatment. Not suitable for all contaminants. Can be a relatively slow process (months or years). Soil Washing: Soil is stripped of contaminants via a leaching process and the concentrated contaminated liquid product retained for disposal or additional treatment. Air Sparging and Extraction: Air is forced through the contaminated soil to volatilise organic contaminants. The air is then extracted and captured for treatment leaving reduced contaminant concentrations within the sub-strata. Thermal Desorption: Contaminated soils are heated within an incinerator to volatilise or combust the contaminants. Contaminants are either broken down to water and carbon dioxide or alternatively trapped within an air filtration system. Licenses are necessary for specific individual waste streams due to the potential for air pollution and the formation of harmful by-products during the incineration process. The options discussed above are expensive on a per tonne of treated soil basis, slow to complete, subject to site specific environmental variables and require on-going monitoring of conditions.	Not considered suitable for subject site
Option 3 Off-site treatment of contaminated soil	Contaminated soils are excavated, transported to an approved/ licensed treatment facility, treated to remove/stabilise the contaminants then returned to the subject site, transported to an alternative site or disposed to an approved landfill facility. This option provides for a relatively short program of on-site works, however there may be some delays if the material is to be returned to the site following treatment.	Not considered suitable for subject site

REMEDIATION OPTION	COMMENTS	SUITABILITY
	The cost per tonne for transport to and from the site and for treatment is considered to be relatively high. The material would also have to be assessed in terms of suitability for reuse as part of the proposed redevelopment works.	
<u>Option 4</u> Removal of contaminated material to an appropriate facility and reinstatement with clean material	Contaminated soils would be classified in accordance with NSW DECCW (EPA) guidelines for waste disposal, excavated and disposed of off-site to a NSW DECCW (EPA) licensed landfill. The material would have to meet the requirements for landfill disposal and gate fees (which may be significant) would apply in addition to transport costs.	Considered suitable for contaminated fill material in the remediation areas
<u>Option 5</u> Consolidation and isolation of impacted soil by cap and containment	This would include the placement of an impermeable barrier such as concrete, or a warning barrier and non-contaminated soil material, over the existing ground surface to isolate the contaminated material and thereby reduce the health risk to future site users. This action may also reduce the transport of contamination via surface water movement, dust generation and potentially groundwater infiltration, however, environmental issues would need to be evaluated. Such an option should only be considered where other preferred approaches from the NSW DECCW hierarchy are not applicable. The capping and/or containment must be appropriate for the specific contaminants of concern. An ongoing environmental management plan would be required and site identification documentation, possibly including the S.149 council planning certificate and/or the land title, would be modified to note the presence of the contamination. This may impact upon development approval conditions and limit the future potential land value.	Considered suitable for the site following remediation of the potential contamination point sources

13.4 <u>Groundwater Remediation Options</u>

The preferred order for the remediation and management of contaminated groundwater presented in the Groundwater Contamination Guidelines 2007 is outlined below:

1. Clean up so that the natural background water quality is restored;
2. Clean up to protect the environmental, human and ecological health; and
3. Clean up to the extent practicable.

The groundwater remediation options available for consideration are outlined in the following table:

REMEDIATION OPTION	COMMENTS	SUITABILITY
Option 1 In-situ treatment of contaminated groundwater	Some of the in-situ treatment options include: Bio-remediation: Addition of oxygen and nutrient compounds to accelerate the natural process of organic compound decay within the environment. Chemical oxidation: Addition of chemical compounds to oxidise the contaminants in groundwater into compounds that are less harmful for the environment, Air Sparging and Extraction: Air is forced through the contaminated groundwater system to volatilise organic contaminants. The air is then extracted and captured for treatment leaving reduced contaminant concentrations within the sub-strata.	Considered suitable for subject site
Option 2 Ex-situ treatment of contaminated groundwater	Some of the ex-situ treatment options include: Washing: Groundwater is stripped of contaminants via a leaching process with the concentrated contaminated liquid product retained for disposal or additional treatment. Bioreactors: Groundwater is pumped into an above ground tank and treated with inorganic nutrients. Oxygen is introduced in to the tank by sparging. Hydrocarbons are broken down by naturally occurring bacteria. Contaminated groundwater is transported to an approved/ licensed treatment facility, treated to remove/stabilise the contaminants then returned to the subject site or transported to an alternative facility for disposal.	Considered suitable for subject site
Option 3 On-going management & monitoring	Measures to manage groundwater contamination may include: • Notifying appropriate government agencies, owners of subsurface facilities and any other appropriate parties of the presence of groundwater contamination; • Plume containment; • Active or passive cleanup of contaminated groundwater; • Ongoing monitoring of natural attenuation; • Implementing groundwater management or contingency plans to reduce risks; and • Restricting groundwater use in and down gradient of the contaminated plume.	Considered suitable for subject site

14 RATIONALE FOR THE SELECTION OF THE PROPOSED REMEDIATION STRATEGY

14.1 Suspected USTs (Areas A, B and C)

The most viable option for the remediation of Areas A, B and C is considered to be removal of the tanks and associated infrastructure, followed by excavation and off-site disposal of the impacted fill/soil in the immediate vicinity of the suspected UST(s). This will result in:

- Removal of the USTs that may be acting as a point source for the soil and groundwater contamination; and/or
- Removal of the fill soils that contained the highest elevations of contaminants.

The cap and contain approach would then be adopted to further reduce the potential adverse impacts associated with the site contamination (refer to Section 14.3 below).

The other remediation options were considered less appropriate for the following reasons:

- The do nothing approach is unacceptable as the suspected USTs and soil contamination may be impacting on the groundwater;
- Landfarming and bio-remediation of the fill/soil would require a significant amount of time and may not be as effective for the mid to heavy fraction TPH. Site limitations, including the lack of space, would also restrict the viability of this option; and
- Treatments such as thermal desorption are not considered to be economically viable for relatively small quantities of contaminated soils.

14.2 Arsenic Contamination Hotspot (Area D)

The most viable option for remediation of the arsenic contamination is considered to be excavation and off-site disposal of the contaminated material. Removal of the arsenic impacted soil is considered appropriate for the following reasons:

- The potential source of the arsenic contamination has not been established; and
- The arsenic may be impacting on the groundwater conditions at the site.

The cap and contain approach would then be adopted to further reduce the potential adverse impacts associated with the site contamination (refer to Section 14.3 below).

Elevated PAHs were also encountered in Area D. However, as the PAHs at this location were not considered to be particularly mobile (i.e. they were associated with ash and slag), removal of the PAH contaminated soil was not considered necessary. Implementation of the cap and contain approach would be used to remediate/manage the PAH contamination that remained in the area after removal of the arsenic hotspot (refer to Section 14.3 below).

14.3 Whole of Site

Following implementation of the remedial strategies detailed above, remediation/ management of the entire site will be required in order to address the remaining TPH and PAH contamination. The most viable option for the site remediation is considered to be the cap and contain approach, and the implementation of an environmental management plan (EMP). This combined remediation strategy is considered most appropriate due to the following reasons:

- Elevated concentrations of contaminants will be present at the site following the remediation of Areas A to D (inclusive);
- Remediation of the whole site to remove all of the contaminated soil is considered impractical and unfeasible; and
- The current/proposed land use is not considered to be particularly sensitive.

An assessment of the health risks associated with the site contamination and the proposed cap and contain approach will be required prior to proceeding on this basis. This would require a quantitative health risk assessment to be undertaken by a suitably qualified consultant.

14.4 Groundwater

EIS are of the opinion that physical remediation of the groundwater is not necessary at this point in time. The most viable option is considered to be on-going management and monitoring of the groundwater. EIS consider this to be the most appropriate remediation strategy at this stage due to the following reasons:

- Implementation of the RAP should remove the worst of the on-site contamination sources that may be impacting on the groundwater quality. This may result in the natural attenuation of some of the groundwater contaminants;
- Groundwater beneath the Pyrmont area and the water/sediments of Blackwattle Bay are considered to be highly disturbed systems as a result of past historical use of the area for industrial activities;
- The preliminary assessment of the harbour water in Blackwattle Bay, immediately adjacent to the site, did not indicate that significant quantities of TPH or BTEX compounds were migrating into Blackwattle Bay; and
- Groundwater in the vicinity of the site is not currently utilised as a significant resource.

15 REMEDIATION DETAILS

Prior to commencement of the proposed remediation works, a suitable occupational health and safety plan should be prepared for the contaminants that are present at the site.

15.1 Waste Classification for Excavated Soils

A summary of the waste classification details for the site soils is presented in the following table:

Area	Waste Classification	Additional Testing Required
Areas B, C and D to a depth of 1.5m	Fill soils: Restricted solid waste (non-putrescible)	Optional (may be undertaken in an attempt to reduce waste classification)
Areas B, C and D beyond a depth of 1.5m	Fill soils: Restricted solid waste (non-putrescible) containing treated acid sulfate soils	Yes (following treatment in accordance with the EIS ASSMP)
Remainder of the site to a depth of 1.5m (including Area A)	Fill soils: General solid waste (non-putrescible)	No (provided that nothing unexpected is encountered between the EIS sampling locations)
Remainder of the site beyond a depth of 1.5m (including Area A)	Fill soils: General solid waste (non-putrescible) containing treated acid sulfate soils	Yes (following treatment in accordance with the EIS ASSMP)

15.2 Suspected USTs (Areas A, B and C)

Following demolition of the pavements in Areas A, B and C (as shown on Figures 8b and 8c), the USTs and associated infrastructure should be removed by an experienced contractor, in accordance with AS4976-2008[30]. Liquid and/or sludge within the UST and associated pipe work should be pumped out and disposed of by a licensed liquid waste operator.

In the event that the fuel facilities to be excavated are located adjacent to any buildings, a foundation stability assessment should be undertaken by an appropriately qualified geotechnical engineer;

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[30] AS4976-2008 *The removal and disposal of Underground Storage Tanks*

Following removal of the UST(s) remediation will be undertaken in the following manner:

Area A

- All excavation works should be undertaken in accordance with the EIS ASSMP (ref: E23982KrptASSMP, dated August 2010);
- The backfill soils (most likely to be sand) surrounding the UST should be excavated and stockpiled separately. This material should be analysed for TPH, BTEX, PAHs and lead and assigned a waste classification prior to disposal;
- The remaining fill/soil material excavated from the remediation area, to a depth of 1.5m, can be loaded directly onto trucks and disposed in accordance with the waste classification provided in Section 15.1 of this report;
- The remaining fill/soil material in the remediation area should be excavated to the base of the tank pit and treated in accordance with the EIS ASSMP;
- Following treatment, the material should be sampled and analysed for heavy metals, TPH/BTEX, PAHs and TCLP heavy metals and PAHs in order to assign a waste classification. Once the waste classification has been assigned to the material, the material can be disposed of to a suitable landfill;
- Validation samples of the walls and base of the excavation should be obtained in order to obtain additional data for the material to be left in-situ; and
- Any water encountered within the pit should be sampled at the time of the soil validation sampling. The water should then be pumped out of the excavation by a liquid waste contractor and disposed of in accordance with Council/DECCW (EPA) requirements; and
- Backfill the excavation with clean VENM which should be compacted to the requirements of the proposed development.

Area B

- All excavation works should be undertaken in accordance with the EIS ASSMP (ref: E23982KrptASSMP, dated August 2010);
- The backfill soils (most likely to be sand) surrounding the USTs should be excavated and stockpiled separately. This material should be analysed for TPH, BTEX, PAHs and lead and assigned a waste classification prior to disposal;
- The remaining fill/soil material excavated from the remediation area, to a depth of 1.5m, can be loaded directly onto trucks and disposed in accordance with the waste classification provided in Section 15.1 of this report;
- Geotechnical advice should be sought regarding the stability of the adjacent areas prior to continuing the excavation;
- The remaining fill/soil material in the remediation area should be excavated to the top of the sandstone bedrock (anticipated to be at a depth of approximately 2.5m

below the existing ground levels in the vicinity of BH606) and treated in accordance with the EIS ASSMP;

- Following treatment, the material should be sampled and analysed for heavy metals, TPH/BTEX, PAHs and TCLP heavy metals and PAHs in order to assign a waste classification. Once the waste classification has been assigned to the material, the material can be disposed of to a suitable landfill;
- Validation samples of the walls and base of the excavation should be obtained in order to obtain additional data for the material to be left in-situ;
- Any water encountered within the pit should be sampled at the time of the soil validation sampling; and
- Backfill the excavation with clean VENM which should be compacted to the requirements of the proposed development.

Area C

Based on a review of the contamination data obtained from the boreholes in the vicinity of Area C, EIS consider that it may be impractical to excavate to the depth of the identified contamination (around 2.5m-3.5m). The remediation of Area C will require close liaison with the consultant who will be undertaking the risk assessment. Therefore, the following should be undertaken:

- All excavation works should be undertaken in accordance with the EIS ASSMP (ref: E23982KrptASSMP, dated August 2010);
- The backfill soils (most likely to be sand) surrounding the UST should be excavated and stockpiled separately. This material should be analysed for TPH, BTEX and lead and assigned a waste classification prior to disposal;
- The remaining fill/soil material excavated from the remediation area, to a depth of 1.5m, can be loaded directly onto trucks and disposed in accordance with the waste classification provided in Section 15.1 of this report;
- Geotechnical advice should be sought regarding the stability of the adjacent areas prior to continuing the excavation;
- The remaining fill/soil material in the remediation area should be excavated to the extent practical and treated in accordance with the EIS ASSMP;
- Following treatment, the material should be sampled and analysed for heavy metals, TPH/BTEX, PAHs and TCLP heavy metals and PAHs in order to assign a waste classification. Once the waste classification has been assigned to the material, the material can be disposed of to a suitable landfill;
- Validation samples of the walls and base of the excavation should be obtained where possible in order to provide additional contamination data for the material to be left in-situ;
- Any water encountered within the pit should be sampled at the time of the soil validation sampling; and

- Backfill the excavation with clean VENM which should be compacted to the requirements of the proposed development.

15.2.1 Inspection Requirements

Environmental personnel should be present during removal of any tanks and associated pipework to assess the excavation and provide advice on the removal of any impacted soil in the vicinity of the subsurface facilities.

During excavation of the fill material, environmental personnel will be available to make site visits as required to inspect unexpected conditions and manage any issues associated with removal of the fill material. Following removal of the UST, validation inspections will be undertaken and samples obtained as described in the following section.

15.2.2 Documentation

The remediation contractor must retain all documentation associated with the remediation (e.g. tank destruction certificate, landfill dockets, liquid waste disposal dockets etc). Copies of these documents must be forwarded to EIS on completion of the remediation for inclusion in the final validation report.

15.3 Arsenic Contamination Hotspot (Area D)

The specific remediation details for Area D are described below:

- All excavation works should be undertaken in accordance with the EIS ASSMP (ref: E23982KrptASSMP, dated August 2010);
- Submit an application to dispose of the upper 1.5m of contaminated soil as "Restricted Solid waste (non-putrescible)" to a NSW DECCW (EPA) landfill licensed to receive the waste and obtain authorisation to dispose;
- Mark out Area D on the site with tape measure and pegs;
- Geotechnical advice should be sought regarding the stability of the adjacent structures and/or adjacent areas prior to commencing the excavation;
- Excavate Area D to a depth of approximately 1.5m and load the soil directly onto trucks for transport to landfill;
- The remaining fill/soil material in the remediation area should be excavated to a depth of approximately 2.5m below the existing ground levels and treated in accordance with the EIS ASSMP;
- Following treatment, the material should be sampled and analysed for heavy metals, TPH/BTEX, PAHs, and TCLP heavy metals and PAHs in order to assign a

waste classification. Once the waste classification has been assigned to the material, the material can be disposed of to a suitable landfill;

- Validation samples of the walls and base of the excavation should be obtained where possible in order to provide additional contamination data for the material to be left in-situ; and
- Backfill the excavation with clean VENM which should be compacted to the requirements of the proposed development.

15.4 Whole of Site

EIS would expect a health risk consultant to be involved in the project prior to the commencement of remediation works.

Following remediation and validation of Areas A, B, C and D, a report should be prepared detailing the results of the validation assessment. The validation report should present all of the data from the previous investigations and include updated statistical analysis for the contaminants to remain on-site. The validation report should be submitted to a suitably qualified consultant in order to prepare a quantitative risk assessment. The risk assessment should be based on the proposed land use in the waterfront works part 3A area (i.e. parks and recreational open space) and the SFM part 3A and 4 area (i.e. commercial/industrial).

Provided that the risk assessment indicates that the site contamination does not pose a significant risk under the proposed site configuration, a report should be prepared detailing the specific capping requirements in each area of the site. The capping requirements may vary pending the results of the risk assessment and the proposed redevelopment details.

An environmental management plan (EMP) should subsequently be prepared for the contaminants remaining at the site. The capping works should be documented for the duration of the redevelopment works for inclusion in the EMP.

An appropriate public notification of the EMP will be established under Section 149(2) of the *Environmental Planning and Assessment Act 1979* or a covenant registered on the title to land under Section 88B of the *Conveyancing Act 1919*.

A site specific survey should be prepared prior to preparation of the EMP. The survey should clearly show the site boundaries and the boundary between the waterfront works part 3A area and the SFM part 3A and 4 area.

15.5 Groundwater

Following completion of the proposed redevelopment works, a series of groundwater monitoring wells (i.e. at least three wells) should be installed at the site to monitor the groundwater conditions. The monitoring wells should be sampled quarterly for a period of one year, together with the harbour water immediately adjacent to the site.

The monitoring wells should be developed prior to each sampling event and sampled using micro-purge sampling techniques. Groundwater samples should be analysed for TPH (silica gel cleanup), PAHs, oil and grease, and arsenic. The groundwater management/remediation strategy should be reviewed after the first four monitoring events.

15.6 Validation Sampling

Validation sampling will be undertaken in the remediation areas in order to provide additional contamination data for the soils to be left in-situ. The validation data will be used in conjunction with the data from the previous assessment in order to calculate the UCLs for the contaminants to remain at the site. Validation samples are obtained from the base and walls of the excavations and from imported backfill soil.

During all excavation work a close watch for excavation stability and any other below ground facilities should be maintained by site personnel. A geotechnical engineer should be retained to provide advice on potential instability of adjacent building foundations (EIS personnel do not provide this advice).

15.6.1 Suspected USTs (Areas A, B and C)

In general the validation of Areas A, B and C should be completed at a frequency of sampling within the excavation of a 10m grid across the base of the excavation and one sample per 10m lineal meters of 1.5m high (i.e. 15m^2) excavation wall (i.e. if the excavation is deeper than 1.5m then two samples should be obtained from each of the locations). Where applicable, validation wall samples will be obtained of both fill material and natural soil and analysed for TPH and PAHs.

Any groundwater seepage at the base of the excavation should also be sampled at the time of the validation and analysed for TPH and PAHs. The TPH analysis should include a silica gel cleanup.

Should the excavation be deemed safe to enter, validation sampling should be undertaken using hand tools. The hand tools should be washed following each sampling event with a phosphate free detergent. Should the excavation be deemed unsafe to enter, validation sampling is anticipated to be undertaken using an excavator with samples obtained directly from the excavator bucket.

A detailed inspection of excavation faces of the tank pit(s) should be undertaken at the time of sampling and a photographic record should be maintained for inclusion in the validation assessment report.

15.6.2 Arsenic Contamination Hotspot (Area D)

In general the validation of Area D should be completed at a frequency of sampling within the excavation of a 10m grid across the base of the excavation and one sample per 10m lineal meters of 1.5m high (i.e. 15m^2) excavation wall (i.e. if the excavation is deeper than 1.5m then two samples should be obtained from each of the locations). Where applicable, validation wall samples will be obtained of both fill material and natural soil and analysed for arsenic and PAHs.

Validation sampling should be undertaken as detailed above.

15.6.3 Data Quality Objectives – Site Validation Assessment

The data quality objectives developed for the validation assessment are outlined in the following table:

State the problem	The site investigation works undertaken to date have identified areas of contamination that will require remediation to make the site suitable for the proposed use. The principal contaminants of concern associated with the remediation works are petroleum hydrocarbons (TPH) and arsenic. The groundwater contaminants of concern include TPH, PAHs, arsenic and oil and grease. A validation assessment will be necessary to provide additional data for the soils to be left in-situ.
Identify the decision	The principal objective of the validation works are to assess the concentrations of contaminants in the soil; and to provide updated UCL data prior to preparation of a quantitative risk assessment.
Identify inputs into the decision	The following data will be reviewed to resolve the decision statement: • Review of previous site investigation results including soil and groundwater laboratory analysis data. • Inspection and documentation of remediation works and off-site disposal of contaminated material; • Physical site data that includes photographs, site testing data, field record sheets from subcontractors, etc ; Analytical schedule for soils: • TPH; and • Arsenic. Field QA/QC samples should include inter-laboratory and intra-laboratory duplicates at ratios of approximately 5% and 10%, respectively; field blanks

	and trip spike samples (as discussed in the DQI sections).
Study Boundaries	The study is confined to the site area shown on Figure 2.
Develop a Decision Rule	The results of the sample analysis will be compared with the relevant SAC for each area of the site.
Specify Limits on Decision Errors	Decision errors are false negatives or false positives i.e. stating the site is clean when it is contaminated; or stating that the site is contaminated when it is not. The most significant of these is a false negative i.e. stating that the site is suitable for the proposed use when, in fact, it is contaminated. This error could potentially impact on the health of the site users. This study assumed that elevated concentrations of contaminants occur unless demonstrated otherwise.
Optimise the Design for Obtaining data	If necessary additional rounds of sampling may be undertaken. The overall data set will be optimised by review of the data as the project proceeds. If necessary adjustments will be made to the sampling and/or analytical program.

15.6.4 Data Quality Indicators

The purpose of Data Quality Indicators (DQIs) is to develop criteria to assess the reliability of the laboratory data. The following table provides the DQIs and the methods adopted to achieve these.

DQIs	**Method of Achievement**
Documentation Completeness	• Review of previous investigation reports • Review of site inspection information • Preparation of sampling location plan • Preparation of chain of custody records • Laboratory sample receipt information • NATA registered laboratory results
Data Completeness	• Appropriately distributed sampling, • On-site visual and PID assessment of samples • Analysis for all potential contaminants of concern
Data Comparability	• The use of appropriate sampling techniques • The use of appropriate preservation, storage and transport methods • The use of NATA registered laboratories for all analyses
Data Representativeness	• Adequate coverage of sample locations across the remediation areas • Representative coverage of analysis for contaminants of concern
Data Precision and Accuracy	• Use of trained and qualified field staff • Appropriate industry standard sampling equipment and decontamination procedures • Field QA/QC including collection and analysis of the following for the contaminants of concern: ➢ approximately 5% of field soil samples as inter-laboratory duplicates; ➢ approximately 10% of field soil samples as intra-laboratory

	➢ duplicates; ➢ field blank samples, rinsate samples of field equipment, and ➢ soil/water trip spike samples. • Acceptable RPDs for duplicate comparison. The RPD is calculated as the absolute value of the difference between the initial and repeat result divided by the average value, expressed as a percentage. The following acceptance criteria will be used to assess the RPD results: ➢ For results that were greater than 10 times the Practical Quantitation Limit (PQL) RPDs less than 50% were considered acceptable; ➢ For results that were between 5 and 10 times PQL RPDs less than 75% were considered acceptable; and ➢ For results that were less than 5 times the PQL RPDs less than 100% were considered acceptable. • Review of laboratory QA/QC data (including surrogate recovery, repeat analysis, duplicates, matrix spikes and method blanks) • Acceptable concentrations in blank samples • Check of laboratory quality control methods and results

15.6.5 Imported backfill

Only Virgin Excavated Natural Material (VENM) or Excavated Natural Material (ENM), free of contamination and acid sulfate soils, should be imported onto the site for backfilling excavations. All imported material should be accompanied by analytical data showing that the material has been analysed and meets the criteria for heavy metals, TPH/BTEX, organochlorine pesticides, PAHs and asbestos. Geotechnical advice should be sought regarding fill compaction so that all backfilled areas are suitable for the proposed use.

In the case of ENM, the material should be assessed in accordance with the excavated natural material exemption 2008 (ENM 2008[31]).

Imported fill material should be sampled at a density of one sample per 100m^3 (NSW EPA Service Station Guidelines) with a minimum of three samples per source site. Source sites should be inspected by an experienced consultant and any relevant reports should be reviewed, prior to acceptance of any material onto the site. The

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[31] Protection of the Environment Operations (Waste) Regulation 2005 – General Exemption Under Part 6, Clase 51 and 51A, The excavated natural material exemption 2008

source material should be of similar geology to the natural materials at the site (silty sand).

Concentrations of some contaminants (such as volatile hydrocarbons and OC pesticides) may be below the guideline levels but may still impact upon groundwater. For this reason the practical quantitation limit has been selected as the acceptance criteria for volatile hydrocarbons and organochlorine pesticides. These compounds should not occur in VENM. The acceptance criteria for VENM are summarised in the Table below:

Proposed Acceptance Criteria (mg/kg)	
Substance	**Acceptance criteria**
Arsenic (total)	1-50
Cadmium	1
Chromium (Total)	5-1000
Copper	2-100
Lead	2-200
Mercury (inorganic)	0.03
Nickel	5-500
Zinc	10-300
Benzo[a]pyrene	LPQL
Polycyclic Aromatic hydrocarbons	LPQL
Organochlorine pesticides	LPQL
Benzene	LPQL
Toluene	LPQL
Ethyl benzene	LPQL
Total xylenes	LPQL
Petroleum hydrocarbons C_6-C_9	LPQL
Petroleum hydrocarbons C_{10}-C_{36}	LPQL
Asbestos	absent

In the event that a site is within an area of known Acid Sulfate Soil occurrence (identified from the acid soil risk maps) the analytical suite will include suspension Peroxide Oxidation-Combined Acidity and Sulfate (sPOCAS) analysis. Acid Sulfate Soils will not be imported onto the site.

The action criteria for acid sulfate soils presented within the ASSMAC *Acid Sulfate Soil Manual* (1998)[32] for coarse textured soils (applicable to all soil quantities over 1,000 tonnes) are summarised below:

- pH - less than 5.
- TAA/TSA/TPA (pH5.5) – greater than 18mol H^+/tonne.
- S_{pos} – greater than 0.03% sulfur oxidisable.

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[32] Acid Sulfate Soils Management Advisory Committee (ASSMAC) *Acid Sulfate Soil Manual* (1998)

16 CONTINGENCY PLANS

In the event that underground tanks, subsurface pits or unexpected features (eg discoloured or odorous soil) are encountered during earthworks, all work in the area should cease and EIS should be contacted immediately for advice.

Where waste classification assessment of any material indicates that contaminant concentrations exceed the "restricted solid waste" criteria (ie. the material is classified as "Hazardous" waste) listed in the Waste Classification Guidelines 2009, further assessment and stabilisation of contaminants may be required prior to off-site disposal of the contaminated material. Off-site disposal of stabilised contaminated soil will require additional testing and NSW DECCW and landfill approvals. The presence of material classified as "Hazardous" waste on the site may result in significant delays and additional cost to the project.

In the event that any underground services are damaged, all works in the vicinity should cease immediately. The project manager should be notified and the project manager or authorised representative should assess the situation, notify the appropriate service provider and co-ordinate the subsequent appropriate actions.

Plant and vehicles used during site works should be stored, refuelled and maintained in one nominated section of the site for the duration of site works. This area should be designated for this purpose and, where possible, paved and graded to minimise the overland flow of runoff into the larger site area. Spill response procedures and equipment should be implemented for this section of the site and all site personnel should be adequately trained prior to, or during, the site induction process.

If spills or leaks of hydraulic fluids, lubricants or fuel from vehicles/plant occur in the work areas, the following measures should be considered for use as appropriate:

- Use of absorbent booms to contain the material;
- Treatment with an absorbent material specifically designed for such situations;
- Construction of diversion drains and retention basin to assist with mopping up the spill.

Fuel/oil impacted building materials, soil and/or rock should be excavated and stockpiled in a suitable area of the site on an impermeable surface (skip bin, pavement and/or heavy builders plastic as available) prior to assessment and off-site disposal. The environmental consultant should then inspect the impacted area and sampling/analysis be completed as appropriate to demonstrate that the contaminated material has been successfully removed from the site.

During adverse weather conditions (ie heavy rainfall events, high winds etc) all works should cease for safety and environmental hazard purposes. Reference should be made to the following site management plan for procedures on dust, odour, water etc control. During adverse weather conditions an active inspection program should be implemented to monitor the water, dust etc control systems employed during the site works and ensure that the actions are suitable for the given conditions.

17 SITE MANAGEMENT

17.1 Interim Site Management

No special site management plans are considered necessary prior to remediation taking place.

17.2 Project Contacts

The contact names and phone numbers of key project personnel from the contractor, and offsite emergency services phone numbers are shown below. Emergency procedures and contact telephone numbers shall be displayed in a prominent position at the site entrance gate and within the main site working areas. These contacts will also facilitate registration of complaint acceptance points. The primary point for complaint acceptance will be the project manager.

Position	**Name**	**Phone**
Remediation Contractor – Site Manager	TBA	
Project manager	TBA	
Site Contamination Consultant	Environmental Investigation Services	9888 5000
Geotechnical Consultant	Jeffery & Katauskas	9888 5000
Certifier	TBA	
Department of Environment, Climate Change and Water (Environmental Protection Authority)	Pollution Line	131 555
Emergency Services	Ambulance Police Fire Department	000
General Hospital	Royal Prince Alfred Hospital	9515 6111

TBA: to be appointed.

17.3 Security

Prior to the commencement of site works, fencing should be installed as required to secure the work areas. Warning signs should be erected, including: 'hard hat only area', 'visitors must report to the site manager' and 'keep out'. All excavations should be clearly marked with coloured tape to reduce the risk to site personnel from injury by falling into open excavations.

17.4 Timing and Sequencing of Remediation Works

In the event of unexpected delays following commencement of the proposed remediation works, builder's plastic or a similar material will be employed to cover the exposed contaminated material to minimise the production of dust, on-site worker's exposure and/or run-off.

An OH&S plan prepared by a suitably qualified consultant/contractor to comply with WorkCover NSW requirements and relevant legislation or regulations will address the protection of remedial and construction workers at the site. The OH&S plan should be provided to the auditor (if appointed) and approved prior to commencement of remedial works. In general, all remedial works will be completed prior to the commencement of site construction and excavation works for the proposed development. In the event that remedial works and construction/excavation works are undertaken concurently to assist with site access, all areas of contaminated material should be clearly marked and covered with builder's plastic, or similar materials, to reduce the generation of dust, run-off and exposure to site workers and occupants.

17.5 Site Soil and Water Management Plan

The earthworks contractor should prepare a detailed soil and water management plan prior to the commencement of site works. The NSW Government/Landcom Blue Book "*Managing Urban Stormwater – Soil and Construction*" 2004 (4th Ed)[33] (Blue Book) presents the general requirements to be included in soil and water management plans. Silt fences should be used to control the surface water runoff at all appropriate locations of the site. All stockpiled materials should be placed within an erosion containment boundary with silt fences and sandbags employed to limit sediment movement. The containment area should be located away from drainage lines, gutters, stormwater pits and inlets and the site boundary. No liquid waste or runoff should be discharged to the stormwater or sewerage system without the concurrence of the appropriate authorities.

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[33] NSW Government/Landcom Blue Book "*Managing Urban Stormwater – Soil and Construction*" 2004 (4th Ed)

17.6 Noise and Vibration Control Plan

Australian Standard AS2460[34] outlines guidelines for the minimisation of noise on construction sites and these should be followed by site personnel at all times. Noise and vibration abatement measures should also be completed in accordance with any specific requirements as stated in the applicable Development Consent.

Noise producing machinery and equipment should only be operated between the hours of 7:00am and 6:00pm Monday to Friday and 8:00am and 6:00pm on Saturday (excluding public holidays). Reference should be made to specific conditions to confirm these hours and if additional works are required special permission should be sought from the consent authority.

All practicable measures should be taken to reduce the generation of noise and vibration to within acceptable limits. In the event that short-term noisy operations are necessary, and where these are likely to affect residences, notifications should be provided to the relevant authorities and the residents by the Project Manager / Site Foreman, specifying the expected duration of the noisy works.

17.7 Dust Control Plan

All practicable measures should be taken to reduce dust emanating from the site. Factors that contribute to dust production are:

- Wind over a cleared surface;
- Wind over stockpiled material; and
- Movement of machinery in unpaved areas.

Visible dust should not be present at the site boundary. Measures to minimise the potential for dust generation include:

- Use of water sprays on unsealed or exposed soil surfaces;
- Covering of stockpiled materials and excavation faces particularly during periods of site inactivity and/or during windy conditions or alternatively hessian fences around stockpiled soil or large exposed areas of soil;
- Establishment of dust screens consisting of a 2m high shade cloth or similar material secured to a chain wire fence;
- Maintenance of dust control measures to keep the facilities in good operating condition;
- Concrete surfaces brushed or washed to remove dust;
- Work may have to cease in strong winds;

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[34] Australian Standard AS2460[34] Acoustics - Measurement of the reverberation time in rooms

- Loading or unloading of dry soil should be as close as possible to stockpiles to prevent spreading of loose material around the site; and
- The expanse of cleared land should be kept to a minimum to achieve a clean and economical working environment.

If stockpiles are to remain on-site or an excavation remains open for a period of longer than 3 days, dust monitoring should be undertaken at the site. If excessive dust is generated all site activities should cease until either wind conditions are more acceptable or a revised method of excavation/remediation is developed.

Dust is also produced during the transfer of material to and from the site. All material should be covered during transport and should be properly disposed of on delivery. No material is to be left in an exposed, un-monitored condition.

All plant, including trucks transporting material, should be brushed or washed down before leaving the site to limit dust and sediment movement off-site. In the event of prolonged rain and lack of paved areas all vehicles should be washed down prior to exit from the site, and any soil or dirt on the wheels of the vehicles removed. Water used to clean the vehicles should be collected and tested prior to appropriate disposal under the NSW DECCW Waste Classification Guidelines.

17.8 Odour Control Plan

All activities undertaken at the site should be completed in a manner that minimises emissions of smoke, fumes and vapour into the atmosphere and any odours arising from the works or stockpiled material should be controlled. Control measures may include:

- Maintenance of construction equipment so that exhaust emissions comply with the Clean Air Regulations issued under the *Protection of the Environment Operations Act*;
- Demolition materials and other combustible waste should not be burnt on site;
- The spraying of a solution of Biosolve™ or other appropriate product if required to suppress any odours that may be generate by excavated materials; and
- Use of protective covers (eg HDPE).

All practicable measures should be taken to reduce fugitive emissions emanating from the site so that associated odours do not constitute a nuisance and that the ambient air quality is not adversely impacted.

Disturbance of hydrocarbon contaminated soils is likely to result in odorous conditions. The following odour management plan should be implemented to limit the exposure of site personnel and surrounding residents to unpleasant odours:

- Excavation and stockpiling of material should be scheduled during periods with low winds if possible.
- Biosolve or a similar product should be sprayed on material during excavation and following stockpiling to reduce odours.
- All complaints from workers and neighbours should be logged and a response provided. Work should be rescheduled as necessary to minimise odour problems.
- The site foreman should consider the following odour control measures as outlined in the National Environment Protection Measure (NEPM.), No. 9[35], *Draft Guideline on the Protection of Health and the Environment During the Assessment of Contamination (1999):*
  - reduce the exposed surface of the odorous materials;
  - time excavation activities to reduce off-site nuisance (particularly during strong winds); and
  - cover exposed excavation faces overnight or during periods of low excavation activity.
- If continued complaints are received, alternative odour management strategies should be considered and implemented.

17.9 Occupational Health and Safety Plan

A specific occupational health and safety plan will be prepared by the contractor for all work to be undertaken at the site in accordance with the occupational health and safety and construction safety regulations of NSW WorkCover. As a minimum requirement, personnel must wear appropriate protective clothing, including long sleeve shirts, long trousers and steel cap boots. Gloves should be worn when working on remediation activities.

Washroom and lunchroom facilities should also be provided to allow workers to remove potential contamination from their hands and clothing prior to eating or drinking. Smoking on site is not permissible during remediation works.

17.10 Hours of Operation

Hours of operation will be nominated by the contractor, and should be between 7am and 5pm, Monday to Friday and 8am to 6pm Saturday. No works will be undertaken

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[35] National Environment Protection Measure (NEPM.), No. 9, *Draft Guideline on the Protection of Health and the Environment During the Assessment of Contamination (1999)*

on Sunday or public holidays. Reference should be made to any specific conditions imposed by the relevant regulatory bodies.

17.11 Regulatory Compliance

The proposed remediation work is likely to meet the conditions for Category 1 remediation works. Category 1 remediation works must not be carried out without specific approval from the consent authority. Prior to commencement of the proposed remediation works, the project team should check with the relevant authorities regarding any site specific and/or other requirements.

Building/excavation works within 40m of a watercourse will require a Controlled Activity Approval (CAA) under the Water Management Act 2000[36].

Section 143 of the *Protection of the Environment Operations Act 1997* states that if waste is transported to a place that cannot lawfully be used as a waste facility for that waste, then the transporter and owner of the waste are each guilty of an offence. The transporter and owner of the waste have a duty to ensure that the waste is disposed of in an appropriate manner. EIS accepts no liability whatsoever for the unlawful disposal of any waste from any site.

17.12 Regulatory Requirement under the CLM Amendment Act 2008

EIS consider that there is reasonable cause to notify the DECCW (EPA) of the site contamination under Section 60 of the CLM Amendment Act 2008. The site contamination is considered to meet the Notification Triggers specified in the *Guidelines on the Duty to Report Contamination*[37] under the CLM Amendment Act 2008.

18 CONCLUSION

EIS consider that the site can be made suitable for the proposed commercial development provided that the remediation and management measures outlined in this RAP are implemented.

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[36] NSW Government Water Management Act 2000

[37] *Guidelines on the Duty to Report Contamination*, NSW Government Legislation, 2008 (Duty to Report Contamination 2008)

19 LIMITATIONS

The boreholes drilled for the investigation have enabled an assessment to be made of the existence of significant, large quantities of contaminated soils. EIS adopts no responsibility whatsoever for any problems such as underground storage tanks, buried items or contaminated material that may be encountered between sampling locations at the site. The proposed construction activities at the site should be planned on this basis, and any unexpected problem areas that are encountered between boreholes should be immediately inspected by experienced environmental personnel.

The conclusions developed in this report are based on site conditions which existed at the time of the site assessment and the scope of work outlined previously in this report. They are based on investigation of conditions at specific locations, chosen to be as representative as possible under the given circumstances, and visual observations of the site and vicinity, together with the interpretation of available historical information and documents reviewed as described in this report.

The investigation and preparation of this report have been undertaken in accordance with accepted practice for environmental consultants, with reference to applicable environmental regulatory authority and industry standards, guidelines and the assessment criteria outlined previously in this report.

Where information has been provided by third parties, EIS has not undertaken any verification process, except where specifically stated.

EIS has not undertaken any assessment of off-site areas that may be potential contamination sources or may have been impacted by site contamination.

Subsurface soil and rock conditions encountered between investigation locations may be found to be different from those expected. Groundwater conditions may also vary, especially after climatic changes.

Previous use of this site may have involved excavation for the foundations of buildings, services, and similar facilities. In addition, unrecorded excavation and burial of material may have occurred on the site. Backfilling of excavations could have been undertaken with potentially contaminated material that may be discovered in discrete, isolated locations across the site during construction work.

EIS accept no responsibility for potentially asbestos containing materials that may exist at the site. These materials may be associated with demolition of pre-1990 constructed buildings or fill material at the site.

EIS have not and will not make any determination regarding finances associated with the site.

Changes in the proposed or current site use may result in remediation or further investigation being required at the site.

This report has been prepared for the particular project described and no responsibility is accepted for the use of any part of this report in any other context or for any other purpose. Copyright of the report is the property of EIS. EIS has used a degree of care, skill and diligence normally exercised by consulting engineers in similar circumstances and locality. No other warranty expressed or implied is made or intended. Subject to payment of all fees due for the investigation, the client alone shall have a licence to use this report.

Should you require any further information regarding the above, please do not hesitate to contact us.

Yours faithfully
For and on behalf of
ENVIRONMENTAL INVESTIGATION SERVICES

Brendan Page
Environmental Scientist

Adrian Kingswell
Senior Associate

ABBREVIATIONS

AAS	Atomic Absorption Spectrometry
AGST	Above Ground Storage Tank
AHD	Australian Height Datum
ANZECC	Australian and New Zealand Environment Conservation Council
ASS	Acid Sulfate Soil
B(a)P	Benzo(a)pyrene
BH	Borehole
BTEX	Benzene, Toluene, Ethyl benzene, Xylene
COC	Chain of Custody documentation
CLM	Contaminated Land Management
DECCW	Department of Environment, Climate Change and Water (formerly EPA)
DNR	NSW Department of Natural Resources (now split between DWE and DECCW)
DWE	NSW Department of Water and Energy
DP	Deposited Plan
DQO	Data Quality Objective
EC	Electrical Conductivity
EPA NSW	Environment Protection Authority, New South Wales (now part of DECCW)
GC-ECD	Gas Chromatograph-Electron Capture Detector
GC-FID	Gas Chromatograph-Flame Ionisation Detector
GC-MS	Gas Chromatograph-Mass Spectrometer
HIL	Health Based Investigation Level
HM	Heavy Metals
ICP-AES	Inductively Couple Plasma – Atomic Emission Spectra
NATA	National Association of Testing Authorities, Australia
NEPC	National Environmental Protection Council
NHMRC	National Health and Medical Research Council
OCPs	Organochlorine Pesticides
OPPs	Organophosphorous Pesticides
OHS (OH&S)	Occupational Health and Safety
PAH	Polycyclic Aromatic Hydrocarbons
PCBs	Polychlorinated Biphenyls
PID	Photo-ionisation Detector
PPIL	Provisional Phyto-toxicity Investigation Levels
PQL	Practical Quantitation Limit
P&T	Purge & Trap
RAP	Remedial Action Plan
QA/QC	Quality Assurance and Quality Control
RPD	Relative Percentage Difference
SEPP	State Environmental Planning Policy
sPOCAS	suspension Peroxide Oxidation Combined Acidity and Sulfate
SPT	Standard Penetration Test
SWL	Standing Water Level
TCLP	Toxicity Characteristic Leaching Procedure
TP	Test Pit
TPH	Total Petroleum Hydrocarbons
USEPA	United States Environmental Protection Agency
UCL	Upper Confidence Limit
UST	Underground Storage Tank
VOC	Volatile Organic Compounds

IMPORTANT INFORMATION ABOUT THE SITE ASSESSMENT REPORT

These notes have been prepared by EIS to assist with the assessment and interpretation of this report.

An Environmental Assessment Report is Based on a Unique Set of Project Specific Factors:

This report has been prepared in response to specific project requirements as stated in the EIS proposal document which may have been limited by instructions from the client. This report should be reviewed, and if necessary, revised if any of the following occur:

- the proposed land use is altered;
- the defined subject site is increased or sub-divided;
- the proposed development details including size, configuration, location, orientation of the structures are modified;
- the proposed development levels are altered, eg addition of basement levels; or
- ownership of the site changes.

EIS/J&K will not accept any responsibility whatsoever for situations where one or more of the above factors have changed since completion of the assessment. If the subject site is sold, ownership of the assessment report should be transferred by EIS to the new site owners who will be informed of the conditions and limitations under which the assessment was undertaken. No person should apply an assessment for any purpose other than that originally intended without first conferring with the consultant.

Changes in Subsurface Conditions

Subsurface conditions are influenced by natural geological and hydrogeological process and human activities. Groundwater conditions are likely to vary over time with changes in climatic conditions and human activities within the catchment (eg. water extraction for irrigation or industrial uses, subsurface waste water disposal, construction related dewatering). Soil and groundwater contaminant concentrations may also vary over time through contaminant migration, natural attenuation of organic contaminants, ongoing contaminating activities and placement or removal of fill material. The conclusions of an assessment report may have been affected by the above factors if a significant period of time has elapsed prior to commencement of the proposed development.

This Assessment is Based on Professional Interpretations of Factual Data

Site assessments identify actual subsurface conditions at the actual sampling locations at the time of the investigation. Data obtained from the sampling and subsequent laboratory analyses, available site history information and published regional information is interpreted by geologists, engineers or environmental scientists and opinions are drawn about the overall subsurface conditions, the nature and extent of contamination, the likely impact on the proposed development and appropriate remediation measures.

Actual conditions may differ from those inferred, because no professional, no matter how qualified, and no subsurface exploration program, no matter how comprehensive, can reveal what is hidden by earth, rock and time. The actual interface between materials may be far more gradual or abrupt than an assessment indicates. Actual conditions in areas not sampled may differ from predictions. Nothing can be done to prevent the unanticipated, but steps can be taken to help minimise the impact. For this reason, site owners should retain the services of their consultants throughout the development stage of the project, to identify variances, conduct additional tests which may be needed, and to recommend solutions to problems encountered on site.

Environmental Site Assessment Limitations

Although information provided by an environmental site assessment can reduce exposure to the risk of the presence of contamination, no environmental site assessment can eliminate the risk. Even a rigorous professional assessment may not detect all contamination on a site. Contaminants may be present in areas that were not surveyed or sampled, or may migrate to areas which showed no signs of contamination when sampled. Contaminant analysis cannot possibly cover every type of contaminant which may occur; only the most likely contaminants are screened.

Misinterpretation of Environmental Site Assessments by Design Professionals

Costly problems can occur when other design professionals develop plans based on misinterpretation of an environmental assessment report. To minimise problems associated with misinterpretations, the environmental consultant should be retained to work with appropriate professionals to explain relevant findings and to review the adequacy of plans and specifications relevant to contamination issues.

Logs Should not be Separated from the Environmental Assessment Report

Borehole and test pit logs are prepared by environmental scientists, engineers or geologists based upon interpretation of field conditions and laboratory evaluation of field samples. Logs are normally provided in our reports and these should not be re-drawn for inclusion in site remediation or other design drawings, as subtle but significant drafting errors or omissions may occur in the transfer process. Photographic reproduction can eliminate this problems, however contractors can still misinterpret the logs during bid preparation if separated from the text of the assessment. If this occurs, delays, disputes and unanticipated costs may result. In all cases it is necessary to refer to the test of the report to obtain a proper understanding of the assessment. Please note that logs with the 'Environmental Log' header are not suitable for geotechnical purposes as they have not been peer reviewed by a Senior Geotechnical Engineer.

To reduce the likelihood of borehole and test pit log misinterpretation, the complete assessment should be available to persons or organisations involved in the project, such as contractors, for their use. Denial of such access and disclaiming responsibility for the accuracy of subsurface information does not insulate an owner from the attendant liability. It is critical that the site owner provides all available site information to persons and organisations such as contractors.

Read Responsibility Clauses Closely

Because an environmental site assessment is based extensively on judgement and opinion, it is necessarily less exact than other disciplines. This situation has resulted in wholly unwarranted claims being lodged against consultants. To help prevent this problem, model clauses have been developed for use in written transmittals. These are definitive clauses designed to indicate consultant responsibility. Their use helps all parties involved recognise individual responsibilities and formulate appropriate action. Some of these definitive clauses are likely to appear in the environmental site assessment, and you are encouraged to read them closely. Your consultant will be pleased to give full and frank answers to any questions.

TABLE A - 2
CHEMICAL CONTAMINANT CRITERIA FOR WASTE CLASSIFICATION
Waste Classification Guidelines. Part 1: Classifying Waste DECC (now DECCW) NSW July 2009

GENERAL SOLID WASTE	RESTRICTED SOLID WASTE	HAZARDOUS WASTE
IF SCC ≤ CT1, TCLP NOT NEEDED TO CLASSIFY AS GENERAL SOLID WASTE	IF SCC ≤ CT2, TCLP NOT NEEDED TO CLASSIFY AS RESTRICTED SOLID WASTE	IF SCC > CT2, TCLP NOT NEEDED TO CLASSIFY AS HAZARDOUS WASTE
IF TCLP ≤ TCLP1 AND SCC ≤ SCC1 TREAT AS GENERAL SOLID WASTE	IF TCLP ≤ TCLP2 AND SCC ≤ SCC2 TREAT AS RESTRICTED SOLID WASTE	IF TCLP > TCLP2 AND/OR SCC > SCC2 TREAT AS HAZARDOUS WASTE

	GENERAL SOLID WASTE			RESTRICTED SOLID WASTE		
CONTAMINANT	CT1 (mg/kg)	TCLP1 (mg/L)	SCC1 (mg/kg)	CT2 (mg/kg)	TCLP2 (mg/L)	SCC2 (mg/kg)
Arsenic	100	5	500	400	20	2,000
Beryllium	20	1.0	100	80	4	400
Cadmium	20	1.0	100	80	4	400
Chromium VI	100	5	1,900	400	20	7,600
Cyanide (total)	320	16	5,900	1280	64	23,600
Cyanide (Amenable)	70	3.5	300	280	14	1,200
Fluoride	3,000	150	10,000	12,000	600	40,000
Lead	100	5	1,500	400	20	6,000
Mercury	4	0.2	50	16	0.8	200
Molybdenum	100	5	1,000	400	20	4,000
Nickel	40	2	1,050	160	8	4,200
Selenium	20	1	50	80	4	200
Silver	100	5.0	180	400	20	720
Benzene	10	0.5	18	40	2	72
Toluene	288	14.4	518	1,152	57.6	2,073
Ethylbenzene	600	30	1,080	2,400	120	4,320
Total xylenes	1,000	50	1,800	4,000	200	7,200
Total petroleum hydrocarbons (C6-C9)	-	-	650	-	-	2,600
Total petroleum hydrocarbons (C10-C36) (C10-C14, C15-C28, C29-C36)	-	-	10,000	-	-	40,000
Benzo(a)pyrene	0.8	0.04	10	3.2	0.16	23
Polycyclic aromatic hydrocarbons (Total)	-	-	200	-	-	800
Polychlorinated biphenyls	-	-	<50	-	-	<50
Phenol (nonhalogenated)	288	14.4	518	1,152	57.6	2,073
Scheduled chemicals	-	-	<50	-	-	<50

NOTE:
SCC – Specific Contaminant Concentration
CT – Contaminant Threshold
TCLP – Toxicity Characteristics Leaching Procedure

TABLE B
SUMMARY OF LABORATORY TEST DATA
SOIL CHARACTERISATION ASSESSMENT
All data in mg/kg unless stated otherwise

ANALYTE			HEAVY METALS								PAHs		ORGANOCHLORINE PESTICIDES				OP PESTICIDES	PCBs	PETROLEUM HYDROCARBONS									PID VALUES	ASBESTOS FIBRES
			Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	Total PAHs	B(a)P	Aldrin and Dieldrin	Chlordane	DDT, DDD & DDE	Heptachlor			Petroleum Hydrocarbons					Benzene	Toluene	Ethyl Benzene	Total Xylenes		
																			C_6-C_9	C_{10}-C_{14}	C_{15}-C_{28}	C_{29}-C_{36}	C_{10} - C_{36}						
PQL - Envirolab Services			4	0.5	1	1	1	0.1	1	1	-	0.05	0.1	0.1	0.1	0.1	0.1	0.1	25	50	100	100	100	0.5	0.5	1	1		
Site Assessment Criteria ^			500 *	100 *	60% *	5000 *	1500 *	75 *	3000 *	35000 *	100 *	5 *	50 *	250 *	1000 *	50 *	0.1 ^^	50 *	65 #	NSL	NSL	NSL	1000 #	1 #	1.4 #	3.1 #	14 #		
General Solid Waste CT1+			100	20	100	NSL	100	4	40	NSL	NSL	0.8	NSL					NSL	NSL	NSL			NSL	10	288	600	1000		
General Solid Waste SCC1+			500	100	1900	NSL	1500	50	1050	NSL	200	10	50					50	650	NSL			10000	18	518	1080	1800		
Restricted Solid Waste CT2+			400	80	400	NSL	400	16	160	NSL	NSL	3.2	NSL					NSL	NSL	NSL			NSL	40	1152	2400	4000		
Restricted Solid Waste SCC2+			2000	400	7600	NSL	6000	200	4200	NSL	800	23	50					50	2600	NSL			40000	72	2073	4320	7200		
Location	Depth in metres	DESCRIPTION																											
BH701	0.5-0.8	Fill: sandy gravel	24	NA	NA	NA	NA	NA	NA	NA	0.9	0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0	NA
BH701	1.3-1.5	Fill: silty sand	LPQL	NA	NA	NA	NA	NA	NA	NA	0.15	0.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0	NA
BH701	1.7-1.95	Fill: silty sand	LPQL	NA	NA	NA	NA	NA	NA	NA	LPQL	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0	NA
BH701	3.2-3.45	Silty clayey sand	LPQL	NA	NA	NA	NA	NA	NA	NA	LPQL	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0	NA
BH702	0.3-0.5	Fill: silty sand	15	NA	NA	NA	NA	NA	NA	NA	164.3	13	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0	NA
BH702	1.2-1.5	Fill: silty clayey sand	11	NA	NA	NA	NA	NA	NA	NA	0.5	0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0	NA
BH702	1.5-1.95	Fill: silty sand	LPQL	NA	NA	NA	NA	NA	NA	NA	LPQL	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0	NA
BH702	2.8-3.0	Fill: silty sand	LPQL	NA	NA	NA	NA	NA	NA	NA	LPQL	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0	NA
BH702	3.3-3.45	Silty clayey sand	LPQL	NA	NA	NA	NA	NA	NA	NA	LPQL	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0	NA
BH704	0.1-0.3	Fill: silty sand	LPQL	NA	NA	NA	NA	NA	NA	NA	3.1	0.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0	NA
BH704	0.7-1.0	Fill: silty sand	100	NA	NA	NA	NA	NA	NA	NA	119.4D	20D	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0	NA
BH704	1.6-1.95	Fill: silty sand	580	NA	NA	NA	NA	NA	NA	NA	LPQL	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0	NA
BH704	2.8-3.0	Fill: silty sand	53	NA	NA	NA	NA	NA	NA	NA	LPQL	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0	NA
BH704	3.2-3.45	Silty sand	6	NA	NA	NA	NA	NA	NA	NA	LPQL	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0	NA
BH705	1.3-1.5	Fill: silty sand	10	LPQL	29	19	58	0.2	5	130	6.7	0.5	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	2.6	No Asbestos Detected
BH705	1.8-1.95	Fill: silty sand	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	36	1700	4200	810	6710	LPQL	LPQL	LPQL	LPQL	59.1	NA
BH706	1.7-1.95	Fill: silty clayey sand	LPQL	LPQL	8	8	27	LPQL	3	53	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	1.8	No Asbestos Detected
BH706	2.8-3.0	Silty sand	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0.8	NA
BH707	1.5-1.55	Fill: silty sand	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	91.5	NA
BH707	2.3-2.5	Fill: silty sand	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1100	6200	1700	190	8090	LPQL	LPQL	LPQL	LPQL	553	NA
BH707	4.0-4.5	Silty sand	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	11.8	NA
BH708	0.7-0.95	Fill: silty sand	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	20.1	NA
BH708	1.6-1.95	Fill: silty sand	5	LPQL	9	79	900	1.1	4	210	0.05	0.05	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	31.6	No Asbestos Detected
BH709	0.9-1.15	Fill: silty sand	5	LPQL	10	30	350	1.9	3	170	1.8	0.2	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0	No Asbestos Detected
BH709	1.7-1.95	Fill: silty sand	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	4.1	NA
BH710	0.3-0.5	Fill: gravelly sand	LPQL	LPQL	50	52	52	0.2	48	70	28.8	4.1	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	110	100	210	LPQL	LPQL	LPQL	LPQL	0.4	No Asbestos Detected
BH711	1.3-1.5	Fill: clayey sand	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	19.4	NA
BH711	1.7-1.95	Fill: clayey gravel	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	70.6	NA
BH711	3.3-3.45	Silty sand	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	2	NA
BH712	1.3-1.5	Fill: silty clayey sand	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	37	800	660	210	1670	LPQL	LPQL	LPQL	LPQL	81.7	NA
BH712	1.6-1.95	Fill: silty clayey sand	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	230	3000	1500	LPQL	4500	LPQL	LPQL	LPQL	2	350	NA
BH712	3.0-3.45	Fill: silty sandy gravel	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	72	730	360	LPQL	1090	LPQL	LPQL	LPQL	LPQL	232	NA
BH713	0.4-0.6	Fill: silty sand	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	2.4	NA
BH713	1.7-1.95	Fill: silty clayey sand	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	89	3200	1800	LPQL	5000	LPQL	LPQL	LPQL	LPQL	80.2	NA
BH713	4.7-4.95	Silty clayey sand	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	11.4	NA
BH714	0.8-1.0	Fill: clayey sand	LPQL	LPQL	20	59	90	1.8	13	140	11.8	1.6	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0.2	No Asbestos Detected
BH714	1.7-1.95	Fill: clayey sand	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0.3	NA
BH715	0.6-0.95	Fill: clayey sand	8	LPQL	10	25	29	0.1	6	53	5.2	0.6	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0	No Asbestos Detected
BH715	1.5-1.95	Fill: clayey sand	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	1.6	NA
BH716	0.5-0.8	Fill: silty sand	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0	NA
BH716	1.7-1.95	Fill: silty sand	9	LPQL	18	120	600	1.7	27	120	51.6	5.9	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	190	190	380	LPQL	LPQL	LPQL	LPQL	0.8	No Asbestos Detected
Total no. of samples			22	8	8	8	8	8	8	8	22	22	8	8	8	8	8	8	27	27	27	27	27	27	27	27	27	41	8
Maximum Value			580	LPQL	50	120	900	1.9	48	210	164.3	13	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	1100	6200	4200	810	8090	LPQL	LPQL	LPQL	2	553	NC
Mean Value			43	NC	NC	NC	NC	NC	NC	NC	16	1.7	NC	NC	NC	NC	NC	NC	60	NC	NC	NC	1222	NC	NC	NC	NC	NC	NC
Standard Deviation			222	NC	NC	NC	NC	NC	NC	NC	37	4.2	NC	NC	NC	NC	NC	NC	168	NC	NC	NC	2674	NC	NC	NC	NC	NC	NC
Coefficient of Variation			5	NC	NC	NC	NC	NC	NC	NC	2.3	2.5	NC	NC	NC	NC	NC	NC	2.8	NC	NC	NC	2.2	NC	NC	NC	NC	NC	NC
Distribution +			Non-parametric	NC	NC	NC	NC	NC	NC	NC	Non-parametric	Non-parametric	NC	NC	NC	NC	NC	NC	Non-parametric	NC	NC	NC	Non-parametric	NC	NC	NC	NC	NC	NC
Upper Level 99% or 99.7% Confidence Limit on Mean Value (99% or 97.5% UCL) ++			422	NC	NC	NC	NC	NC	NC	NC	48	7.3	NC	NC	NC	NC	NC	NC	198	NC	NC	NC	3415	NC	NC	NC	NC	NC	NC

EXPLANATION:

^ Site Assessment Criteria: Guideline concentrations adopted for the investigation as outlined below:
* National Environment Protection (Assessment of Site Contamination) Measure 1999 (NEPC Guidelines)
Health Investigation Levels (HIL) - Column F, Commercial/Industrial
\# NSW EPA (DECCW) Guidelines for Assessing Service Station Sites - 1994
^^ In the absence of Australian guidelines, the laboratory PQL has been adopted as the site assessment criteria
\+ Waste Classification Guidelines – Part 1: Classifying Waste (2009)
D Higher laboratory duplicate values adopted for PAH compounds for stats calculations (see page 28-29 in Envirolabs report 44203).

