Contamination | Remediation | Geotechnical

SUNNY THIRD: REGENT STREET PTY LTD C/- MILLIGAN GROUP PTY LTD

DETAILED SITE INVESTIGATION REPORT

Proposed Mixed-use Development

80-88 Regent Street, Redfern NSW

Report E22974 AA_Rev 0
1 June 2016

REPORT DISTRIBUTION

Detailed Site Investigation
Proposed Mixed Use Development
80-88 Regent Street, Redfern NSW

EI Report No.: E22974 AA_Rev0
Date: 1 June 2016

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EXECUTIVE SUMMARY

Background

Sunny Third: Regent Street Pty Ltd C/- Milligan Group Pty Ltd engaged Environmental Investigations Australia Pty Ltd (EI) to conduct a Detailed Site Investigation (Stage 2 DSI) for the former commercial property located at 80-88 Regent Street, Redfern NSW ('the site'). This environmental assessment was completed as part of a development application process through The Council of the City of Sydney to allow site development for mixed, multi-storey, residential and commercial (including child care facility).

Based on a previous Preliminary Site Investigation, the site was has been used for commercial and residential land uses since at least the 1930s.

Objectives

The main objectives of the assessment were to:

- Characterise site environmental conditions in relation to the nature, degree and sources of any soil, vapour and groundwater impacts;
- Target potentially impacted areas identified during the preliminary stages of the assessment for intrusive investigation;
- Understand the influence of site specific, geologic and hydrogeological conditions on the potential fate and transport of any impacts that may be identified;
- Evaluate potential risks that identified impacts may pose to human health and the environment; and
- Where site contamination is confirmed, provide data to assist in the selection and design of appropriate remedial options.

Findings

- The site was bound by commercial buildings north, Regent Street to the east, Marian Street to the south and William Lane to the west, and covers a total area of approximately 822 m^2.
- The site was free of statutory notices issued by the NSW EPA/OEH;
- A previous Preliminary Site Investigation was conducted on the site by Aargus Pty Ltd in November 2015. This investigation identified the site history to have been commercial and residential land uses since at least the 1930s. Aargus concluded that further investigation, in the form of a DSI was required as the following potential contamination sources were identified:
  - Potential importation of uncontrolled fill that may contain various contaminants;
  - Current or previous use of pesticides;
  - Driveways where leaks and spills may have occurred from vehicles;
  - Metal degradations; and
  - Asbestos based materials.

- Soil sampling and analysis were conducted at seven targeted test bore locations (BH01 – BH07) down to a maximum depth of 9.0 mBGL. Sampling regime was considered to be appropriate for preliminary investigation purposes and comprised judgemental and systematic (triangular grid) sampling patterns, with allowance for structural obstacles (e.g. building walls, underground and overhanging services and other physical obstructions in use by existing operating businesses);

- Boreholes BH01M and BH06M were converted to groundwater monitoring wells;

- The sub-surface layers comprised fill materials of various constituents, comprising yellow to. grey-brown clayey sands and silty clays underlain by residual clay and weathered Ashfield Shale at depth;

- Groundwater was encountered at shallow depths within weathered Ashfield Shale, with standing water levels recorded at 5.464 mBGL (BH01M) and 8.305 mBGL (BH06M);

- No exceedances above the HIL-B criteria for asbestos, heavy metals, TRH, BTEX, PAHs, PCBs or OC/OP pesticides were detected in soil samples analysed during this DSI;

- Concentrations of TRH, BTEX, PAH, and VOCs were reported at concentrations below adopted GILs. Elevated concentration of some heavy metals were reported above the GILs in groundwater at boreholes BH01M and BH06M, however, these exceedances are considered to be attributed to background groundwater quality within inner suburban Sydney;

- On the basis of investigation findings the CSM discussed was considered to identify contamination sources, migration mechanisms and exposure pathways, as well as potential onsite and offsite receptors. As identified potential contaminants of concern are below the selected human health site investigation levels in soil and groundwater samples analysed, the risk of exposure to contamination is considered low through all potential exposure pathways for all potential receptors.

Conclusions and Recommendations

Based on the findings of this report and with consideration of the Statement of Limitations (**Section 12**), EI conclude that widespread contamination was not identified at the site. In view of the proposed development scope, and currently available information, EI conclude that the condition of soils and groundwater reported at the site are suitable for proposed commercial (including child care facility) and residential land use.

EI provide the following recommendations:

- Prior to site demolition, carry out a Hazardous Materials Survey on existing site structures to identify potentially hazardous building products that may be released to the environment during demolition;

- Any material being removed from site (including virgin excavated natural materials (VENM)) should be classified for off-site disposal in accordance the EPA (2014) *Waste Classification Guidelines*; and

- Any material being imported to the site should be assessed for potential contamination in accordance with NSW EPA guidelines as being suitable for the intended use or be classified as VENM.

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1. INTRODUCTION

1.1 BACKGROUND AND PURPOSE

Mr Jarrod White of Sunny Third: Regent Street Pty Ltd C/- Milligan Group Pty Ltd engaged Environmental Investigations Australia Pty Ltd (EI) to conduct a Detailed Site Investigation (DSI) for site characterisation purposes within Proposed Mixed Use Development, located at 80-88 Regent Street, Redfern NSW (‘the site’).

As shown in **Figure 1**, the site is currently occupied by five two-storey commercial terraced, brick buildings and is located approximately 3 km south of the Sydney central business district, comprising Lots A, B, C, D and E in DP105824. The site is situated within the Local Government Area of City of Sydney Council and covers a total area of approximately 1,250 m^2, as depicted in the site plan presented as **Figure 2**.

This assessment was conducted in support of a Development Application (DA) to City of Sydney Council and for the purpose of enabling the developer to meet its obligations under the Contaminated Land Management Act 1997 (CLM Act), for the assessment and management of contaminated soil and/or groundwater.

1.2 PROPOSED DEVELOPMENT

Based on Development Plans provided by the Client, the proposed development will involve the demolition of existing site structures and the construction of a 17-storey mixed, commercial and residential building with a childcare centre occupying the first floor. Four levels of basement car-parking will be constructed, which will involve nominal excavation of the entire site footprint to a depth of RL 12.80 m AHD (approximately 14 m below existing ground level). Copies of the proposed development plans are provided in **Appendix A**.

1.3 REGULATORY FRAMEWORK

The following regulatory framework and guidelines were considered during the preparation of this report:

- ANZECC & ARMCANZ (2000) *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*;
- DECCW (2009) *Guidelines for Implementing the Protection of the Environment Operations (Underground Petroleum Storage Systems) Regulation 2008*, (UPSS Guidelines);
- DEC (2007) *Guidelines for the Assessment and Management of Groundwater Contamination*;
- DEC (2006) *Guidelines for the NSW Site Auditor Scheme (2nd Edition)*;
- EPA (1995) *Sampling Design Guidelines*;
- EPA (2014) *Technical Note: Investigation of Service Station Sites*;
- NEPC (2013) *Schedule B(1) Guideline on Investigation Levels for Soil and Groundwater*;
- NEPC (2013) *Schedule B(2) Guideline on Site Characterisation*;

- *Contaminated Land Management Act (1997)*;
- State Environment Protection Policy 55 (SEPP 55) – *Remediation of Land*, and
- OEH (2011) *Guidelines for Consultants Reporting on Contaminated Sites*.

1.4 PROJECT OBJECTIVES

In order to achieve the above objectives, and in accordance with EI Proposal P13755.2 (dated 6 April 2016), the scope of works was as follows:

- Evaluate the potential for site contamination on the basis of historical land uses, anecdotal and documentary evidence of possible pollutant sources;
- To investigate the degree of any potential contamination by means of limited intrusive sampling and laboratory analysis, for relevant contaminants; and
- Where site contamination is confirmed, make recommendations for the appropriate management of any contaminated soils and/or groundwater.

1.5 SCOPE OF WORKS

In accordance with EI proposal P13755.2 (dated 6 April 2016), the scope of works was as follows:

1.5.1 Desktop Study

- A review of relevant topographical, geological, hydrogeological and soil landscape maps for the project area;
- A review of previous Preliminary Site Investigation report prepared by Aargus Pty Ltd for the site;
- A search of NSW EPA Land Information records under the Contaminated Land Management Act (1997) and Protection of the Environment Operations Act (1997);
- A review of existing underground services on site.

1.5.2 Field Work & Laboratory Analysis

- A detailed site walkover inspection;
- Drilling of boreholes at seven locations across accessible areas of the site, in accordance with the minimum sampling protocol recommended under EPA (1995);
- Installation of three groundwater monitoring wells to a maximum depth of 9 m (or prior refusal), constructed to standard environmental protocols to investigate potential groundwater contamination;
- Multiple level soil sampling within fill and natural soils and one round of groundwater sampling from the constructed groundwater monitoring well; and

- Laboratory analysis of selected soil and groundwater samples for relevant analytical parameters as determined from the site history survey and field observations during the investigation programme.

1.5.3 Data Analysis and Reporting

A DSI report would also be prepared to document desk study findings, the conceptual site model, data quality objectives, investigation methodologies and results. The report would also provide a record of observations made during the detailed site walkover inspection, borehole and monitoring well construction logs and a discussion of laboratory analytical results in regards to potential risks to human health, the environment and the aesthetic uses of the land.

2. SITE DESCRIPTION

2.1 PROPERTY IDENTIFICATION, LOCATION AND PHYSICAL SETTING

The site identification details and associated information are presented in **Table 2-1**, while the site locality is shown in **Figure 1**.

Table 2-1 Site Identification, Location and Zoning

Attribute	**Description**
Street Address	80-88 Regent Street, Redfern NSW
Location Description	Approximately 3 km south of the Sydney CBD, a rectangular shaped block bound by commercial buildings north, Regent Street to the east, Marian Street to the south and William Lane to the west. North eastern corner of site: GDA94-MGA55 Easting:888490.25, Northing: 6241777.416 (Source: http://maps.six.nsw.gov.au)
Site Area	Approximately 822 m^2.
Site Owner	Sunny Third: Regent Street Pty Ltd C/- Milligan Group Pty Ltd
Lot and Deposited Plan (DP)	Lots A, B, C, D and E in DP105824
State Survey Marks	One State Survey Mark (SSM) is situated in close proximity to the site: PM53328 on the corner of Marian Street and Rosehill Street, approximately 130 m south west of the site. (Source: http://maps.six.nsw.gov.au)
Local Government Authority	City of Sydney Council
Parish	Parish of Alexandria
County	County of Cumberland
Current Zoning	MD – SEPP Major Development 2005 (Sydney Local Environment Plan, 2012)
Current Land Uses	Commercial, vacant and residential

At the time of this assessment the site was occupied by a two commercially operated buildings within units 80 and 82 which included a second-hand store and café respectively. The remaining buildings (84, 86 and 88) were unoccupied, former commercial buildings. Unit 88 was also residential within the western portion. The site layout and features are illustrated in **Figure 2**.

2.2 SURROUNDING LAND USE

The site is situated within an area of mixed land uses and current uses. Current uses of surrounding land are described in **Table 2-2**.

Table 2-2 Surrounding Land Uses

Direction Relative to Site	**Land Use Description**
North	Commercial buildings.
South	Marian Street followed by commercial buildings.
East	Regent Street, followed by commercial buildings.
West	William Lane followed by commercial / car-parks.

There were no sensitive receptors identified within 500 m radius of the site.

2.3 REGIONAL SETTING

Regional topography, geology, soil landscape and hydrogeological information are summarised in **Table 2-3**.

Table 2-3 Regional Setting Information

Attribute	**Description**
Topography	The topography of the site drops towards the south west from an approximate RL of 29.16 m AHD to RL 26.18 m AHD (ref. Mitchell Land Surveyors Pty Ltd, Drawing No. 1241AA).
Site Drainage	Consistent with the general slope of the site, stormwater is assumed to flow south west towards Alexandra Canal via drainage systems which flow in a northerly direction towards Blackwattle Bay.
Regional Geology	With reference to the 1:100 000 scale Geological Series Sheet 9130 (Sydney) the site is located on a contact between the Ashfield Shale and the Botany Sands. The Ashfield Shale is characterised by black to dark grey shale and laminite. Whereas the Botany Sands are characterised as medium to fine-grained marine sands with podsols. A Quaternary alluvial deposit (Qha) is located within close proximity (north) to the site which consists of silty to peaty quartz sand, silt and clay. Ferruginous and humic cementation in places and common shell layers. A fault line running east to west was also identified north of the site.
Soil Landscapes	The Soil Conservation Service of NSW Soil Landscapes of the Sydney 1:100,000 Sheet (Chapman and Murphy, 1989) indicates that the site overlies the Blacktown (bt) landscape. Soils are generally shallow to moderately deep (<100 cm) red and brown podzolic soils on crests, upper slopes and well-drained areas, and deep (150-300 cm) yellow podzolic soils and soloths on lower slopes and in areas of poor drainage. Land use is dominantly intensive residential and light and heavy industrial. Soil limitations include moderately reactive highly plastic subsoil, low soil fertility and poor soil drainage.

Attribute	**Description**
Acid Sulphate Soil Risk	With reference to the Botany Bay Acid Sulfate Soil Risk Map (1:25,000 scale; Murphy, 1997), the subject land lies within the map class description of *No Known Occurrence*. In such cases, acid sulphate soils (ASS) are not known or expected to occur and “land management activities are not likely to be affected by ASS materials”. The ASS Map provided under the Sydney Local Environmental Plan 2012 (Ref. Sheet ASS_11, Map ID 7200_COM_ASS_011_005_20150710) indicates that the site lies within an area of no known occurrences; however, Class 5 ASS area is present on the eastern boundary of Regent Street. Council consent is therefore required prior to commencing any works within 500m of Class 1, 2, 3 or 4 land, with a ground elevation of below 5m Australian Height Datum (AHD) and where the water table is likely to be lowered below 1m AHD on adjacent Class 1, 2, 3 or 4 land.
Depth to Groundwater	Onsite groundwater conditions, including groundwater flow direction, are discussed in **Section 8.2**.
Hydraulic Conductivity	Groundwater flow through the Ashfield Shale is documented to be influenced by the bedrock fracture system with hydraulic conductivities estimated to range between 8.6 x10-9 and 1.7x10-4 m/day (Domenico and Schwartz, 1990).
Nearest Surface Water Feature	Alexandria Canal which is located approximately 2.2 km south west of the site. Alexandria Canal is understood to be tidally influenced and is considered to be a marine system for impact assessment purposes.
Groundwater Flow Direction	Consistent with the general slope of the site, groundwater flow direction in the vicinity of the site is inferred to be towards Alexandra Canal located approximately 2.2 km south west of the site.

2.4 GROUNDWATER BORE RECORDS AND LOCAL GROUNDWATER USE

An online search of registered groundwater bores was conducted by EI on the 11 May 2016 through the NSW Office of Water (Ref. http:// realtimedata.water.nsw.gov.au/water.stm). No groundwater bores were identified within 500 m radius of the site.

2.5 SITE WALKOVER INSPECTION

EI staff made a number of observations during a detailed site inspection on 14 April, 2016. The recorded observations are summarised below:

- The site was occupied by a five, terrace-style, brick / steel / wood, double storey buildings located within the eastern portion of the site. The western portion was occupied by concrete paved courtyards (**Photograph 1, Photograph 2**);
- At the time of investigation two commercially operated buildings within units 80 and 82 which included a second-hand store and café respectively. The remaining buildings (84, 86 and 88) were unoccupied, former commercial buildings. Unit 88 was also residential within the western portion;
- Site buildings were observed to be poorly maintained and in average condition;
- The site sloped gently towards the south west;
- A small amount of vegetation was identified at the site within the western courtyard areas which appeared to be in average, unmaintained condition, with no evidence of stress;

- Site pavements were observed to be in fairly good condition, with some cracking was observed within the courtyard areas;
- No suspicious odours or staining were observed across any part of the site and;
- No evidence of underground storage tanks, previous boreholes or groundwater monitoring wells was identified at the site.

A photograph log is provided in **Appendix B**.

2.6 HAZARDOUS CHEMICALS AND REGULATORY COMPLIANCE

Contaminated Land - Record of Notices under Section 58 of CLM Act (1997)

The contaminated land public record is a searchable database of:

- Orders made under Part 3 of the Contaminated Land Management Act 1997 (CLM Act);
- Approved voluntary management proposals under the CLM Act that have not been fully carried out and where the approval of the EPA has not been revoked;
- Site Audit Statements provided to the EPA under Section 53B of the CLM Act that relate to significantly contaminated land;
- Where practicable, copies of any documentation formerly required to be part of the public record; and
- Actions taken by the EPA under Sections 35 and 36 of the Environmentally Hazardous Chemicals Act 1985.

An on-line search of the contaminated land public record of NSW Environment Protection Authority (EPA) Notices was conducted and did not identify the site or any nearby properties identified two nearby properties as being listed on the NSW Contaminated Land – Record of EPA notices.

NSW Contaminated Sites notified to the EPA under Section 60 of CLM Act (1997)

A search through the List of NSW Contaminated Sites notified to the EPA under Section 60 of the CLM Act 2008 was also conducted. This list is maintained by NSW EPA and includes properties on which contamination has been identified. Not all notified land is deemed to be impacted significantly enough to warrant regulation by the EPA. The site has not been notified as contaminated to the EPA.

The following nearby property was identified as being listed on the NSW Contaminated Sites:

116 Regent Street, Redfern NSW: Service station which is currently under assessment, located approximately 100 m south from the site and inferred, hydraulically across gradient.

In summary, groundwater flow direction is anticipated to be north-west towards Blackwattle Bay. The above property was not identified immediately up-gradient (south east) of the site and are therefore not considered potential off-site sources of groundwater contamination.

Protection of the Environment Operations Act public register

A search of the Protection of the Environment Operations (POEO) Act public register, regarding environmental protection licences, applications, notices, audits, pollution studies, and reduction programmes, did not identify any record for the site or surrounding properties.

3. SUMMARY OF PREVIOUS INVESTIGATION

A previous environmental investigation in the form of a Preliminary Site Investigation (PSI) was conducted on the site by Aargus Pty Ltd (Argus) in November 2015. Aargus documented their findings in a report titled *Preliminary Site Investigation at 80-88 Regent Street, Redfern NSW* (Ref. Aargus Report No. ES6416, 24 November 2015), which provided an overall indication of potential for contamination at the site. A summary of Aargus' works and key findings is outlined in **Table 3-1**.

Table 3-1 Summary of Previous Investigation Works and Findings

Assessment Details	**Project Tasks and Findings**
Preliminary Site Investigation (Aargus, 2015)	
Work Objectives	The primary objectives were to: • Identify potential areas where contamination may have occurred on site from current and historical activities; • Identify potential contaminants associated with potentially contaminating activities; • Assess the potential for soils and groundwater to have been impacted by current and historical activities; and • Assess the suitability of the site for redevelopment into a mixed commercial/residential building with basement car park, based on its current condition and the investigation findings.
Scope of Works	• A review of the physical site setting and site conditions based on a site inspection, including research of the location of sewers, drains, holdings tanks and pits, spills, patches of discoloured vegetation, etc; • Research and review of the information available, including previous environmental investigations, current and historical titles information, review of aerial photographs, groundwater bore searches, EPA notices, council records, anecdotal evidence, site survey and site records on waste management; • Development of a preliminary Conceptual Site Model (CSM) to demonstrate the interactions between potential sources of contamination, exposure pathways and human / ecological receptors identified; and • Recommendations for additional investigations should any data gaps be identified or possible strategies for the management of the site, where relevant.
Conclusions	Land title records indicate that the site has been terrace-style buildings from at least the 1930s, operating in a commercial and residential nature. The following potential sources of contamination were identified: • Potential importation of uncontrolled fill that may contain various contaminants; • Current or previous use of pesticides; • Driveways where leaks and spills may have occurred from vehicles; • Metal degradations; and • Asbestos based materials.
Recommendations	Aargus recommended further investigation in the form of a Detailed Site Investigation to confirm the presence and extent of contamination in order to determine the suitably of the site for the proposed development.

4. CONCEPTUAL SITE MODEL

In accordance with NEPM (2013) *Schedule B2 – Guideline on Site Characterisation* and to aid in the assessment of data collection for the site, EI developed a preliminary conceptual site model (CSM) assessing plausible pollutant linkages between potential contamination sources, migration pathways and receptors. The CSM provides a framework for the review of the reliability and useability of the data collected and to identify data gaps in the existing site characterisation.

4.1 CHEMICAL HAZARDS AND CONTAMINATION SOURCES

On the basis of site history and search findings (described in **Section 5**) EI consider potential chemical hazards and onsite contamination sources to be as follows:

- Imported fill soils of unknown origin distributed across the site;
- Impacts from previous commercial activities at the site;
- Potential use of pesticides under site buildings;
- Painted surfaces in relation to the structures (buildings) that are currently present on the site;
- Hazardous materials, including potential asbestos-containing materials (ACM) from building products; and
- Deeper, natural soils containing residual impacts, representing potential secondary sources of contamination.

4.2 CHEMICALS OF CONCERN

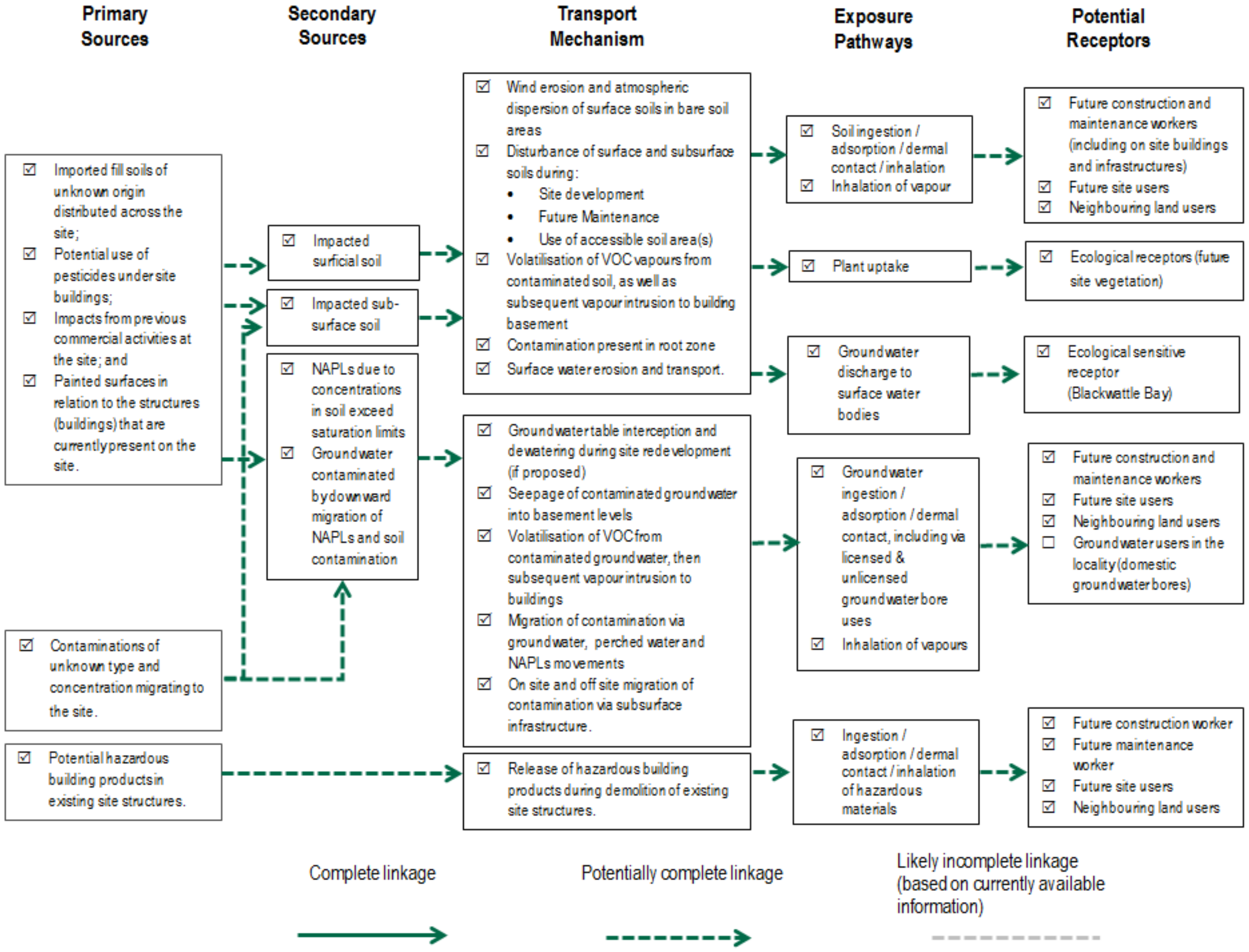
Based on the findings of the site contamination appraisal the chemicals of concern (COC) at the site are considered to be:

- Soil – heavy metals (HMs), total recoverable hydrocarbons (TRH), polycyclic aromatic hydrocarbons (PAH), the monocyclic aromatic hydrocarbon compounds *benzene, toluene, ethylbenzene and xylenes* (BTEX), organochlorine and organophosphate pesticides (OCP/ OPP), polychlorinated biphenyls (PCB), volatile organic compounds (VOC) and asbestos.
- Groundwater – HMs, TRH, BTEX, PAH, VOCs and phenols.

4.3 POTENTIAL SOURCES, EXPOSURE PATHWAYS AND RECEPTORS

Potential contamination sources, exposure pathways and human and environmental receptors that were considered relevant for this assessment are summarised along with a qualitative assessment of the potential risks posed by complete exposure pathways in **Table 4-1**.

Table 4-1 Preliminary Conceptual Site Model



Preliminary Conceptual Site Model

Source: based on NEPM schedule B4 HRA Methodology

4.4 DATA GAPS

Based on information from the site walkover inspection and site history review, EI considered a programme of intrusive investigation was warranted to conduct targeted sampling at locations of known, potential sources of contamination (as listed in **Section 5.1**), with systematic sampling coverage in site areas where operational site history was not documented.

5. SAMPLING, ANALYTICAL AND QUALITY PLAN (SAQP)

The SAQP plays a crucial role in ensuring that the data collected as part of this, and ongoing environmental works carried out at the site are representative, and provide a robust basis for site assessment decisions. This SAQP includes the following:

- Data quality objectives, including a summary of the objectives of the ESA;
- Investigation methodology including media to be sampled, details of analytes and parameters to be monitored and a description of intended sampling points;
- Sampling methods and procedures;
- Field screening methods;
- Analysis Methods;
- Sample handling, preservation and storage; and
- Analytical QA/QC.

5.1 DATA QUALITY OBJECTIVES (DQO)

In accordance with the US EPA (2006) *Data Quality Assessment* and the DEC (2006) *Guidelines for the NSW Site Auditor Scheme*, the process of developing Data Quality Objectives (DQO) was used by the EI assessment team to determine the appropriate level of data quality needed for the specific data requirements of the project. The DQO process that was applied for this assessment is documented in **Table 5-1**.

Table 5-1 Summary of Project Data Quality Objectives

DQO Steps (NSW DEC, 2006)	Details	Comments (changes during investigation)
1. State the Problem Summarise the contamination problem that will require new environmental data, and identify the resources available to resolve the problem; develop a conceptual site model	The site is currently occupied by five, commercial / residential terrace style buildings and covers an area of approximately 822 m^2. Open car-parks and yard space are present within the western quarter of the site. Based on the review of the previous Preliminary Site Investigation (Aargus, 2015) and a detailed site inspection, potential for contamination to be present within the site soil and/or groundwater was identified, contributed by various potential sources listed in **Section 4.1**. EI considered the main source of potential contamination was imported fill material of unknown origin. This assessment is required as part of a Development Application to Council of the City of Sydney Council for the demolition of existing structures and the construction of a multi-storey mixed, commercial (including a childcare centre) and residential building over four levels of basement car-parking.	-
2. Identify the Goal of the Study (Identify the decisions) Identify the decisions that need to be made on the contamination problem and the new environmental data required to make them	Historical information indicated that there is the potential for site contamination from previous commercial operations at the site, including the various potential sources listed in **Section 4.1**. Based on the objectives outlined in **Section 1.4**, the decisions that need to be made are: • Has the nature, extent and source of any soil, vapour and/or groundwater impacts onsite been defined? • What impact do the site specific, geologic and hydrogeological conditions have on the fate and transport of any impacts that may be identified? • Does the level of impact coupled with the fate and transport of identified contaminants represent an unacceptable risk to identified human and/or environmental receptors on or offsite? • Does the collected data provide sufficient information to allow the selection and design of an appropriate remedial strategy, if necessary?	-

DQO Steps (NSW DEC, 2006)	**Details**	**Comments (changes during investigation)**
3. Identify Information Inputs (Identify inputs to decision) Identify the information needed to support any decision and specify which inputs require new environmental measurements	Inputs to the decision making process include: • Previous PSI (Aargus, 2015) undertaken for the site; • Areas of concern identified by Aargus (2015) and during the site inspection prior to intrusive investigations; • National and NSW EPA guidelines endorsed under the NSW *Contaminated Land Management Act 1997*; • Soil and groundwater samples obtained from an intrusive investigation in locations, and to depths deemed appropriate for detailed investigation purposes (or prior auger refusal); • Investigation sampling to verify the presence of onsite contamination and to evaluate the potential risks to sensitive receptors; and • Laboratory analysis of selected soil and groundwater samples will comprise contaminants of concern presented in **Section 4.2**. At the end of the assessment, a decision must be made regarding whether the environmental conditions are suitable for the proposed redevelopment, or if additional investigation or remedial works are required to make the site suitable.	-
4. Define the Boundaries of the Study Specify the spatial and temporal aspects of the environmental media that the data must represent to support decision	• Lateral – The cadastral boundaries of the investigation area; with the site located on the corner of Regent Street (east) and Marian Street (south).. • Vertical – From the existing ground level to a maximum depth of 9.0 mBGL. • Temporal – The results will be valid on the day samples are collected and will remain valid as long as no changes occur on site or contamination (if present) does not migrate on site or on to the site from off-site sources.	Lateral – Due to access restrictions within the site buildings, the contract drilling rig could only access two locations for the installation of groundwater wells. The two monitoring wells were installed to a maximum depth of 9.0 mBGL.
5. Develop the Analytic Approach (Develop a decision rule) To define the parameter of interest, specify the action level, and integrate previous DQO outputs into a single statement that describes a logical basis for choosing from alternative actions	The decision rules for the investigation were: • If the concentrations of contaminants in the soils data exceed the land use criteria; then assess the need to further investigate the extent of impacts onsite; and • Decision criteria for QA/QC measures are defined by the Data Quality Indicators (DQI) in **Table 6-2**.	-

DQO Steps (NSW DEC, 2006)	**Details**	**Comments (changes during investigation)**
6. Specify Performance or Acceptance Criteria (Specify limits on decision errors) Specify the decision-maker's acceptable limits on decision errors, which are used to establish performance goals for limiting uncertainties in the data	Specific limits for this project are to be in accordance with the National and NSW EPA guidance, and appropriate indicators of data quality and standard procedures for field sampling and handling. This should include the following points to quantify tolerable limits: • The null hypothesis for the investigation is that: – The 95% Upper Confidence Limits (UCL) of the mean for contaminants of concern exceed residential HIL-B and HSL-A&B land use criteria across the site. • Sampling on a 11 m grid will allow detection of a circular hotspot with a nominal diameter of 13 m with 95% certainty; • The acceptance of the site will be based on the probability that – The 95% UCL of the mean of the data will satisfy the given site criteria. Therefore a limit on the decision error will be 5% that a conclusive statement may be incorrect; and – The standard deviation of the results is less than 50% of the relevant remediation acceptance criterion; and – No single results exceeds the remediation acceptance criteria by 250% or more; and • Soil concentrations for chemicals of concern that are below investigation criteria made or approved by the NSW EPA will be treated as acceptable and indicative of suitability for the proposed land use(s); and • If contaminant concentrations in groundwater exceed the adopted criteria, further investigation will be considered prudent. If no contamination is detected in groundwater, further action will not be warranted.	-

DQO Steps (NSW DEC, 2006)	Details	Comments (changes during investigation)
7. Develop the Detailed Plan for Obtaining Data (Optimise the design for obtaining data) Identify the most resource-effective sampling and analysis design for general data that are expected to satisfy the DQOs	• The site area of 822 m^2 requires a minimum of seven (7) sampling points according to EPA (1995), for assessment purposes. • Soil sampling locations were set using a systematic sampling pattern across the accessible areas of the site with allowance for structural obstacles. • An upper soil profile sample (or soil extracted immediately beneath the concrete hardstand / pavement) will be collected at each borehole location and tested for chemicals of concern, to assess the conditions of fill layer, and impacts from activities above ground. Further sampling would also be carried out at deeper soil layers. These samples would be selected for testing based on field observations (including visual and olfactory evidence, as well as soil vapour screening in headspace samples) whilst giving consideration to characterise the subsurface stratigraphy. • Three groundwater monitoring wells would be installed at both up and down gradient locations across the site. • Written instructions will be issued to guide field personnel in the required fieldwork activities.	Due to building restrictions, only two of the three proposed groundwater wells could be installed.