Concentration above the Site Assessment Criteria VALUE

ABBREVIATIONS:

PAHs: Polycyclic Aromatic Hydrocarbons
B(a)P: Benzo(a)pyrene
PQL: Practical Quantitation Limit
LPQL: Less than PQL
NA: Not Analysed
NC: Not Calculated
OP: Organophosphorus Pesticides
PID: Photoionisation Detector
PCBs: Polychlorinated Biphenyls
NSL: No Set Limit

NOTE: ++ Statistical analysis has been calculate using ProUCL version 3.0 (USEPA). Statistical analyses has been undertaken using the combined data set from EIS report E23982Krpt and E23982Krpt2, and has only been undertaken for those contaminants that exceeded the health based site assessment criteria. Fill samples only.

TABLE C
SUMMARY OF LABORATORY RESULTS
PETROLEUM HYDROCARBONS - AROMATIC AND ALIPHATIC SPECIATION

All data in mg/kg unless stated otherwise

ANALYTE	PETROLEUM HYDROCARBON COMPONENTS		
	Aromatics $>C_{16}-C_{35}$	Aliphatics $C_{16}-C_{35}$	Aliphatics $>C_{35}$
PQL - Envirolab	50	1000	1000
Site Assessment Criteria ^	450	28000	280000
SAMPLE (Depth in metres)			
BH705 (1.8-1.95)	8800	LPQL	LPQL
BH712 (1.3-1.5)	190	LPQL	LPQL
Total no. of samples	1	1	1
Maximum Value	8800	LPQL	LPQL

EXPLANATION:

^ Site Assessment Criteria: Guideline concentrations adopted for the investigation as outlined below:
National Environment Protection (Assessment of Site Contamination) Measure 1999 (NEPC Guidelines)
Health Investigation Levels (HIL) - Column F, Commercial/Industrial

Concentration above the Site Assessment Criteria	**VALUE**

ABBREVIATIONS:

PQL: Practical Quantitation Limit
LPQL: Less than PQL
NSL: No Set Limit

TABLE D
SUMMARY OF LABORATORY TEST DATA
TOXICITY CHARACTERISTICS LEACHING PROCEDURE (TCLP)
All data in mg/L unless stated otherwise

ANALYTE		Arsenic	Lead	Nickel	B(a)P
PQL - Envirolab		0.05	0.03	0.02	0.001
TCLP1 - General Solid Waste *		5	5	2	0.04
TCLP2 - Restricted Solid Waste *		20	20	8	0.16
TCLP3 - Hazardous Waste *		>20	>20	>8	>0.16
SAMPLE	Depth in metres				
BH702	0.3-0.5	NA	NA	NA	LPQL
BH704	0.7-1.0	NA	NA	NA	0.01
BH704	1.6-1.95	0.8	NA	NA	NA
BH708	1.6-1.95	NA	1.1	NA	NA
BH709	0.9-1.15	NA	0.3	NA	NA
BH716	1.7-1.95	NA	0.8	NA	LPQL
BH714	0.8-1.0	NA	NA	NA	LPQL
BH710	0.3-0.5	NA	NA	0.04	LPQL
Total no. of samples		1	3	1	5
Maximum Value		0.8	1.1	0.04	0.01

EXPLANATION:

* NSW DECC (DECCW) Waste Classification Guidelines - Part 1: Classifying Waste - 2009

Concentration above the General Solid Waste guideline level VALUE

ABBREVIATIONS:

PQL: Practical Quantitation Limit
LPQL: Less than PQL
B(a)P: Benzo(a)pyrene
NA: Not Analysed

TABLE E
GROUNDWATER MONITORING ANALYSIS
All results in mg/L unless stated otherwise.

Contaminant	PQL Envirolab	SAC ANZECC 2000 Marine Waters [1]	SAMPLES MW517	MW708	MW712	MW713
Field Measurements *						
Dissolved oxygen (ppm)	-	NSL	0.4	0.2	0.3	0.2
Redox potential (mV)	-	NSL	-61.9	29.6	61.7	236.9
pH	-	7 - 8.5[++]	6.97	6.39	6.81	5.91
Conductivity (mS/cm)	-	NSL	1.2	1.2	1.6	1.9
Temperature ©	-	NSL	19.8	20.7	19	18.1
Miscellaneous Inorganics						
pH	0.1	7 - 8.5[++]	6.7	6.6	6.8	6.1
Electrical Conductivity (mS/cm)	0.001	NSL	1.3	1.2	1.6	2
Oil and Grease	5	10[#^]	LPQL	11[D]	LPQL	LPQL
Petroleum Hydrocarbons						
Hydrocarbons C6-C9	0.01	NSL	0.032	0.019	0.078	0.012
Hydrocarbons C10-C14	0.05	0.6**	0.370	0.210	0.500	0.770
Hydrocarbons C15-C28	0.1		0.240	0.170	0.270	0.580
Hydrocarbons C29-C36	0.1		LPQL	LPQL	LPQL	LPQL
Petroleum Hydrocarbons (silica gel cleanup)						
Hydrocarbons C10-C14	0.05	0.6**	NA	NA	0.170	0.190
Hydrocarbons C15-C28	0.1		NA	NA	0.150	0.210
Hydrocarbons C29-C36	0.1		NA	NA	LPQL	LPQL
Volatile Organic Contaminants (VOCs)[2]						
Benzene	0.001	0.7	LPQL	LPQL	LPQL	LPQL
Toluene	0.001	0.18 [t]	LPQL	LPQL	LPQL	LPQL
Ethyl Benzene	0.001	0.005 [t]	LPQL	LPQL	LPQL	LPQL
Total xylenes	0.003	0.38[#]	LPQL	LPQL	LPQL	LPQL
o-xylene	0.001	0.35 [t]	LPQL	LPQL	LPQL	LPQL
m+p-xylene	0.002	0.275 [t]	LPQL	LPQL	LPQL	LPQL
Polycyclic Aromatic Hydrocarbons (PAHs)[3]						
Naphthalene	0.0001	0.016	0.0004	0.0001	0.0052	0.0003
Acenaphthylene	0.0001	NSL	LPQL	LPQL	LPQL	0.0001
Acenaphthene	0.0001	NSL	0.0028	0.0003[D]	0.0003	0.0007
Fluorene	0.0001	NSL	0.0025	0.0004[D]	0.0003	0.0008
Phenanthrene	0.0001	0.0006[L]	0.0024	0.0006[D]	0.0002	0.0012
Anthracene	0.0001	0.0004[t]	0.0004	0.0001	LPQL	0.0003
Fluoranthene	0.0001	0.001[L]	0.0005	0.0003[D]	0.0001	0.001
Pyrene	0.0001	NSL	0.0003	0.0002[D]	0.0001	0.0009
Benzo(a)anthracene	0.0001	NSL	LPQL	LPQL	LPQL	0.0003
Chrysene	0.0001	NSL	LPQL	LPQL	LPQL	0.0002
Benzo(b+k)fluoranthene	0.0002	NSL	LPQL	LPQL	LPQL	0.0002
Benzo(a)pyrene	0.0001	0.0001 [L]	LPQL	LPQL	LPQL	0.0002

EXPLANATION:

[1] ANZECC Australian Water Quality Guidelines for Marine Waters, 2000 - Trigger Values for protection of 95% of species
[3] PAHs listed are those with trigger values presented in ANZECC together with all PAH compounds with detections above the PQLs
* Field Measurements Undertaken on 5 August 2010
[++] ANZECC Australian Water Quality Guidelines for Fresh and Marine Waters, 2000 - Level for South-East Australian Estuaries
^ In the absence of a health guideline the aesthetic guideline concentration has been quoted
** In the absence of locally endorsed guidelines, the Dutch intervention levels specified in *'Circular on target values and intervention values for soil remediation has been quoted'* (*Ministry of Housing and the Environment 2000*) have been quoted
[t] In the absence of a high reliability guideline concentration, the moderate or low reliability guideline concentration has been used.
[#] NSW EPA (now DECCW) Guidelines for Assessing Service Station Sites (1994).
^^ In the absence of Australian guidelines, the laboratory practical quantitation limit has been used.
[L] 99% Protection levels adopted due to potential for bioaccumulation effects
[D] Higher duplicate value adopted where appropriate for analytes where the RPDs exceeded the acceptance criteria (SGS report SE80464)

Concentration above the Site Assessment Criteria VALUE

ABBREVIATIONS:

NA : Not Analysed
NSL : No set limit
PQL: Practical Quantitation Limit
LPQL: - Less than Practical Quantitation Limit
ALPQL:- all results less than the Practical Quantitation Limit

TABLE F
LABORATORY DUPLICATE RESULTS - SOIL
QA/QC - RELATIVE PERCENTAGE DIFFERENCES

All data in mg/kg unless stated otherwise

ANALYTE		HEAVY METALS								PAHs															Total OPPs	Total OCPs	Total PCBs	PETROLEUM HYDROCARBONS							
		As	Cd	Cr	Cu	Pb	Hg	Ni	Zn	Nap	Acenaphty	Acenaphte	Fluo	Phen	Anth	Fluoro	Pyr	B(a)A	Chy	B(b+k)F	B(a)P	I(123-cd)	D(ah)A	B(ghi)P				Petroleum Hydrocarbons				Benzene	Toluene	Ethyl Benzene	Total Xylenes
																												C_6-C_9	C_{10}-C_{14}	C_{15}-C_{28}	C_{29}-C_{36}				
PQL - Envirolab Services		4	0.5	1	1	1	0.1	1	1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.05	0.1	0.1	0.1	0.1	0.1	0.1	25	50	100	100	0.5	0.5	1	1
PQL - SGS		3	0.3	0.3	0.5	1	0.05	0.5	0.5	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.20	0.05	0.10	0.10	0.10	0.2	0.1	0.1	20	20	50	50	0.1	0.1	0.1	0.3
Intra-laboratory Soil Duplicate Results - Envirolab Report Number 44203																																			
Initial Sample Ref	BH701 (0.5-0.8)	24	-	-	-	-	-	-	-	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0.2	0.2	0.1	0.1	<0.2	0.1	0.1	LPQL	0.1	-	-	-	-	-	-	-	-	-	-	-
Duplicate Sample Ref	Dup AA	24	-	-	-	-	-	-	-	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0.2	0.2	0.1	0.1	0.3	0.2	0.1	LPQL	0.1	-	-	-	-	-	-	-	-	-	-	-
Mean Value		24	-	-	-	-	-	-	-	NC	NC	NC	NC	NC	NC	0.2	0.2	0.1	0.1	0.2	0.15	0.1	NC	0.1	-	-	-	-	-	-	-	-	-	-	-
RPD Value		0	-	-	-	-	-	-	-	NC	NC	NC	NC	NC	NC	0	0	0	0	100	67	0	NC	0	-	-	-	-	-	-	-	-	-	-	-
Intra-laboratory Soil Duplicate Results - Envirolab Report Number 44203																																			
Initial Sample Ref	BH702 (1.5-1.95)	LPQL	-	-	-	-	-	-	-	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	-	-	-	-	-	-	-	-	-	-	-
Duplicate Sample Ref	Dup BB	LPQL	-	-	-	-	-	-	-	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	-	-	-	-	-	-	-	-	-	-	-
Mean Value		NC	-	-	-	-	-	-	-	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	-	-	-	-	-	-	-	-	-	-	-
RPD Value		NC	-	-	-	-	-	-	-	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	-	-	-	-	-	-	-	-	-	-	-
Intra-laboratory Soil Duplicate Results - Envirolab Report Number 44203																																			
Initial Sample Ref	BH706 (2.8-3.0)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL
Duplicate Sample Ref	Dup EE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL
Mean Value		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	NC	NC	NC	NC	NC	NC	NC	NC
RPD Value		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	NC	NC	NC	NC	NC	NC	NC	NC
Intra-laboratory Soil Duplicate Results - Envirolab Report Number 44203																																			
Initial Sample Ref	BH713 (0.4-0.6)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL
Duplicate Sample Ref	Dup HH	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL
Mean Value		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	NC	NC	NC	NC	NC	NC	NC	NC
RPD Value		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	NC	NC	NC	NC	NC	NC	NC	NC
Intra-laboratory Soil Duplicate Results - Envirolab Report Number 44203																																			
Initial Sample Ref	BH705 (1.3-1.5)	10	LPQL	29	19	58	0.2	5	130	LPQL	LPQL	LPQL	0.1	1.2	0.2	1.2	1.1	0.5	0.6	0.7	0.5	0.3	<0.1	0.3	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL
Duplicate Sample Ref	Dup KK	7	LPQL	25	27	80	0.2	5	140	LPQL	LPQL	LPQL	0.2	1.9	0.4	1.7	1.6	0.8	0.8	1	0.7	0.4	0.1	0.4	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL
Mean Value		8.5	NC	27	23	69	0.2	5	135	NC	NC	NC	0.15	1.55	0.3	1.45	1.35	0.65	0.7	0.85	0.6	0.35	0.075	0.35	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
RPD Value		35	NC	15	35	32	0	0	7	NC	NC	NC	67	45	67	34	37	46	29	35	33	29	67	29	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
Inter-laboratory Soil Duplicate Results - Envirolab Report Number 44203, SGS Report Number SE80351																																			
Initial Sample Ref	BH704 (1.6-1.95)	580	-	-	-	-	-	-	-	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	-	-	-	-	-	-	-	-	-	-	-
Duplicate Sample Ref	Dup CC	870	-	-	-	-	-	-	-	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	-	-	-	-	-	-	-	-	-	-	-
Mean Value		725	-	-	-	-	-	-	-	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	-	-	-	-	-	-	-	-	-	-	-
RPD Value		40	-	-	-	-	-	-	-	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	-	-	-	-	-	-	-	-	-	-	-
Inter-laboratory Soil Duplicate Results - Envirolab Report Number 44203, SGS Report Number SE80351																																			
Initial Sample Ref	BH715 (0.6-0.95)	8	LPQL	10	25	29	0.1	6	53	LPQL	LPQL	LPQL	LPQL	0.2	<0.1	0.9	1	0.5	0.5	0.9	0.6	0.3	LPQL	0.3	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL
Duplicate Sample Ref	Dup II	6	LPQL	11	33	38	0.14	7.1	47	LPQL	LPQL	LPQL	LPQL	0.41	0.14	1.6	2	0.97	0.82	1.3	0.78	0.21	LPQL	0.22	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL
Mean Value		7	NC	10.5	29	33.5	0.12	6.55	50	NC	NC	NC	NC	0.305	0.095	1.25	1.5	0.735	0.66	1.1	0.69	0.255	NC	0.26	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
RPD Value		29	NC	10	28	27	33	17	12	NC	NC	NC	NC	69	95	56	67	64	48	36	26	35	NC	31	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
Inter-laboratory Soil Duplicate Results - Envirolab Report Number 44203, SGS Report Number SE80351																																			
Initial Sample Ref	BH716 (0.5-0.8)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	LPQL	LPQL	<100	LPQL	LPQL	LPQL	LPQL	LPQL
Duplicate Sample Ref	Dup JJ	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	LPQL	LPQL	91	LPQL	LPQL	LPQL	LPQL	LPQL
Mean Value		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	NC	NC	70.5	NC	NC	NC	NC	NC
RPD Value		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	NC	NC	58	NC	NC	NC	NC	NC

EXPLANATION:

The RPD value is calculated as the absolute value of the difference between the initial and repeat results divided by the average value expressed as a percentage. The following acceptance criteria will be used to assess the RPD results:

- Results > 10 times PQL = RPD value < 50% are acceptable
- Results between 5 & 10 time PQL = RPD value < 75% are acceptable
- Results < 5 times PQL = RPD value < 100% are acceptable

RPD Results Above the Acceptance Criteria 🟩 VALUE

ABBREVIATIONS:

PQL: Practical Quantitation Limit
LPQL: Less than PQL
(-) : Not Analysed
nc: Not Calculated
OPP: Organophosphorus Pesticides
OCP: Organochlorine Pesticides
PCBs: Polychlorinated Biphenyls
RPD: Relative Percentage Difference

PAHs: Polycyclic Aromatic Hydrocarbons
Nap: Naphthalene
Acenaphty: Acenapthylene
Acenaphte: Acenaphthene
Fluo: Fluorene
Phen: Phenanthrene
Anth: Anthracene
Fluoro: Fluoranthene

Pyr: Pyrene
B(a)A: Benzo(a)anthracene
Chy: Chrysene
B(a+k)F: Benzo(a+k)fluoranthene
B(a)P: Benzo(a)pyrene
I(123-cd): Indeno(123-cd)pyrene
D(ah)A: Dibenzo(ah)anthracene
B(ghi)P: Benzo(ghi)perylene

As: Arsenic
Cd: Cadmium
Cr: Chromium
Cu: Copper
Pb: Lead
Hg: Mercury
Ni: Nickel
Zn: Zinc

TABLE G
LABORATORY DUPLICATE RESULTS - GROUNDWATER
QA/QC - RELATIVE PERCENTAGE DIFFERENCES
All data in mg/L unless stated otherwise

ANALYTE		PAHs															Oil and Grease	PETROLEUM HYDROCARBONS							
		Nap	Acenaphty	Acenaphte	Fluo	Phen	Anth	Fluoro	Pyr	B(a)A	Chy	B(b+k)F	B(a)P	I(123-cd)	D(ah)A	B(ghi)P		Petroleum Hydrocarbons				Benzene	Toluene	Ethyl Benzene	Total Xylenes
																		C_6-C_9	C_{10}-C_{14}	C_{15}-C_{28}	C_{29}-C_{36}				
PQL - Envirolab Services		0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0001	0.0001	0.0001	0.0001	5	0.01	0.05	0.1	0.1	0.001	0.001	0.001	0.001
PQL - SGS		0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0001	0.0001	0.0001	0.0001	5	0.04	0.1	0.2	0.2	0.0005	0.0005	0.0005	0.001
Intra-laboratory Groundwater Duplicate Results - Envirolab Report Number 44406																									
Initial Sample Ref	MW517	0.0004	LPQL	0.0028	0.0025	0.0024	0.0004	0.0005	0.0003	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0.032	0.37	0.24	LPQL	LPQL	LPQL	LPQL	LPQL
Duplicate Sample Ref	GW Dup BB	0.0005	LPQL	0.0031	0.0031	0.003	0.0004	0.0007	0.0005	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0.042	0.4	0.28	LPQL	LPQL	LPQL	LPQL	LPQL
Mean Value		0.00045	NC	0.00295	0.0028	0.0027	0.0004	0.0006	0.0004	NC	NC	NC	NC	NC	NC	NC	NC	0.037	0.385	0.26	NC	NC	NC	NC	NC
RPD Value		22	NC	10	21	22	0	33	50	NC	NC	NC	NC	NC	NC	NC	NC	27	8	15	NC	NC	NC	NC	NC
Inter-laboratory Groundwater Duplicate Results - Envirolab Report Number 44406, SGS Report Number SE80464																									
Initial Sample Ref	MW708	<0.0001	LPQL	0.0001	<0.0001	0.0002	<0.0001	<0.0001	<0.0001	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	<5	0.019	0.21	0.17	LPQL	LPQL	LPQL	LPQL	LPQL
Duplicate Sample Ref	GW Dup AA	0.0001	LPQL	0.0003	0.0004	0.0006	0.0001	0.0003	0.0002	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	11	0.04	0.243	<0.1	LPQL	LPQL	LPQL	LPQL	LPQL
Mean Value		0.000075	NC	0.0002	0.000225	0.0004	0.000075	0.000175	0.0001	NC	NC	NC	NC	NC	NC	NC	6.75	0.0295	0.2265	0.135	NC	NC	NC	NC	NC
RPD Value		67	NC	100	156	100	67	143	120	NC	NC	NC	NC	NC	NC	NC	126	71	15	52	NC	NC	NC	NC	NC

EXPLANATION:

The RPD value is calculated as the absolute value of the difference between the initial and repeat results divided by the average value expressed as a percentage. The following acceptance criteria will be used to assess the RPD results:

- Results > 10 times PQL = RPD value < 50% are acceptable
- Results between 5 & 10 time PQL = RPD value < 75% are acceptable
- Results < 5 times PQL = RPD value < 100% are acceptable

RPD Results Above the Acceptance Criteria 🟩 VALUE

ABBREVIATIONS:

PQL: Practical Quantitation Limit
LPQL: Less than PQL
(-) : Not Analysed
nc: Not Calculated
RPD: Relative Percentage Difference
PAHs: Polycyclic Aromatic Hydrocarbons
Nap: Naphthalene
Acenaphty: Acenapthylene
Acenaphte: Acenaphthene
Fluo: Fluorene
Phen: Phenanthrene
Anth: Anthracene
Fluoro: Fluoranthene
Pyr: Pyrene
B(a)A: Benzo(a)anthracene
Chy: Chrysene
B(a+k)F: Benzo(a+k)fluoranthene
B(a)P: Benzo(a)pyrene
I(123-cd): Indeno(123-cd)pyrene
D(ah)A: Dibenzo(ah)anthracene
B(ghi)P: Benzo(ghi)perylene

TABLE H
LABORATORY RESULTS
QA/QC - TRIP SPIKES, TRIP BLANKS AND RINSATES

All data in mg/kg unless stated otherwise

ANALYTE			PETROLEUM HYDROCARBONS								
			Petroleum Hydrocarbons				Benzene	Toluene	Ethyl Benzene	m+p Xylene	o-Xylenes
			C_6-C_9	C_{10}-C_{14}	C_{15}-C_{28}	C_{29}-C_{36}					
PQL - Soil			25	50	100	100	0.5	0.5	1	2	1
PQL - Water			0.01	0.05	0.1	0.1	0.001	0.001	0.001	0.002	0.001
Date	**Report**	**Sample ref**	**Trip Spikes**								
29/07/2010	44203	T Spike 1A^S	-	-	-	-	100%	99%	99%	96%	99%
30/07/2010	44203	T Spike 2A^S	-	-	-	-	93%	93%	93%	93%	92%
5/08/2010	44406	GW TS AA^W	-	-	-	-	72%	78%	80%	79%	79%
Field Rinsates											
29/07/2010	44203	Rinsate 1A^W	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL
30/07/2010	44203	Rinsate 2A^W	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL
Trip Blanks											
29/07/2010	44203	FB 1A^S	-	-	-	-	LPQL	LPQL	LPQL	LPQL	LPQL
30/07/2010	44203	FB 2A^S	-	-	-	-	LPQL	LPQL	LPQL	LPQL	LPQL
5/08/2010	44406	GW TB AA^W	-	-	-	-	LPQL	LPQL	LPQL	LPQL	LPQL

EXPLANATION:

^{W} Sample type (water) - concentrations in mg/L
^{S} Sample type (sand)
BTEX concentrations in trip spikes are presented as % recovery

ABBREVIATIONS:

PQL: Practical Quantitation Limit
LPQL: Less than PQL
(-) : Not Applicable / Not Analysed

TABLE I
SUMMARY OF LABORATORY TEST DATA
SFM PART 3A AND 4 AREA (EIS 2010a)
All data in mg/kg unless stated otherwise

ANALYTE			HEAVY METALS								PAHs		ORGANOCHLORINE PESTICIDES				OP	PCBs	PETROLEUM HYDROCARBONS									PID	ASBESTOS
			Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	Total PAHs	B(a)P	Aldrin and Dieldrin	Chlordane	DDT, DDD & DDE	Heptachlor	PESTICIDES		Petroleum Hydrocarbons					Benzene	Toluene	Ethyl Benzene	Total Xylenes	VALUES	FIBRES
																			C_6-C_9	C_{10}-C_{14}	C_{15}-C_{28}	C_{29}-C_{36}	C_{10} - C_{36}						
PQL - Envirolab Services			4	0.5	1	1	1	0.1	1	1	-	0.05	0.1	0.1	0.1	0.1	0.1	0.1	25	50	100	100	100	0.5	0.5	1	1		
Site Assessment Criteria ^			500 *	100 *	60% *	5000 *	1500 *	75 *	3000 *	35000 *	100 *	5 *	50 *	250 *	1000 *	50 *	0.1 ^^	50 *	65 $^{\#}$	NSL	NSL	NSL	1000 $^{\#}$	1 $^{\#}$	1.4 $^{\#}$	3.1 $^{\#}$	14 $^{\#}$		
General Solid Waste CT1^{+}			100	20	100	NSL	100	4	40	NSL	NSL	0.8	NSL					NSL	NSL	NSL			NSL	10	288	600	1000		
General Solid Waste SCC1^{+}			500	100	1900	NSL	1500	50	1050	NSL	200	10	50					50	650	NSL			10000	18	518	1080	1800		
Restricted Solid Waste CT2^{+}			400	80	400	NSL	400	16	160	NSL	NSL	3.2	NSL					NSL	NSL	NSL			NSL	40	1152	2400	4000		
Restricted Solid Waste SCC2^{+}			2000	400	7600	NSL	6000	200	4200	NSL	800	23	50					50	2600	NSL			40000	72	2073	4320	7200		
Location	Depth in metres	DESCRIPTION																											
BH501	0.5-0.95	Fill: sand	7	LPQL	24	46	140	0.4	19	150	5.5	0.9	LPQL	LPQL	1.3	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0	No Asbestos Detected
BH501	1.5-1.95	Fill: sand	7	LPQL	23	9	28	0.1	2	26	0.05	0.05	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0	No Asbestos Detected
BH502^{D}	0.3-0.8	Fill: sandy gravel	11	LPQL	9	73	230	0.1	7	160	3.4	0.043	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	340	480	820	LPQL	LPQL	LPQL	LPQL	0	No Asbestos Detected
BH503	0.1-0.4	Fill: gravelly sand	LPQL	LPQL	11	120	98	0.2	14	160	1.5	0.2	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	400	1100	1500	LPQL	LPQL	LPQL	LPQL	0	No Asbestos Detected
BH504^{D}	0.2-0.5	Fill: gravelly sand	4	LPQL	13	71	58	LPQL	11	34	6.5	0.8	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	260	650	910	LPQL	LPQL	LPQL	LPQL	0	No Asbestos Detected
BH504	0.5-0.95	Fill: gravelly sand	7	LPQL	11	130	170	0.5	4	93	149.7	19	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	520	380	900	LPQL	LPQL	LPQL	LPQL	0	No Asbestos Detected
BH504	1.3-1.6	Fill: sandy gravel	11	0.5	14	600	230	0.3	18	270	55.5	5.7	NA	NA	NA	NA	NA	NA	LPQL	LPQL	430	250	680	LPQL	LPQL	LPQL	LPQL	0	No Asbestos Detected
BH504	1.6-1.95	Fill: silty sand	1300	1.7	9	300	260	40	6	280	0.06	0.06	NA	NA	NA	NA	NA	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0	No Asbestos Detected
BH506	0.5-1.0	Fill: gravelly sand	LPQL	LPQL	31	16	9	LPQL	23	22	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0	No Asbestos Detected
BH506	1.85-2.05	Fill: gravelly sand	9	LPQL	8	11	52	LPQL	3	7	1.6	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	110	280	LPQL	390	LPQL	LPQL	LPQL	LPQL	0	No Asbestos Detected
BH507	0.5-0.8	Fill: gravelly sand	LPQL	LPQL	60	25	17	LPQL	45	54	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	3	No Asbestos Detected
BH507	1.6-2.05	Fill: gravelly sand	LPQL	LPQL	13	76	130	0.3	8	340	7.7	0.3	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	310	1400	340	LPQL	1740	LPQL	LPQL	LPQL	2.1	94.7	No Asbestos Detected
BH507	3.0-3.45	Silty sand	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	21	NA
BH508^{D}	0.3-0.5	Fill: gravelly sand	5	LPQL	15	110	130	0.2	20	120	5.7	1	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	130	430	510	1070	LPQL	LPQL	LPQL	LPQL	0	No Asbestos Detected
BH508	1.5-1.95	Fill: silty sand	LPQL	LPQL	9	50	39	LPQL	4	110	0.29	0.09	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0	No Asbestos Detected
BH510	1.0-1.45	Fill: gravelly sand	11	LPQL	19	47	170	2	6	72	27.8	2.7	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	310	250	560	LPQL	LPQL	LPQL	LPQL	0	No Asbestos Detected
BH510	3.0-3.45	Fill: gravelly sand	5	1.8	15	120	210	1.1	8	160	18.1	1.6	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	150	LPQL	150	LPQL	LPQL	LPQL	LPQL	0	No Asbestos Detected
BH511	0.3-0.8	Fill: gravelly sand	4	LPQL	52	62	87	0.3	43	97	1.3	0.2	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	180	240	420	LPQL	LPQL	LPQL	LPQL	0	No Asbestos Detected
BH511	1.5-1.95	Fill: gravelly sand	4	LPQL	7	58	110	0.3	3	68	8	0.1	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	82	4900	2400	1100	8400	LPQL	LPQL	LPQL	LPQL	100	No Asbestos Detected
BH511	3.0-3.45	Fill: gravelly sand	25	LPQL	85	74	390	1.6	31	140	9.5	0.8	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	480	2100	1300	410	3810	LPQL	LPQL	LPQL	LPQL	324	No Asbestos Detected
BH511	4.5-4.95	Silty sand	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	8.3	NA
BH512	0.32-0.4	Fill: gravelly sand	LPQL	LPQL	2	33	71	0.2	1	130	6.1	0.6	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0	No Asbestos Detected
BH512	0.9-1.0	Fill: gravelly sand	6	LPQL	8	100	300	1.7	4	160	14.1	1.3	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	220	150	370	LPQL	LPQL	LPQL	LPQL	0	No Asbestos Detected
BH512	1.4-1.5	Fill: sand	LPQL	0.5	6	25	56	0.4	1	330	15.3	1.5	NA	NA	NA	NA	NA	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0	No Asbestos Detected
BH512	2.9-3.0	Fill: sandy clay	5	0.9	11	65	230	0.4	9	1500	11.8	1	NA	NA	NA	NA	NA	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0	No Asbestos Detected
BH513	1.1-1.5	Fill: silty clayey sand	LPQL	LPQL	5	6	24	LPQL	1	5	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0.8	No Asbestos Detected
BH514	0.5-0.9	Fill: clayey gravelly sand	5	LPQL	14	16	45	0.4	4	41	2.2	0.2	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0	No Asbestos Detected
BH514	1.0-1.45	Fill: silty sand	LPQL	LPQL	8	7	21	LPQL	6	44	LPQL	LPQL	NA	NA	NA	NA	NA	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0	No Asbestos Detected
BH515	0.5-0.95	Fill: gravelly sand	LPQL	LPQL	8	13	31	0.1	3	31	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0	No Asbestos Detected
BH516	0.5-0.9	Fill: silty sand	5	LPQL	25	31	85	0.2	25	280	2.57	0.07	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	190	LPQL	190	LPQL	LPQL	LPQL	LPQL	0	No Asbestos Detected
BH516	1.1-1.4	sand	LPQL	LPQL	10	3	16	LPQL	2	40	1.98	0.08	NA	NA	NA	NA	NA	NA	LPQL	180	540	LPQL	720	LPQL	LPQL	LPQL	LPQL	57.1	NA
BH517	0.2-0.5	Fill: gravelly sand	LPQL	LPQL	22	49	5	LPQL	150	49	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	14.9	No Asbestos Detected
BH517	0.5-0.95	Fill: sand	6	LPQL	3	LPQL	1	LPQL	1	2	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0	No Asbestos Detected
BH517	1.5-1.95	Fill: gravelly sand	LPQL	LPQL	12	150	68	0.3	4	240	LPQL	LPQL	NA	NA	NA	NA	NA	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0	No Asbestos Detected
BH517	3.0-3.45	Fill: silty sand	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	450	11000	4100	270	15370	LPQL	LPQL	LPQL	LPQL	178	NA
BH517	4.5-4.95	Silty sand	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	LPQL	190	LPQL	LPQL	190	LPQL	LPQL	LPQL	LPQL	159	NA
BH517	5.5-6.0	Silty sand	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	LPQL	160	LPQL	LPQL	160	LPQL	LPQL	LPQL	LPQL	44.6	NA
BH518	0.5-0.8	Fill: sandy gravel	4	LPQL	11	10	42	LPQL	5	110	1.2	0.1	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	550	LPQL	550	LPQL	LPQL	LPQL	LPQL	0	No Asbestos Detected
BH518	1.0-1.6	Fill: sandy gravel	LPQL	LPQL	83	26	11	LPQL	20	58	LPQL	LPQL	NA	NA	NA	NA	NA	NA	LPQL	51	150	LPQL	201	LPQL	LPQL	LPQL	LPQL	5.6	No Asbestos Detected
BH519	0.5-0.8	Fill: sandy gravel	9	0.7	40	94	180	0.9	36	190	22.6	2.2	LPQL	LPQL	44	LPQL	LPQL	LPQL	LPQL	LPQL	210	300	510	LPQL	LPQL	LPQL	LPQL	0	No Asbestos Detected
Total no. of samples			35	35	35	35	35	35	35	35	35	35	27	27	27	27	27	27	40	40	40	40	40	40	40	40	40	40	34
Maximum Value			1300	1.8	85	600	390	40	150	1500	149.7	19	LPQL	LPQL	44	LPQL	LPQL	LPQL	480	11000	4100	1100	15370	LPQL	LPQL	LPQL	2.1	324	NC

EXPLANATION:

^ Site Assessment Criteria: Guideline concentrations adopted for the investigation as outlined below:
* National Environment Protection (Assessment of Site Contamination) Measure 1999 (NEPC Guidelines)
Health Investigation Levels (HIL) - Column F, Commercial/Industrial
$^{\#}$ NSW EPA (DECCW) Guidelines for Assessing Service Station Sites - 1994
^^ In the absence of Australian guidelines, the laboratory PQL has been adopted as the site assessment criteria
$^{+}$ Waste Classification Guidelines – Part 1: Classifying Waste (2009)
^{D} Higher duplicate values adopted where appropriate

Concentration above the Site Assessment Criteria 🟨 VALUE

ABBREVIATIONS:

PAHs: Polycyclic Aromatic Hydrocarbons
B(a)P: Benzo(a)pyrene
PQL: Practical Quantitation Limit
LPQL: Less than PQL
NA: Not Analysed
NC: Not Calculated
OP: Organophosphorus Pesticides
PID: Photoionisation Detector
PCBs: Polychlorinated Biphenyls
NSL: No Set Limit

TABLE J
GROUNDWATER MONITORING ANALYSIS
SFM PART 3A AND 4 AREA (EIS 2010a)
All results in mg/L unless stated otherwise.

Contaminant	PQL Envirolab	Guideline Concentration	SAMPLES				
		ANZECC 2000 Marine Waters ^{1}	MW508	MW512	MW513	MW516	MW517^{D}
Field Measurements *							
Dissolved oxygen (ppm)	-	NSL	0.3	0.3	0.2	no data	0.2
Redox potential (mV)	-	NSL	129.2	134.6	44.7	no data	90.1
pH	-	7 - 8.5^{++}	6.75	7.05	6.63	no data	7.09
Conductivity (mS/cm)	-	NSL	1.2	0.8	0.77	no data	1.3
Temperature ©	-	NSL	22.9	19.4	22.1	no data	24
Miscellaneous Inorganics							
pH	0.1	7 - 8.5^{++}	6.3	6.8	6.7	NA	6.8
Electrical Conductivity (mS/cm)	0.001	NSL	1.1	0.8	0.69	NA	1.1
Hardness (mg/CaC03/L)	1	NSL	304	186	236	NA	315
Oil and Grease	5	10$^{\#\wedge}$	LPQL	LPQL	LPQL	LPQL	57
Heavy Metals							
Arsenic (As lll)	0.001	0.0023 ^{t}	0.005	0.005	LPQL	0.002	0.012
Cadmium	0.0001	0.0055	LPQL	LPQL	LPQL	LPQL	LPQL
Chromium	0.001	0.059^{H}	LPQL	LPQL	0.001	LPQL	LPQL
Copper	0.001	0.008^{H}	LPQL	LPQL	LPQL	0.002	LPQL
Lead	0.001	0.068^{H}	LPQL	0.001	LPQL	0.071	LPQL
Mercury	0.0001	0.0004	LPQL	LPQL	LPQL	LPQL	LPQL
Nickel	0.001	0.439^{H}	0.018	0.006	0.011	0.003	0.005
Zinc	0.001	0.094^{H}	0.022	0.055	0.009	0.031	0.084
Petroleum Hydrocarbons							
Hydrocarbons C6-C9	0.01	NSL	LPQL	LPQL	LPQL	LPQL	0.190
Hydrocarbons C10-C14	0.05	0.6**	LPQL	LPQL	LPQL	NA	0.830
Hydrocarbons C15-C28	0.1		0.190	LPQL	LPQL	NA	0.470
Hydrocarbons C29-C36	0.1		LPQL	LPQL	LPQL	NA	LPQL
Volatile Organic Contaminants (VOCs)^{2}							
Benzene	0.001	0.7	LPQL	LPQL	LPQL	LPQL	LPQL
Toluene	0.001	0.18 ^{t}	LPQL	LPQL	LPQL	LPQL	LPQL
Ethyl Benzene	0.001	0.005 ^{t}	LPQL	LPQL	LPQL	LPQL	LPQL
Total xylenes	0.003	0.38$^{\#}$	LPQL	LPQL	LPQL	LPQL	LPQL
o-xylene	0.001	0.35 ^{t}	LPQL	LPQL	LPQL	LPQL	LPQL
m+p-xylene	0.002	0.275 ^{t}	LPQL	LPQL	LPQL	LPQL	LPQL
Isopropylbenzene	0.001	0.66^{US}	LPQL	LPQL	LPQL	LPQL	0.024
n-Propylbenzene	0.001	0.24^{US}	LPQL	LPQL	LPQL	LPQL	0.011
tert -Butylbenzene	0.001	0.24^{US}	LPQL	LPQL	LPQL	LPQL	0.0027
sec -Butylbenzene	0.001	0.24^{US}	LPQL	LPQL	LPQL	LPQL	0.013
n-Butylbenzene	0.001	0.24^{US}	LPQL	LPQL	LPQL	LPQL	0.0016
Total VOCs	0.001	NSL	ALPQL	ALPQL	ALPQL	ALPQL	0.0523
Polycyclic Aromatic Hydrocarbons (PAHs)^{3}							
Naphthalene	0.001	0.016	LPQL	LPQL	LPQL	NA	0.0012
Acenaphthylene	0.0001	NSL	LPQL	LPQL	LPQL	NA	0.0001
Acenaphthene	0.0001	NSL	LPQL	LPQL	LPQL	NA	0.004
Fluorene	0.0001	NSL	LPQL	LPQL	LPQL	NA	0.004
Phenanthrene	0.0001	0.0006^{L}	LPQL	LPQL	LPQL	NA	0.0042
Anthracene	0.0001	0.0004^{t}	LPQL	LPQL	LPQL	NA	0.001
Fluoranthene	0.0001	0.001^{L}	LPQL	LPQL	LPQL	NA	0.001
Pyrene	0.0001	NSL	LPQL	LPQL	LPQL	NA	0.0007
Benzo(a)anthracene	0.0001	NSL	LPQL	LPQL	LPQL	NA	0.0001
Chrysene	0.0001	NSL	LPQL	LPQL	LPQL	NA	LPQL
Benzo(a)pyrene	0.0001	0.0001 ^{L}	LPQL	LPQL	LPQL	NA	LPQL
1-Methylnaphthalene	0.0001	NSL	LPQL	LPQL	LPQL	NA	LPQL
2-Methylnaphthalene	0.0001	NSL	LPQL	LPQL	LPQL	NA	LPQL
Total PAHs	-	0.003 $^{\#}$	ALPQL	ALPQL	ALPQL	NA	0.0163

EXPLANATION:

[1] ANZECC Australian Water Quality Guidelines for Fresh Waters, 2000 - Trigger Values for protection of 95% of species
[2] VOCs listed are BTEX compounds together with all VOCs with detections above the PQL
[3] PAHs listed are those with trigger values presented in ANZECC together with all PAH compounds with detections above the PQLs
* Field Measurements Undertaken on 28 May 2010
[++] ANZECC Australian Water Quality Guidelines for Fresh and Marine Waters, 2000 - Level for South-East Australian Estuaries
^ In the absence of a health guideline the aesthetic guideline concentration has been quoted
** In the absence of locally endorsed guidelines, the Dutch intervention levels specified in *'Circular on target values and intervention values for soil remediation'* (*Ministry of Housing and the Environment 2000*) have been quoted
[t] In the absence of a high reliability guideline concentration, the moderate or low reliability guideline concentration has been used.
[#] NSW EPA (now DECCW) Guidelines for Assessing Service Station Sites (1994).
^^ In the absence of Australian guidelines, the laboratory practical quantitation limit has been used.
[H] Hardness modified trigger value adopted in accordance with ANZECC 2000
[US] In the absence of locally endorsed guidelines, the USEPA Region 9 PRGs adopted for Tap Water was used for screening level purposes
[L] 99% Protection levels adopted due to potential for bioaccumulation effects
[D] Higher duplicate value adopted where appropriate

Concentration above the Site Assessment Criteria	VALUE

ABBREVIATIONS:

NA : Not Analysed
NSL : No set limit
PQL: Practical Quantitation Limit
LPQL: - Less than Practical Quantitation Limit
ALPQL:- all results less than the Practical Quantitation Limit

TABLE K
SUMMARY OF LABORATORY TEST DATA
WATERFRONT WORKS PART 3A AREA
All data in mg/kg unless stated otherwise

ANALYTE			HEAVY METALS								PAHs		ORGANOCHLORINE PESTICIDES				OP	PCBs	Total	PETROLEUM HYDROCARBONS									PID	ASBESTOS
			Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	Total PAHs	B(a)P	Aldrin and Dieldrin	Chlordane	DDT, DDD & DDE	Heptachlor	PESTICIDES		Cyanide	Petroleum Hydrocarbons					Benzene	Toluene	Ethyl Benzene	Total Xylenes	VALUES	FIBRES
																				C_6-C_9	C_{10}-C_{14}	C_{15}-C_{28}	C_{29}-C_{36}	C_{10} - C_{36}						
PQL - Envirolab Services			4	0.5	1	1	1	0.1	1	1	-	0.05	0.1	0.1	0.1	0.1	0.1	0.1	0.5	25	50	100	100	100	0.5	0.5	1	1		
Site Assessment Criteria ^			200 *	40 *	24% *	2000 *	600 *	30 *	600 *	14000 *	40 *	2 *	20 *	100 *	400 *	20 *	0.1 ^^	20 *	1000*	65 [#]	NSL	NSL	NSL	1000 [#]	1 [#]	1.4 [#]	3.1 [#]	14 [#]		
General Solid Waste CT1[+]			100	20	100	NSL	100	4	40	NSL	NSL	0.8	NSL					NSL	320	NSL	NSL			NSL	10	288	600	1000		
General Solid Waste SCC1[+]			500	100	1900	NSL	1500	50	1050	NSL	200	10	50					50	5900	650	NSL			10000	18	518	1080	1800		
Restricted Solid Waste CT2[+]			400	80	400	NSL	400	16	160	NSL	NSL	3.2	NSL					NSL	1280	NSL	NSL			NSL	40	1152	2400	4000		
Restricted Solid Waste SCC2[+]			2000	400	7600	NSL	6000	200	4200	NSL	800	23	50					50	23600	2600	NSL			40000	72	2073	4320	7200		
Location	Depth in metres	DESCRIPTION																												
BH601	0.3-0.5	Fill: Silty sandy clay	5	LPQL	14	90	150	1.5	13	180	46.3	6.1	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	NA	LPQL	LPQL	330	380	710	LPQL	LPQL	LPQL	LPQL	0	No asbestos detected
BH601	0.6-0.95	Fill: Silty clayey sand	8	LPQL	11	56	640	1.2	9	110	26.1	3.4	NA	NA	NA	NA	NA	NA	LPQL	LPQL	LPQL	120	170	290	LPQL	LPQL	LPQL	LPQL	0	No asbestos detected
BH601	3.2-3.45	Fill: Silty sand	LPQL	LPQL	4	LPQL	3	LPQL	LPQL	3	LPQL	LPQL	NA	NA	NA	NA	NA	NA	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0	No asbestos detected
BH602	0.3-0.5	Fill: Silty sandy clay	12	LPQL	25	34	31	0.1	17	70	6.6	0.8	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0	No asbestos detected
BH602	1.7-1.92	Fill: Silty sand	7	LPQL	15	33	97	0.1	7	81	20.6	3	NA	NA	NA	NA	NA	NA	NA	LPQL	LPQL	280	320	600	LPQL	LPQL	LPQL	LPQL	0	No asbestos detected
BH602	2.8-3.0	Fill: Silty sand	LPQL	LPQL	8	5	25	LPQL	2	45	0.3	0.1	NA	NA	NA	NA	NA	NA	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0	No asbestos detected
BH603	0.3-0.5	Fill: Sandy gravel	LPQL	LPQL	120	61	6	LPQL	97	54	0.2	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0	No asbestos detected
BH603	0.9-1.2	Fill: Silty sand	LPQL	LPQL	7	3	3	LPQL	6	9	LPQL	LPQL	NA	NA	NA	NA	NA	NA	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0	No asbestos detected
BH604	0.3-0.5	Fill: Sandy gravel	6	1.5	41	260	520	2.6	24	840	5.6	0.8	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	NA	LPQL	630	2000	2000	4630	LPQL	LPQL	LPQL	LPQL	23	No asbestos detected
BH604	1.7-1.95	Fill: Silty clayey sand	LPQL	LPQL	25	26	44	0.2	4	37	0.1	LPQL	NA	NA	NA	NA	NA	NA	LPQL	LPQL	140	490	160	790	LPQL	LPQL	LPQL	LPQL	48.3	No asbestos detected
BH604	3.2-3.45	Silty sand	5	LPQL	7	6	21	LPQL	3	28	LPQL	LPQL	NA	NA	NA	NA	NA	NA	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	41.1	NA
BH605	0.7-0.95	Fill: Silty sand	LPQL	LPQL	4	3	16	0.1	LPQL	53	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0	No asbestos detected
BH605	1.3-1.5	Fill: Silty gravel	12	LPQL	20	38	120	0.2	18	140	2.29	0.09	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	NA	LPQL	120	1500	LPQL	1620	LPQL	LPQL	LPQL	LPQL	9.3	No asbestos detected
BH605	3-3.45	Silty sand	LPQL	LPQL	4	4	8	LPQL	1	4	LPQL	LPQL	NA	NA	NA	NA	NA	NA	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0.6	NA
BH606	0.3-0.5	Fill: Silty clayey sand	LPQL	LPQL	16	30	78	0.2	5	42	0.08	0.08	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	NA	LPQL	LPQL	220	110	330	LPQL	LPQL	LPQL	LPQL	0	No asbestos detected
BH606	0.7-0.95	Fill: Silty clayey sand	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA	0	NA
BH606[D]	1.7-1.95	Fill: Silty clayey sand	LPQL	LPQL	8	3	15	LPQL	4	28	4.9	0.1	NA	NA	NA	NA	NA	NA	NA	LPQL	380	850	LPQL	1230	LPQL	LPQL	LPQL	LPQL	44.8	No asbestos detected
BH606	2.2-2.5	Fill: Silty clayey sand	16	LPQL	14	61	58	0.3	4	220	249.9	24	NA	NA	NA	NA	NA	NA	NA	LPQL	7000	13000	2100	22100	LPQL	LPQL	LPQL	LPQL	50.6	No asbestos detected
BH606	2.8-3.2	Sandstone	LPQL	LPQL	4	1	4	LPQL	LPQL	4	2.4	0.2	NA	NA	NA	NA	NA	NA	NA	LPQL	120	230	LPQL	350	LPQL	LPQL	LPQL	LPQL	44	NA
BH607	0.1-0.2	Fill: Gravelly silty sand	LPQL	LPQL	30	71	46	LPQL	30	41	0.8	0.1	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	630	1800	2430	LPQL	LPQL	LPQL	LPQL	0	No asbestos detected
BH607	0.5-0.7	Fill: Sandy clay	29	LPQL	12	16	40	0.2	2	29	47.9	4.7	NA	NA	NA	NA	NA	NA	NA	LPQL	LPQL	200	130	330	LPQL	LPQL	LPQL	LPQL	0	No asbestos detected
BH607	1.7-1.9	Fill: Sandy clay	16	LPQL	74	1	11	0.1	LPQL	5	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	14	No asbestos detected
BH608[DL]	0.3-0.5	Fill: Silty sand	LPQL	LPQL	8	23	27	LPQL	4	58	0.07	0.07	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	NA	LPQL	LPQL	440	1100	1540	LPQL	LPQL	LPQL	LPQL	0	No asbestos detected
BH608	0.7-0.95	Fill: Silty sand	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA	0	NA
BH608	1.3-1.5	Fill: Silty sand	LPQL	LPQL	2	1	5	LPQL	1	620	LPQL	LPQL	NA	NA	NA	NA	NA	NA	NA	LPQL	76	150	LPQL	226	LPQL	LPQL	LPQL	LPQL	6.6	No asbestos detected
BH609	0.2-0.5	Fill: Gravelly sand	30	LPQL	8	35	33	LPQL	3	64	0.26	0.06	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	NA	LPQL	53	LPQL	LPQL	53	LPQL	LPQL	LPQL	LPQL	2.2	No asbestos detected
BH610	0.2-0.4	Fill: Gravelly sand	LPQL	LPQL	11	82	58	0.1	32	63	33.7	3.5	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	NA	LPQL	LPQL	320	620	940	LPQL	LPQL	LPQL	LPQL	0	No asbestos detected
BH610	0.7-0.95	Fill: Silty clayey sand	LPQL	LPQL	5	29	88	0.2	8	250	40.9	5.9	NA	NA	NA	NA	NA	NA	NA	LPQL	LPQL	150	160	310	LPQL	LPQL	LPQL	LPQL	0	No asbestos detected
BH610	1.7-1.95	Fill: Silty clay	NA	NA	NA	NA	NA	NA	NA	NA	LPQL	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0	NA
Total no. of samples			26	26	26	26	26	26	26	26	27	27	12	12	12	12	12	12	5	26	26	26	26	26	26	26	26	26	29	23
Maximum Value			30	1.5	120	260	640	2.6	97	840	250	24	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	7000	13000	2100	22100	LPQL	LPQL	LPQL	LPQL	50.6	NC
Mean Value			43	NC	NC	NC	92	NC	NC	NC	21	2.2	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	1647	NC	NC	NC	NC	NC	NC
Standard Deviation			NC	NC	NC	NC	160.0	NC	NC	NC	51	5.0	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	4476	NC	NC	NC	NC	NC	NC
Coefficient of Variation			NC	NC	NC	NC	1.7	NC	NC	NC	2.5	2.3	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	2.8	NC	NC	NC	NC	NC	NC
Distribution [+]			NC	NC	NC	NC	Gamma	NC	NC	NC	Non-parametric	Non-parametric	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	Non-parametric	NC	NC	NC	NC	NC	NC
Upper Level 95% Confidence Limit on Mean Value (95% UCL) [++]			NC	NC	NC	NC	153	NC	NC	NC	66	6.7	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	5630	NC	NC	NC	NC	NC	NC

EXPLANATION:

^ Site Assessment Criteria: Guideline concentrations adopted for the investigation as outlined below:
* National Environment Protection (Assessment of Site Contamination) Measure 1999 (NEPC Guidelines)
Health Investigation Levels (HIL) - Column E, Parks and recreational open space
[#] NSW EPA (DECCW) Guidelines for Assessing Service Station Sites - 1994
^^ In the absence of Australian guidelines, the laboratory PQL has been adopted as the site assessment criteria
[+] Waste Classification Guidelines – Part 1: Classifying Waste (2009)
[D] Higher duplicate values adopted where appropriate for UCL calculations
[L] Laboratory duplicate results adopted for TPH. See page 38 in report 43806.

Concentration above the Site Assessment Criteria VALUE

ABBREVIATIONS:

PAHs: Polycyclic Aromatic Hydrocarbons
B(a)P: Benzo(a)pyrene
PQL: Practical Quantitation Limit
LPQL: Less than PQL
NA: Not Analysed
NC: Not Calculated
OP: Organophosphorus Pesticides
PID: Photoionisation Detector
PCBs: Polychlorinated Biphenyls
NSL: No Set Limit

NOTE: ++ Statistical analysis has been calculate using ProUCL version 3.0 (USEPA). Statistical analyses has only been undertaken for those contaminants that exceeded the health based site assessment criteria. Fill samples only (Waterfront Works Part 3A area).

TABLE L
GROUNDWATER MONITORING ANALYSIS
WATERFRONT WORKS PART 3A AREA (EIS 2010b)
All results in mg/L unless stated otherwise.