5.2 DATA QUALITY INDICATORS

To ensure that the investigation data collected was of an acceptable quality, the investigation data set was assessed against the data quality indicators (DQI) outlined in **Table 5-2**, which related to both field and laboratory-based procedures. The assessment of data quality is discussed in **Section 7**.

Table 5-2 Data Quality Indicators

Data Quality Objective	**Data Quality Indicator**	**Acceptable Range**
Accuracy	Field – Trip blank (laboratory prepared) Laboratory – Laboratory control spike and matrix spike	< laboratory limit of reporting (LOR) Prescribed by the laboratories
Precision	Field – Blind replicate and spilt duplicate Laboratory – Laboratory duplicate and matrix spike duplicate	< 30 % relative percentage difference (RPD [%]) Prescribed by the laboratories
Representativeness	Field – Trip blank (laboratory prepared) Laboratory – Method blank	< laboratory limit of reporting (LOR) Prescribed by the laboratories
Completeness	Completion (%)	-

6. ASSESSMENT METHODOLOGY

6.1 SAMPLING RATIONALE

With reference to the preliminary CSM described in **Section 5**, soil and groundwater investigation works were planned in accordance with the following rationale:

- Sampling fill and natural soils from seven test bore locations located systematically across the site using a grid-based sampling pattern to characterise in-situ soils;
- Sampling groundwater during a single groundwater monitoring event (GME) at three monitoring wells located close to the up gradient and down gradient site boundaries, to assess for potential groundwater impacts; and
- Laboratory analysis of representative soil and groundwater samples for the identified chemicals of concern.

6.2 INVESTIGATION CONSTRAINTS

While the number of proposed test borehole locations was achieved during intrusive site investigations, the proposed number of monitoring wells (three monitoring wells) prescribed in the investigation scope (**Section 1.5)** was not achieved due to a number of physical obstructions. As such, only two groundwater monitoring wells were able to be installed. Installation of a third monitoring wells was not possible due to limited head-clearance for the mechanical drilling rig within internal site buildings which prevented installation of a third up-gradient groundwater monitoring well.

6.3 ASSESSMENT CRITERIA

The assessment criteria proposed for this project are outlined in **Table 6-1**. These were selected from available published guidelines that are endorsed by national or state regulatory authorities, with due consideration of the exposure scenario that is expected for various parts of the site, the likely exposure pathways and the identified potential receptors.

Table 6-1 Adopted Investigation Levels for Soil and Groundwater

Environmental Media	Adopted Guidelines	Rationale
Soil	NEPM, 2013 Soil HILs, HSLs & Management Limits for TPHs	**Soil Health-based Investigation Levels (HILs)** All samples to be assessed against the NEPM 2013 HIL-B thresholds for residential sites with minimal access to soils. **Soil Health-based Screening Levels (HSLs)** The NEPM 2013 Soil HSL-A&B thresholds for low-high density residential sites for vapour intrusion would be applied to assess for potential human health impacts from residual vapours resulting from petroleum, BTEX & naphthalene. WADOH (2009) assessment criteria, as presented in NEPC (2013) were not adopted as part of this investigation. As assessment for asbestos was conducted for preliminary screening purposes as part of this investigation, the criteria adopted is based on the limit of reporting (LOR) reported by the analytical laboratory of (>0.01 w/w%) or where asbestos is reported to be present in the analysed sample. **Management Limits for Petroleum Hydrocarbons** Should the ESLs and HSLs be exceeded for petroleum hydrocarbons, soil samples would also assessed against the NEPM 2013 *Management Limits* for the TRH fractions F1 – F4 to assess propensity for phase-separated hydrocarbons (PSH), fire and explosive hazards & adverse effects on buried infrastructure.
Groundwater	NEPM, 2013 GILs for Marine Waters	**Groundwater Investigation Levels (GILs) for Marine Water** NEPM 2013 provides GILs for typical, slightly-moderately disturbed aquatic ecosystems, which are based on the ANZECC & ARMCANZ 2000 Trigger Values (TVs) for the 95% level of protection of aquatic ecosystems; however, the 99% TVs were applied for the bio-accumulative metals *cadmium* and *mercury*. The marine criteria were considered relevant as the closest, potential surface water receptor was Alexandra Canal, located 700m west of the site and understood to be tidally influenced.
	NEPM, 2013 Groundwater HSLs for Vapour Intrusion	**Health-based Screening Levels (HSLs)** The NEPM 2013 groundwater HSLs for vapour intrusion were used to assess for potential human health impacts from residual vapours resulting from petroleum, BTEX and naphthalene impacts. The *HSL A* and *HSL B* thresholds for low and medium-density residential sites were applied for groundwater.
	NEPM, 2013 GILs for Drinking purposes	**Drinking Water GILs** The NEPM (2013) GILs for drinking water quality were applied for specific parameters, for which freshwater/marine GILs were not provided. These were based on the Australian Drinking Water Guidelines (Ref. NHMRC, 2011).

For the purposes of this investigation, the adopted soil assessment criteria are referred to as the Soil Investigation Levels (SILs) and the adopted groundwater assessment criteria are referred to as the Groundwater Investigation Levels (GILs). SILs and GILs are presented alongside the analytical results in the corresponding summary tables, which are discussed in **Section 9**.

6.4 SOIL INVESTIGATIONS

The soil investigations conducted at the site are described in **Table 6-2**. Test bore locations are illustrated in **Figure 2**.

Table 6-2 Summary of Soil Investigation Methodology

Activity/Item	Details
Fieldwork	Site investigations were conducted on 29 April 2016. All planned test bores (BH01M, BH02 – BH05, BH06M and BH07) were completed to natural soils. Boreholes BH01M and BH06M were converted into groundwater monitoring wells.
Drilling Method & Investigation Depth	Boreholes BH01M and BH06M were drilled by BG Drilling using a mechanical track-mounted drilling rig with 100 mm diameter solid flight augers. Boreholes BH02 – BH05 and BH07 were drilled via the hand auger method. Final bore depths were: • 10.5 mBGL for BH01M; • 2.0 mBGL for BH02; • 1.9 mBGL for BH03; • 1.5 mBGL for BH04; • 1.9 mBGL for BH05; • 9.0 mBGL for BH06M; and • 1.0 mBGL for BH07.
Soil Logging	Drilled soils were classified in the field with respect to lithological characteristics and evaluated on a qualitative basis for odour and visual signs of contamination. Soil classifications and descriptions were based on Unified Soil Classification System (USCS) and Australian Standard (AS) 4482.1-2005. Bore logs are presented in **Appendix C**.
Field Observations (including visual and olfactory signs of potential contamination)	A summary of field observations is provided in **Section 8.1.2**.
Soil Sampling	• Soil samples were collected using a dry grab method (unused, dedicated nitrile gloves) & placed into laboratory-supplied, acid-washed, solvent-rinsed glass jars. • Blind field duplicates was separated from the primary samples and placed into glass jars. • A small amount of duplicate was collected from each soil samples and placed into zip-lock bag for Photo-ionisation Detector (PID) screening. • A small amount of duplicate was separated from all fill samples and placed into a zip-lock bag for asbestos analysis.
Decontamination Procedures	*Drilling Equipment* - The drilling rods were decontaminated between sampling locations with potable water until the augers were free of all residual materials. *Sampling Equipment* – Samples were collected via hand with a new pair of dedicated nitrile gloves for each sample and placed into laboratory prepared and pre-labelled sample jars
Sample Preservation	Samples were stored in a refrigerated (ice-filled) chest, whilst on-site and in transit to the laboratory. All samples were submitted and analysed within the required holding period, as documented in laboratory reports discussed in a later section.

Activity/Item	**Details**
Management of Soil Cuttings	Soil cuttings were used as backfill for completed boreholes.
Quality Control & Laboratory Analysis	A number of soil samples were submitted for analysis of previously-identified COPC by SGS Laboratories (SGS). QA/QC testing comprised intra-laboratory duplicates ('field duplicates') tested blind by SGS and an inter-laboratory field duplicate tested blind by Envirolab Services (Envirolab). All samples were transported under strict Chain-of-Custody (COC) conditions and COC certificates and laboratory sample receipt documentation were provided to EI for confirmation purposes, as discussed in **Section 9**.
Soil Vapour Screening	Screening for potential VOCs in collected soil samples was conducted using a Photo-ionisation Detector (PID) fitted with a 10.9 eV lamp. Elevated volatile odours were not detected at any sampling location during the course of the fieldwork.

6.5 GROUNDWATER INVESTIGATIONS

The groundwater investigations conducted at the site are described in **Table 6-3**. Monitoring well locations are illustrated in **Figure 2**.

Table 6-3 Summary of Groundwater Investigation Methodology

Activity/Item	**Details**
Fieldwork	Groundwater monitoring wells were installed and developed on 29 April 2016; whereas, water level gauging, well purging, field testing and groundwater sampling was conducted on 11 May, 2016.
Well Construction	Test bores were converted to groundwater monitoring wells as follows: • One 9.0 m deep, onsite, down-gradient well identified as BH01M; and • One,9.0 m deep, onsite, down-gradient well identified as BH06M. Drilled by BG Drilling using a track-mounted, mechanical, 100 mm diameter, solid-flight auger rig. Well construction details are tabulated in **Table 9-2** and documented in the bore logs presented in **Appendix C**. Both wells were installed to screen the Ashfield Shale aquifer.
Well Construction (continued)	Well construction was in general accordance with the standards described in NUDLC, 2012 and involved the following: • 50 mm, Class 18 uPVC, threaded, machine-slotted screen and casing, with slotted intervals in shallow wells set to screen to at least 500 mm above the standing water level to allow sampling of phase-separated hydrocarbon product, if present; • Base and top of each well was sealed with a uPVC cap; • Annular, graded sand filter was used to approximately 300mm above top of screen interval; • Granular bentonite was applied above annular filter to seal the screened interval; • Drill cuttings were used to backfill the bore annulus to just below ground level; and • Surface completion comprised a steel road box cover set in neat cement and finished flush with the concrete slab level.

Activity/Item	**Details**
Well Development	Well development was conducted for each well directly following installation. This involved agitation within the full length of the water column using a dedicated, HDPE, disposable bailer. Bailing was continued until no further reduction in suspended sediment was observed (i.e. after removal of several well volumes).
Well Survey (Elevation and location)	Well elevations at ground level were extrapolated from the spot elevations marked on the survey plan provided by the client (**Figure 2**). Well elevations at ground level were extrapolated in metres relative to Australian Height Datum (mAHD).
Well Purging & Field Testing	Monitoring wells BH01M and BH06M were gauged for standing water level (SWL, depth to groundwater) prior to well purging at the commencement of the GME on 11 May 2016. Due to slow recovery within the shale aquifer, all groundwater monitoring wells were purged and sampled using a dedicated, HDPE, disposable bailer. Field measurement of water quality parameters was conducted on purged groundwater with a water quality meter (Hanna Multi Parameter 9829) prior to sampling. Groundwater parameters tested in the field were Dissolved Oxygen (DO), Electrical Conductivity (EC), Redox, Temperature and pH. The measured parameters were recorded onto a field data sheet (**Appendix D**), along with the purged water volume at the time of measurement. Total water volume purged and stabilised groundwater parameters at each groundwater monitoring well are summarised in **Table 9-3**.
Decontamination Procedure	• All sample containers were supplied by the laboratory for the particular project and only opened once immediately prior to sampling. • Samples were stored in a chilled cooler, whilst on-site and in transit to the laboratory. All samples were submitted and analysed within the required holding period, as documented in laboratory reports discussed in a later section. • The micro-purge pump, water level probe and water quality kit probes were washed in a solution of potable water and Decon 90 and then rinsed with potable water between measurements/wells.
Sample Preservation	Sample containers were supplied by the laboratory with the following preservatives: • One 1 litre amber glass, acid-washed and solvent-rinsed bottle; • Two 40ml glass vials, pre-preserved with dilute hydrochloric acid, Teflon-sealed; and • One 250mL, HDPE bottle, pre-preserved with dilute nitric acid (1 mL). Samples for metals analysis were field-filtered using 0.45 µm pore-size filters. All containers were filled with sample to the brim then capped and stored in ice-filled chests, until completion of the fieldwork and during sample transit to the laboratory.
Quality Control & Laboratory Analysis	All groundwater samples were submitted for analysis of previously-identified chemicals of concern by SGS Laboratories (SGS). QA/QC testing comprised intra-laboratory duplicates (‘field duplicates’) tested blind by SGS and an inter-laboratory field duplicate tested blind by Envirolab Services (Envirolab). All samples were transported under strict Chain-of-Custody (COC) conditions and COC certificates and laboratory sample receipt documentation were provided to EI for confirmation purposes.
Sample Transport	After sampling, refrigerated sample chests were transported to SGS Australia Pty Ltd using strict Chain-of-Custody (COC) procedures. Inter-laboratory duplicate (ILD) samples were forwarded to Envirolab Services Pty Ltd (Envirolab) for QA/QC analysis. A Sample Receipt Advice (SRA) was provided by each laboratory to document sample condition upon receipt. Copies of SRA and COC certificates are presented in **Appendix E**.

7. DATA QUALITY ASSESSMENT

The assessment of data quality is defined as the scientific and statistical evaluation of environmental data to determine if these data meet the objectives of the project (Ref. USEPA 2006). Data quality assessment includes an evaluation of the compliance of the field sampling and laboratory analytical procedures and an assessment of the accuracy and precision of these data from the laboratory quality control measurements obtained.

The data quality assessment process for this assessment included a review of analytical procedures to confirm compliance with established laboratory protocols and an assessment of the accuracy and precision of analytical data from a range of quality control measurements. The QC measures generated from the field sampling and analytical program were as follows:

- Suitable records of fieldwork observations including borehole logs;
- Relevant and appropriate sampling plan (density, type, and location);
- Use of approved and appropriate sampling methods;
- Preservation and storage of samples upon collection and during transport to the laboratory;
- Complete field and analytical laboratory sample COC procedures and documentation;
- Sample holding times within acceptable limits;
- Use of appropriate analytical procedures and NATA-accredited laboratories; and
- Required LOR (to allow for comparison with adopted IL);
- Frequency of conducting quality control measurements;
- Laboratory blanks;
- Field duplicates;
- Laboratory duplicates;
- Matrix spike/matrix spike duplicates (MS/MSDs);
- Surrogates (or System Monitoring Compounds);
- Analytical results for replicated samples, including field and laboratory duplicates and inter-laboratory duplicates, expressed as Relative Percentage Difference (RPD); and
- Checking for the occurrence of apparently unusual or anomalous results, e.g. laboratory results that appear to be inconsistent with field observations or measurements.

The findings of the data quality assessment in relation to the soil and groundwater investigations at the site are discussed in detail in **Appendix G**. QA/QC policies and DQOs are presented in **Appendix H**.

On the basis of the analytical data validation procedure employed the overall quality of the soil and groundwater analytical data produced for the site were considered to be of an acceptable standard for interpretive use.

8. RESULTS

8.1 SOIL INVESTIGATION RESULTS

8.1.1 Site Geology and Subsurface Conditions

The general site geology encountered during the drilling of the soil investigation boreholes, installation of monitoring wells may be described as a layer of anthropogenic filling overlying residual soils and weathered Ashfield Shale at depth. The geological information obtained during the investigation is summarised in **Table 8-1** and borehole logs from these works are presented in **Appendix C**.

Table 8-1 Generalised Subsurface Profile

Layer	Description	Depth to top & bottom of layer (m BGL)	
		Min (mBGL)	**Max (mBGL)**
Void	Tiles, wooden floorboards and void (BH02, BH03 and BH05).	0.0	0.75
Fill	FILL: Clayey SAND, fine-medium grained, grey with trace fine to medium grained sub-angular gravels, weak solvent odour. FILL: Sandy CLAY, medium to high plasticity, grey/yellow-brown, sand is fine grained, no odour. FILL: Silty SAND, fine-medium grained, grey-brown, pale grey with some sandstone fragments, no odour.	0.0	1.4
Residual Clays	Silty CLAY; medium to high plasticity, red-brown/yellow-brown, no odour. Silty CLAY; low to medium plasticity, red-brown / pale grey, no odour.	0.8	5.0+
Bedrock	SHALE; pale grey-grey, extremely weathered, no odour (BH01M and BH06M). SHALE; pale grey-grey, highly weathered, no odour (BH01M and BH06M).	4.5	9.0+

Notes:
+ Termination depth of borehole

8.1.2 Field Observations and PID Results

Soil samples were obtained from the test bores at various depths ranging between 0.0 m to 9.0 mBGL. All examined soil samples were evaluated on a qualitative basis for odour and visual signs of contamination (e.g. hydrocarbon odours, oil staining, petrochemical filming, asbestos fragments, ash, charcoal) and the following observations were noted:

- No visual or olfactory evidence of hydrocarbon impacts were noted at any of the borehole locations investigated during this assessment;
- A solvent odour was observed in fill material in boreholes BH01M (0.0 – 0.3) and BH06M (0.08 – 0.6);

- No fibrous cement sheeting, ash or slag was observed in any of the examined fill soils; and
- No elevated VOC concentrations were detected, with concentrations ranging from 0.6 to 3.2 parts per million (ppm) in soil headspace samples which were field-screened using a portable PID. The PID results are shown in the borehole logs (**Appendix C**).

8.2 GROUNDWATER INVESTIGATION RESULTS

8.2.1 Monitoring Well Construction

A total of two groundwater monitoring wells were installed across the site, screening the unconsolidated natural sand at each location. Well construction details for the installed groundwater monitoring wells are summarised in **Table 8-2**.

Table 8-2 Monitoring Well Construction Details

Well ID	Bore Depth (mBGL)	RL (GL)	RL (TOC)	Screen Interval (mBGL)	Lithology Screened
BH01M	9.0	26.30	26.19	3.0 – 9.0	Shale
BH06M	9.0	27.00	26.90	6.0 – 9.0	Shale

Notes:
mBGL - metres below ground level.
RL - Reduced Level – Surveyed elevation in metres relative to Australian Height Datum (mAHD).
TOC - top of well casing
RL (TOC) - Surveyed elevation at TOC in mAHD.

8.2.2 Field Observations and Water Test Results

A single GME was conducted on all wells in 26 April 2016. On this date, standing water levels (SWLs) were measured within each well prior to well purging, the results of which were recorded with well purge volumes and field-based water test results. A summary of the recorded field data is presented in **Table 8-3** and copies of the completed Field Data Sheets are included in **Appendix D**.

Table 8-3 Groundwater Field Data

Well ID	SWL (m BTOC)	RL (TOC)	WL[†] (m AHD)	Purge Volume (L)	DO (mg/L)	Field pH	Field EC (µS/cm)	Temp (°C)	Redox (mV)	Odours / Turbidity
BH01M	5.464	26.19	20.726	0.5	1.32	7.06	985	19.29	30.6	None / high
BH06M	8.305	26.20	34.605	0.5	1.88	6.20	748	19.47	128.8	None / high

Notes:
GME – Groundwater monitoring event.
SWL – Standing Water Levels as measured from TOC (top of well casing) prior to groundwater sampling.
m BTOC – metres below top of well casing.
RL (TOC) – Reduced Level, elevation at TOC in metres relative to Australian Height Datum (m AHD).
[†] WL = Calculated groundwater level, in m AHD (calculated as RL – SWL) Note: these values were used for groundwater contouring analysis.
L – litres (referring to volume of water purged from the well prior to groundwater sample collection).
EC – groundwater electrical conductivity as measured onsite using portable EC meter.
µS/cm – micro Siemens per centimetre (EC units).
DO – Dissolved Oxygen in units of milligrams per litre (mg/L)
All groundwater parameters (pH, EC and DO) were tested on site.

With reference to **Table 8-3**, the field pH data indicated that the groundwater was relatively netural (pH 6.20 – 7.06) with reducing conditions present. Electrical Conductivity (EC) measurements recorded in BH03M was 655 µS/cm, indicating that the groundwater was relatively fresh in terms of water salinity.

8.3 LABORATORY ANALYTICAL RESULTS

8.3.1 Soil Analytical Results

A summary of laboratory results showing test sample quantities, minimum/maximum analyte concentrations and samples found to exceed the SILs, is presented in **Table 8-4**. More detailed tabulations of results showing the tested concentrations for individual samples alongside the adopted soil criteria are presented in **Table T1** at the end of this report. Completed documentation used to track soil sample movements and laboratory receipt (i.e. COC and SRA forms) are copied in **Appendix E** and all laboratory analytical reports for tested soil samples are presented in **Appendix F**.

Table 8-4 Summary of Soil Analytical Results

No. of primary samples	Analyte	Min. Conc. (mg/kg)	Max. Conc. (mg/kg)	Sample locations exceeding investigation levels
TRH				
11	F1 (C_6–C_{10})	<25	<25	None
11	F2 ($>C_{10}$-C_{16})	<25	45	None
11	F3 ($>C_{16}$-C_{34})	<90	160	None
11	F4 ($>C_{34}$-C_{40})	<120	<240	None
BTEX				
11	Benzene	<0.1	<0.1	None
11	Toluene	<0.1	<0.1	None

No. of primary samples	Analyte	Min. Conc. (mg/kg)	Max. Conc. (mg/kg)	Sample locations exceeding investigation levels
11	Ethylbenzene	<0.1	<0.1	None
11	Total xylenes	<0.3	<0.3	None
PAHs				
11	Total PAHs	<0.8	17	None
11	Carcinogenic PAHs (as B(a)P TEQ)	<0.3	2.5	None
11	Naphthalene	<0.1	<0.1	None
11	Benzo(a)pyrene	<0.1	1.8	None
OCPs				
7	Gamma & Alpha Chlordane	<0.1	0.2	None
7	Aldrin & Dieldrin	<0.2	0.4	None
7	Other OCPs	ND	ND	None
OPPs				
7	Total OPPs	ND	ND	None
PCBs				
7	Total PCBs	ND	ND	None
Heavy Metals				
11	Arsenic	<3	18	None
11	Cadmium	<0.3	1.6	None
11	Chromium (Total)	4.6	29	None
11	Copper	1	270	None
11	Lead	14	730	None
11	Mercury	0.04	22	None
11	Nickel	0.7	19	None
11	Zinc	8.3	950	None
Asbestos				
7	Asbestos	No asbestos detected	No asbestos detected	None

8.3.2 Groundwater Analytical Results

Laboratory analytical results for groundwater samples are summarised in **Table T2**, which also include the adopted GILs. Completed documentation used to track groundwater sample movements and laboratory receipt (COC and SRA forms) are copied in **Appendix E**. Copies of the laboratory analytical reports are attached in **Appendix F**.

Heavy Metals

With reference to **Table T2** concentrations in excess of the adopted GILs were identified in groundwater sampled from BH01M for zinc (98 µg/L) for BH06M for cadmium (4 µg/L) and zinc (25 µg/L).

TRHs, BTEX, PAHs, VOCs and Phenols

As shown in **Table T2**, there were no exceedances of TRH, BTEX, PAHs, VOCs or Phenols within groundwater at BH01M or BH06M. All concentrations were below the laboratory's limit of reporting.

9. SITE CHARACTERISATION DISCUSSION

9.1 ASBESTOS RISK

No asbestos was reported in fill material in any of the boreholes sampled during this DSI.

EI recommend that prior to demolition, a Hazardous Materials Survey is undertaken on existing site structures to identify potentially hazardous building products (including asbestos) that may be released to the environment during demolition.

9.2 HEAVY METALS AND PAHS IN SOIL

No exceedances above the adopted HIL-B criteria were detected for heavy metals or PAHs in any of the soil samples analysed during this DSI.

9.3 TRH, BTEX, AND PCBS

No exceedances of TRH, BTEX or PCBs were reported in any of the soil samples analysed during this DSI.

EI note that the F2 (45 mg/kg) and F3 (160 mg/kg) TRH fractions were detected in fill material within borehole BH07_0.1-0.2. The source of the TRH detections is currently unknown; however, the concentrations detected were below the HIL-B criteria and therefore not expected to pose a risk to human health during redevelopment.

9.4 PESTICIDES IN SOIL

No exceedances of OCPs or OPPs were reported in any of the soil samples analysed during this DSI. Minor detections of gamma chlordane and dieldrin were identified in sample BH02_0.5-0.6 (0.2 mg/kg and 0.4 mg/kg respectively).

9.5 ON SITE GROUNDWATER CONDITIONS

Two groundwater bores were installed on site during this investigation. Due to restricted drilling rig access in internal areas of the existing site buildings, the positioning of groundwater monitoring wells was limited to accessible site areas. BH01M and BH06M were both installed to 9.0 mBGL and were located close to the inferred hydraulic down-gradient boundary of the site.

The analytical results of BH01M and BH06M identified concentrations of TRH, BTEX, PAHs and VOCs to be below the adopted GIL criteria. Exceedances of heavy metal concentrations were detected for zinc (98 zinc µg/L) in BH01M and zinc (25 µg/L) and cadmium (4 µg/L) in BH06M with remaining heavy metal concentrations below the laboratory limit of reporting (LOR). Based on EI's experience assessing groundwater in inner-suburban areas of Sydney, these concentrations, while exceeding the adopted GILs, are typical heavy metal concentrations present in the aquifer of the Ashfield Shale in inner-suburban areas of Sydney.

Although no up-hydraulic gradient groundwater monitoring well could be installed during this investigation, EI concludes that based on the down-hydraulic gradient groundwater conditions at the site, and that no potential off-site contamination sources were identified up-gradient of the site, the risk of groundwater contamination is considered to be low.

9.6 CONCEPTUAL SITE MODEL

On the basis of investigation findings the CSM discussed in **Section 4** was considered to appropriately identify contamination sources, migration mechanisms and exposure pathways, as well as potential onsite and offsite receptors. While the potential exposure pathways and receptors have not altered, the concentrations of the previously identified potential contaminants of concern are below the selected human health site investigation levels in soil and groundwater samples analysed, therefore the risk of exposure to contamination is considered low through all potential exposure pathways for all potential receptors.

10. CONCLUSIONS

The property located at 80-88 Regent Street, Redfern NSW was the subject of a Detailed Site Investigation which was conducted in order to assess the nature and degree of on-site contamination associated with current and former uses of the property. Based on the findings of this assessment it was concluded that:

- The site was bound by commercial buildings north, Regent Street to the east, Marian Street to the south and William Lane to the west, and covers a total area of approximately 822 m^2.
- The site was free of statutory notices issued by the NSW EPA/OEH;
- A previous Preliminary Site Investigation was conducted on the site by Aargus Pty Ltd in November 2015. This investigation identified the site history to have been commercial and residential land uses since at least the 1930s. Aargus concluded that further investigation, in the form of a DSI was required as the following potential contamination sources were identified:
    - Potential importation of uncontrolled fill that may contain various contaminants;
    - Current or previous use of pesticides;
    - Driveways where leaks and spills may have occurred from vehicles;
    - Metal degradations; and
    - Asbestos based materials.
- Soil sampling and analysis were conducted at seven targeted test bore locations (BH01 – BH07) down to a maximum depth of 9.0 mBGL. Sampling regime was considered to be appropriate for preliminary investigation purposes and comprised judgemental and systematic (triangular grid) sampling patterns, with allowance for structural obstacles (e.g. building walls, underground and overhanging services and other physical obstructions in use by existing operating businesses);
- Boreholes BH01M and BH06M were converted to groundwater monitoring wells;
- The sub-surface layers comprised fill materials of various constituents, comprising yellow to. grey-brown clayey sands and silty clays underlain by residual clay and weathered Ashfield Shale at depth;
- Groundwater was encountered at shallow depths within weathered Ashfield Shale, with standing water levels recorded at 5.464 mBGL (BH01M) and 8.305 mBGL (BH06M);
- No exceedances above the HIL-B criteria for asbestos, heavy metals, TRH, BTEX, PAHs, PCBs or OC/OP pesticides were detected in soil samples analysed during this DSI;
- Concentrations of TRH, BTEX, PAH, and VOCs were reported at concentrations below adopted GILs. Elevated concentration of some heavy metals were reported above the GILs in groundwater at boreholes BH01M and BH06M, however, these exceedances are considered to be attributed to background groundwater quality within inner suburban Sydney;

- On the basis of investigation findings the CSM discussed was considered to identify contamination sources, migration mechanisms and exposure pathways, as well as potential onsite and offsite receptors. As identified potential contaminants of concern are below the selected human health site investigation levels in soil and groundwater samples analysed, the risk of exposure to contamination is considered low through all potential exposure pathways for all potential receptors.

Based on the findings of this report and with consideration of the Statement of Limitations (**Section 12**), EI conclude that widespread contamination was not identified at the site. In view of the proposed development scope, and currently available information, EI conclude that the condition of soils and groundwater reported at the site are suitable for proposed commercial (including child care facility) and residential land use.

11. RECOMMENDATIONS

EI provide the following recommendations:

- Prior to site demolition, carry out a Hazardous Materials Survey on existing site structures to identify potentially hazardous building products that may be released to the environment during demolition;
- Any material being removed from site (including virgin excavated natural materials (VENM)) should be classified for off-site disposal in accordance the EPA (2014) *Waste Classification Guidelines*; and
- Any material being imported to the site should be assessed for potential contamination in accordance with NSW EPA guidelines as being suitable for the intended use or be classified as VENM.

12. STATEMENT OF LIMITATIONS

The findings presented in this report are the result of discrete and specific sampling methodologies used in accordance with best industry practices and standards. Due to the site-specific nature of soil sampling from point locations, it is considered likely that all variations in subsurface conditions across a site cannot be fully defined, no matter how comprehensive the field investigation program.

While normal assessments of data reliability have been made, EI assumes no responsibility or liability for errors in any data obtained from previous assessments conducted on site, regulatory agencies (e.g. Council, EPA), statements from sources outside of EI, or developments resulting from situations outside the scope of works of this project.

Despite all reasonable care and diligence, the ground conditions encountered and concentrations of contaminants measured may not be representative of conditions between the locations sampled and investigated. In addition, site characteristics may change at any time in response to variations in natural conditions, chemical reactions and other events, e.g. groundwater movement and or spillages of contaminating substances. These changes may occur subsequent to EI's investigations and assessment.

EI's assessment is necessarily based upon the result of the site investigation and the restricted program of surface and subsurface sampling, screening and chemical testing which was set out in the proposal. Neither EI, nor any other reputable consultant, can provide unqualified warranties nor does EI assume any liability for site conditions not observed or accessible during the time of the investigations.

This report was prepared for the above named client and no responsibility is accepted for use of any part of this report in any other context or for any other purpose or by other third parties. This report does not purport to provide legal advice.

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REFERENCES

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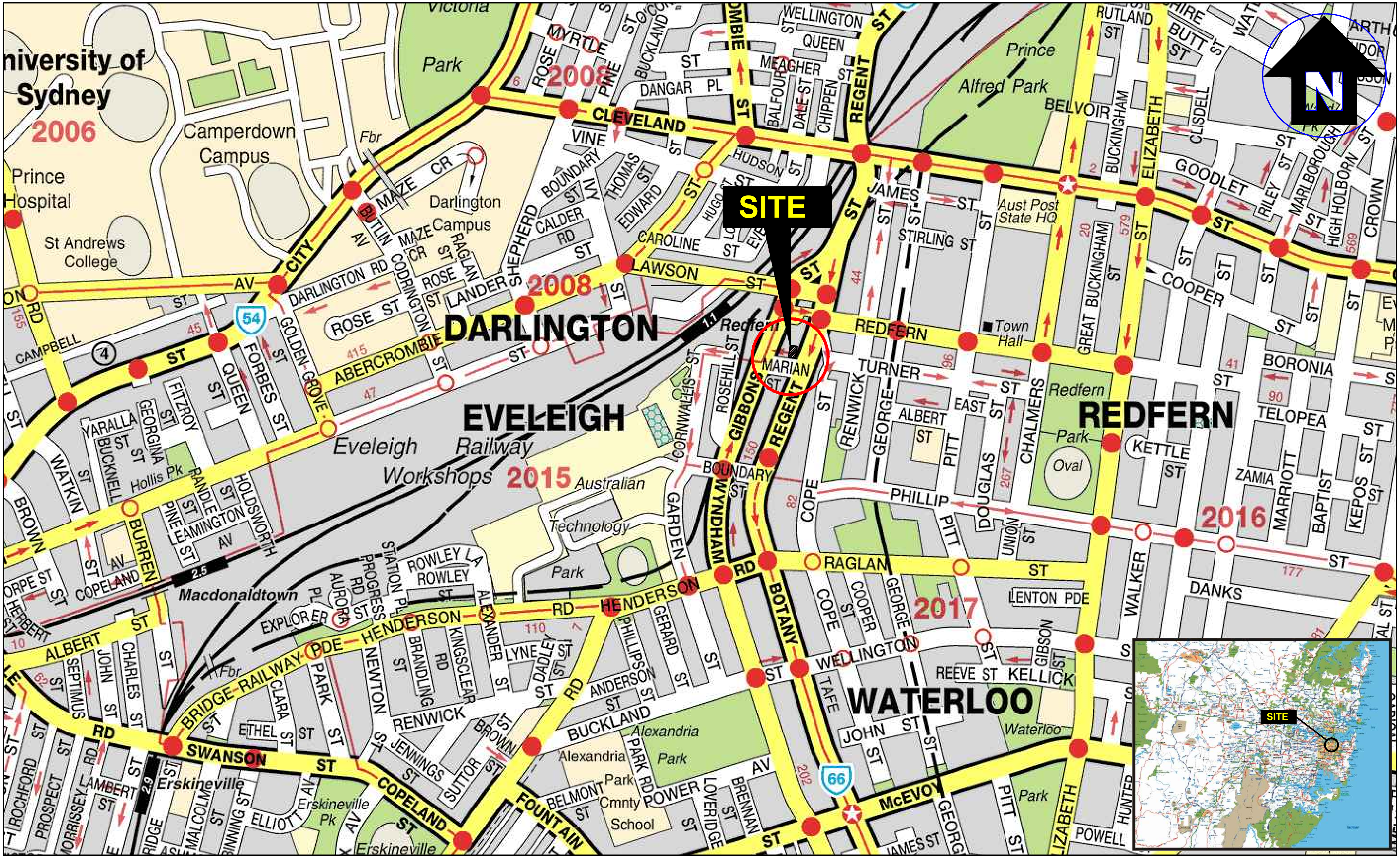
ABBREVIATIONS

ACM	Asbestos-containing materials
ASS	Acid sulfate soils
ANZECC	Australian and New Zealand Environment Conservation Council
ARMCANZ	Agriculture and Resource Management Council of Australia and New Zealand
B(a)P	Benzo(a)Pyrene (a PAH compound)
BH	Borehole
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
COC	Chain of Custody
DEC	Department of Environment and Conservation, NSW (see OEH)
DECC	Department of Environment and Climate Change, NSW (see OEH)
DECCW	Department of Environment, Climate Change and Water, NSW (see OEH)
DA	Development Application
DO	Dissolved Oxygen
DP	Deposited Plan
EC	Electrical Conductivity
Eh	Redox potential
EPA	Environment Protection Authority
EMP	Environmental Management Plan
F1	TRH C_6 – C_{10} less the sum of BTEX concentrations (Ref. NEPM 2013, Schedule B1)
F2	TRH $>C_{10}$ – C_{16} less the concentration of naphthalene (Ref. NEPM 2013, Schedule B1)
GIL	Groundwater Investigation Level
GME	Groundwater Monitoring Event
HIL	Health-based Investigation Level
HSL	Health-based Screening Level
km	Kilometres
LNAPL	Light, non-aqueous phase liquid (also referred to as PSH)
DNAPL	Dense, non-aqueous phase liquid
m	Metres
m AHD	Metres Australian Height Datum
m BGL	Metres Below Ground Level
mg/m^3	Milligrams per cubic metre
mg/L	Milligrams per litre
µg/L	Micrograms per litre
mV	Millivolts
MW	Monitoring well
NATA	National Association of Testing Authorities, Australia
NEPC	National Environmental Protection Council
NSW	New South Wales
OEH	Office of Environment and Heritage, NSW (formerly DEC, DECC, DECCW)
PAHs	Polycyclic Aromatic Hydrocarbons
pH	Measure of the acidity or basicity of an aqueous solution
PSH	Phase-separated hydrocarbons (also referred to as LNAPL)
PQL	Practical Quantitation Limit (limit of detection for respective laboratory instruments)
QA/QC	Quality Assurance / Quality Control
RAP	Remediation Action Plan
SRA	Sample receipt advice (document confirming laboratory receipt of samples)

SWL	Standing Water Level
TDS	Total dissolved solids (a measure of water salinity)
TCLP	Toxicity Characteristics Leaching Procedure
TPH	Total Petroleum Hydrocarbons (superseded term equivalent to TRH)
TRH	Total Recoverable Hydrocarbons (non-specific analysis of organic compounds)
UCL	Upper Confidence Limit of the mean
USEPA	United States Environmental Protection Agency
UPSS	Underground Petroleum Storage System
UST	Underground Storage Tank
VOCs	Volatile Organic Compounds (specific organic compounds which are volatile)
VOCCs	Volatile Organic Chlorinated Compounds (a sub-set of the VOC analysis suite)

FIGURES



eiaustralia
Contamination | Remediation | Geotechnical

Suite 6.01, 55 Miller Street, PYRMONT 2009
Ph (02) 9516 0722 Fax (02) 9518 5088

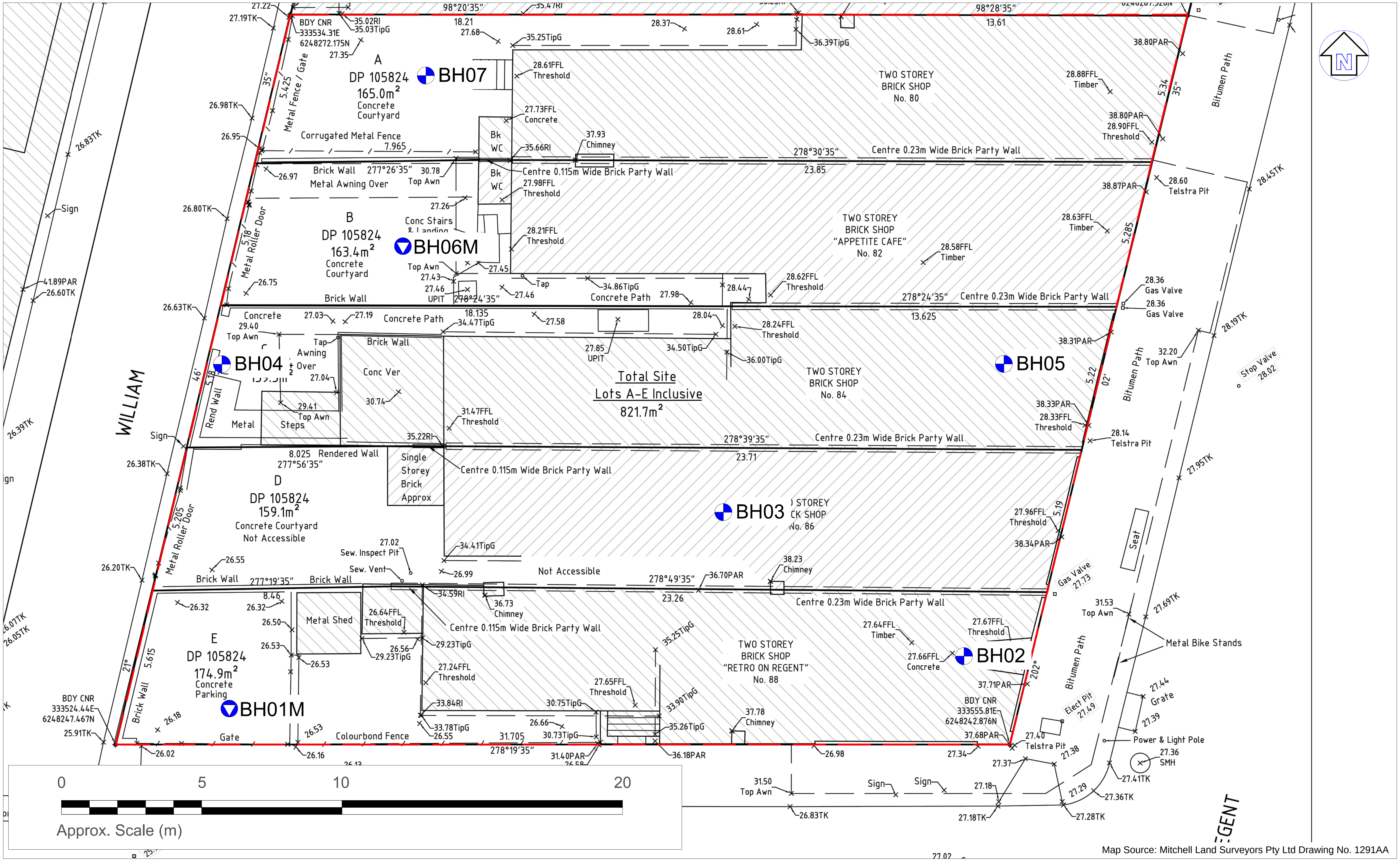
Drawn:	J.S.
Approved:	N.F.
Date:	02-05-16
Approx Scale:	N.T.S.

Sunny Third: Regent Street Pty Ltd C/- Milligan Group Pty Ltd

Detailed Site Investigation
80-88 Regent Street, Redfern NSW
Site Locality Plan

Figure:
1

Project: E22974 AA_Rev0



Map Source: Mitchell Land Surveyors Pty Ltd Drawing No. 1291AA

LEGEND

▼ Approximate monitoring well / borehole sample location

◐ Approximate borehole sample location

— — Approximate site boundary

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Suite 6.01, 55 Miller Street, PYRMONT 2009
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Approx Scale:	Custom @ A3 or as shown

Sunny Third: Regent Street Pty Ltd C/- Milligan Group Pty Ltd

Detailed Site Investigation
80-88 Regent Street, Redfern NSW
Sampling Location Plan

Figure:
2

Project: E22974 AA_Rev0

TABLES

Table T1 - Summary of Soil Analytical results

Sample ID	Sampling Date	Heavy Metals								PAHs				BTEX				TPHs				OCPs			OPPs	Total PCBs	Asbestos
		As	Cd	$Cr^{\#}$	Cu	Pb	Hg	Ni	Zn	Carcinogenic PAHs **(as B(α)P TEQ)**	**Benzo(α)pyrene**	Total PAHs	Naphthalene	Benzene	Toluene	Ethylbenzene	Total Xylenes	F1^{2}	F2^{3}	F3 (>C_{16}-C_{34})	F4 (>C_{34}-C_{40})	Gamma & Alpha Chlordane	Aldrin & Dieldrin	All other OCPs			
BH01M_0.1-0.2	5/05/2014	3	<0.3	7	6	56	0.4	2.4	28	<0.3	<0.1	<0.8	<0.1	<0.1	<0.1	<0.1	<0.3	<25	<25	<90	<120	<0.1	<0.2	ND	ND	ND	ND
BH01M_0.9-1.0		5	0.3	19	1.7	16	0.04	2.1	8.3	<0.3	<0.1	<0.8	<0.1	<0.1	<0.1	<0.1	<0.3	<25	<25	<90	<120	NA	NA	NA	NA	NA	NA
BH02_0.5-0.6		<3	<0.3	4.6	33	43	0.19	1.5	25	<0.3	<0.1	<0.8	<0.1	<0.1	<0.1	<0.1	<0.3	<25	<25	<90	<120	0.2	0.4	ND	ND	ND	ND
BH03_0.7-0.8		4	0.8	6.4	48	140	0.47	2	250	1.7	1.2	17	<0.1	<0.1	<0.1	<0.1	<0.3	<25	<25	<90	<120	<0.1	<0.2	ND	ND	ND	ND
BH03_1.8-1.9		8	0.7	29	6.4	39	0.17	2.7	47	<0.3	<0.1	<0.8	<0.1	<0.1	<0.1	<0.1	<0.3	<25	<25	<90	<120	NA	NA	NA	NA	NA	NA
BH04_0.15-0.25		4	0.5	6.1	22	210	0.14	5	320	0.8	0.5	4.2	<0.1	<0.1	<0.1	<0.1	<0.3	<25	<25	<90	<120	<0.1	<0.2	ND	ND	ND	ND
BH05_0.75-0.85		3	<0.3	7	30	110	0.78	2.9	100	0.5	0.3	4.9	0.1	<0.1	<0.1	<0.1	<0.3	<25	<25	<90	<120	<0.1	<0.2	ND	ND	ND	ND
BH05_1.8-1.9		7	0.5	29	1	14	0.06	2	7.2	<0.3	<0.1	<0.8	<0.1	<0.1	<0.1	<0.1	<0.3	<25	<25	<90	<120	NA	NA	NA	NA	NA	NA
BH06M_0.1-0.2		18	1	9.2	130	290	0.56	6.5	510	0.3	0.2	1.3	<0.1	<0.1	<0.1	<0.1	<0.3	<25	<25	<90	<120	<0.1	<0.2	ND	ND	ND	ND
BH06M_0.9-1.0		5	0.5	17	4.1	31	0.08	0.7	15	<0.3	<0.1	<0.8	<0.1	<0.1	<0.1	<0.1	<0.3	<25	<25	<90	<120	NA	NA	NA	NA	NA	NA
BH07_0.1-0.2		14	1.6	16	270	730	22	19	950	2.5	1.8	17	<0.1	<0.1	<0.1	<0.1	<0.3	<25	45	160	<120	<0.1	<0.2	ND	ND	ND	ND
SILs																											
HIL B - *Residential with minimal opportunities for soil access*		500	150	500 Cr(VI)	30,000	1,200	120	1,200	60,000	4	-	400										90	10	-	-	1	
HSL A & HSL B - *Residential*		Source depths (0 m to <1 m. BGL)											3	0.5	160	55	40	45	110								
Soil texture classification –Sand ^{1}		Source depths (1 m to <2 m. BGL)											NL	0.5	220	NL	60	70	240								
Management Limits – *Residential, parkland and public open space* Coarse grained soil texture^{1}																		700	1000	2500	10000						
Asbestos contamination HSL – *Residential B* Bonded ACM (%w/w)																											>0.01
Asbestos contamination HSL for Non Bonded / Friable Asbestos (%w/w)																											>0.01

Notes: All results are recorded in mg/kg

🟨	Highlighted values indicates concentration exceeds Human Helath Based Soil Criteria
🟩	Highlighted values indicates concentration exceeds EIL / ESL.

HIL B	NEPC 1999 Amendment 2013 'HIL B" Health Based Investigation Levels applicable for residential exposure settings with minimal opportunities for soil access, including dwellings with fully and permanently paved yard space such as high rise buildings and apartments.
#	Thresholds are for Chromium VI.
NR	No current published criterion.
NL	Not Limiting' If the derived soil vapour limit exceeds the soil concentration at which the pore water phase cannot dissolve any more of the individual chemical
ND	'Not detected' i.e. all concentrations of the compounds within the analyte group were found to be below the laboratory limits of detection.
NT	'Not Tested' i.e. the sample as not analysed.
1	Coarse Grained soil values were applied, being the most conservative of the material types.
2	To obtain F1 subtract the sum of BTEX concentrations from the C6-C10 fraction.
3	To obtain F2 subtract Naphthalene from the >C10-C16 fraction.

Table T2 – Summary of Groundwater Investigation Results

Sample Identification	Heavy Metals								PAHs			BTEX				TRHs				Total VOCs	Phenols
	As	Cd	Cr	Cu	Pb	Hg	Ni	Zn	Total PAHs	**Benzo(a)pyrene**	Naphthalene	Benzene	Toluene	Ethylbenzene	o-xylene	F1*	F2**	F3 (>C_{16}-C_{34})	F4 (>C_{34}-C_{40})		
BH01M	<1	0.2	<1	<1	<1	<0.01	3	98	<1	<0.1	<0.1	<0.5	<0.5	<0.5	<0.5	<50	<60	<500	<500	ND	<0.01
BH06M	<0.01	4	<0.1	<1	<1	<0.01	4	25	<1	<0.1	<0.1	<0.5	<0.5	<0.5	<0.5	<50	<60	<500	<500	ND	<0.01
GILs																					
HSL - A&B *Low-High Density Residential* [5]	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NL	800	NL	NL	NL	1,000	1,000	NR	NR	NR	400
GIL[4] (Marine Water)	24 (AsIII) [9] 13 (AsV)	0.7	27 (Cr III)	1.3	4.4	0.1	7	15 [1,2]	NR	0.2	50	500	180	5	75	50 [10]	60 [10]	500 [10]	500 [10]	NR	320
Drinking Water[6,7]	100	20	NR	20,000	100	10	200	NR	NR	0.1	NR	10	8,000	3,000	6,000	NR	NR	NR	NR	NR	NR

All values are µg/L unless stated otherwise NR = No current publish criterion

* = To obtain F1 subtract the sum of BTEX concentrations from the C6-C10 fraction.

** = To obtain F2 subtract Naphthalene from the >C10-C16 fraction.

1 = Values have been calculated using a hardness of 30mg/L CaCO3 refer to ANZECC & ARMCANZ (2000) for further guidance on recalculating for site-specific hardness

2 = Figure may not protect key species from chronic toxicity, refer to ANZECC & ARMCANZ (2000) for further guidance

3 = Chemical for which possible bioaccumulation and secondary poisoning effects should be considered, refer to ANZECC & ARMCANZ (2000) for further guidance

4 = NEPM (2013) Groundwater Investigation Levels for marine water quality, based on ANZECC & ARMCANZ (2000).

5 = NEPC (2013) Table 1A(4) Groundwater HSL A&B for vapour intrusion at the contaminant source depth ranges in sand 2m to <4m.

6 = NEPM (2013) Groundwater Investigation Levels for drinking water quality, based on Australian Drinking Water Guidelines (NHMRC 2011).

7 = Drinking Water value has been used multiplied by a factor of 10 to address the secondary contact recreation.

8 = In lack of a criteria the laboratory PQL has been used.

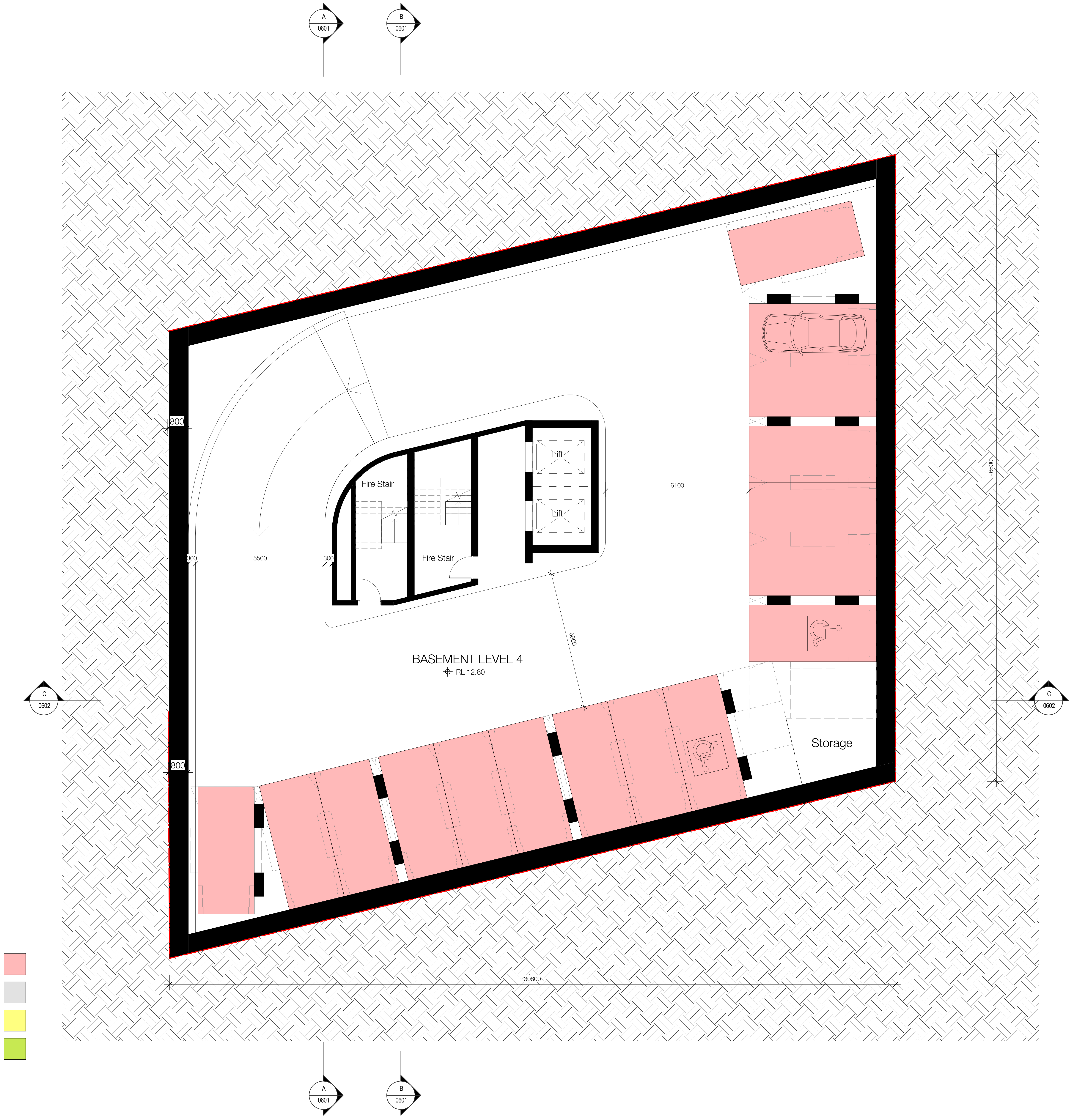
9 = where no Marine Criteria is available, Freshwater criteria has been used.

10 = Where GIL is less the than the laboratory reporting limit (LOR), the LOR is adoted as the GIL, as per DEC (2007).

🟨	Highlighted indicates analyte concentration value exceeding the adopted criteria
XXX	Bolded value indicates concentration value exceeds the screening level for secondary contact recreation.

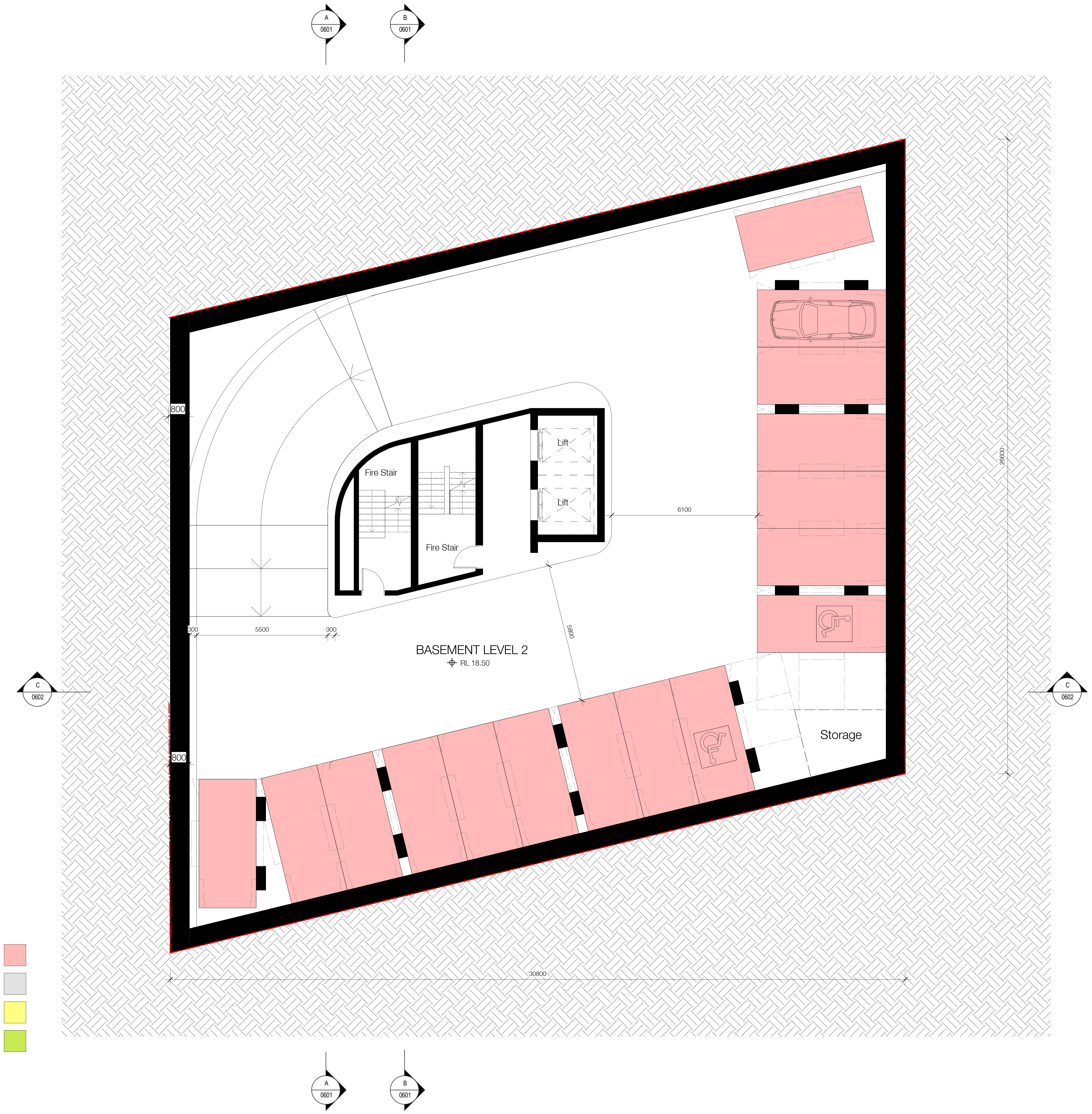
APPENDIX A

Proposed Development Plans



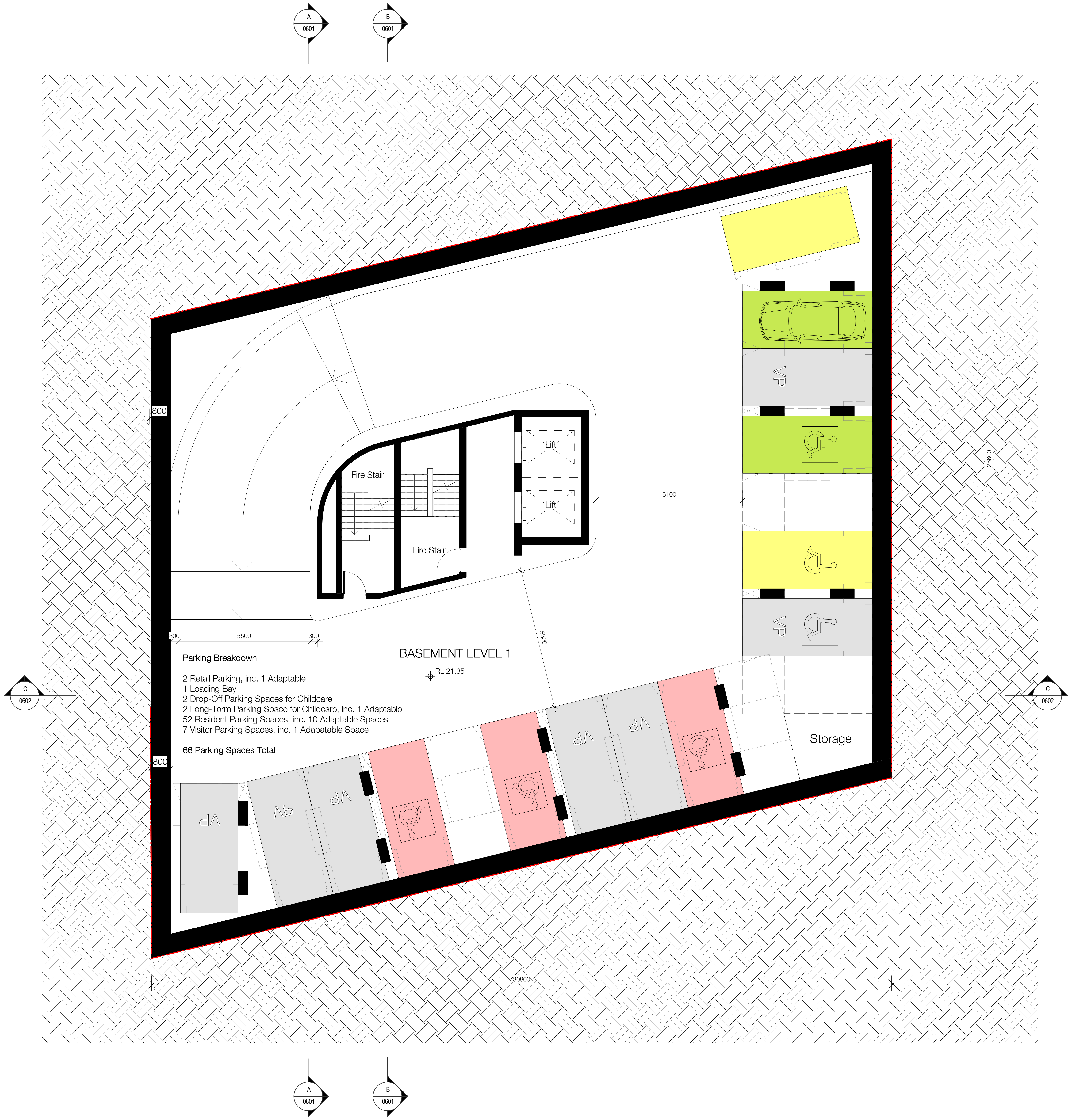
Carparking Legend

- Residential Carparking 🟥
- Residential Visitor Carparking ⬜
- Retail Carparking 🟨
- Childcare Carparking 🟩



Carparking Legend

Residential Carparking	🟥
Residential Visitor Carparking	⬜
Retail Carparking	🟨
Childcare Carparking	🟩