Contaminant	PQL Envirolab	Guideline Concentration ANZECC 2000 Marine Waters [1]	Guideline Concentration Hardness Modified Triggers Marine Waters[H]	SAMPLES		
				MW605[D]	MW606	MW608
Field Measurements *						
Dissolved oxygen (ppm)	-	NSL	-	0.2	0.3	0.7
Redox potential (mV)	-	NSL	-	35.9	121.2	272.9
pH	-	7 - 8.5[++]	-	6.9	6.78	5.41
Conductivity (mS/cm)	-	NSL	-	1.4	2	11.9
Temperature ©	-	NSL	-	20.9	20.3	20.8
Miscellaneous						
pH	0.1	7 - 8.5[++]	-	7	6.9	5.7
Electrical Conductivity (mS/cm)	0.001	NSL	-	1.2	1.8	8.9
Hardness (mg/CaC03/L)	1	NSL	-	387	503	1346
Total Cyanide	0.005	0.004	-	LPQL	LPQL	LPQL
Oil and Grease	5	10[#^]	-	LPQL	LPQL	LPQL
Heavy Metals						
Arsenic (As lll)	0.001	0.0023 [t]	-	0.004	0.004	0.003
Cadmium	0.0001	0.0055	0.0022[H]	LPQL	LPQL	0.0004
Chromium	0.001	0.01[t]	0.0091[H]	LPQL	LPQL	0.002
Copper	0.001	0.0013	0.0139[H]	LPQL	LPQL	0.057
Lead	0.001	0.0044	0.1045[H]	LPQL	LPQL	0.008
Mercury	0.0001	0.0004	-	LPQL	LPQL	LPQL
Nickel	0.001	0.07	0.1089[H]	0.002	0.006	0.022
Zinc	0.001	0.015	0.0792[H]	0.005	0.03	0.17
Petroleum Hydrocarbons						
Hydrocarbons C6-C9	0.01	NSL	-	LPQL	LPQL	LPQL
Hydrocarbons C10-C14	0.05	0.6**	-	0.060	0.410	0.058
Hydrocarbons C15-C28	0.1			0.350	0.740	0.450
Hydrocarbons C29-C36	0.1			LPQL	LPQL	0.130
Volatile Organic Contaminants (VOCs)[2]						
Benzene	0.001	0.7	-	LPQL	LPQL	LPQL
Toluene	0.001	0.18 [t]	-	LPQL	LPQL	LPQL
Ethyl Benzene	0.001	0.005 [t]	-	LPQL	LPQL	LPQL
Total xylenes	0.003	0.38[#]	-	LPQL	LPQL	LPQL
o-xylene	0.001	0.35 [t]	-	LPQL	LPQL	LPQL
m+p-xylene	0.002	0.275 [t]	-	LPQL	LPQL	LPQL
Isopropylbenzene	0.001	0.66[US]	-	0.0033	LPQL	LPQL
n-Propylbenzene	0.001	0.24[US]	-	0.0013	LPQL	LPQL
tert -Butylbenzene	0.001	0.24[US]	-	LPQL	LPQL	LPQL
sec -Butylbenzene	0.001	0.24[US]	-	LPQL	LPQL	LPQL
n-Butylbenzene	0.001	0.24[US]	-	LPQL	LPQL	LPQL
Total VOCs	0.001	NSL	-	0.0046	ALPQL	ALPQL
Polycyclic Aromatic Hydrocarbons (PAHs)[3]						
Naphthalene	0.001	0.016	-	0.0003	0.0008	LPQL
Acenaphthylene	0.0001	NSL	-	0.0001	0.0003	LPQL
Acenaphthene	0.0001	NSL	-	0.0036	0.0023	LPQL
Fluorene	0.0001	NSL	-	0.0027	0.0027	LPQL
Phenanthrene	0.0001	0.0006[L]	-	0.0029	0.0008	LPQL
Anthracene	0.0001	0.0004[t]	-	0.0006	0.0003	LPQL
Fluoranthene	0.0001	0.001[L]	-	0.0002	0.0004	LPQL
Pyrene	0.0001	NSL	-	0.0001	0.0003	LPQL
Benzo(a)pyrene	0.0001	0.0001 [L]	-	LPQL	LPQL	LPQL
1-Methylnaphthalene	0.0001	NSL	-	LPQL	NA	NA
2-Methylnaphthalene	0.0001	NSL	-	0.0019	NA	NA

EXPLANATION:

[1] ANZECC Australian Water Quality Guidelines for Fresh Waters, 2000 - Trigger Values for protection of 95% of species

[2] VOCs listed are BTEX compounds together with all VOCs with detections above the PQL

[3] PAHs listed are those with trigger values presented in ANZECC together with all PAH compounds with detections above the PQLs

* Field Measurements Undertaken on 22 July 2010 for the surface water and 27 July 2010

[++] ANZECC Australian Water Quality Guidelines for Fresh and Marine Waters, 2000 - Level for South-East Australian Estuaries

^ In the absence of a health guideline the aesthetic guideline concentration has been quoted

** In the absence of locally endorsed guidelines, the Dutch intervention levels specified in *'Circular on target values and intervention values for soil remediation'* (*Ministry of Housing and the Environment 2000*) have been quoted

[t] In the absence of a high reliability guideline concentration, the moderate or low reliability guideline concentration has been used.

[#] NSW EPA (now DECCW) Guidelines for Assessing Service Station Sites (1994).

^^ In the absence of Australian guidelines, the laboratory practical quantitation limit has been used.

[H] Hardness modified trigger value adopted in accordance with ANZECC 2000. Only adopted for MW605 and MW606 based on EC values

[US] In the absence of locally endorsed guidelines, the USEPA Region 9 PRGs adopted for Tap Water was used for screening level purposes

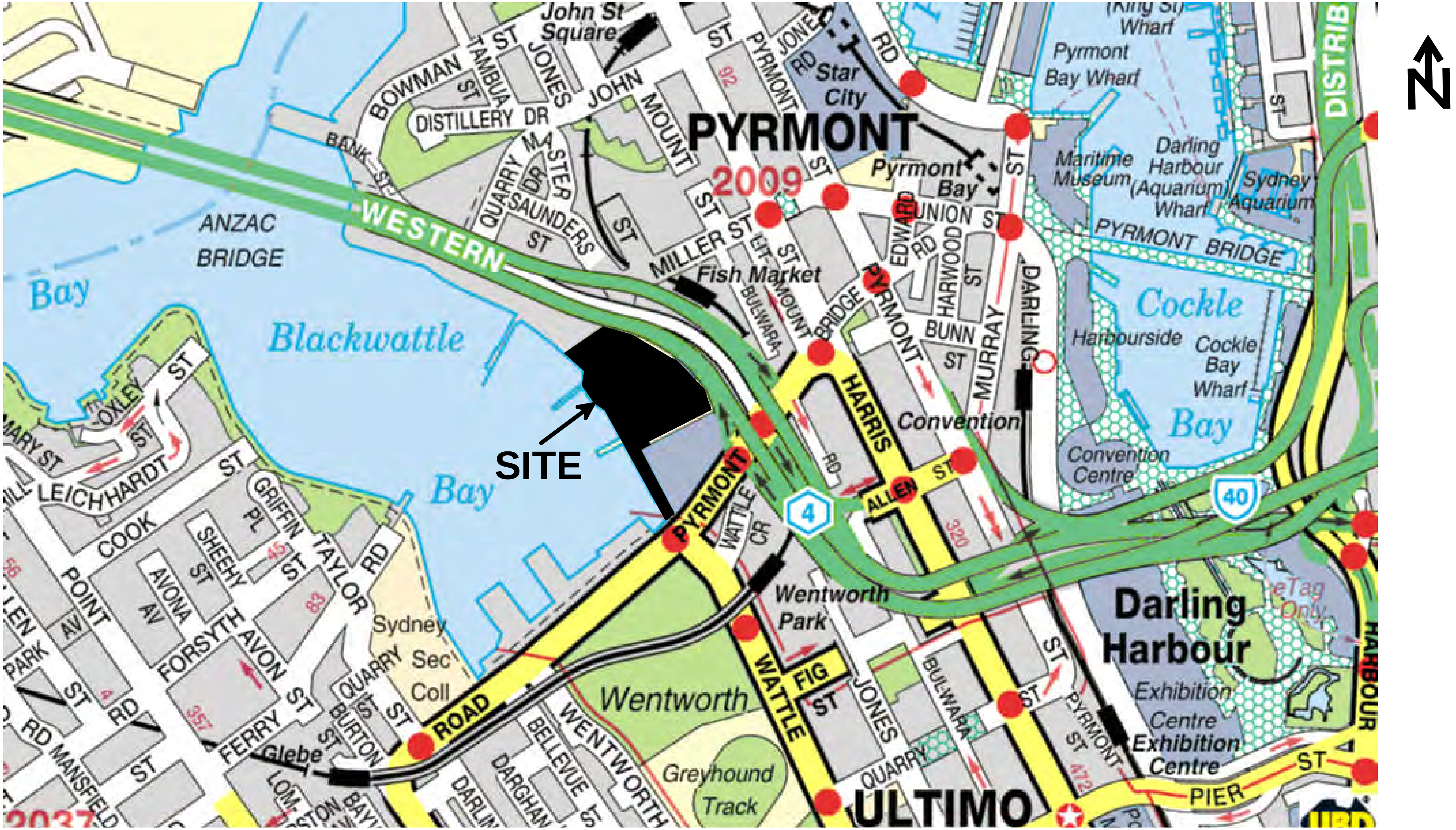
[L] 99% Protection levels adopted due to potential for bioaccumulation effects

[D] Higher duplicate value adopted where appropriate

Concentration above the Site Assessment Criteria	VALUE

ABBREVIATIONS:

NA : Not Analysed
NSL : No set limit
PQL: Practical Quantitation Limit
LPQL: - Less than Practical Quantitation Limit
ALPQL:- all results less than the Practical Quantitation Limit



Recreated from UBD on disc (version 5.0)
Map Ref: 235 N11 (not to scale)

Note: Reference should be made to the text for a full understanding of this plan

SITE LOCATION PLAN

Sydney Fish Markets
56-60 Pyrmont Bridge Road, Pyrmont, NSW

EIS

**ENVIRONMENTAL
INVESTIGATION
SERVICES**

Job No: E23982Krpt2
Figure: 1

LEGEND:

—	APPROXIMATE SITE BOUNDARY
—	APPROXIMATE BOUNDARY OF SFM PART 3A AND 4 AREA
—	APPROXIMATE BOUNDARY OF WATERFRONT WORKS PART 3A AREA
- - -	APPROXIMATE OUTLINE OF PROPOSED REDEVELOPMENT STAGES
🟪	GPR SURVEY AREAS

Approximate Scale (m)

0 10 20 30 40 50

Note: Reference should be made to the text for a full understanding of this plan.

SITE LAYOUT PLAN

Sydney Fish Markets
56-60 Pyrmont Bridge Road, Pyrmont, NSW

EIS

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INVESTIGATION
SERVICES

Job No: E23982Krpt2
Figure: 2

Site boundary extends further south.
Please refer to Figure 2.

LEGEND:

● **BH501 (1.0) BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m) - August 2010**

● **BH701 (1.0) BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m) - June 2010**

✚ **MONITORING WELL LOCATION**

🟥 **APPROXIMATE SITE BOUNDARY**

🟩 **APPROXIMATE BOUNDARY OF SFM PART 3A AND 4 AREA**

0.7-0.95
TPH C10-C36 = 1,000
B(a)P = 5
Total PAHs = 100

SAMPLE DEPTH (m) CONTAMINANT AND CONCENTRATION ABOVE SAC (mg/kg)

Approximate Scale (m)
0 10 20 30 40 50

Note: Reference should be made to the text for a full understanding of this plan.

BOREHOLE LOCATION PLAN AND SOIL CONTAMINATION DATA SFM PART 3A AND 4 AREA

Sydney Fish Markets
56-60 Pyrmont Bridge Road, Pyrmont, NSW

EIS
ENVIRONMENTAL INVESTIGATION SERVICES

Job No: E23982Krpt2
Figure: 3

Site boundary extends further south.
Please refer to Figure 2.

LEGEND:

🟡 **BH501 (1.0) BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m) - August 2010**

● **BH701 (1.0) BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m) - June 2010**

✚ **MONITORING WELL LOCATION**

— **APPROXIMATE SITE BOUNDARY**

— **APPROXIMATE BOUNDARY OF SFM PART 3A AND 4 AREA**

TPH C10-C36 = 0.6
Phenanthrene = 0.006 **CONTAMINANT AND CONCENTRATION ABOVE SAC (mg/L)**

Approximate Scale (m)
0 10 20 30 40 50

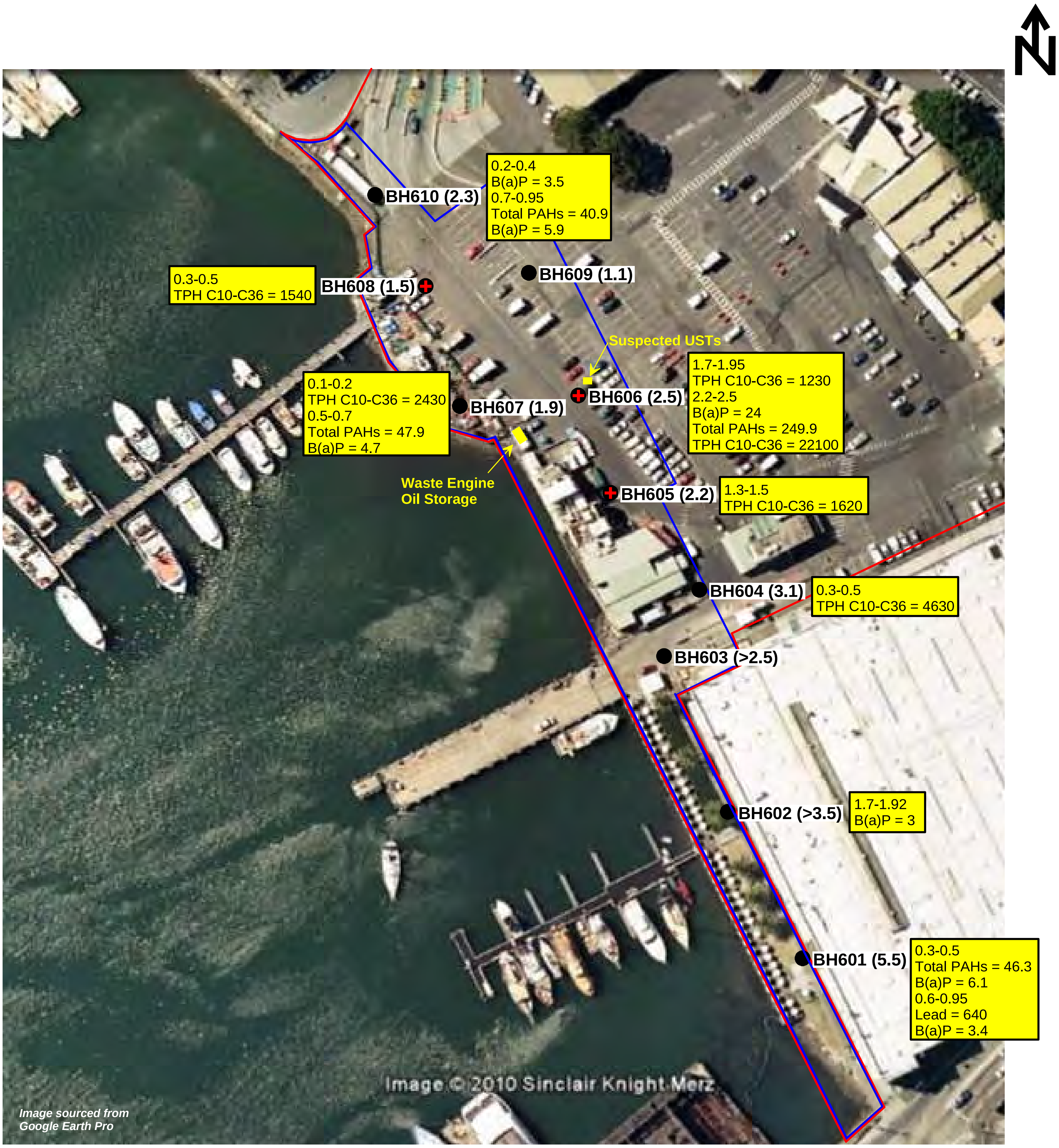
Note: Reference should be made to the text for a full understanding of this plan.

BOREHOLE LOCATION PLAN AND GROUNDWATER CONTAMINATION DATA, SFM PART 3A AND 4 AREA

Sydney Fish Markets
56-60 Pyrmont Bridge Road, Pyrmont, NSW

Job No: E23982Krpt2
Figure: 4

**ENVIRONMENTAL
INVESTIGATION
SERVICES**



LEGEND:

● **BH601 (5.5)**	**BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m)**
✚	**MONITORING WELL LOCATION**
—	**APPROXIMATE SITE BOUNDARY**
—	**APPROXIMATE BOUNDARY OF WATERFRONT WORKS PART 3A AREA**
0.3-0.5 B(a)P = 5 TPH = 1000	**SAMPLE DEPTH (m) SOIL CONTAMINANT AND CONCENTRATION ABOVE SAC (mg/kg)**

Approximate Scale (m)

0 10 20 30 40 50

Note: Reference should be made to the text for a full understanding of this plan.

BOREHOLE LOCATION PLAN AND SOIL CONTAMINATION DATA, WATERFRONT WORKS PART 3A AREA

Sydney Fish Markets
56-60 Pyrmont Bridge Road, Pyrmont, NSW

EIS

ENVIRONMENTAL
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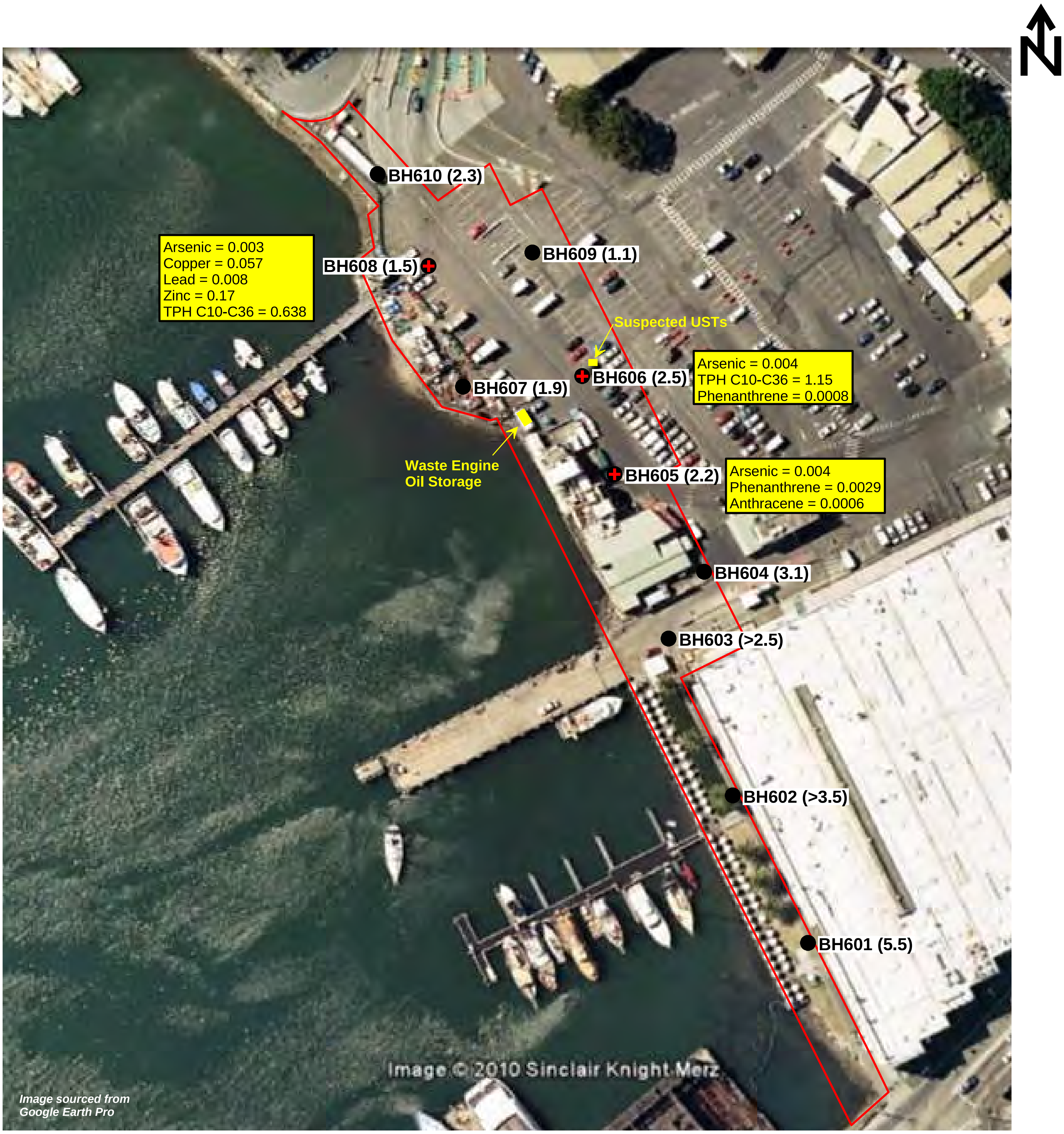
SERVICES

Job No: E23982Krpt2
Figure: 5



LEGEND:

● **BH601 (5.5) BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m)**

✚ **MONITORING WELL LOCATION**

— **APPROXIMATE SITE BOUNDARY**

Arsenic = 0.004
TPH C10-C36 = 0.6 **GROUNDWATER CONTAMINANT AND CONCENTRATION ABOVE SAC (mg/L)**

Approximate Scale (m)

0 10 20 30 40 50

Note: Reference should be made to the text for a full understanding of this plan.

BOREHOLE LOCATION PLAN AND GROUNDWATER CONTAMINATION DATA

Sydney Fish Markets
56-60 Pyrmont Bridge Road, Pyrmont, NSW

EIS
ENVIRONMENTAL
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SERVICES

Job No: E23982Krpt2
Figure: 6

GPR SURVEY PLAN

Sydney Fish Markets
56-60 Pyrmont Bridge Road, Pyrmont, NSW

EIS
ENVIRONMENTAL
INVESTIGATION
SERVICES

Job No: E23982Krpt2
Figure: 7

Note: Reference should be made to the text for a full understanding of this plan and the limitations of the GPR. Sketches are not to scale.

LEGEND:

●●BH501	EIS BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m)
━━━━	APPROXIMATE SITE BOUNDARY
– – – – –	APPROXIMATE EXTENT OF REMEDIATION AREAS

Approximate Scale (m)

0 10 20 30 40 50

Note: Reference should be made to the text for a full understanding of this plan.

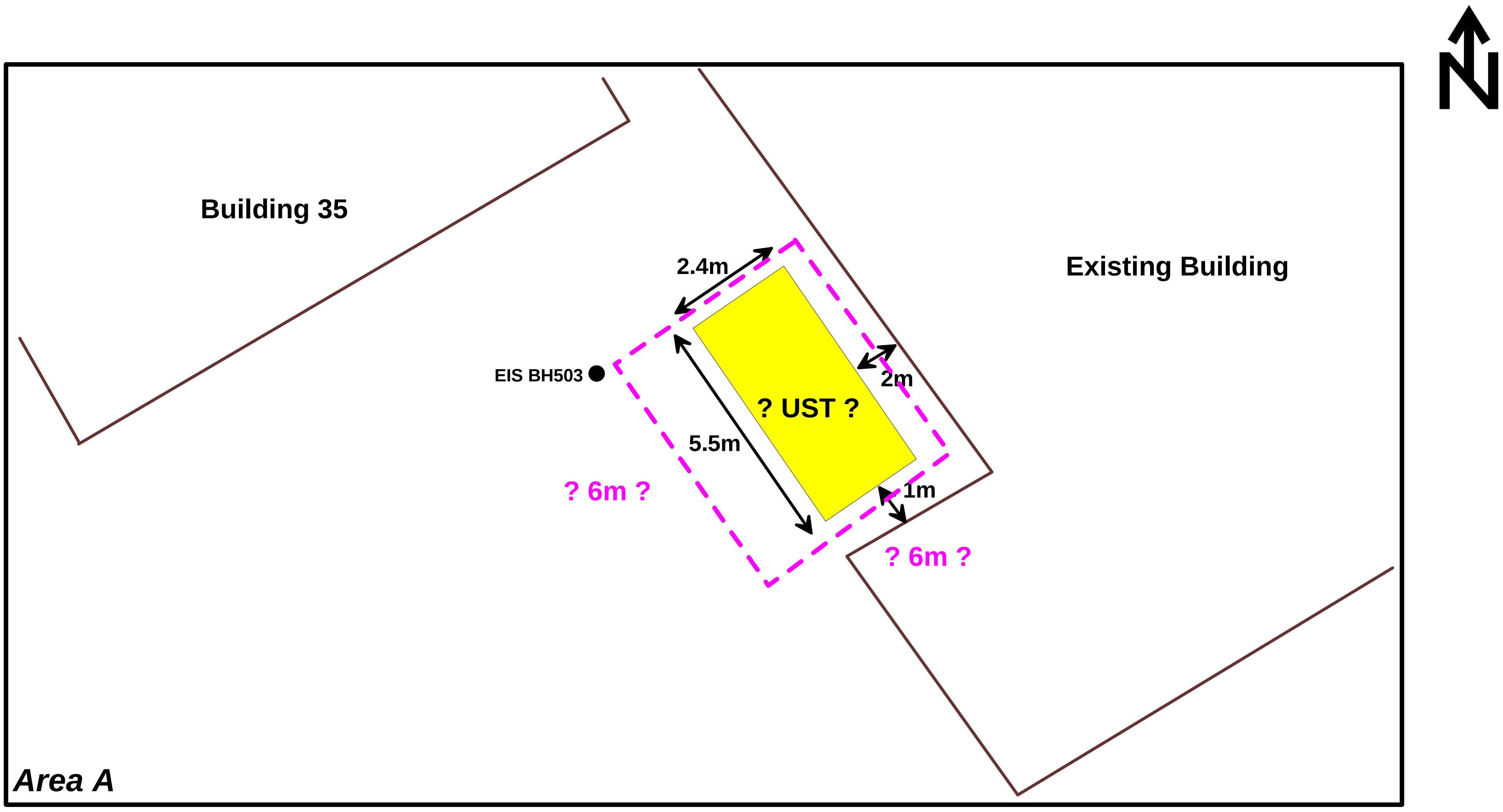
REMEDIATION AREA PLAN

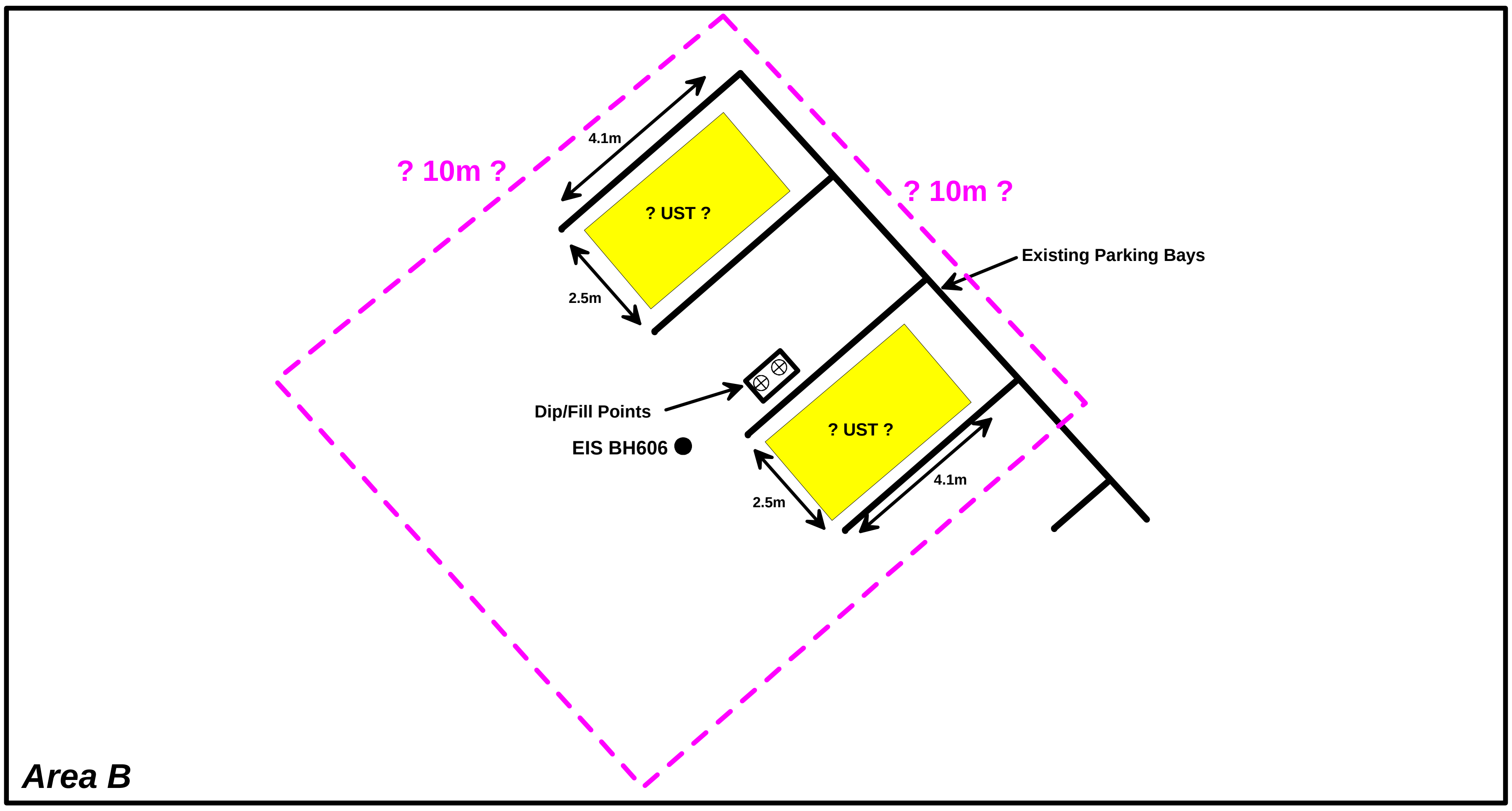
Sydney Fish Markets
56-60 Pyrmont Bridge Road, Pyrmont, NSW

EIS

ENVIRONMENTAL
INVESTIGATION
SERVICES

Job No: E23982Krpt2
Figure: 8a





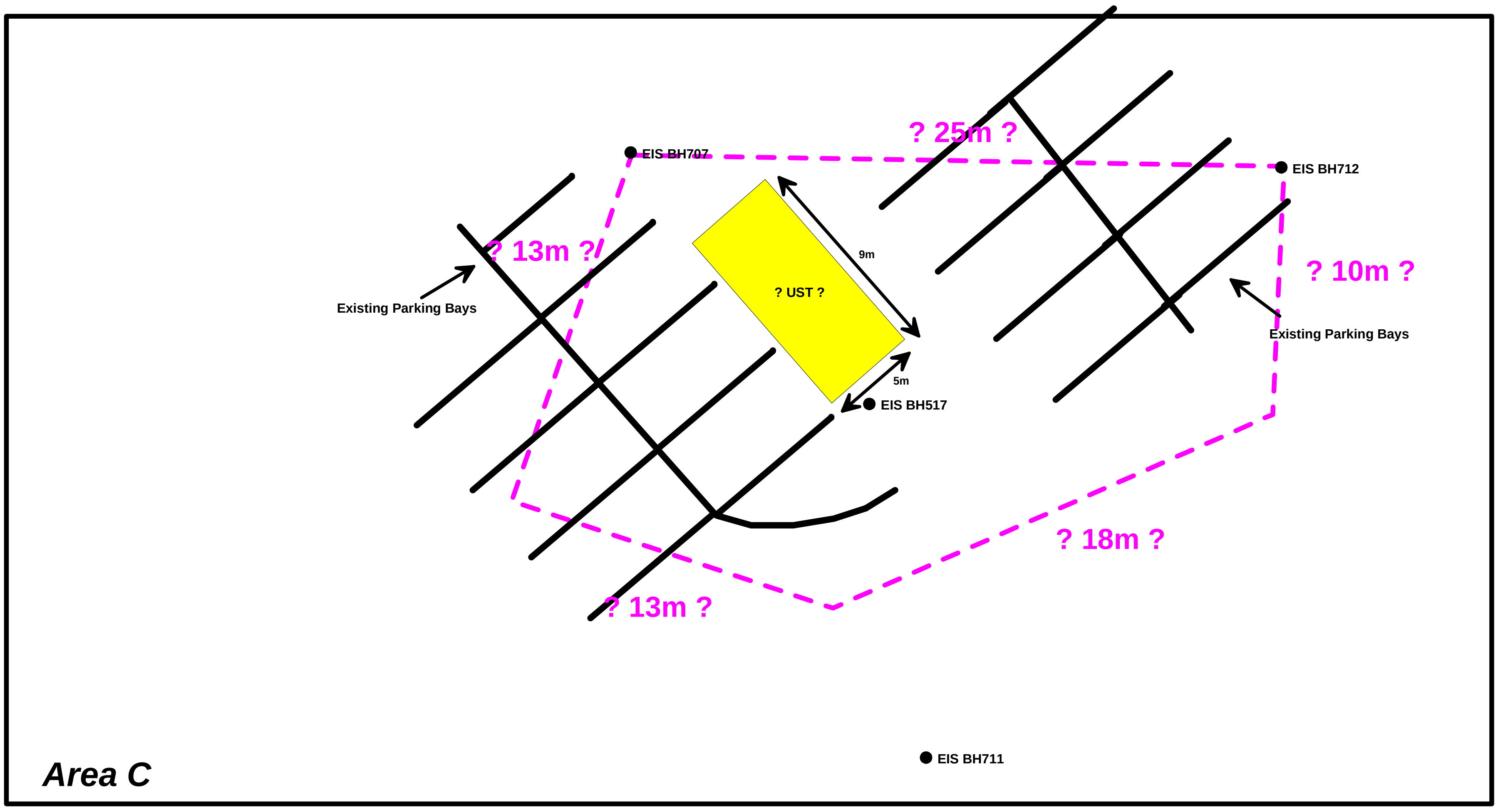
Note: Reference should be made to the text for a full understanding of this plan. Plan is not to scale.

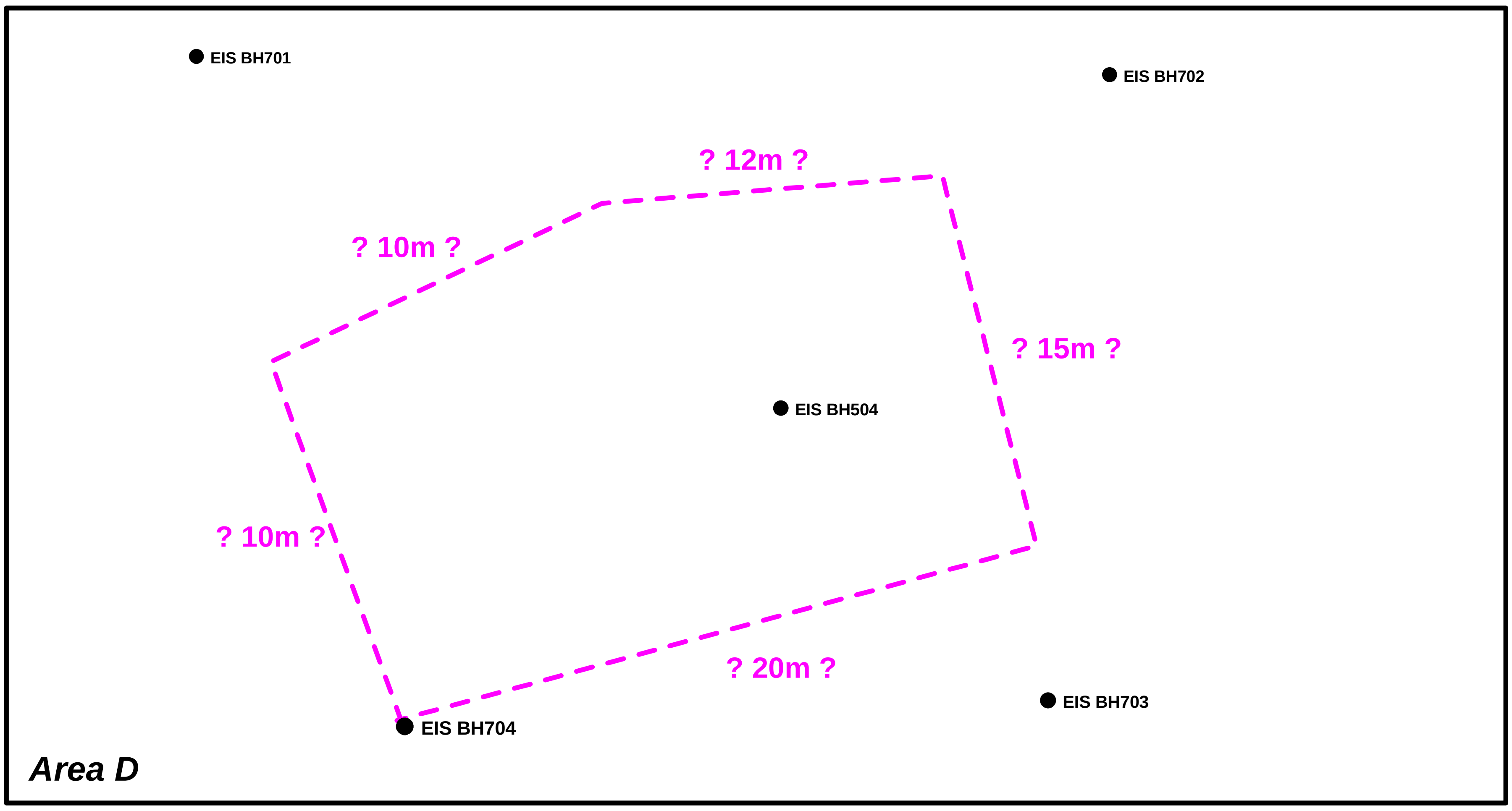
REMEDIATION AREA SKETCH
AREAS A AND B

Sydney Fish Markets
56-60 Pyrmont Bridge Road, Pyrmont, NSW

ENVIRONMENTAL INVESTIGATION SERVICES

Job No: E23982Krpt2
Figure: 8b





REMEDIATION AREA SKETCH AREAS C AND D

Sydney Fish Markets
56-60 Pyrmont Bridge Road, Pyrmont, NSW

Note: Reference should be made to the text for a full understanding of this plan. Plan is not to scale.

Job No:	E23982Krpt2
Figure:	8c

ENVIRONMENTAL INVESTIGATION SERVICES

APPENDIX A

(Borehole Logs and Geotechnical Explanatory Notes)

ENVIRONMENTAL LOG

Borehole No.
701
1/1

Environmental logs are not to be used for geotechnical purposes

Client: SYDNEY FISH MARKET PTY LTD
Project: SYDNEY FISH MARKET REDEVELOPMENT
Location: SYDNEY FISH MARKETS, 56-60 PYRMONT BRIDGE ROAD, PYRMONT, NSW

Job No. E23982K
Date: 29-7-10
Method: SPIRAL AUGER
JK300
R.L. Surface:
Datum:
Logged/Checked by: B.P/

Groundwater Record	SAMPLES ES	ASS	ASB	SAL	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLE-TION						0			ASPHALTIC CONCRETE: 100mm.t.				
								-	CONCRETE: 120mm.t.	-	-	-	6mm DIAMETER REINFORCEMENT, 80mm TOP COVER
	■							-	FILL: Sandy gravel, fine to coarse grained sub rounded sandstone, red brown, fine to medium grained sand.	W	-	-	
	■					1			FILL: Silty sand, fine to medium grained, light yellow brown.	D			
	■				N = 14 2,4,10				FILL: Silty sand, fine to coarse grained, orange brown and brown, with a trace of sandstone gravel.	D-M			
▶	■				N = 6 1,2,4	2 3		SC	SILTY CLAYEY SAND: fine to medium grained, grey and light orange brown	M-W	-	-	
						4 5 6 7			END OF BOREHOLE AT 3.45m				

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. 702
1/1

Environmental logs are not to be used for geotechnical purposes

Client: SYDNEY FISH MARKET PTY LTD

Project: SYDNEY FISH MARKET REDEVELOPMENT

Location: SYDNEY FISH MARKETS, 56-60 PYRMONT BRIDGE ROAD, PYRMONT, NSW

Job No. E23982K

Date: 29-7-10

Method: SPIRAL AUGER
JK300

R.L. Surface:

Datum:

Logged/Checked by: B.P/

Groundwater Record	SAMPLES				Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	ASS	ASB	SAL									
DRY ON COMPLE -TION						0		-	ASPHALTIC CONCRETE: 60mm.t.	-	-	-	NO OBSERVED REINFORCEMENT
								-	CONCRETE: 80mm.t.			-	
	■								FILL: Silty sand: fine to medium grained, brown, with igneous gravel.	W	-		
	■					1			FILL: Silty clayey sand, fine to medium grained, red brown, with brick fragments and a trace of sandstone gravel.	D			
	■				N = 10 3,5,5				FILL: Silty sand, fine to medium grained, brown, with sandstone gravel/cobbles and a trace of ash and slag.	D			
	■					2			as above, but light brown, with a trace of sandstone gravel and ash.				
	■				N = 18 8,8,10	3		SC	SILTY CLAYEY SAND: fine to medium grained grey and red brown.	M	-	-	
									END OF BOREHOLE AT 3.45m				
						4							
						5							
						6							
						7							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No.
703
1/1

Environmental logs are not to be used for geotechnical purposes

Client: SYDNEY FISH MARKET PTY LTD

Project: SYDNEY FISH MARKET REDEVELOPMENT

Location: SYDNEY FISH MARKETS, 56-60 PYRMONT BRIDGE ROAD, PYRMONT, NSW

Job No. E23982K

Date: 29-7-10

Method: SPIRAL AUGER
JK300

Logged/Checked by: B.P/

R.L. Surface:

Datum:

Groundwater Record	SAMPLES ES	ASS	ASB	SAL	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLE -TION						0		-	ASPHALTIC CONCRETE: 65mm.t.	-	-	-	NO OBSERVED REINFORCEMENT
								-	CONCRETE: 45mm.t.	-	-	-	
									CONCRETE: 550mm.t				20mm DIAMETER REINFORCEMENT, 140mm TOP COVER
								-	VOID				
						1							
						2							
									END OF BOREHOLE AT 2.1m				'TC' BIT REFUSAL ON POSSIBLE CONCRETE SLAB
						3							
						4							
						5							
						6							
						7							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No.
704
1/1

Environmental logs are not to be used for geotechnical purposes

Client: SYDNEY FISH MARKET PTY LTD

Project: SYDNEY FISH MARKET REDEVELOPMENT

Location: SYDNEY FISH MARKETS, 56-60 PYRMONT BRIDGE ROAD, PYRMONT, NSW

Job No. E23982K

Date: 29-7-10

Method: SPIRAL AUGER
JK300

Logged/Checked by: B.P/

R.L. Surface:

Datum:

Groundwater Record	SAMPLES ES	ASS	ASB	SAL	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLE -TION						0			ASPHALTIC CONCRETE: 100mm.t.				
	■							-	FILL: Silty sand, fine to medium grained, light brown, with sandstone gravel.	D	-	-	
	■								as above, but dark brown, with slag.	D			
	■				N = 11 5,5,6	1			FILL: Silty sand, fine grained, light brown, with a trace of sandstone gravel and ash.	D-M			
	■				N = 5 1,1,4	2 3			as above, but fine to medium grained, brown and orange brown, with a trace of sandstone gravel.				
	■							SM	SILTY SAND: fine to medium grained grey with peaty bands and a trace of root fibres.	M	-	-	
						4 5 6 7			END OF BOREHOLE AT 3.45m				

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No.
705
1/1

Environmental logs are not to be used for geotechnical purposes

Client: SYDNEY FISH MARKET PTY LTD

Project: SYDNEY FISH MARKET REDEVELOPMENT

Location: SYDNEY FISH MARKETS, 56-60 PYRMONT BRIDGE ROAD, PYRMONT, NSW

Job No. E23982K

Date: 29-7-10

Method: SPIRAL AUGER
JK300

R.L. Surface:

Datum:

Logged/Checked by: B.P/

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
						0		-	ASPHALTIC CONCRETE: 50mm.t.	D	-	-	
									FILL: Gravel, fine to coarse grained angular igneous gravel, grey, with fine to medium grained sand.	D-M			
						1			FILL: Silty sand, fine to medium grained, light brown, with a trace of sandstone gravel.				
					N = 3 3,2,1	2			FILL: Sandy clay, medium plasticity, grey, with a trace of brick fragments.	MC>PL			HYDROCARBON ODOUR
ON COMPLE -TION					N = 3 1,1,2	3		SM	SILTY SAND: fine to medium grained, brown with grey brown bands.	W	-	-	
						4 5 6 7			END OF BOREHOLE AT 3.45m				

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ENVIRONMENTAL INVESTIGATION SERVICES
CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No.
706
1/1

Environmental logs are not to be used for geotechnical purposes

Client: SYDNEY FISH MARKET PTY LTD
Project: SYDNEY FISH MARKET REDEVELOPMENT
Location: SYDNEY FISH MARKETS, 56-60 PYRMONT BRIDGE ROAD, PYRMONT, NSW

Job No. E23982K
Date: 29-7-10
Method: SPIRAL AUGER
JK300
Logged/Checked by: B.P/
R.L. Surface:
Datum:

Groundwater Record	SAMPLES ES	ASS	ASB	SAL	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
						0 1		-	ASPHALTIC CONCRETE: 50mm.t. CONCRETE: 1450mm.t.	-	-	-	NO OBSERVED REINFORCEMENT
	■		■		N = 5 2,2,3	2		-	FILL: Silty clayey sand, fine to medium grained, brown, grey and orange brown, with sandstone gravel.	M	-	-	
▶ (	■ ■		■ ■		N = 2 0,1,1	3		SM	SILTY SAND: fine to medium grained, brown, with a trace of root fibres.	M W	-	-	SUNK 150mm UNDER WEIGHT OF SPT HAMMER
						4 5 6 7			END OF BOREHOLE AT 3.6m				

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

EIS

ENVIRONMENTAL LOG

Borehole No.
707
1/1

Environmental logs are not to be used for geotechnical purposes

Client: SYDNEY FISH MARKET PTY LTD

Project: SYDNEY FISH MARKET REDEVELOPMENT

Location: SYDNEY FISH MARKETS, 56-60 PYRMONT BRIDGE ROAD, PYRMONT, NSW

Job No. E23982K

Date: 30-7-10

Method: SPIRAL AUGER
JK300

Logged/Checked by: B.P/

R.L. Surface:

Datum:

Groundwater Record	SAMPLES ES	ASS	ASB	SAL	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
						0		-	ASPHALTIC CONCRETE: 35mm.t.	-	-	-	7mm DIAMETER REINFORCEMENT, 60mm TOP COVER
								-	CONCRETE: 140mm.t.	M	-	-	
					N = 5 2,2,3				FILL: Sand, fine to medium grained, light brown, with a trace of silt.				
						1		-	CONCRETE: 200mm.t.	-	-	-	
					>6/50mm REFUSAL			-	FILL: Silty sand, fine to medium grained, grey brown, with a trace of ash, sandstone and igneous gravel.	M	-	-	SLIGHT HYDROCARBON ODOUR
						2							
▼										W			
					N = 2 2,1,1	3			as above, but with gravel (igneous and sandstone) and a trace of ash.				
						4		SM	SILTY SAND: fine to medium grained, dark grey brown.	W	-	-	
									END OF BOREHOLE AT 4.5m				
						5							
						6							
						7							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No.
708
1/1

Environmental logs are not to be used for geotechnical purposes

Client: SYDNEY FISH MARKET PTY LTD

Project: SYDNEY FISH MARKET REDEVELOPMENT

Location: SYDNEY FISH MARKETS, 56-60 PYRMONT BRIDGE ROAD, PYRMONT, NSW

Job No. E23982K

Date: 29-7-10

Method: SPIRAL AUGER JK300

Logged/Checked by: B.P/

R.L. Surface:

Datum:

Groundwater Record	SAMPLES ES	ASS	ASB	SAL	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
						0	■		ASPHALTIC CONCRETE: 120mm.t.				
	■		■				▨	-	FILL: Sandy gravel, fine to coarse grained sub angular igneous gravel, grey, fine to medium grained sand.	W	-	-	
	■		■		N = 25 8,13,12	1	▨		FILL: Silty sand, fine to medium grained, dark brown, with sandstone gravel/cobbles and a trace of clay nodules and slag.	D-M			
	■		■		N = 10 2,3,7		▨						
ON COMPLE-TION						2	▨		FILL: Silty sand, fine to medium grained, grey brown, with a trace of igneous gravel.	M W			HYDROCARBON ODOUR
	■		■		N = 2 2,1,1	3	⠿	SM	SILTY SAND: fine to medium grained grey and grey brown with a trace of roots and organic material.	W	-	-	
						4	⠿		as above, but grey roots and organic material absent.				
						5	⠿		as above, but light grey.				Monitoring Well Installed to 5.7m, Class 18 50mm dia. Machine slotted PVC from 5.7m to 2. 7m, Casing from 2.7m to surface, 2mm sand filter pack to 1.7m, Bentonite seal from 1.7m to 1.3m, Backfilled with cuttings to surface and completed with a steel gatic cover and lockable cap.
						6			END OF BOREHOLE AT 6.0m				
						7							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No.
709
1/1

Environmental logs are not to be used for geotechnical purposes

Client: SYDNEY FISH MARKET PTY LTD

Project: SYDNEY FISH MARKET REDEVELOPMENT

Location: SYDNEY FISH MARKETS, 56-60 PYRMONT BRIDGE ROAD, PYRMONT, NSW

Job No. E23982K

Date: 29-7-10

Method: SPIRAL AUGER
JK300

R.L. Surface:

Datum:

Logged/Checked by: B.P/

Groundwater Record	SAMPLES ES ASS ASB SAL	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
			0		-	ASPHALTIC CONCRETE: 180mm.t. FILL: Silty sand, fine to medium grained, orange brown, with brick fragments and a trace of slag.	D	-	-	
		N = 7 2,3,4	1			as above, but a trace of sandstone gravel, ash and slag.				
		N = 3 4,1,2	2			as above, but dark brown, with a trace of igneous gravel and slag.	M			
ON COMPLE -TION		N = 2 1,1,1	3		SM	SILTY SAND: fine to medium grained, grey brown with a trace of root fibres.	W	-	-	
			4 5 6 7			END OF BOREHOLE AT 3.45m				

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No.
710
1/1

Environmental logs are not to be used for geotechnical purposes

Client: SYDNEY FISH MARKET PTY LTD

Project: SYDNEY FISH MARKET REDEVELOPMENT

Location: SYDNEY FISH MARKETS, 56-60 PYRMONT BRIDGE ROAD, PYRMONT, NSW

Job No. E23982K

Date: 3-8-10

Method: SPIRAL AUGER
JK350

R.L. Surface:

Datum:

Logged/Checked by: B.P/

Groundwater Record	SAMPLES ES	ASS	ASB	SAL	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
						0			CONCRETE: 220mm.t.				8mm DIAMETER REINFORCEMENT 80mm TOP COVER
	■ ■		■ ■		>12/ 150mm REFUSAL			-	FILL: Gravelly sand, fine to medium grained, brown, fine to medium grained igneous gravel, with a trace of sandstone gravel, terracotta fragments, and asphaltic concrete fragments.	M	-	-	
									END OF BOREHOLE AT 0.7m				'TC' BIT REFUSAL
						1							
						2							
						3							
						4							
						5							
						6							
						7							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No.
711
1/1

Environmental logs are not to be used for geotechnical purposes

Client: SYDNEY FISH MARKET PTY LTD
Project: SYDNEY FISH MARKET REDEVELOPMENT
Location: SYDNEY FISH MARKETS, 56-60 PYRMONT BRIDGE ROAD, PYRMONT, NSW

Job No. E23982K
Date: 30-7-10
Method: SPIRAL AUGER JK300
Logged/Checked by: B.P/
R.L. Surface:
Datum:

Groundwater Record	SAMPLES ES ASS ASB SAL	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
			0			CONCRETE: 200mm.t.				8mm DIAMETER REINFORCEMENT, 70mm TOP COVER
					-	FILL: Gravelly sand, fine to medium grained, brown, fine to medium grained igneous gravel.	D	-	-	
			1			FILL: Clayey sand, fine to medium grained, brown and orange brown, with a trace of sandstone gravel/ cobbles and brick fragments.	M			
▼ ON COMPLE -TION ▶		N = 23 5,9,14	2			FILL: Clayey gravel, coarse grained, sub rounded sandstone gravel, yellow brown, clay nodules and possible sandstone cobbles.	M			HYDROCARBON ODOUR
		N = 2 1,1,1	3		CL	SILTY CLAY: low plasticity, dark grey, with a trace of shell fragments.	MC>PL	-	-	
					SM	SILTY SAND: fine to medium grained, grey brown.	W	-	-	
			4 5 6 7			END OF BOREHOLE AT 3.45m				

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ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No.
712
1/1

Environmental logs are not to be used for geotechnical purposes

Client: SYDNEY FISH MARKET PTY LTD

Project: SYDNEY FISH MARKET REDEVELOPMENT

Location: SYDNEY FISH MARKETS, 56-60 PYRMONT BRIDGE ROAD, PYRMONT, NSW

Job No. E23982K

Date: 30-7-10

Method: SPIRAL AUGER
JK300

R.L. Surface:

Datum:

Logged/Checked by: B.P/

Groundwater Record	SAMPLES ES	ASS	ASB	SAL	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
						0		-	ASPHALTIC CONCRETE: 70mm.t.				NO OBSERVED REINFORCEMENT
								-	CONCRETE: 90mm.t.				
									FILL: bricks / brick gravel, scrap metal.	-	-	-	
						1							
	■								FILL: Silty clayey sand, fine to medium grained, grey, with a trace of sandstone and igneous gravel.	M			HYDROCARBON ODOUR
	■				N = 7 5,3,4					W			
						2							
➤									as above, but with sandstone gravel/cobbles.				
						3							
	■				N = 10 6,6,4				FILL: Silty sandy gravel, fine to medium grained angular, grey and light brown gravel (various), fine to medium grained sand.	W			
								SC	CLAYEY SAND: fine to medium grained, light grey.	W	-	-	
						4							
					SPT 450mm								SPT SANK 450mm UNDER SELF WEIGHT
▼ ON COMPLE-TION					SANK	5							Monitoring Well Installed to 6m, Class 18 50mm dia. Machine slotted PVC from 6m to 3m, Casing from 3m to surface, 2mm sand filter pack to 1.5m, Bentonite seal from 1.5m to 1m, Backfilled with sand to surface and completed with a steel gatic cover and lockable cap.
	■												
						6			END OF BOREHOLE AT 6.0m				
						7							

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ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No.
713
1/1

Environmental logs are not to be used for geotechnical purposes

Client: SYDNEY FISH MARKET PTY LTD
Project: SYDNEY FISH MARKET REDEVELOPMENT
Location: SYDNEY FISH MARKETS, 56-60 PYRMONT BRIDGE ROAD, PYRMONT, NSW

Job No. E23982K
Date: 30-7-10
Method: SPIRAL AUGER JK300
Logged/Checked by: B.P/
R.L. Surface:
Datum:

Groundwater Record	Field Tests	Depth (m)	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
		0		CONCRETE: 210mm.t.				
			-	FILL: Gravel, fine to coarse grained sub angular igneous gravel, grey, with fine to medium grained sand.	W	-	-	
				FILL: Silty sand, fine to medium grained, light brown, with sandstone gravel and a trace of ash.	M			
		1		FILL: Silty clayey sand, fine to medium grained, grey, with a trace of brick fragments and sandstone gravel and ash.				
	N = 5 2,3,2							
▶		2			W			SLIGHT HYDROCARBON ODOUR
	N = 2 1,1,1	3		FILL: Silty sand, fine to medium grained, grey brown, with a trace of sandstone gravel and organic material.				
		4						
	N = 2 2,1,1							
▼ ON COMPLE -TION		5	SC-SM	SILTY CLAYEY SAND: fine to medium grained, light grey, with dark grey peaty bands.	W	-	-	Monitoring Well Installed to 6m, Class 18 50mm dia. Machine slotted PVC from 6m to 3m, Casing from 3m to surface, 2mm sand filter pack to 1.5m, Bentonite seal from 1.5m to 1m, Backfilled with sand to surface and completed with a steel gatic cover and lockable cap.
		6		END OF BOREHOLE AT 6.0m				
		7						

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No.
714
1/1

Environmental logs are not to be used for geotechnical purposes

Client: SYDNEY FISH MARKET PTY LTD

Project: SYDNEY FISH MARKET REDEVELOPMENT

Location: SYDNEY FISH MARKETS, 56-60 PYRMONT BRIDGE ROAD, PYRMONT, NSW

Job No. E23982K

Date: 3-8-10

Method: SPIRAL AUGER
JK350

R.L. Surface:

Datum:

Logged/Checked by: B.P/

Groundwater Record	SAMPLES (ES, ASS, ASB, SAL)	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
			0			CONCRETE: 210mm.t.				10mm DIAMETER REINFORCEMENT, 65mm TOP COVER
					-	FILL: Silty sandy gravel, medium to coarse grained sub angular igneous gravel, grey, fine to medium grained sand.	W	-	-	
			1			FILL: Clayey sand, fine to medium grained, brown, with gravel (sandstone and brick) and a trace of ash and slag.	M			
ON COMPLE -TION		N = 3 1,2,1	2				W			
		N = 2 1,1,1	3		SM	SILTY SAND: fine to medium grained, grey brown.	W			
						END OF BOREHOLE AT 3.45m				
			4							
			5							
			6							
			7							

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ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No.
715
1/1

Environmental logs are not to be used for geotechnical purposes

Client: SYDNEY FISH MARKET PTY LTD

Project: SYDNEY FISH MARKET REDEVELOPMENT

Location: SYDNEY FISH MARKETS, 56-60 PYRMONT BRIDGE ROAD, PYRMONT, NSW

Job No. E23982K

Date: 30-7-10

Method: SPIRAL AUGER
JK300

R.L. Surface:

Datum:

Logged/Checked by: B.P/

Groundwater Record	SAMPLES ES	ASS	ASB	SAL	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
						0			CONCRETE: 210mm.t.				10mm DIAMETER REINFORCEMENT, 60mm TOP COVER
	■		■				▨	-	FILL: Clayey sand, fine to medium grained, brown and orange brown, with sandstone gravel and a trace of ash and igneous gravel.	M	-	-	
	■		■		N = 18 9,10,8		▨						
						1	▨						
▼ ON COMPLETION ▶	■		■		N = 2 1,1,1		▨						
						2	▨						
						3	▨						
	■		■		SPT 450mm SANK			SM	SILTY SAND: fine to medium grained, grey with grey brown bands and a trace of root fibres.	-	-	-	ORGANIC ODOUR
									END OF BOREHOLE AT 3.45m				
						4							
						5							
						6							
						7							

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ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No.
716
1/1

Environmental logs are not to be used for geotechnical purposes

Client: SYDNEY FISH MARKET PTY LTD

Project: SYDNEY FISH MARKET REDEVELOPMENT

Location: SYDNEY FISH MARKETS, 56-60 PYRMONT BRIDGE ROAD, PYRMONT, NSW

Job No. E23982K
Date: 30-7-10

Method: SPIRAL AUGER
JK300

Logged/Checked by: B.P/

R.L. Surface:
Datum:

Groundwater Record	SAMPLES ES	ASS	ASB	SAL	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
						0			CONCRETE: 190mm.t.				20mm REINFORCEMENT, 40mm.t, 90mm TOP COVER
	■		■					-	FILL: Sandy gravel, fine to medium grained sub angular igneous gravel, grey, fine to medium grained sand.	D	-	-	
						1			FILL: Silty sand, fine to medium grained, brown, with a trace of igneous and sandstone gravel and ash.				
	■		■		N = 4 1,2,2								
						2							
ON COMPLE -TION								SC	SILTY CLAYEY SAND: fine to medium grained, dark grey.	W	-	-	
	■		■		N >5 3,1,4/ 50mm REFUSAL	3		SM	SILTY SAND: fine to medium grained, grey brown.	W	-	-	
									END OF BOREHOLE AT 3.35m				
						4							
						5							
						6							
						7							

REPORT EXPLANATION NOTES

INTRODUCTION

These notes have been provided to amplify the geotechnical report in regard to classification methods, field procedures and certain matters relating to the Comments and Recommendations section. Not all notes are necessarily relevant to all reports.