BASEMENT LEVEL 1

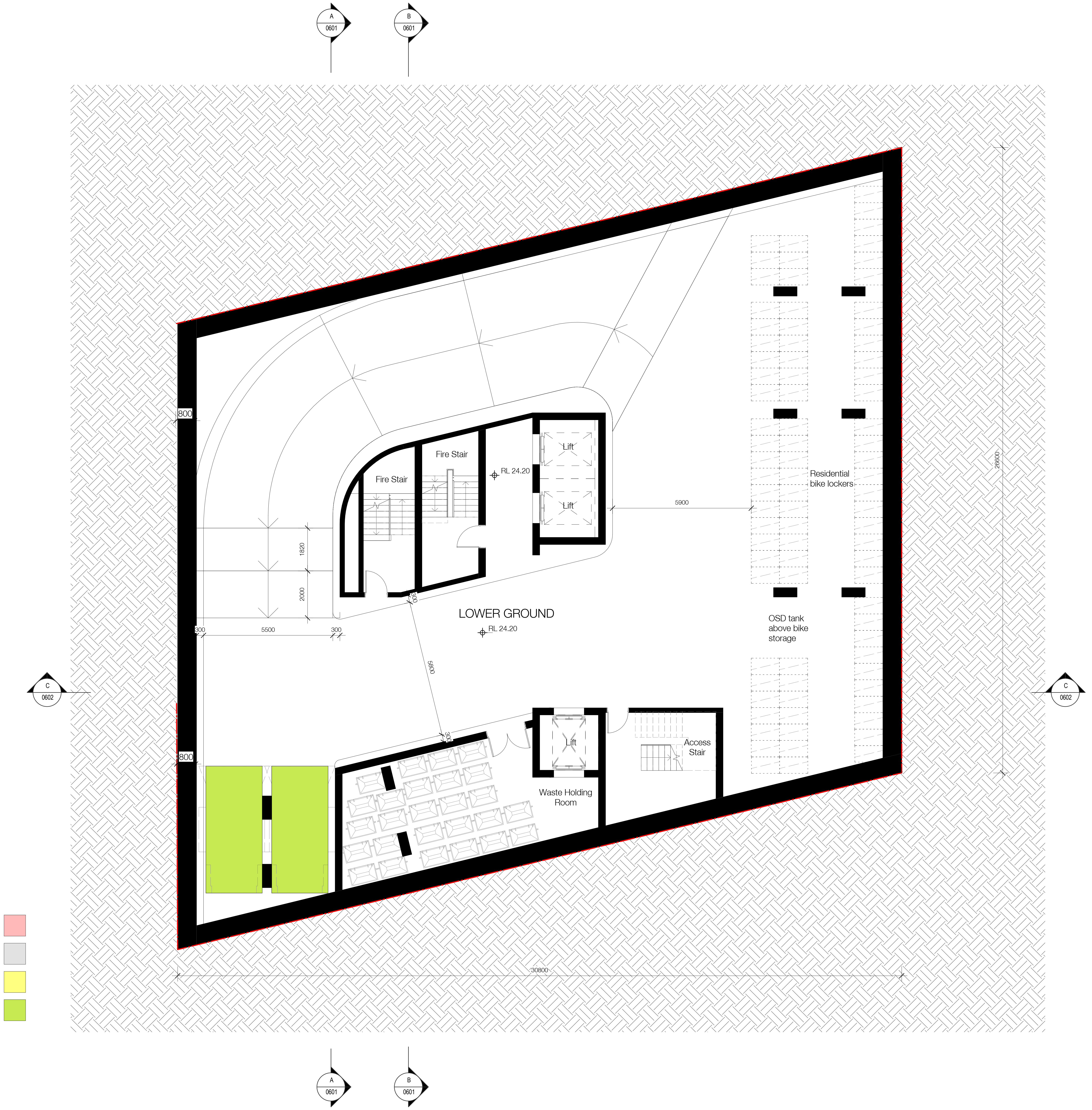
Parking Breakdown

2 Retail Parking, inc. 1 Adaptable
1 Loading Bay
2 Drop-Off Parking Spaces for Childcare
2 Long-Term Parking Space for Childcare, inc. 1 Adaptable
52 Resident Parking Spaces, inc. 10 Adaptable Spaces
7 Visitor Parking Spaces, inc. 1 Adapatable Space

66 Parking Spaces Total

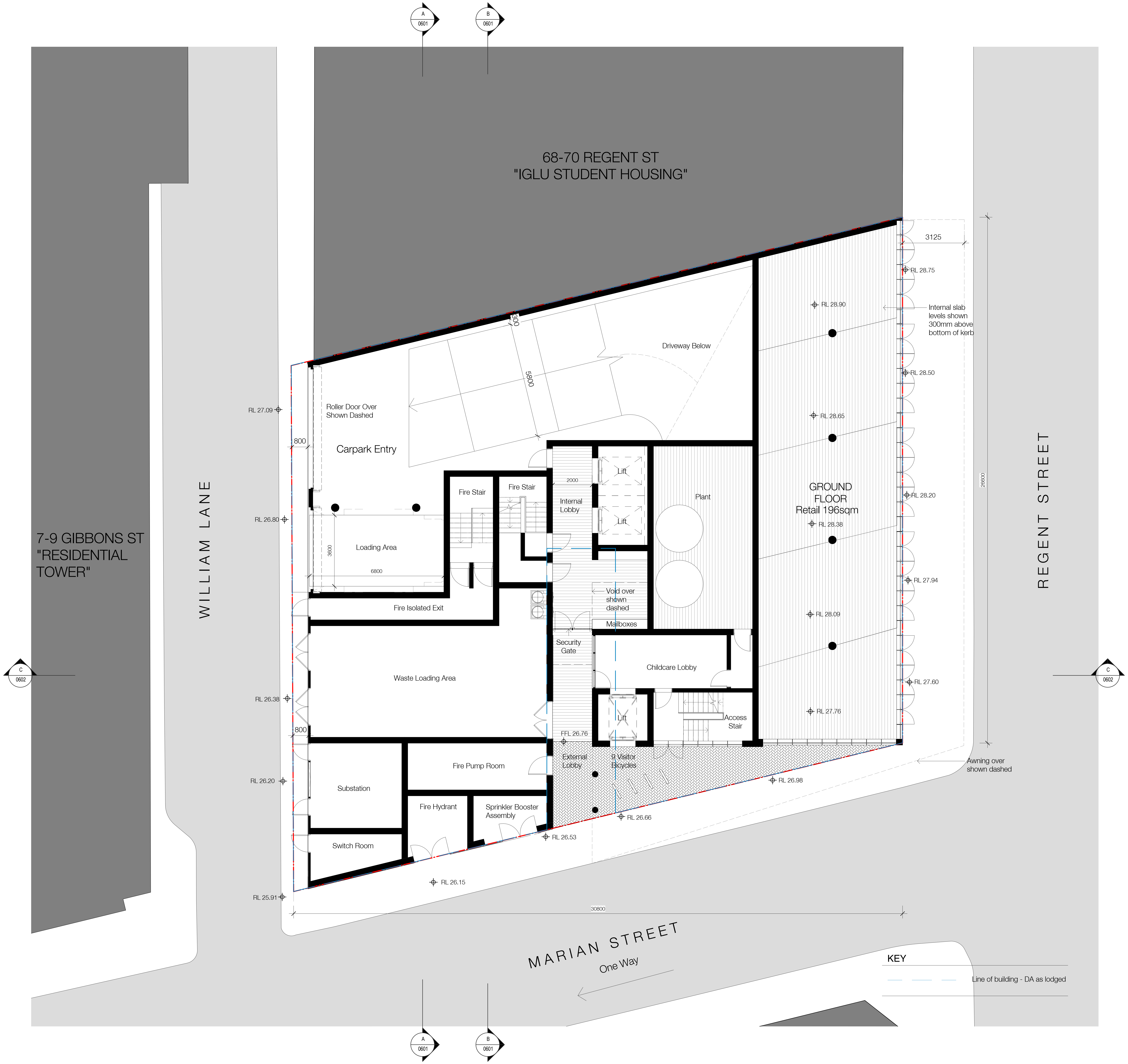
Carparking Legend

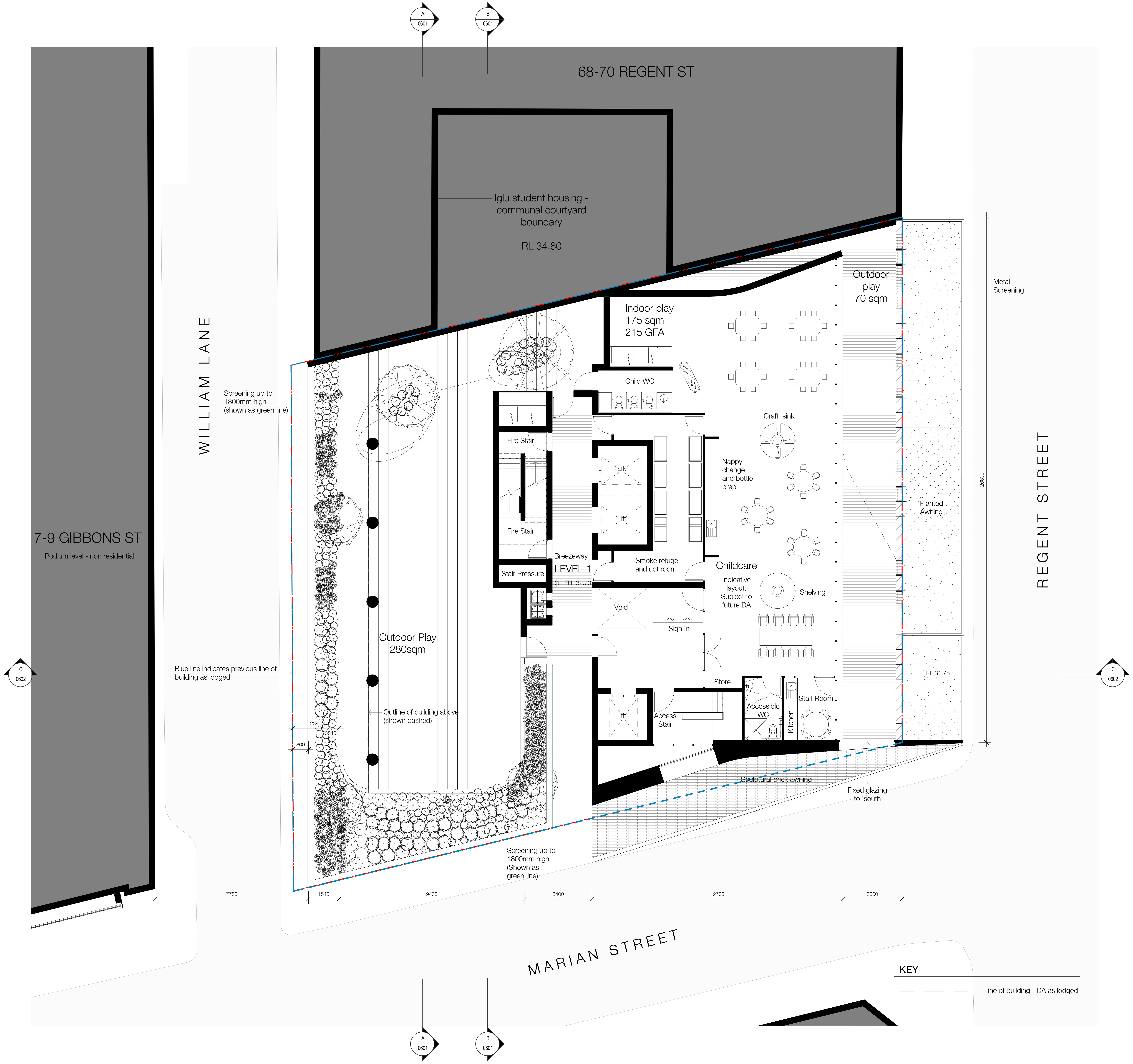
Residential Carparking	🟥
Residential Visitor Carparking	⬜
Retail Carparking	🟨
Childcare Carparking	🟩



Carparking Legend

Residential Carparking	🟥
Residential Visitor Carparking	⬜
Retail Carparking	🟨
Childcare Carparking	🟩


A
0601
B
0601
68-70 REGENT ST
"IGLU STUDENT HOUSING"
300
5800
Driveway Below
3125
RL 28.75
RL 28.90
Internal slab levels shown 300mm above bottom of kerb
RL 28.50
RL 28.65
RL 27.09
Roller Door Over Shown Dashed
800
Carpark Entry
Fire Stair
Fire Stair
2000
Internal Lobby
Lift
Lift
Plant
GROUND FLOOR
Retail 196sqm
RL 28.20
RL 28.38
26600
REGENT STREET
RL 26.80
3600
Loading Area
6800
WILLIAM LANE
7-9 GIBBONS ST
"RESIDENTIAL TOWER"
Fire Isolated Exit
Void over shown dashed
Mailboxes
RL 27.94
RL 28.09
Security Gate
Childcare Lobby
Waste Loading Area
C
0602
C
0602
RL 27.60
RL 26.38
Lift
Access Stair
RL 27.76
800
FFL 26.76
External Lobby
9 Visitor Bicycles
Fire Pump Room
Awning over shown dashed
RL 26.98
RL 26.20
Substation
Fire Hydrant
Sprinkler Booster Assembly
RL 26.66
RL 26.53
Switch Room
RL 26.15
RL 25.91
30800
MARIAN STREET
One Way
KEY
Line of building - DA as lodged
A
0601
B
0601


A
0601
B
0601
68-70 REGENT ST
Iglu student housing - communal courtyard boundary
RL 34.80
WILLIAM LANE
7-9 GIBBONS ST
Podium level - non residential
Screening up to 1800mm high (shown as green line)
Blue line indicates previous line of building as lodged
Outdoor Play 280sqm
Outline of building above (shown dashed)
2340
3840
800
Screening up to 1800mm high (Shown as green line)
Indoor play
175 sqm
215 GFA
Child WC
Fire Stair
Fire Stair
Lift
Lift
Breezeway
LEVEL 1
FFL 32.70
Stair Pressure
Smoke refuge and cot room
Void
Sign In
Lift
Access Stair
Store
Accessible WC
Kitchen
Staff Room
Craft sink
Nappy change and bottle prep
Childcare
Indicative layout. Subject to future DA
Shelving
Outdoor play 70 sqm
Metal Screening
Planted Awning
26600
RL 31.78
REGENT STREET
Sculptural brick awning
Fixed glazing to south
C
0602
C
0602
7780
1540
9400
3400
12700
3000
MARIAN STREET
KEY
Line of building - DA as lodged
A
0601
B
0601


A
0601
B
0601
68-70 REGENT ST
Iglu student housing - communal courtyard boundary below
RL 34.80
7000
13225
2000
15700
8265
10740
8675
Fixed highlight window
Blue line indicates previous line of building as lodged
3000
Childcare outdoor area below
D
0701
WILLIAM LANE
3000
3800
3925
Outline of building above (shown dashed)
10225
AC Units / Exhaust
Fire Stair
Fire Stair
Stair Pressure
L2.01
2 BED
75 m²
Lift
Lift
Exhaust
Comms & Elec
2500
L2.02
1 BED
50 m²
LEVEL 2
Breezeway
FFL 36.50
Void
L2.03
3 BED
90 m²
REGENT STREET
7-9 GIBBONS ST
Podium level - non residential
C
0602
C
0602
L2.04
1 BED
50 m²
11000
7100
3830
2000
4000
1300
1500
555
Fixed glazing to south side
9300
2000
12700
MARIAN STREET
KEY
Line of building - DA as lodged
A
0601
B
0601


A
0601
B
0601
68-70 REGENT ST
10740
8265
7000
13225
2000
15700
Fixed highlight window
Blue line indicates previous line of building as lodged
3000
L3.01
2 Bed
75 m²
3925
3000
WILLIAM LANE
Fire Stair
Lift
Lift
L3.02
1 BED
50 m²
REGENT STREET
7-9 GIBBONS ST
Podium level - non residential
Fire Stair
Exhaust
Comms & Elec
L3.05
2 BED
75 m²
LEVEL 3
Breezeway
FFL 39.60
Stair Pressure
Void
C
0602
C
0602
Apts. 3.03, 4.03
ADAPTABLE
L3.03
3 BED
90 m²
L3.04
1 BED
50 m²
1500
555
Fixed glazing to south side
7150
3830
2000
4000
9300
2000
15700
MARIAN STREET
KEY
Line of building - DA as lodged
A
0601
B
0601

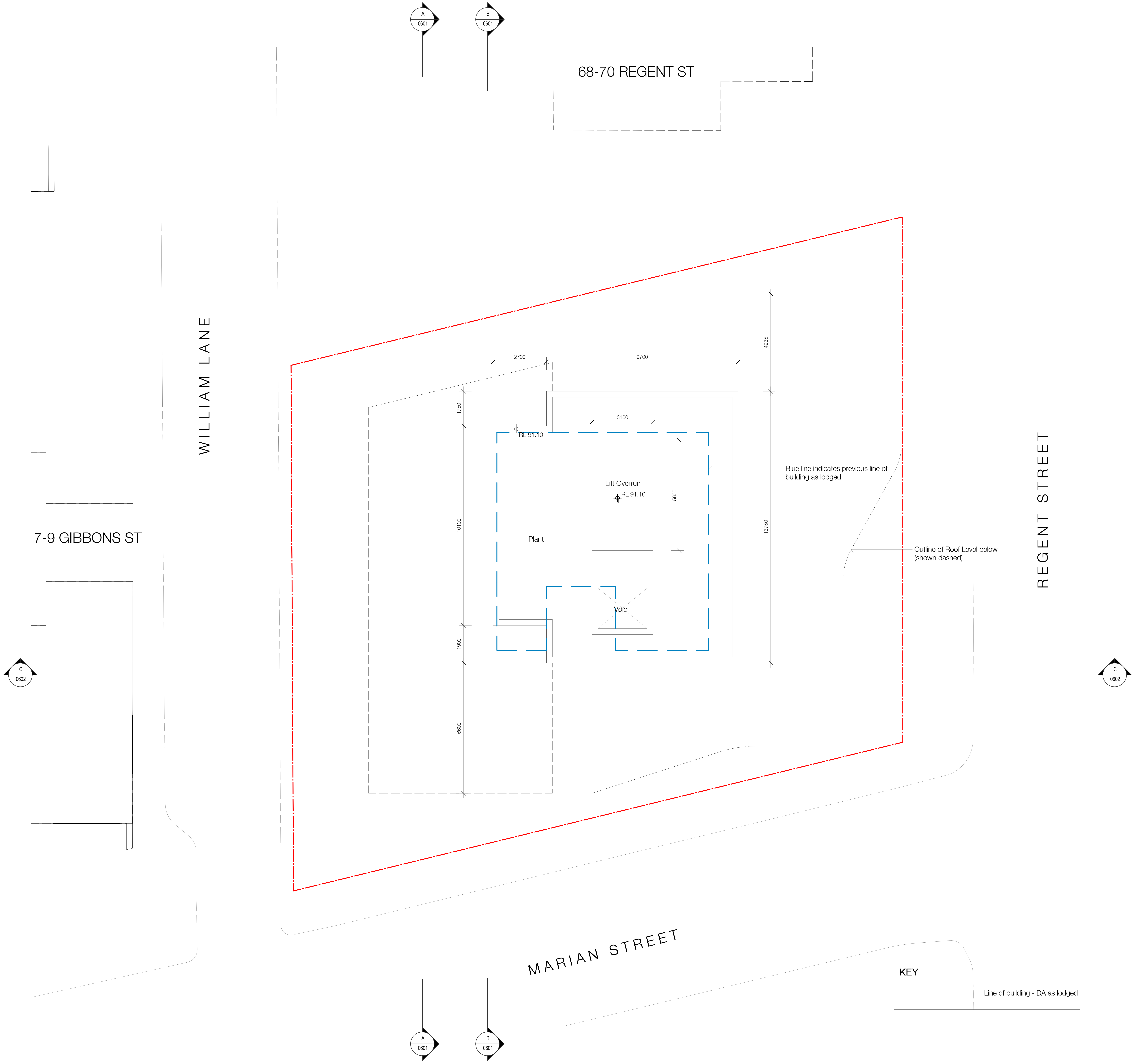

68-70 REGENT ST
7-9 GIBBONS ST
WILLIAM LANE
REGENT STREET
MARIAN STREET
Lounge
Bed
Bed
Lounge
Highlight window
Highlight window
Fixed highlight window
Blue line indicates previous line of building as lodged
Fixed glazing to south side
Fire Stair
Fire Stair
Stair Pressure
Lift
Lift
Exhaust
Comms & Elec
Void
LEVEL 4
Breezeway
FFL 42.70
L4.01
2 BED
75 m²
L4.02
1 BED
50 m²
ADAPTABLE
Apts. 4.02, 5.02, 6.02, 7.02, 8.02, 9.02, 10.2
L4.03
3 BED
90 m²
ADAPTABLE
Apts. 3.03, 4.03
L4.04
1 Bed
50 m²
L4.05
2 BED
75 m²
7000
13225
2000
15700
8265
10740
3000
3925
6000
2000
12000
7150
3830
2000
1200
4000
1500
555
9300
2000
15700
27000
A
0601
B
0601
C
0602
KEY
Line of building - DA as lodged

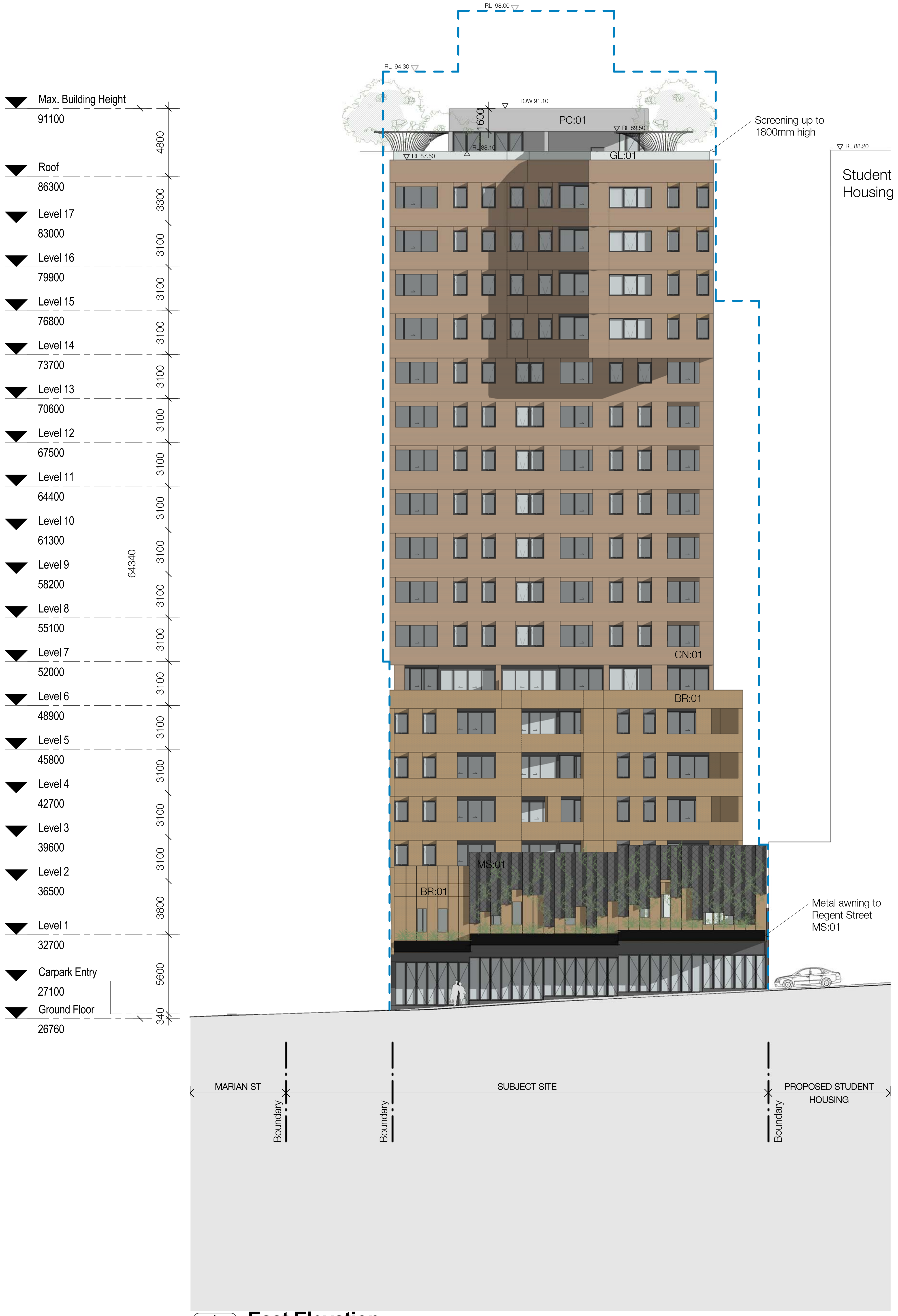

A
0601
B
0601
68-70 REGENT ST
10740
8265
7000
13225
2000
15700
Fixed highlight window
Blue line indicates previous line of building as lodged
3000
WILLIAM LANE
Lounge
Highlight window
Bed
7-9 GIBBONS ST
3000
3925
Fire Stair
L6.01
2 BED
75 m²
Lift
Lift
L6.02
1 BED
50 m²
ADAPTABLE
Apts. 4.02, 5.02, 6.02, 7.02, 8.02, 9.02, 10.2
Exhaust
Comms & Elec
24963
REGENT STREET
L6.05
2 BED
75 m²
Fire Stair
Stair Pressure
LEVEL 6
Breezeway
FFL 48.90
Void
ADAPTABLE
Apts. 6.03, 7.03, 8.03, 9.03,10.03
L6.03
2 BED
75 m²
C
0602
Bed
Highlight window
Lounge
L6.04
1 BED
50 m²
12000
7100
3830
555
1500
1200
2000
4000
27000
9300
2000
15700
MARIAN STREET
KEY
Line of building - DA as lodged
A
0601
B
0601
C
0602


A 0601
B 0601
68-70 REGENT ST
7000
13225
2000
15700
10740
8265
Fixed highlight window
Blue line indicates previous line of building as lodged
3000
3000
3925
Lounge
Highlight window
WILLIAM LANE
Bed
7-9 GIBBONS ST
Bed
C 0602
Highlight window
Lounge
12000
10930
1070
7100
3830
Fire Stair
Fire Stair
Stair Pressure
L7.05
2 BED
75 m²
LEVEL 7
Breezeway
FFL 52.00
Lift
Lift
Exhaust
Comms & Elec
Void
L7.01
2 BED
75 m²
L7.02
1 BED
50 m²
ADAPTABLE
Apts. 4.02, 5.02, 6.02, 7.02, 8.02, 9.02, 10.2
22900
ADAPTABLE
Apts. 6.03, 7.03, 8.03, 9.03,10.03
L7.03
2 BED
75 m²
L7.04
1 BED
50 m²
REGENT STREET
C 0602
1500
550
Fixed glazing to south side
2000
1300
4000
24000
9300
2000
15700
MARIAN STREET
KEY
Line of building - DA as lodged
A 0601
B 0601

A 0601
B 0601
68-70 REGENT ST
10740
8265
6987
13225
2000
15700
Fixed highlight window
3000
3925
WILLIAM LANE
Highlight window
Lounge
Bed
7-9 GIBBONS ST
C 0602
Bed
Lounge
Highlight window
12000
7100
3830
BBQ
L14.01
3 BED
90 m²
Fire Stair
Lift
Lift
Exhaust
Comms & Elec
L14.02
1 BED
50 m²
Blue line indicates previous line of building as lodged
REGENT STREET
L14.05
2 BED
75 m²
Fire Stair
Stair Pressure
LEVEL 14
Breezeway
FFL 73.70
Void
L14.03
2 BED
75 m²
3000
C 0602
L14.04
2 BED
50 m²
1500
550
Fixed glazing to south side
2000
4000
9300
2000
12700
MARIAN STREET
A 0601
B 0601
KEY
Line of building - DA as lodged

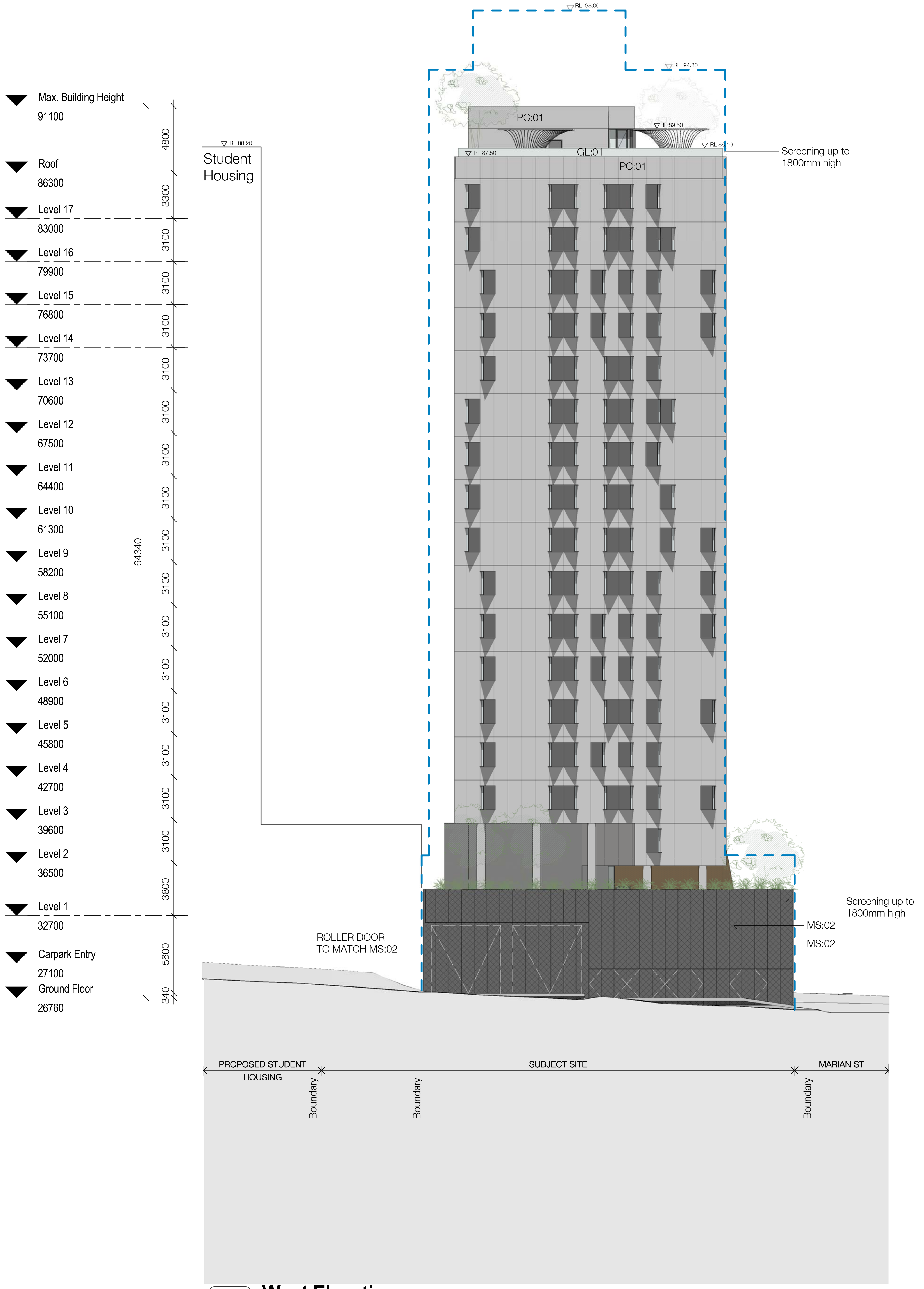

A 0601
B 0601
68-70 REGENT ST
WILLIAM LANE
7-9 GIBBONS ST
C 0602
3000
Sceening up to
1800mm high
(shown dashed)
Fire Stair
Fire Stair
Stair
Pressure
ROOF
RL 86.30
Services
Lift
Lift
Accessible
WC
Comms & Elec
Void
Communal Open
Space 398 sqm
Sceening up to
1800mm high
(shown dashed)
Blue line indicates previous line of
building as lodged
REGENT STREET
TOW 87.50
TOW 87.50
3000
3830
11944
1635
535
4000
9300
2000
12700
24000
MARIAN STREET
KEY
Line of building - DA as lodged


68-70 REGENT ST
WILLIAM LANE
7-9 GIBBONS ST
REGENT STREET
MARIAN STREET
A
0601
B
0601
C
0602
2700
9700
4935
3100
1750
RL 91.10
Lift Overrun
RL 91.10
5600
10100
13750
Plant
Void
1900
6600
Blue line indicates previous line of building as lodged
Outline of Roof Level below (shown dashed)
KEY
Line of building - DA as lodged



1 **East Elevation**

1 : 200@A1



2 **West Elevation**

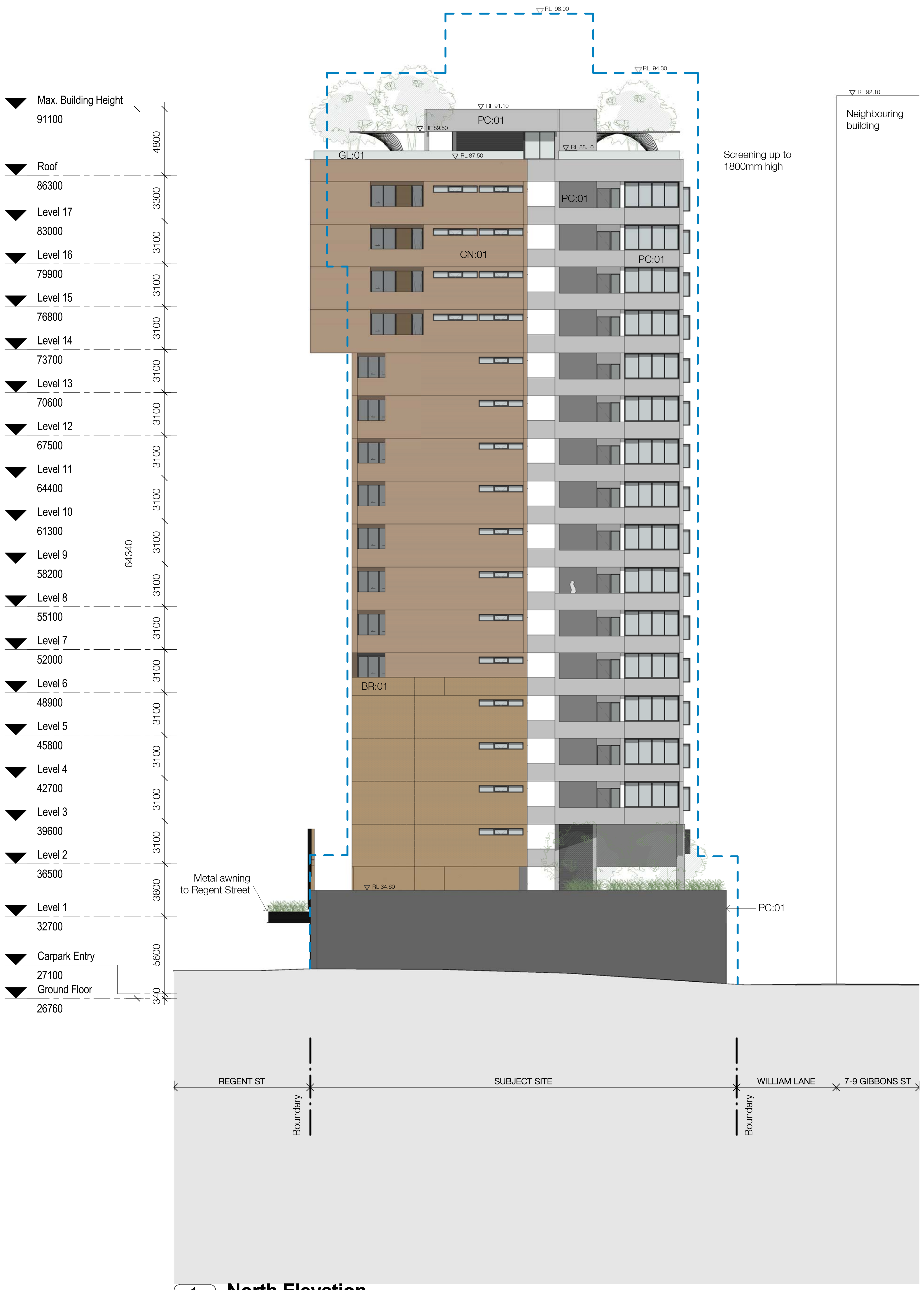
1 : 200@A1

Legend

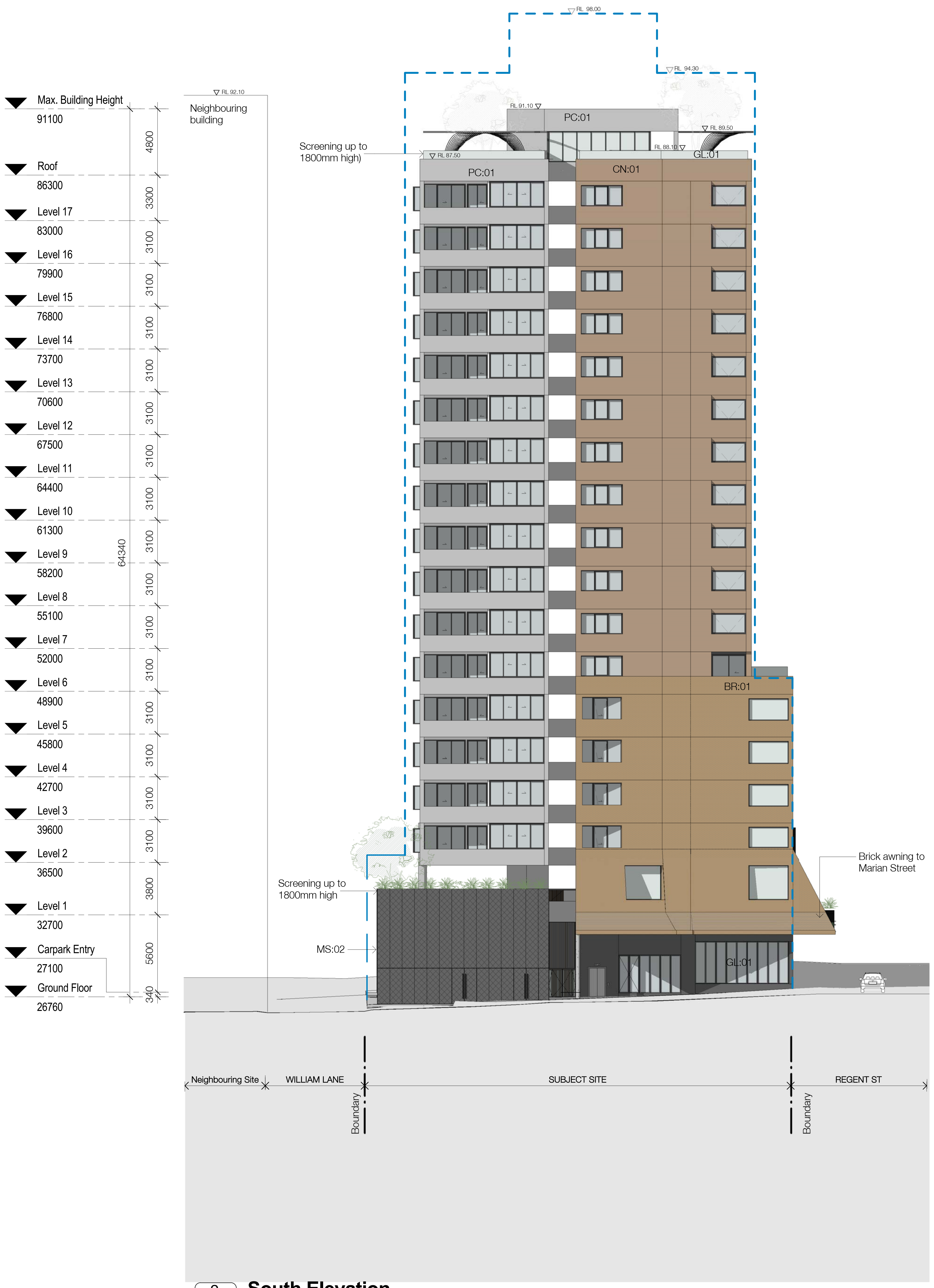
BR:01	-	Face Brick Type 01
CN:01	-	Concrete Finish Type 01
CN:02	-	Concrete Finish Type 02
PC:01	-	Pre-cast Concrete Finish
LV:01	-	Louvres Type 01
MS:01	-	Metal Screening Type 01
MS:02	-	Metal Screening Type 02
MS:03	-	Metal Screening Type 03
GL:01	-	Glass Type 01

KEY

— — — Line of building - DA as lodged



1 **North Elevation**
1 : 200@A1



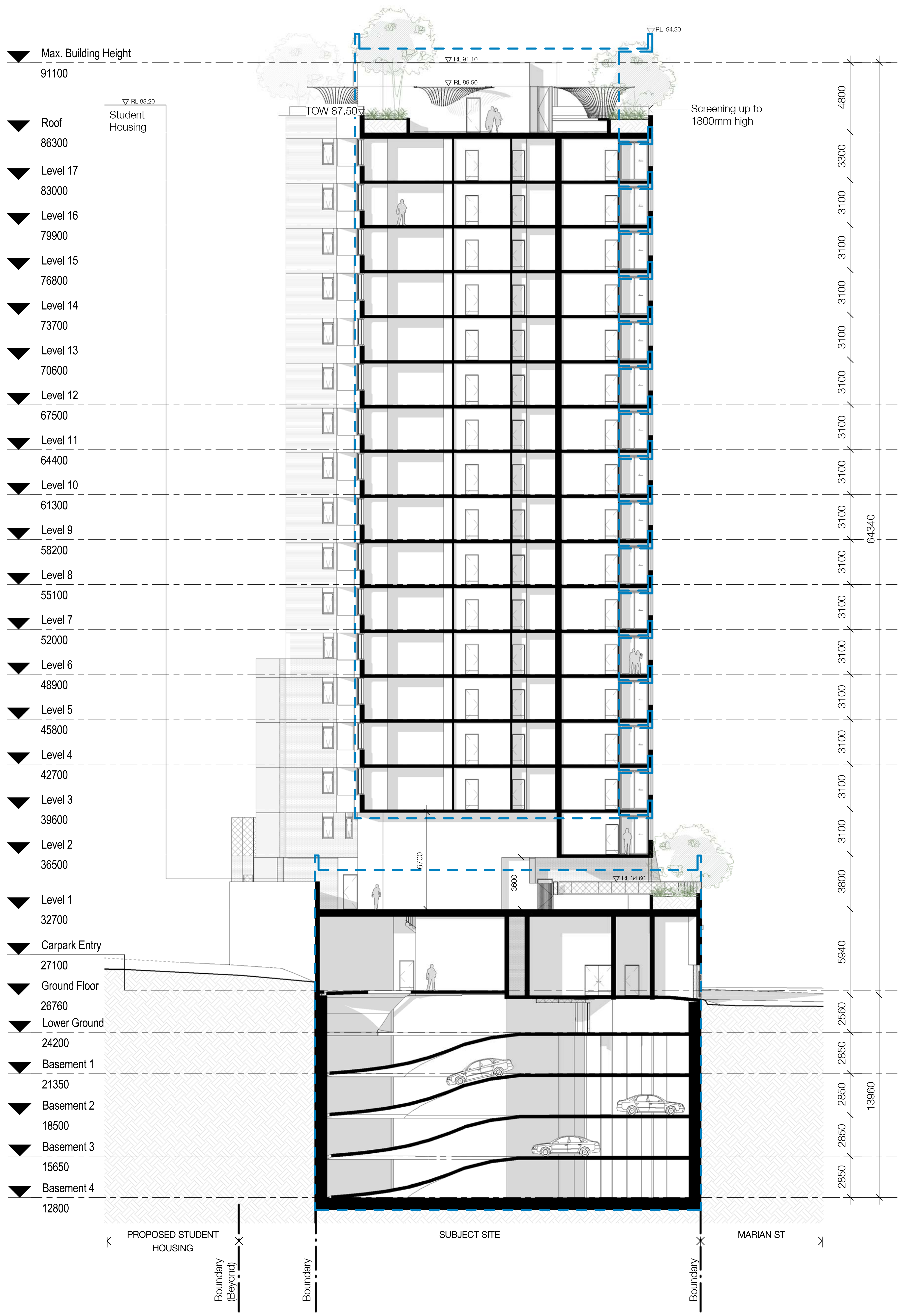
2 **South Elevation**
1 : 200@A1

Legend

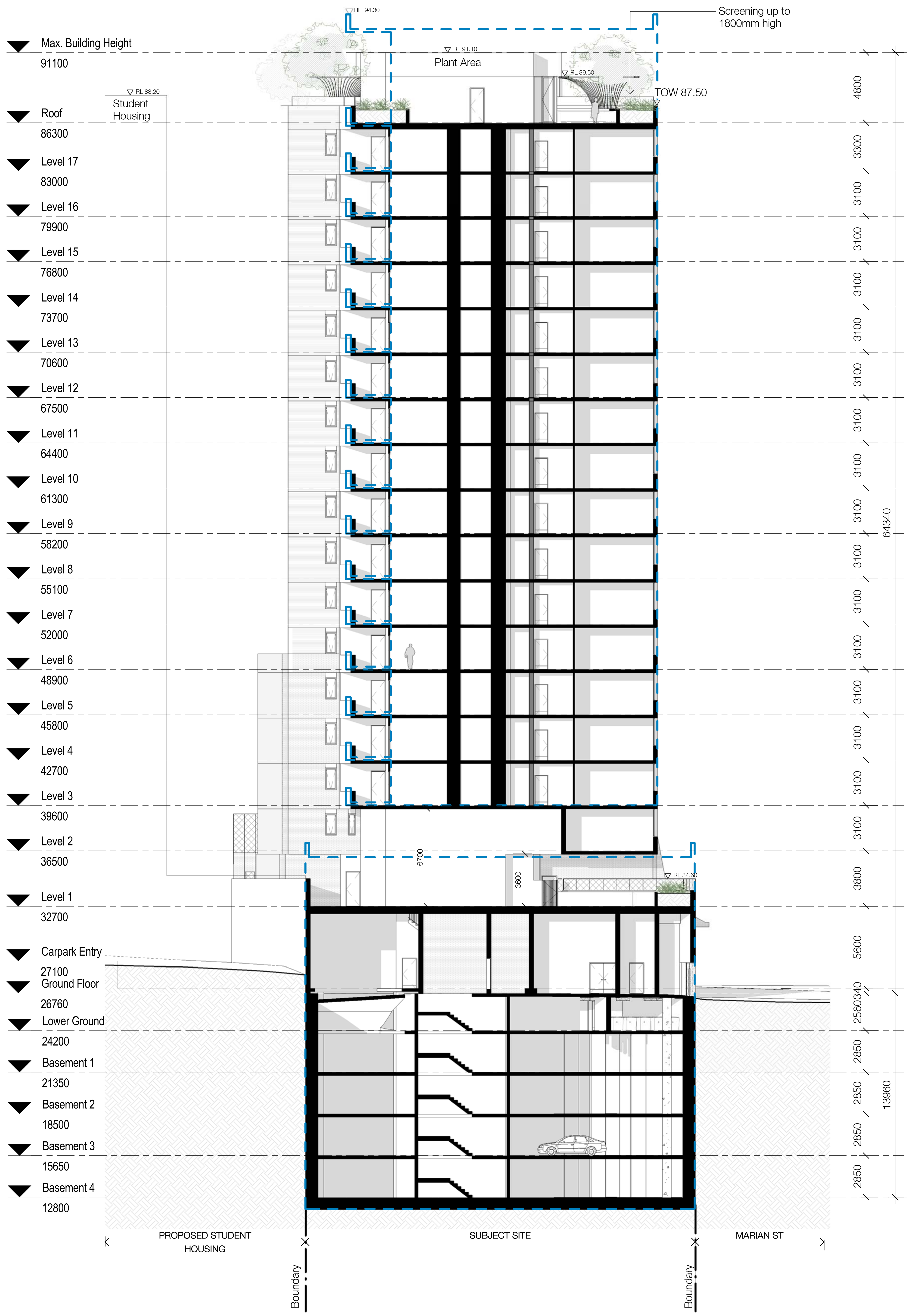
BR:01	-	Face Brick Type 01
CN:01	-	Concrete Finish Type 01
CN:02	-	Concrete Finish Type 02
PC:01	-	Pre-cast Concrete Finish
LV:01	-	Louvres Type 01
MS:01	-	Metal Screening Type 01
MS:02	-	Metal Screening Type 02
MS:03	-	Metal Screening Type 03
GL:01	-	Glass Type 01

KEY

— — —	Line of building - DA as lodged



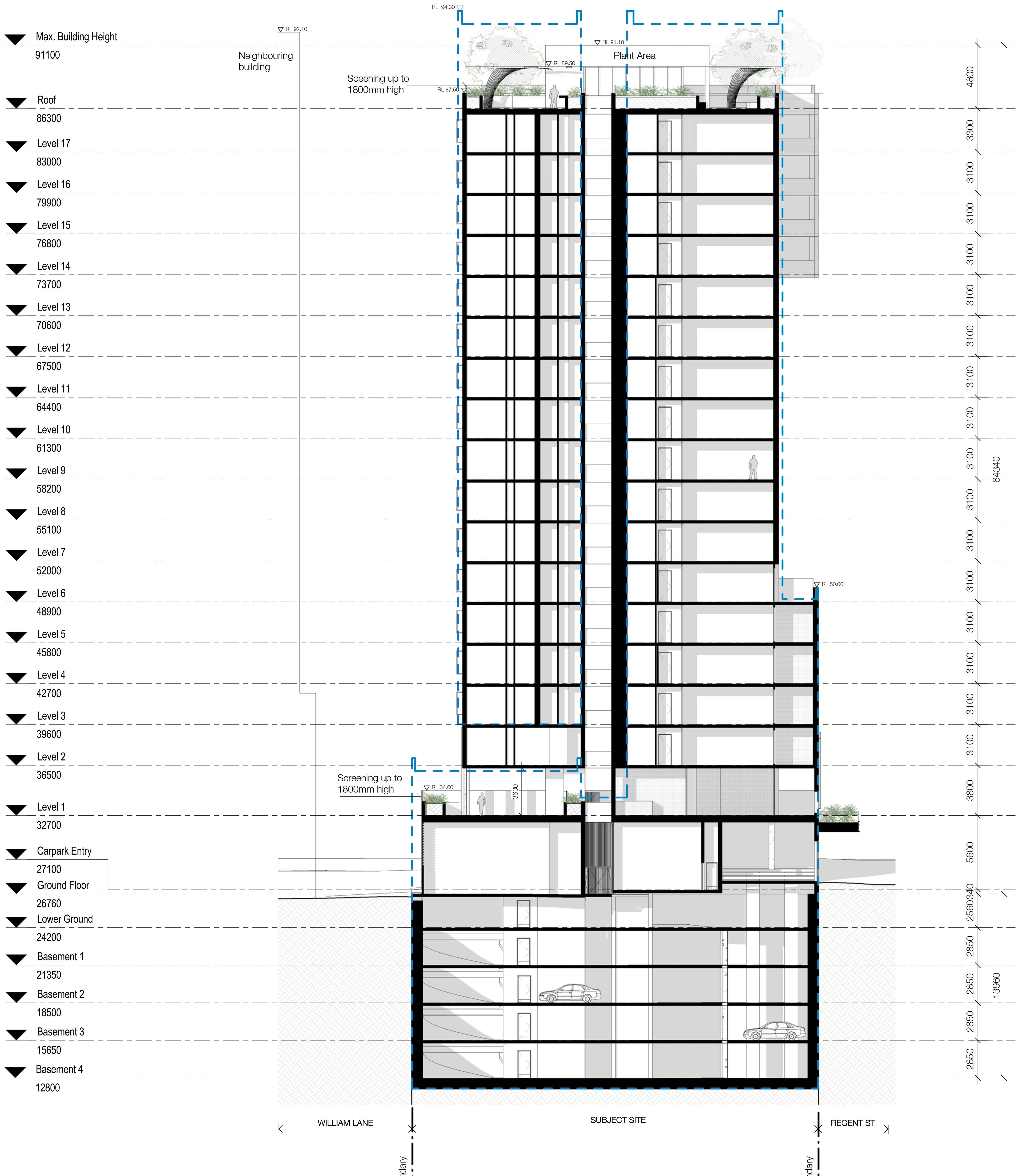
A
0201
Section A
1 : 200@A1



B
0201
Section B
1 : 200@A1

KEY

— — — Line of building - DA as lodged



C
0201
Section C
1 : 200@A1

KEY

Line of building - DA as lodged

APPENDIX B

Site Photographs

Photograph 1: Commercial buildings located at 80-88 Regent Street, Redfern NSW.

Photograph 2: Western portion of the site occupied by open, courtyards.

APPENDIX C

Borehole Logs

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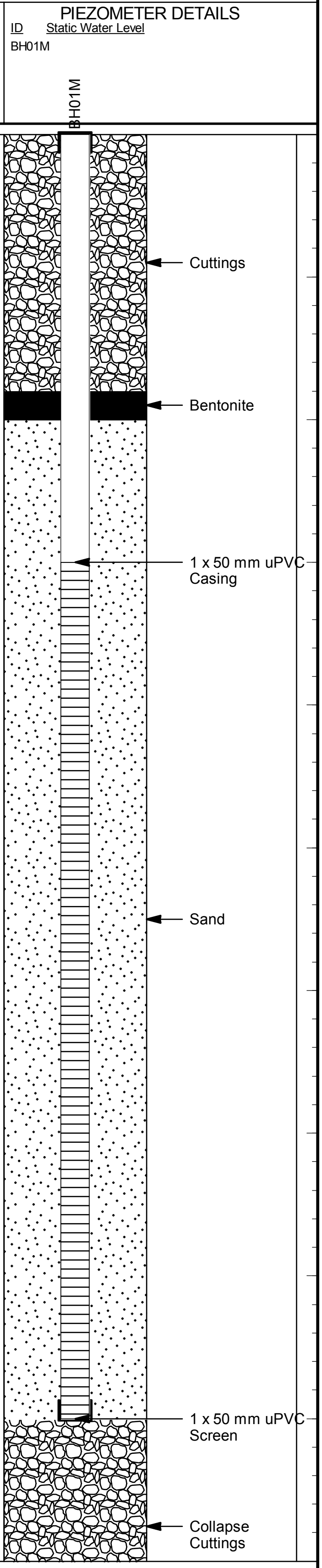
BOREHOLE: BH01M

Project	Detailed Site Investigation			Sheet	1 OF 2
Location	80-88 Regent Street, Redfern NSW			Date Started	29/4/16
Position	Refer to Figure 2			Date Completed	29/4/16
Job No.	E22974	Contractor	BG Drilling	Logged BY	Date:29/4/16
Client	Sunny Thirdi Regent Street Pty Ltd	Drill Rig	Track Mounted Rig	Checked NF	Date: 30/5/16
		Inclination	-90°		

Drilling				Sampling	Field Material Description		
METHOD	PENETRATION RESISTANCE	WATER	DEPTH RL	SAMPLE OR FIELD TEST	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION
AD/T	E	▽	*0.30*	BH01M_0.1-0.2 D 0.10-0.20 m	-	FILL: Clayey SAND, fine-medium grained, grey with trace fine to medium grained sub-angular gravels, weak solvent odour.	D
			0.80	BH01M_0.14-0.5 D 0.40-0.50 m PID = 0.9 ppm	-	FILL: Sandy CLAY, medium to high plasticity, grey/yellow-brown, sand is fine grained, no odour.	D - W
			1.40	BH01M_0.9-1.0 D 0.90-1.00 m PID = 1 ppm	CL-SM	Silty CLAY; medium to high plasticity, red-brown/yellow-brown, no odour.	
			4.50	BH01M_1.9-2.0 D 1.90-2.00 m PID = 0.6 ppm BH01M_2.9-3.0 D 2.90-3.00 m PID = 0.9 ppm	CL-SM	Silty CLAY; low to medium plasticity, red-brown / pale grey, no odour.	
			7.20		-	SHALE; pale grey-grey, extremely weathered, no odour.	
					-	SHALE; pale grey-grey, highly weathered, no odour.	



This borehole log should be read in conjunction with Environmental Investigations Australia's accompanying standard notes.

BOREHOLE: BH01M

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Project	Detailed Site Investigation			Sheet	2 OF 2
Location	80-88 Regent Street, Redfern NSW			Date Started	29/4/16
Position	Refer to Figure 2			Date Completed	29/4/16
Job No.	E22974	Contractor	BG Drilling	Logged BY	Date:29/4/16
Client	Sunny Thirdi Regent Street Pty Ltd	Drill Rig	Track Mounted Rig	Checked JS	Date: 30/5/16
		Inclination	-90°		

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	*DEPTH* RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	PIEZOMETER DETAILS ID Static Water Level BH01M
AD/T	E		10	*10.50*			▤	-	SHALE; pale grey-grey, highly weathered, no odour.	D - W		▨
			11 12 13 14 15 16 17 18 19 20						Hole Terminated at 10.50 m Borehole converted to monitoring well			

This borehole log should be read in conjunction with Environmental Investigations Australia's accompanying standard notes.

BOREHOLE: BH02

Project Detailed Site Investigation
Location 80-88 Regent Street, Redfern NSW
Position Refer to Figure 2
Job No. E22974
Client Sunny Thirdi Regent Street Pty Ltd

Contractor Hand Auger
Drill Rig
Inclination -90°

Sheet 1 OF 1
Date Started 29/4/16
Date Completed 29/4/16
Logged BY Date:29/4/16
Checked NF Date: 30/5/16

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	*DEPTH* RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	E	GWNE	0						Wooden floor boards Void	D		
				0.50	BH02_0.5-0.6 D 0.50-0.60 m PID = 1.2 ppm BH02_0.9-1.0 D 0.90-1.00 m PID = 2 ppm	■ ■	▨	-	FILL: Silty SAND, fine-medium grained, grey-brown / pale grey with some sandstone fragements, no odour.			FILL
			1									
				1.40	BH02_1.4-1.5 D 1.40-1.50 m PID = 0.8 ppm	■		CL-SM	Silty CLAY; medium plasticity, orange-brown/red, no odour.			RESIDUAL SOIL
			2	*2.00*	BH02_1.9-2.0 D 1.90-2.00 m PID = 0.6 ppm	■			Hole Terminated at 2.00 m Target depth reached			
			3									
			4									
			5									
			6									
			7									
			8									
			9									
			10									

This borehole log should be read in conjunction with Environmental Investigations Australia's accompanying standard notes.

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BOREHOLE: BH03

Project	Detailed Site Investigation	Sheet	1 OF 1
Location	80-88 Regent Street, Redfern NSW	Date Started	29/4/16
Position	Refer to Figure 2	Date Completed	29/4/16
Job No.	E22974	Contractor	Hand Auger
Client	Sunny Thirdi Regent Street Pty Ltd	Drill Rig	
		Inclination	-90°
		Logged BY	Date: 29/4/16
		Checked NF	Date: 30/5/16

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	E	GWNE	0						Wooden floor boards			
									Void			
				0.70	BH03_0.7-0.8 D 0.70-0.80 m PID = 0.9 ppm			-	FILL: Silty SAND, fine-medium grained, grey-brown, pale grey with some sandstone fragements, no odour.	D		FILL
				1.40	BH03_1.3-1.4 D 1.30-1.40 m PID = 1.7 ppm BH03_1.8-1.9 D 1.80-1.90 m PID = 0.8 ppm			CL-SM	Silty CLAY; medium plasticity, orange-brown/red, no odour.			RESIDUAL SOIL
				1.90					Hole Terminated at 1.90 m Target depth reached			

This borehole log should be read in conjunction with Environmental Investigations Australia's accompanying standard notes.

BOREHOLE: BH04

Project Detailed Site Investigation
Location 80-88 Regent Street, Redfern NSW
Position Refer to Figure 2
Job No. E22974
Client Sunny Thirdi Regent Street Pty Ltd

Contractor Hand Auger
Drill Rig
Inclination -90°

Sheet 1 OF 1
Date Started 29/4/16
Date Completed 29/4/16
Logged BY Date: 29/4/16
Checked JS Date:30/5/16

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	H	GWNE	0	0.20	BH04_0.15-0.25 QD1/QT1 D 0.15-0.25 m PID = 0.8 ppm	■		-	CONCRETE: 200 mm thick	D		CONCRETE HARDSTAND
	E			0.40	BH04_0.4-0.5 D 0.40-0.50 m PID = 1.4 ppm	■		-	FILL: Sand, fine to medium grained, brown/pale-brown, with fine-medium grained, sub-angular gravels, no odour.			FILL
				0.80				-	FILL: Sandy CLAY, low to medium plasticity, fine-medium grained, dark brown / dark-grey, no odour.			
			1	1.50	NJ04_0.9-1.0 D 0.90-1.00 m PID = 0.9 ppm BH04_1.4-1.5 D 1.40-1.50 m PID = 0.9 ppm	■ ■		CL-SM	Silty CLAY; medium plasticity, orange-brown/red, no odour.			RESIDUAL SOIL
			2 3 4 5 6 7 8 9 10						Hole Terminated at 1.50 m Target depth reached			

This borehole log should be read in conjunction with Environmental Investigations Australia's accompanying standard notes.

EIA LIB 1.03.GLB Log IS AU BOREHOLE 3 E22974 LOG V2.GPJ <<DrawingFile>> 13/05/2016 14:55 8.30.004 Datgel Lab and In Situ Tool - DGD | Lib: EIA 1.03 2014-07-05 Prj: EIA 1.03 2014-07-05

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BOREHOLE: BH05

Project	Detailed Site Investigation		
Location	80-88 Regent Street, Redfern NSW	Sheet	1 OF 1
Position	Refer to Figure 2	Date Started	29/4/16
Job No.	E22974	Contractor: Hand Auger	Date Completed: 29/4/16
Client	Sunny Thirdi Regent Street Pty Ltd	Drill Rig	Logged BY, Date:29/4/16
		Inclination: -90°	Checked JS, Date:30/5/16

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	E	GWNE	0						Tiles and wooden floor boards			
									Void			
				0.75	BH05_0.75-0.85 D 0.75-0.85 m PID = 1.1 ppm	■	☒	-	FILL: Silty SAND, fine-medium grained, grey-brown, pale grey with some sandstone fragements, no odour.	D		FILL
			1	1.00			☒	-	FILL: Sandy CLAY, nedium to high plasticity, grey/yellow-brown, sand is fine grained, no odour.			
				1.40	BH05_1.3-1.4 D 1.30-1.40 m PID = 1.2 ppm	■		CL-SM	Silty CLAY; medium plasticity, orange-brown/red, no odour.			RESIDUAL SOIL
			2	1.90	BH05_1.8-1.9 D 1.80-1.90 m PID = 0.8 ppm	■			Hole Terminated at 1.90 m Target depth reached			
			3									
			4									
			5									
			6									
			7									
			8									
			9									
			10									

This borehole log should be read in conjunction with Environmental Investigations Australia's accompanying standard notes.

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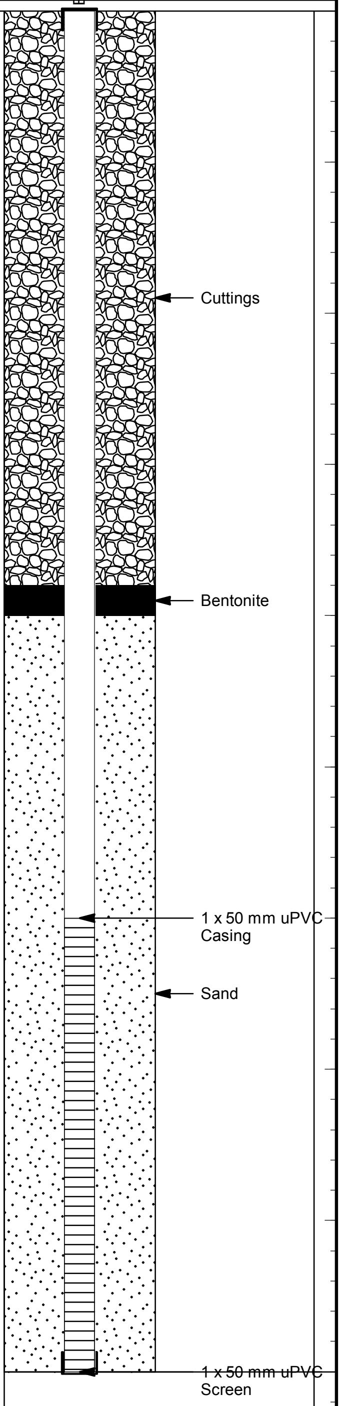
BOREHOLE: BH06M

Project	Detailed Site Investigation	Sheet	1 OF 1
Location	80-88 Regent Street, Redfern NSW	Date Started	29/4/16
Position	Refer to Figure 2	Date Completed	29/4/16
Job No.	E22974	Contractor	BG Drilling
Client	Sunny Thirdi Regent Street Pty Ltd	Drill Rig	Track Mounted Rig
		Inclination	-90°
Logged BY	Date:29/4/16	Checked NF	Date:30/5/16

Drilling | **Sampling** | **Field Material Description**

METHOD	PENETRATION RESISTANCE	WATER	DEPTH RL	SAMPLE OR FIELD TEST	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY
AD/T	H				-	CONCRETE: 80 mm thick	D	
	E		0.30	BH06M_0.1-0.2 D 0.10-0.20 m PID = 0.6 ppm	-	FILL: Clayey SAND, fine-medium grained, grey with trace fine to medium grained sub-angular gravels, weak solvent odour.		
			0.60	BH06M_0.4-0.5 D 0.40-0.50 m PID = 0.8 ppm	CL-SM	FILL: Clay, medium to high plasticity, red-brown/orange/yellow/pale-grey, with trace fine to medium grained sand and sub-angular gravels, weak solvent odour.		
			4.00	BH06M_0.9-1.0 D 0.90-1.00 m PID = 1 ppm BH06M_1.9-2.0 D 1.90-2.00 m PID = 3.2 ppm BH06M_2.9-3.0 D 2.90-3.00 m PID = 1.2 ppm		CLAY, medium to high plasticity, red-brown / orange / yellow/ pale grey, no odour.	D - W	
			5.00		CL-SM	Silty CLAY, red-brown/pale grey, low to medium plasticity, with trace shale fragments, no odour.	W	
			6.50		-	SHALE: extremely weathered to highly weathered, pale grey to grey, no odour.		
		▽	9.00		-	SHALE: highly weathered to slightly weathered, pale grey to grey, no odour.		
						Hole Terminated at 9.00 m Borehole converted to monitoring well		

PIEZOMETER DETAILS
ID Static Water Level
BH06M



This borehole log should be read in conjunction with Environmental Investigations Australia's accompanying standard notes.