The ground is a product of continuing natural and man-made processes and therefore exhibits a variety of characteristics and properties which vary from place to place and can change with time. Geotechnical engineering involves gathering and assimilating limited facts about these characteristics and properties in order to understand or predict the behaviour of the ground on a particular site under certain conditions. This report may contain such facts obtained by inspection, excavation, probing, sampling, testing or other means of investigation. If so, they are directly relevant only to the ground at the place where and time when the investigation was carried out.

DESCRIPTION AND CLASSIFICATION METHODS

The methods of description and classification of soils and rocks used in this report are based on Australian Standard 1726, the SAA Site Investigation Code. In general, descriptions cover the following properties – soil or rock type, colour, structure, strength or density, and inclusions. Identification and classification of soil and rock involves judgement and the Company infers accuracy only to the extent that is common in current geotechnical practice.

Soil types are described according to the predominating particle size and behaviour as set out in the attached Unified Soil Classification Table qualified by the grading of other particles present (eg sandy clay) as set out below:

Soil Classification	Particle Size
Clay	less than 0.002mm
Silt	0.002 to 0.06mm
Sand	0.06 to 2mm
Gravel	2 to 60mm

Non-cohesive soils are classified on the basis of relative density, generally from the results of Standard Penetration Test (SPT) as below:

Relative Density	SPT 'N' Value (blows/300mm)
Very loose	less than 4
Loose	4 – 10
Medium dense	10 – 30
Dense	30 – 50
Very Dense	greater than 50

Cohesive soils are classified on the basis of strength (consistency) either by use of hand penetrometer, laboratory testing or engineering examination. The strength terms are defined as follows.

Classification	Unconfined Compressive Strength kPa
Very Soft	less than 25
Soft	25 – 50
Firm	50 – 100
Stiff	100 – 200
Very Stiff	200 – 400
Hard	Greater than 400
Friable	Strength not attainable – soil crumbles

Rock types are classified by their geological names, together with descriptive terms regarding weathering, strength, defects, etc. Where relevant, further information regarding rock classification is given in the text of the report. In the Sydney Basin, 'Shale' is used to describe thinly bedded to laminated siltstone.

SAMPLING

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

Disturbed samples taken during drilling provide information on plasticity, grain size, colour, moisture content, minor constituents and, depending upon the degree of disturbance, some information on strength and structure. Bulk samples are similar but of greater volume required for some test procedures.

Undisturbed samples are taken by pushing a thin-walled sample tube, usually 50mm diameter (known as a U50), into the soil and withdrawing it with a sample of the soil contained in a relatively undisturbed state. Such samples yield information on structure and strength, and are necessary for laboratory determination of shear strength and compressibility. Undisturbed sampling is generally effective only in cohesive soils.

Details of the type and method of sampling used are given on the attached logs.

INVESTIGATION METHODS

The following is a brief summary of investigation methods currently adopted by the Company and some comments on their use and application. All except test pits, hand auger drilling and portable dynamic cone penetrometers require the use of a mechanical drilling rig which is commonly mounted on a truck chassis.

Test Pits: These are normally excavated with a backhoe or a tracked excavator, allowing close examination of the insitu soils if it is safe to descend into the pit. The depth of penetration is limited to about 3m for a backhoe and up to 6m for an excavator. Limitations of test pits are the problems associated with disturbance and difficulty of reinstatement and the consequent effects on close-by structures. Care must be taken if construction is to be carried out near test pit locations to either properly recompact the backfill during construction or to design and construct the structure so as not to be adversely affected by poorly compacted backfill at the test pit location.

Hand Auger Drilling: A borehole of 50mm to 100mm diameter is advanced by manually operated equipment. Premature refusal of the hand augers can occur on a variety of materials such as hard clay, gravel or ironstone, and does not necessarily indicate rock level.

Continuous Spiral Flight Augers: The borehole is advanced using 75mm to 115mm diameter continuous spiral flight augers, which are withdrawn at intervals to allow sampling and insitu testing. This is a relatively economical means of drilling in clays and in sands above the water table. Samples are returned to the surface by the flights or may be collected after withdrawal of the auger flights, but they can be very disturbed and layers may become mixed. Information from the auger sampling (as distinct from specific sampling by SPTs or undisturbed samples) is of relatively lower reliability due to mixing or softening of samples by groundwater, or uncertainties as to the original depth of the samples. Augering below the groundwater table is of even lesser reliability than augering above the water table.

Rock Augering: Use can be made of a Tungsten Carbide (TC) bit for auger drilling into rock to indicate rock quality and continuity by variation in drilling resistance and from examination of recovered rock fragments. This method of investigation is quick and relatively inexpensive but provides only an indication of the likely rock strength and predicted values may be in error by a strength order. Where rock strengths may have a significant impact on construction feasibility or costs, then further investigation by means of cored boreholes may be warranted.

Wash Boring: The borehole is usually advanced by a rotary bit, with water being pumped down the drill rods and returned up the annulus, carrying the drill cuttings. Only major changes in stratification can be determined from the cuttings, together with some information from "feel" and rate of penetration.

Mud Stabilised Drilling: Either Wash Boring or Continuous Core Drilling can use drilling mud as a circulating fluid to stabilise the borehole. The term 'mud' encompasses a range of products ranging from bentonite to polymers such as Revert or Biogel. The mud tends to mask the cuttings and reliable identification is only possible from intermittent intact sampling (eg from SPT and U50 samples) or from rock coring, etc.

Continuous Core Drilling: A continuous core sample is obtained using a diamond tipped core barrel. Provided full core recovery is achieved (which is not always possible in very low strength rocks and granular soils), this technique provides a very reliable (but relatively expensive) method of investigation. In rocks, an NMLC triple tube core barrel, which gives a core of about 50mm diameter, is usually used with water flush. The length of core recovered is compared to the length drilled and any length not recovered is shown as CORE LOSS. The location of losses are determined on site by the supervising engineer; where the location is uncertain, the loss is placed at the top end of the drill run.

Standard Penetration Tests: Standard Penetration Tests (SPT) are used mainly in non-cohesive soils, but can also be used in cohesive soils as a means of indicating density or strength and also of obtaining a relatively undisturbed sample. The test procedure is described in Australian Standard 1289, "Methods of Testing Soils for Engineering Purposes" – Test F3.1.

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

The test results are reported in the following form:

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

  N = 13
  4, 6, 7

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

  N>30
  15, 30/40mm

The results of the test can be related empirically to the engineering properties of the soil.

Occasionally, the drop hammer is used to drive 50mm diameter thin walled sample tubes (U50) in clays. In such circumstances, the test results are shown on the borehole logs in brackets.

A modification to the SPT test is where the same driving system is used with a solid 60° tipped steel cone of the same diameter as the SPT hollow sampler. The solid cone can be continuously driven for some distance in soft clays or loose sands, or may be used where damage would otherwise occur to the SPT. The results of this Solid Cone Penetration Test (SCPT) are shown as "N_c" on the borehole logs, together with the number of blows per 150mm penetration.

Static Cone Penetrometer Testing and Interpretation: Cone penetrometer testing (sometimes referred to as a Dutch Cone) described in this report has been carried out using an Electronic Friction Cone Penetrometer (EFCP). The test is described in Australian Standard 1289, Test F5.1.

In the tests, a 35mm diameter rod with a conical tip is pushed continuously into the soil, the reaction being provided by a specially designed truck or rig which is fitted with an hydraulic ram system. Measurements are made of the end bearing resistance on the cone and the frictional resistance on a separate 134mm long sleeve, immediately behind the cone. Transducers in the tip of the assembly are electrically connected by wires passing through the centre of the push rods to an amplifier and recorder unit mounted on the control truck.

As penetration occurs (at a rate of approximately 20mm per second) the information is output as incremental digital records every 10mm. The results given in this report have been plotted from the digital data.

The information provided on the charts comprise:

- Cone resistance – the actual end bearing force divided by the cross sectional area of the cone – expressed in MPa.
- Sleeve friction – the frictional force on the sleeve divided by the surface area – expressed in kPa.
- Friction ratio – the ratio of sleeve friction to cone resistance, expressed as a percentage.

The ratios of the sleeve resistance to cone resistance will vary with the type of soil encountered, with higher relative friction in clays than in sands. Friction ratios of 1% to 2% are commonly encountered in sands and occasionally very soft clays, rising to 4% to 10% in stiff clays and peats. Soil descriptions based on cone resistance and friction ratios are only inferred and must not be considered as exact.

Correlations between EFCP and SPT values can be developed for both sands and clays but may be site specific.

Interpretation of EFCP values can be made to empirically derive modulus or compressibility values to allow calculation of foundation settlements.

Stratification can be inferred from the cone and friction traces and from experience and information from nearby boreholes etc. Where shown, this information is presented for general guidance, but must be regarded as interpretive. The test method provides a continuous profile of engineering properties but, where precise information on soil classification is required, direct drilling and sampling may be preferable.

Portable Dynamic Cone Penetrometers: Portable Dynamic Cone Penetrometer (DCP) tests are carried out by driving a rod into the ground with a sliding hammer and counting the blows for successive 100mm increments of penetration.

Two relatively similar tests are used:

- Cone penetrometer (commonly known as the Scala Penetrometer) – a 16mm rod with a 20mm diameter cone end is driven with a 9kg hammer dropping 510mm (AS1289, Test F3.2). The test was developed initially for pavement subgrade investigations, and correlations of the test results with California Bearing Ratio have been published by various Road Authorities.
- Perth sand penetrometer – a 16mm diameter flat ended rod is driven with a 9kg hammer, dropping 600mm (AS1289, Test F3.3). This test was developed for testing the density of sands (originating in Perth) and is mainly used in granular soils and filling.

LOGS

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

The attached explanatory notes define the terms and symbols used in preparation of the logs.

Interpretation of the information shown on the logs, and its application to design and construction, should therefore take into account the spacing of boreholes or test pits, the method of drilling or excavation, the frequency of sampling and testing and the possibility of other than "straight line" variations between the boreholes or test pits. Subsurface conditions between boreholes or test pits may vary significantly from conditions encountered at the borehole or test pit locations.

GROUNDWATER

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

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

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

FILL

The presence of fill materials can often be determined only by the inclusion of foreign objects (eg bricks, steel etc) or by distinctly unusual colour, texture or fabric. Identification of the extent of fill materials will also depend on investigation methods and frequency. Where natural soils similar to those at the site are used for fill, it may be difficult with limited testing and sampling to reliably determine the extent of the fill.

The presence of fill materials is usually regarded with caution as the possible variation in density, strength and material type is much greater than with natural soil deposits. Consequently, there is an increased risk of adverse engineering characteristics or behaviour. If the volume and quality of fill is of importance to a project, then frequent test pit excavations are preferable to boreholes.

LABORATORY TESTING

Laboratory testing is normally carried out in accordance with Australian Standard 1289 *'Methods of Testing Soil for Engineering Purposes'*. Details of the test procedure used are given on the individual report forms.

ENGINEERING REPORTS

Engineering reports are prepared by qualified personnel and are based on the information obtained and on current engineering standards of interpretation and analysis. Where the report has been prepared for a specific design proposal (eg. a three storey building) the information and interpretation may not be relevant if the design proposal is changed (eg to a twenty storey building). If this happens, the company will be pleased to review the report and the sufficiency of the investigation work.

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

- Unexpected variations in ground conditions – the potential for this will be partially dependent on borehole spacing and sampling frequency as well as investigation technique.
- Changes in policy or interpretation of policy by statutory authorities.
- The actions of persons or contractors responding to commercial pressures.

If these occur, the company will be pleased to assist with investigation or advice to resolve any problems occurring.

SITE ANOMALIES

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

REPRODUCTION OF INFORMATION FOR CONTRACTUAL PURPOSES

Attention is drawn to the document *'Guidelines for the Provision of Geotechnical Information in Tender Documents'*, published by the Institution of Engineers, Australia. Where information obtained from this investigation is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document. The company would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

Copyright in all documents (such as drawings, borehole or test pit logs, reports and specifications) provided by the Company shall remain the property of Jeffery and Katauskas Pty Ltd. Subject to the payment of all fees due, the Client alone shall have a licence to use the documents provided for the sole purpose of completing the project to which they relate. License to use the documents may be revoked without notice if the Client is in breach of any objection to make a payment to us.

REVIEW OF DESIGN

Where major civil or structural developments are proposed or where only a limited investigation has been completed or where the geotechnical conditions/ constraints are quite complex, it is prudent to have a joint design review which involves a senior geotechnical engineer.

SITE INSPECTION

The company will always be pleased to provide engineering inspection services for geotechnical aspects of work to which this report is related.

Requirements could range from:

i) a site visit to confirm that conditions exposed are no worse than those interpreted, to

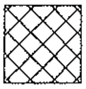
ii) a visit to assist the contractor or other site personnel in identifying various soil/rock types such as appropriate footing or pier founding depths, or

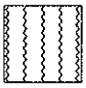
iii) full time engineering presence on site.

Jeffery and Katauskas Pty Ltd
CONSULTING GEOTECHNICAL & ENVIRONMENTAL ENGINEERS

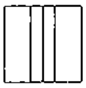
GRAPHIC LOG SYMBOLS FOR SOILS AND ROCKS

SOIL


FILL


TOPSOIL


CLAY (CL, CH)

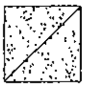

SILT (ML, MH)


SAND (SP, SW)

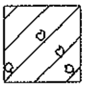

GRAVEL (GP, GW)

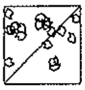

SANDY CLAY (CL, CH)


SILTY CLAY (CL, CH)

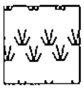

CLAYEY SAND (SC)


SILTY SAND (SM)


GRAVELLY CLAY (CL, CH)

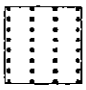

CLAYEY GRAVEL (GC)


SANDY SILT (ML)

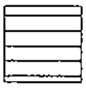

PEAT AND ORGANIC SOILS

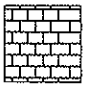
ROCK


CONGLOMERATE

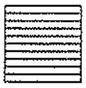

SANDSTONE


SHALE

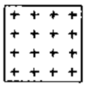

SILTSTONE, MUDSTONE, CLAYSTONE

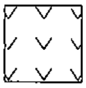

LIMESTONE


PHYLLITE, SCHIST


TUFF

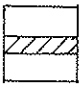

GRANITE, GABBRO

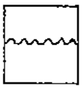

DOLERITE, DIORITE


BASALT, ANDESITE

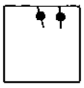

QUARTZITE

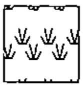
DEFECTS AND INCLUSIONS


CLAY SEAM


SHEARED OR CRUSHED SEAM


BRECCIATED OR SHATTERED SEAM/ZONE


IRONSTONE GRAVEL


ORGANIC MATERIAL

OTHER MATERIALS


CONCRETE


BITUMINOUS CONCRETE, COAL


COLLUVIUM

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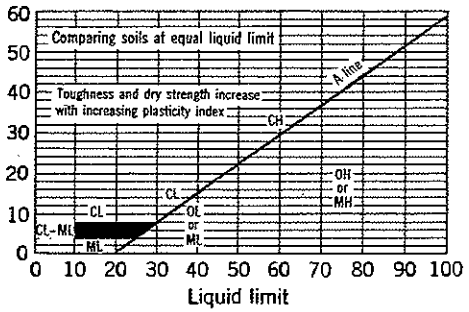
UNIFIED SOIL CLASSIFICATION TABLE

Field Identification Procedures (Excluding particles larger than 75 µm and basing fractions on estimated weights)						Group Symbols[a]	Typical Names	Information Required for Describing Soils	Laboratory Classification Criteria			
Coarse-grained soils More than half of material is *larger* than 75 µm sieve size[b] (The 75 µm sieve size is about the smallest particle visible to naked eye)	Gravels More than half of coarse fraction is larger than 4 mm sieve size	Clean gravels (little or no fines)	Wide range in grain size and substantial amounts of all intermediate particle sizes			*GW*	Well graded gravels, gravel-sand mixtures, little or no fines	Give typical name; indicate approximate percentages of sand and gravel; maximum size; angularity, surface condition, and hardness of the coarse grains; local or geologic name and other pertinent descriptive information; and symbols in parentheses For undisturbed soils add information on stratification, degree of compactness, cementation, moisture conditions and drainage characteristics Example: *Silty sand*, gravelly; about 20% hard, angular gravel particles 12 mm maximum size; rounded and subangular sand grains coarse to fine, about 15% non-plastic fines with low dry strength; well compacted and moist in place; alluvial sand; (*SM*)	Use grain size curve in identifying the fractions as given under field identification	Determine percentages of gravel and sand from grain size curve Depending on percentage of fines (fraction smaller than 75 µm sieve size) coarse grained soils are classified as follows: Less than 5% *GW, GP, SW, SP* More than 12% *GM, GC, SM, SC* 5% to 12% *Borderline* cases requiring use of dual symbols	$C_U = \frac{D_{60}}{D_{10}}$ Greater than 4 $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ Between 1 and 3	
			Predominantly one size or a range of sizes with some intermediate sizes missing			*GP*	Poorly graded gravels, gravel-sand mixtures, little or no fines				Not meeting all gradation requirements for *GW*	
		Gravels with fines (appreciable amount of fines)	Nonplastic fines (for identification procedures see *ML* below)			*GM*	Silty gravels, poorly graded gravel-sand-silt mixtures				Atterberg limits below "A" line, or *PI* less than 4	Above "A" line with *PI* between 4 and 7 are *borderline* cases requiring use of dual symbols
			Plastic fines (for identification procedures, see *CL* below)			*GC*	Clayey gravels, poorly graded gravel-sand-clay mixtures				Atterberg limits above "A" line, with *PI* greater than 7	
	Sands More than half of coarse fraction is smaller than 4 mm sieve size	Clean sands (little or no fines)	Wide range in grain sizes and substantial amounts of all intermediate particle sizes			*SW*	Well graded sands, gravelly sands, little or no fines				$C_U = \frac{D_{60}}{D_{10}}$ Greater than 6 $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ Between 1 and 3	
			Predominantly one size or a range of sizes with some intermediate sizes missing			*SP*	Poorly graded sands, gravelly sands, little or no fines				Not meeting all gradation requirements for *SW*	
		Sands with fines (appreciable amount of fines)	Nonplastic fines (for identification procedures, see *ML* below)			*SM*	Silty sands, poorly graded sand-silt mixtures				Atterberg limits below "A" line or *PI* less than 5	Above "A" line with *PI* between 4 and 7 are *borderline* cases requiring use of dual symbols
			Plastic fines (for identification procedures, see *CL* below)			*SC*	Clayey sands, poorly graded sand-clay mixtures				Atterberg limits below "A" line with *PI* greater than 7	
	Identification Procedures on Fraction Smaller than 380 µm Sieve Size											
			Dry Strength (crushing characteristics)	Dilatancy (reaction to shaking)	Toughness (consistency near plastic limit)							
Fine-grained soils More than half of material is *smaller* than 75 µm sieve size	Silts and clays liquid limit less than 50		None to slight	Quick to slow	None	*ML*	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands with slight plasticity	Give typical name; indicate degree and character of plasticity, amount and maximum size of coarse grains; colour in wet condition, odour if any, local or geologic name, and other pertinent descriptive information, and symbol in parentheses For undisturbed soils add information on structure, stratification, consistency in undisturbed and remoulded states, moisture and drainage conditions Example: *Clayey silt*, brown; slightly plastic; small percentage of fine sand; numerous vertical root holes; firm and dry in place; loess; (*ML*)		 Plasticity chart for laboratory classification of fine grained soils		
			Medium to high	None to very slow	Medium	*CL*	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays					
			Slight to medium	Slow	Slight	*OL*	Organic silts and organic silt-clays of low plasticity					
	Silts and clays liquid limit greater than 50		Slight to medium	Slow to none	Slight to medium	*MH*	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts					
			High to very high	None	High	*CH*	Inorganic clays of high plasticity, fat clays					
			Medium to high	None to very slow	Slight to medium	*OH*	Organic clays of medium to high plasticity					
Highly Organic Soils			Readily identified by colour, odour, spongy feel and frequently by fibrous texture			*Pt*	Peat and other highly organic soils					

NOTE: 1) Soils possessing characteristics of two groups are designated by combinations of group symbols (e.g. GW-GC, well graded gravel-sand mixture with clay fines).

2) Soils with liquid limits of the order of 35 to 50 may be visually classified as being of medium plasticity.

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LOG SYMBOLS

ROCK MATERIAL WEATHERING CLASSIFICATION

TERM	SYMBOL	DEFINITION
Residual Soil	RS	Soil developed on extremely weathered rock; the mass structure and substance fabric are no longer evident; there is a large change in volume but the soil has not been significantly transported.
Extremely weathered rock	XW	Rock is weathered to such an extent that it has "soil" properties, ie it either disintegrates or can be remoulded, in water.
Distinctly weathered rock	DW	Rock strength usually changed by weathering. The rock may be highly discoloured, usually by ironstaining. Porosity may be increased by leaching, or may be decreased due to deposition of weathering products in pores.
Slightly weathered rock	SW	Rock is slightly discoloured but shows little or no change of strength from fresh rock.
Fresh rock	FR	Rock shows no sign of decomposition or staining.

ROCK STRENGTH

Rock strength is defined by the Point Load Strength Index (Is 50) and refers to the strength of the rock substance in the direction normal to the bedding. The test procedure is described by the International Journal of Rock Mechanics, Mining, Science and Geomechanics. Abstract Volume 22, No 2, 1985.

TERM	SYMBOL	Is (50) MPa	FIELD GUIDE
Extremely Low:	EL		Easily remoulded by hand to a material with soil properties.
		0.03	
Very Low:	VL		May be crumbled in the hand. Sandstone is "sugary" and friable.
		0.1	
Low:	L		A piece of core 150mm long x 50mm dia. may be broken by hand and easily scored with a knife. Sharp edges of core may be friable and break during handling.
		0.3	
Medium Strength:	M		A piece of core 150mm long x 50mm dia. can be broken by hand with difficulty. Readily scored with knife.
		1	
High:	H		A piece of core 150mm long x 50mm dia. core cannot be broken by hand, can be slightly scratched or scored with knife; rock rings under hammer.
		3	
Very High:	VH		A piece of core 150mm long x 50mm dia. may be broken with hand-held pick after more than one blow. Cannot be scratched with pen knife; rock rings under hammer.
		10	
Extremely High:	EH		A piece of core 150mm long x 50mm dia. is very difficult to break with hand-held hammer. Rings when struck with a hammer.

ABBREVIATIONS USED IN DEFECT DESCRIPTION

ABBREVIATION	DESCRIPTION	NOTES
Be	Bedding Plane Parting	Defect orientations measured relative to the normal to the long core axis (ie relative to horizontal for vertical holes)
CS	Clay Seam	
J	Joint	
P	Planar	
Un	Undulating	
S	Smooth	
R	Rough	
IS	Ironstained	
XWS	Extremely Weathered Seam	
Cr	Crushed Seam	
60t	Thickness of defect in millimetres	

Ref: Standard Sheets Log Symbols
August 2001

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LOG SYMBOLS

LOG COLUMN	SYMBOL	DEFINITION
Groundwater Record	▼	Standing water level. Time delay following completion of drilling may be shown.
	—C—	Extent of borehole collapse shortly after drilling.
	▶—	Groundwater seepage into borehole or excavation noted during drilling or excavation.
Samples	ES	Soil sample taken over depth indicated, for environmental analysis.
	U50	Undisturbed 50mm diameter tube sample taken over depth indicated.
	DB	Bulk disturbed sample taken over depth indicated.
	DS	Small disturbed bag sample taken over depth indicated.
Field Tests	N = 17 4, 7, 10	Standard Penetration Test (SPT) performed between depths indicated by lines. Individual figures show blows per 150mm penetration. 'R' as noted below.
	N_c = 5 7 3R	Solid Cone Penetration Test (SCPT) performed between depths indicated by lines. Individual figures show blows per 150mm penetration for 60 degree solid cone driven by SPT hammer. 'R' refers to apparent hammer refusal within the corresponding 150mm depth increment.
	VNS = 25	Vane shear reading in kPa of Undrained Shear Strength.
	PID = 100	Photoionisation detector reading in ppm (Soil sample headspace test).
Moisture Condition (Cohesive Soils)	MC>PL	Moisture content estimated to be greater than plastic limit.
	MC≈PL	Moisture content estimated to be approximately equal to plastic limit.
	MC<PL	Moisture content estimated to be less than plastic limit.
(Cohesionless Soils)	D	DRY - runs freely through fingers.
	M	MOIST - does not run freely but no free water visible on soil surface.
	W	WET - free water visible on soil surface.
Strength (Consistency) Cohesive Soils	VS	VERY SOFT - Unconfined compressive strength less than 25kPa
	S	SOFT - Unconfined compressive strength 25-50kPa
	F	FIRM - Unconfined compressive strength 50-100kPa
	St	STIFF - Unconfined compressive strength 100-200kPa
	VSt	VERY STIFF - Unconfined compressive strength 200-400kPa
	H	HARD - Unconfined compressive strength greater than 400kPa
	( )	Bracketed symbol indicates estimated consistency based on tactile examination or other tests.
Density Index/ Relative Density (Cohesionless Soils)		**Density Index (I_D) Range (%)** **SPT 'N' Value Range (Blows/300mm)**
	VL	Very Loose <15 0-4
	L	Loose 15-35 4-10
	MD	Medium Dense 35-65 10-30
	D	Dense 65-85 30-50
	VD	Very Dense >85 >50
	( )	Bracketed symbol indicates estimated density based on ease of drilling or other tests.
Hand Penetrometer Readings	300 250	Numbers indicate individual test results in kPa on representative undisturbed material unless noted otherwise.
Remarks	'V' bit	Hardened steel 'V' shaped bit.
	'TC' bit	Tungsten carbide wing bit.
	T 60	Penetration of auger string in mm under static load of rig applied by drill head hydraulics without rotation of augers.

Ref: Standard Sheets Log Symbols
August 2001

APPENDIX B

(Laboratory Reports and Chain of Custody Documents)

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

CERTIFICATE OF ANALYSIS 44203

Client:

Environmental Investigation Services
PO Box 976
North Ryde BC
NSW 1670

Attention: Brendan Page

Sample log in details:

Your Reference:	**E23982K, Pyrmont**
No. of samples:	68 Soils, 2 Waters
Date samples received:	02/08/10
Date completed instructions received:	02/08/10

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:	9/08/10
Date of Preliminary Report:	Not Issued
Issue Date:	9/08/10

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

Results Approved By:

Sandra Taylor
Senior Organic Chemist

Rhian Morgan
Metals Supervisor

Nancy Zhang
Chemist

Matt Mansfield
Approved Signatory

NATA
ACCREDITED FOR TECHNICAL COMPETENCE

vTPH & BTEX in Soil						
Our Reference:	UNITS	44203-16	44203-17	44203-20	44203-21	44203-25
Your Reference	-------------	BH705	BH705	BH706	BH706	BH707
Depth	------------	1.3-1.5	1.8-1.95	1.7-1.95	2.8-3.0	1.5-1.55
Date Sampled		29/07/2010	29/07/2010	29/07/2010	29/07/2010	30/07/2010
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	3/8/2010	3/8/2010	3/8/2010	3/8/2010	3/8/2010
Date analysed	-	6/8/2010	6/8/2010	6/8/2010	6/8/2010	6/8/2010
vTPH C_6 - C_9	mg/kg	<25	36	<25	<25	<25
Benzene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
m+p-xylene	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0
o-Xylene	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
Surrogate aaa-Trifluorotoluene	%	107	106	107	101	104

vTPH & BTEX in Soil						
Our Reference:	UNITS	44203-26	44203-28	44203-30	44203-31	44203-34
Your Reference	-------------	BH707	BH707	BH708	BH708	BH709
Depth	------------	2.3-2.5	4.0-4.5	0.7-0.95	1.6-1.95	0.9-1.15
Date Sampled		30/07/2010	30/07/2010	29/07/2010	29/07/2010	29/07/2010
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	3/8/2010	3/8/2010	3/8/2010	3/8/2010	3/8/2010
Date analysed	-	6/8/2010	6/8/2010	6/8/2010	6/8/2010	6/8/2010
vTPH C_6 - C_9	mg/kg	1,100	<25	<25	<25	<25
Benzene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
m+p-xylene	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0
o-Xylene	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
Surrogate aaa-Trifluorotoluene	%	95	102	107	119	105

vTPH & BTEX in Soil						
Our Reference:	UNITS	44203-35	44203-38	44203-39	44203-40	44203-41
Your Reference	-------------	BH709	BH711	BH711	BH711	BH712
Depth	------------	1.7-1.95	1.3-1.5	1.7-1.95	3.3-3.45	1.3-1.5
Date Sampled		29/07/2010	30/07/2010	30/07/2010	30/07/2010	30/07/2010
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	3/8/2010	3/8/2010	3/8/2010	3/8/2010	3/8/2010
Date analysed	-	6/8/2010	6/8/2010	6/8/2010	6/8/2010	6/8/2010
vTPH C_6 - C_9	mg/kg	<25	<25	<25	<25	37
Benzene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
m+p-xylene	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0
o-Xylene	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
Surrogate aaa-Trifluorotoluene	%	104	104	99	100	101

vTPH & BTEX in Soil						
Our Reference:	UNITS	44203-42	44203-43	44203-45	44203-47	44203-49
Your Reference	-------------	BH712	BH712	BH713	BH713	BH713
Depth	------------	1.6-1.95	3.0-3.95	0.4-0.6	1.7-1.95	4.7-4.95
Date Sampled		30/07/2010	30/07/2010	30/07/2010	30/07/2010	30/07/2010
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	3/8/2010	3/8/2010	3/8/2010	3/8/2010	3/8/2010
Date analysed	-	6/8/2010	6/8/2010	6/8/2010	6/8/2010	6/8/2010
vTPH C_6 - C_9	mg/kg	230	72	<25	89	<25
Benzene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
m+p-xylene	mg/kg	2.0	<2.0	<2.0	<2.0	<2.0
o-Xylene	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
Surrogate aaa-Trifluorotoluene	%	99	98	108	91	102

vTPH & BTEX in Soil						
Our Reference:	UNITS	44203-52	44203-53	44203-55	44203-56	44203-61
Your Reference	-------------	BH715	BH715	BH716	BH716	DupEE
Depth	------------	0.6-0.95	1.5-1.95	0.5-0.8	1.7-1.95	-
Date Sampled		30/07/2010	30/07/2010	30/07/2010	30/07/2010	30/07/2010
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	3/8/2010	3/8/2010	3/8/2010	3/8/2010	3/8/2010
Date analysed	-	6/8/2010	6/8/2010	6/8/2010	6/8/2010	6/8/2010
vTPH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
m+p-xylene	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0
o-Xylene	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
Surrogate aaa-Trifluorotoluene	%	104	103	105	103	90

vTPH & BTEX in Soil						
Our Reference:	UNITS	44203-63	44203-64	44203-66	44203-67	44203-69
Your Reference	-------------	DupHH	FB1A	T Spike 1A	FB2A	T Spike 2A
Depth	------------	-	-	-	-	-
Date Sampled		30/07/2010	29/07/2010	29/07/2010	30/07/2010	30/07/2010
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	3/8/2010	3/8/2010	3/8/2010	3/8/2010	3/8/2010
Date analysed	-	6/8/2010	6/8/2010	6/8/2010	6/8/2010	6/8/2010
vTPH C_6 - C_9	mg/kg	<25	[NA]	[NA]	[NA]	[NA]
Benzene	mg/kg	<0.5	<0.5	100%	<0.5	93%
Toluene	mg/kg	<0.5	<0.5	99%	<0.5	93%
Ethylbenzene	mg/kg	<1.0	<1.0	99%	<1.0	93%
m+p-xylene	mg/kg	<2.0	<2.0	96%	<2.0	93%
o-Xylene	mg/kg	<1.0	<1.0	99%	<1.0	92%
Surrogate aaa-Trifluorotoluene	%	102	102	96	100	77

vTPH & BTEX in Soil		
Our Reference:	UNITS	44203-70
Your Reference	-------------	DupKK
Depth	------------	-
Date Sampled		30/07/2010
Type of sample		Soil
Date extracted	-	3/8/2010
Date analysed	-	6/8/2010
vTPH C_6 - C_9	mg/kg	<25
Benzene	mg/kg	<0.5
Toluene	mg/kg	<0.5
Ethylbenzene	mg/kg	<1.0
m+p-xylene	mg/kg	<2.0
o-Xylene	mg/kg	<1.0
Surrogate aaa-Trifluorotoluene	%	104

sTPH in Soil (C10-C36)						
Our Reference:	UNITS	44203-16	44203-17	44203-20	44203-21	44203-25
Your Reference	-------------	BH705	BH705	BH706	BH706	BH707
Depth	------------	1.3-1.5	1.8-1.95	1.7-1.95	2.8-3.0	1.5-1.55
Date Sampled		29/07/2010	29/07/2010	29/07/2010	29/07/2010	30/07/2010
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	03/08/2010	03/08/2010	03/08/2010	03/08/2010	03/08/2010
Date analysed	-	03/08/2010	03/08/2010	03/08/2010	03/08/2010	03/08/2010
TPH C_{10} - C_{14}	mg/kg	<50	1,700	<50	<50	<50
TPH C_{15} - C_{28}	mg/kg	<100	4,200	<100	<100	<100
TPH C_{29} - C_{36}	mg/kg	<100	810	<100	<100	<100
Surrogate o-Terphenyl	%	129	#	128	122	#

sTPH in Soil (C10-C36)						
Our Reference:	UNITS	44203-26	44203-28	44203-30	44203-31	44203-34
Your Reference	-------------	BH707	BH707	BH708	BH708	BH709
Depth	------------	2.3-2.5	4.0-4.5	0.7-0.95	1.6-1.95	0.9-1.15
Date Sampled		30/07/2010	30/07/2010	29/07/2010	29/07/2010	29/07/2010
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	03/08/2010	03/08/2010	03/08/2010	03/08/2010	03/08/2010
Date analysed	-	03/08/2010	03/08/2010	03/08/2010	03/08/2010	03/08/2010
TPH C_{10} - C_{14}	mg/kg	6,200	<50	<50	<50	<50
TPH C_{15} - C_{28}	mg/kg	1,700	<100	<100	<100	<100
TPH C_{29} - C_{36}	mg/kg	190	<100	<100	<100	<100
Surrogate o-Terphenyl	%	#	122	131	120	126

sTPH in Soil (C10-C36)						
Our Reference:	UNITS	44203-35	44203-38	44203-39	44203-40	44203-41
Your Reference	-------------	BH709	BH711	BH711	BH711	BH712
Depth	------------	1.7-1.95	1.3-1.5	1.7-1.95	3.3-3.45	1.3-1.5
Date Sampled		29/07/2010	30/07/2010	30/07/2010	30/07/2010	30/07/2010
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	03/08/2010	03/08/2010	03/08/2010	03/08/2010	03/08/2010
Date analysed	-	03/08/2010	03/08/2010	03/08/2010	03/08/2010	03/08/2010
TPH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	800
TPH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	660
TPH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100	210
Surrogate o-Terphenyl	%	132	124	121	117	#

sTPH in Soil (C10-C36)						
Our Reference:	UNITS	44203-42	44203-43	44203-45	44203-47	44203-49
Your Reference	-------------	BH712	BH712	BH713	BH713	BH713
Depth	------------	1.6-1.95	3.0-3.95	0.4-0.6	1.7-1.95	4.7-4.95
Date Sampled		30/07/2010	30/07/2010	30/07/2010	30/07/2010	30/07/2010
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	03/08/2010	03/08/2010	03/08/2010	03/08/2010	03/08/2010
Date analysed	-	03/08/2010	03/08/2010	03/08/2010	03/08/2010	03/08/2010
TPH C_{10} - C_{14}	mg/kg	3,000	730	<50	3,200	<50
TPH C_{15} - C_{28}	mg/kg	1,500	360	<100	1,800	<100
TPH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100	<100
Surrogate o-Terphenyl	%	#	#	119	#	120

sTPH in Soil (C10-C36)						
Our Reference:	UNITS	44203-52	44203-53	44203-55	44203-56	44203-61
Your Reference	-------------	BH715	BH715	BH716	BH716	DupEE
Depth	------------	0.6-0.95	1.5-1.95	0.5-0.8	1.7-1.95	-
Date Sampled		30/07/2010	30/07/2010	30/07/2010	30/07/2010	30/07/2010
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	03/08/2010	03/08/2010	03/08/2010	03/08/2010	03/08/2010
Date analysed	-	03/08/2010	03/08/2010	03/08/2010	03/08/2010	03/08/2010
TPH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TPH C_{15} - C_{28}	mg/kg	<100	<100	<100	190	<100
TPH C_{29} - C_{36}	mg/kg	<100	<100	<100	190	<100
Surrogate o-Terphenyl	%	119	130	130	136	132

sTPH in Soil (C10-C36)			
Our Reference:	UNITS	44203-63	44203-70
Your Reference	-------------	DupHH	DupKK
Depth	------------	-	-
Date Sampled		30/07/2010	30/07/2010
Type of sample		Soil	Soil
Date extracted	-	03/08/2010	03/08/2010
Date analysed	-	03/08/2010	03/08/2010
TPH C_{10} - C_{14}	mg/kg	<50	<50
TPH C_{15} - C_{28}	mg/kg	<100	<100
TPH C_{29} - C_{36}	mg/kg	<100	<100
Surrogate o-Terphenyl	%	133	140

PAHs in Soil Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ------------- ------------	44203-1 BH701 0.5-0.8 29/07/2010 Soil	44203-2 BH701 1.3-1.5 29/07/2010 Soil	44203-3 BH701 1.7-1.95 29/07/2010 Soil	44203-4 BH701 3.2-3.45 29/07/2010 Soil	44203-5 BH702 0.3-0.5 29/07/2010 Soil
Date extracted	-	03/08/2010	03/08/2010	03/08/2010	03/08/2010	03/08/2010
Date analysed	-	05/08/2010	05/08/2010	05/08/2010	05/08/2010	05/08/2010
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.8
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	2.7
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.3
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	1.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	26
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	4.9
Fluoranthene	mg/kg	0.2	<0.1	<0.1	<0.1	30
Pyrene	mg/kg	0.2	0.1	<0.1	<0.1	29
Benzo(a)anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	14
Chrysene	mg/kg	0.1	<0.1	<0.1	<0.1	11
Benzo(b+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	17
Benzo(a)pyrene	mg/kg	0.1	0.05	<0.05	<0.05	13
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	<0.1	<0.1	<0.1	6.8
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	1.5
Benzo(g,h,i)perylene	mg/kg	0.1	<0.1	<0.1	<0.1	6.2
Surrogate p-Terphenyl-d_{14}	%	103	99	99	101	99

PAHs in Soil						
Our Reference:	UNITS	44203-6	44203-7	44203-8	44203-9	44203-10
Your Reference	-------------	BH702	BH702	BH702	BH702	BH704
Depth	------------	1.2-1.5	1.5-1.95	2.8-3.0	3.3-3.45	0.1-0.3
Date Sampled		29/07/2010	29/07/2010	29/07/2010	29/07/2010	29/07/2010
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	03/08/2010	03/08/2010	03/08/2010	03/08/2010	03/08/2010
Date analysed	-	05/08/2010	05/08/2010	05/08/2010	05/08/2010	05/08/2010
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.2
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.1	<0.1	<0.1	<0.1	0.5
Pyrene	mg/kg	0.1	<0.1	<0.1	<0.1	0.5
Benzo(a)anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	0.3
Chrysene	mg/kg	0.1	<0.1	<0.1	<0.1	0.3
Benzo(b+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	0.5
Benzo(a)pyrene	mg/kg	0.1	<0.05	<0.05	<0.05	0.4
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.2
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.2
Surrogate p-Terphenyl-d_{14}	%	101	104	101	99	100

PAHs in Soil Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ------------- ------------	44203-11 BH704 0.7-1.0 29/07/2010 Soil	44203-12 BH704 1.6-1.95 29/07/2010 Soil	44203-13 BH704 2.8-3.0 29/07/2010 Soil	44203-14 BH704 3.2-3.45 29/07/2010 Soil	44203-16 BH705 1.3-1.5 29/07/2010 Soil
Date extracted	-	03/08/2010	03/08/2010	03/08/2010	03/08/2010	03/08/2010
Date analysed	-	05/08/2010	05/08/2010	05/08/2010	05/08/2010	05/08/2010
Naphthalene	mg/kg	0.2	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	0.6	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	0.1	<0.1	<0.1	<0.1	0.1
Phenanthrene	mg/kg	4.5	<0.1	<0.1	<0.1	1.2
Anthracene	mg/kg	1.0	<0.1	<0.1	<0.1	0.2
Fluoranthene	mg/kg	17	<0.1	<0.1	<0.1	1.2
Pyrene	mg/kg	19	<0.1	<0.1	<0.1	1.1
Benzo(a)anthracene	mg/kg	11	<0.1	<0.1	<0.1	0.5
Chrysene	mg/kg	10	<0.1	<0.1	<0.1	0.6
Benzo(b+k)fluoranthene	mg/kg	19	<0.2	<0.2	<0.2	0.7
Benzo(a)pyrene	mg/kg	16	<0.05	<0.05	<0.05	0.5
Indeno(1,2,3-c,d)pyrene	mg/kg	9.7	<0.1	<0.1	<0.1	0.3
Dibenzo(a,h)anthracene	mg/kg	1.9	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	9.4	<0.1	<0.1	<0.1	0.3
Surrogate p-Terphenyl-d_{14}	%	99	106	100	97	101

PAHs in Soil Our Reference:	UNITS	44203-20	44203-31	44203-34	44203-52	44203-56
Your Reference	-------------	BH706	BH708	BH709	BH715	BH716
Depth	------------	1.7-1.95	1.6-1.95	0.9-1.15	0.6-0.95	1.7-1.95
Date Sampled		29/07/2010	29/07/2010	29/07/2010	30/07/2010	30/07/2010
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	03/08/2010	03/08/2010	03/08/2010	03/08/2010	03/08/2010
Date analysed	-	05/08/2010	05/08/2010	05/08/2010	05/08/2010	05/08/2010
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	1.3
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.7
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.2
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.3
Phenanthrene	mg/kg	<0.1	<0.1	0.1	0.2	4.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	1.0
Fluoranthene	mg/kg	<0.1	<0.1	0.3	0.9	7.5
Pyrene	mg/kg	<0.1	<0.1	0.3	1.0	7.7
Benzo(a)anthracene	mg/kg	<0.1	<0.1	0.2	0.5	4.5
Chrysene	mg/kg	<0.1	<0.1	0.2	0.5	4.0
Benzo(b+k)fluoranthene	mg/kg	<0.2	<0.2	0.3	0.9	7.2
Benzo(a)pyrene	mg/kg	<0.05	0.05	0.2	0.6	5.9
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	0.1	0.3	3.3
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.7
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	0.1	0.3	3.2
Surrogate p-Terphenyl-d_{14}	%	99	100	99	98	105

PAHs in Soil Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ------------- ------------	44203-58 DupAA - 30/07/2010 Soil	44203-59 DupBB - 30/07/2010 Soil	44203-70 DupKK - 30/07/2010 Soil
Date extracted	-	03/08/2010	03/08/2010	03/08/2010
Date analysed	-	05/08/2010	05/08/2010	05/08/2010
Naphthalene	mg/kg	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	0.2
Phenanthrene	mg/kg	<0.1	<0.1	1.9
Anthracene	mg/kg	<0.1	<0.1	0.4
Fluoranthene	mg/kg	0.2	<0.1	1.7
Pyrene	mg/kg	0.2	<0.1	1.6
Benzo(a)anthracene	mg/kg	0.1	<0.1	0.8
Chrysene	mg/kg	0.1	<0.1	0.8
Benzo(b+k)fluoranthene	mg/kg	0.3	<0.2	1.0
Benzo(a)pyrene	mg/kg	0.2	<0.05	0.7
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	<0.1	0.4
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	0.1
Benzo(g,h,i)perylene	mg/kg	0.1	<0.1	0.4
Surrogate p-Terphenyl-d_{14}	%	109	103	103

Organochlorine Pesticides in soil Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ------------- ------------	44203-16 BH705 1.3-1.5 29/07/2010 Soil	44203-20 BH706 1.7-1.95 29/07/2010 Soil	44203-31 BH708 1.6-1.95 29/07/2010 Soil	44203-34 BH709 0.9-1.15 29/07/2010 Soil	44203-52 BH715 0.6-0.95 30/07/2010 Soil
Date extracted	-	03/08/2010	03/08/2010	03/08/2010	03/08/2010	03/08/2010
Date analysed	-	04/08/2010	04/08/2010	04/08/2010	04/08/2010	04/08/2010
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	75	76	79	77	73

Organochlorine Pesticides in soil			
Our Reference:	UNITS	44203-56	44203-70
Your Reference	-------------	BH716	DupKK
Depth	------------	1.7-1.95	-
Date Sampled		30/07/2010	30/07/2010
Type of sample		Soil	Soil
Date extracted	-	03/08/2010	03/08/2010
Date analysed	-	04/08/2010	04/08/2010
HCB	mg/kg	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1
Surrogate TCLMX	%	82	81

Organophosphorus Pesticides Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ------------- ------------	44203-16 BH705 1.3-1.5 29/07/2010 Soil	44203-20 BH706 1.7-1.95 29/07/2010 Soil	44203-31 BH708 1.6-1.95 29/07/2010 Soil	44203-34 BH709 0.9-1.15 29/07/2010 Soil	44203-52 BH715 0.6-0.95 30/07/2010 Soil
Date extracted	-	03/08/2010	03/08/2010	03/08/2010	03/08/2010	03/08/2010
Date analysed	-	03/08/2010	03/08/2010	03/08/2010	03/08/2010	03/08/2010
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	75	76	79	77	73

Organophosphorus Pesticides Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ------------- ------------	44203-56 BH716 1.7-1.95 30/07/2010 Soil	44203-70 DupKK - 30/07/2010 Soil
Date extracted	-	03/08/2010	03/08/2010
Date analysed	-	03/08/2010	03/08/2010
Diazinon	mg/kg	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1
Surrogate TCLMX	%	82	81

PCBs in Soil Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ------------- ------------	44203-16 BH705 1.3-1.5 29/07/2010 Soil	44203-20 BH706 1.7-1.95 29/07/2010 Soil	44203-31 BH708 1.6-1.95 29/07/2010 Soil	44203-34 BH709 0.9-1.15 29/07/2010 Soil	44203-52 BH715 0.6-0.95 30/07/2010 Soil
Date extracted	-	03/08/2010	03/08/2010	03/08/2010	03/08/2010	03/08/2010
Date analysed	-	04/08/2010	04/08/2010	04/08/2010	04/08/2010	04/08/2010
Arochlor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1221*	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	75	76	79	77	73

PCBs in Soil Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ------------- ------------	44203-56 BH716 1.7-1.95 30/07/2010 Soil	44203-70 DupKK - 30/07/2010 Soil
Date extracted	-	03/08/2010	03/08/2010
Date analysed	-	04/08/2010	04/08/2010
Arochlor 1016	mg/kg	<0.1	<0.1
Arochlor 1221*	mg/kg	<0.1	<0.1
Arochlor 1232	mg/kg	<0.1	<0.1
Arochlor 1242	mg/kg	<0.1	<0.1
Arochlor 1248	mg/kg	<0.1	<0.1
Arochlor 1254	mg/kg	<0.1	<0.1
Arochlor 1260	mg/kg	<0.1	<0.1
Surrogate TCLMX	%	82	81

Acid Extractable metals in soil						
Our Reference:	UNITS	44203-1	44203-2	44203-3	44203-4	44203-5
Your Reference	-------------	BH701	BH701	BH701	BH701	BH702
Depth	------------	0.5-0.8	1.3-1.5	1.7-1.95	3.2-3.45	0.3-0.5
Date Sampled		29/07/2010	29/07/2010	29/07/2010	29/07/2010	29/07/2010
Type of sample		Soil	Soil	Soil	Soil	Soil
Date digested	-	03/08/2010	03/08/2010	03/08/2010	03/08/2010	03/08/2010
Date analysed	-	03/08/2010	03/08/2010	03/08/2010	03/08/2010	03/08/2010
Arsenic	mg/kg	24	<4	<4	<4	15

Acid Extractable metals in soil						
Our Reference:	UNITS	44203-6	44203-7	44203-8	44203-9	44203-10
Your Reference	-------------	BH702	BH702	BH702	BH702	BH704
Depth	------------	1.2-1.5	1.5-1.95	2.8-3.0	3.3-3.45	0.1-0.3
Date Sampled		29/07/2010	29/07/2010	29/07/2010	29/07/2010	29/07/2010
Type of sample		Soil	Soil	Soil	Soil	Soil
Date digested	-	03/08/2010	03/08/2010	03/08/2010	03/08/2010	03/08/2010
Date analysed	-	03/08/2010	03/08/2010	03/08/2010	03/08/2010	03/08/2010
Arsenic	mg/kg	11	<4	<4	<4	<4

Acid Extractable metals in soil						
Our Reference:	UNITS	44203-11	44203-12	44203-13	44203-14	44203-16
Your Reference	-------------	BH704	BH704	BH704	BH704	BH705
Depth	------------	0.7-1.0	1.6-1.95	2.8-3.0	3.2-3.45	1.3-1.5
Date Sampled		29/07/2010	29/07/2010	29/07/2010	29/07/2010	29/07/2010
Type of sample		Soil	Soil	Soil	Soil	Soil
Date digested	-	03/08/2010	03/08/2010	03/08/2010	03/08/2010	03/08/2010
Date analysed	-	03/08/2010	03/08/2010	03/08/2010	03/08/2010	03/08/2010
Arsenic	mg/kg	100	580	53	6	10
Cadmium	mg/kg	[NA]	[NA]	[NA]	[NA]	<0.5
Chromium	mg/kg	[NA]	[NA]	[NA]	[NA]	29
Copper	mg/kg	[NA]	[NA]	[NA]	[NA]	19
Lead	mg/kg	[NA]	[NA]	[NA]	[NA]	58
Mercury	mg/kg	[NA]	[NA]	[NA]	[NA]	0.2
Nickel	mg/kg	[NA]	[NA]	[NA]	[NA]	5
Zinc	mg/kg	[NA]	[NA]	[NA]	[NA]	130

Acid Extractable metals in soil						
Our Reference:	UNITS	44203-20	44203-31	44203-34	44203-52	44203-56
Your Reference	-------------	BH706	BH708	BH709	BH715	BH716
Depth	------------	1.7-1.95	1.6-1.95	0.9-1.15	0.6-0.95	1.7-1.95
Date Sampled		29/07/2010	29/07/2010	29/07/2010	30/07/2010	30/07/2010
Type of sample		Soil	Soil	Soil	Soil	Soil
Date digested	-	03/08/2010	03/08/2010	03/08/2010	03/08/2010	03/08/2010
Date analysed	-	03/08/2010	03/08/2010	03/08/2010	03/08/2010	03/08/2010
Arsenic	mg/kg	<4	5	5	8	9
Cadmium	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Chromium	mg/kg	8	9	10	10	18
Copper	mg/kg	8	79	30	25	120
Lead	mg/kg	27	900	350	29	600
Mercury	mg/kg	<0.1	1.1	1.9	0.1	1.7
Nickel	mg/kg	3	4	3	6	27
Zinc	mg/kg	53	210	170	53	120

Acid Extractable metals in soil				
Our Reference:	UNITS	44203-58	44203-59	44203-70
Your Reference	-------------	DupAA	DupBB	DupKK
Depth	------------	-	-	-
Date Sampled		30/07/2010	30/07/2010	30/07/2010
Type of sample		Soil	Soil	Soil
Date digested	-	03/08/2010	03/08/2010	03/08/2010
Date analysed	-	03/08/2010	03/08/2010	03/08/2010
Arsenic	mg/kg	24	<4	7
Cadmium	mg/kg	[NA]	[NA]	<0.5
Chromium	mg/kg	[NA]	[NA]	25
Copper	mg/kg	[NA]	[NA]	27
Lead	mg/kg	[NA]	[NA]	80
Mercury	mg/kg	[NA]	[NA]	0.2
Nickel	mg/kg	[NA]	[NA]	5
Zinc	mg/kg	[NA]	[NA]	140

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Moisture						
Our Reference:	UNITS	44203-1	44203-2	44203-3	44203-4	44203-5
Your Reference	-------------	BH701	BH701	BH701	BH701	BH702
Depth	------------	0.5-0.8	1.3-1.5	1.7-1.95	3.2-3.45	0.3-0.5
Date Sampled		29/07/2010	29/07/2010	29/07/2010	29/07/2010	29/07/2010
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	3/8/2010	3/8/2010	3/8/2010	3/8/2010	3/8/2010
Date analysed	-	3/8/2010	3/8/2010	3/8/2010	3/8/2010	3/8/2010
Moisture	%	20	2.4	9.3	15	18

Moisture						
Our Reference:	UNITS	44203-6	44203-7	44203-8	44203-9	44203-10
Your Reference	-------------	BH702	BH702	BH702	BH702	BH704
Depth	------------	1.2-1.5	1.5-1.95	2.8-3.0	3.3-3.45	0.1-0.3
Date Sampled		29/07/2010	29/07/2010	29/07/2010	29/07/2010	29/07/2010
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	3/8/2010	3/8/2010	3/8/2010	3/8/2010	3/8/2010
Date analysed	-	3/8/2010	3/8/2010	3/8/2010	3/8/2010	3/8/2010
Moisture	%	9.3	8.4	9.9	14	6.0

Moisture						
Our Reference:	UNITS	44203-11	44203-12	44203-13	44203-14	44203-16
Your Reference	-------------	BH704	BH704	BH704	BH704	BH705
Depth	------------	0.7-1.0	1.6-1.95	2.8-3.0	3.2-3.45	1.3-1.5
Date Sampled		29/07/2010	29/07/2010	29/07/2010	29/07/2010	29/07/2010
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	3/8/2010	3/8/2010	3/8/2010	3/8/2010	3/8/2010
Date analysed	-	3/8/2010	3/8/2010	3/8/2010	3/8/2010	3/8/2010
Moisture	%	12	7.0	9.9	27	8.6

Moisture						
Our Reference:	UNITS	44203-17	44203-20	44203-21	44203-25	44203-26
Your Reference	-------------	BH705	BH706	BH706	BH707	BH707
Depth	------------	1.8-1.95	1.7-1.95	2.8-3.0	1.5-1.55	2.3-2.5
Date Sampled		29/07/2010	29/07/2010	29/07/2010	30/07/2010	30/07/2010
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	3/8/2010	3/8/2010	3/8/2010	3/8/2010	3/8/2010
Date analysed	-	3/8/2010	3/8/2010	3/8/2010	3/8/2010	3/8/2010
Moisture	%	14	11	30	12	31

Moisture						
Our Reference:	UNITS	44203-28	44203-30	44203-31	44203-34	44203-35
Your Reference	-------------	BH707	BH708	BH708	BH709	BH709
Depth	------------	4.0-4.5	0.7-0.95	1.6-1.95	0.9-1.15	1.7-1.95
Date Sampled		30/07/2010	29/07/2010	29/07/2010	29/07/2010	29/07/2010
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	3/8/2010	3/8/2010	3/8/2010	3/8/2010	3/8/2010
Date analysed	-	3/8/2010	3/8/2010	3/8/2010	3/8/2010	3/8/2010
Moisture	%	26	11	15	12	21

Moisture						
Our Reference:	UNITS	44203-38	44203-39	44203-40	44203-41	44203-42
Your Reference	-------------	BH711	BH711	BH711	BH712	BH712
Depth	------------	1.3-1.5	1.7-1.95	3.3-3.45	1.3-1.5	1.6-1.95
Date Sampled		30/07/2010	30/07/2010	30/07/2010	30/07/2010	30/07/2010
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	3/8/2010	3/8/2010	3/8/2010	3/8/2010	3/8/2010
Date analysed	-	3/8/2010	3/8/2010	3/8/2010	3/8/2010	3/8/2010
Moisture	%	11	9.6	23	18	17

Moisture						
Our Reference:	UNITS	44203-43	44203-45	44203-47	44203-49	44203-52
Your Reference	-------------	BH712	BH713	BH713	BH713	BH715
Depth	------------	3.0-3.95	0.4-0.6	1.7-1.95	4.7-4.95	0.6-0.95
Date Sampled		30/07/2010	30/07/2010	30/07/2010	30/07/2010	30/07/2010
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	3/8/2010	3/8/2010	3/8/2010	3/8/2010	3/8/2010
Date analysed	-	3/8/2010	3/8/2010	3/8/2010	3/8/2010	3/8/2010
Moisture	%	20	9.9	17	16	9.6

Moisture						
Our Reference:	UNITS	44203-53	44203-55	44203-56	44203-58	44203-59
Your Reference	-------------	BH715	BH716	BH716	DupAA	DupBB
Depth	------------	1.5-1.95	0.5-0.8	1.7-1.95	-	-
Date Sampled		30/07/2010	30/07/2010	30/07/2010	30/07/2010	30/07/2010
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	3/8/2010	3/8/2010	3/8/2010	3/8/2010	3/8/2010
Date analysed	-	3/8/2010	3/8/2010	3/8/2010	3/8/2010	3/8/2010
Moisture	%	17	12	12	21	7.3

Moisture						
Our Reference:	UNITS	44203-61	44203-63	44203-64	44203-67	44203-70
Your Reference	-------------	DupEE	DupHH	FB1A	FB2A	DupKK
Depth	------------	-	-	-	-	-
Date Sampled		30/07/2010	30/07/2010	29/07/2010	30/07/2010	30/07/2010
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	3/8/2010	3/8/2010	3/8/2010	3/8/2010	3/8/2010
Date analysed	-	3/8/2010	3/8/2010	3/8/2010	3/8/2010	3/8/2010
Moisture	%	31	11	5.5	4.6	9.3

Asbestos ID - soils Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ------------- ------------	44203-16 BH705 1.3-1.5 29/07/2010 Soil	44203-20 BH706 1.7-1.95 29/07/2010 Soil	44203-31 BH708 1.6-1.95 29/07/2010 Soil	44203-34 BH709 0.9-1.15 29/07/2010 Soil	44203-52 BH715 0.6-0.95 30/07/2010 Soil
Date analysed	-	5/8/2010	5/8/2010	5/8/2010	5/8/2010	5/8/2010
Sample Description	-	Approx 30g Soil	Approx 40g Clay Soil	Approx 35g Soil	Approx 40g Soil	Approx 40g Soil
Asbestos ID in soil	-	No asbestos found at reporting limit of 0.1g/kg	No asbestos found at reporting limit of 0.1g/kg	No asbestos found at reporting limit of 0.1g/kg	No asbestos found at reporting limit of 0.1g/kg	No asbestos found at reporting limit of 0.1g/kg
Trace Analysis	-	Respirable fibres not detected	Respirable fibres not detected	Respirable fibres not detected	Respirable fibres not detected	Respirable fibres not detected

Asbestos ID - soils Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ------------- ------------	44203-56 BH716 1.7-1.95 30/07/2010 Soil
Date analysed	-	5/8/2010
Sample Description	-	Approx 40g Soil
Asbestos ID in soil	-	No asbestos found at reporting limit of 0.1g/kg
Trace Analysis	-	Respirable fibres not detected

vTPH & BTEX in Water Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ------------- ------------	44203-65 Rinsate 1A - 29/07/2010 Water	44203-68 Rinsate 2A - 30/07/2010 Water
Date extracted	-	4/8/2010	4/8/2010
Date analysed	-	4/8/2010	4/8/2010
TPH C_6 - C_9	µg/L	<10	<10
Benzene	µg/L	<1.0	<1.0
Toluene	µg/L	<1.0	<1.0
Ethylbenzene	µg/L	<1.0	<1.0
m+p-xylene	µg/L	<2.0	<2.0
o-xylene	µg/L	<1.0	<1.0
Surrogate Dibromofluoromethane	%	101	103
Surrogate toluene-d8	%	96	96
Surrogate 4-BFB	%	103	82

sTPH in Water (C10-C36) Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ------------- ------------	44203-65 Rinsate 1A - 29/07/2010 Water	44203-68 Rinsate 2A - 30/07/2010 Water
Date extracted	-	3/8/2010	3/8/2010
Date analysed	-	3/8/2010	3/8/2010
TPH C_{10} - C_{14}	µg/L	<50	<50
TPH C_{15} - C_{28}	µg/L	<100	<100
TPH C_{29} - C_{36}	µg/L	<100	<100
Surrogate o-Terphenyl	%	128	128

Method ID	Methodology Summary
GC.16	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.
GC.3	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID.
GC.12 subset	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS.
GC-5	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
GC.8	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
GC-6	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD.
Metals.20 ICP-AES	Determination of various metals by ICP-AES.
Metals.21 CV-AAS	Determination of Mercury by Cold Vapour AAS.
LAB.8	Moisture content determined by heating at 105 deg C for a minimum of 4 hours.
AS4964-2004	Asbestos ID - Qualitative identification of asbestos type fibres in bulk samples using Polarised Light Microscopy and Dispersion Staining Techniques.

QUALITY CONTROL vTPH & BTEX in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			3/8/2010	44203-16	3/8/2010 || 3/8/2010	LCS-3	3/8/2010
Date analysed	-			6/8/2010	44203-16	6/8/2010 || 6/8/2010	LCS-3	6/8/2010
vTPH C_6 - C_9	mg/kg	25	GC.16	<25	44203-16	<25 || <25	LCS-3	93%
Benzene	mg/kg	0.5	GC.16	<0.5	44203-16	<0.5 || <0.5	LCS-3	87%
Toluene	mg/kg	0.5	GC.16	<0.5	44203-16	<0.5 || <0.5	LCS-3	92%
Ethylbenzene	mg/kg	1	GC.16	<1.0	44203-16	<1.0 || <1.0	LCS-3	93%
m+p-xylene	mg/kg	2	GC.16	<2.0	44203-16	<2.0 || <2.0	LCS-3	96%
o-Xylene	mg/kg	1	GC.16	<1.0	44203-16	<1.0 || <1.0	LCS-3	98%
Surrogate aaa-Trifluorotoluene	%		GC.16	116	44203-16	107 || 109 || RPD: 2	LCS-3	112%

QUALITY CONTROL sTPH in Soil (C10-C36)	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			3/8/2010	44203-16	03/08/2010 || 03/08/2010	LCS-3	03/08/2010
Date analysed	-			3/8/2010	44203-16	03/08/2010 || 03/08/2010	LCS-3	03/08/2010
TPH C_{10} - C_{14}	mg/kg	50	GC.3	<50	44203-16	<50 || <50	LCS-3	81%
TPH C_{15} - C_{28}	mg/kg	100	GC.3	<100	44203-16	<100 || <100	LCS-3	87%
TPH C_{29} - C_{36}	mg/kg	100	GC.3	<100	44203-16	<100 || <100	LCS-3	87%
Surrogate o-Terphenyl	%		GC.3	126	44203-16	129 || 132 || RPD: 2	LCS-3	119%

QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			03/08/2010	44203-1	03/08/2010 || 03/08/2010	LCS-3	03/08/2010
Date analysed	-			05/18/2010	44203-1	05/08/2010 || 05/08/2010	LCS-3	03/08/2010
Naphthalene	mg/kg	0.1	GC.12 subset	<0.1	44203-1	<0.1 || <0.1	LCS-3	106%
Acenaphthylene	mg/kg	0.1	GC.12 subset	<0.1	44203-1	<0.1 || <0.1	[NR]	[NR]
Acenaphthene	mg/kg	0.1	GC.12 subset	<0.1	44203-1	<0.1 || <0.1	[NR]	[NR]
Fluorene	mg/kg	0.1	GC.12 subset	<0.1	44203-1	<0.1 || <0.1	LCS-3	116%
Phenanthrene	mg/kg	0.1	GC.12 subset	<0.1	44203-1	<0.1 || <0.1	LCS-3	119%
Anthracene	mg/kg	0.1	GC.12 subset	<0.1	44203-1	<0.1 || <0.1	[NR]	[NR]
Fluoranthene	mg/kg	0.1	GC.12 subset	<0.1	44203-1	0.2 || 0.2 || RPD: 0	LCS-3	110%
Pyrene	mg/kg	0.1	GC.12 subset	<0.1	44203-1	0.2 || 0.2 || RPD: 0	LCS-3	116%

QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Benzo(a)anthracene	mg/kg	0.1	GC.12 subset	<0.1	44203-1	0.1 || 0.1 || RPD: 0	[NR]	[NR]
Chrysene	mg/kg	0.1	GC.12 subset	<0.1	44203-1	0.1 || 0.2 || RPD: 67	LCS-3	125%
Benzo(b+k)fluoranthene	mg/kg	0.2	GC.12 subset	<0.2	44203-1	<0.2 || 0.2	[NR]	[NR]
Benzo(a)pyrene	mg/kg	0.05	GC.12 subset	<0.05	44203-1	0.1 || 0.1 || RPD: 0	LCS-3	127%
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	GC.12 subset	<0.1	44203-1	0.1 || 0.1 || RPD: 0	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	0.1	GC.12 subset	<0.1	44203-1	<0.1 || <0.1	[NR]	[NR]
Benzo(g,h,i)perylene	mg/kg	0.1	GC.12 subset	<0.1	44203-1	0.1 || 0.1 || RPD: 0	[NR]	[NR]
Surrogate p-Terphenyl-d_{14}	%		GC.12 subset	96	44203-1	103 || 100 || RPD: 3	LCS-3	99%

QUALITY CONTROL Organochlorine Pesticides in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			03/08/2010	[NT]	[NT]	LCS-3	03/08/2010
Date analysed	-			04/08/2010	[NT]	[NT]	LCS-3	04/08/2010
HCB	mg/kg	0.1	GC-5	<0.1	[NT]	[NT]	[NR]	[NR]
alpha-BHC	mg/kg	0.1	GC-5	<0.1	[NT]	[NT]	LCS-3	98%
gamma-BHC	mg/kg	0.1	GC-5	<0.1	[NT]	[NT]	[NR]	[NR]
beta-BHC	mg/kg	0.1	GC-5	<0.1	[NT]	[NT]	LCS-3	108%
Heptachlor	mg/kg	0.1	GC-5	<0.1	[NT]	[NT]	LCS-3	96%
delta-BHC	mg/kg	0.1	GC-5	<0.1	[NT]	[NT]	[NR]	[NR]
Aldrin	mg/kg	0.1	GC-5	<0.1	[NT]	[NT]	LCS-3	92%
Heptachlor Epoxide	mg/kg	0.1	GC-5	<0.1	[NT]	[NT]	LCS-3	106%
gamma-Chlordane	mg/kg	0.1	GC-5	<0.1	[NT]	[NT]	[NR]	[NR]
alpha-chlordane	mg/kg	0.1	GC-5	<0.1	[NT]	[NT]	[NR]	[NR]
Endosulfan I	mg/kg	0.1	GC-5	<0.1	[NT]	[NT]	[NR]	[NR]
pp-DDE	mg/kg	0.1	GC-5	<0.1	[NT]	[NT]	LCS-3	115%
Dieldrin	mg/kg	0.1	GC-5	<0.1	[NT]	[NT]	LCS-3	93%
Endrin	mg/kg	0.1	GC-5	<0.1	[NT]	[NT]	LCS-3	97%
pp-DDD	mg/kg	0.1	GC-5	<0.1	[NT]	[NT]	LCS-3	106%
Endosulfan II	mg/kg	0.1	GC-5	<0.1	[NT]	[NT]	[NR]	[NR]
pp-DDT	mg/kg	0.1	GC-5	<0.1	[NT]	[NT]	[NR]	[NR]
Endrin Aldehyde	mg/kg	0.1	GC-5	<0.1	[NT]	[NT]	[NR]	[NR]
Endosulfan Sulphate	mg/kg	0.1	GC-5	<0.1	[NT]	[NT]	LCS-3	87%
Methoxychlor	mg/kg	0.1	GC-5	<0.1	[NT]	[NT]	[NR]	[NR]
Surrogate TCLMX	%		GC-5	74	[NT]	[NT]	LCS-3	76%

QUALITY CONTROL Organophosphorus Pesticides	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			03/08/2010	[NT]	[NT]	LCS-3	03/08/2010
Date analysed	-			04/08/2010	[NT]	[NT]	LCS-3	04/08/2010
Diazinon	mg/kg	0.1	GC.8	<0.1	[NT]	[NT]	[NR]	[NR]
Dimethoate	mg/kg	0.1	GC.8	<0.1	[NT]	[NT]	[NR]	[NR]
Chlorpyriphos-methyl	mg/kg	0.1	GC.8	<0.1	[NT]	[NT]	[NR]	[NR]
Ronnel	mg/kg	0.1	GC.8	<0.1	[NT]	[NT]	[NR]	[NR]
Chlorpyriphos	mg/kg	0.1	GC.8	<0.1	[NT]	[NT]	LCS-3	112%
Fenitrothion	mg/kg	0.1	GC.8	<0.1	[NT]	[NT]	LCS-3	109%
Bromophos-ethyl	mg/kg	0.1	GC.8	<0.1	[NT]	[NT]	[NR]	[NR]
Ethion	mg/kg	0.1	GC.8	<0.1	[NT]	[NT]	LCS-3	101%
Surrogate TCLMX	%		GC.8	74	[NT]	[NT]	LCS-3	96%

QUALITY CONTROL PCBs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			03/08/2010	[NT]	[NT]	LCS-3	03/08/2010
Date analysed	-			04/08/2010	[NT]	[NT]	LCS-3	04/08/2010
Arochlor 1016	mg/kg	0.1	GC-6	<0.1	[NT]	[NT]	[NR]	[NR]
Arochlor 1221*	mg/kg	0.1	GC-6	<0.1	[NT]	[NT]	[NR]	[NR]
Arochlor 1232	mg/kg	0.1	GC-6	<0.1	[NT]	[NT]	[NR]	[NR]
Arochlor 1242	mg/kg	0.1	GC-6	<0.1	[NT]	[NT]	[NR]	[NR]
Arochlor 1248	mg/kg	0.1	GC-6	<0.1	[NT]	[NT]	[NR]	[NR]
Arochlor 1254	mg/kg	0.1	GC-6	<0.1	[NT]	[NT]	LCS-3	126%
Arochlor 1260	mg/kg	0.1	GC-6	<0.1	[NT]	[NT]	[NR]	[NR]
Surrogate TCLMX	%		GC-6	74	[NT]	[NT]	LCS-3	107%

QUALITY CONTROL Acid Extractable metals in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date digested	-			03/08/2010	44203-1	03/08/2010 || 03/08/2010	LCS-1	03/08/2010
Date analysed	-			03/08/2010	44203-1	03/08/2010 || 03/08/2010	LCS-1	03/08/2010
Arsenic	mg/kg	4	Metals.20 ICP-AES	<4	44203-1	24 || 25 || RPD: 4	LCS-1	103%
Cadmium	mg/kg	0.5	Metals.20 ICP-AES	<0.5	[NT]	[NT]	LCS-1	101%
Chromium	mg/kg	1	Metals.20 ICP-AES	<1	[NT]	[NT]	LCS-1	104%
Copper	mg/kg	1	Metals.20 ICP-AES	<1	[NT]	[NT]	LCS-1	105%

QUALITY CONTROL Acid Extractable metals in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Lead	mg/kg	1	Metals.20 ICP-AES	<1	[NT]	[NT]	LCS-1	104%
Mercury	mg/kg	0.1	Metals.21 CV-AAS	<0.1	[NT]	[NT]	LCS-1	96%
Nickel	mg/kg	1	Metals.20 ICP-AES	<1	[NT]	[NT]	LCS-1	105%
Zinc	mg/kg	1	Metals.20 ICP-AES	<1	[NT]	[NT]	LCS-1	104%

QUALITY CONTROL Moisture	UNITS	PQL	METHOD	Blank
Date prepared	-			3/8/2010
Date analysed	-			3/8/2010
Moisture	%	0.1	LAB.8	<0.10

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

QUALITY CONTROL vTPH & BTEX in Water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			4/8/2010	[NT]	[NT]	LCS-W1	4/8/2010
Date analysed	-			4/8/2010	[NT]	[NT]	LCS-W1	4/8/2010
TPH C_6 - C_9	µg/L	10	GC.16	<10	[NT]	[NT]	LCS-W1	102%
Benzene	µg/L	1	GC.16	<1.0	[NT]	[NT]	LCS-W1	105%
Toluene	µg/L	1	GC.16	<1.0	[NT]	[NT]	LCS-W1	112%
Ethylbenzene	µg/L	1	GC.16	<1.0	[NT]	[NT]	LCS-W1	98%
m+p-xylene	µg/L	2	GC.16	<2.0	[NT]	[NT]	LCS-W1	98%
o-xylene	µg/L	1	GC.16	<1.0	[NT]	[NT]	LCS-W1	99%
Surrogate Dibromofluoromethane	%		GC.16	98	[NT]	[NT]	LCS-W1	100%
Surrogate toluene-d8	%		GC.16	100	[NT]	[NT]	LCS-W1	104%
Surrogate 4-BFB	%		GC.16	104	[NT]	[NT]	LCS-W1	97%

QUALITY CONTROL sTPH in Water (C10-C36)	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			03/08/2010	[NT]	[NT]	LCS-W1	3/8/2010
Date analysed	-			03/08/2010	[NT]	[NT]	LCS-W1	3/8/2010
TPH C_{10} - C_{14}	µg/L	50	GC.3	<50	[NT]	[NT]	LCS-W1	81%
TPH C_{15} - C_{28}	µg/L	100	GC.3	<100	[NT]	[NT]	LCS-W1	117%
TPH C_{29} - C_{36}	µg/L	100	GC.3	<100	[NT]	[NT]	LCS-W1	99%
Surrogate o-Terphenyl	%		GC.3	131	[NT]	[NT]	LCS-W1	121%

QUALITY CONTROL vTPH & BTEX in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	44203-38	3/8/2010 || 3/8/2010	LCS-4	3/8/2010
Date analysed	-	44203-38	6/8/2010 || 6/8/2010	LCS-4	6/8/2010
vTPH C_6 - C_9	mg/kg	44203-38	<25 || <25	LCS-4	102%
Benzene	mg/kg	44203-38	<0.5 || <0.5	LCS-4	95%
Toluene	mg/kg	44203-38	<0.5 || <0.5	LCS-4	101%
Ethylbenzene	mg/kg	44203-38	<1.0 || <1.0	LCS-4	103%
m+p-xylene	mg/kg	44203-38	<2.0 || <2.0	LCS-4	106%
o-Xylene	mg/kg	44203-38	<1.0 || <1.0	LCS-4	108%
Surrogate aaa-Trifluorotoluene	%	44203-38	104 || 100 || RPD: 4	LCS-4	115%

QUALITY CONTROL sTPH in Soil (C10-C36)	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	44203-38	03/08/2010 || 03/08/2010	LCS-4	03/08/2010
Date analysed	-	44203-38	03/08/2010 || 03/08/2010	LCS-4	03/08/2010
TPH C_{10} - C_{14}	mg/kg	44203-38	<50 || <50	LCS-4	87%
TPH C_{15} - C_{28}	mg/kg	44203-38	<100 || <100	LCS-4	95%
TPH C_{29} - C_{36}	mg/kg	44203-38	<100 || <100	LCS-4	93%
Surrogate o-Terphenyl	%	44203-38	124 || 121 || RPD: 2	LCS-4	80%

QUALITY CONTROL PAHs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	44203-11	03/08/2010 || 03/08/2010	LCS-4	03/08/2010
Date analysed	-	44203-11	05/08/2010 || 05/08/2010	LCS-4	05/08/2010
Naphthalene	mg/kg	44203-11	0.2 || 0.2 || RPD: 0	LCS-4	116%
Acenaphthylene	mg/kg	44203-11	0.6 || 0.8 || RPD: 29	[NR]	[NR]
Acenaphthene	mg/kg	44203-11	<0.1 || <0.1	[NR]	[NR]
Fluorene	mg/kg	44203-11	0.1 || 0.3 || RPD: 100	LCS-4	129%
Phenanthrene	mg/kg	44203-11	4.5 || 7.9 || RPD: 55	LCS-4	130%
Anthracene	mg/kg	44203-11	1.0 || 1.9 || RPD: 62	[NR]	[NR]
Fluoranthene	mg/kg	44203-11	17 || 26 || RPD: 42	LCS-4	121%
Pyrene	mg/kg	44203-11	19 || 29 || RPD: 42	LCS-4	128%

QUALITY CONTROL PAHs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Benzo(a)anthracene	mg/kg	44203-11	11 || 15 || RPD: 31	[NR]	[NR]
Chrysene	mg/kg	44203-11	10 || 14 || RPD: 33	LCS-4	139%
Benzo(b+k)fluoranthene	mg/kg	44203-11	19 || 23 || RPD: 19	[NR]	[NR]
Benzo(a)pyrene	mg/kg	44203-11	16 || 20 || RPD: 22	LCS-4	138%
Indeno(1,2,3-c,d)pyrene	mg/kg	44203-11	9.7 || 12 || RPD: 21	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	44203-11	1.9 || 2.4 || RPD: 23	[NR]	[NR]
Benzo(g,h,i)perylene	mg/kg	44203-11	9.4 || 11 || RPD: 16	[NR]	[NR]
Surrogate p-Terphenyl-d$_{14}$	%	44203-11	99 || 100 || RPD: 1	LCS-4	120%

QUALITY CONTROL Organochlorine Pesticides in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	44203-20	03/08/2010
Date analysed	-	[NT]	[NT]	44203-20	04/08/2010
HCB	mg/kg	[NT]	[NT]	[NR]	[NR]
alpha-BHC	mg/kg	[NT]	[NT]	44203-20	88%
gamma-BHC	mg/kg	[NT]	[NT]	[NR]	[NR]
beta-BHC	mg/kg	[NT]	[NT]	44203-20	96%
Heptachlor	mg/kg	[NT]	[NT]	44203-20	86%
delta-BHC	mg/kg	[NT]	[NT]	[NR]	[NR]
Aldrin	mg/kg	[NT]	[NT]	44203-20	83%
Heptachlor Epoxide	mg/kg	[NT]	[NT]	44203-20	95%
gamma-Chlordane	mg/kg	[NT]	[NT]	[NR]	[NR]
alpha-chlordane	mg/kg	[NT]	[NT]	[NR]	[NR]
Endosulfan I	mg/kg	[NT]	[NT]	[NR]	[NR]
pp-DDE	mg/kg	[NT]	[NT]	44203-20	92%
Dieldrin	mg/kg	[NT]	[NT]	44203-20	84%
Endrin	mg/kg	[NT]	[NT]	44203-20	83%
pp-DDD	mg/kg	[NT]	[NT]	44203-20	82%
Endosulfan II	mg/kg	[NT]	[NT]	[NR]	[NR]
pp-DDT	mg/kg	[NT]	[NT]	[NR]	[NR]
Endrin Aldehyde	mg/kg	[NT]	[NT]	[NR]	[NR]
Endosulfan Sulphate	mg/kg	[NT]	[NT]	44203-20	78%
Methoxychlor	mg/kg	[NT]	[NT]	[NR]	[NR]
Surrogate TCLMX	%	[NT]	[NT]	44203-20	73%

QUALITY CONTROL Organophosphorus Pesticides	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	44203-20	03/08/2010
Date analysed	-	[NT]	[NT]	44203-20	04/08/2010
Diazinon	mg/kg	[NT]	[NT]	[NR]	[NR]
Dimethoate	mg/kg	[NT]	[NT]	[NR]	[NR]
Chlorpyriphos-methyl	mg/kg	[NT]	[NT]	[NR]	[NR]
Ronnel	mg/kg	[NT]	[NT]	[NR]	[NR]
Chlorpyriphos	mg/kg	[NT]	[NT]	44203-20	96%
Fenitrothion	mg/kg	[NT]	[NT]	44203-20	85%
Bromophos-ethyl	mg/kg	[NT]	[NT]	[NR]	[NR]
Ethion	mg/kg	[NT]	[NT]	44203-20	86%
Surrogate TCLMX	%	[NT]	[NT]	44203-20	76%

QUALITY CONTROL PCBs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	44203-20	03/08/2010
Date analysed	-	[NT]	[NT]	44203-20	04/08/2010
Arochlor 1016	mg/kg	[NT]	[NT]	[NR]	[NR]
Arochlor 1221*	mg/kg	[NT]	[NT]	[NR]	[NR]
Arochlor 1232	mg/kg	[NT]	[NT]	[NR]	[NR]
Arochlor 1242	mg/kg	[NT]	[NT]	[NR]	[NR]
Arochlor 1248	mg/kg	[NT]	[NT]	[NR]	[NR]
Arochlor 1254	mg/kg	[NT]	[NT]	44203-20	111%
Arochlor 1260	mg/kg	[NT]	[NT]	[NR]	[NR]
Surrogate TCLMX	%	[NT]	[NT]	44203-20	94%

QUALITY CONTROL Acid Extractable metals in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date digested	-	44203-11	03/08/2010 || 03/08/2010	LCS-2	03/08/2010
Date analysed	-	44203-11	03/08/2010 || 03/08/2010	LCS-2	03/08/2010
Arsenic	mg/kg	44203-11	100 || 99 || RPD: 1	LCS-2	104%
Cadmium	mg/kg	[NT]	[NT]	LCS-2	101%
Chromium	mg/kg	[NT]	[NT]	LCS-2	105%
Copper	mg/kg	[NT]	[NT]	LCS-2	107%
Lead	mg/kg	[NT]	[NT]	LCS-2	105%
Mercury	mg/kg	[NT]	[NT]	LCS-2	99%
Nickel	mg/kg	[NT]	[NT]	LCS-2	106%
Zinc	mg/kg	[NT]	[NT]	LCS-2	105%

QUALITY CONTROL vTPH & BTEX in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	44203-55	3/8/2010 || 3/8/2010	44203-20	3/8/2010
Date analysed	-	44203-55	6/8/2010 || 6/8/2010	44203-20	6/8/2010
vTPH C_6 - C_9	mg/kg	44203-55	<25 || <25	44203-20	90%
Benzene	mg/kg	44203-55	<0.5 || <0.5	44203-20	86%
Toluene	mg/kg	44203-55	<0.5 || <0.5	44203-20	88%
Ethylbenzene	mg/kg	44203-55	<1.0 || <1.0	44203-20	88%
m+p-xylene	mg/kg	44203-55	<2.0 || <2.0	44203-20	93%
o-Xylene	mg/kg	44203-55	<1.0 || <1.0	44203-20	94%
Surrogate aaa-Trifluorotoluene	%	44203-55	105 || 103 || RPD: 2	44203-20	108%

QUALITY CONTROL sTPH in Soil (C10-C36)	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	44203-55	03/08/2010 || 03/08/2010	44203-20	03/08/2010
Date analysed	-	44203-55	03/08/2010 || 03/08/2010	44203-20	03/08/2010
TPH C_{10} - C_{14}	mg/kg	44203-55	<50 || <50	44203-20	72%
TPH C_{15} - C_{28}	mg/kg	44203-55	<100 || <100	44203-20	95%
TPH C_{29} - C_{36}	mg/kg	44203-55	<100 || <100	44203-20	87%
Surrogate o-Terphenyl	%	44203-55	130 || 133 || RPD: 2	44203-20	111%

QUALITY CONTROL PAHs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	44203-2	03/08/2010
Date analysed	-	[NT]	[NT]	44203-2	05/08/2010
Naphthalene	mg/kg	[NT]	[NT]	44203-2	91%
Acenaphthylene	mg/kg	[NT]	[NT]	[NR]	[NR]
Acenaphthene	mg/kg	[NT]	[NT]	[NR]	[NR]
Fluorene	mg/kg	[NT]	[NT]	44203-2	109%
Phenanthrene	mg/kg	[NT]	[NT]	44203-2	112%
Anthracene	mg/kg	[NT]	[NT]	[NR]	[NR]
Fluoranthene	mg/kg	[NT]	[NT]	44203-2	104%
Pyrene	mg/kg	[NT]	[NT]	44203-2	109%
Benzo(a)anthracene	mg/kg	[NT]	[NT]	[NR]	[NR]
Chrysene	mg/kg	[NT]	[NT]	44203-2	117%
Benzo(b+k)fluoranthene	mg/kg	[NT]	[NT]	[NR]	[NR]
Benzo(a)pyrene	mg/kg	[NT]	[NT]	44203-2	116%
Indeno(1,2,3-c,d)pyrene	mg/kg	[NT]	[NT]	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	[NT]	[NT]	[NR]	[NR]
Benzo(g,h,i)perylene	mg/kg	[NT]	[NT]	[NR]	[NR]
Surrogate p-Terphenyl-d_{14}	%	[NT]	[NT]	44203-2	100%

QUALITY CONTROL Acid Extractable metals in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date digested	-	44203-16	03/08/2010 || 03/08/2010	44203-2	03/08/2010
Date analysed	-	44203-16	03/08/2010 || 03/08/2010	44203-2	03/08/2010
Arsenic	mg/kg	44203-16	10 || 7 || RPD: 35	44203-2	107%
Cadmium	mg/kg	44203-16	<0.5 || <0.5	[NR]	[NR]
Chromium	mg/kg	44203-16	29 || 21 || RPD: 32	[NR]	[NR]
Copper	mg/kg	44203-16	19 || 22 || RPD: 15	[NR]	[NR]
Lead	mg/kg	44203-16	58 || 72 || RPD: 22	[NR]	[NR]
Mercury	mg/kg	44203-16	0.2 || 0.2 || RPD: 0	[NR]	[NR]
Nickel	mg/kg	44203-16	5 || 5 || RPD: 0	[NR]	[NR]
Zinc	mg/kg	44203-16	130 || 150 || RPD: 14	[NR]	[NR]

QUALITY CONTROL vTPH & BTEX in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	44203-56	3/8/2010
Date analysed	-	[NT]	[NT]	44203-56	6/8/2010
vTPH C_6 - C_9	mg/kg	[NT]	[NT]	44203-56	91%
Benzene	mg/kg	[NT]	[NT]	44203-56	94%
Toluene	mg/kg	[NT]	[NT]	44203-56	90%
Ethylbenzene	mg/kg	[NT]	[NT]	44203-56	89%
m+p-xylene	mg/kg	[NT]	[NT]	44203-56	92%
o-Xylene	mg/kg	[NT]	[NT]	44203-56	94%
Surrogate aaa-Trifluorotoluene	%	[NT]	[NT]	44203-56	106%

QUALITY CONTROL sTPH in Soil (C10-C36)	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	44203-56	03/08/2010
Date analysed	-	[NT]	[NT]	44203-56	03/08/2010
TPH C_{10} - C_{14}	mg/kg	[NT]	[NT]	44203-56	77%
TPH C_{15} - C_{28}	mg/kg	[NT]	[NT]	44203-56	#
TPH C_{29} - C_{36}	mg/kg	[NT]	[NT]	44203-56	#
Surrogate o-Terphenyl	%	[NT]	[NT]	44203-56	135%

QUALITY CONTROL PAHs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	44203-56	03/08/2010
Date analysed	-	[NT]	[NT]	44203-56	05/08/2010
Naphthalene	mg/kg	[NT]	[NT]	44203-56	103%
Acenaphthylene	mg/kg	[NT]	[NT]	[NR]	[NR]
Acenaphthene	mg/kg	[NT]	[NT]	[NR]	[NR]
Fluorene	mg/kg	[NT]	[NT]	44203-56	117%
Phenanthrene	mg/kg	[NT]	[NT]	44203-56	#
Anthracene	mg/kg	[NT]	[NT]	[NR]	[NR]

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QUALITY CONTROL PAHs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Fluoranthene	mg/kg	[NT]	[NT]	44203-56	#
Pyrene	mg/kg	[NT]	[NT]	44203-56	#
Benzo(a)anthracene	mg/kg	[NT]	[NT]	[NR]	[NR]
Chrysene	mg/kg	[NT]	[NT]	44203-56	121%
Benzo(b+k)fluoranthene	mg/kg	[NT]	[NT]	[NR]	[NR]
Benzo(a)pyrene	mg/kg	[NT]	[NT]	44203-56	140%
Indeno(1,2,3-c,d)pyrene	mg/kg	[NT]	[NT]	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	[NT]	[NT]	[NR]	[NR]
Benzo(g,h,i)perylene	mg/kg	[NT]	[NT]	[NR]	[NR]
Surrogate p-Terphenyl-d_{14}	%	[NT]	[NT]	44203-56	103%

QUALITY CONTROL Acid Extractable metals in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date digested	-	[NT]	[NT]	44203-20	03/08/2010
Date analysed	-	[NT]	[NT]	44203-20	03/08/2010
Arsenic	mg/kg	[NT]	[NT]	44203-20	104%
Cadmium	mg/kg	[NT]	[NT]	44203-20	99%
Chromium	mg/kg	[NT]	[NT]	44203-20	105%
Copper	mg/kg	[NT]	[NT]	44203-20	110%
Lead	mg/kg	[NT]	[NT]	44203-20	99%
Mercury	mg/kg	[NT]	[NT]	44203-20	113%
Nickel	mg/kg	[NT]	[NT]	44203-20	104%
Zinc	mg/kg	[NT]	[NT]	44203-20	108%

Report Comments:

Total Petroleum Hydrocarbons in soil (semivol):# Percent recovery is not possible to report as the high concentration of analytes in the sample/s have caused interference.

PAH in Soil: The RPD for duplicate results is accepted due to the non homogenous nature of the sample/s.

Asbestos: A portion of the supplied sample was sub-sampled for asbestos according to Envirolab procedures. We cannot guarantee that this sub-sample is indicative of the entire sample. Envirolab recommends supplying 30-40g of sample in it's own container.

Asbestos was analysed by Approved Identifier: Paul Ching

Asbestos was authorised by Approved Signatory: Matt Mansfield

INS: Insufficient sample for this test NT: Not tested PQL: Practical Quantitation Limit <: Less than >: Greater than

RPD: Relative Percent Difference NA: Test not required LCS: Laboratory Control Sample NR: Not requested

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 sample batch were within laboratory acceptance criteria.

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

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

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

SAMPLE RECEIPT ADVICE

Client:

Environmental Investigation Services	ph: 02 9888 5000
PO Box 976	Fax: 02 9888 5001
North Ryde BC NSW 1670	

Attention: Brendan Page

Sample log in details:

Your reference:	**E23982K, Pyrmont**
Envirolab Reference:	**44203**
Date received:	02/08/10
Date results expected to be reported:	**9/08/10**

Samples received in appropriate condition for analysis:	YES
No. of samples provided	68 Soils, 2 Waters
Turnaround time requested:	Standard
Temperature on receipt	Cool
Cooling Method:	Ice

Comments:

Samples will be held for 1 month for water samples and 2 months for soil samples from date of receipt of samples.

Contact details:

Please direct any queries to Aileen Hie or Jacinta Hurst
ph: 02 9910 6200 fax: 02 9910 6201
email: ahie@envirolabservices.com.au or jhurst@envirolabservices.com.au

SAMPLE AND CHAIN OF CUSTODY FORM

TO:
Envirolab Services Pty Ltd
12 Ashley Street
Chatswood NSW 2067
Phone: (02) 99106200
Fax: (02) 99106201

Attention: Aileen

EIS Job Number: E23982K

Date Results Required: Standard

Sheet 1 / 3

FROM:
Environmental Investigation Services
Rear 115 Wicks Road
Macquarie Park NSW 2113

Phone: (02) 9888 5000
Fax: (02) 9888 5004
Contact: Brendan Page

Project: Proposed Redevelopment
Location: Pyrmont
Sampler: BP

Sample Preservation: In esky on ice

Tests Required

Date Sampled	Lab Ref:	Borehole/ Sample Number	Depth (m)	Sample Container	PID	Sample Description	Heavy Metals (8)	TPH/BTEX	PAH	OC/OP/ PCB	Asbestos	TCLP Prep + M6, PAH	Phenols	VOC	sVOC	sPOCAS	Arsenic	
29/7/10	1	BH701	0.5/0.8	Glass jar + ~~Asb Bag~~	0	F (all soil)			X								X	
↓	2	↓	1.3/1.5	Glass jar + ~~Asb Bag~~	0	F			X								X	
	3		1.7/1.[illegible]	Glass jar + ~~Asb Bag~~	0	F			X								X	
	4	↓	3.2/3[illegible]	Glass jar + ~~Asb Bag~~	0	N			X								X	
	5	BH702	0.3/0.5	Glass jar + ~~Asb Bag~~	0	F			X								X	
	6	↓	1.2/1.5	Glass jar + ~~Asb Bag~~	0	F			X								X	
	7		1.5/1.95	Glass jar + ~~Asb Bag~~	0	F			X								X	
	8		2.8/3.0	Glass jar + ~~Asb Bag~~	0	F			X								X	
	9	↓	3.3/3.45	Glass jar + ~~Asb Bag~~	0	N			X								X	
	10	BH704	0.1/0.3	Glass jar + ~~Asb Bag~~	0	F			X								X	
	11	↓	0.7/1.0	Glass jar + ~~Asb Bag~~	0	F			X								X	
	12		1.6/1.95	Glass jar + ~~Asb Bag~~	0	F			X								X	
	13		2.8/3.0	Glass jar + ~~Asb Bag~~	0	F			X								X	
	14	↓	3.2/3.45	Glass jar + ~~Asb Bag~~	0	N			X								X	
	15	BH705	0.3/0.5	Glass jar + Asb Bag	0	F												
	16	↓	1.3/1.5	Glass jar + Asb Bag	2.6	F	X	X	X	X	X							
	17		1.8/1.95	Glass jar + ~~Asb Bag~~	59.1	F		X										
	18		2.8/3.0	Glass jar + ~~Asb Bag~~	12.7	F												
	19	↓	3.2/3.45	Glass jar + Asb Bag	17.7	N												
	20	BH706	1.7/1.95	Glass jar + Asb Bag	1.8	F	X	X	X	X	X							
	21	↓	2.8/3.0	Glass jar + Asb Bag	0.8	N		X										
↓	22	↓	3.4/3.6	Glass jar + Asb Bag	0.6	N												
30/7/10	23	BH707	0.3/0.5	Glass jar + ~~Asb Bag~~	09	F												
↓	24	↓	0.6/0.95	Glass jar + ~~Asb Bag~~	1.8	F												
↓	25	↓	1.5/1.55	Glass jar + ~~Asb Bag~~	91.5	F		X										

Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph: 9910 6200
Job No: 44203
Date received: 2/8/10
Time received: [illegible]
Received by: 10:00
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

Remarks (comments/detection limits required):

Relinquished By:	Date: 2/8/10 Time: 10:30am	Received By: 2/8/10 10:00	Relinquished By:	Date: Time:	Received By:

SAMPLE AND CHAIN OF CUSTODY FORM

TO:
Envirolab Services Pty Ltd
12 Ashley Street
Chatswood NSW 2067
Phone: (02) 99106200
Fax: (02) 99106201

Attention: Aileen

EIS Job Number: E23982K

Date Results Required: Standard

Sheet 2 / 3

FROM:
Environmental Investigation Services
Rear 115 Wicks Road
Macquarie Park NSW 2113

Phone: (02) 9888 5000
Fax: (02) 9888 5004
Contact: Brendan Page

Project: Proposed Redevelopment
Location: Pyrmont
Sampler: BP

Sample Preservation:
In esky on ice

Tests Required

Date Sampled	Lab Ref:	Borehole/ Sample Number	Depth (m)	Sample Container	PID	Sample Description	Heavy Metals (8)	TPH/BTEX	PAH	OC/OP/ PCB	Asbestos	TCLP Prep + M6, PAH	Phenols	VOC	sVOC	sPOCAS		
30/7/10	26	BH707	2.3/2.5	Glass jar + ~~Asb Bag~~	553	F		X										
↓	27	↓	3.2/3.45	Glass jar + ~~Asb Bag~~	42.8	F												
↓	28	↓	4.0/4.5	Glass jar + ~~Asb Bag~~	11.8	N		X										
29/7/10	29	BH708	0.3/0.5	Glass jar + Asb Bag	4.1	F												
↓	30	↓	0.7/0.95	Glass jar + Asb Bag	20.1	F		X										
↓	31	↓	1.6/1.95	Glass jar + Asb Bag	31.6	F	X	X	X	X	X							
↓	32	↓	3.2/3.45	Glass jar + Asb Bag	2.2	N												
↓	33	BH709	0.5/0.7	Glass jar + Asb Bag	0	F												
↓	34	↓	0.9/1.15	Glass jar + Asb Bag	0	F	X	X	X	X	✓							
↓	35	↓	1.7/1.95	Glass jar + ~~Asb Bag~~	4.1	F		X										
↓	36	↓	3.2/3.45	Glass jar + Asb Bag	0	N												
30/7/10	37	BH711	0.2/0.4	Glass jar + ~~Asb Bag~~	1.6	F												
↓	38	↓	1.3/1.5	Glass jar + ~~Asb Bag~~	194	F		X										
↓	39	↓	1.7/1.95	Glass jar + ~~Asb Bag~~	70.6	F		X										
↓	40	↓	3.3/3.45	Glass jar + ~~Asb Bag~~	2	N		X										
↓	41	BH712	1.3/1.5	Glass jar + ~~Asb Bag~~	81.7	F		X										
↓	42	↓	1.6/1.95	Glass jar + ~~Asb Bag~~	350	F		X										
↓	43	↓	3.0/3.45	Glass jar + ~~Asb Bag~~	232	F		X										
↓	44	↓	5.7/6.0	Glass jar + ~~Asb Bag~~	4.9	N												
↓	45	BH713	0.4/0.6	Glass jar + ~~Asb Bag~~	2.4	F		X										
↓	46	↓	1.3/1.5	Glass jar + ~~Asb Bag~~	2.1	F												
↓	47	↓	1.7/1.95	Glass jar + ~~Asb Bag~~	80.2	F		X										
↓	48	↓	3.2/3.45	Glass jar + ~~Asb Bag~~	2.8	F												
↓	49	↓	4.7/4.95	Glass jar + ~~Asb Bag~~	11.4	F		X										
↓	50	↓	5.7/6.0	Glass jar + ~~Asb Bag~~	3.4	N												

Remarks (comments/detection limits required):

Relinquished By:	Date: 2/8/10 Time: 10:30am	Received By:	Relinquished By:	Date: Time:	Received By:

SAMPLE AND CHAIN OF CUSTODY FORM

TO:
Envirolab Services Pty Ltd
12 Ashley Street
Chatswood NSW 2067
Phone: (02) 99106200
Fax: (02) 99106201

Attention: Aileen

EIS Job Number: E23982K

Date Results Required: Standard

Sheet 3 / 3

FROM:
Environmental Investigation Services
Rear 115 Wicks Road
Macquarie Park NSW 2113

Phone: (02) 9888 5000
Fax: (02) 9888 5004
Contact: Brendan Page

Project: Proposed Redevelopment
Location: Pyrmont
Sampler: BP

Sample Preservation: In esky on ice

Tests Required

Date Sampled	Lab Ref:	Borehole/ Sample Number	Depth (m)	Sample Container	PID	Sample Description	Heavy Metals (8)	TPH/BTEX	PAH	OC/OP/ PCB	Asbestos	TCLP Prep + M6, PAH	Phenols	VOC	sVOC	sPOCAS	Arsenic	BTEX
30/7/10	51	BH715	0.21/0.5	Glass jar + Asb Bag	1.3	F												
↓	52	↓	0.6/0.95	Glass jar + Asb Bag	0	F	X	X	X	X	X							
	53		1.5/1.95	Glass jar + Asb Bag	1.6	F		X										
	54	↓	3.1/3.45	Glass jar + Asb Bag	0	N												
	55	BH716	0.5/0.8	Glass jar + Asb Bag	0	F		X										
	56	↓	1.7/1.95	Glass jar + Asb Bag	0.8	F	X	X	X	X	X							
↓	57	↓	3.0/3.35	Glass jar + Asb Bag	1.1	N.												
–	58	Dup AA		Glass jar + ~~Asb Bag~~		Soil			X								X	
–	59	Dup BB		Glass jar + ~~Asb Bag~~		↓			X								X	
–		Dup CC *		Glass jar + ~~Asb Bag~~					X								X	
–	60	Dup DD		Glass jar + ~~Asb Bag~~														
–	61	Dup EE		Glass jar + ~~Asb Bag~~				X										
–	62	Dup FF		Glass jar + ~~Asb Bag~~														
–	63	Dup HH		Glass jar + ~~Asb Bag~~				X										
–		Dup II *		Glass jar + ~~Asb Bag~~			X	X	X	X								
–		Dup JJ *		Glass jar + ~~Asb Bag~~		↓		X										
29/7/10	64	FB 1A		Glass jar + ~~Asb Bag~~		Sand												X
↓	65	Rinsate 1A		1L Amber 1 vial		Water		X										
↓	66	T spike 1A		Glass jar + ~~Asb Bag~~		Sand spike												X
30/7/10	67	FB 2A		Glass jar + ~~Asb Bag~~		Sand												X
↓	68	Rinsate 2A		1L Amber 1 vial		Water		X										
↓	69	T spike 2A		Glass jar + ~~Asb Bag~~		Sand spike												X
	70	Dup KK		Glass jar + ~~Asb Bag~~			X	X	X	X								
				Glass jar + Asb Bag														
				Glass jar + Asb Bag														

Remarks (comments/detection limits required): * Please send to SGS as inter-lab dups. Cheers.

Relinquished By:	Date: 2/8/10 Time: 10:30am	Received By:	Relinquished By:	Date: Time:	Received By:

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

CERTIFICATE OF ANALYSIS 44203-A

Client:

Environmental Investigation Services
PO Box 976
North Ryde BC
NSW 1670

Attention: Brendan Page

Sample log in details:

Your Reference: **E23982K, Pyrmont**
No. of samples: Additional Testing on 8 Soils
Date samples received: 02/08/10
Date completed instructions received: 10/08/10

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: 17/08/10
Date of Preliminary Report: Not Issued
Issue Date: 17/08/10
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Accredited for compliance with ISO/IEC 17025.
Tests not covered by NATA are denoted with *.

Results Approved By:

Sandra Taylor
Senior Organic Chemist

Rhian Morgan
Rhian Morgan
Metals Supervisor

Aromatic & Aliphatic TPH Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ------------- ------------	44203-A-17 BH705 1.8-1.95 29/07/2010 Soil	44203-A-41 BH712 1.3-1.5 30/07/2010 Soil
Date extracted	-	12/08/2010	12/08/2010
Date analysed	-	12/08/2010	12/08/2010
C16-C35 Aliphatic	mg/kg	<10,000	<1,000
>C35 Aliphatic	mg/kg	<10,000	<1,000
C16-C35 Aromatic	mg/kg	8,800	190
Surrogate 1-chlorooctadecane	%	#	#

Metals in TCLP USEPA1311 Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ------------- ------------	44203-A-5 BH702 0.3-0.5 29/07/2010 Soil	44203-A-11 BH704 0.7-1.0 29/07/2010 Soil	44203-A-12 BH704 1.6-1.95 29/07/2010 Soil	44203-A-31 BH708 1.6-1.95 29/07/2010 Soil	44203-A-34 BH709 0.9-1.15 29/07/2010 Soil
Date extracted	-	13/08/2010	13/08/2010	13/08/2010	13/08/2010	13/08/2010
Date analysed	-	[NA]	[NA]	16/08/2010	16/08/2010	16/08/2010
pH of soil for fluid# determ.	pH units	9.80	9.00	9.00	9.10	9.50
pH of soil for fluid # determ. (acid)	pH units	1.30	1.20	1.20	1.40	1.60
Extraction fluid used	-	1	1	1	1	1
pH of final Leachate	pH units	5.40	5.10	5.00	5.20	6.30
Arsenic in TCLP	mg/L	[NA]	[NA]	0.8	[NA]	[NA]
Lead in TCLP	mg/L	[NA]	[NA]	[NA]	1.1	0.3

Metals in TCLP USEPA1311 Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ------------- ------------	44203-A-56 BH716 1.7-1.95 30/07/2010 Soil
Date extracted	-	13/08/2010
Date analysed	-	16/08/2010
pH of soil for fluid# determ.	pH units	9.10
pH of soil for fluid # determ. (acid)	pH units	1.30
Extraction fluid used	-	1
pH of final Leachate	pH units	5.10
Lead in TCLP	mg/L	0.8

PAHs in TCLP (USEPA 1311) Our Reference:	UNITS	44203-A-5	44203-A-11	44203-A-56
Your Reference	-------------	BH702	BH704	BH716
Depth	------------	0.3-0.5	0.7-1.0	1.7-1.95
Date Sampled		29/07/2010	29/07/2010	30/07/2010
Type of sample		Soil	Soil	Soil
Date extracted	-	13/8/2010	13/8/2010	13/8/2010
Date analysed	-	13/8/2010	13/8/2010	13/8/2010
Naphthalene in TCLP	mg/L	<0.001	<0.001	0.020
Acenaphthylene in TCLP	mg/L	<0.001	<0.001	<0.001
Acenaphthene in TCLP	mg/L	<0.001	<0.001	<0.001
Fluorene in TCLP	mg/L	<0.001	<0.001	0.010
Phenanthrene in TCLP	mg/L	<0.001	<0.001	0.030
Anthracene in TCLP	mg/L	<0.001	0.010	0.030
Fluoranthene in TCLP	mg/L	<0.001	0.010	0.010
Pyrene in TCLP	mg/L	<0.001	0.010	0.010
Benzo(a)anthracene in TCLP	mg/L	<0.001	<0.001	<0.001
Chrysene in TCLP	mg/L	<0.001	<0.001	<0.001
Benzo(b+k)fluoranthene in TCLP	mg/L	<0.002	0.01	<0.002
Benzo(a)pyrene in TCLP	mg/L	<0.001	0.010	<0.001
Indeno(1,2,3-c,d)pyrene - TCLP	mg/L	<0.001	0.010	<0.001
Dibenzo(a,h)anthracene in TCLP	mg/L	<0.001	<0.001	<0.001
Benzo(g,h,i)perylene in TCLP	mg/L	<0.001	<0.001	<0.001
Surrogate p-Terphenyl-d_{14}	%	115	124	120

Method ID	Methodology Summary
GC.3	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. Fractionation with pentane through a silica gel column for aliphatics and DCM for aromatics.
LAB.4	Toxicity Characteristic Leaching Procedure (TCLP).
EXTRACT.7	Toxicity Characteristic Leaching Procedure (TCLP).
LAB.1	pH - Measured using pH meter and electrode in accordance with APHA 20th ED, 4500-H+.
Metals.20 ICP-AES	Determination of various metals by ICP-AES.
GC.12 subset	Leachates are extracted with Dichloromethane and analysed by GC-MS.
GC.12 subset	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS.
GC.12	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS.

QUALITY CONTROL Aromatic & Aliphatic TPH	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			12/08/2010	[NT]	[NT]	LCS-1	12/08/2010
Date analysed	-			12/08/2010	[NT]	[NT]	LCS-1	12/08/2010
C16-C35 Aliphatic	mg/kg	1000	GC.3	<1000	[NT]	[NT]	LCS-1	65%
>C35 Aliphatic	mg/kg	1000	GC.3	<1000	[NT]	[NT]	LCS-1	60%
C16-C35 Aromatic	mg/kg	50	GC.3	<50	[NT]	[NT]	LCS-1	131%
Surrogate 1-chlorooctadecane	%	0	GC.3	76	[NT]	[NT]	LCS-1	72%

QUALITY CONTROL Metals in TCLP USEPA1311	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			13/08/20140	[NT]	[NT]	LCS-W2	13/08/2010
Date analysed	-			16/08/2010	[NT]	[NT]	LCS-W2	16/08/2010
Arsenic in TCLP	mg/L	0.05	Metals.20 ICP-AES	<0.05	[NT]	[NT]	LCS-W2	102%
Lead in TCLP	mg/L	0.03	Metals.20 ICP-AES	<0.03	[NT]	[NT]	LCS-W2	95%

QUALITY CONTROL PAHs in TCLP (USEPA 1311)	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			13/8/2010	[NT]	[NT]	LCS-W1	13/8/2010
Date analysed	-			13/8/2010	[NT]	[NT]	LCS-W1	13/8/2010
Naphthalene in TCLP	mg/L	0.001	GC.12 subset	<0.001	[NT]	[NT]	LCS-W1	101%
Acenaphthylene in TCLP	mg/L	0.001	GC.12 subset	<0.001	[NT]	[NT]	[NR]	[NR]
Acenaphthene in TCLP	mg/L	0.001	GC.12 subset	<0.001	[NT]	[NT]	[NR]	[NR]
Fluorene in TCLP	mg/L	0.001	GC.12 subset	<0.001	[NT]	[NT]	LCS-W1	106%
Phenanthrene in TCLP	mg/L	0.001	GC.12 subset	<0.001	[NT]	[NT]	LCS-W1	102%
Anthracene in TCLP	mg/L	0.001	GC.12 subset	<0.001	[NT]	[NT]	[NR]	[NR]
Fluoranthene in TCLP	mg/L	0.001	GC.12 subset	<0.001	[NT]	[NT]	LCS-W1	96%
Pyrene in TCLP	mg/L	0.001	GC.12 subset	<0.001	[NT]	[NT]	LCS-W1	105%
Benzo(a)anthracene in TCLP	mg/L	0.001	GC.12 subset	<0.001	[NT]	[NT]	[NR]	[NR]

QUALITY CONTROL PAHs in TCLP (USEPA 1311)	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Chrysene in TCLP	mg/L	0.001	GC.12 subset	<0.001	[NT]	[NT]	LCS-W1	100%
Benzo(b+k)fluoranthene in TCLP	mg/L	0.002	GC.12 subset	<0.002	[NT]	[NT]	[NR]	[NR]
Benzo(a)pyrene in TCLP	mg/L	0.001	GC.12 subset	<0.001	[NT]	[NT]	LCS-W1	132%
Indeno(1,2,3-c,d)pyrene - TCLP	mg/L	0.001	GC.12 subset	<0.001	[NT]	[NT]	[NR]	[NR]
Dibenzo(a,h)anthracene in TCLP	mg/L	0.001	GC.12 subset	<0.001	[NT]	[NT]	[NR]	[NR]
Benzo(g,h,i)perylene in TCLP	mg/L	0.001	GC.12 subset	<0.001	[NT]	[NT]	[NR]	[NR]
Surrogate p-Terphenyl-d_{14}	%		GC.12	124	[NT]	[NT]	LCS-W1	109%

Report Comments:

Aliphatic Aromatic:PQL has been raised due to the high concentration of analytes in the sample/s, resulting in the sample/s requiring dilution.# Percent recovery is not possible to report as the high concentration of analytes in the sample/s have caused interference.