BOREHOLE: BH07

Project	Detailed Site Investigation			Sheet	1 OF 1
Location	80-88 Regent Street, Redfern NSW			Date Started	29/4/16
Position	Refer to Figure 2				
Job No.	E22974	Contractor	Hand Auger	Date Completed	29/4/16
Client	Sunny Thirdi Regent Street Pty Ltd	Drill Rig		Logged BY	Date:29/4/16
		Inclination	-90°	Checked JS	Date: 30/5/16

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	*DEPTH* RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	E	GWNE	0					-	CONCRETE: 30 mm thick	D		CONCRETE HARDSTAND
				0.40	BH07_0.1-0.2 D 0.10-0.20 m PID = 0.8 ppm			-	FILL: Sand, fine to medium grained, brown/pale-brown, with fine-medium grained, sub-angular gravels, no odour.			FILL
				1.00	BH07_0.4-0.5 D 0.40-0.50 m PID = 0.8 ppm BH07_0.9-1.0 D 0.90-1.00 m PID = 0.9 ppm			CL-SM	Silty CLAY; medium plasticity, orange-brown/red, no odour.			RESIDUAL SOIL
			1						Hole Terminated at 1.00 m Target depth reached			
			2									
			3									
			4									
			5									
			6									
			7									
			8									
			9									
			10									

This borehole log should be read in conjunction with Environmental Investigations Australia's accompanying standard notes.

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EXPLANATION OF NOTES, ABBREVIATIONS & TERMS USED ON BOREHOLE AND TEST PIT LOGS

DRILLING/EXCAVATION METHOD

HA	Hand Auger	RD	Rotary blade or drag bit	NQ	Diamond Core - 47 mm
DTC	Diatube Coring	RT	Rotary Tricone bit	NMLC	Diamond Core - 52 mm
NDD	Non-destructive digging	RAB	Rotary Air Blast	HQ	Diamond Core - 63 mm
AS*	Auger Screwing	RC	Reverse Circulation	HMLC	Diamond Core - 63mm
AD*	Auger Drilling	PT	Push Tube	BH	Tractor Mounted Backhoe
*V	V-Bit	CT	Cable Tool Rig	EX	Tracked Hydraulic Excavator
*T	TC-Bit, e.g. ADT	JET	Jetting	EE	Existing Excavation
ADH	Hollow Auger	WB	Washbore or Bailer	HAND	Excavated by Hand Methods

PENETRATION/EXCAVATION RESISTANCE

L	**Low resistance.** Rapid penetration/ excavation possible with little effort from equipment used.
M	**Medium resistance.** Penetration/ excavation possible at an acceptable rate with moderate effort from equipment used.
H	**High resistance.** Penetration/ excavation is possible but at a slow rate and requires significant effort from equipment used.
R	**Refusal/ Practical Refusal.** No further progress possible without risk of damage or unacceptable wear to equipment used.

These assessments are subjective and are dependent on many factors, including equipment power and weight, condition of excavation or drilling tools and experience of the operator.

WATER

▽	Water level at date shown	◁	Partial water loss
▷	Water inflow	◀	Complete water loss

GROUNDWATER NOT OBSERVED	Observation of groundwater, whether present or not, was not possible due to drilling water, surface seepage or cave-in of the borehole/ test pit.
GROUNDWATER NOT ENCOUNTERED	Borehole/ test pit was dry soon after excavation. However, groundwater could be present in less permeable strata. Inflow may have been observed had the borehole/ test pit been left open for a longer period.

SAMPLING AND TESTING

SPT	Standard Penetration Test to AS1289.6.3.1-2004
4,7,11 N=18	4,7,11 = Blows per 150mm. N = Blows per 300mm penetration following 150mm
seating 30/80mm	Where practical refusal occurs, the blows and penetration for that interval are reported
RW	Penetration occurred under the rod weight only
HW	Penetration occurred under the hammer and rod weight only
HB	Hammer double bouncing on anvil
Sampling	
DS	Disturbed Sample
BDS	Bulk disturbed Sample
GS	Gas Sample
WS	Water Sample
U63	Thin walled tube sample - number indicates nominal sample diameter in millimetres
Testing	
FP	Field Permeability test over section noted
FVS	Field Vane Shear test expressed as uncorrected shear strength (sv = peak value, sr = residual value)
PID	Photoionisation Detector reading in ppm
PM	Pressuremeter test over section noted
PP	Pocket Penetrometer test expressed as instrument reading in kPa
WPT	Water Pressure tests
DCP	Dynamic Cone Penetrometer test
CPT	Static Cone Penetration test
CPTu	Static Cone Penetration test with pore pressure (u) measurement

RANKING OF VISUALLY OBSERVABLE CONTAMINATION AND ODOUR (for specific soil contamination assessment

R = 0	No visible evidence of contamination	R = A	No non-natural odours identified
R = 1	Slight evidence of visible contamination	R = B	Slight non-natural odours identified
R = 2	Visible contamination	R = C	Moderate non-natural odours identified
R = 3	Significant visible contamination	R = D	Strong non-natural odours identified

ROCK CORE RECOVERY

TCR = Total Core Recovery (%)

$$= \frac{\text{Length of core recevered}}{\text{Lengh of core run}} \text{ x } 100$$

SCR = Solid Core Recovery (%)

$$= \frac{\Sigma \text{ Length ofcylindrical core recevered}}{\text{Lengh of core run}} \text{ x } 100$$

RQD = Rock Quality Designation (%)

$$= \frac{\Sigma\text{Axial Lenghts of core} > 100\text{mm}}{\text{Lengh of core run}} \text{ x } 100$$

MATERIAL BOUNDARIES

——— = inferred boundary

- - - - - - - - = probable boundary

— ?— ?— ?— ?— ? = possible boundary

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METHOD OF SOIL DESCRIPTION USED ON BOREHOLE AND TEST PIT LOGS

▩	FILL	⁂	ORGANIC SOILS (OL, OH or Pt)	☰	CLAY (CL, CI or CH)
◌	COUBLES or BOULDERS	×	SILT (ML or MH)	⁘	SAND (SP or SW)
○	GRAVEL (GP or GW)		Combinations of these basic symbols may be used to indicate mixed materials such as sandy clay		

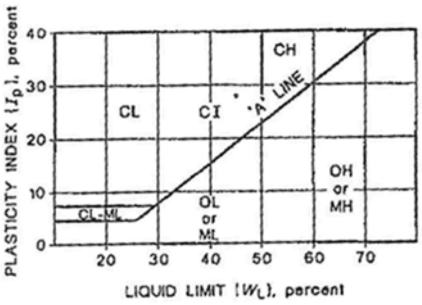
CLASSIFICATION AND INFERRED STRATIGRAPHY

Soil is broadly classified and described in Borehole and Test Pit Logs using the preferred method given in AS1726 – 1993, (Amdt1 – 1994 and Amdt2 – 1994), Appendix A. Material properties are assessed in the field by visual/tactile methods.

PARTICLE SIZE CHARACTERISTICS

Major Division	Sub Division	Particle Size
BOULDERS		>200 mm
COBBLES		63 to 200 mm
GRAVEL	Coarse	20 to 63 mm
	Medium	6 to 20 mm
	Fine	2 to 6 mm
SAND	Coarse	0.6 to 2 mm
	Medium	0.2 to 0.6 mm
	Fine	0.075 to 0.2mm
SILT		0.002 to 0.075 mm
CLAY		<0.002 mm

PLASTICITY PROPERTIES



USCS SYMBOLS

Major Divisions		Symbol	Description
COARSE GRAINED SOILS More than 50% by dry mass less than 63mm is greater than 0.075mm	More than 50% of coarse grains are >2.mm	GW	Well graded gravel and gravel-sand mixtures, little or no fines.
		GP	Poorly graded gravel and gravel-sand mixtures, little or no fines.
		GM	Silty gravel, gravel-sand-silt mixtures.
		GC	Clayey gravel, gravel-sand-clay mixtures.
	More than 50% of coarse grains are <2 mm	SW	Well graded sand and gravelly sand, little or no fines.
		SP	Poorly graded sand and gravelly sand, little or no fines.
		SM	Silty sand, sand-silt mixtures.
		SC	Clayey sand, sandy-clay mixtures.
FINE GRAINED SOILS More than 50% by dry mass less than 63mm is less than 0.075mm	Liquid Limit less < 50%	ML	Inorganic silts of low plasticity, very fine sands, rock flour, silty or clayey fine sands.
		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays.
		OL	Organic silts and organic silty clays of low plasticity.
	Liquid Limit > than 50%	MH	Inorganic silts of high plasticity.
		CH	Inorganic clays of high plasticity.
		OH	Organic clays of medium to high plasticity.
		PT	Peat muck and other highly organic soils.

MOISTURE CONDITION

Symbol	Term	Description
D	Dry	Sands and gravels are free flowing. Clays & Silts may be brittle or friable and powdery.
M	Moist	Soils are darker than in the dry condition & may feel cool. Sands and gravels tend to cohere.
W	Wet	Soils exude free water. Sands and gravels tend to cohere.

Moisture content of cohesive soils may also be described in relation to plastic limit (WP) or liquid limit (WL) [» much greater than, > greater than, < less than, « much less than].

CONSISTENCY

Symbol	Term	Undrained Shear Strength
VS	Very Soft	0. to 12 kPa
S	Soft	12 to 25 kPa
F	Firm	25 to 50 kPa
St	Stiff	50 to 100 kPa
VSt	Very Stiff	100 to 200 kPa
H	Hard	Above 200 kPa

DENSITY

Symbol	Term	Density Index %	SPT "N" #
VL	Very Loose	< 15	0 to 4
L	Loose	15 to 35	4 to 10
MD	Medium Density	35 to 65	10 to 30
D	Dense	65 to 85	30 to 50
VD	Very Dense	Above 85	Above 50

In the absence of test results, consistency and density may be assessed from correlations with the observed behaviour of the material.
SPT correlations are not stated in AS1726 – 1993, and may be subject to corrections for overburden pressure and equipment type.

MINOR COMPONENTS

Term	Assessment Guide	Proportion by Mass
Trace	Presence just detectable by feel or eye but soil properties little or no different to general properties of primary component	Coarse grained soils: ≤ 5% Fine grained soil: ≤15%
Some	Presence easily detectable by feel or eye but soil properties little or no different to general properties of primary component	Coarse grained soils: 5 - 12% Fine grained soil: 15 - 30%

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TERMS FOR ROCK MATERIAL STRENGTH AND WEATHERING

CLASSIFICATION AND INFERRED STRATIGRAPHY

Soil is broadly classified and described in Borehole and Test Pit Logs using the preferred method given in AS1726 – 1993, (Amdt1 – 1994 and Amdt2 – 1994), Appendix A. Material properties are assessed in the field by visual/ tactile methods.

STRENGTH

Symbol	Term	Point Load Index, $Is_{(50)}$ (MPa) #	Field Guide
EL	Extremely Low	< 0.03	Easily remoulded by hand to a material with soil properties.
VL	Very Low	0.03 to 0.1	Material crumbles under firm blows with sharp end of pick; can be peeled with knife; too hard to cut a triaxial sample by hand. Pieces up to 30 mm can be broken by finger pressure.
L	Low	0.1 to 0.3	Easily scored with a knife; indentations 1 mm to 3 mm show in the specimen with firm blows of pick point; has dull sound under hammer. A piece of core 150 mm long by 50 mm diameter may be broken by hand. Sharp edges of core may be friable and break during handling.
M	Medium	0.3 to 1	Readily scored with a knife; a piece of core 150 mm long by 50 mm diameter can be broken by hand with difficulty.
H	High	1 to 3	A piece of core 150 mm long by 50 mm diameter cannot be broken by hand but can be broken with pick with a single firm blow; rock rings under hammer.
VH	Very High	3 to 10	Hand specimen breaks with pick after more than one blow; rock rings under hammer.
EH	Extremely High	>10	Specimen requires many blows with geological pick to break through intact material; rock rings under hammer.

 # Rock Strength Test Results

▼	Point Load Strength Index, $Is_{(50)}$, Axial test (MPa)
◀	Point Load Strength Index, $Is_{(50)}$, Diametral test (MPa)

Relationship between rock strength test result ($Is_{(50)}$) and unconfined compressive strength (UCS) will vary with rock type and strength, and should be determined on a site-specific basis. UCS is typically 10 to 30 x $Is_{(50)}$, but can be as low as 5 MPa.

ROCK MATERIAL WEATHERING

Symbol		Term	Field Guide
RS		Residual Soil	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.
EW		Extremely Weathered	Rock is weathered to such an extent that it has soil properties - i.e. it either disintegrates or can be remoulded, in water.
DW	HW	Distinctly Weathered	Rock strength usually changed by weathering. The rock may be highly discoloured, usually by iron staining. Porosity may be increased by leaching, or may be decreased due to deposition of weathering products in pores. In some environments it is convenient to subdivide into Highly Weathered and Moderately Weathered, with the degree of alteration typically less for MW.
	MW		
SW		Slightly Weathered	Rock slightly discoloured but shows little or no change of strength relative to fresh rock.
FR		Fresh	Rock shows no sign of decomposition or staining.

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ABBREVIATIONS AND DESCRIPTIONS FOR ROCK MATERIAL AND DEFECTS

CLASSIFICATION AND INFERRED STRATIGRAPHY

Rock is broadly classified and described in Borehole Logs using the preferred method given in AS1726 – 1993, (Amdt1 – 1994 and Amdt2 – 1994), Appendix A. Material properties are assessed in the field by visual/ tactile methods.

ROCK MATERIAL DESCRIPTION

Layering

Term	Description
Massive	No layering apparent
Poorly Developed	Layering just visible; little effect on properties
Well Developed	Layering (bedding, foliation, cleavage) distinct; rock breaks more easily parallel to layering

Structure

Term	Spacing (mm)
Thinly laminated	<6
Laminated	6 – 20
Very thinly bedded	20 – 60
Thinly bedded	60 – 200
Medium bedded	200 – 600
Thickly bedded	600 – 2,000
Very thickly bedded	> 2,000

ABBREVIATIONS AND DESCRIPTIONS FOR DEFECT TYPES

Defect Type	Abbr.	Description
Joint	JT	Surface of a fracture or parting, formed without displacement, across which the rock has little or no tensile strength. May be closed or filled by air, water or soil or rock substance, which acts as cement.
Bedding Parting	BP	Surface of fracture or parting, across which the rock has little or no tensile strength, parallel or sub-parallel to layering/ bedding. Bedding refers to the layering or stratification of a rock, indicating orientation during deposition, resulting in planar anisotropy in the rock material.
Foliation	FL	Repetitive planar structure parallel to the shear direction or perpendicular to the direction of higher pressure, especially in metamorphic rock, e.g. Schistosity (SH) and Gneissosity.
Contact	CO	The surface between two types or ages of rock.
Cleavage	CL	Cleavage planes appear as parallel, closely spaced and planar surfaces resulting from mechanical fracturing of rock through deformation or metamorphism, independent of bedding.
Sheared Seam/ Zone (Fault)	SS/SZ	Seam or zone with roughly parallel almost planar boundaries of rock substance cut by closely spaced (often <50 mm) parallel and usually smooth or slickensided joints or cleavage planes.
Crushed Seam/ Zone (Fault)	CS/CZ	Seam or zone composed of disoriented usually angular fragments of the host rock substance, with roughly parallel near-planar boundaries. The brecciated fragments may be of clay, silt, sand or gravel sizes or mixtures of these.
Decomposed Seam/ Zone	DS/DZ	Seam of soil substance, often with gradational boundaries, formed by weathering of the rock material in places.
Infilled Seam	IS	Seam of soil substance, usually clay or clayey, with very distinct roughly parallel boundaries, formed by soil migrating into joint or open cavity.
Schistocity	SH	The foliation in schist or other coarse grained crystalline rock due to the parallel arrangement of platy or prismatic mineral grains, such as mica.
Vein	VN	Distinct sheet-like body of minerals crystallised within rock through typically open-space filling or crack-seal growth.

ABBREVIATIONS AND DESCRIPTIONS FOR DEFECT SHAPE AND ROUGHNESS

Shape	Abbr.	Description	Roughness	Abbr.	Description
Planar	Pl	Consistent orientation	Polished	Pol	Shiny smooth surface
Curved	Cu	Gradual change in orientation	Slickensided	SL	Grooved or striated surface, usually polished
Undulating	Un	Wavy surface	Smooth	S	Smooth to touch. Few or no surface irregularities
Stepped	St	One or more well defined steps	Rough	RF	Many small surface irregularities (amplitude generally <1mm). Feels like fine to coarse sandpaper
Irregular	Ir	Many sharp changes in orientation	Very Rough	VR	Many large surface irregularities, amplitude generally >1mm. Feels like very coarse sandpaper

Orientation: **Vertical Boreholes –** The dip (inclination from horizontal) of the defect.
Inclined Boreholes – The inclination is measured as the acute angle to the core axis.

ABBREVIATIONS AND DESCRIPTIONS FOR DEFECT COATING

Coating	Abbr.	Description
Clean	CN	No visible coating or infilling
Stain	SN	No visible coating but surfaces are discoloured by staining, often limonite (orange-brown)
Veneer	VNR	A visible coating of soil or mineral substance, usually too thin to measure (< 1 mm); may be patchy

DEFECT APERTURE

Aperture	Abbr.	Description
Closed	CL	Closed.
Open	O	Without any infill material.
Infilled	-	Soil or rock i.e. clay, talc, pyrite, quartz, etc.

APPENDIX D

Field Data Sheets

E22974
Redfern.

eiaustralia

Environmental Investigations Australia Pty Ltd
Suite 6.01, 55 Miller Street
PYRMONT, NSW, 2009

ABN 33 102 449 507
E service@eiaustralia.com.au
W www.eiaustralia.com.au
T 02 9516 0722

CALIBRATION CERTIFICATE FOR PHOTO IONISATION DETECTOR

Instrument: Mini RAE 3000

Serial Number: 592-906667 - EI **PID02** ☒ **OR** 592-901345 - EI **PID03** ☐

Instrument Conditions: GOOD

Calibration gas species: Isobutylene.

Calibration gas concentration: 100 ppm

Gas bottle number: 002

This PID has been calibrated to Isobutylene gas with the span concentration displayed as 100 ppm at 99.8 ppm span setting (allowable range +/-10ppm from span setting).

The PID is initially zero calibrated in fresh air.

Remaining gas in bottle: >250 psi (if reading is <250 psi, notify Equipment Manager to arrange new gas bottle order)

The above detector was calibrated in accordance with manufacturer's specifications.

Signed: BY

Date: 29/04/16

Time: 07:00 AM

WATER SAMPLING FIELD SHEET

Environmental Investigations Australia
Contamination | Remediation | Geotechnical

Site Address: 80-88 Regent Street, Redfern NSW
Job Number: E22974
Client: Milligan Group
Date: 11-5-16
Field Staff: JS
Sampling Location ID BH01M
Well Location: See Figure
Round No: 1

MEDIUM ☑Groundwater ☐Surface Water ☐Stormwater ☐Other:

SAMPLING POINT INFO

Well Installation Date: 29-04-16
Stickup (m): -0.11 (+ above ground - below ground)
Initial Well Depth (mbgl): 9.0 m bgL
Screen Interval (mBTOC): 3-9 m
Previous Sampling Date: –
Previous SWL (mBTOC): -

PID READINGS

PID Headspace (ppm): –
PID Background (ppm): –
PID Breathing Space (ppm): –

PRE PURGE

Total Well Depth (mbgl): 8.30
Well Head Condition: Covered in Dirt, but Good.
SWL (mbtoc): 5.464
Water Column (m): 2.836

PHASE SEPARATED HYDROCARBONS (PSH)

Depth to PSH (mbtoc): /
PSH Visually Confirmed (Bailer): None
PSH Thickness (mm): /

PURGE AND SAMPLE

Sampling Method ☐Bladder ☐Peristaltic ☐Submersible ☐Other:

Depth of Pump Inlet:
Fill Timer:
Pump Pressure Regulator (psi):
Discharge Timer:
Weather Conditions:
Cycle:
Pump on time:
Pump off time:

WATER QUALITY PARAMETERS

Probe Make and Model:
Bump Test Date and Time:

Time	Volume (L)	SWL (mbtoc)	Temp (°C)	EC (µS/cm)	Redox (mV)	DO (mg/L)	pH (units)	Comments (colour, turbidity, odour etc.)
–	–	–	19.29	985	30.6	1.32	7.06	brown, high suspended solids/
								turbidity, No odour or
								Sheen.
Stabilisation range: 3 consecutive readings			±0.2°C	±3%	±20mV	±10%	±0.2	

OTHER COMMENTS/OBSERVATIONS:

Bailed well due to very slow recharge.
very High suspended solids - could not filter metals.

SIGNATURE:

WATER SAMPLING FIELD SHEET

Environmental Investigations Australia
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Site Address: 80-88 Regent Street, Redfern NSW	Job Number: E22974
Client: Milligan Group	Date: 11-5-16
Field Staff: JS	Sampling Location ID BH06M
Well Location: See Figure	Round No: 1
MEDIUM ☑Groundwater ☐Surface Water	☐Stormwater ☐Other:
SAMPLING POINT INFO	
Well Installation Date: 29-04-16	Stickup (m): -0.10 (+ above ground - below ground)
Initial Well Depth (mbgl): 9.0	Screen Interval (mBTOC): 6-9m
Previous Sampling Date: –	Previous SWL (mBTOC): –
PID READINGS	
PID Headspace (ppm): /	PID Background (ppm): /
PID Breathing Space (ppm):	
PRE PURGE	
Total Well Depth (mbgl): 8.95	Well Head Condition: Good
SWL (mbtoc): 8.305	Water Column (m): 0.645
PHASE SEPARATED HYDROCARBONS (PSH)	
Depth to PSH (mbtoc): /	PSH Visually Confirmed (Bailer): /
PSH Thickness (mm):	
PURGE AND SAMPLE	
Sampling Method ☐Bladder ☐Peristaltic	☐Submersible ☐Other:
Depth of Pump Inlet: /	Fill Timer: /
Pump Pressure Regulator (psi):	Discharge Timer:
Weather Conditions:	Cycle:
Pump on time:	Pump off time:
WATER QUALITY PARAMETERS	
Probe Make and Model:	Bump Test Date and Time:

Time	Volume (L)	SWL (mbtoc)	Temp (°C)	EC (µS/cm)	Redox (mV)	DO (mg/L)	pH (units)	Comments (colour, turbidity, odour etc.)
—	—	—	19.47	748	128.8	1.88	6.20	No odour, High suspended
								solids brown, high turbidity
Stabilisation range: 3 consecutive readings			±0.2°C	±3%	±20mV	±10%	±0.2	

OTHER COMMENTS/OBSERVATIONS:

Bailed due to small water column & very slow recharge. Could not filter metals.

SIGNATURE:

Environmental Investigations Australia
Contamination | Remediation | Geotechnical

Water Quality Meter Calibration Log

Instrument: EI WQM 001 (Hanna Multi Parameter 9828 – Serial no. 08267834)

Room Temperature: 24.7°C

Sensor (Unit of measure)	Standard Solutions Used (Item Code / Name)	Solution Batch Number	Temperature Adjusted Calibration Solution Value	Instrument Reading	
				Initial	Post Calibration
pH	HI7007L	8650	7.01	6.95	7.01
	HI7004L	8498	4.01	3.95	4.01
	HI7010	8072	10-01	10.00	10.02
ORP (mV)	HI7021	6011	240	232.9	240.4
Conductivity (μs/cm)	HI7031L	8656	1413	1380	1422
	HI7030L	8661	12880	10300	12560
DO Saturation (%)	Ambient Air	N/A	100%	113.9%	100.1%
	Sodin Metabisulfide + Deionised Water	278121 BA 000026.001	0%	0.0%	0.0%
Temperature (ºC)	Thermometre	N/A	24.7°C	24.43	24.7

Calibrated by: Carmen YI

Calibration Date: 5 May 2016

Next Calibration Due: June 2016

Notes:

pH/ORP probe replaced with new unit

APPENDIX E

Chain of Custody and Sample Receipt Forms

Sheet 1 of 3

Site: 80-88 Regent Street Redfern NSW

Project No: E22974

Laboratory: **SGS Australia**
Unit 16, 33 Maddox Street,
ALEXANDRIA NSW 2015
P: 02 8594 0400 F: 02 8594 0499

			Sampling		Sample Matrix			Analysis																
Sample ID	Laboratory ID	Container Type	Date	Time	WATER	SOIL	OTHERS (i.e. Fibro, Paint, etc.)	HM ^{A} /TRH/BTEX/PAHs OCP/OP/PCB/Asbestos	HM ^{A} /TRH/BTEX/PAHs	HM ^{A} /TRH/BTEX	TRH/BTEX/Lead	TRH/BTEX	PAHs	VOCs	Asbestos	pH / CEC (cation exchange)	pH / EC (electrical conductivity)	sPOCAS	Hold			TCLP PAHs	TCLP HM ^{A}	TCLP HM ^{B}
BH01m_0.1-0.2	1	J,ZLB	29-4-16	Am/pm		✓		X																
BH01m_0.4-0.5		J,ZLB	↓	↓		↓													X					
BH01m_0.9-1.0	2	J							X															
BH01m_1.9-2.0		↓																	X					
BH01m_2.9-3.0																			X					
BH02_0.5-0.6	3	J,ZLB						X																
BH02_0.9-1.0		J,ZLB																	X					
BH02_1.4-1.5		J																	X					
BH02_1.9-2.0		J																	X					
BH03_0.7-0.8	4	J,ZLB						X																
BH03_1.3-1.4		J,ZLB																	X					
BH03_1.8-1.9	5	J							X															

SGS Alexandria Environmental
SE151756 COC
Received: 02-May-2016

Comments

HM A
Arsenic
Cadmium
Chromium
Copper
Lead
Mercury
Nickel
ZinC

HM B
Arsenic
Cadmium
Chromium
Lead
Mercury
Nickel

LABORATORY TURNAROUND

☒ Standard
☐ 24 Hours
☐ 48 Hours
☐ 72 Hours
☐ Other______

Investigator: I attest that these samples were collected in accordance with standard EI field sampling procedures.

Sampler's Comments:

Sampler's Name (EI):	Received by (SGS):
Ben yuan	
Print Jessie Sixsmith	Print A. Odisho
Signature JSmith	Signature
Date 2-5-16	Date 2/5/16 @ 2:30

Container Type:
J= solvent washed, acid rinsed,Teflon sealed, glass jaR
S= solvent washed, acid rinsed glass bottle
P= natural HDPE plastic bottle
VC= glass vial, Teflon Septum
ZLB = Zip-Lock Bag

IMPORTANT:
Please e-mail laboratory results to: lab@eiaustralia.com.au

Environmental Investigations Australia
Contamination | Remediation | Geotechnical
Suite 6.01, 55 Miller Street
PYRMONT NSW 2009
Ph: 9516 0722
lab@eiaustralia.com.au

COC July 2014 FORM v.2 - SGS

Sheet 2 of 3

Site: 80-88 Regent Street, Redfern NSW

Project No: E22974

Laboratory: **SGS Australia**
Unit 16, 33 Maddox Street,
ALEXANDRIA NSW 2015
P: 02 8594 0400 F: 02 8594 0499

Sample ID	Laboratory ID	Container Type	Sampling Date	Sampling Time	WATER	SOIL	OTHERS (i.e. Fibro, Paint, etc.)	HM^{A} /TRH/BTEX/PAHs OCP/OP/PCB/Asbestos	HM^{A} /TRH/BTEX/PAHs	HM^{A} /TRH/BTEX	TRH/BTEX/Lead	TRH/BTEX	PAHs	VOCs	Asbestos	pH / CEC (cation exchange)	pH / EC (electrical conductivity)	sPOCAS	Hold			TCLP PAHs	TCLP HM^{A}	TCLP HM^{B}
BH04_0.15-0.25	6	J,ZLB	29-4-16	Am/Pm		X		X																
BH04_0.4-0.5		J,ZLB																	X					
BH04_0.9-1.0		J																	X					
BH04_1.4-1.5		J																	X					
BH05-0.75-0.85	7	J,ZLB						X																
BH05-1.3-1.4		J,ZLB																	X					
BH05-1.8-1.9	8	J							X															
BH06M_0-0.2	9	J,ZLB						X																
BH06M_0.4-0.5		J,ZLB																	X					
BH06M_0.9-1.0	10	J							X															
BH06M-1.9-2.0		J																	X					
BH06M-2.9-3.0		J	↓	↓		↓													X					

Comments

HM^{A}
Arsenic
Cadmium
Chromium
Copper
Lead
Mercury
Nickel
ZinC

HM^{B}
Arsenic
Cadmium
Chromium
Lead
Mercury
Nickel

LABORATORY TURNAROUND

☑ Standard
☐ 24 Hours
☐ 48 Hours
☐ 72 Hours
☐ Other______

Investigator: I attest that these samples were collected in accordance with standard EI field sampling procedures.

Sampler's Comments:

Sampler's Name (EI):	Received by (SGS):
Ben Yuan	
Print Jessie Sixsmith	*Print* A. Odisho
Signature	*Signature*
Date 2-5-16	*Date* 2/5/16 @ 2:50

Container Type:
J= solvent washed, acid rinsed,Teflon sealed, glass jaR
S= solvent washed, acid rinsed glass bottle
P= natural HDPE plastic bottle
VC= glass vial, Teflon Septum
ZLB = Zip-Lock Bag

IMPORTANT:
Please e-mail laboratory results to: lab@eiaustralia.com.au

Environmental Investigations Australia
Contamination | Remediation | Geotechnical
Suite 6.01, 55 Miller Street
PYRMONT NSW 2009
Ph: 9516 0722
lab@eiaustralia.com.au

Sheet 3 of 5

Site: 80-88 Regent Street Redfern NSW

Project No: E22974

Laboratory: **SGS Australia**
Unit 16, 33 Maddox Street,
ALEXANDRIA NSW 2015
P: 02 8594 0400 F: 02 8594 0499

Sample ID	Laboratory ID	Container Type	Sampling		Sample Matrix			Analysis																
			Date	Time	WATER	SOIL	OTHERS (i.e. Fibro, Paint, etc.)	HM ^{A} /TRH/BTEX/PAHs OCP/OP/PCB/Asbestos	HM ^{A} /TRH/BTEX/PAHs	HM ^{A} /TRH/BTEX	TRH/BTEX/Lead	~~TRH~~/BTEX	PAHs	VOCs	Asbestos	pH / CEC (cation exchange)	pH / EC (electrical conductivity)	sPOCAS	Hold			TCLP PAHs	TCLP HM ^{A}	TCLP HM ^{B}
BH07_0.1-0.2	11	J, ZLB				X		X																
BH07_0.4-0.5		J				X													X					
BH07_0.9-1.0		J				X													X					
QR-01	12				X					X														
Tripblank	13					X						X												
Tripspike	14					X						X												
QD-01	15					X				X														

Comments

HM ^{A}
Arsenic
Cadmium
Chromium
Copper
Lead
Mercury
Nickel
ZinC

HM ^{B}
Arsenic
Cadmium
Chromium
Lead
Mercury
Nickel

LABORATORY TURNAROUND

☒ Standard
☐ 24 Hours
☐ 48 Hours
☐ 72 Hours
☐ Other______

Investigator: I attest that these samples were collected in accordance with standard EI field sampling procedures.