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

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

Quality Control Definitions

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike: A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample): This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike: Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria

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

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

Aileen Hie

From: Brendan Page [bpage@jkgroup.net.au]
Sent: Tuesday, 10 August 2010 02:10 PM
To: Aileen Hie
Subject: Additional Analyses - 44203 (E23982K, Pyrmont)

EIS

ENVIRONMENTAL INVESTIGATION SERVICES
A division of Jeffery & Katauskas Pty Ltd
ABN 17 003 550 801

Hi Aileen,

Could you please arrange for the following additional analysis to be undertaken on the samples in Envirolabs custody:

- 44203-5, TCLP prep and leachate analysis for PAHs;
- 44203-11, TCLP prep and leachate analysis for PAHs;
- 44203-12, TCLP prep and leachate analysis for As;
- 44203-17, speciated hydrocarbons;
- 44203-31, TCLP prep and leachate analysis for lead;
- 44203-34, TCLP prep and leachate analysis for lead;
- 44203-41, speciated hydrocarbons;
- 44203-56, TCLP prep and leachate analysis for PAHs and lead;
-

All analysis is on a standard TAT. Cheers.

Regards,
For and on behalf of
ENVIRONMENTAL INVESTIGATION SERVICES

Envirolab Ref: 44203A
Due: 17/8/10
std T/A.

Brendan Page
Environmental Scientist

115 Wicks Road, Macquarie Park, NSW, 2113
PO Box 976, North Ryde BC, NSW, 1670
Tel: 02 9888 5000
Fax: 02 9888 5004
email: bpage@jkgroup.net.au
Web: www.jkgroup.net.au

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

CERTIFICATE OF ANALYSIS 44295

Client:

Environmental Investigation Services
PO Box 976
North Ryde BC
NSW 1670

Attention: Brendan Page

Sample log in details:

Your Reference:	**E23982K, Pyrmont**
No. of samples:	7 Soils
Date samples received:	04/08/10
Date completed instructions received:	04/08/10

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:	11/08/10
Date of Preliminary Report:	Not Issued
Issue Date:	11/08/10

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Accredited for compliance with ISO/IEC 17025.
Tests not covered by NATA are denoted with *.

Results Approved By:

Sandra Taylor
Senior Organic Chemist

Rhian Morgan
Rhian Morgan
Metals Supervisor

Nancy Zhang
Chemist

M. Mansfield
Matt Mansfield
Approved Signatory

vTPH & BTEX in Soil Our Reference:	UNITS	44295-2	44295-3	44295-5
Your Reference	-------------	BH714	BH714	BH710
Depth	------------	0.8-1.0	1.7-1.95	0.3-0.5
Date Sampled		3/08/2010	3/08/2010	3/08/2010
Type of sample		Soil	Soil	Soil
Date extracted	-	5/8/2010	5/8/2010	5/8/2010
Date analysed	-	6/8/2010	6/8/2010	6/8/2010
vTPH C_6 - C_9	mg/kg	<25	<25	<25
Benzene	mg/kg	<0.5	<0.5	<0.5
Toluene	mg/kg	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1.0	<1.0	<1.0
m+p-xylene	mg/kg	<2.0	<2.0	<2.0
o-Xylene	mg/kg	<1.0	<1.0	<1.0
Surrogate aaa-Trifluorotoluene	%	101	109	110

sTPH in Soil (C10-C36) Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ------------- ------------	44295-2 BH714 0.8-1.0 3/08/2010 Soil	44295-3 BH714 1.7-1.95 3/08/2010 Soil	44295-5 BH710 0.3-0.5 3/08/2010 Soil
Date extracted	-	5/8/2010	5/8/2010	5/8/2010
Date analysed	-	5/8/2010	5/8/2010	5/8/2010
TPH C_{10} - C_{14}	mg/kg	<50	<50	<50
TPH C_{15} - C_{28}	mg/kg	<100	<100	110
TPH C_{29} - C_{36}	mg/kg	<100	<100	100
Surrogate o-Terphenyl	%	71	95	103

PAHs in Soil Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ------------- ------------	44295-2 BH714 0.8-1.0 3/08/2010 Soil	44295-5 BH710 0.3-0.5 3/08/2010 Soil
Date extracted	-	5/8/2010	5/8/2010
Date analysed	-	6/8/2010	6/8/2010
Naphthalene	mg/kg	<0.1	<0.1
Acenaphthylene	mg/kg	0.1	0.2
Acenaphthene	mg/kg	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1
Phenanthrene	mg/kg	0.5	1.2
Anthracene	mg/kg	0.1	0.3
Fluoranthene	mg/kg	1.4	3.4
Pyrene	mg/kg	1.5	4.0
Benzo(a)anthracene	mg/kg	1.0	2.2
Chrysene	mg/kg	1.1	2.3
Benzo(b+k)fluoranthene	mg/kg	2.4	5.3
Benzo(a)pyrene	mg/kg	1.6	4.1
Indeno(1,2,3-c,d)pyrene	mg/kg	1	2.6
Dibenzo(a,h)anthracene	mg/kg	0.2	0.5
Benzo(g,h,i)perylene	mg/kg	0.9	2.7
Surrogate p-Terphenyl-d_{14}	%	81	99

Organochlorine Pesticides in soil Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ------------- ------------	44295-2 BH714 0.8-1.0 3/08/2010 Soil	44295-5 BH710 0.3-0.5 3/08/2010 Soil
Date extracted	-	5/8/2010	5/8/2010
Date analysed	-	6/8/2010	6/8/2010
HCB	mg/kg	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1
Surrogate TCLMX	%	136	82

Organophosphorus Pesticides Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ------------- ------------	44295-2 BH714 0.8-1.0 3/08/2010 Soil	44295-5 BH710 0.3-0.5 3/08/2010 Soil
Date extracted	-	5/8/2010	5/8/2010
Date analysed	-	6/8/2010	6/8/2010
Diazinon	mg/kg	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1
Surrogate TCLMX	%	136	82

PCBs in Soil Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ------------- ------------	44295-2 BH714 0.8-1.0 3/08/2010 Soil	44295-5 BH710 0.3-0.5 3/08/2010 Soil
Date extracted	-	5/8/2010	5/8/2010
Date analysed	-	6/8/2010	6/8/2010
Arochlor 1016	mg/kg	<0.1	<0.1
Arochlor 1221*	mg/kg	<0.1	<0.1
Arochlor 1232	mg/kg	<0.1	<0.1
Arochlor 1242	mg/kg	<0.1	<0.1
Arochlor 1248	mg/kg	<0.1	<0.1
Arochlor 1254	mg/kg	<0.1	<0.1
Arochlor 1260	mg/kg	<0.1	<0.1
Surrogate TCLMX	%	136	82

Acid Extractable metals in soil			
Our Reference:	UNITS	44295-2	44295-5
Your Reference	-------------	BH714	BH710
Depth	------------	0.8-1.0	0.3-0.5
Date Sampled		3/08/2010	3/08/2010
Type of sample		Soil	Soil
Date digested	-	05/08/2010	05/08/2010
Date analysed	-	05/08/2010	05/08/2010
Arsenic	mg/kg	<4	<4
Cadmium	mg/kg	<0.5	<0.5
Chromium	mg/kg	20	50
Copper	mg/kg	59	52
Lead	mg/kg	90	52
Mercury	mg/kg	1.8	0.2
Nickel	mg/kg	13	48
Zinc	mg/kg	140	70

Moisture Our Reference:	UNITS	44295-2	44295-3	44295-5
Your Reference	-------------	BH714	BH714	BH710
Depth	------------	0.8-1.0	1.7-1.95	0.3-0.5
Date Sampled		3/08/2010	3/08/2010	3/08/2010
Type of sample		Soil	Soil	Soil
Date prepared	-	5/8/2010	5/8/2010	5/8/2010
Date analysed	-	5/8/2010	5/8/2010	5/8/2010
Moisture	%	13	15	7.3

Asbestos ID - soils Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ------------- ------------	44295-2 BH714 0.8-1.0 3/08/2010 Soil	44295-5 BH710 0.3-0.5 3/08/2010 Soil
Date analysed	-	5/8/2010	5/8/2010
Sample Description	-	Approx 35g Soil & Rocks	Approx 35g Soil & Rocks
Asbestos ID in soil	-	No asbestos found at reporting limit of 0.1g/kg	No asbestos found at reporting limit of 0.1g/kg
Trace Analysis	-	Respirable fibres not detected	Respirable fibres not detected

Method ID	Methodology Summary
GC.16	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.
GC.3	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID.
GC.12 subset	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS.
GC-5	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
GC.8	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
GC-6	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD.
Metals.20 ICP-AES	Determination of various metals by ICP-AES.
Metals.21 CV-AAS	Determination of Mercury by Cold Vapour AAS.
LAB.8	Moisture content determined by heating at 105 deg C for a minimum of 4 hours.
AS4964-2004	Asbestos ID - Qualitative identification of asbestos type fibres in bulk samples using Polarised Light Microscopy and Dispersion Staining Techniques.

QUALITY CONTROL vTPH & BTEX in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			5/8/2010	44295-2	5/8/2010 || 5/8/2010	LCS-4	5/8/2010
Date analysed	-			6/8/2010	44295-2	6/8/2010 || 6/8/2010	LCS-4	6/8/2010
vTPH C_6 - C_9	mg/kg	25	GC.16	<25	44295-2	<25 || <25	LCS-4	100%
Benzene	mg/kg	0.5	GC.16	<0.5	44295-2	<0.5 || <0.5	LCS-4	93%
Toluene	mg/kg	0.5	GC.16	<0.5	44295-2	<0.5 || <0.5	LCS-4	110%
Ethylbenzene	mg/kg	1	GC.16	<1.0	44295-2	<1.0 || <1.0	LCS-4	97%
m+p-xylene	mg/kg	2	GC.16	<2.0	44295-2	<2.0 || <2.0	LCS-4	101%
o-Xylene	mg/kg	1	GC.16	<1.0	44295-2	<1.0 || <1.0	LCS-4	103%
Surrogate aaa-Trifluorotoluene	%		GC.16	83	44295-2	101 || 123 || RPD: 20	LCS-4	137%

QUALITY CONTROL sTPH in Soil (C10-C36)	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			5/8/2010	44295-2	5/8/2010 || 5/8/2010	LCS-4	5/8/2010
Date analysed	-			5/8/2010	44295-2	5/8/2010 || 5/8/2010	LCS-4	5/8/2010
TPH C_{10} - C_{14}	mg/kg	50	GC.3	<50	44295-2	<50 || <50	LCS-4	84%
TPH C_{15} - C_{28}	mg/kg	100	GC.3	<100	44295-2	<100 || <100	LCS-4	91%
TPH C_{29} - C_{36}	mg/kg	100	GC.3	<100	44295-2	<100 || <100	LCS-4	87%
Surrogate o-Terphenyl	%		GC.3	92	44295-2	71 || 99 || RPD: 33	LCS-4	98%

QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			5/8/2010	44295-2	5/8/2010 || 5/8/2010	LCS-4	5/8/2010
Date analysed	-			6/8/2010	44295-2	6/8/2010 || 6/8/2010	LCS-4	6/8/2010
Naphthalene	mg/kg	0.1	GC.12 subset	<0.1	44295-2	<0.1 || <0.1	LCS-4	97%
Acenaphthylene	mg/kg	0.1	GC.12 subset	<0.1	44295-2	0.1 || <0.1	[NR]	[NR]
Acenaphthene	mg/kg	0.1	GC.12 subset	<0.1	44295-2	<0.1 || <0.1	[NR]	[NR]
Fluorene	mg/kg	0.1	GC.12 subset	<0.1	44295-2	<0.1 || <0.1	LCS-4	104%
Phenanthrene	mg/kg	0.1	GC.12 subset	<0.1	44295-2	0.5 || 0.7 || RPD: 33	LCS-4	106%
Anthracene	mg/kg	0.1	GC.12 subset	<0.1	44295-2	0.1 || 0.2 || RPD: 67	[NR]	[NR]
Fluoranthene	mg/kg	0.1	GC.12 subset	<0.1	44295-2	1.4 || 1.5 || RPD: 7	LCS-4	100%
Pyrene	mg/kg	0.1	GC.12 subset	<0.1	44295-2	1.5 || 1.7 || RPD: 12	LCS-4	106%

QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Benzo(a)anthracene	mg/kg	0.1	GC.12 subset	<0.1	44295-2	1.0 || 1.1 || RPD: 10	[NR]	[NR]
Chrysene	mg/kg	0.1	GC.12 subset	<0.1	44295-2	1.1 || 1.2 || RPD: 9	LCS-4	116%
Benzo(b+k)fluoranthene	mg/kg	0.2	GC.12 subset	<0.2	44295-2	2.4 || 2.1 || RPD: 13	[NR]	[NR]
Benzo(a)pyrene	mg/kg	0.05	GC.12 subset	<0.05	44295-2	1.6 || 1.5 || RPD: 6	LCS-4	119%
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	GC.12 subset	<0.1	44295-2	1 || 0.9 || RPD: 11	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	0.1	GC.12 subset	<0.1	44295-2	0.2 || 0.2 || RPD: 0	[NR]	[NR]
Benzo(g,h,i)perylene	mg/kg	0.1	GC.12 subset	<0.1	44295-2	0.9 || 0.9 || RPD: 0	[NR]	[NR]
Surrogate p-Terphenyl-d$_{14}$	%		GC.12 subset	109	44295-2	81 || 96 || RPD: 17	LCS-4	91%

QUALITY CONTROL Organochlorine Pesticides in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			5/8/2010	44295-2	5/8/2010 || 5/8/2010	LCS-4	5/8/2010
Date analysed	-			6/8/2010	44295-2	6/8/2010 || 6/8/2010	LCS-4	6/8/2010
HCB	mg/kg	0.1	GC-5	<0.1	44295-2	<0.1 || <0.1	[NR]	[NR]
alpha-BHC	mg/kg	0.1	GC-5	<0.1	44295-2	<0.1 || <0.1	LCS-4	113%
gamma-BHC	mg/kg	0.1	GC-5	<0.1	44295-2	<0.1 || <0.1	[NR]	[NR]
beta-BHC	mg/kg	0.1	GC-5	<0.1	44295-2	<0.1 || <0.1	LCS-4	129%
Heptachlor	mg/kg	0.1	GC-5	<0.1	44295-2	<0.1 || <0.1	LCS-4	112%
delta-BHC	mg/kg	0.1	GC-5	<0.1	44295-2	<0.1 || <0.1	[NR]	[NR]
Aldrin	mg/kg	0.1	GC-5	<0.1	44295-2	<0.1 || <0.1	LCS-4	108%
Heptachlor Epoxide	mg/kg	0.1	GC-5	<0.1	44295-2	<0.1 || <0.1	LCS-4	126%
gamma-Chlordane	mg/kg	0.1	GC-5	<0.1	44295-2	<0.1 || <0.1	[NR]	[NR]
alpha-chlordane	mg/kg	0.1	GC-5	<0.1	44295-2	<0.1 || <0.1	[NR]	[NR]
Endosulfan I	mg/kg	0.1	GC-5	<0.1	44295-2	<0.1 || <0.1	[NR]	[NR]
pp-DDE	mg/kg	0.1	GC-5	<0.1	44295-2	<0.1 || <0.1	LCS-4	140%
Dieldrin	mg/kg	0.1	GC-5	<0.1	44295-2	<0.1 || <0.1	LCS-4	113%
Endrin	mg/kg	0.1	GC-5	<0.1	44295-2	<0.1 || <0.1	LCS-4	119%
pp-DDD	mg/kg	0.1	GC-5	<0.1	44295-2	<0.1 || <0.1	LCS-4	131%
Endosulfan II	mg/kg	0.1	GC-5	<0.1	44295-2	<0.1 || <0.1	[NR]	[NR]
pp-DDT	mg/kg	0.1	GC-5	<0.1	44295-2	<0.1 || <0.1	[NR]	[NR]
Endrin Aldehyde	mg/kg	0.1	GC-5	<0.1	44295-2	<0.1 || <0.1	[NR]	[NR]
Endosulfan Sulphate	mg/kg	0.1	GC-5	<0.1	44295-2	<0.1 || <0.1	LCS-4	106%
Methoxychlor	mg/kg	0.1	GC-5	<0.1	44295-2	<0.1 || <0.1	[NR]	[NR]
Surrogate TCLMX	%		GC-5	82	44295-2	136 || 82 || RPD: 50	LCS-4	96%

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QUALITY CONTROL Organophosphorus Pesticides	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			5/8/2010	44295-2	5/8/2010 || 5/8/2010	LCS-4	5/8/2010
Date analysed	-			6/8/2010	44295-2	6/8/2010 || 6/8/2010	LCS-4	6/8/2010
Diazinon	mg/kg	0.1	GC.8	<0.1	44295-2	<0.1 || <0.1	[NR]	[NR]
Dimethoate	mg/kg	0.1	GC.8	<0.1	44295-2	<0.1 || <0.1	[NR]	[NR]
Chlorpyriphos-methyl	mg/kg	0.1	GC.8	<0.1	44295-2	<0.1 || <0.1	[NR]	[NR]
Ronnel	mg/kg	0.1	GC.8	<0.1	44295-2	<0.1 || <0.1	[NR]	[NR]
Chlorpyriphos	mg/kg	0.1	GC.8	<0.1	44295-2	<0.1 || <0.1	LCS-4	82%
Fenitrothion	mg/kg	0.1	GC.8	<0.1	44295-2	<0.1 || <0.1	LCS-4	100%
Bromophos-ethyl	mg/kg	0.1	GC.8	<0.1	44295-2	<0.1 || <0.1	[NR]	[NR]
Ethion	mg/kg	0.1	GC.8	<0.1	44295-2	<0.1 || <0.1	LCS-4	99%
Surrogate TCLMX	%		GC.8	82	44295-2	136 || 82 || RPD: 50	LCS-4	89%

QUALITY CONTROL PCBs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			5/8/2010	44295-2	5/8/2010 || 5/8/2010	LCS-4	5/8/2010
Date analysed	-			6/8/2010	44295-2	6/8/2010 || 6/8/2010	LCS-4	6/8/2010
Arochlor 1016	mg/kg	0.1	GC-6	<0.1	44295-2	<0.1 || <0.1	[NR]	[NR]
Arochlor 1221*	mg/kg	0.1	GC-6	<0.1	44295-2	<0.1 || <0.1	[NR]	[NR]
Arochlor 1232	mg/kg	0.1	GC-6	<0.1	44295-2	<0.1 || <0.1	[NR]	[NR]
Arochlor 1242	mg/kg	0.1	GC-6	<0.1	44295-2	<0.1 || <0.1	[NR]	[NR]
Arochlor 1248	mg/kg	0.1	GC-6	<0.1	44295-2	<0.1 || <0.1	[NR]	[NR]
Arochlor 1254	mg/kg	0.1	GC-6	<0.1	44295-2	<0.1 || <0.1	LCS-4	119%
Arochlor 1260	mg/kg	0.1	GC-6	<0.1	44295-2	<0.1 || <0.1	[NR]	[NR]
Surrogate TCLMX	%		GC-6	82	44295-2	136 || 82 || RPD: 50	LCS-4	102%

QUALITY CONTROL Acid Extractable metals in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date digested	-			05/08/2010	44295-2	05/08/2010 || 05/08/2010	LCS-3	05/08/2010
Date analysed	-			05/08/2010	44295-2	05/08/2010 || 05/08/2010	LCS-3	05/08/2010
Arsenic	mg/kg	4	Metals.20 ICP-AES	<4	44295-2	<4 || 4	LCS-3	104%
Cadmium	mg/kg	0.5	Metals.20 ICP-AES	<0.5	44295-2	<0.5 || <0.5	LCS-3	108%
Chromium	mg/kg	1	Metals.20 ICP-AES	<1	44295-2	20 || 16 || RPD: 22	LCS-3	108%
Copper	mg/kg	1	Metals.20 ICP-AES	<1	44295-2	59 || 75 || RPD: 24	LCS-3	108%

QUALITY CONTROL Acid Extractable metals in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Lead	mg/kg	1	Metals.20 ICP-AES	<1	44295-2	90 || 100 || RPD: 11	LCS-3	105%
Mercury	mg/kg	0.1	Metals.21 CV-AAS	<0.1	44295-2	1.8 || 2.8 || RPD: 43	LCS-3	114%
Nickel	mg/kg	1	Metals.20 ICP-AES	<1	44295-2	13 || 10 || RPD: 26	LCS-3	108%
Zinc	mg/kg	1	Metals.20 ICP-AES	<1	44295-2	140 || 160 || RPD: 13	LCS-3	108%

QUALITY CONTROL Moisture	UNITS	PQL	METHOD	Blank
Date prepared	-			5/8/2010
Date analysed	-			5/8/2010
Moisture	%	0.1	LAB.8	<0.10

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

QUALITY CONTROL vTPH & BTEX in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	44295-5	5/8/2010
Date analysed	-	[NT]	[NT]	44295-5	6/8/2010
vTPH C_6 - C_9	mg/kg	[NT]	[NT]	44295-5	93%
Benzene	mg/kg	[NT]	[NT]	44295-5	86%
Toluene	mg/kg	[NT]	[NT]	44295-5	92%
Ethylbenzene	mg/kg	[NT]	[NT]	44295-5	94%
m+p-xylene	mg/kg	[NT]	[NT]	44295-5	97%
o-Xylene	mg/kg	[NT]	[NT]	44295-5	99%
Surrogate aaa-Trifluorotoluene	%	[NT]	[NT]	44295-5	109%

QUALITY CONTROL sTPH in Soil (C10-C36)	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	44295-5	5/8/2010
Date analysed	-	[NT]	[NT]	44295-5	5/8/2010
TPH C_{10} - C_{14}	mg/kg	[NT]	[NT]	44295-5	91%
TPH C_{15} - C_{28}	mg/kg	[NT]	[NT]	44295-5	#
TPH C_{29} - C_{36}	mg/kg	[NT]	[NT]	44295-5	106%
Surrogate o-Terphenyl	%	[NT]	[NT]	44295-5	104%

QUALITY CONTROL PAHs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	44295-5	5/8/2010
Date analysed	-	[NT]	[NT]	44295-5	6/8/2010
Naphthalene	mg/kg	[NT]	[NT]	44295-5	105%
Acenaphthylene	mg/kg	[NT]	[NT]	[NR]	[NR]
Acenaphthene	mg/kg	[NT]	[NT]	[NR]	[NR]
Fluorene	mg/kg	[NT]	[NT]	44295-5	110%
Phenanthrene	mg/kg	[NT]	[NT]	44295-5	118%
Anthracene	mg/kg	[NT]	[NT]	[NR]	[NR]
Fluoranthene	mg/kg	[NT]	[NT]	44295-5	#
Pyrene	mg/kg	[NT]	[NT]	44295-5	#
Benzo(a)anthracene	mg/kg	[NT]	[NT]	[NR]	[NR]
Chrysene	mg/kg	[NT]	[NT]	44295-5	140%
Benzo(b+k)fluoranthene	mg/kg	[NT]	[NT]	[NR]	[NR]
Benzo(a)pyrene	mg/kg	[NT]	[NT]	44295-5	#
Indeno(1,2,3-c,d)pyrene	mg/kg	[NT]	[NT]	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	[NT]	[NT]	[NR]	[NR]
Benzo(g,h,i)perylene	mg/kg	[NT]	[NT]	[NR]	[NR]
Surrogate p-Terphenyl-d_{14}	%	[NT]	[NT]	44295-5	100%

QUALITY CONTROL Organochlorine Pesticides in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	44295-5	5/8/2010
Date analysed	-	[NT]	[NT]	44295-5	6/8/2010
HCB	mg/kg	[NT]	[NT]	[NR]	[NR]
alpha-BHC	mg/kg	[NT]	[NT]	44295-5	103%
gamma-BHC	mg/kg	[NT]	[NT]	[NR]	[NR]
beta-BHC	mg/kg	[NT]	[NT]	44295-5	111%
Heptachlor	mg/kg	[NT]	[NT]	44295-5	104%
delta-BHC	mg/kg	[NT]	[NT]	[NR]	[NR]
Aldrin	mg/kg	[NT]	[NT]	44295-5	99%
Heptachlor Epoxide	mg/kg	[NT]	[NT]	44295-5	111%
gamma-Chlordane	mg/kg	[NT]	[NT]	[NR]	[NR]
alpha-chlordane	mg/kg	[NT]	[NT]	[NR]	[NR]
Endosulfan I	mg/kg	[NT]	[NT]	[NR]	[NR]
pp-DDE	mg/kg	[NT]	[NT]	44295-5	119%
Dieldrin	mg/kg	[NT]	[NT]	44295-5	99%
Endrin	mg/kg	[NT]	[NT]	44295-5	106%
pp-DDD	mg/kg	[NT]	[NT]	44295-5	111%
Endosulfan II	mg/kg	[NT]	[NT]	[NR]	[NR]
pp-DDT	mg/kg	[NT]	[NT]	[NR]	[NR]
Endrin Aldehyde	mg/kg	[NT]	[NT]	[NR]	[NR]
Endosulfan Sulphate	mg/kg	[NT]	[NT]	44295-5	101%
Methoxychlor	mg/kg	[NT]	[NT]	[NR]	[NR]
Surrogate TCLMX	%	[NT]	[NT]	44295-5	85%

QUALITY CONTROL Organophosphorus Pesticides	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	44295-5	5/8/2010
Date analysed	-	[NT]	[NT]	44295-5	6/8/2010
Diazinon	mg/kg	[NT]	[NT]	[NR]	[NR]
Dimethoate	mg/kg	[NT]	[NT]	[NR]	[NR]
Chlorpyriphos-methyl	mg/kg	[NT]	[NT]	[NR]	[NR]
Ronnel	mg/kg	[NT]	[NT]	[NR]	[NR]
Chlorpyriphos	mg/kg	[NT]	[NT]	44295-5	96%
Fenitrothion	mg/kg	[NT]	[NT]	44295-5	96%
Bromophos-ethyl	mg/kg	[NT]	[NT]	[NR]	[NR]
Ethion	mg/kg	[NT]	[NT]	44295-5	96%
Surrogate TCLMX	%	[NT]	[NT]	44295-5	83%

QUALITY CONTROL PCBs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	44295-5	5/8/2010
Date analysed	-	[NT]	[NT]	44295-5	6/8/2010
Arochlor 1016	mg/kg	[NT]	[NT]	[NR]	[NR]
Arochlor 1221*	mg/kg	[NT]	[NT]	[NR]	[NR]
Arochlor 1232	mg/kg	[NT]	[NT]	[NR]	[NR]
Arochlor 1242	mg/kg	[NT]	[NT]	[NR]	[NR]
Arochlor 1248	mg/kg	[NT]	[NT]	[NR]	[NR]
Arochlor 1254	mg/kg	[NT]	[NT]	44295-5	107%
Arochlor 1260	mg/kg	[NT]	[NT]	[NR]	[NR]
Surrogate TCLMX	%	[NT]	[NT]	44295-5	103%

QUALITY CONTROL Acid Extractable metals in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date digested	-	[NT]	[NT]	44295-5	05/08/2010
Date analysed	-	[NT]	[NT]	44295-5	05/08/2010
Arsenic	mg/kg	[NT]	[NT]	44295-5	103%
Cadmium	mg/kg	[NT]	[NT]	44295-5	95%
Chromium	mg/kg	[NT]	[NT]	44295-5	115%
Copper	mg/kg	[NT]	[NT]	44295-5	121%
Lead	mg/kg	[NT]	[NT]	44295-5	92%
Mercury	mg/kg	[NT]	[NT]	44295-5	123%
Nickel	mg/kg	[NT]	[NT]	44295-5	101%
Zinc	mg/kg	[NT]	[NT]	44295-5	95%

Report Comments:

PAH's in soil:# Percent recovery is not possible to report as the high concentration
of analytes in the sample/s have caused interference.

Asbestos was analysed by Approved Identifier: Paul Ching

INS: Insufficient sample for this test	NT: Not tested
NR: Not requested	PQL: Practical Quantitation Limit
<: Less than	>: Greater than
NA: Test not required	

Quality Control Definitions

LCS: Laboratory Control Sample

RPD: Relative Percent Difference

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:

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

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

SAMPLE RECEIPT ADVICE

Client:

Environmental Investigation Services
PO Box 976
North Ryde BC NSW 1670

ph: 02 9888 5000
Fax: 02 9888 5001

Attention: Brendan Page

Sample log in details:

Your reference:	**E23982K, Pyrmont**
Envirolab Reference:	**44295**
Date received:	04/08/10
Date results expected to be reported:	**11/08/10**

Samples received in appropriate condition for analysis:	YES
No. of samples provided	7 Soils
Turnaround time requested:	Standard
Temperature on receipt	Cool
Cooling Method:	Ice Pack

Comments:

Samples will be held for 1 month for water samples and 2 months for soil samples from date of receipt of samples.

Contact details:

Please direct any queries to Aileen Hie or Jacinta Hurst
ph: 02 9910 6200 fax: 02 9910 6201
email: ahie@envirolabservices.com.au or jhurst@envirolabservices.com.au

SAMPLE AND CHAIN OF CUSTODY FORM

TO:
Envirolab Services Pty Ltd
12 Ashley Street
Chatswood NSW 2067
Phone: (02) 99106200
Fax: (02) 99106201

Attention: Aileen

EIS Job Number: E23982K

Date Results Required: Standard

Sheet 1 /1

FROM:
Environmental Investigation Services
Rear 115 Wicks Road
Macquarie Park NSW 2113

Phone: (02) 9888 5000
Fax: (02) 9888 5004
Contact: Brendan Page

Project: Proposed Redevelopment
Location: Pyrmont
Sampler: BP

Sample Preservation:
In esky on ice

							Tests Required											
Date Sampled	Lab Ref:	Borehole/ Sample Number	Depth (m)	Sample Container	PID	Sample Description	Heavy Metals (8)	TPH/BTEX	PAH	OC/OP/ PCB	Asbestos	TCLP Prep + M6, PAH	Phenols	VOC	sVOC	sPOCAS		
3/8/10	1	BH 714	0.3/0.4	Glass jar + Asb Bag	0.2	F Soil												
↓	2	BH 714	0.8/1.0	Glass jar + Asb Bag	0.2	F	X	X	X	X	X							
	3	BH 714	1.7/1.95	Glass jar + Asb Bag	0.3	F		X										
	4	BH 714	3.2/3.45	Glass jar + Asb Bag	0.4	N												
	5	BH 710	0.3/0.5	Glass jar + Asb Bag	0.4	F	X	X	X	X	X							
	6	BH 710	0.5/0.65	Glass jar + ~~Asb Bag~~	0.1	F												
	7	~~BH~~ Dup LL		Glass jar + ~~Asb Bag~~	—	—												
		BH		Glass jar + Asb Bag														
				Glass jar + Asb Bag														
				Glass jar + Asb Bag														
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Envirolab
Envirolab S
12 As
Chatswood NSW
Ph: 9910
Job No: 44295
Date received: 4/8/10
Time received: 2pm
Received by: JH
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

Remarks (comments/detection limits required):

Relinquished By:
Date: 4/8/10
Time: 12:00pm
Received By: 4/8/10

Relinquished By:
Date:
Time:
Received By:

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

CERTIFICATE OF ANALYSIS 44295-A

Client:

Environmental Investigation Services
PO Box 976
North Ryde BC
NSW 1670

Attention: Brendan Page

Sample log in details:

Your Reference: **E23982K, Pyrmont**
No. of samples: Additional Testing on 2 Soils
Date samples received: 04/08/10
Date completed instructions received: 11/08/10

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: 18/08/10
Date of Preliminary Report: Not Issued
Issue Date: 17/08/10
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Accredited for compliance with ISO/IEC 17025.
Tests not covered by NATA are denoted with *.

Results Approved By:

Sandra Taylor
Senior Organic Chemist

Rhian Morgan
Rhian Morgan
Metals Supervisor

Metals in TCLP USEPA1311 Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ------------- ------------	44295-A-2 BH714 0.8-1.0 3/08/2010 Soil	44295-A-5 BH710 0.3-0.5 3/08/2010 Soil
Date extracted	-	16/8/2010	16/8/2010
Date analysed	-	[NA]	16/8/2010
pH of soil for fluid# determ.	pH units	9.70	9.90
pH of soil for fluid # determ. (acid)	pH units	1.50	1.50
Extraction fluid used	-	1	1
pH of final Leachate	pH units	5.00	5.50
Nickel in TCLP	mg/L	[NA]	0.04

PAHs in TCLP (USEPA 1311) Our Reference:	UNITS	44295-A-2	44295-A-5
Your Reference	-------------	BH714	BH710
Depth	------------	0.8-1.0	0.3-0.5
Date Sampled		3/08/2010	3/08/2010
Type of sample		Soil	Soil
Date extracted	-	12/8/2010	12/8/2010
Date analysed	-	13/8/2010	13/8/2010
Naphthalene in TCLP	mg/L	<0.001	<0.001
Acenaphthylene in TCLP	mg/L	<0.001	<0.001
Acenaphthene in TCLP	mg/L	<0.001	<0.001
Fluorene in TCLP	mg/L	<0.001	<0.001
Phenanthrene in TCLP	mg/L	<0.001	<0.001
Anthracene in TCLP	mg/L	<0.001	<0.001
Fluoranthene in TCLP	mg/L	<0.001	<0.001
Pyrene in TCLP	mg/L	<0.001	<0.001
Benzo(a)anthracene in TCLP	mg/L	<0.001	<0.001
Chrysene in TCLP	mg/L	<0.001	<0.001
Benzo(b+k)fluoranthene in TCLP	mg/L	<0.002	<0.002
Benzo(a)pyrene in TCLP	mg/L	<0.001	<0.001
Indeno(1,2,3-c,d)pyrene - TCLP	mg/L	<0.001	<0.001
Dibenzo(a,h)anthracene in TCLP	mg/L	<0.001	<0.001
Benzo(g,h,i)perylene in TCLP	mg/L	<0.001	<0.001
Surrogate p-Terphenyl-d_{14}	%	75	72

Method ID	Methodology Summary
LAB.4	Toxicity Characteristic Leaching Procedure (TCLP).
EXTRACT.7	Toxicity Characteristic Leaching Procedure (TCLP).
LAB.1	pH - Measured using pH meter and electrode in accordance with APHA 20th ED, 4500-H+.
Metals.20 ICP-AES	Determination of various metals by ICP-AES.
GC.12 subset	Leachates are extracted with Dichloromethane and analysed by GC-MS.
GC.12 subset	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS.
GC.12	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS.

QUALITY CONTROL Metals in TCLP USEPA1311	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			16/8/2010	[NT]	[NT]	LCS-1	16/8/2010
Date analysed	-			16/8/2010	[NT]	[NT]	LCS-1	16/8/2010
Nickel in TCLP	mg/L	0.02	Metals.20 ICP-AES	<0.02	[NT]	[NT]	LCS-1	94%

QUALITY CONTROL PAHs in TCLP (USEPA 1311)	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			12/8/2010	[NT]	[NT]	LCS-W1	12/8/2010
Date analysed	-			13/8/2010	[NT]	[NT]	LCS-W1	13/8/2010
Naphthalene in TCLP	mg/L	0.001	GC.12 subset	<0.001	[NT]	[NT]	LCS-W1	97%
Acenaphthylene in TCLP	mg/L	0.001	GC.12 subset	<0.001	[NT]	[NT]	[NR]	[NR]
Acenaphthene in TCLP	mg/L	0.001	GC.12 subset	<0.001	[NT]	[NT]	[NR]	[NR]
Fluorene in TCLP	mg/L	0.001	GC.12 subset	<0.001	[NT]	[NT]	LCS-W1	104%
Phenanthrene in TCLP	mg/L	0.001	GC.12 subset	<0.001	[NT]	[NT]	LCS-W1	100%
Anthracene in TCLP	mg/L	0.001	GC.12 subset	<0.001	[NT]	[NT]	[NR]	[NR]
Fluoranthene in TCLP	mg/L	0.001	GC.12 subset	<0.001	[NT]	[NT]	LCS-W1	92%
Pyrene in TCLP	mg/L	0.001	GC.12 subset	<0.001	[NT]	[NT]	LCS-W1	99%
Benzo(a)anthracene in TCLP	mg/L	0.001	GC.12 subset	<0.001	[NT]	[NT]	[NR]	[NR]
Chrysene in TCLP	mg/L	0.001	GC.12 subset	<0.001	[NT]	[NT]	LCS-W1	99%
Benzo(b+k)fluoranthene in TCLP	mg/L	0.002	GC.12 subset	<0.002	[NT]	[NT]	[NR]	[NR]
Benzo(a)pyrene in TCLP	mg/L	0.001	GC.12 subset	<0.001	[NT]	[NT]	LCS-W1	110%
Indeno(1,2,3-c,d)pyrene - TCLP	mg/L	0.001	GC.12 subset	<0.001	[NT]	[NT]	[NR]	[NR]
Dibenzo(a,h)anthracene in TCLP	mg/L	0.001	GC.12 subset	<0.001	[NT]	[NT]	[NR]	[NR]
Benzo(g,h,i)perylene in TCLP	mg/L	0.001	GC.12 subset	<0.001	[NT]	[NT]	[NR]	[NR]
Surrogate p-Terphenyl-d_{14}	%		GC.12	137	[NT]	[NT]	LCS-W1	106%

Report Comments:

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

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

Quality Control Definitions

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike: A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample): This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike: Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria

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

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

Aileen Hie

From: Brendan Page [bpage@jkgroup.net.au]
Sent: Wednesday, 11 August 2010 01:23 PM
To: Aileen Hie
Subject: Additional Analyses 44295 (E23982K, Pyrmont)

EIS
ENVIRONMENTAL INVESTIGATION SERVICES
A division of Jeffery & Katauskas Pty Ltd
ABN 17 003 550 801

Hi Aileen,

Could you please arrange for the following additional analyses to be undertaken on the samples in Envirolabs custody:

- 44295-2 TCLP prep and leachate analysis for PAHs; and
- 44295-5 TCLP prep and leachate analysis for PAHs and Ni.

All analyses is to be on a standard turnaround. Cheers

Regards,
For and on behalf of
ENVIRONMENTAL INVESTIGATION SERVICES

Brendan Page
Environmental Scientist

Envirolab Ref: 44295A
Due: 18/8/10
std T/A.

115 Wicks Road, Macquarie Park, NSW, 2113
PO Box 976, North Ryde BC, NSW, 1670
Tel: 02 9888 5000
Fax: 02 9888 5004
email: bpage@jkgroup.net.au
Web: www.jkgroup.net.au

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

CERTIFICATE OF ANALYSIS 44406

Client:
Environmental Investigation Services
PO Box 976
North Ryde BC
NSW 1670

Attention: Brendan Page

Sample log in details:

Your Reference:	**E23982K, Pyrmont**
No. of samples:	7 Waters
Date samples received:	06/08/10
Date completed instructions received:	06/08/10

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:	13/08/10
Date of Preliminary Report:	Not Issued
Issue Date:	24/08/10

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Accredited for compliance with ISO/IEC 17025.
Tests not covered by NATA are denoted with *.

Results Approved By:

Giovanni Agosti
Technical Manager

Nancy
Nancy Zhang
Chemist

NATA
ACCREDITED FOR
TECHNICAL
COMPETENCE

vTPH & BTEX in Water Our Reference: Your Reference Date Sampled Type of sample	UNITS ------------- ------------	44406-1 MW517 5/08/2010 Water	44406-2 MW708 5/08/2010 Water	44406-3 MW713 5/08/2010 Water	44406-4 MW712 5/08/2010 Water	44406-5 GWDUPBB 5/08/2010 Water
Date extracted	-	12/08/2010	12/08/2010	12/08/2010	12/08/2010	12/08/2010
Date analysed	-	12/08/2010	12/08/2010	12/08/2010	12/08/2010	12/08/2010
TPH C_6 - C_9	µg/L	32	19	12	78	42
Benzene	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Ethylbenzene	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
m+p-xylene	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
o-xylene	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Surrogate Dibromofluoromethane	%	102	105	103	100	101
Surrogate toluene-d8	%	104	107	112	112	110
Surrogate 4-BFB	%	108	99	99	103	104

vTPH & BTEX in Water Our Reference: Your Reference Date Sampled Type of sample	UNITS ------------- ------------	44406-6 GWTBAA 5/08/2010 Water	44406-7 GWTSAA 5/08/2010 Water
Date extracted	-	12/08/2010	12/08/2010
Date analysed	-	12/08/2010	12/08/2010
Benzene	µg/L	<1.0	72%
Toluene	µg/L	<1.0	78%
Ethylbenzene	µg/L	<1.0	80%
m+p-xylene	µg/L	<2.0	79%
o-xylene	µg/L	<1.0	79%
Surrogate Dibromofluoromethane	%	101	102
Surrogate toluene-d8	%	110	98
Surrogate 4-BFB	%	92	98

sTPH in Water (C10-C36) Our Reference: Your Reference Date Sampled Type of sample	UNITS ------------- ------------	44406-1 MW517 5/08/2010 Water	44406-2 MW708 5/08/2010 Water	44406-3 MW713 5/08/2010 Water	44406-4 MW712 5/08/2010 Water	44406-5 GWDUPBB 5/08/2010 Water
Date extracted	-	9/8/2010	9/8/2010	9/8/2010	9/8/2010	9/8/2010
Date analysed	-	9/8/2010	9/8/2010	9/8/2010	9/8/2010	9/8/2010
TPH C_{10} - C_{14}	µg/L	370	210	770	500	400
TPH C_{15} - C_{28}	µg/L	240	170	580	270	280
TPH C_{29} - C_{36}	µg/L	<100	<100	<100	<100	<100
Surrogate o-Terphenyl	%	#	#	#	#	#

PAHs in Water - Low Level Our Reference: Your Reference Date Sampled Type of sample	UNITS ------------- ------------	44406-1 MW517 5/08/2010 Water	44406-2 MW708 5/08/2010 Water	44406-3 MW713 5/08/2010 Water	44406-4 MW712 5/08/2010 Water	44406-5 GWDUPBB 5/08/2010 Water
Date extracted	-	9/8/2010	9/8/2010	9/8/2010	9/8/2010	9/8/2010
Date analysed	-	9/8/2010	9/8/2010	9/8/2010	9/8/2010	9/8/2010
Naphthalene	µg/L	0.4	<0.1	0.3	5.2	0.5
Acenaphthylene	µg/L	<0.1	<0.1	0.1	<0.1	<0.1
Acenaphthene	µg/L	2.8	0.1	0.7	0.3	3.1
Fluorene	µg/L	2.5	<0.1	0.8	0.3	3.1
Phenanthrene	µg/L	2.4	0.2	1.2	0.2	3.0
Anthracene	µg/L	0.4	<0.1	0.3	<0.1	0.4
Fluoranthene	µg/L	0.5	<0.1	1.0	0.1	0.7
Pyrene	µg/L	0.3	<0.1	0.9	0.1	0.5
Benzo(a)anthracene	µg/L	<0.1	<0.1	0.3	<0.1	<0.1
Chrysene	µg/L	<0.1	<0.1	0.2	<0.1	<0.1
Benzo(b+k)fluoranthene	µg/L	<0.2	<0.2	0.2	<0.2	<0.2
Benzo(a)pyrene	µg/L	<0.1	<0.1	0.2	<0.1	<0.1
Indeno(1,2,3-c,d)pyrene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate p-Terphenyl-d_{14}	%	81	60	67	88	86

Miscellaneous Inorganics Our Reference: Your Reference Date Sampled Type of sample	UNITS ------------- ------------	44406-1 MW517 5/08/2010 Water	44406-2 MW708 5/08/2010 Water	44406-3 MW713 5/08/2010 Water	44406-4 MW712 5/08/2010 Water	44406-5 GWDUPBB 5/08/2010 Water
Date prepared	-	9/8/10	9/8/10	9/8/10	9/8/10	9/8/10
Date analysed	-	9/8/10	9/8/10	9/8/10	9/8/10	9/8/10
pH	pH Units	6.7	6.6	6.1	6.8	[NA]
Electrical Conductivity	µS/cm	1,300	1,200	2,000	1,600	[NA]
Oil & Grease (LLE)	mg/L	<5	<5	<5	<5	<5

Method ID	Methodology Summary
GC.16	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.
GC.3	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID.
GC.12 subset	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS.
LAB.1	pH - Measured using pH meter and electrode in accordance with APHA 20th ED, 4500-H+.
LAB.2	Conductivity and Salinity - measured using a conductivity cell and dedicated meter, in accordance with APHA2510 20th ED and Rayment & Higginson.
LAB.3	Oil & Grease - determine gravimetrically following extraction with Hexane/tert-Methyl Butyl Ether, in accordance with APHA 20th ED, 5220-B.

QUALITY CONTROL vTPH & BTEX in Water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			12/08/2010	[NT]	[NT]	LCS-W1	12/08/2010
Date analysed	-			12/08/2010	[NT]	[NT]	LCS-W1	12/08/2010
TPH C_6 - C_9	µg/L	10	GC.16	<10	[NT]	[NT]	LCS-W1	92%
Benzene	µg/L	1	GC.16	<1.0	[NT]	[NT]	LCS-W1	122%
Toluene	µg/L	1	GC.16	<1.0	[NT]	[NT]	LCS-W1	91%
Ethylbenzene	µg/L	1	GC.16	<1.0	[NT]	[NT]	LCS-W1	86%
m+p-xylene	µg/L	2	GC.16	<2.0	[NT]	[NT]	LCS-W1	81%
o-xylene	µg/L	1	GC.16	<1.0	[NT]	[NT]	LCS-W1	82%
Surrogate Dibromofluoromethane	%		GC.16	102	[NT]	[NT]	LCS-W1	101%
Surrogate toluene-d8	%		GC.16	111	[NT]	[NT]	LCS-W1	110%
Surrogate 4-BFB	%		GC.16	94	[NT]	[NT]	LCS-W1	100%

QUALITY CONTROL sTPH in Water (C10-C36)	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			9/8/2010	[NT]	[NT]	LCS-W1	9/8/2010
Date analysed	-			9/8/2010	[NT]	[NT]	LCS-W1	9/8/2010
TPH C_{10} - C_{14}	µg/L	50	GC.3	<50	[NT]	[NT]	LCS-W1	86%
TPH C_{15} - C_{28}	µg/L	100	GC.3	<100	[NT]	[NT]	LCS-W1	113%
TPH C_{29} - C_{36}	µg/L	100	GC.3	<100	[NT]	[NT]	LCS-W1	104%
Surrogate o-Terphenyl	%		GC.3	121	[NT]	[NT]	LCS-W1	119%

QUALITY CONTROL PAHs in Water - Low Level	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			9/8/2010	[NT]	[NT]	LCS-W1	9/8/2010
Date analysed	-			9/8/2010	[NT]	[NT]	LCS-W1	9/8/2010
Naphthalene	µg/L	0.1	GC.12 subset	<0.1	[NT]	[NT]	LCS-W1	96%
Acenaphthylene	µg/L	0.1	GC.12 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Acenaphthene	µg/L	0.1	GC.12 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Fluorene	µg/L	0.1	GC.12 subset	<0.1	[NT]	[NT]	LCS-W1	106%
Phenanthrene	µg/L	0.1	GC.12 subset	<0.1	[NT]	[NT]	LCS-W1	97%
Anthracene	µg/L	0.1	GC.12 subset	<0.1	[NT]	[NT]	[NR]	[NR]

QUALITY CONTROL PAHs in Water - Low Level	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Fluoranthene	µg/L	0.1	GC.12 subset	<0.1	[NT]	[NT]	LCS-W1	94%
Pyrene	µg/L	0.1	GC.12 subset	<0.1	[NT]	[NT]	LCS-W1	94%
Benzo(a)anthracene	µg/L	0.1	GC.12 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Chrysene	µg/L	0.1	GC.12 subset	<0.1	[NT]	[NT]	LCS-W1	82%
Benzo(b+k)fluoranthene	µg/L	0.2	GC.12 subset	<0.2	[NT]	[NT]	[NR]	[NR]
Benzo(a)pyrene	µg/L	0.1	GC.12 subset	<0.1	[NT]	[NT]	LCS-W1	132%
Indeno(1,2,3-c,d)pyrene	µg/L	0.1	GC.12 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Dibenzo(a,h)anthracene	µg/L	0.1	GC.12 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Benzo(g,h,i)perylene	µg/L	0.1	GC.12 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Surrogate p-Terphenyl-d$_{14}$	%		GC.12 subset	127	[NT]	[NT]	LCS-W1	125%

QUALITY CONTROL Miscellaneous Inorganics	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			9/8/10	[NT]	[NT]	LCS-W1	9/8/10
Date analysed	-			9/8/10	[NT]	[NT]	LCS-W1	9/8/10
pH	pH Units		LAB.1	[NT]	[NT]	[NT]	LCS-W1	98%
Electrical Conductivity	µS/cm	1	LAB.2	<1.0	[NT]	[NT]	LCS-W1	100%
Oil & Grease (LLE)	mg/L	5	LAB.3	<5	[NT]	[NT]	LCS-W1	89%

ACCREDITED FOR TECHNICAL COMPETENCE

Report Comments:

Total Petroleum Hydrocarbons in water:# Percent recovery is not possible to report as the high concentration of analytes in the sample/s have caused interference.

Asbestos ID was analysed by Approved Identifier: Not applicable for this job
Asbestos ID was authorised by Approved Signatory: Not applicable for this job
Asbestos counting was analysed by Approved Counter: @ERROR
Asbestos counting was authorised by Approved Signatory: @ERROR

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

Quality Control Definitions

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike: A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample): This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike: Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria

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

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

Brendan Page

From: Brendan Page [bpage@jkgroup.net.au]
Sent: Tuesday, 24 August 2010 7:51 AM
To: 'Aileen Hie'
Subject: URGENT - Changes to reports 44406 and 44406A (E23982K, Pyrmont)

EIS

ENVIRONMENTAL INVESTIGATION SERVICES
A division of Jeffery & Katauskas Pty Ltd
ABN 17 003 550 801

Hi Aileen,

My apologies for the inconvenience, however, there was a slight error made in the field with the sample labelling for the above referenced job. Could you please make the following changes and re-issue the reports:

- 44406-3 (currently MW712), change to MW713; and
- 44406-4 (currently MW713), change to MW712.

We will need both reports: 44406; and 44406A amended accordingly and re-issued. If this could be done at your earliest convenience it would be appreciated as we are on quite a tight deadline to issue these results to the client.

Thanks,

Regards,
For and on behalf of
ENVIRONMENTAL INVESTIGATION SERVICES

Brendan Page
Environmental Scientist

115 Wicks Road, Macquarie Park, NSW, 2113
PO Box 976, North Ryde BC, NSW, 1670
Tel: 02 9888 5000
Fax: 02 9888 5004
email: bpage@jkgroup.net.au
Web: www.jkgroup.net.au

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

SAMPLE RECEIPT ADVICE

Client:

Environmental Investigation Services
PO Box 976
North Ryde BC NSW 1670

ph: 02 9888 5000
Fax: 02 9888 5001

Attention: Brendan Page

Sample log in details:

Your reference:	**E23982K, Pyrmont**
Envirolab Reference:	**44406**
Date received:	06/08/10
Date results expected to be reported:	**13/08/10**

Samples received in appropriate condition for analysis:	YES
No. of samples provided	7 Waters
Turnaround time requested:	Standard
Temperature on receipt	Cool
Cooling Method:	Ice Pack

Comments:

Samples will be held for 1 month for water samples and 2 months for soil samples from date of receipt of samples.

Contact details:

Please direct any queries to Aileen Hie or Jacinta Hurst
ph: 02 9910 6200 fax: 02 9910 6201
email: ahie@envirolabservices.com.au or jhurst@envirolabservices.com.au

TO:
Envirolab Services Pty Ltd
12 Ashley St, Chatswood 2067

Phone: (02) 9910 6200
Fax: (02) 9910 6201

Attention: Aileen

Date Results Required:

SAMPLE AND CHAIN OF CUSTODY FORM

EIS Job Number: E23982K

Sheet 1 / 2

FROM:
Environmental Investigation Services

Rear 115 Wicks Road
Macquarie Park NSW 2113

Phone: (02) 9888 5000
Fax: (02) 9888 5004

Contact: Brendan Page

Project: Proposed Redevelopment
Location: Pyrmont
Sampler: BP

Sample Preservation:
In esky on ice

							Tests Required									
Date Sampled	Time Sampled	Location	Sample/ Borehole Number	Sample Container	PID (ppm/ Odour)	Sample Description		TPH/BTEX	Oil & Grease		PAHs (low level)		pH / EC	BTEX		Comments/Detection Limits Required
5-8-10	pm	1	MW517	3 x 1L Amber Bottle 2x BTEX Vials 1 x HDPE Plastic Bottle 1 x ½L Amber	–	Water		X	X		X		X			
5/8/10	Am	2	MW708	3x 1L Amber Bottle 2x BTEX Vials 1 x HDPE Plastic Bottle 1 x ½L Amber	–	Water		X	X		X		X			
6/8/10	Pm	3	MW712	3 x 1L Amber Bottle 2x BTEX Vials 1 x HDPE Plastic Bottle 1 x ½L Amber	–	Water		X	X		X		X			
6/8/10	Pm	4	MW713	x 1L Amber Bottle 2x BTEX Vials x HDPE Plastic Bottle	–	Water		X	X		X		X			
5/8/10	–	[redacted]	GWDUPAA	3 x 1L Amber Bottle 2x BTEX Vials 1 x HDPE Plastic Bottle 1 x ½L Amber	–	water		X	X		X					
6/8/10	–	5	GWDUPBB	3 x 1L Amber Bottle 2x BTEX Vials 1 x HDPE Plastic Bottle 1 x ½L Amber	–	water		X	X		X					

Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph: 9910 6200
Job No: 44406.
Date received: 6/8/10.
Time received: 100.
Received by: Jrie.
Temp: [✓ Cool]/Ambient
Cooling: Ice/[✓ Icepack]
Security: [✓ Intact]/Broken/None

Relinquished By: Mick	Date: 6/8/10. Time:	Received By:
Relinquished By:	Date: Time:	Received By:

Remarks:

All analysis PQLs to ANZECC (2000) Detection Limits Please

[redacted]

TO:
Envirolab Services Pty Ltd
12 Ashley St, Chatswood 2067

Phone: (02) 9910 6200
Fax: (02) 9910 6201

Attention: Aileen

Date Results Required:

SAMPLE AND CHAIN OF CUSTODY FORM

EIS Job Number: E23982K

Sheet 2 / 2

FROM:
Environmental Investigation Services

Rear 115 Wicks Road
Macquarie Park NSW 2113

Phone: (02) 9888 5000
Fax: (02) 9888 5004

Contact: Brendan Page

Project: Proposed Redevelopment
Location: Pyrmont
Sampler: BP

Sample Preservation:
In esky on ice

							Tests Required									
Date Sampled	Time Sampled	Location	Sample/ Borehole Number	Sample Container	PID (ppm/ Odour)	Sample Description		TPH/BTEX	Oil & Grease		PAHs (low level)		pH / EC	BTEX		Comments/Detection Limits Required
5-8-10	–	6	GWTBAA	~~x 1L Amber Bottle~~ 1 ~~2~~x BTEX Vials ~~x HDPE Plastic Bottle~~	–	Water								X		
5/8/10	–	7	GWTSAA	~~x 1L Amber Bottle~~ 1 ~~2~~x BTEX Vials ~~x HDPE Plastic Bottle~~	–	water								X		

Relinquished By:	Date: Time:	Received By:
Relinquished By:	Date: Time:	Received By:

Remarks:

All analysis PQLs to ANZECC (2000) Detection Limits Please

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

CERTIFICATE OF ANALYSIS 44406-A

Client:

Environmental Investigation Services
PO Box 976
North Ryde BC
NSW 1670

Attention: Brendan Page

Sample log in details:

Your Reference:	**E23982K, Pyrmont**
No. of samples:	Additional Testing on 2 Waters
Date samples received:	06/08/10
Date completed instructions received:	16/08/10

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:	23/08/10
Date of Preliminary Report:	Not Issued
Issue Date:	24/08/10

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Accredited for compliance with ISO/IEC 17025.
Tests not covered by NATA are denoted with *.

Results Approved By:

Nancy
Nancy Zhang
Chemist

sTPH in Water (C10-C36) Silica Gel Clean Our Reference: Your Reference Date Sampled Type of sample	UNITS ------------- ------------	44406-A-3 MW713 5/08/2010 Water	44406-A-4 MW712 5/08/2010 Water
Date extracted	-	17/08/2010	17/08/2010
Date analysed	-	17/08/2010	17/08/2010
TPH C_{10} - C_{14}	µg/L	190	170
TPH C_{15} - C_{28}	µg/L	210	150
TPH C_{29} - C_{36}	µg/L	<100	<100
Surrogate o-Terphenyl	%	95	109

Method ID	Methodology Summary
GC.3	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID.

QUALITY CONTROL sTPH in Water (C10-C36) Silica Gel Clean	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			17/08/2010	[NT]	[NT]	LCS-W1	17/08/2010
Date analysed	-			17/08/2010	[NT]	[NT]	LCS-W1	17/08/2010
TPH C_{10} - C_{14}	µg/L	50	GC.3	<50	[NT]	[NT]	LCS-W1	68%
TPH C_{15} - C_{28}	µg/L	100	GC.3	<100	[NT]	[NT]	LCS-W1	103%
TPH C_{29} - C_{36}	µg/L	100	GC.3	<100	[NT]	[NT]	LCS-W1	89%
Surrogate o-Terphenyl	%		GC.3	136	[NT]	[NT]	LCS-W1	135%

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
Asbestos counting was analysed by Approved Counter:	@ERROR
Asbestos counting was authorised by Approved Signatory:	@ERROR

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

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

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

Quality Control Definitions

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

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

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

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

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

Laboratory Acceptance Criteria

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

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

Aileen Hie

From: Brendan Page [bpage@jkgroup.net.au]
Sent: Monday, 16 August 2010 01:57 PM
To: Aileen Hie
Subject: Additional Analysis 44406 (E23982K, Pyrmont)

EIS

ENVIRONMENTAL INVESTIGATION SERVICES
A division of Jeffery & Katauskas Pty Ltd
ABN 17 003 550 801

Hi Aileen,

Could you please schedule TPH (C_{10}-C_{36}) analysis with a silica gel cleanup on the groundwater samples 44406-3 (MW712) and 44406-4 (MW713). Standard TAT.

Please give me a call if there are any problems.

Regards,
For and on behalf of
ENVIRONMENTAL INVESTIGATION SERVICES

Envirolab Ref: 44406A
Due: 23/8/10
std T/A.

Brendan Page
Environmental Scientist

115 Wicks Road, Macquarie Park, NSW, 2113
PO Box 976, North Ryde BC, NSW, 1670
Tel: 02 9888 5000
Fax: 02 9888 5004
email: bpage@jkgroup.net.au
Web: www.jkgroup.net.au

ANALYTICAL REPORT

10 August 2010

Jeffery and Katauskas Pty Ltd
115 Wicks Road
Macquarie Park
North Ryde BC
NSW 1670

Attention: **Brendan Page**

Your Reference: E23982K - Proposed Redevelopment - Pyrmont

Our Reference: SE80351

Samples: 3 Soils
Received: 3/08/2010

Preliminary Report Sent: Not Issued

These samples were analysed in accordance with your written instructions.

For and on Behalf of:
SGS ENVIRONMENTAL SERVICES

Sample Receipt:	Angela Mamalicos	AU.SampleReceipt.Sydney@sgs.com
Production Manager:	Huong Crawford	Huong.Crawford@sgs.com

Results Approved and/or Authorised by:

Ly Kim Ha
Organics Signatory

Huong Crawford
Metals Signatory

MBTEX in Soil Our Reference: Your Reference Sample Matrix	UNITS ------------- ------------	SE80351-2 Dup II Soil	SE80351-3 Dup JJ Soil
Date Extracted (MBTEX)		5/08/2010	5/08/2010
Date Analysed (MBTEX)		5/08/2010	5/08/2010
Methyl-tert-butyl ether (MtBE)	mg/kg	<0.1	<0.1
Benzene	mg/kg	<0.1	<0.1
Toluene	mg/kg	<0.1	<0.1
Ethylbenzene	mg/kg	<0.1	<0.1
Total Xylenes	mg/kg	<0.3	<0.3
BTEX Surrogate (%)	%	128	102

TRH in soil with C6-C9 by P/T Our Reference: Your Reference Sample Matrix	UNITS ------------- ------------	SE80351-2 Dup II Soil	SE80351-3 Dup JJ Soil
Date Extracted (TRH C6-C9 PT)		5/08/2010	5/08/2010
Date Analysed (TRH C6-C9 PT)		5/08/2010	5/08/2010
TRH C_6 - C_9 P&T	mg/kg	<20	<20
Date Extracted (TRH C10-C36)		5/08/2010	5/08/2010
Date Analysed (TRH C10-C36)		6/08/2010	6/08/2010
TRH C_{10} - C_{14}	mg/kg	<20	<20
TRH C_{15} - C_{28}	mg/kg	<50	91
TRH C_{29} - C_{36}	mg/kg	<50	<50

PAHs in Soil Our Reference: Your Reference Sample Matrix	UNITS ------------- ------------	SE80351-1 Dup CC Soil	SE80351-2 Dup II Soil
Date Extracted		5/08/2010	5/08/2010
Date Analysed		5/08/2010	5/08/2010
Naphthalene	mg/kg	<0.10	<0.10
2-Methylnaphthalene	mg/kg	<0.10	<0.10
1-Methylnaphthalene	mg/kg	<0.10	<0.10
Acenaphthylene	mg/kg	<0.10	<0.10
Acenaphthene	mg/kg	<0.10	<0.10
Fluorene	mg/kg	<0.10	<0.10
Phenanthrene	mg/kg	<0.10	0.41
Anthracene	mg/kg	<0.10	0.14
Fluoranthene	mg/kg	<0.10	1.6
Pyrene	mg/kg	<0.10	2.0
Benzo[*a*]anthracene	mg/kg	<0.10	0.97
Chrysene	mg/kg	<0.10	0.82
Benzo[*b,k*]fluoranthene	mg/kg	<0.20	1.3
Benzo[*a*]pyrene	mg/kg	<0.05	0.78
Indeno[*123-cd*]pyrene	mg/kg	<0.10	0.21
Dibenzo[*ah*]anthracene	mg/kg	<0.10	<0.10
Benzo[*ghi*]perylene	mg/kg	<0.10	0.22
Total PAHs (sum)	mg/kg	<1.7	<9.18
Nitrobenzene-d5	%	88	69
2-Fluorobiphenyl	%	88	69
p -Terphenyl-*d14*	%	94	73

OC Pesticides in Soil Our Reference: Your Reference Sample Matrix	UNITS ------------- ------------	SE80351-2 Dup II Soil
Date Extracted		5/08/2010
Date Analysed		5/08/2010
HCB	mg/kg	<0.1
alpha-BHC	mg/kg	<0.1
gamma-BHC (Lindane)	mg/kg	<0.1
Heptachlor	mg/kg	<0.1
Aldrin	mg/kg	<0.1
beta-BHC	mg/kg	<0.1
delta-BHC	mg/kg	<0.1
Heptachlor Epoxide	mg/kg	<0.1
o,p-DDE	mg/kg	<0.1
alpha-Endosulfan	mg/kg	<0.1
trans-Chlordane *(gamma)*	mg/kg	<0.1
cis-Chlordane *(alpha)*	mg/kg	<0.1
trans-Nonachlor	mg/kg	<0.1
p,p-DDE	mg/kg	<0.1
Dieldrin	mg/kg	<0.1
Endrin	mg/kg	<0.1
o,p-DDD	mg/kg	<0.1
o,p-DDT	mg/kg	<0.1
beta-Endosulfan	mg/kg	<0.1
p,p-DDD	mg/kg	<0.1
p,p-DDT	mg/kg	<0.1
Endosulfan Sulphate	mg/kg	<0.1
Endrin Aldehyde	mg/kg	<0.1
Methoxychlor	mg/kg	<0.1
Endrin Ketone	mg/kg	<0.1
2,4,5,6-Tetrachloro-m-xylene *(Surrogate*	%	115

OP Pesticides in Soil by GCMS Our Reference: Your Reference Sample Matrix	UNITS ------------- ------------	SE80351-2 Dup II Soil
Date Extracted		5/08/2010
Date Analysed		5/08/2010
Dichlorvos	mg/kg	<1
Dimethoate	mg/kg	<1
Diazinon	mg/kg	<0.5
Fenitrothion	mg/kg	<0.2
Malathion	mg/kg	<0.20
Chlorpyrifos-ethyl	mg/kg	<0.2
Parathion-ethyl	mg/kg	<0.2
Bromofos-ethyl	mg/kg	<0.2
Methidathion	mg/kg	<0.5
Ethion	mg/kg	<0.2
Azinphos-methyl	mg/kg	<0.20
2-fluorobiphenyl (Surr)	%	69
d14-p-Terphenyl (Surr)	%	73

PCBs in Soil Our Reference: Your Reference Sample Matrix	UNITS ------------- ------------	SE80351-2 Dup II Soil
Date Extracted		5/08/2010
Date Analysed		5/08/2010
Arochlor 1016	mg/kg	<0.1
Arochlor 1221	mg/kg	<0.1
Arochlor 1232	mg/kg	<0.1
Arochlor 1242	mg/kg	<0.1
Arochlor 1248	mg/kg	<0.1
Arochlor 1254	mg/kg	<0.1
Arochlor 1260	mg/kg	<0.1
Arochlor 1262	mg/kg	<0.1
Arochlor 1268	mg/kg	<0.1
Total Positive PCB	mg/kg	<0.90
PCB_Surrogate 1	%	115

Metals in Soil by ICP-OES Our Reference: Your Reference Sample Matrix	UNITS ------------- ------------	SE80351-1 Dup CC Soil	SE80351-2 Dup II Soil
Date Extracted (Metals)		6/08/2010	6/08/2010
Date Analysed (Metals)		6/08/2010	6/08/2010
Arsenic	mg/kg	870	6
Cadmium	mg/kg	[NA]	<0.3
Chromium	mg/kg	[NA]	11
Copper	mg/kg	[NA]	33
Lead	mg/kg	[NA]	38
Nickel	mg/kg	[NA]	7.1
Zinc	mg/kg	[NA]	47

Mercury Cold Vapor/Hg Analyser Our Reference: Your Reference Sample Matrix	UNITS ------------- ------------	SE80351-2 Dup II Soil
Date Extracted (Mercury)		6/08/2010
Date Analysed (Mercury)		6/08/2010
Mercury	mg/kg	0.14

Moisture Our Reference: Your Reference Sample Matrix	UNITS ------------- ------------	SE80351-1 Dup CC Soil	SE80351-2 Dup II Soil	SE80351-3 Dup JJ Soil
Date Analysed (moisture)		5/08/2010	5/08/2010	5/08/2010
Moisture	%	12	10	12

Method ID	Methodology Summary
SEO-018	BTEX / C6-C9 Hydrocarbons - Soil samples are extracted with methanol, purged and concentrated by a purge and trap apparatus, and then analysed using GC/MS technique. Water samples undergo the same analysis without the extraction step. Based on USEPA 5030B and 8260B.
SEO-020	Total Recoverable Hydrocarbons - determined by solvent extraction with dichloromethane / acetone for soils and dichloromethane for waters, followed by instrumentation analysis using GC/FID. Where applicable Solid Phase Extraction Manifold technique is used for aliphatic / aromatic fractionation.
SEO-030	Polynuclear Aromatic Hydrocarbons - determined by solvent extraction with dichloromethane / acetone for soils and dichloromethane for waters, followed by instrumentation analysis using GC/MS SIM mode.
SEO-005	OC/OP/PCB - Determination of a suite of Organchlorine Pesticides, Chlorinated Organo-phosphorus Pesticides and Polychlorinated Biphenyls (PCB's) by liquid-liquid extraction using dichloromethane for waters, or mechanical extraction using acetone / hexane for soils, followed by instrumentation analysis using GC/ECD. Based on USEPA 8081/8082.
AN420	Semi-Volatile Organic Compounds (SVOCs) including OC, OP, PCB, Herbicides, PAH, Phthalates, and Speciated Phenols in soils, sediments and waters are determined by GCMS/ECD/FID technique following appropriate solvent extraction process (Based on USEPA 3500C and 8270D).
SEM-010	Determination of elements by ICP-OES following appropriate sample preparation / digestion process. Based on USEPA 6010C / APHA 21st Edition, 3120B.
SEM-005	Mercury - determined by Cold-Vapour AAS following appropriate sample preparation or digestion process. Based on APHA 21st Edition, 3112B.
AN002	Preparation of soils, sediments and sludges undergo analysis by either air drying, compositing, subsampling and 1:5 soil water extraction where required. Moisture content is determined by drying the sample at 105 ± 5°C.

QUALITY CONTROL MBTEX in Soil	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Date Extracted (MBTEX)				05/08/10	[NT]	[NT]	LCS	05/08/10
Date Analysed (MBTEX)				05/08/10	[NT]	[NT]	LCS	05/08/10
Methyl-tert-butyl ether (MtBE)	mg/kg	0.1	SEO-018	<0.1	[NT]	[NT]	LCS	105%
Benzene	mg/kg	0.1	SEO-018	<0.1	[NT]	[NT]	LCS	101%
Toluene	mg/kg	0.1	SEO-018	<0.1	[NT]	[NT]	LCS	105%
Ethylbenzene	mg/kg	0.1	SEO-018	<0.1	[NT]	[NT]	LCS	104%
Total Xylenes	mg/kg	0.3	SEO-018	<0.3	[NT]	[NT]	LCS	110%
BTEX Surrogate (%)	%	0	SEO-018	127	[NT]	[NT]	LCS	123%

QUALITY CONTROL TRH in soil with C6-C9 by P/T	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Date Extracted (TRH C6-C9 PT)				05/08/10	[NT]	[NT]	LCS	05/08/10
Date Analysed (TRH C6-C9 PT)				05/08/10	[NT]	[NT]	LCS	05/08/10
TRH C_6 - C_9 P&T	mg/kg	20	SEO-018	<20	[NT]	[NT]	LCS	119%
Date Extracted (TRH C10-C36)				05/08/10	[NT]	[NT]	LCS	05/08/10
Date Analysed (TRH C10-C36)				06/08/10	[NT]	[NT]	LCS	06/08/10
TRH C_{10} - C_{14}	mg/kg	20	SEO-020	<20	[NT]	[NT]	LCS	112%
TRH C_{15} - C_{28}	mg/kg	50	SEO-020	<50	[NT]	[NT]	LCS	114%
TRH C_{29} - C_{36}	mg/kg	50	SEO-020	<50	[NT]	[NT]	LCS	95%

QUALITY CONTROL PAHs in Soil	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Date Extracted				5/08/2010	[NT]	[NT]	LCS	5/08/2010
Date Analysed				5/08/2010	[NT]	[NT]	LCS	5/08/2010
Naphthalene	mg/kg	0.1	SEO-030	<0.10	[NT]	[NT]	LCS	108%
2-Methylnaphthalene	mg/kg	0.1	SEO-030	<0.10	[NT]	[NT]	[NR]	[NR]
1-Methylnaphthalene	mg/kg	0.1	SEO-030	<0.10	[NT]	[NT]	[NR]	[NR]
Acenaphthylene	mg/kg	0.1	SEO-030	<0.10	[NT]	[NT]	LCS	112%
Acenaphthene	mg/kg	0.1	SEO-030	<0.10	[NT]	[NT]	LCS	128%
Fluorene	mg/kg	0.1	SEO-030	<0.10	[NT]	[NT]	[NR]	[NR]
Phenanthrene	mg/kg	0.1	SEO-030	<0.10	[NT]	[NT]	LCS	114%
Anthracene	mg/kg	0.1	SEO-030	<0.10	[NT]	[NT]	LCS	125%
Fluoranthene	mg/kg	0.1	SEO-030	<0.10	[NT]	[NT]	LCS	124%
Pyrene	mg/kg	0.1	SEO-030	<0.10	[NT]	[NT]	LCS	121%
Benzo[*a*]anthracene	mg/kg	0.1	SEO-030	<0.10	[NT]	[NT]	[NR]	[NR]
Chrysene	mg/kg	0.1	SEO-030	<0.10	[NT]	[NT]	[NR]	[NR]
Benzo[*b,k*]fluoranthene	mg/kg	0.2	SEO-030	<0.20	[NT]	[NT]	[NR]	[NR]
Benzo[*a*]pyrene	mg/kg	0.05	SEO-030	<0.05	[NT]	[NT]	LCS	127%
Indeno[*123-cd*]pyrene	mg/kg	0.1	SEO-030	<0.10	[NT]	[NT]	[NR]	[NR]
Dibenzo[*ah*]anthracene	mg/kg	0.1	SEO-030	<0.10	[NT]	[NT]	[NR]	[NR]
Benzo[*ghi*]perylene	mg/kg	0.1	SEO-030	<0.10	[NT]	[NT]	[NR]	[NR]
Total PAHs (sum)	mg/kg	1.75	SEO-030	<1.7	[NT]	[NT]	[NR]	[NR]
Nitrobenzene-d5	%	0	SEO-030	102	[NT]	[NT]	LCS	74%
2-Fluorobiphenyl	%	0	SEO-030	99	[NT]	[NT]	LCS	72%
p -Terphenyl-*d* 14	%	0	SEO-030	104	[NT]	[NT]	LCS	75%

QUALITY CONTROL OC Pesticides in Soil	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Date Extracted				5/08/2010	[NT]	[NT]	LCS	5/08/2010
Date Analysed				5/08/2010	[NT]	[NT]	LCS	5/08/2010
HCB	mg/kg	0.1	SEO-005	<0.1	[NT]	[NT]	[NR]	[NR]
alpha-BHC	mg/kg	0.1	SEO-005	<0.1	[NT]	[NT]	[NR]	[NR]
gamma-BHC (Lindane)	mg/kg	0.1	SEO-005	<0.1	[NT]	[NT]	[NR]	[NR]
Heptachlor	mg/kg	0.1	SEO-005	<0.1	[NT]	[NT]	LCS	118%
Aldrin	mg/kg	0.1	SEO-005	<0.1	[NT]	[NT]	LCS	106%
beta-BHC	mg/kg	0.1	SEO-005	<0.1	[NT]	[NT]	[NR]	[NR]
delta-BHC	mg/kg	0.1	SEO-005	<0.1	[NT]	[NT]	LCS	92%
Heptachlor Epoxide	mg/kg	0.1	SEO-005	<0.1	[NT]	[NT]	[NR]	[NR]
o,p-DDE	mg/kg	0.1	SEO-005	<0.1	[NT]	[NT]	[NR]	[NR]
alpha-Endosulfan	mg/kg	0.1	SEO-005	<0.1	[NT]	[NT]	[NR]	[NR]
trans-Chlordane *(gamma)*	mg/kg	0.1	SEO-005	<0.1	[NT]	[NT]	[NR]	[NR]
cis-Chlordane *(alpha)*	mg/kg	0.1	SEO-005	<0.1	[NT]	[NT]	[NR]	[NR]
trans-Nonachlor	mg/kg	0.1	SEO-005	<0.1	[NT]	[NT]	[NR]	[NR]
p,p-DDE	mg/kg	0.1	SEO-005	<0.1	[NT]	[NT]	[NR]	[NR]
Dieldrin	mg/kg	0.1	SEO-005	<0.1	[NT]	[NT]	LCS	114%
Endrin	mg/kg	0.1	SEO-005	<0.1	[NT]	[NT]	LCS	120%
o,p-DDD	mg/kg	0.1	SEO-005	<0.1	[NT]	[NT]	[NR]	[NR]
o,p-DDT	mg/kg	0.1	SEO-005	<0.1	[NT]	[NT]	[NR]	[NR]
beta-Endosulfan	mg/kg	0.1	SEO-005	<0.1	[NT]	[NT]	[NR]	[NR]
p,p-DDD	mg/kg	0.1	SEO-005	<0.1	[NT]	[NT]	[NR]	[NR]
p,p-DDT	mg/kg	0.1	SEO-005	<0.1	[NT]	[NT]	LCS	115%
Endosulfan Sulphate	mg/kg	0.1	SEO-005	<0.1	[NT]	[NT]	[NR]	[NR]
Endrin Aldehyde	mg/kg	0.1	SEO-005	<0.1	[NT]	[NT]	[NR]	[NR]
Methoxychlor	mg/kg	0.1	SEO-005	<0.1	[NT]	[NT]	[NR]	[NR]
Endrin Ketone	mg/kg	0.1	SEO-005	<0.1	[NT]	[NT]	[NR]	[NR]
2,4,5,6-Tetrachloro-m-xylene *(Surrogate*	%	0	SEO-005	107	[NT]	[NT]	LCS	91%

QUALITY CONTROL OP Pesticides in Soil by GCMS	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Date Extracted				05/08/10	[NT]	[NT]	LCS	05/08/10
Date Analysed				05/08/10	[NT]	[NT]	LCS	05/08/10
Dichlorvos	mg/kg	1	AN420	<1	[NT]	[NT]	LCS	108%
Dimethoate	mg/kg	1	AN420	<1	[NT]	[NT]	[NR]	[NR]
Diazinon	mg/kg	0.5	AN420	<0.5	[NT]	[NT]	LCS	80%
Fenitrothion	mg/kg	0.2	AN420	<0.2	[NT]	[NT]	[NR]	[NR]
Malathion	mg/kg	0.2	AN420	<0.20	[NT]	[NT]	[NR]	[NR]
Chlorpyrifos-ethyl	mg/kg	0.2	AN420	<0.2	[NT]	[NT]	LCS	95%
Parathion-ethyl	mg/kg	0.2	AN420	<0.2	[NT]	[NT]	[NR]	[NR]
Bromofos-ethyl	mg/kg	0.2	AN420	<0.2	[NT]	[NT]	[NR]	[NR]
Methidathion	mg/kg	0.5	AN420	<0.5	[NT]	[NT]	[NR]	[NR]
Ethion	mg/kg	0.2	AN420	<0.2	[NT]	[NT]	LCS	71%
Azinphos-methyl	mg/kg	0.2	AN420	<0.20	[NT]	[NT]	[NR]	[NR]
2-fluorobiphenyl (Surr)	%	0	AN420	81	[NT]	[NT]	LCS	79%
d14-p-Terphenyl (Surr)	%	0	AN420	79	[NT]	[NT]	LCS	83%

QUALITY CONTROL PCBs in Soil	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Date Extracted				05/08/10	[NT]	[NT]	LCS	5/08/2010
Date Analysed				05/08/10	[NT]	[NT]	LCS	5/08/2010
Arochlor 1016	mg/kg	0.1	SEO-005	<0.1	[NT]	[NT]	[NR]	[NR]
Arochlor 1221	mg/kg	0.1	SEO-005	<0.1	[NT]	[NT]	[NR]	[NR]
Arochlor 1232	mg/kg	0.1	SEO-005	<0.1	[NT]	[NT]	[NR]	[NR]
Arochlor 1242	mg/kg	0.1	SEO-005	<0.1	[NT]	[NT]	[NR]	[NR]
Arochlor 1248	mg/kg	0.1	SEO-005	<0.1	[NT]	[NT]	[NR]	[NR]
Arochlor 1254	mg/kg	0.1	SEO-005	<0.1	[NT]	[NT]	[NR]	[NR]
Arochlor 1260	mg/kg	0.1	SEO-005	<0.1	[NT]	[NT]	LCS	118%
Arochlor 1262	mg/kg	0.1	SEO-005	<0.1	[NT]	[NT]	[NR]	[NR]
Arochlor 1268	mg/kg	0.1	SEO-005	<0.1	[NT]	[NT]	[NR]	[NR]
Total Positive PCB	mg/kg	0.9	SEO-005	<0.90	[NT]	[NT]	[NR]	[NR]
PCB_Surrogate 1	%	0	SEO-005	107	[NT]	[NT]	LCS	104%

QUALITY CONTROL Metals in Soil by ICP-OES	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Date Extracted (Metals)				6/08/2010	[NT]	[NT]	LCS	6/08/2010
Date Analysed (Metals)				6/08/2010	[NT]	[NT]	LCS	6/08/2010
Arsenic	mg/kg	3	SEM-010	<3	[NT]	[NT]	LCS	103%
Cadmium	mg/kg	0.3	SEM-010	<0.3	[NT]	[NT]	LCS	104%
Chromium	mg/kg	0.3	SEM-010	<0.3	[NT]	[NT]	LCS	104%
Copper	mg/kg	0.5	SEM-010	<0.5	[NT]	[NT]	LCS	103%
Lead	mg/kg	1	SEM-010	<1	[NT]	[NT]	LCS	103%
Nickel	mg/kg	0.5	SEM-010	<0.5	[NT]	[NT]	LCS	104%
Zinc	mg/kg	0.5	SEM-010	<0.5	[NT]	[NT]	LCS	103%

QUALITY CONTROL Mercury Cold Vapor/Hg Analyser	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Date Extracted (Mercury)				6/08/2010	[NT]	[NT]	LCS	6/08/2010
Date Analysed (Mercury)				6/08/2010	[NT]	[NT]	LCS	6/08/2010
Mercury	mg/kg	0.05	SEM-005	<0.05	[NT]	[NT]	LCS	100%

QUALITY CONTROL Moisture	UNITS	LOR	METHOD	Blank
Date Analysed (moisture)				[NT]
Moisture	%	1	AN002	<1

Result Codes

[INS]	:	Insufficient Sample for this test	[RPD]	:	Relative Percentage Difference
[NR]	:	Not Requested	*	:	Not part of NATA Accreditation
[NT]	:	Not tested	[N/A]	:	Not Applicable
[LOR]	:	Limit of reporting			

Report Comments

Samples analysed as received. Solid samples expressed on a dry weight basis.
Date Organics extraction commenced:
NATA Corporate Accreditation No. 2562, Site No 4354
Note: Test results are not corrected for recovery (excluding Air-toxics and Dioxins/Furans*)
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Quality Control Protocol

Method Blank: An analyte free matrix to which all reagents are added in the same volume or proportions as used in sample processing. The method blank should be carried through the complete sample preparation and analytical procedure. A method blank is prepared every 20 samples.
Duplicate: A separate portion of a sample being analysed that is treated the same as the other samples in the batch. One duplicate is processed at least every 10 samples.
Surrogate Spike: An organic compound which is similar to the target analyte(s) in chemical composition and behavior in the analytical process, but which is not normally found in environmental samples. Surrogates are added to samples before extraction to monitor extraction efficiency and percent recovery in each sample.
Internal Standard: Added to all samples requiring analysis for organics (where relevant) or metals by ICP after the extraction/digestion process; the compounds/elements serve to give a standard of retention time and/or response, which is invariant from run-to-run with the instruments.
Laboratory Control Sample: A known matrix spiked with compound(s) representative of the target analytes. It is used to document laboratory performance. When the results of the matrix spike analysis indicates a potential problem due to the sample matrix itself, the LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.
Matrix Spike: An aliquot of sample spiked with a known concentration of target analyte(s). The spiking occurs prior to sample preparation and analysis. A matrix spike is used to document the bias of a method in a given sample matrix.

Quality Acceptance Criteria

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.au.sgs.com/sgs-mp-au-env-qu-022-qa-qc-plan-en-09.pdf

SAMPLE RECEIPT ADVICE (SRA)

4 August 2010

Client Details

Requested By : **Brendan Page**
Client : Jeffery and Katauskas Pty Ltd
Contact : Brendan Page
Address : 115 Wicks Road
Macquarie Park
North Ryde BC NSW 1670

Email : eis@jkgroup.net.au
Telephone : 02 9888 5000
Facsimile : 02 9888 5001

Project : E23982K - Proposed Redevelopment - Pyrmont
Order Number :
Samples : 3 Soils

Laboratory Details

Laboratory : SGS Environmental Services
Manager : Edward Ibrahim

Address : Unit 16, 33 Maddox Street
Alexandria NSW 2015

Email : au.samplereceipt.sydney@sgs.com
Telephone : 61 2 8594 0400
Facsimile : 61 2 8594 0499

Report No : **SE80351**
No. of Samples : 3
Due Date : 10/08/2010

Date Instructions Received : 3/08/2010
Sample Receipt Date : 3/08/2010

Samples received in good order : YES
Samples received without headspace : YES
Upon receipt sample temperature : Cool
Sample containers provided by : Other Lab
Turnaround time requested : Standard

Samples received in correct container : YES
Sufficient quantity supplied : YES
Cooling Method : Ice Pack
Samples clearly Labelled : YES
Completed documentation received : YES

Samples will be held for 1 month for water samples and 3 months for soil samples from date of receipt of samples, unless otherwise instructed.

Comments

To the extent not inconsistent with the other provisions of this document and unless specifically agreed otherwise in writing by SGS, all SGS services are rendered in accordance with the applicable SGS General Conditions of Service accessible at http://www.sgs.com/terms_and_conditions.htm as at the date of this document. Attention is drawn to the limitations of liablility and to the clauses of indemnification.

The signed chain of custody will be returned to you with the original report.

SAMPLE RECEIPT ADVICE (SRA) - continued

Client : Jeffery and Katauskas Pty Ltd
Report No : SE80351
Project : E23982K - Proposed Redevelopment - Pyrmont

Summary of Samples and Requested Analysis

The table below represents SGS Environmental Service's understanding and interpretation of the customer supplied sample request.

Please indicate ASAP if your request differs from these details.

Testing shall commence immediately as per this table, unless the customer intervenes with a correction prior to testing.

Note that a small X in the table below indicates some testing has not been requested in the package.

Sample No.	Description	Metals Prep, soil 8 HM	MBTEX in Soil	TRH in soil with C6-C9 by P/T	PAHs in Soil	OC Pesticides in Soil	OP Pesticides in Soil by GCMS	PCBs in Soil	Metals in Soil by ICP-OES	Mercury Cold Vapor/Hg Analyser	Moisture
1	Dup CC	x			X				x		X
2	Dup II	X	X	X	X	X	X	X	X	X	X
3	Dup JJ		X	X							X

Sample No.	Description
1	Dup CC
2	Dup II
3	Dup JJ

SAMPLE AND CHAIN OF CUSTODY FORM

TO:
Envirolab Services Pty Ltd
12 Ashley Street
Chatswood NSW 2067
Phone: (02) 99106200
Fax: (02) 99106201

Attention: Aileen

EIS Job Number: E23982K

Date Results Required: Standard

Sheet 3 / 3

FROM:
Environmental Investigation Services
Rear 115 Wicks Road
Macquarie Park NSW 2113

Phone: (02) 9888 5000
Fax: (02) 9888 5004

Contact: Brendan Page

Project: Proposed Redevelopment
Location: Pyrmont
Sampler: BP

Sample Preservation:
In esky on ice

								Tests Required										
	Date Sampled	Lab Ref:	Borehole/ Sample Number	Depth (m)	Sample Container	PID	Sample Description	Heavy Metals (8)	TPH/BTEX	PAH	OC/OP/ PCB	Asbestos	TCLP Prep + M6, PAH	Phenols	VOC	sVOC	sPOCAS	Arsenic	BTEX
	30/7/10		BH715	0.21/0.5	Glass jar + Asb Bag	1.3	F												
				0.6/0.95	Glass jar + Asb Bag	0	F	X	X	X	X	X							
				1.5/1.95	Glass jar + Asb Bag	1.6	F		X										
			↓	3.1/3.45	Glass jar + Asb Bag	0	N												
			BH716	0.5/0.8	Glass jar + Asb Bag	0	F		X										
				1.7/1.95	Glass jar + Asb Bag	0.8	F	X	X	X	X	X							
	↓		↓	3.0/3.35	Glass jar + Asb Bag	1.1	N.												
	–		Dup AA		Glass jar + ~~Asb Bag~~		Soil			X								X	
	–		Dup BB		Glass jar + ~~Asb Bag~~					X								X	
1	–		Dup CC*		Glass jar + ~~Asb Bag~~					X								X	
	–		Dup DD		Glass jar + ~~Asb Bag~~														
	–		Dup EE		Glass jar + ~~Asb Bag~~				X										
	–		Dup FF		Glass jar + ~~Asb Bag~~														
	–		Dup HH		Glass jar + ~~Asb Bag~~				X										
2	–		Dup II*		Glass jar + ~~Asb Bag~~			X	X	X	X								
3	–		Dup JJ*		Glass jar + ~~Asb Bag~~		↓		X										
	29/7/10		FB 1A		Glass jar + ~~Asb Bag~~		Sand												X
			Rinsate 1A		1L Amber 1 vial		Water		X										
	↓		T spike 1A		Glass jar + ~~Asb Bag~~		Sand spike												X
	30/7/10		FB 2A		Glass jar + ~~Asb Bag~~		Sand												X
			Rinsate 2A		1L Amber 1 vial		Water		X										
	↓		T spike 2A		Glass jar + ~~Asb Bag~~		Sand spike												X
			Dup KK		Glass jar + ~~Asb Bag~~			X	X	X	X								
					Glass jar + Asb Bag														
					Glass jar + Asb Bag														

SGS
3/8/10
Received By CP
Time 145
Samples intact O
Ice/Cooler Pack O
Temperature on Receipt 5
Storage Location 5586
SGS Ref SE80351

Remarks (comments/detection limits required): * Please send to SGS as inter-lab dups. Cheers.

Relinquished By:	Date: 2/8/10 Time: 10:30am	Received By: CP 2/8/10 145pm	Relinquished By:	Date: Time:	Received By:

ANALYTICAL REPORT

13 August 2010

Jeffery and Katauskas Pty Ltd
115 Wicks Road
Macquarie Park
North Ryde BC
NSW 1670

Attention: **Brendan Page**

Your Reference: E23982K - Proposed Redevelopment - Pyrmont

Our Reference:	SE80464	Samples:	1 Water
		Received:	6/08/2010

Preliminary Report Sent: Not Issued

These samples were analysed in accordance with your written instructions.

For and on Behalf of:
SGS ENVIRONMENTAL SERVICES

Sample Receipt:	Angela Mamalicos	AU.SampleReceipt.Sydney@sgs.com
Production Manager:	Huong Crawford	Huong.Crawford@sgs.com

Results Approved and/or Authorised by:

Dong Liang
Quality Manager

Ly Kim Ha
Organics Signatory

MBTEX in Water (µg/L) Our Reference: Your Reference Sample Matrix Date Sampled	UNITS ------------- ------------	SE80464-1 GWDUPAA Water 5/08/2010
Date Extracted (MBTEX)		11/08/2010
Date Analysed (MBTEX)		11/08/2010
Methyl-tert-butyl ether (MtBE)	µg/L	<1
Benzene	µg/L	<0.5
Toluene	µg/L	<0.5
Ethylbenzene	µg/L	<0.5
Total Xylenes	µg/L	<1.5
Surrogate	%	98

TRH in water with C6-C9 by P/T		
Our Reference:	UNITS	SE80464-1
Your Reference	-------------	GWDUPAA
Sample Matrix	------------	Water
Date Sampled		5/08/2010
Date Extracted (TRH C6-C9 PT)		11/08/2010
Date Analysed (TRH C6-C9 PT)		11/08/2010
TRH C_{6} - C_{9} P&T in µg/L	µg/L	40
Date Extracted (TRH C10-C36)		11/08/2010
Date Analysed (TRH C10-C36)		11/08/2010
TRH C_{10} - C_{14}	µg/L	243
TRH C_{15} - C_{28}	µg/L	<200
TRH C_{29} - C_{36}	µg/L	<200

PAHs in Water-Low Level Our Reference: Your Reference Sample Matrix Date Sampled	UNITS ------------- ------------	SE80464-1 GWDUPAA Water 5/08/2010
Date Extracted		11/08/2010
Date Analysed		12/08/2010
Naphthalene	µg/L	0.1
Acenaphthylene	µg/L	<0.1
Acenaphthene	µg/L	0.3
Fluorene	µg/L	0.4
Phenanthrene	µg/L	0.6
Anthracene	µg/L	0.1
Fluoranthene	µg/L	0.3
Pyrene	µg/L	0.2
Benzo[*a*]anthracene	µg/L	<0.1
Chrysene	µg/L	<0.1
Benzo*[b,k*]fluoranthene	µg/L	<0.2
Benzo[*a*]pyrene	µg/L	<0.1
Indeno[*123-cd*]pyrene	µg/L	<0.1
Dibenzo[*ah*]anthracene	µg/L	<0.1
Benzo[*ghi*]perylene	µg/L	<0.1
1-Methylnaphthalene	µg/L	0.4
2-Methylnaphthalene	µg/L	0.1
Total PAHs (sum)	µg/L	<3.53
p -Terphenyl-*d14*	%	74
Nitrobenzene-d5	%	73
2-Fluorobiphenyl	%	90

Inorganics Our Reference: Your Reference Sample Matrix Date Sampled	UNITS ------------- ------------	SE80464-1 GWDUPAA Water 5/08/2010
Date Extracted (Oil & Grease)		13/08/2010
Date Analysed (Oil & Grease)		13/08/2010
Oil & Grease gravimetric	mg/L	11

Method ID	Methodology Summary
SEO-018	BTEX / C6-C9 Hydrocarbons - Soil samples are extracted with methanol, purged and concentrated by a purge and trap apparatus, and then analysed using GC/MS technique. Water samples undergo the same analysis without the extraction step. Based on USEPA 5030B and 8260B.
SEO-020	Total Recoverable Hydrocarbons - determined by solvent extraction with dichloromethane / acetone for soils and dichloromethane for waters, followed by instrumentation analysis using GC/FID. Where applicable Solid Phase Extraction Manifold technique is used for aliphatic / aromatic fractionation.
SEO-030	Polynuclear Aromatic Hydrocarbons - determined by solvent extraction with dichloromethane / acetone for soils and dichloromethane for waters, followed by instrumentation analysis using GC/MS SIM mode.
SEI-025	Oil & Grease - determined by liquid-liquid extraction with n-hexane, and then gravimetric measurement of the oil & grease residue, based on APHA 21st Edition, 5520B.

QUALITY CONTROL MBTEX in Water (µg/L)	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Date Extracted (MBTEX)				11/08/10	[NT]	[NT]	LCS	11/08/10
Date Analysed (MBTEX)				11/08/10	[NT]	[NT]	LCS	11/08/10
Methyl-tert-butyl ether (MtBE)	µg/L	1	SEO-018	<1	[NT]	[NT]	LCS	106%
Benzene	µg/L	0.5	SEO-018	<0.5	[NT]	[NT]	LCS	103%
Toluene	µg/L	0.5	SEO-018	<0.5	[NT]	[NT]	LCS	104%
Ethylbenzene	µg/L	0.5	SEO-018	<0.5	[NT]	[NT]	LCS	104%
Total Xylenes	µg/L	1.5	SEO-018	<1.5	[NT]	[NT]	LCS	103%
Surrogate	%	0	SEO-018	75	[NT]	[NT]	LCS	72%

QUALITY CONTROL TRH in water with C6-C9 by P/T	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Date Extracted (TRH C6-C9 PT)				11/08/10	[NT]	[NT]	LCS	11/08/10
Date Analysed (TRH C6-C9 PT)				11/08/10	[NT]	[NT]	LCS	11/08/10
TRH C_6 - C_9 P&T in µg/L	µg/L	40	SEO-018	<40	[NT]	[NT]	LCS	102%
Date Extracted (TRH C10-C36)				11/08/2010	[NT]	[NT]	LCS	11/08/2010
Date Analysed (TRH C10-C36)				11/08/2010	[NT]	[NT]	LCS	11/08/2010
TRH C_{10} - C_{14}	µg/L	100	SEO-020	<100	[NT]	[NT]	LCS	89%
TRH C_{15} - C_{28}	µg/L	200	SEO-020	<200	[NT]	[NT]	LCS	79%
TRH C_{29} - C_{36}	µg/L	200	SEO-020	<200	[NT]	[NT]	LCS	72%

QUALITY CONTROL PAHs in Water-Low Level	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Date Extracted				11/08/2010	[NT]	[NT]	LCS	11/08/2010
Date Analysed				12/08/2010	[NT]	[NT]	LCS	12/08/2010
Naphthalene	µg/L	0.1	SEO-030	<0.1	[NT]	[NT]	LCS	74%
Acenaphthylene	µg/L	0.1	SEO-030	<0.1	[NT]	[NT]	LCS	84%
Acenaphthene	µg/L	0.1	SEO-030	<0.1	[NT]	[NT]	LCS	89%
Fluorene	µg/L	0.1	SEO-030	<0.1	[NT]	[NT]	[NR]	[NR]
Phenanthrene	µg/L	0.1	SEO-030	<0.1	[NT]	[NT]	LCS	81%
Anthracene	µg/L	0.1	SEO-030	<0.1	[NT]	[NT]	LCS	92%
Fluoranthene	µg/L	0.1	SEO-030	<0.1	[NT]	[NT]	LCS	100%
Pyrene	µg/L	0.1	SEO-030	<0.1	[NT]	[NT]	LCS	99%
Benzo[*a*]anthracene	µg/L	0.1	SEO-030	<0.1	[NT]	[NT]	[NR]	[NR]
Chrysene	µg/L	0.1	SEO-030	<0.1	[NT]	[NT]	[NR]	[NR]
Benzo[*b,k*]fluoranthene	µg/L	0.2	SEO-030	<0.2	[NT]	[NT]	[NR]	[NR]
Benzo[*a*]pyrene	µg/L	0.1	SEO-030	<0.1	[NT]	[NT]	LCS	92%
Indeno[*123-cd*]pyrene	µg/L	0.1	SEO-030	<0.1	[NT]	[NT]	[NR]	[NR]
Dibenzo[*ah*]anthracene	µg/L	0.1	SEO-030	<0.1	[NT]	[NT]	[NR]	[NR]
Benzo[*ghi*]perylene	µg/L	0.1	SEO-030	<0.1	[NT]	[NT]	[NR]	[NR]
1-Methylnaphthalene	µg/L	0.1	SEO-030	<0.1	[NT]	[NT]	[NR]	[NR]
2-Methylnaphthalene	µg/L	0.1	SEO-030	<0.1	[NT]	[NT]	[NR]	[NR]
Total PAHs (sum)	µg/L	1.8	SEO-030	<2	[NT]	[NT]	[NR]	[NR]
p -Terphenyl-*d* 14	%	0	SEO-030	104	[NT]	[NT]	LCS	81%
Nitrobenzene-d5	%	0	SEO-030	98	[NT]	[NT]	LCS	76%
2-Fluorobiphenyl	%	0	SEO-030	107	[NT]	[NT]	LCS	92%

QUALITY CONTROL Inorganics	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Date Extracted (Oil & Grease)				13/08/2010	[NT]	[NT]	LCS	13/08/2010
Date Analysed (Oil & Grease)				13/08/2010	[NT]	[NT]	LCS	13/08/2010
Oil & Grease gravimetric	mg/L	5	SEI-025	<5	[NT]	[NT]	LCS	87%

Result Codes

[INS] :	Insufficient Sample for this test	[RPD] :	Relative Percentage Difference
[NR] :	Not Requested	* :	Not part of NATA Accreditation
[NT] :	Not tested	[N/A] :	Not Applicable
[LOR] :	Limit of reporting		

Report Comments

Samples analysed as received. Solid samples expressed on a dry weight basis.
Date Organics extraction commenced:
NATA Corporate Accreditation No. 2562, Site No 4354
Note: Test results are not corrected for recovery (excluding Air-toxics and Dioxins/Furans*)
This document is issued by the Company subject to its General Conditions of Service (www.sgs.com/terms_and_conditions.htm). Attention is drawn to the limitations of liability, indemnification and jurisdictional issues established therein.

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Quality Control Protocol

Method Blank: An analyte free matrix to which all reagents are added in the same volume or proportions as used in sample processing. The method blank should be carried through the complete sample preparation and analytical procedure. A method blank is prepared every 20 samples.
Duplicate: A separate portion of a sample being analysed that is treated the same as the other samples in the batch. One duplicate is processed at least every 10 samples.
Surrogate Spike: An organic compound which is similar to the target analyte(s) in chemical composition and behavior in the analytical process, but which is not normally found in environmental samples. Surrogates are added to samples before extraction to monitor extraction efficiency and percent recovery in each sample.
Internal Standard: Added to all samples requiring analysis for organics (where relevant) or metals by ICP after the extraction/digestion process; the compounds/elements serve to give a standard of retention time and/or response, which is invariant from run-to-run with the instruments.
Laboratory Control Sample: A known matrix spiked with compound(s) representative of the target analytes. It is used to document laboratory performance. When the results of the matrix spike analysis indicates a potential problem due to the sample matrix itself, the LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.
Matrix Spike: An aliquot of sample spiked with a known concentration of target analyte(s). The spiking occurs prior to sample preparation and analysis. A matrix spike is used to document the bias of a method in a given sample matrix.

Quality Acceptance Criteria

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.au.sgs.com/sgs-mp-au-env-qu-022-qa-qc-plan-en-09.pdf

SAMPLE RECEIPT ADVICE (SRA)

9 August 2010

Client Details			**Laboratory Details**		
Requested By	:	**Brendan Page**			
Client	:	Jeffery and Katauskas Pty Ltd	Laboratory	:	SGS Environmental Services
Contact	:	Brendan Page	Manager	:	Edward Ibrahim
Address	:	115 Wicks Road Macquarie Park North Ryde BC NSW 1670	Address	:	Unit 16, 33 Maddox Street Alexandria NSW 2015
Email	:	eis@jkgroup.net.au	Email	:	au.samplereceipt.sydney@sgs.com
Telephone	:	02 9888 5000	Telephone	:	61 2 8594 0400
Facsimile	:	02 9888 5001	Facsimile	:	61 2 8594 0499
Project	:	E23982K - Proposed Redevelopment - Pyrmont	Report No	:	**SE80464**
Order Number	:		No. of Samples	:	1
Samples	:	1 Water	Due Date	:	13/08/2010

Date Instructions Received : 6/08/2010
Sample Receipt Date : 6/08/2010

Samples received in good order	:	YES	Samples received in correct containers	:	YES
Samples received without headspace	:	YES	Sufficient quantity supplied	:	YES
Upon receipt sample temperature	:	Cool	Cooling Method	:	Ice Pack
Sample containers provided by	:	Other Lab	Samples clearly Labelled	:	YES
Turnaround time requested	:	Standard	Completed documentation received	:	YES

Samples will be held for 1 month for water samples and 3 months for soil samples from date of receipt of samples, unless otherwise instructed.

Comments

To the extent not inconsistent with the other provisions of this document and unless specifically agreed otherwise in writing by SGS, all SGS services are rendered in accordance with the applicable SGS General Conditions of Service accessible at http://www.sgs.com/terms_and_conditions.htm as at the date of this document. Attention is drawn to the limitations of liablility and to the clauses of indemnification.

The signed chain of custody will be returned to you with the original report.

SAMPLE RECEIPT ADVICE (SRA) - continued

Client	:	Jeffery and Katauskas Pty Ltd	Report No	:	SE80464
Project	:	E23982K - Proposed Redevelopment - Pyrmont			

Summary of Samples and Requested Analysis

The table below represents SGS Environmental Service's understanding and interpretation of the customer supplied sample request.

Please indicate ASAP if your request differs from these details.

Testing shall commence immediately as per this table, unless the customer intervenes with a correction prior to testing.

Note that a small X in the table below indicates some testing has not been requested in the package.

Sample No.	Description	No Prep Required	MBTEX in Water (µg/L)	TRH in water with C6-C9 by P/T	PAHs in Water-Low Level	Inorganics
1	GWDUPAA	X	X	X	X	X

Sample No.	Description
1	GWDUPAA

TO:
Envirolab Services Pty Ltd
12 Ashley St, Chatswood 2067

Phone: (02) 9910 6200
Fax: (02) 9910 6201

Attention: Aileen

Date Results Required:

SAMPLE AND CHAIN OF CUSTODY FORM

EIS Job Number: E23982K

Sheet 1 / 2

FROM:
Environmental Investigation Services

Rear 115 Wicks Road
Macquarie Park NSW 2113

Phone: (02) 9888 5000
Fax: (02) 9888 5004

Contact: Brendan Page

Project: Proposed Redevelopment
Location: Pyrmont
Sampler: BP

Sample Preservation:
In esky on ice

Tests Required

Date Sampled	Time Sampled	Location	Sample/ Borehole Number	Sample Container	PID (ppm/ Odour)	Sample Description		TPH/BTEX	Oil & Grease		PAHs (low level)		pH / EC	BTEX		Comments/Detection Limits Required
6-8-10	pm		MW517	3 x 1L Amber Bottle 2x BTEX Vials 1 x HDPE Plastic Bottle 1 x ½L Amber	–	Water		X	X		X		X			
5/8/10	Am		MW708	3x 1L Amber Bottle 2x BTEX Vials 1 x HDPE Plastic Bottle 1 x ½L Amber	–	Water		X	X		X		X			SGS
6/8/10	Pm		MW712	3 x 1L Amber Bottle 2x BTEX Vials 1 x HDPE Plastic Bottle 1 x ½L Amber	–	Water		X	X		X		X			Received 6/8/10 By CP Time 320
6/8/10	Pm		MW713	x 1L Amber Bottle 2x BTEX Vials x HDPE Plastic Bottle	–	Water		X	X		X		X			Samples intact 8 Ice/Cooler Pack 0 Temperature on Rec 5
6/8/10	–	|	*GWDUPAA	3 x 1L Amber Bottle 2x BTEX Vials 1 x HDPE Plastic Bottle 1 x ½L Amber	–	water		X	X		X					Storage Location WOLLO SGS Ref SE80464
6/8/10	–		GWDUPBB	3 x 1L Amber Bottle 2x BTEX Vials 1 x HDPE Plastic Bottle 1 x ½L Amber	–	water		X	X		X					

Relinquished By: Mike L	Date: 6/8/10. Time:	Received By: Sandy 6/8 3.20
Relinquished By:	Date: 6/8/10 Time: 130pm	Received By:

Remarks:

All analysis PQLs to ANZECC (2000) Detection Limits Please

* Please send to SGS for inter-lab analysis

APPENDIX C

(Sampling Protocols and QA/QC Definitions)

SOIL AND GROUNDWATER SAMPLING PROTOCOLS

These protocols specify the basic procedures to be used when sampling soils or groundwater for environmental site assessments undertaken by EIS. The purpose of these protocols is to provide standard methods for: sampling, decontamination procedures for sampling equipment, sample preservation, sample storage and sample handling. Deviations from these procedures must be recorded.

Soil Sampling

a) Prepare a test pit/borehole log.

b) Layout sampling equipment on clean plastic sheeting to prevent direct contact with ground surface. The work area should be at a distance from the drill/rig excavator such that the drill rig/excavator can operate in a safe manner.

c) Ensure all sampling equipment has been decontaminated prior to use.

d) Remove any surface debris from the immediate area of the sampling location.

e) Collect samples and place in glass jar with a Teflon seal. This should be undertaken as quickly as possibly to prevent the loss of volatiles. If possible, fill the glass jars completely.

f) Collect samples for asbestos analysis and place in a zip-lock plastic bag.

g) Label the jar and/or bag with the EIS job number, sample location (eg. BH1), sampling depth interval and date. If more than one sample container is used, this should also be indicated (eg. 2 = Sample jar 1 of 2 jars).

h) Photoionisation detector (PID) screening of volatile organic compounds (VOCs) should be undertaken on samples using the soil sample headspace method. Headspace measurements are taken following equilibration of the headspace gasses in partly filled zip-lock plastic bags. PID headspace data is recorded on the borehole/test pit log and the chain of custody forms.

i) Record the lithology of the sample and sample depth on the borehole/test pit log in accordance with AS1726-1993[38].

j) Store the sample in a sample container cooled with ice or chill packs. On completion of the sampling the sample container should be delivered to the lab immediately or stored in the refrigerator prior to delivery to the lab. All samples are preserved in accordance with AS 4482.1:2005, AS 4482.2:1999 and AS/NZS 5667.1:1998.

k) Check for the presence of groundwater after completion of each borehole using an electronic dip metre or water whistle. Boreholes should be left open until the end of fieldwork. All groundwater levels in the boreholes should be rechecked on the completion of the fieldwork.

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[38] *Geotechnical Site Investigations*, Standards Australia 1993 (AS1726-1993)

l) Backfill the boreholes/test pits with the excavation cuttings or clean sand prior to leaving the site.

Decontamination Procedures for Soil Sampling Equipment

a) All of the equipment associated with the soil sampling procedure should be decontaminated between every sampling location.

b) The following equipment and materials are required for the decontamination procedure:
   - Phosphate free detergent (Decon 90)
   - Tap water
   - Stiff brushes
   - Plastic sheets

c) Ensure the decontamination materials are clean prior to proceeding with the decontamination.

d) Fill both buckets with clean tap water and add phosphate free detergent to one bucket.

e) In the bucket containing the detergent scrub the sampling equipment until all the material attached to the equipment has been removed.

f) Rinse sampling equipment in the bucket containing tap water.

g) Place cleaned equipment on clean plastic sheets.

If all materials are not removed by this procedure, high-pressure water cleaning is recommended. If any equipment is not completely decontaminated by both these processes that equipment should not be used until it has been thoroughly cleaned.

Groundwater Sampling

Groundwater samples are more sensitive to contamination than soil samples and therefore adhesion to this protocol is particularly important to obtain reliable, reproducible results. The recommendations detailed in AS/NZS 5667.1:1998 are considered to form a minimum standard.

The basis of this protocol is to maintain the security of the borehole and obtain accurate and representative groundwater samples. The following procedure should be used for collection of groundwater samples from previously installed groundwater monitoring wells.

a) After groundwater monitoring wells installation, at least three bore volumes should be pumped from the monitoring wells (well development) to remove any water introduced during the drilling process and/or the water that is disturbed during installation of the groundwater monitoring wells. This should be completed prior to purging and sampling.

b) Groundwater monitoring wells should then be left to recharge for at least three days before purging and sampling. Prior to purging or sampling the condition of each well should observed and any anomalies recorded on the field data sheets. The following information should be noted: the condition of the well, noting any signs of damage, tampering or complete destruction; the condition and operation of the well lock; the condition of the protective casing and the cement footing (raised or cracked); and, the presence of water between protective casing and well.

c) Take the groundwater level from the collar of the piezometer using an electronic dipmeter. The collar level should be taken (if required) during the site visit using a dumpy level and staff.

d) Purging and sampling of piezometers is done on the same site visit when using micro-purge (or low flow) techniques. Layout and organize all equipment associated with groundwater sampling in a location where they will not interfere with the sampling procedure and will not pose a risk of contaminating samples. Equipment generally required includes:

- Micropore filtration system or Stericup single-use filters (for heavy metals samples).
- Filter paper for Micropore filtration system.
- Bucket with volume increments.
- Sample containers: teflon bottles with 1 ml nitric acid, 75mL glass vials with 1 mL hydrochloric acid, 1 L amber glass bottles.
- Bucket with volume increments.
- Flow cell.
- pH/EC/Eh/T meters.
- Plastic drums used for transportation of purged water.
- Esky and ice.
- Nitrile gloves.
- Distilled water (for cleaning).
- Electronic dip meter.
- Micro-purge pump pack and pump head.
- Air and water tubing for Micro-purge.
- Groundwater sampling forms.

e) If single-use stericup filtration is not being used, clean the Micropore filtration system thoroughly with distilled water prior to use and between each sample. Filter paper should be changed between samples. 0.45um filter paper should be placed below the glass fibre filter paper in the filtration system.

f) Ensure all non-disposable sampling equipment is decontaminated or that new disposable equipment is available prior to any work commencing at a new location. The procedure for decontamination of groundwater equipment is outlined at the end of this section.

g) Disposable gloves should be used whenever samples are taken to protect the sampler and to assist in avoidance of contamination.

h) Groundwater samples are obtained from the monitoring wells using low flow/micro-purge sampling equipment to reduce the disturbance of the water column and loss of volatiles.

i) During pumping to purge the well, the pH, temperature, conductivity, dissolved oxygen, redox potential and groundwater levels are monitored (where possible) using calibrated field instruments to assess the development of steady state conditions. Steady state conditions are generally considered to have been achieved when the difference in the pH measurements was less than 0.2 units and the difference in conductivity was less than 10%.

j) All measurements are recorded on specific data sheets.

k) Once steady state conditions are considered to have been achieved, groundwater samples are obtained directly from the pump tubing and placed in appropriate glass bottles, BTEX vials or plastic bottles.

l) All samples are preserved in accordance with water sampling requirements detailed in the NEPM Guidelines (1999) and placed in an insulated container with ice. Groundwater samples are preserved by immediate storage in an insulated sample container with ice in accordance with AS/NZS 5667.1-1 998.

m) Record the sample on the appropriate log in accordance with AS 1726-1 993. At the end of each water sampling complete a chain of custody form.