Sampler's Comments:

Sampler's Name (EI):	Received by (SGS):
Ben Yuan	
Print Jessie Sixsmith	Print A. Colisho
Signature	Signature
Date 2-5-16	Date 2/5/16 @ 2:30

Container Type:
J= solvent washed, acid rinsed,Teflon sealed, glass jaR
S= solvent washed, acid rinsed glass bottle
P= natural HDPE plastic bottle
VC= glass vial, Teflon Septum
ZLB = Zip-Lock Bag

IMPORTANT:
Please e-mail laboratory results to: lab@eiaustralia.com.au

Environmental Investigations Australia
Contamination | Remediation | Geotechnical
Suite 6.01, 55 Miller Street
PYRMONT NSW 2009
Ph: 9516 0722
lab@eiaustralia.com.au

SAMPLE RECEIPT ADVICE

SE151756

CLIENT DETAILS

Contact	Benjamin Yuan
Client	Environmental Investigations
Address	Suite 6.01, 55 Miller Street NSW 2009
Telephone	02 9516 0722
Facsimile	02 9516 0741
Email	benjamin.yuan@eiaustralia.com.au
Project	**E22974 - 80-88 Regent St - Redfern**
Order Number	**E22974**
Samples	15

LABORATORY DETAILS

Manager	Huong Crawford
Laboratory	SGS Alexandria Environmental
Address	Unit 16, 33 Maddox St Alexandria NSW 2015
Telephone	+61 2 8594 0400
Facsimile	+61 2 8594 0499
Email	au.environmental.sydney@sgs.com
Samples Received	Mon 2/5/2016
Report Due	Mon 9/5/2016
SGS Reference	**SE151756**

SUBMISSION DETAILS

This is to confirm that 15 samples were received on Monday 2/5/2016. Results are expected to be ready by Monday 9/5/2016. Please quote SGS reference SE151756 when making enquiries. Refer below for details relating to sample integrity upon receipt.

Sample counts by matrix	14 Soils, 1 Water	Type of documentation received	COC
Date documentation received	2/5/2016	Samples received in good order	Yes
Samples received without headspace	Yes	Sample temperature upon receipt	8.3°C
Sample container provider	SGS	Turnaround time requested	Standard
Samples received in correct containers	Yes	Sufficient sample for analysis	Yes
Sample cooling method	Ice Bricks	Samples clearly labelled	Yes
Complete documentation received	Yes		

Samples will be held for one month for water samples and two months for soil samples from date of report, unless otherwise instructed.

COMMENTS

16 soil samples have been placed on hold.

SAMPLE RECEIPT ADVICE

CLIENT DETAILS

Client	Environmental Investigations	Project	E22974 - 80-88 Regent St - Redfern

SUMMARY OF ANALYSIS

No.	Sample ID	OC Pesticides in Soil	OP Pesticides in Soil	PAH (Polynuclear Aromatic Hydrocarbons) in Soil	PCBs in Soil	Total Recoverable Metals in Soil/Waste	TRH (Total Recoverable Hydrocarbons) in Soil	VOC's in Soil	Volatile Petroleum Hydrocarbons in Soil
001	BH01M_0.1-0.2	28	13	25	11	7	10	12	8
002	BH01M_0.9-1.0	-	-	25	-	7	10	12	8
003	BH02_0.5-0.6	28	13	25	11	7	10	12	8
004	BH03_0.7-0.8	28	13	25	11	7	10	12	8
005	BH03_1.8-1.9	-	-	25	-	7	10	12	8
006	BH04_0.15-0.25	28	13	25	11	7	10	12	8
007	BH05_0.75-0.85	28	13	25	11	7	10	12	8
008	BH05_1.8-1.9	-	-	25	-	7	10	12	8
009	BH06M_0.1-0.2	28	13	25	11	7	10	12	8
010	BH06M_0.9-1.0	-	-	25	-	7	10	12	8
011	BH07_0.1-0.2	28	13	25	11	7	10	12	8
013	Trip Blank	-	-	-	-	-	-	12	-
014	Trip Spike	-	-	-	-	-	-	12	-
015	QD-01	-	-	-	-	7	10	12	8

CONTINUED OVERLEAF

The above table represents SGS' interpretation of the client-supplied Chain Of Custody document.
The numbers shown in the table indicate the number of results requested in each package.
Please indicate as soon as possible should your request differ from these details .
Testing as per this table shall commence immediately unless the client intervenes with a correction .

SAMPLE RECEIPT ADVICE

SE151756

CLIENT DETAILS

Client Environmental Investigations

Project E22974 - 80-88 Regent St - Redfern

SUMMARY OF ANALYSIS

No.	Sample ID	Fibre Identification in soil	Mercury in Soil	Moisture Content	TRH (Total Recoverable Hydrocarbons) in Water	VOCs in Water	Volatile Petroleum Hydrocarbons in Water
001	BH01M_0.1-0.2	2	1	1	-	-	-
002	BH01M_0.9-1.0	-	1	1	-	-	-
003	BH02_0.5-0.6	2	1	1	-	-	-
004	BH03_0.7-0.8	2	1	1	-	-	-
005	BH03_1.8-1.9	-	1	1	-	-	-
006	BH04_0.15-0.25	2	1	1	-	-	-
007	BH05_0.75-0.85	2	1	1	-	-	-
008	BH05_1.8-1.9	-	1	1	-	-	-
009	BH06M_0.1-0.2	2	1	1	-	-	-
010	BH06M_0.9-1.0	-	1	1	-	-	-
011	BH07_0.1-0.2	2	1	1	-	-	-
012	QR-01	-	-	-	9	12	8
013	Trip Blank	-	-	1	-	-	-
015	QD-01	-	1	1	-	-	-

CONTINUED OVERLEAF

The above table represents SGS' interpretation of the client-supplied Chain Of Custody document.
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Testing as per this table shall commence immediately unless the client intervenes with a correction .

SAMPLE RECEIPT ADVICE

SE151756

CLIENT DETAILS

Client Environmental Investigations

Project E22974 - 80-88 Regent St - Redfern

SUMMARY OF ANALYSIS

No.	Sample ID	Mercury (dissolved) in Water	Trace Metals (Dissolved) in Water by ICPMS
012	QR-01	1	7

The above table represents SGS' interpretation of the client-supplied Chain Of Custody document.
The numbers shown in the table indicate the number of results requested in each package.
Please indicate as soon as possible should your request differ from these details .
Testing as per this table shall commence immediately unless the client intervenes with a correction .

Sheet 1 of 1

Site: 80-88 Regent Street
Redfern NSW

Project No: E22974

Laboratory: Envirolab Services
12 Ashley Street
CHATSWOOD NSW 2067
P: 02 9910 6200

Sample Matrix | Analysis

Sample ID	Laboratory ID	Container Type	Sampling Date	Sampling Time	WATER	SOIL	OTHERS (i.e. Fibro, Paint, etc.)	HM $^{\underline{A}}$ /TRH/BTEX/PAHs OCP/OP/PCB/Asbestos	HM $^{\underline{A}}$ /TRH/BTEX/PAHs	HM $^{\underline{A}}$ /TRH/BTEX	TRH/BTEX/Lead	TRH/BTEX	PAHs	VOCs	Asbestos	pH / CEC (cation exchange)	pH / EC (electrical conductivity)	sPOCAS					TCLP PAHs	TCLP HM $^{\underline{B}}$
QT-01	(P)	J	29.4.16	Am/pm		X				X														

Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph: (02) 9910 6200

Job No: 145816

Date Received: 2/5/16
Time Received: 15:45
Received by: JAS
Temp: [✓ Cool]/Ambient
Cooling: Ice/[✓ Icepack]
Security: [✓ Intact]/Broken/None

Comments

HM $^{\underline{A}}$
Arsenic
Cadmium
Chromium
Copper
Lead
Mercury
Nickel
ZinC

HM $^{\underline{B}}$
Arsenic
Cadmium
Chromium
Lead
Mercury
Nickel

LABORATORY TURNAROUND

☒ Standard
☐ 24 Hours
☐ 48 Hours
☐ 72 Hours
☐ Other______

Investigator: I attest that these samples were collected in accordance with standard EI field sampling procedures.

Sampler's Comments:

Sampler's Name (EI):	Received by (Envirolab):
Print Jessie Sixsmith	Print James Goddard
Signature Jsmith	Signature
Date 2-5-16	Date 2/5/16 15.45

Container Type:
J= solvent washed, acid rinsed,Teflon sealed, glass jaR
S= solvent washed, acid rinsed glass bottle
P= natural HDPE plastic bottle
VC= glass vial, Teflon Septum
ZLB = Zip-Lock Bag

IMPORTANT:
Please e-mail laboratory results to: lab@eiaustralia.com.au

Environmental Investigations Australia
Contamination | Remediation | Geotechnical
Suite 6.01, 55 Miller Street
PYRMONT NSW 2009
Ph: 9516 0722
lab@eiaustralia.com.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 Details	
Client	Environmental Investigations
Attention	Jessie Sixsmith

Sample Login Details	
Your Reference	E22974, Redfern
Envirolab Reference	**145816**
Date Sample Received	02/05/2016
Date Instructions Received	02/05/2016
Date Results Expected to be Reported	**09/05/2016**

Sample Condition	
Samples received in appropriate condition for analysis	YES
No. of Samples Provided	1 Soil
Turnaround Time Requested	Standard
Temperature on receipt (°C)	9.2
Cooling Method	Ice Pack
Sampling Date Provided	YES

Comments
Samples will be held for 1 month for water samples and 2 months for soil samples from date of receipt of samples

Please direct any queries to:

Aileen Hie	**Jacinta Hurst**
Phone: 02 9910 6200	Phone: 02 9910 6200
Fax: 02 9910 6201	Fax: 02 9910 6201
Email: ahie@envirolabservices.com.au	Email: jhurst@envirolabservices.com.au

Sample and Testing Details on following page

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 Id	***vTRH(C6-C10)/BTEXN in Soil***	***svTRH (C10-C40) in Soil***	***Acid Extractable metals in soil***
QT-01	✓	✓	✓

Sheet 1 of 1

Site: 80-88 Regent Street
Redfern, NSW

Project No: E22974

Laboratory: **SGS Australia**
Unit 16, 33 Maddox Street,
ALEXANDRIA NSW 2015
P: 02 8594 0400 F: 02 8594 0499

Sample ID	Laboratory ID	Container Type	Sampling Date	Sampling Time	WATER	SOIL	OTHERS (i.e. Fibro, Paint, etc.)	HM^{A} /TRH/BTEX/PAHs OCP/OP/PCB/Asbestos	HM^{A} /TRH/BTEX/PAHs	HM^{A} /TRH/BTEX	TRH/BTEX/Lead	~~TRH~~/BTEX	PAHs	VOCs + Phenols	Asbestos	pH / CEC (cation exchange)	pH / EC (electrical conductivity)	sPOCAS				TCLP PAHs	TCLP HM^{A}	TCLP HM^{B}
BH01M	1	S, P, 2xVC	11-5-16	AM	✓				✓					✓										
BH06M	2	↓	↓	↓	✓				✓					✓										
QD-1	3	↓	↓	↓	✓					✓														
GWQR-1	4	↓	↓	↓	✓					✓														
GWQB-1	5	↓	↓	↓	✓					✓														
Trip Blank	6	VC	Labprep	↓	✓							✓												
Trip Spike	7	VC	↓	↓	✓							✓												

Comments

HM ^{A}
Arsenic
Cadmium
Chromium
Copper
Lead
Mercury
Nickel
ZinC

HM ^{B}
Arsenic
Cadmium
Chromium
Lead
Mercury
Nickel

LABORATORY TURNAROUND

☑ Standard
☐ 24 Hours
☐ 48 Hours
☐ 72 Hours
☐ Other______

SGS Alexandria Environmental
SE152112 COC
Received: 12–May–2016

Investigator: I attest that these samples were collected in accordance with standard EI field sampling procedures.

Sampler's Comments:

Sampler's Name (EI):	Received by (SGS):
Print Jessie Sixsmith	Print Suba
Signature	Signature
Date 12-5-16	Date 12/05/16 @10:45

IMPORTANT:
Please e-mail laboratory results to: lab@eiaustralia.com.au

Container Type:
J= solvent washed, acid rinsed, Teflon sealed, glass jaR
S= solvent washed, acid rinsed glass bottle
P= natural HDPE plastic bottle
VC= glass vial, Teflon Septum
ZLB = Zip-Lock Bag

Environmental Investigations Australia
Contamination | Remediation | Geotechnical
Suite 6.01, 55 Miller Street
PYRMONT NSW 2009
Ph: 9516 0722
lab@eiaustralia.com.au

COC July 2014 FORM v.2 - SGS

SAMPLE RECEIPT ADVICE

SE152112

CLIENT DETAILS

Contact	Jessie Sixsmith
Client	Environmental Investigations
Address	Suite 6.01, 55 Miller Street NSW 2009
Telephone	02 9516 0722
Facsimile	02 9516 0741
Email	Jessie.Sixsmith@eiaustralia.com.au
Project	**E22974 - 80-88 Regent St, Redfern, NSW**
Order Number	**E22974**
Samples	7

LABORATORY DETAILS

Manager	Huong Crawford
Laboratory	SGS Alexandria Environmental
Address	Unit 16, 33 Maddox St Alexandria NSW 2015
Telephone	+61 2 8594 0400
Facsimile	+61 2 8594 0499
Email	au.environmental.sydney@sgs.com
Samples Received	Thu 12/5/2016
Report Due	Thu 19/5/2016
SGS Reference	**SE152112**

SUBMISSION DETAILS

This is to confirm that 7 samples were received on Thursday 12/5/2016. Results are expected to be ready by Thursday 19/5/2016. Please quote SGS reference SE152112 when making enquiries. Refer below for details relating to sample integrity upon receipt.

Sample counts by matrix	7 Water	Type of documentation received	COC
Date documentation received	12/5/2016	Samples received in good order	Yes
Samples received without headspace	Yes	Sample temperature upon receipt	7.1°C
Sample container provider	SGS	Turnaround time requested	Standard
Samples received in correct containers	Yes	Sufficient sample for analysis	Yes
Sample cooling method	Ice Bricks	Samples clearly labelled	Yes
Complete documentation received	Yes		

Samples will be held for one month for water samples and two months for soil samples from date of report, unless otherwise instructed.

COMMENTS

SAMPLE RECEIPT ADVICE

CLIENT DETAILS

Client	Environmental Investigations	Project	E22974 - 80-88 Regent St, Redfern, NSW

SUMMARY OF ANALYSIS

No.	Sample ID	Mercury (dissolved) in Water	PAH (Polynuclear Aromatic Hydrocarbons) in Water	Total Phenolics in Water	Trace Metals (Dissolved) in Water by ICPMS	TRH (Total Recoverable Hydrocarbons) in Water	VOCs in Water	Volatile Petroleum Hydrocarbons in Water
001	BH01M	1	22	1	7	9	79	8
002	BH06M	1	22	1	7	9	79	8
003	QD-1	1	-	-	7	9	12	8
004	GWQR-1	1	-	-	7	9	12	8
005	GWQB-1	1	-	-	7	9	12	8
006	Trip Blank	-	-	-	-	-	12	-
007	Trip Spike	-	-	-	-	-	12	-

The above table represents SGS' interpretation of the client-supplied Chain Of Custody document.
The numbers shown in the table indicate the number of results requested in each package.
Please indicate as soon as possible should your request differ from these details .
Testing as per this table shall commence immediately unless the client intervenes with a correction .

APPENDIX F

Laboratory Analytical Reports

ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS		LABORATORY DETAILS	
Contact	Benjamin Yuan	Manager	Huong Crawford
Client	Environmental Investigations	Laboratory	SGS Alexandria Environmental
Address	Suite 6.01, 55 Miller Street NSW 2009	Address	Unit 16, 33 Maddox St Alexandria NSW 2015
Telephone	02 9516 0722	Telephone	+61 2 8594 0400
Facsimile	02 9516 0741	Facsimile	+61 2 8594 0499
Email	benjamin.yuan@eiaustralia.com.au	Email	au.environmental.sydney@sgs.com
Project	**E22974 - 80-88 Regent St - Redfern**	SGS Reference	**SE151756 R0**
Order Number	**E22974**	Date Received	2/5/2016
Samples	15	Date Reported	10/5/2016

COMMENTS

Accredited for compliance with ISO/IEC 17025. NATA accredited laboratory 2562(4354).

No respirable fibres detected in all samples using trace analysis technique.

Sample #9: A portion of the sample supplied has been sub-sampled for asbestos according to SGS In-house procedures.
We therefore cannot guarantee that the sub-sample is representative of the entire sample supplied.
SGS Environment, Heath and Safety recommends supplying approximately 50-100g of sample in a separate container.

Asbestos analysed by Approved Identifier Yusuf Kuthpudin.

SIGNATORIES

Andy Sutton
Senior Organic Chemist

Dong Liang
Metals/Inorganics Team Leader

Huong Crawford
Production Manager

Kamrul Ahsan
Senior Chemist

Ly Kim Ha
Organic Section Head

Ravee Sivasubramaniam
Hygiene Team Leader

VOC's in Soil [AN433/AN434]   Tested: 5/5/2016

PARAMETER	UOM	LOR	BH01M_0.1-0.2 SOIL - 29/4/2016 SE151756.001	BH01M_0.9-1.0 SOIL - 29/4/2016 SE151756.002	BH02_0.5-0.6 SOIL - 29/4/2016 SE151756.003	BH03_0.7-0.8 SOIL - 29/4/2016 SE151756.004	BH03_1.8-1.9 SOIL - 29/4/2016 SE151756.005
Benzene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Toluene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Ethylbenzene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
m/p-xylene	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
o-xylene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total Xylenes*	mg/kg	0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Total BTEX	mg/kg	0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Naphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1

PARAMETER	UOM	LOR	BH04_0.15-0.25 SOIL - 29/4/2016 SE151756.006	BH05_0.75-0.85 SOIL - 29/4/2016 SE151756.007	BH05_1.8-1.9 SOIL - 29/4/2016 SE151756.008	BH06M_0.1-0.2 SOIL - 29/4/2016 SE151756.009	BH06M_0.9-1.0 SOIL - 29/4/2016 SE151756.010
Benzene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Toluene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Ethylbenzene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
m/p-xylene	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
o-xylene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total Xylenes*	mg/kg	0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Total BTEX	mg/kg	0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Naphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1

PARAMETER	UOM	LOR	BH07_0.1-0.2 SOIL - 29/4/2016 SE151756.011	Trip Blank SOIL - 29/4/2016 SE151756.013	Trip Spike SOIL - 29/4/2016 SE151756.014	QD-01 SOIL - 29/4/2016 SE151756.015
Benzene	mg/kg	0.1	<0.1	<0.1	[80%]	<0.1
Toluene	mg/kg	0.1	<0.1	<0.1	[87%]	<0.1
Ethylbenzene	mg/kg	0.1	<0.1	<0.1	[80%]	<0.1
m/p-xylene	mg/kg	0.2	<0.2	<0.2	[83%]	<0.2
o-xylene	mg/kg	0.1	<0.1	<0.1	[83%]	<0.1
Total Xylenes*	mg/kg	0.3	<0.3	<0.3	-	<0.3
Total BTEX	mg/kg	0.6	<0.6	<0.6	-	<0.6
Naphthalene	mg/kg	0.1	<0.1	<0.1	-	<0.1

Volatile Petroleum Hydrocarbons in Soil [AN433/AN434/AN410] Tested: 5/5/2016

			BH01M_0.1-0.2	BH01M_0.9-1.0	BH02_0.5-0.6	BH03_0.7-0.8	BH03_1.8-1.9
			SOIL	SOIL	SOIL	SOIL	SOIL
			-	-	-	-	-
			29/4/2016	29/4/2016	29/4/2016	29/4/2016	29/4/2016
PARAMETER	**UOM**	**LOR**	**SE151756.001**	**SE151756.002**	**SE151756.003**	**SE151756.004**	**SE151756.005**
TRH C6-C9	mg/kg	20	<20	<20	<20	<20	<20
Benzene (F0)	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
TRH C6-C10	mg/kg	25	<25	<25	<25	<25	<25
TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	<25	<25	<25	<25

			BH04_0.15-0.25	BH05_0.75-0.85	BH05_1.8-1.9	BH06M_0.1-0.2	BH06M_0.9-1.0
			SOIL	SOIL	SOIL	SOIL	SOIL
			-	-	-	-	-
			29/4/2016	29/4/2016	29/4/2016	29/4/2016	29/4/2016
PARAMETER	**UOM**	**LOR**	**SE151756.006**	**SE151756.007**	**SE151756.008**	**SE151756.009**	**SE151756.010**
TRH C6-C9	mg/kg	20	<20	<20	<20	<20	<20
Benzene (F0)	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
TRH C6-C10	mg/kg	25	<25	<25	<25	<25	<25
TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	<25	<25	<25	<25

			BH07_0.1-0.2	QD-01
			SOIL	SOIL
			-	-
			29/4/2016	29/4/2016
PARAMETER	**UOM**	**LOR**	**SE151756.011**	**SE151756.015**
TRH C6-C9	mg/kg	20	<20	<20
Benzene (F0)	mg/kg	0.1	<0.1	<0.1
TRH C6-C10	mg/kg	25	<25	<25
TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	<25

TRH (Total Recoverable Hydrocarbons) in Soil [AN403] Tested: 5/5/2016

			BH01M_0.1-0.2	BH01M_0.9-1.0	BH02_0.5-0.6	BH03_0.7-0.8	BH03_1.8-1.9
			SOIL	SOIL	SOIL	SOIL	SOIL
			-	-	-	-	-
			29/4/2016	29/4/2016	29/4/2016	29/4/2016	29/4/2016
PARAMETER	**UOM**	**LOR**	**SE151756.001**	**SE151756.002**	**SE151756.003**	**SE151756.004**	**SE151756.005**
TRH C10-C14	mg/kg	20	<20	<20	<20	<20	<20
TRH C15-C28	mg/kg	45	<45	<45	<45	**59**	<45
TRH C29-C36	mg/kg	45	<45	<45	<45	<45	<45
TRH C37-C40	mg/kg	100	<100	<100	<100	<100	<100
TRH >C10-C16 (F2)	mg/kg	25	<25	<25	<25	<25	<25
TRH >C10-C16 (F2) - Naphthalene	mg/kg	25	<25	<25	<25	<25	<25
TRH >C16-C34 (F3)	mg/kg	90	<90	<90	<90	<90	<90
TRH >C34-C40 (F4)	mg/kg	120	<120	<120	<120	<120	<120
TRH C10-C36 Total	mg/kg	110	<110	<110	<110	<110	<110
TRH C10-C40 Total	mg/kg	210	<210	<210	<210	<210	<210

			BH04_0.15-0.25	BH05_0.75-0.85	BH05_1.8-1.9	BH06M_0.1-0.2	BH06M_0.9-1.0
			SOIL	SOIL	SOIL	SOIL	SOIL
			-	-	-	-	-
			29/4/2016	29/4/2016	29/4/2016	29/4/2016	29/4/2016
PARAMETER	**UOM**	**LOR**	**SE151756.006**	**SE151756.007**	**SE151756.008**	**SE151756.009**	**SE151756.010**
TRH C10-C14	mg/kg	20	<20	<20	<20	<20	<20
TRH C15-C28	mg/kg	45	<45	<45	<45	<45	<45
TRH C29-C36	mg/kg	45	<45	<45	<45	<45	<45
TRH C37-C40	mg/kg	100	<100	<100	<100	<100	<100
TRH >C10-C16 (F2)	mg/kg	25	<25	<25	<25	<25	<25
TRH >C10-C16 (F2) - Naphthalene	mg/kg	25	<25	<25	<25	<25	<25
TRH >C16-C34 (F3)	mg/kg	90	<90	<90	<90	<90	<90
TRH >C34-C40 (F4)	mg/kg	120	<120	<120	<120	<120	<120
TRH C10-C36 Total	mg/kg	110	<110	<110	<110	<110	<110
TRH C10-C40 Total	mg/kg	210	<210	<210	<210	<210	<210

			BH07_0.1-0.2	QD-01
			SOIL	SOIL
			-	-
			29/4/2016	29/4/2016
PARAMETER	**UOM**	**LOR**	**SE151756.011**	**SE151756.015**
TRH C10-C14	mg/kg	20	**32**	<20
TRH C15-C28	mg/kg	45	**130**	<45
TRH C29-C36	mg/kg	45	**49**	<45
TRH C37-C40	mg/kg	100	<100	<100
TRH >C10-C16 (F2)	mg/kg	25	**45**	<25
TRH >C10-C16 (F2) - Naphthalene	mg/kg	25	**45**	<25
TRH >C16-C34 (F3)	mg/kg	90	**160**	<90
TRH >C34-C40 (F4)	mg/kg	120	<120	<120
TRH C10-C36 Total	mg/kg	110	**210**	<110
TRH C10-C40 Total	mg/kg	210	**210**	<210

PAH (Polynuclear Aromatic Hydrocarbons) in Soil [AN420] Tested: 5/5/2016

PARAMETER	UOM	LOR	BH01M_0.1-0.2 SOIL - 29/4/2016 SE151756.001	BH01M_0.9-1.0 SOIL - 29/4/2016 SE151756.002	BH02_0.5-0.6 SOIL - 29/4/2016 SE151756.003	BH03_0.7-0.8 SOIL - 29/4/2016 SE151756.004	BH03_1.8-1.9 SOIL - 29/4/2016 SE151756.005
Naphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
1-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	0.1	<0.1	<0.1	<0.1	0.5	<0.1
Acenaphthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	0.1	<0.1	<0.1	<0.1	0.2	<0.1
Phenanthrene	mg/kg	0.1	<0.1	<0.1	<0.1	2.8	<0.1
Anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	0.7	<0.1
Fluoranthene	mg/kg	0.1	<0.1	<0.1	<0.1	3.0	<0.1
Pyrene	mg/kg	0.1	<0.1	<0.1	<0.1	3.4	<0.1
Benzo(a)anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	1.5	<0.1
Chrysene	mg/kg	0.1	<0.1	<0.1	<0.1	1.2	<0.1
Benzo(b&j)fluoranthene	mg/kg	0.1	<0.1	<0.1	<0.1	1.2	<0.1
Benzo(k)fluoranthene	mg/kg	0.1	<0.1	<0.1	<0.1	0.6	<0.1
Benzo(a)pyrene	mg/kg	0.1	<0.1	<0.1	<0.1	1.2	<0.1
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	<0.1	<0.1	<0.1	0.5	<0.1
Dibenzo(ah)anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(ghi)perylene	mg/kg	0.1	<0.1	<0.1	<0.1	0.6	<0.1
Carcinogenic PAHs, BaP TEQ <LOR=0	TEQ	0.2	<0.2	<0.2	<0.2	1.6	<0.2
Carcinogenic PAHs, BaP TEQ <LOR=LOR	TEQ (mg/kg)	0.3	<0.3	<0.3	<0.3	1.7	<0.3
Carcinogenic PAHs, BaP TEQ <LOR=LOR/2	TEQ (mg/kg)	0.2	<0.2	<0.2	<0.2	1.6	<0.2
Total PAH (18)	mg/kg	0.8	<0.8	<0.8	<0.8	17	<0.8

PARAMETER	UOM	LOR	BH04_0.15-0.25 SOIL - 29/4/2016 SE151756.006	BH05_0.75-0.85 SOIL - 29/4/2016 SE151756.007	BH05_1.8-1.9 SOIL - 29/4/2016 SE151756.008	BH06M_0.1-0.2 SOIL - 29/4/2016 SE151756.009	BH06M_0.9-1.0 SOIL - 29/4/2016 SE151756.010
Naphthalene	mg/kg	0.1	<0.1	0.1	<0.1	<0.1	<0.1
2-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
1-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	0.1	<0.1	0.2	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	0.1	<0.1	0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	0.1	0.1	0.8	<0.1	<0.1	<0.1
Anthracene	mg/kg	0.1	<0.1	0.2	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.1	0.5	0.8	<0.1	0.2	<0.1
Pyrene	mg/kg	0.1	0.7	0.8	<0.1	0.2	<0.1
Benzo(a)anthracene	mg/kg	0.1	0.4	0.4	<0.1	0.1	<0.1
Chrysene	mg/kg	0.1	0.4	0.3	<0.1	0.2	<0.1
Benzo(b&j)fluoranthene	mg/kg	0.1	0.4	0.3	<0.1	0.1	<0.1
Benzo(k)fluoranthene	mg/kg	0.1	0.3	0.2	<0.1	0.1	<0.1
Benzo(a)pyrene	mg/kg	0.1	0.5	0.3	<0.1	0.2	<0.1
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	0.3	0.2	<0.1	<0.1	<0.1
Dibenzo(ah)anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(ghi)perylene	mg/kg	0.1	0.5	0.2	<0.1	0.1	<0.1
Carcinogenic PAHs, BaP TEQ <LOR=0	TEQ	0.2	0.7	0.4	<0.2	<0.2	<0.2
Carcinogenic PAHs, BaP TEQ <LOR=LOR	TEQ (mg/kg)	0.3	0.8	0.5	<0.3	0.3	<0.3
Carcinogenic PAHs, BaP TEQ <LOR=LOR/2	TEQ (mg/kg)	0.2	0.7	0.5	<0.2	0.2	<0.2
Total PAH (18)	mg/kg	0.8	4.2	4.9	<0.8	1.3	<0.8

PAH (Polynuclear Aromatic Hydrocarbons) in Soil [AN420] Tested: 5/5/2016 (continued)

PARAMETER	UOM	LOR	BH07_0.1-0.2 SOIL - 29/4/2016 SE151756.011
Naphthalene	mg/kg	0.1	<0.1
2-methylnaphthalene	mg/kg	0.1	<0.1
1-methylnaphthalene	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	0.1	0.9
Anthracene	mg/kg	0.1	0.2
Fluoranthene	mg/kg	0.1	2.4
Pyrene	mg/kg	0.1	3.2
Benzo(a)anthracene	mg/kg	0.1	1.6
Chrysene	mg/kg	0.1	1.4
Benzo(b&j)fluoranthene	mg/kg	0.1	1.7
Benzo(k)fluoranthene	mg/kg	0.1	0.9
Benzo(a)pyrene	mg/kg	0.1	1.8
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	0.9
Dibenzo(ah)anthracene	mg/kg	0.1	0.1
Benzo(ghi)perylene	mg/kg	0.1	1.2
Carcinogenic PAHs, BaP TEQ <LOR=0	TEQ	0.2	2.5
Carcinogenic PAHs, BaP TEQ <LOR=LOR	TEQ (mg/kg)	0.3	2.5
Carcinogenic PAHs, BaP TEQ <LOR=LOR/2	TEQ (mg/kg)	0.2	2.5
Total PAH (18)	mg/kg	0.8	17

OC Pesticides in Soil [AN400/AN420] Tested: 5/5/2016

PARAMETER	UOM	LOR	BH01M_0.1-0.2 SOIL - 29/4/2016 SE151756.001	BH02_0.5-0.6 SOIL - 29/4/2016 SE151756.003	BH03_0.7-0.8 SOIL - 29/4/2016 SE151756.004	BH04_0.15-0.25 SOIL - 29/4/2016 SE151756.006	BH05_0.75-0.85 SOIL - 29/4/2016 SE151756.007
Hexachlorobenzene (HCB)	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Alpha BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Lindane	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Beta BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Delta BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor epoxide	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
o,p'-DDE	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Alpha Endosulfan	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Gamma Chlordane	mg/kg	0.1	<0.1	0.2	<0.1	<0.1	<0.1
Alpha Chlordane	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
trans-Nonachlor	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
p,p'-DDE	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	0.2	<0.2	0.4	<0.2	<0.2	<0.2
Endrin	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
o,p'-DDD	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
o,p'-DDT	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Beta Endosulfan	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
p,p'-DDD	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
p,p'-DDT	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan sulphate	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Ketone	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Isodrin	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Mirex	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1

OC Pesticides in Soil [AN400/AN420] Tested: 5/5/2016 (continued)