Decontamination Procedures for Groundwater Sampling Equipment

a) All of the equipment associated with the groundwater sampling procedure (other than single-use items) should be decontaminated between every sampling location.

b) The following equipment and materials are required for the decontamination procedure:
   - ➢ Phosphate free detergent.
   - ➢ Tap water.
   - ➢ Distilled water
   - ➢ Plastic Sheets or bulk bags (plastic bags)

c) Fill one bucket with clean tap water and phosphate free detergent, and one bucket with distilled water.

d) Flush tap water and detergent through pump head. Wash sampling equipment and pump head using brushes in the bucket containing detergent until all materials attached to the equipment are removed.

e) Flush pump head with distilled water.

f) Change water and detergent solution after each sampling location.

g) Rinse sampling equipment in the bucket containing distilled water.

h) Place cleaned equipment on clean plastic sheets.

i) If all materials are not removed by this procedure that equipment should not be used until it has been thoroughly cleaned

QA/QC DEFINITIONS

The QA/QC terms used in this report are defined below. The definitions are in accordance with US EPA publication SW-846, entitled *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (1994[39]) methods and those described in *Environmental Sampling and Analysis, A Practical Guide,* (H. Keith 1991[40]).

Practical Quantitation Limit (PQL), Limit of Reporting (LOR) and Estimated Quantitation Limit (EQL)

These terms all refer to the concentration above which results can be expressed with a minimum 95% confidence level. The laboratory reporting limits are generally set at ten times the standard deviation for the Method Detection limit (MDL) for each specific analyte. For the purposes of this report the LOR, PQL, and EQL are considered to be equivalent.

When assessing laboratory data it should be borne in mind that values at or near the PQL have two important limitations.*"The uncertainty of the measurement value can approach, and even equal, the reported value. Secondly, confirmation of the analytes reported is virtually impossible unless identification uses highly selective methods. These issues diminish when reliably measurable amounts of analytes are present. Accordingly, legal and regulatory actions should be limited to data at or above the reliable detection limit"*, Keith (1 991).

Precision

The degree to which data generated from repeated measurements differ from one another due to random errors. Precision is measured using the standard deviation or Relative Percent Difference (RPD). Acceptable targets for precision in this report will be less than 50% RPD for concentrations greater than ten times the PQL, less than 75% RPD for concentrations between five and ten times the PQL and less than 100% RPD for concentrations that are less than five times the PQL.

Accuracy

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[39] *SW-846: Test Methods for Evaluating Solid Waste, Physical/Chemical Methods,* US EPA, 1994 (US EPA SW-846)

[40] *Environmental Sampling and Analysis, A Practical Guide*, Keith, H, 1991 (Keith 1991)

Accuracy is a measure of the agreement between an experimental result and the true value of the parameter being measured. The assessment of accuracy for an analysis can be achieved through the analysis of known reference materials or assessed by the analysis of surrogates, field blanks, trip spikes and matrix spikes.

The proximity of an averaged result to the true value, where all random errors have been statistically removed. Accuracy is measured by percent recovery. Acceptable limits for accuracy generally lie between 70% to 130% recoveries. Certain laboratory methods may allow for values that lie outside these limits.

Representativeness

Representativeness expresses the degree to which sample data accurately and precisely represents a characteristic of a population, parameter variations at a sampling point, or an environmental condition. Representativeness is primarily dependent upon the design and implementation of the sampling program. Representativeness of the data is partially ensured by the avoidance of contamination, adherence to sample handing and analysis protocols and use of proper chain-of-custody and documentation procedures.

Completeness

Completeness is a measure of the number of valid measurements in a data set compared to the total number of measurements made and overall performance against DQIs. The following information is assessed for completeness:

- Chain-of-custody forms;
- Sample receipt form;
- All sample results reported;
- All blank data reported;
- All laboratory duplicate and RPDs calculated;
- All surrogate spike data reported;
- All matrix spike and lab control spike (LCS) data reported and RPDs calculated;
- Spike recovery acceptable limits reported; and
- NATA stamp on reports.

Comparability

Comparability is the evaluation of the similarity of conditions (eg. sample depth, sample homogeneity) under which separate sets of data are produced. Data comparability checks include a bias assessment that may arise from the following sources:

- Collection and analysis of samples by different personnel;

- Use of different techniques;
- Collection and analysis by the same personnel using the same methods but at different times; and
- Spatial and temporal changes (due to environmental dynamics).

Blanks

The purpose of laboratory and field blanks is to check for artifacts and interferences that may arise during sampling and analysis.

Matrix Spikes

Samples are spiked with laboratory grade standards to detect interactive effects between the sample matrix and the analytes being measured. Matrix Spikes are reported as a percent recovery and are prepared for 1 in every 20 samples. Sample batches that contain less than 20 samples may be reported with a Matrix Spike from another batch. The percent recovery is calculated using the formula;

$$\frac{\text{(Spike Sample Result – Sample Result)}}{\text{Concentration of Spike Added}} \times 100$$

Acceptable recovery limits are 70% to 130%.

Surrogate Spikes

Samples are spiked with a known concentration of compounds that are chemically related to the analyte being investigated but unlikely to be detected in the environment. The purpose of the Surrogate Spikes is to check the accuracy of the analytical technique. Surrogate Spikes are reported as percent recovery.

Duplicates

Laboratory duplicates measure precision, expressed as Relative Percent Difference. Duplicates are prepared from a single field sample and analysed as two separate extraction procedures in the laboratory. The RPD is calculated using the formula where D1 is the sample concentration and D2 is the duplicate sample concentration:

$$\frac{(D1 - D2)}{\{(D1 + D2)/2\}} \times 100$$

APPENDIX D

(Groundwater Monitoring Data Sheets and Equipment Calibration Records)

Calibration 2.8.10

```
----------------------------------
***** Calibrate: DO

Date                   02/08/10 DD/MM/YY
Time                   12:21:04 24-hour
User ID:               BP


Method                 DO Air Calibrate
Cal Value:             100.000000 %
Sensor Value:          2.893462 uA
Sensor Type            Polarographic
Membrane Type          1.25 PE Yellow
Salinity Mode          2.893462 Auto
Temperature            11.900000 %C2%B0C
Barometer              759.099976 mmHg
Calibrate Status       Calibrated

----------------------------------
***** Calibrate: ORP

Date                   02/08/10 DD/MM/YY
Time                   12:19:01 24-hour
User ID:               BP

Cal Solution Value:    244.869995 ORP mV
Sensor Value:          235.699997 ORP mV
Temperature            15.100000 %C2%B0C
Calibrate Status       Calibrated

----------------------------------
***** Calibrate: pH

Date                   02/08/10 DD/MM/YY
Time                   12:18:24 24-hour
User ID:               BP

Buffer Value           7.047007 pH
Sensor Value:          -19.600000 pH mV
Temperature            14.350000 %C2%B0C

Buffer Value           4.000601 pH
Sensor Value:          153.500000 pH mV
Temperature            14.950006 %C2%B0C

Slope                  58.805065 mV/pH
Slope                  95.252823 % of Ideal pH Value
Calibrate Status       Calibrated

----------------------------------
***** Calibrate: Conductivity

Date                   02/08/10 DD/MM/YY
Time                   12:14:24 24-hour
User ID:               BP

Method                 Sp. Conductance
Cal Value:             1358.000000 SPC-uS/cm
Sensor Value:          1358.000000 SPC-uS/cm
Temperature Ref.       25.000000 %C2%B0C
Temperature Comp.      1.910000 %/C
TDS Constant           0.650000
Temperature            14.900000 %C2%B0C
Cal Cell Constant:     4.776870
Calibrate Status       Calibrated

----------------------------------
```

E23982K, Pyrmont
Monitoring well Development

Timestamp	EC (uS/cm)	DO (mg/L)	ORP_1 (mV)	pH_1 (Units)	Temp (C)	Site	Folder
							MW517
2/08/2010 12:41	0.8	9.9	356	5.8	14.3	E23982K Pyrmont	MW517
2/08/2010 12:42	0.7	9.6	381.6	5.89	13.9	E23982K Pyrmont	MW517
2/08/2010 12:43	161.9	5.6	201.1	6.81	16.6	E23982K Pyrmont	MW517
2/08/2010 12:43	1290	3.2	211.2	5.98	19.5	E23982K Pyrmont	MW517
2/08/2010 12:43	1172	0.6	178.3	6.4	20.4	E23982K Pyrmont	MW517
2/08/2010 12:44	146.3	2.4	158.8	6.58	20.5	E23982K Pyrmont	MW517
2/08/2010 12:44	73.3	7.1	152.4	6.73	20.4	E23982K Pyrmont	MW517
2/08/2010 12:44	118.2	7.2	149.3	6.94	20.4	E23982K Pyrmont	MW517
2/08/2010 12:45	13.1	5.9	143.3	6.9	20.2	E23982K Pyrmont	MW517
2/08/2010 12:45	1143	4.1	139.3	6.87	19.9	E23982K Pyrmont	MW517
2/08/2010 12:45	1175	1.6	130.9	6.86	20.5	E23982K Pyrmont	MW517
2/08/2010 12:46	1174	1	127.4	6.89	20.5	E23982K Pyrmont	MW517
2/08/2010 12:46	1186	0.6	118.3	6.88	20.6	E23982K Pyrmont	MW517
2/08/2010 12:46	1189	0.5	110.1	6.89	20.6	E23982K Pyrmont	MW517
2/08/2010 12:47	1205	0.4	100.7	6.87	20.8	E23982K Pyrmont	MW517
2/08/2010 12:47	1207	0.4	91.2	6.86	20.9	E23982K Pyrmont	MW517
2/08/2010 12:47	1207	0.3	82.9	6.88	20.9	E23982K Pyrmont	MW517
2/08/2010 12:48	1207	0.3	77.7	6.9	20.9	E23982K Pyrmont	MW517
2/08/2010 12:48	1207	0.4	67.8	6.9	20.9	E23982K Pyrmont	MW517
2/08/2010 12:48	1206	0.3	60.1	6.9	20.9	E23982K Pyrmont	MW517
2/08/2010 12:49	660	0.7	53.5	6.9	20.9	E23982K Pyrmont	MW517
2/08/2010 12:49	1205	0.7	46.6	6.92	20.9	E23982K Pyrmont	MW517
2/08/2010 12:49	1204	0.8	41.3	6.92	20.9	E23982K Pyrmont	MW517
2/08/2010 12:50	1204	0.8	36.8	6.93	20.9	E23982K Pyrmont	MW517
2/08/2010 12:50	1203	0.9	32.5	6.91	20.8	E23982K Pyrmont	MW517
2/08/2010 12:50	1205	0.8	27	6.91	20.9	E23982K Pyrmont	MW517
2/08/2010 12:51	1204	0.9	22.9	6.93	20.9	E23982K Pyrmont	MW517

2/08/2010 12:51	1204	1	19.9	6.93	20.9	E23982K Pyrmont	MW517
							MW708
2/08/2010 13:41	605	2.2	130.1	7.22	18.5	E23982K Pyrmont	MW708
2/08/2010 13:41	3465	6	128	11.65	18.5	E23982K Pyrmont	MW708
2/08/2010 13:42	1332	2.1	139.9	8.23	20.6	E23982K Pyrmont	MW708
2/08/2010 13:42	1292	0.9	119.9	7.34	20.9	E23982K Pyrmont	MW708
2/08/2010 13:42	1246	0.6	103.4	6.95	21	E23982K Pyrmont	MW708
2/08/2010 13:43	1246	0.6	96.6	6.92	21	E23982K Pyrmont	MW708
2/08/2010 13:43	1246	0.4	88.6	6.72	21	E23982K Pyrmont	MW708
2/08/2010 13:43	1246	0.5	83.1	6.66	21	E23982K Pyrmont	MW708
2/08/2010 13:44	1246	0.6	77.5	6.63	21	E23982K Pyrmont	MW708
2/08/2010 13:44	1247	0.7	71.9	6.61	21.1	E23982K Pyrmont	MW708
2/08/2010 13:44	1244	0.8	70.3	6.6	21.1	E23982K Pyrmont	MW708
2/08/2010 13:45	1247	1.1	64.4	6.59	21.1	E23982K Pyrmont	MW708
2/08/2010 13:45	1240	1	64	6.58	21.1	E23982K Pyrmont	MW708
2/08/2010 13:45	1250	0.8	59.8	6.57	21.1	E23982K Pyrmont	MW708
2/08/2010 13:46	1237	0.8	59.3	6.57	21.1	E23982K Pyrmont	MW708
2/08/2010 13:46	1239	0.9	55.2	6.57	21.1	E23982K Pyrmont	MW708
2/08/2010 13:46	1249	0.6	52.3	6.56	21.1	E23982K Pyrmont	MW708
2/08/2010 13:47	1249	0.5	52.7	6.56	21.1	E23982K Pyrmont	MW708
2/08/2010 13:47	1243	1	50.8	6.55	21.1	E23982K Pyrmont	MW708
2/08/2010 13:47	1249	1	49.5	6.56	21.1	E23982K Pyrmont	MW708
							MW713
2/08/2010 14:15	41.5	9	159.5	12.14	17.5	E23982K Pyrmont	MW713
2/08/2010 14:15	1015	8.5	123.4	10.8	17	E23982K Pyrmont	MW713
2/08/2010 14:16	1635	1.6	156.8	8.01	19.2	E23982K Pyrmont	MW713
2/08/2010 14:16	1631	0.5	150.2	7.7	19	E23982K Pyrmont	MW713
2/08/2010 14:16	1630	0.3	146.6	7.62	19	E23982K Pyrmont	MW713
2/08/2010 14:17	1630	0.2	143.8	7.57	18.9	E23982K Pyrmont	MW713
							MW712
2/08/2010 14:49	1.9	8.3	133.7	9.07	16.2	E23982K Pyrmont	MW712
2/08/2010 14:49	168.2	8.7	134.4	9.12	16.4	E23982K Pyrmont	MW712
2/08/2010 14:49	1503	3.8	161.3	7.66	19.4	E23982K Pyrmont	MW712

2/08/2010 14:50	1508	2.2	150.8	7.51	19.4	E23982K Pyrmont	MW712
2/08/2010 14:50	1607	1.2	142.4	7.38	19.6	E23982K Pyrmont	MW712
2/08/2010 14:50	1611	0.7	123.6	7.35	19.5	E23982K Pyrmont	MW712
2/08/2010 14:51	1623	0.4	112.6	7.32	19.4	E23982K Pyrmont	MW712
2/08/2010 14:51	1624	0.3	106.8	7.31	19.3	E23982K Pyrmont	MW712
2/08/2010 14:51	1625	0.3	102.5	7.3	19.3	E23982K Pyrmont	MW712
2/08/2010 14:52	1625	0.3	99	7.29	19.3	E23982K Pyrmont	MW712
2/08/2010 14:52	1625	0.2	95.8	7.28	19.3	E23982K Pyrmont	MW712
2/08/2010 14:52	1625	0.2	92.7	7.28	19.3	E23982K Pyrmont	MW712
2/08/2010 14:53	1624	0.2	90.2	7.27	19.3	E23982K Pyrmont	MW712
2/08/2010 14:53	1625	0.2	88	7.27	19.2	E23982K Pyrmont	MW712
2/08/2010 14:53	1624	0.3	85.9	7.26	19.2	E23982K Pyrmont	MW712
2/08/2010 14:54	1624	0.2	84.2	7.26	19.2	E23982K Pyrmont	MW712
2/08/2010 14:54	1623	0.2	82.6	7.26	19.2	E23982K Pyrmont	MW712
2/08/2010 14:54	1623	0.2	81.1	7.25	19.2	E23982K Pyrmont	MW712
2/08/2010 14:55	1622	0.2	80.5	7.25	19.2	E23982K Pyrmont	MW712

```
                               Calibration 5.8.10

----------------------------------
***** Calibrate: DO

Date                   05/08/10 DD/MM/YY
Time                   08:42:23 24-hour
User ID:               MD


Method                 DO Air Calibrate
Cal Value:             100.000000 %
Sensor Value:          2.604350 uA
Sensor Type            Polarographic
Membrane Type          1.25 PE Yellow
Salinity Mode          2.604350 Auto
Temperature            10.000000 %C2%B0C
Barometer              763.099976 mmHg
Calibrate Status       Calibrated

----------------------------------
***** Calibrate: ORP

Date                   05/08/10 DD/MM/YY
Time                   08:37:04 24-hour
User ID:               MD

Cal Solution Value:    252.020004 ORP mV
Sensor Value:          262.000000 ORP mV
Temperature            9.600000 %C2%B0C
Calibrate Status       Calibrated

----------------------------------
***** Calibrate: pH

Date                   05/08/10 DD/MM/YY
Time                   08:34:02 24-hour
User ID:               MD

Buffer Value           7.075316 pH
Sensor Value:          -19.600000 pH mV
Temperature            8.950006 %C2%B0C

Buffer Value           7.075316 pH
Sensor Value:          -19.600000 pH mV
Temperature            8.950006 %C2%B0C

Buffer Value           4.002072 pH
Sensor Value:          149.800003 pH mV
Temperature            9.050013 %C2%B0C

Duplicate Data Points Detected.
Data Used for pH Calibration

Buffer Value           7.075316 pH
Sensor Value:          -19.600000 pH mV
Temperature            8.950006 %C2%B0C

Buffer Value           4.002072 pH
Sensor Value:          149.800003 pH mV
Temperature            9.050013 %C2%B0C

Slope                  58.236854 mV/pH
Slope                  96.264956 % of Ideal pH Value
Calibrate Status       Calibrated

----------------------------------
***** Calibrate: Conductivity
```

```
                               Calibration 5.8.10
Date                   05/08/10 DD/MM/YY
Time                   08:31:33 24-hour
User ID:               MD

Method                 Sp. Conductance
Cal Value:             1337.000000 SPC-uS/cm
Sensor Value:          1337.000000 SPC-uS/cm
Temperature Ref.       25.000000 %C2%B0C
Temperature Comp.      1.910000 %/C
TDS Constant           0.650000
Temperature            9.500000 %C2%B0C
Cal Cell Constant:     4.776870
Calibrate Status       Calibrated

----------------------------------
```

E23982K, Pyrmont
Monitoring Well Sampling

Timestamp	EC (uS/cm)	DO (mg/L)	ORP_1 (mV)	pH_1 (Units)	Temp (C)	Site	Folder
							MW708
5/08/2010 9:24	560	5.2	121.3	6.43	17	E23982K Pyrmont	MW708
5/08/2010 9:25	1185	1.9	115.6	5.93	18.8	E23982K Pyrmont	MW708
5/08/2010 9:26	1221	1.1	118.8	5.91	19.6	E23982K Pyrmont	MW708
5/08/2010 9:27	1238	0.6	117.1	5.93	20.1	E23982K Pyrmont	MW708
5/08/2010 9:28	1243	0.5	113.5	5.97	20.3	E23982K Pyrmont	MW708
5/08/2010 9:29	1244	0.4	108.9	6.01	20.5	E23982K Pyrmont	MW708
5/08/2010 9:30	1242	0.4	103.6	6.05	20.5	E23982K Pyrmont	MW708
5/08/2010 9:31	1238	0.3	98.4	6.1	20.6	E23982K Pyrmont	MW708
5/08/2010 9:32	1234	0.3	92	6.14	20.6	E23982K Pyrmont	MW708
5/08/2010 9:33	1231	0.3	85.9	6.17	20.6	E23982K Pyrmont	MW708
5/08/2010 9:34	1230	0.3	79.5	6.2	20.6	E23982K Pyrmont	MW708
5/08/2010 9:35	1228	0.2	73.7	6.23	20.7	E23982K Pyrmont	MW708
5/08/2010 9:36	1226	0.2	67.1	6.26	20.7	E23982K Pyrmont	MW708
5/08/2010 9:37	1223	0.2	61.1	6.28	20.6	E23982K Pyrmont	MW708
5/08/2010 9:38	1222	0.2	55.7	6.3	20.6	E23982K Pyrmont	MW708
5/08/2010 9:39	1220	0.2	50.8	6.32	20.6	E23982K Pyrmont	MW708
5/08/2010 9:40	1220	0.3	45.6	6.34	20.6	E23982K Pyrmont	MW708
5/08/2010 9:41	1219	0.3	40.5	6.36	20.7	E23982K Pyrmont	MW708
5/08/2010 9:42	1219	0.2	35.9	6.37	20.8	E23982K Pyrmont	MW708
5/08/2010 9:43	1219	0.2	32	6.38	20.8	E23982K Pyrmont	MW708
5/08/2010 9:44	1218	0.2	29.6	6.39	20.7	E23982K Pyrmont	MW708
							MW517
5/08/2010 10:55	0.3	9.6	179.7	6.58	14.5	E23982K Pyrmont	MW517
5/08/2010 10:56	1117	1.8	103.3	6.89	18.4	E23982K Pyrmont	MW517
5/08/2010 10:57	1133	1.2	45.8	6.91	18.7	E23982K Pyrmont	MW517
5/08/2010 10:58	1139	1.2	5.9	6.94	18.9	E23982K Pyrmont	MW517
5/08/2010 10:59	1150	0.8	-16.8	6.94	19.2	E23982K Pyrmont	MW517

5/08/2010 11:00	1159	0.6	-32.7	6.95	19.5	E23982K Pyrmont	MW517
5/08/2010 11:01	1165	0.5	-43.6	6.96	19.7	E23982K Pyrmont	MW517
5/08/2010 11:02	1170	0.5	-53.4	6.95	19.7	E23982K Pyrmont	MW517
5/08/2010 11:03	1174	0.5	-59.6	6.97	19.8	E23982K Pyrmont	MW517
5/08/2010 11:04	1174	0.4	-61.9	6.97	19.8	E23982K Pyrmont	MW517
							MW713
5/08/2010 12:37	5.6	9	212.2	7.07	15.7	E23982K Pyrmont	MW713
5/08/2010 12:38	1652	2.7	200.3	7.48	16.7	E23982K Pyrmont	MW713
5/08/2010 12:39	1771	1	214.3	6	17.1	E23982K Pyrmont	MW713
5/08/2010 12:40	1817	0.8	222.1	5.92	17.4	E23982K Pyrmont	MW713
5/08/2010 12:41	1846	0.6	228.9	5.9	17.6	E23982K Pyrmont	MW713
5/08/2010 12:42	1870	0.4	233.2	5.89	17.8	E23982K Pyrmont	MW713
5/08/2010 12:43	1886	0.3	235.6	5.89	17.9	E23982K Pyrmont	MW713
5/08/2010 12:44	1893	0.2	236.8	5.89	18	E23982K Pyrmont	MW713
5/08/2010 12:45	1895	0.2	237.3	5.89	18	E23982K Pyrmont	MW713
5/08/2010 12:46	1895	0.2	237.6	5.9	18.1	E23982K Pyrmont	MW713
5/08/2010 12:47	1893	0.2	237.6	5.9	18.1	E23982K Pyrmont	MW713
5/08/2010 12:48	1889	0.2	237.4	5.91	18.1	E23982K Pyrmont	MW713
5/08/2010 12:49	1883	0.2	237.3	5.91	18.1	E23982K Pyrmont	MW713
5/08/2010 12:50	1878	0.2	236.9	5.91	18.1	E23982K Pyrmont	MW713
							MW712
5/08/2010 14:09	0.6	10.4	672.8	6.35	13.1	E23982K Pyrmont	MW712
5/08/2010 14:10	1601	1.7	198.1	6.79	18.2	E23982K Pyrmont	MW712
5/08/2010 14:11	1631	1.2	169.8	6.86	18.5	E23982K Pyrmont	MW712
5/08/2010 14:12	1639	0.7	149.6	6.88	18.9	E23982K Pyrmont	MW712
5/08/2010 14:13	1631	0.6	131.2	6.88	19.1	E23982K Pyrmont	MW712
5/08/2010 14:14	1628	0.5	115.1	6.89	19.3	E23982K Pyrmont	MW712
5/08/2010 14:15	1622	0.5	103.2	6.88	19.4	E23982K Pyrmont	MW712
5/08/2010 14:16	1612	0.4	91.9	6.87	19.5	E23982K Pyrmont	MW712
5/08/2010 14:17	1611	0.4	83.6	6.87	19.4	E23982K Pyrmont	MW712
5/08/2010 14:18	1607	0.3	77.2	6.86	19.3	E23982K Pyrmont	MW712
5/08/2010 14:19	1600	0.3	70.8	6.87	19.2	E23982K Pyrmont	MW712
5/08/2010 14:20	1594	0.3	67.6	6.84	19.1	E23982K Pyrmont	MW712

5/08/2010 14:21	1590	0.3	63.1	6.85	19	E23982K Pyrmont	MW712
5/08/2010 14:22	1587	0.3	63	6.83	18.9	E23982K Pyrmont	MW712
5/08/2010 14:23	1585	0.3	62.7	6.81	18.9	E23982K Pyrmont	MW712
5/08/2010 14:24	1583	0.3	61.7	6.8	19	E23982K Pyrmont	MW712

EIS

Groundwater Monitoring Well Development Report

Client:	Sydney Fish Market P/L	**Job No.:**	E23982K
Project:	Proposed Redevelopment	**Well No.:**	MW517
Location:	Pyrmont	**Depth (m):**	5.5m

WELL FINISH DETAILS

☒ Gatic Cover ☐ Standpipe ☐ PVC Pipe

WELL DEVELOPMENT DETAILS

Method:	Blue pump	**SWL – Before: (m)**	2.49
Date:	2/8/10	**Time – Before:**	12:20
Undertaken By:	MD	**SWL – After: (m)**	2.58
Total Vol. Removed:	~60L	**Time – After:**	12:45
PID Reading (ppm):			

Comments:

DEVELOPMENT MEASUREMENTS

Volume Removed (L)	Temp (°C)	pH	EC (mS/m)	DO (mg/L)	Eh (mV)
10L 3min	20.6	6.89	250.4	1.1	127
20L 5min	20.0	6.88	120	0.6	82.3

dark grey [illegible] odor

clear

Comments:

Tested By:	MD
Date Tested:	2/8/10
Checked By:	BP
Date:	4/8/10

Remarks:

- All measurements are corrected to ground level
- All stated Volumes are in Litres
- SWL is an abbreviation for standing water level
- Steady state conditions - difference in the pH less than 0.2 units and difference in conductivity less than 10%
- Minimum 3 monitoring well volumes are purged

Groundwater Monitoring Well Development Report

Client:	Sydney Fish Market P/L	**Job No.:**	E23982K
Project:	Proposed Redevelopment	**Well No.:**	MW708.
Location:	Pyrmont	**Depth (m):**	5.7

WELL FINISH DETAILS

☒ Gatic Cover ☐ Standpipe ☐ PVC Pipe

WELL DEVELOPMENT DETAILS

Method:	Blue pump	**SWL – Before: (m)**	2.19m
Date:	2/8/10	**Time – Before:**	1.33 pm
Undertaken By:	MD	**SWL – After: (m)**	2.30m
Total Vol. Removed:	≈45L	**Time – After:**	1.55 pm
PID Reading (ppm):			

Comments:

DEVELOPMENT MEASUREMENTS

Volume Removed (L)	Temp (°C)	pH	EC (mS/m)	DO (mg/L)	Eh (mV)
5L 1min	20.5	7.85	1292	7.7	127.4
15L 3min	21.8	661	1247	0.7	71.8

Comments:

Tested By:	MD
Date Tested:	2/8/10
Checked By:	BP
Date:	4/8/10

Remarks:

- All measurements are corrected to ground level
- All stated Volumes are in Litres
- SWL is an abbreviation for standing water level
- Steady state conditions - difference in the pH less than 0.2 units and difference in conductivity less than 10%
- Minimum 3 monitoring well volumes are purged

EIS

Groundwater Monitoring Well Development Report

Client:	Sydney Fish Market P/L	**Job No.:**	E23982K
Project:	Proposed Redevelopment	**Well No.:**	MW712
Location:	Pyrmont	**Depth (m):**	6.0m

WELL FINISH DETAILS

☒ **Gatic Cover** ☐ **Standpipe** ☐ **PVC Pipe**

WELL DEVELOPMENT DETAILS

Method:	Blue pump	**SWL - Before: (m)**	2:38m
Date:	2/8/10	**Time - Before:**	2:45
Undertaken By:	MO	**SWL - After: (m)**	2:20
Total Vol. Removed:	7L	**Time - After:**	2:57
PID Reading (ppm):			

604

Comments:

DEVELOPMENT MEASUREMENTS

Volume Removed (L)	Temp (°C)	pH	EC (mS/m)	DO (mg/L)	Eh (mV)
7L (2min)	19.5	7.32	1623	0.4	108.0

Comments:

Tested By:	MO
Date Tested:	2/8/10
Checked By:	BP
Date:	4/8/10

Remarks:
- All measurements are corrected to ground level
- All stated Volumes are in Litres
- SWL is an abbreviation for standing water level
- Steady state conditions - difference in the pH less than 0.2 units and difference in conductivity less than 10%
- Minimum 3 monitoring well volumes are purged

EIS

Groundwater Monitoring Well Development Report

Client:	Sydney Fish Market P/L	**Job No.:**	E23482K
Project:	Proposed Redevelopment	**Well No.:**	MW713
Location:	Pyrmont	**Depth (m):**	6.0m

WELL FINISH DETAILS

☒ Gatic Cover ☐ Standpipe ☐ PVC Pipe

WELL DEVELOPMENT DETAILS

Method:	Blue pump	**SWL – Before: (m)**	1.38
Date:	2/8/10	**Time – Before:**	2:08pm
Undertaken By:	MO	**SWL – After: (m)**	5.54
Total Vol. Removed:	≃10L	**Time – After:**	2:25
PID Reading (ppm):			

Comments:

DEVELOPMENT MEASUREMENTS

Volume Removed (L)	Temp (°C)	pH	EC (mS/m)	DO (mg/L)	Eh (mV)
9L 2min	17	8.07	1630	1.3	142.1

Comments:

Tested By:	MO
Date Tested:	2/8/10
Checked By:	BP
Date:	4/8/10

Remarks:
- All measurements are corrected to ground level
- All stated Volumes are in Litres
- SWL is an abbreviation for standing water level
- Steady state conditions - difference in the pH less than 0.2 units and difference in conductivity less than 10%
- Minimum 3 monitoring well volumes are purged

Groundwater Monitoring Report

EIS

Client:	Sydney Fish Market Pty Ltd	**Job No.:**	E23982K
Project:	Proposed Redevelopment	**Well No.:**	MW 708
Location:	Sydney Fish Markets, Pyrmont, NSW	**Depth (m):**	5.7

WELL FINISH

☒ **Gatic Cover** ☐ **Standpipe** ☐ **PVC Pipe**

WELL PURGE DETAILS:

Method:	Micro-purge	**SWL - Before:**	2.21
Date:	5/8/10	**Time - Before:**	–
Undertaken By:	MD	**Total Vol Removed:**	≈ 8L
Pump Program No.	CPM 4	**PID (ppm):**	–

PURGING / SAMPLING MEASUREMENTS

Time	CMP	Vol (L)	SWL (m)	Temp (°C)	pH	EC (µS/cm)	Eh (mV)	DO ppm
1m	4 10/5		2.24					
2m	"	≈ 3L	2.23	19.4	5.91	1222	118.9	1.0
3m	"		2.23					
5m	"	≈ 5L	2.23	20.6	6.0	1244	107.1	0.4
7m	"		2.25	20.6	6.14	1234	91.4	0.3
10m	"	≈ 6L	2.25	20.7	6.21	1229	78.4	0.3
13m	"	≈ 7.5L	2.25	20.6	6.30	1221	55.1	0.3
16m	"		2.25	20.6	6.32	1219	39.2	0.3
19m	"	≈ 10L	2.25	20.6	6.33	1218	38.1	0.3
→ EH								
Sampled								

Containers Used/Comments

- 6 x 1L Amber - 2 x HNO3 plastic
x algae on surface
- 2 x ½L amber
- 4 x BTEX vials GW/N/PAA

Tested By:	Mike D
Date Tested:	5/8/10
Checked By:	
Date:	

Remarks:
- All measurements are corrected to ground level
- SWL is an abbreviation for standing water level
- Steady state conditions - difference in the pH less than 0.2 units and difference in conductivity less than 10%

Groundwater Monitoring Report

EIS

Client:	Sydney Fish Market Pty Ltd	**Job No.:**	E23982K
Project:	Proposed Redevelopment	**Well No.:**	MW712
Location:	Sydney Fish Markets, Pyrmont, NSW	**Depth (m):**	6.0m

WELL FINISH

☒ Gatic Cover ☐ Standpipe ☐ PVC Pipe

WELL PURGE DETAILS:

Method:	Micro-purge	**SWL – Before:**	1.39
Date:	5/8/10	**Time – Before:**	~~[illegible]~~ 12:37
Undertaken By:	MD	**Total Vol Removed:**	≈ 4L
Pump Program No.	CPM 2.	**PID (ppm):**	

PURGING / SAMPLING MEASUREMENTS

Time	CMP	Vol (L)	SWL (m)	Temp (°C)	pH	EC (μS/cm)	Eh (mV)	DO ppm
1m	2 $\frac{20}{10}$	0.3L	1.44					
2m	"	0.4L	1.47					
5m	"	0.7L	1.50					
7m	"	1L	1.50					
10m	"	2L	1.49	18.1	5.9	1892	237.6	0.2
12m	"		1.50.	18.1	5.91	1883	237.3	0.2
Sampled	"							
@	"							
13min.	"							

Containers Used/Comments -3x1L amber -1x HNO3 plastic
-1x ½L amber
-2x BTEX vial

Tested By: Mike D
Date Tested: 5/8/10
Checked By:
Date:

Remarks:

- All measurements are corrected to ground level
- SWL is an abbreviation for standing water level
- Steady state conditions - difference in the pH less than 0.2 units and difference in conductivity less than 10%

Groundwater Monitoring Report

EIS

Client:	Sydney Fish Market Pty Ltd	**Job No.:**	E23982K
Project:	Proposed Redevelopment	**Well No.:**	MW 713
Location:	Sydney Fish Markets, Pyrmont, NSW	**Depth (m):**	6.0

WELL FINISH

☒ **Gatic Cover** ☐ **Standpipe** ☐ **PVC Pipe**

WELL PURGE DETAILS:

Method:	Micro-purge	**SWL – Before:**	2.35
Date:	5/8/10	**Time – Before:**	2:09 pm
Undertaken By:	MD	**Total Vol Removed:**	
Pump Program No.	CPM /	**PID (ppm):**	

PURGING / SAMPLING MEASUREMENTS

Time	CMP	Vol (L)	SWL (m)	Temp (°C)	pH	EC (µS/cm)	Eh (mV)	DO ppm
1 min	2 $\frac{20}{10}$		2.58					
2 min			2.60					
3 min		≈ 1L	2.63					
5 min			2.72	19.3	6.68	1625	110.9	0.5
7 min		≈ 3L	2.83					
9 min	1 $\frac{20}{10}$		2.77	19.3	6.86	1600	74.4	0.4
10 min			2.73	19.3	6.84	1594	67.7	0.3
13 min		≈ 5L.	2.73	19.1	6.84	1588	62.9	0.4
15 min		≈ 5.5L	2.73	19	6.80	1583	61.9	0.4
sample @ 15 min								

Containers Used/Comments - 3 x 1L Ambers - 1 x HNO3 plastic
- 1 x ½L amber
- 2 x Btex vials

Tested By: Mitch D

Date Tested: 5/8/10

Checked By:

Date:

Remarks:

- All measurements are corrected to ground level
- SWL is an abbreviation for standing water level
- Steady state conditions - difference in the pH less than 0.2 units and difference in conductivity less than 10%

Groundwater Monitoring Report

Client:	Sydney Fish Market Pty Ltd	**Job No.:**	E23982K
Project:	Proposed Redevelopment	**Well No.:**	MW 517
Location:	Sydney Fish Markets, Pyrmont, NSW	**Depth (m):**	5.5m

WELL FINISH

☒ **Gatic Cover** ☐ **Standpipe** ☐ **PVC Pipe**

WELL PURGE DETAILS:

Method:	Micro-purge	**SWL – Before:**	2.50
Date:	5/8/10	**Time – Before:**	10:54
Undertaken By:	MD	**Total Vol Removed:**	
Pump Program No.	CPM 4	**PID (ppm):**	

PURGING / SAMPLING MEASUREMENTS

Time	CMP	Vol (L)	SWL (m)	Temp (°C)	pH	EC (μS/cm)	Eh (mV)	DO ppm
2	4 10/5		2.52					
4	"		2.58					
6	"	2.5L	2.51	19.6	6.95	1165	-44.4	0.5
9	"	3L	2.81	19.8	6.97	1174	-61.4	0.5
Sampled								

Containers Used/Comments DUP - GWDUPBB - 6x 1L Ambers GWDUPBB.

x silty down bottom ≈ 45% - 2x ½L Ambers

x algae on surface. -4x BTEX vials

-2x Hno3 plastics

Tested By: Mikh D

Date Tested: 5/8/10

Checked By:

Date:

Remarks:

- All measurements are corrected to ground level
- SWL is an abbreviation for standing water level
- Steady state conditions - difference in the pH less than 0.2 units and difference in conductivity less than 10%

JOB NO: E 23982K
LOCATION: Pyrmont.

PID FIELD CALIBRATION CERTIFICATE

Make: MiniRAE	Model: 2000	Unit: 1	Date of last factory calibration:
Date of calibration: 29/7/10		Name of Calibrator: BP	
Calibration gas: Iso-butylene		Calibration Gas Concentration: 100.0 ppm	
Measured reading: 100 ppm		Error in measured reading: ± 0 ppm	

Make: MiniRAE	Model: 2000	Unit: 1	Date of last factory calibration:
Date of calibration: 30/7/10		Name of Calibrator: BP	
Calibration gas: Iso-butylene		Calibration Gas Concentration: 100.0 ppm	
Measured reading: 100 ppm		Error in measured reading: ± 0 ppm	

Make: MiniRAE	Model: 2000	Unit: 1	Date of last factory calibration:
Date of calibration: 3/8/10		Name of Calibrator: BP	
Calibration gas: Iso-butylene		Calibration Gas Concentration: 100.0 ppm	
Measured reading: 100 ppm		Error in measured reading: ± 0 ppm	

Make: MiniRAE	Model: 2000	Unit:	Date of last factory calibration:
Date of calibration:		Name of Calibrator:	
Calibration gas: Iso-butylene		Calibration Gas Concentration: 100.0 ppm	
Measured reading: ppm		Error in measured reading: ± ppm	

Make: MiniRAE	Model: 2000	Unit:	Date of last factory calibration:
Date of calibration:		Name of Calibrator:	
Calibration gas: Iso-butylene		Calibration Gas Concentration: 100.0 ppm	
Measured reading: ppm		Error in measured reading: ± ppm	

Make: MiniRAE	Model: 2000	Unit:	Date of last factory calibration:
Date of calibration:		Name of Calibrator:	
Calibration gas: Iso-butylene		Calibration Gas Concentration: 100.0 ppm	
Measured reading: ppm		Error in measured reading: ± ppm	

Make: MiniRAE	Model: 2000	Unit:	Date of last factory calibration:
Date of calibration:		Name of Calibrator:	
Calibration gas: Iso-butylene		Calibration Gas Concentration: 100.0 ppm	
Measured reading: ppm		Error in measured reading: ± ppm	

APPENDIX E

(UCL Calculations)

Data File		Variable: Arsenic	
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	34	Shapiro-Wilk Test Statisitic	0.187804
Number of Unique Samples	9	Shapiro-Wilk 5% Critical Value	0.933
Minimum	2	Data not normal at 5% significance level	
Maximum	1300		
Mean	43.41176	95% UCL (Assuming Normal Distribution)	
Median	4.5	Student's-t UCL	107.8675
Standard Deviation	222.0793		
Variance	49319.22	Gamma Distribution Test	
Coefficient of Variation	5.115648	A-D Test Statistic	8.70163
Skewness	5.827142	A-D 5% Critical Value	0.852892
		K-S Test Statistic	0.4459
Gamma Statistics		K-S 5% Critical Value	0.163491
k hat	0.31367	Data do not follow gamma distribution	
k star (bias corrected)	0.305601	at 5% significance level	
Theta hat	138.3995		
Theta star	142.0537	95% UCLs (Assuming Gamma Distribution)	
nu hat	21.32956	Approximate Gamma UCL	78.9458
nu star	20.78088	Adjusted Gamma UCL	81.39307
Approx.Chi Square Value (.05)	11.42726		
Adjusted Level of Significance	0.0422	Lognormal Distribution Test	
Adjusted Chi Square Value	11.08368	Shapiro-Wilk Test Statisitic	0.668948
		Shapiro-Wilk 5% Critical Value	0.933
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	0.693147		
Maximum of log data	7.17012	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	1.588284	95% H-UCL	17.5102
Standard Deviation of log data	1.200659	95% Chebyshev (MVUE) UCL	20.26036
Variance of log data	1.441581	97.5% Chebyshev (MVUE) UCL	24.81964
		99% Chebyshev (MVUE) UCL	33.77547
		95% Non-parametric UCLs	
		CLT UCL	106.0581
		Adj-CLT UCL (Adjusted for skewness)	146.7273
		Mod-t UCL (Adjusted for skewness)	114.211
		Jackknife UCL	107.8675
		Standard Bootstrap UCL	105.7857
		Bootstrap-t UCL	3053.291
RECOMMENDATION		Hall's Bootstrap UCL	1248.394
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	119.6471
		BCA Bootstrap UCL	157.4412
Use 99% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	209.426
		97.5% Chebyshev (Mean, Sd) UCL	281.2606
		99% Chebyshev (Mean, Sd) UCL	422.3655

Data File		Variable:	Total PAHs
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	53	Lilliefors Test Statisitic	0.343089
Number of Unique Samples	37	Lilliefors 5% Critical Value	0.121701
Minimum	0.775	Data not normal at 5% significance level	
Maximum	164.3		
Mean	15.84236	95% UCL (Assuming Normal Distribution)	
Median	2.175	Student's-t UCL	24.42067
Standard Deviation	37.29112		
Variance	1390.628	Gamma Distribution Test	
Coefficient of Variation	2.353887	A-D Test Statistic	4.62732
Skewness	3.430861	A-D 5% Critical Value	0.830685
		K-S Test Statistic	0.210988
Gamma Statistics		K-S 5% Critical Value	0.130247
k hat	0.433568	Data do not follow gamma distribution	
k star (bias corrected)	0.421605	at 5% significance level	
Theta hat	36.53949		
Theta star	37.57629	95% UCLs (Assuming Gamma Distribution)	
nu hat	45.95822	Approximate Gamma UCL	23.32473
nu star	44.69014	Adjusted Gamma UCL	23.58179
Approx.Chi Square Value (.05)	30.35394		
Adjusted Level of Significance	0.045472	Lognormal Distribution Test	
Adjusted Chi Square Value	30.02305	Lilliefors Test Statisitic	0.172872
		Lilliefors 5% Critical Value	0.121701
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-0.25489		
Maximum of log data	5.101694	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	1.26444	95% H-UCL	25.11186
Standard Deviation of log data	1.606285	95% Chebyshev (MVUE) UCL	28.24151
Variance of log data	2.580152	97.5% Chebyshev (MVUE) UCL	35.17886
		99% Chebyshev (MVUE) UCL	48.80594
		95% Non-parametric UCLs	
		CLT UCL	24.26784
		Adj-CLT UCL (Adjusted for skewness)	26.84721
		Mod-t UCL (Adjusted for skewness)	24.823
		Jackknife UCL	24.42067
		Standard Bootstrap UCL	23.82487
		Bootstrap-t UCL	29.32476
RECOMMENDATION		Hall's Bootstrap UCL	24.05777
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	24.77179
		BCA Bootstrap UCL	27.88519
Use 97.5% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	38.17008
		97.5% Chebyshev (Mean, Sd) UCL	47.8313
		99% Chebyshev (Mean, Sd) UCL	66.8089

Data File		Variable:	B(a)P
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	53	Lilliefors Test Statisitic	0.353975
Number of Unique Samples	26	Lilliefors 5% Critical Value	0.121701
Minimum	0.025	Data not normal at 5% significance level	
Maximum	20		
Mean	1.651189	95% UCL (Assuming Normal Distribution)	
Median	0.1	Student's-t UCL	2.606252
Standard Deviation	4.151796		
Variance	17.23741	Gamma Distribution Test	
Coefficient of Variation	2.514429	A-D Test Statistic	3.843406
Skewness	3.598235	A-D 5% Critical Value	0.855346
		K-S Test Statistic	0.203667
Gamma Statistics		K-S 5% Critical Value	0.132044
k hat	0.330545	Data do not follow gamma distribution	
k star (bias corrected)	0.324414	at 5% significance level	
Theta hat	4.995348		
Theta star	5.089762	95% UCLs (Assuming Gamma Distribution)	
nu hat	35.0378	Approximate Gamma UCL	2.584187
nu star	34.38786	Adjusted Gamma UCL	2.617324
Approx.Chi Square Value (.05)	21.97242		
Adjusted Level of Significance	0.045472	Lognormal Distribution Test	
Adjusted Chi Square Value	21.69424	Lilliefors Test Statisitic	0.153941
		Lilliefors 5% Critical Value	0.121701
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-3.68888		
Maximum of log data	2.995732	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-1.55189	95% H-UCL	4.721444
Standard Deviation of log data	2.044407	95% Chebyshev (MVUE) UCL	4.315501
Variance of log data	4.179598	97.5% Chebyshev (MVUE) UCL	5.519411
		99% Chebyshev (MVUE) UCL	7.884259
		95% Non-parametric UCLs	
		CLT UCL	2.589237
		Adj-CLT UCL (Adjusted for skewness)	2.89042
		Mod-t UCL (Adjusted for skewness)	2.653231
		Jackknife UCL	2.606252
		Standard Bootstrap UCL	2.577847
		Bootstrap-t UCL	3.730402
RECOMMENDATION		Hall's Bootstrap UCL	2.944046
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	2.579057
		BCA Bootstrap UCL	2.92383
Use 99% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	4.137039
		97.5% Chebyshev (Mean, Sd) UCL	5.212668
		99% Chebyshev (Mean, Sd) UCL	7.325533

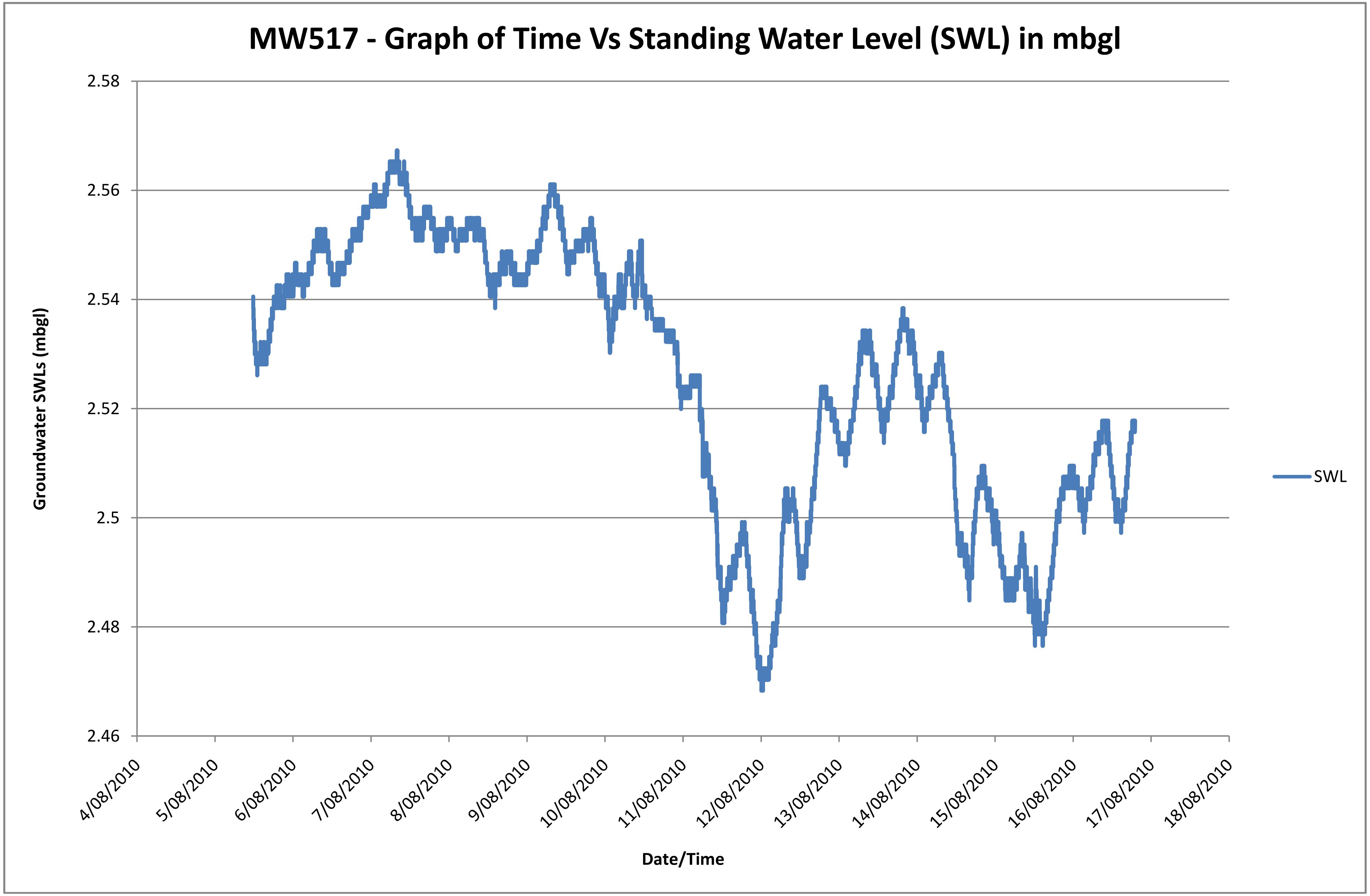
Data File		Variable:	C6-C9 TPH
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	58	Lilliefors Test Statisitic	0.439012
Number of Unique Samples	11	Lilliefors 5% Critical Value	0.116337
Minimum	12.5	Data not normal at 5% significance level	
Maximum	1100		
Mean	60.10345	95% UCL (Assuming Normal Distribution)	
Median	12.5	Student's-t UCL	97.02884
Standard Deviation	168.1881		
Variance	28287.25	Gamma Distribution Test	
Coefficient of Variation	2.798311	A-D Test Statistic	15.7419
Skewness	4.862584	A-D 5% Critical Value	0.810633
		K-S Test Statistic	0.501207
Gamma Statistics		K-S 5% Critical Value	0.123119
k hat	0.553654	Data do not follow gamma distribution	
k star (bias corrected)	0.536511	at 5% significance level	
Theta hat	108.5577		
Theta star	112.0264	95% UCLs (Assuming Gamma Distribution)	
nu hat	64.22391	Approximate Gamma UCL	82.96437
nu star	62.23532	Adjusted Gamma UCL	83.65448
Approx.Chi Square Value (.05)	45.08631		
Adjusted Level of Significance	0.045862	Lognormal Distribution Test	
Adjusted Chi Square Value	44.71437	Lilliefors Test Statisitic	0.486043
		Lilliefors 5% Critical Value	0.116337
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	2.525729		
Maximum of log data	7.003065	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	2.966589	95% H-UCL	48.81628
Standard Deviation of log data	1.079867	95% Chebyshev (MVUE) UCL	59.83391
Variance of log data	1.166114	97.5% Chebyshev (MVUE) UCL	70.89702
		99% Chebyshev (MVUE) UCL	92.62837
		95% Non-parametric UCLs	
		CLT UCL	96.4287
		Adj-CLT UCL (Adjusted for skewness)	111.4953
		Mod-t UCL (Adjusted for skewness)	99.37892
		Jackknife UCL	97.02884
		Standard Bootstrap UCL	96.22805
		Bootstrap-t UCL	144.4552
RECOMMENDATION		Hall's Bootstrap UCL	146.1135
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	100.3707
		BCA Bootstrap UCL	115.8103
Use 97.5% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	156.3662
		97.5% Chebyshev (Mean, Sd) UCL	198.0191
		99% Chebyshev (Mean, Sd) UCL	279.8383

General Statistics

Data File		Variable:	C10-C36 TPH
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	58	Lilliefors Test Statisitic	0.340836
Number of Unique Samples	28	Lilliefors 5% Critical Value	0.116337
Minimum	125	Data not normal at 5% significance level	
Maximum	15370		
Mean	1221.828	95% UCL (Assuming Normal Distribution)	
Median	125	Student's-t UCL	1808.897
Standard Deviation	2673.989		
Variance	7150217	Gamma Distribution Test	
Coefficient of Variation	2.188516	A-D Test Statistic	7.401509
Skewness	3.567696	A-D 5% Critical Value	0.814952
		K-S Test Statistic	0.287341
Gamma Statistics		K-S 5% Critical Value	0.123506
k hat	0.507358	Data do not follow gamma distribution	
k star (bias corrected)	0.492609	at 5% significance level	
Theta hat	2408.217		
Theta star	2480.317	95% UCLs (Assuming Gamma Distribution)	
nu hat	58.8535	Approximate Gamma UCL	1712.768
nu star	57.14269	Adjusted Gamma UCL	1727.714
Approx.Chi Square Value (.05)	40.76356		
Adjusted Level of Significance	0.045862	Lognormal Distribution Test	
Adjusted Chi Square Value	40.41093	Lilliefors Test Statisitic	0.305605
		Lilliefors 5% Critical Value	0.116337
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	4.828314		
Maximum of log data	9.640173	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	5.858992	95% H-UCL	1510.623
Standard Deviation of log data	1.388029	95% Chebyshev (MVUE) UCL	1813.59
Variance of log data	1.926625	97.5% Chebyshev (MVUE) UCL	2213.275
		99% Chebyshev (MVUE) UCL	2998.379
		95% Non-parametric UCLs	
		CLT UCL	1799.355
		Adj-CLT UCL (Adjusted for skewness)	1975.107
		Mod-t UCL (Adjusted for skewness)	1836.311
		Jackknife UCL	1808.897
		Standard Bootstrap UCL	1793.349
		Bootstrap-t UCL	2122.57
RECOMMENDATION		Hall's Bootstrap UCL	2090.499
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	1840.776
		BCA Bootstrap UCL	2009.931
Use 97.5% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	2752.289
		97.5% Chebyshev (Mean, Sd) UCL	3414.521
		99% Chebyshev (Mean, Sd) UCL	4715.348

APPENDIX F

(Data Logger Results)


MW517 - Graph of Time Vs Standing Water Level (SWL) in mbgl
2.58
2.56
2.54
2.52
2.5
2.48
2.46
Groundwater SWLs (mbgl)
4/08/2010
5/08/2010
6/08/2010
7/08/2010
8/08/2010
9/08/2010
10/08/2010
11/08/2010
12/08/2010
13/08/2010
14/08/2010
15/08/2010
16/08/2010
17/08/2010
18/08/2010
Date/Time
SWL