PARAMETER	UOM	LOR	BH06M_0.1-0.2 SOIL - 29/4/2016 SE151756.009	BH07_0.1-0.2 SOIL - 29/4/2016 SE151756.011
Hexachlorobenzene (HCB)	mg/kg	0.1	<0.1	<0.1
Alpha BHC	mg/kg	0.1	<0.1	<0.1
Lindane	mg/kg	0.1	<0.1	<0.1
Heptachlor	mg/kg	0.1	<0.1	<0.1
Aldrin	mg/kg	0.1	<0.1	<0.1
Beta BHC	mg/kg	0.1	<0.1	<0.1
Delta BHC	mg/kg	0.1	<0.1	<0.1
Heptachlor epoxide	mg/kg	0.1	<0.1	<0.1
o,p'-DDE	mg/kg	0.1	<0.1	<0.1
Alpha Endosulfan	mg/kg	0.2	<0.2	<0.2
Gamma Chlordane	mg/kg	0.1	<0.1	<0.1
Alpha Chlordane	mg/kg	0.1	<0.1	<0.1
trans-Nonachlor	mg/kg	0.1	<0.1	<0.1
p,p'-DDE	mg/kg	0.1	<0.1	<0.1
Dieldrin	mg/kg	0.2	<0.2	<0.2
Endrin	mg/kg	0.2	<0.2	<0.2
o,p'-DDD	mg/kg	0.1	<0.1	<0.1
o,p'-DDT	mg/kg	0.1	<0.1	<0.1
Beta Endosulfan	mg/kg	0.2	<0.2	<0.2
p,p'-DDD	mg/kg	0.1	<0.1	<0.1
p,p'-DDT	mg/kg	0.1	<0.1	<0.1
Endosulfan sulphate	mg/kg	0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	0.1	<0.1	<0.1
Methoxychlor	mg/kg	0.1	<0.1	<0.1
Endrin Ketone	mg/kg	0.1	<0.1	<0.1
Isodrin	mg/kg	0.1	<0.1	<0.1
Mirex	mg/kg	0.1	<0.1	<0.1

OP Pesticides in Soil [AN400/AN420] Tested: 5/5/2016

PARAMETER	UOM	LOR	BH01M_0.1-0.2 SOIL - 29/4/2016 SE151756.001	BH02_0.5-0.6 SOIL - 29/4/2016 SE151756.003	BH03_0.7-0.8 SOIL - 29/4/2016 SE151756.004	BH04_0.15-0.25 SOIL - 29/4/2016 SE151756.006	BH05_0.75-0.85 SOIL - 29/4/2016 SE151756.007
Dichlorvos	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dimethoate	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Diazinon (Dimpylate)	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fenitrothion	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Malathion	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Chlorpyrifos (Chlorpyrifos Ethyl)	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Parathion-ethyl (Parathion)	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Bromophos Ethyl	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Methidathion	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethion	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Azinphos-methyl (Guthion)	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2

PARAMETER	UOM	LOR	BH06M_0.1-0.2 SOIL - 29/4/2016 SE151756.009	BH07_0.1-0.2 SOIL - 29/4/2016 SE151756.011
Dichlorvos	mg/kg	0.5	<0.5	<0.5
Dimethoate	mg/kg	0.5	<0.5	<0.5
Diazinon (Dimpylate)	mg/kg	0.5	<0.5	<0.5
Fenitrothion	mg/kg	0.2	<0.2	<0.2
Malathion	mg/kg	0.2	<0.2	<0.2
Chlorpyrifos (Chlorpyrifos Ethyl)	mg/kg	0.2	<0.2	<0.2
Parathion-ethyl (Parathion)	mg/kg	0.2	<0.2	<0.2
Bromophos Ethyl	mg/kg	0.2	<0.2	<0.2
Methidathion	mg/kg	0.5	<0.5	<0.5
Ethion	mg/kg	0.2	<0.2	<0.2
Azinphos-methyl (Guthion)	mg/kg	0.2	<0.2	<0.2

PCBs in Soil [AN400/AN420] Tested: 5/5/2016

PARAMETER	UOM	LOR	**BH01M_0.1-0.2** SOIL - 29/4/2016 **SE151756.001**	**BH02_0.5-0.6** SOIL - 29/4/2016 **SE151756.003**	**BH03_0.7-0.8** SOIL - 29/4/2016 **SE151756.004**	**BH04_0.15-0.25** SOIL - 29/4/2016 **SE151756.006**	**BH05_0.75-0.85** SOIL - 29/4/2016 **SE151756.007**
Arochlor 1016	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1221	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1232	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1242	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1248	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1254	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1260	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1262	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1268	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Total PCBs (Arochlors)	mg/kg	1	<1	<1	<1	<1	<1

PARAMETER	UOM	LOR	**BH06M_0.1-0.2** SOIL - 29/4/2016 **SE151756.009**	**BH07_0.1-0.2** SOIL - 29/4/2016 **SE151756.011**
Arochlor 1016	mg/kg	0.2	<0.2	<0.2
Arochlor 1221	mg/kg	0.2	<0.2	<0.2
Arochlor 1232	mg/kg	0.2	<0.2	<0.2
Arochlor 1242	mg/kg	0.2	<0.2	<0.2
Arochlor 1248	mg/kg	0.2	<0.2	<0.2
Arochlor 1254	mg/kg	0.2	<0.2	<0.2
Arochlor 1260	mg/kg	0.2	<0.2	<0.2
Arochlor 1262	mg/kg	0.2	<0.2	<0.2
Arochlor 1268	mg/kg	0.2	<0.2	<0.2
Total PCBs (Arochlors)	mg/kg	1	<1	<1

Total Recoverable Metals in Soil/Waste Solids/Materials by ICPOES [AN040/AN320] Tested: 5/5/2016

PARAMETER	UOM	LOR	BH01M_0.1-0.2 SOIL - 29/4/2016 SE151756.001	BH01M_0.9-1.0 SOIL - 29/4/2016 SE151756.002	BH02_0.5-0.6 SOIL - 29/4/2016 SE151756.003	BH03_0.7-0.8 SOIL - 29/4/2016 SE151756.004	BH03_1.8-1.9 SOIL - 29/4/2016 SE151756.005
Arsenic, As	mg/kg	3	3	5	<3	4	8
Cadmium, Cd	mg/kg	0.3	<0.3	0.3	<0.3	0.8	0.7
Chromium, Cr	mg/kg	0.3	7.0	19	4.6	6.4	29
Copper, Cu	mg/kg	0.5	6.0	1.7	33	48	6.4
Lead, Pb	mg/kg	1	56	16	43	140	39
Nickel, Ni	mg/kg	0.5	2.4	2.1	1.5	2.0	2.7
Zinc, Zn	mg/kg	0.5	28	8.3	25	250	47

PARAMETER	UOM	LOR	BH04_0.15-0.25 SOIL - 29/4/2016 SE151756.006	BH05_0.75-0.85 SOIL - 29/4/2016 SE151756.007	BH05_1.8-1.9 SOIL - 29/4/2016 SE151756.008	BH06M_0.1-0.2 SOIL - 29/4/2016 SE151756.009	BH06M_0.9-1.0 SOIL - 29/4/2016 SE151756.010
Arsenic, As	mg/kg	3	4	3	7	18	5
Cadmium, Cd	mg/kg	0.3	0.5	<0.3	0.5	1.0	0.5
Chromium, Cr	mg/kg	0.3	6.1	7.0	29	9.2	17
Copper, Cu	mg/kg	0.5	22	30	1.0	130	4.1
Lead, Pb	mg/kg	1	210	110	14	290	31
Nickel, Ni	mg/kg	0.5	5.0	2.9	2.0	6.5	0.7
Zinc, Zn	mg/kg	0.5	320	100	7.2	510	15

PARAMETER	UOM	LOR	BH07_0.1-0.2 SOIL - 29/4/2016 SE151756.011	QD-01 SOIL - 29/4/2016 SE151756.015
Arsenic, As	mg/kg	3	14	5
Cadmium, Cd	mg/kg	0.3	1.6	0.4
Chromium, Cr	mg/kg	0.3	16	6.9
Copper, Cu	mg/kg	0.5	270	20
Lead, Pb	mg/kg	1	730	240
Nickel, Ni	mg/kg	0.5	19	4.0
Zinc, Zn	mg/kg	0.5	950	300

Mercury in Soil [AN312] Tested: 5/5/2016

PARAMETER	UOM	LOR	BH01M_0.1-0.2 SOIL - 29/4/2016 SE151756.001	BH01M_0.9-1.0 SOIL - 29/4/2016 SE151756.002	BH02_0.5-0.6 SOIL - 29/4/2016 SE151756.003	BH03_0.7-0.8 SOIL - 29/4/2016 SE151756.004	BH03_1.8-1.9 SOIL - 29/4/2016 SE151756.005
Mercury	mg/kg	0.01	0.40	0.04	0.19	0.47	0.17

PARAMETER	UOM	LOR	BH04_0.15-0.25 SOIL - 29/4/2016 SE151756.006	BH05_0.75-0.85 SOIL - 29/4/2016 SE151756.007	BH05_1.8-1.9 SOIL - 29/4/2016 SE151756.008	BH06M_0.1-0.2 SOIL - 29/4/2016 SE151756.009	BH06M_0.9-1.0 SOIL - 29/4/2016 SE151756.010
Mercury	mg/kg	0.01	0.14	0.78	0.06	0.56	0.08

PARAMETER	UOM	LOR	BH07_0.1-0.2 SOIL - 29/4/2016 SE151756.011	QD-01 SOIL - 29/4/2016 SE151756.015
Mercury	mg/kg	0.01	22	0.25

Moisture Content [AN002] Tested: 5/5/2016

PARAMETER	UOM	LOR	BH01M_0.1-0.2 SOIL - 29/4/2016 SE151756.001	BH01M_0.9-1.0 SOIL - 29/4/2016 SE151756.002	BH02_0.5-0.6 SOIL - 29/4/2016 SE151756.003	BH03_0.7-0.8 SOIL - 29/4/2016 SE151756.004	BH03_1.8-1.9 SOIL - 29/4/2016 SE151756.005
% Moisture	%w/w	0.5	12	21	9.2	11	24

PARAMETER	UOM	LOR	BH04_0.15-0.25 SOIL - 29/4/2016 SE151756.006	BH05_0.75-0.85 SOIL - 29/4/2016 SE151756.007	BH05_1.8-1.9 SOIL - 29/4/2016 SE151756.008	BH06M_0.1-0.2 SOIL - 29/4/2016 SE151756.009	BH06M_0.9-1.0 SOIL - 29/4/2016 SE151756.010
% Moisture	%w/w	0.5	14	11	20	15	24

PARAMETER	UOM	LOR	BH07_0.1-0.2 SOIL - 29/4/2016 SE151756.011	Trip Blank SOIL - 29/4/2016 SE151756.013	QD-01 SOIL - 29/4/2016 SE151756.015
% Moisture	%w/w	0.5	23	<0.5	14

Fibre Identification in soil [AN602] Tested: 6/5/2016

PARAMETER	UOM	LOR	BH01M_0.1-0.2 SOIL - 29/4/2016 SE151756.001	BH02_0.5-0.6 SOIL - 29/4/2016 SE151756.003	BH03_0.7-0.8 SOIL - 29/4/2016 SE151756.004	BH04_0.15-0.25 SOIL - 29/4/2016 SE151756.006	BH05_0.75-0.85 SOIL - 29/4/2016 SE151756.007
Asbestos Detected	No unit	-	No	No	No	No	No
Estimated Fibres*	%w/w	0.01	<0.01	<0.01	<0.01	<0.01	<0.01

PARAMETER	UOM	LOR	BH06M_0.1-0.2 SOIL - 29/4/2016 SE151756.009	BH07_0.1-0.2 SOIL - 29/4/2016 SE151756.011
Asbestos Detected	No unit	-	No	No
Estimated Fibres*	%w/w	0.01	<0.01	<0.01

VOCs in Water [AN433/AN434] Tested: 6/5/2016

PARAMETER	UOM	LOR	QR-01 WATER - 29/4/2016 SE151756.012
Benzene	µg/L	0.5	<0.5
Toluene	µg/L	0.5	<0.5
Ethylbenzene	µg/L	0.5	<0.5
m/p-xylene	µg/L	1	<1
o-xylene	µg/L	0.5	<0.5
Total Xylenes	µg/L	1.5	<1.5
Total BTEX	µg/L	3	<3
Naphthalene	µg/L	0.5	<0.5

Volatile Petroleum Hydrocarbons in Water [AN433/AN434/AN410] Tested: 6/5/2016

			QR-01 WATER - 29/4/2016
PARAMETER	UOM	LOR	SE151756.012
TRH C6-C9	µg/L	40	<40
Benzene (F0)	µg/L	0.5	<0.5
TRH C6-C10	µg/L	50	<50
TRH C6-C10 minus BTEX (F1)	µg/L	50	<50

TRH (Total Recoverable Hydrocarbons) in Water [AN403] Tested: 5/5/2016

PARAMETER	UOM	LOR	QR-01 WATER - 29/4/2016 SE151756.012
TRH C10-C14	µg/L	50	<50
TRH C15-C28	µg/L	200	<200
TRH C29-C36	µg/L	200	<200
TRH C37-C40	µg/L	200	<200
TRH >C10-C16 (F2)	µg/L	60	<60
TRH >C16-C34 (F3)	µg/L	500	<500
TRH >C34-C40 (F4)	µg/L	500	<500
TRH C10-C36	µg/L	450	<450
TRH C10-C40	µg/L	650	<650

Trace Metals (Dissolved) in Water by ICPMS [AN318] Tested: 5/5/2016

PARAMETER	UOM	LOR	QR-01 WATER - 29/4/2016 SE151756.012
Arsenic, As	µg/L	1	<1
Cadmium, Cd	µg/L	0.1	<0.1
Chromium, Cr	µg/L	1	<1
Copper, Cu	µg/L	1	<1
Lead, Pb	µg/L	1	<1
Nickel, Ni	µg/L	1	<1
Zinc, Zn	µg/L	5	150

Mercury (dissolved) in Water [AN311/AN312] Tested: 6/5/2016

			QR-01
			WATER
			-
			29/4/2016
PARAMETER	**UOM**	**LOR**	**SE151756.012**
Mercury	mg/L	0.0001	<0.0001

METHOD	METHODOLOGY SUMMARY
AN002	The test is carried out by drying (at either 40°C or 105°C) a known mass of sample in a weighed evaporating basin. After fully dry the sample is re-weighed. Samples such as sludge and sediment having high percentages of moisture will take some time in a drying oven for complete removal of water.
AN020	Unpreserved water sample is filtered through a 0.45µm membrane filter and acidified with nitric acid similar to APHA3030B.
AN040/AN320	A portion of sample is digested with nitric acid to decompose organic matter and hydrochloric acid to complete the digestion of metals. The digest is then analysed by ICP OES with metals results reported on the dried sample basis. Based on USEPA method 200.8 and 6010C.
AN040	A portion of sample is digested with Nitric acid to decompose organic matter and Hydrochloric acid to complete the digestion of metals and then filtered for analysis by ASS or ICP as per USEPA Method 200.8.
AN311/AN312	Mercury by Cold Vapour AAS in Waters: Mercury ions are reduced by stannous chloride reagent in acidic solution to elemental mercury. This mercury vapour is purged by nitrogen into a cold cell in an atomic absorption spectrometer or mercury analyser. Quantification is made by comparing absorbances to those of the calibration standards. Reference APHA 3112/3500.
AN312	Mercury by Cold Vapour AAS in Soils: After digestion with nitric acid, hydrogen peroxide and hydrochloric acid , mercury ions are reduced by stannous chloride reagent in acidic solution to elemental mercury. This mercury vapour is purged by nitrogen into a cold cell in an atomic absorption spectrometer or mercury analyser . Quantification is made by comparing absorbances to those of the calibration standards. Reference APHA 3112/3500
AN318	Determination of elements at trace level in waters by ICP-MS technique, in accordance with USEPA 6020A.
AN400	OC and OP Pesticides by GC-ECD: The determination of organochlorine (OC) and organophosphorus (OP) pesticides and polychlorinated biphenyls (PCBs) in soils, sludges and groundwater. (Based on USEPA methods 3510, 3550, 8140 and 8080.)
AN403	Total Recoverable Hydrocarbons: Determination of Hydrocarbons by gas chromatography after a solvent extraction. Detection is by flame ionisation detector (FID) that produces an electronic signal in proportion to the combustible matter passing through it. Total Recoverable Hydrocarbons (TRH) are routinely reported as four alkane groupings based on the carbon chain length of the compounds: C6-C9, C10-C14, C15-C28 and C29-C36 and in recognition of the NEPM 1999 (2013), >C10-C16 (F2), >C16-C34 (F3) and >C34-C40 (F4). F2 is reported directly and also corrected by subtracting Naphthalene (from VOC method AN433) where available.
AN403	Additionally, the volatile C6-C9 fraction may be determined by a purge and trap technique and GC /MS because of the potential for volatiles loss. Total Petroleum Hydrocarbons (TPH) follows the same method of analysis after silica gel cleanup of the solvent extract. Aliphatic/Aromatic Speciation follows the same method of analysis after fractionation of the solvent extract over silica with differential polarity of the eluent solvents .
AN403	The GC/FID method is not well suited to the analysis of refined high boiling point materials (ie lubricating oils or greases) but is particularly suited for measuring diesel, kerosene and petrol if care to control volatility is taken. This method will detect naturally occurring hydrocarbons, lipids, animal fats, phenols and PAHs if they are present at sufficient levels, dependent on the use of specific cleanup /fractionation techniques. Reference USEPA 3510B, 8015B.
AN420	(SVOCs) including OC, OP, PCB, Herbicides, PAH, Phthalates and Speciated Phenols (etc) in soils, sediments and waters are determined by GCMS/ECD technique following appropriate solvent extraction process (Based on USEPA 3500C and 8270D).
AN420	SVOC Compounds: 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 technique following appropriate solvent extraction process (Based on USEPA 3500C and 8270D).
AN433/AN434/AN410	VOCs and C6-C9/C6-C10 Hydrocarbons by GC-MS P&T: VOC`s are volatile organic compounds. The sample is presented to a gas chromatograph via a purge and trap (P&T) concentrator and autosampler and is detected with a Mass Spectrometer (MSD). Solid samples are initially extracted with methanol whilst liquid samples are processed directly. References: USEPA 5030B, 8020A, 8260.
AN433/AN434	VOCs and C6-C9 Hydrocarbons by GC-MS P&T: VOC`s are volatile organic compounds. The sample is presented to a gas chromatograph via a purge and trap (P&T) concentrator and autosampler and is detected with a Mass Spectrometer (MSD). Solid samples are initially extracted with methanol whilst liquid samples are processed directly. References: USEPA 5030B, 8020A, 8260.
AN602	Qualitative identification of chrysotile, amosite and crocidolite in bulk samples by polarised light microscopy (PLM) in conjunction with dispersion staining (DS). AS4964 provides the basis for this document. Unequivocal identification of the asbestos minerals present is made by obtaining sufficient diagnostic `clues`, which provide a reasonable degree of certainty, dispersion staining is a mandatory `clue` for positive identification. If sufficient `clues` are absent, then positive identification of asbestos is not possible. This procedure requires removal of suspect fibres/bundles from the sample which cannot be returned.
AN602	Fibres/material that cannot be unequivocably identified as one of the three asbestos forms, will be reported as unknown mineral fibres (umf).

AN602	AS4964.2004 Method for the Qualitative Identification of Asbestos in Bulk Samples, Section 8.4, Trace Analysis Criteria, Note 4 states:"Depending upon sample condition and fibre type, the detection limit of this technique has been found to lie generally in the range of 1 in 1,000 to 1 in 10,000 parts by weight, equivalent to 1 to 0.1 g/kg."
AN602	The sample can be reported “no asbestos found at the reporting limit of 0.1 g/kg” (<0.01%w/w) where AN602 section 4.5 of this method has been followed, and if- (a) no trace asbestos fibres have been detected (i.e. no ‘respirable’ fibres): (b) the estimated weight of non-respirable asbestos fibre bundles and/or the estimated weight of asbestos in asbestos-containing materials are found to be less than 0.1g/kg: and (c) these non-respirable asbestos fibre bundles and/or the asbestos containing materials are only visible under stereo-microscope viewing conditions.

FOOTNOTES

*	NATA accreditation does not cover the performance of this service.	-	Not analysed.	UOM	Unit of Measure.
		NVL	Not validated.	LOR	Limit of Reporting.
**	Indicative data, theoretical holding time exceeded.	IS	Insufficient sample for analysis.	↑↓	Raised/lowered Limit of Reporting.
		LNR	Sample listed, but not received.		

Samples analysed as received.
Solid samples expressed on a dry weight basis.

Where "Total" analyte groups are reported (for example, Total PAHs, Total OC Pesticides) the total will be calculated as the sum of the individual analytes, with those analytes that are reported as <LOR being assumed to be zero. The summed (Total) limit of reporting is calculated by summing the individual analyte LORs and dividing by two. For example, where 16 individual analytes are being summed and each has an LOR of 0.1 mg/kg, the "Totals" LOR will be 1.6 / 2 (0.8 mg/kg). Where only 2 analytes are being summed, the " Total" LOR will be the sum of those two LORs.

Some totals may not appear to add up because the total is rounded after adding up the raw values.

If reported, measurement uncertainty follow the ± sign after the analytical result and is expressed as the expanded uncertainty calculated using a coverage factor of 2, providing a level of confidence of approximately 95%, unless stated otherwise in the comments section of this report.

Results reported for samples tested under test methods with codes starting with ARS-SOP, radionuclide or gross radioactivity concentrations are expressed in becquerel (Bq) per unit of mass or volume or per wipe as stated on the report. Becquerel is the SI unit for activity and equals one nuclear transformation per second.
Note that in terms of units of radioactivity:

a. 1 Bq is equivalent to 27 pCi
b. 37 MBq is equivalent to 1 mCi

For results reported for samples tested under test methods with codes starting with ARS-SOP, less than (<) values indicate the detection limit for each radionuclide or parameter for the measurement system used. The respective detection limits have been calculated in accordance with ISO 11929.

The QC criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here : http://www.sgs.com.au/~/media/Local/Australia/Documents/Technical Documents/MP-AU-ENV-QU-022 QA QC Plan.pdf

This document is issued, on the Client's behalf, by the Company under its General Conditions of Service available on request and accessible at http://www.sgs.com/en/terms-and-conditions. The Client's attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein.

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ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS

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Client	Environmental Investigations
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Project	**E22974 - 80-88 Regent St - Redfern**
Order Number	**E22974**
Samples	7

LABORATORY DETAILS

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Email	au.environmental.sydney@sgs.com
SGS Reference	**SE151756 R0**
Date Received	02 May 2016
Date Reported	10 May 2016

COMMENTS

Accredited for compliance with ISO/IEC 17025. NATA accredited laboratory 2562(4354).

No respirable fibres detected in all samples using trace analysis technique.

Sample #9: A portion of the sample supplied has been sub-sampled for asbestos according to SGS In-house procedures.
We therefore cannot guarantee that the sub-sample is representative of the entire sample supplied.
SGS Environment, Heath and Safety recommends supplying approximately 50-100g of sample in a separate container.

Asbestos analysed by Approved Identifier Yusuf Kuthpudin.

SIGNATORIES

Andy Sutton
Senior Organic Chemist

Dong Liang
Metals/Inorganics Team Leader

Huong Crawford
Production Manager

Kamrul Ahsan
Senior Chemist

Ly Kim Ha
Organic Section Head

Ravee Sivasubramaniam
Hygiene Team Leader

ANALYTICAL REPORT

RESULTS

Fibre Identification in soil Method AN602

Laboratory Reference	Client Reference	Matrix	Sample Description	Date Sampled	Fibre Identification	Est.%w/w*
SE151756.001	BH01M_0.1-0.2	Soil	184g Clay, Sand, Soil, Rocks	29 Apr 2016	No Asbestos Found	<0.01
SE151756.003	BH02_0.5-0.6	Soil	132g Sand, Soil, Rocks	29 Apr 2016	No Asbestos Found Organic Fibres Detected	<0.01
SE151756.004	BH03_0.7-0.8	Soil	76g Clay, Sand, Soil, Rocks	29 Apr 2016	No Asbestos Found Organic Fibres Detected	<0.01
SE151756.006	BH04_0.15-0.25	Soil	148g Clay, Sand, Soil, Rocks	29 Apr 2016	No Asbestos Found	<0.01
SE151756.007	BH05_0.75-0.85	Soil	84g Sand, Soil, Rocks	29 Apr 2016	No Asbestos Found Organic Fibres Detected	<0.01
SE151756.009	BH06M_0.1-0.2	Soil	90g Clay, Sand, Soil, Rocks	29 Apr 2016	No Asbestos Found	<0.01
SE151756.011	BH07_0.1-0.2	Soil	91g Sand, Soil, Rocks	29 Apr 2016	No Asbestos Found	<0.01

METHOD SUMMARY

METHOD	METHODOLOGY SUMMARY
AN602	Qualitative identification of chrysotile, amosite and crocidolite in bulk samples by polarised light microscopy (PLM) in conjunction with dispersion staining (DS). AS4964 provides the basis for this document. Unequivocal identification of the asbestos minerals present is made by obtaining sufficient diagnostic `clues`, which provide a reasonable degree of certainty, dispersion staining is a mandatory `clue` for positive identification. If sufficient `clues` are absent, then positive identification of asbestos is not possible. This procedure requires removal of suspect fibres/bundles from the sample which cannot be returned.
AN602	Fibres/material that cannot be unequivocably identified as one of the three asbestos forms, will be reported as unknown mineral fibres (umf).
AN602	AS4964.2004 Method for the Qualitative Identification of Asbestos in Bulk Samples, Section 8.4, Trace Analysis Criteria, Note 4 states:"Depending upon sample condition and fibre type, the detection limit of this technique has been found to lie generally in the range of 1 in 1,000 to 1 in 10,000 parts by weight, equivalent to 1 to 0.1 g/kg."
AN602	The sample can be reported "no asbestos found at the reporting limit of 0.1 g/kg" (<0.01%w/w) where AN602 section 4.5 of this method has been followed, and if- (a) no trace asbestos fibres have been detected (i.e. no 'respirable' fibres): (b) the estimated weight of non-respirable asbestos fibre bundles and/or the estimated weight of asbestos in asbestos-containing materials are found to be less than 0.1g/kg: and (c) these non-respirable asbestos fibre bundles and/or the asbestos containing materials are only visible under stereo-microscope viewing conditions.

FOOTNOTES

Amosite	-	Brown Asbestos	NA	-	Not Analysed
Chrysotile	-	White Asbestos	LNR	-	Listed, Not Required
Crocidolite	-	Blue Asbestos	*	-	NATA accreditation does not cover the performance of this service.
Amphiboles	-	Amosite and/or Crocidolite	**	-	Indicative data, theoretical holding time exceeded.

(In reference to soil samples only) This report does not comply with the analytical reporting recommendations in the Western Australian Department of Health Guidelines for the Assessment and Remediation and Management of Asbestos Contaminated sites in Western Australia - May 2009.

Sampled by the client.

Where reported: 'Asbestos Detected': Asbestos detected by polarised light microscopy, including dispersion staining.
Where reported: 'No Asbestos Found': No Asbestos Found by polarised light microscopy, including dispersion staining.
Where reported: 'UMF Detected': Mineral fibres of unknown type detected by polarised light microscopy, including dispersion staining. Confirmation by another independent analytical technique may be necessary.

Even after disintegration it can be very difficult, or impossible, to detect the presence of asbestos in some asbestos-containing bulk materials using polarised light microscopy. This is due to the low grade or small length or diameter of asbestos fibres present in the material, or to the fact that very fine fibres have been distributed intimately throughout the materials.

The QC criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here : http://www.sgs.com.au/~/media/Local/Australia/Documents/Technical Documents/MP-AU-ENV-QU-022 QA QC Plan.pdf

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CERTIFICATE OF ANALYSIS 145816

Client:

Environmental Investigations
Suite 6.01, 55 Miller Street
Pyrmont
NSW 2009

Attention: Jessie Sixsmith

Sample log in details:

Your Reference:	**E22974, Redfern**		
No. of samples:	1 Soil		
Date samples received / completed instructions received	02/05/2016	/	02/05/2016

Analysis Details:

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

Report Details:

Date results requested by: / Issue Date:	9/05/16	/	4/05/16
Date of Preliminary Report:	Not Issued		

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Accredited for compliance with ISO/IEC 17025. **Tests not covered by NATA are denoted with *.**

Results Approved By:

Jacinta Hurst
Laboratory Manager

vTRH(C6-C10)/BTEXN in Soil		
Our Reference:	UNITS	145816-1
Your Reference	-------------	QT-01
Date Sampled	------------	29/04/2016
Type of sample		Soil
Date extracted	-	03/05/2016
Date analysed	-	03/05/2016
TRHC $_6$ - C $_9$	mg/kg	<25
TRHC $_6$ - C $_{10}$	mg/kg	<25
vTPH C $_6$ - C $_{10}$ less BTEX (F1)	mg/kg	<25
Benzene	mg/kg	<0.2
Toluene	mg/kg	<0.5
Ethylbenzene	mg/kg	<1
m+p-xylene	mg/kg	<2
o-Xylene	mg/kg	<1
naphthalene	mg/kg	<1
Surrogate aaa-Trifluorotoluene	%	104

svTRH (C10-C40) in Soil		
Our Reference:	UNITS	145816-1
Your Reference	------------- -	QT-01
Date Sampled	------------	29/04/2016
Type of sample		Soil
Date extracted	-	03/05/2016
Date analysed	-	04/05/2016
TRHC $_{10}$ - C $_{14}$	mg/kg	<50
TRHC $_{15}$ - C $_{28}$	mg/kg	<100
TRHC $_{29}$ - C $_{36}$	mg/kg	<100
TRH>C $_{10}$-C $_{16}$	mg/kg	<50
TRH>C $_{10}$ - C $_{16}$ less Naphthalene (F2)	mg/kg	<50
TRH>C $_{16}$-C $_{34}$	mg/kg	<100
TRH>C $_{34}$-C $_{40}$	mg/kg	<100
Surrogate o-Terphenyl	%	77

Acid Extractable metals in soil		
Our Reference:	UNITS	145816-1
Your Reference	------------- -	QT-01
Date Sampled	------------	29/04/2016
Type of sample		Soil
Date prepared	-	03/05/2016
Date analysed	-	03/05/2016
Arsenic	mg/kg	4
Cadmium	mg/kg	<0.4
Chromium	mg/kg	12
Copper	mg/kg	18
Lead	mg/kg	140
Mercury	mg/kg	0.2
Nickel	mg/kg	3
Zinc	mg/kg	190

Moisture		
Our Reference:	UNITS	145816-1
Your Reference	------------- -	QT-01
Date Sampled	------------	29/04/2016
Type of sample		Soil
Date prepared	-	3/05/2016
Date analysed	-	4/05/2016
Moisture	%	15

Method ID	Methodology Summary
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.
Org-014	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Metals-020 ICP-AES	Determination of various metals by ICP-AES.
Metals-021 CV-AAS	Determination of Mercury by Cold Vapour AAS.
Inorg-008	Moisture content determined by heating at 105+/-5 deg C for a minimum of 12 hours.

QUALITY CONTROL vTRH(C6-C10)/BTEXN in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			03/05/2016	[NT]	[NT]	LCS-3	03/05/2016
Date analysed	-			03/05/2016	[NT]	[NT]	LCS-3	03/05/2016
TRH C_6 - C_9	mg/kg	25	Org-016	<25	[NT]	[NT]	LCS-3	103%
TRH C_6 - C_{10}	mg/kg	25	Org-016	<25	[NT]	[NT]	LCS-3	103%
Benzene	mg/kg	0.2	Org-016	<0.2	[NT]	[NT]	LCS-3	95%
Toluene	mg/kg	0.5	Org-016	<0.5	[NT]	[NT]	LCS-3	96%
Ethylbenzene	mg/kg	1	Org-016	<1	[NT]	[NT]	LCS-3	110%
m+p-xylene	mg/kg	2	Org-016	<2	[NT]	[NT]	LCS-3	107%
o-Xylene	mg/kg	1	Org-016	<1	[NT]	[NT]	LCS-3	107%
naphthalene	mg/kg	1	Org-014	<1	[NT]	[NT]	[NR]	[NR]
Surrogate aaa-Trifluorotoluene	%		Org-016	106	[NT]	[NT]	LCS-3	106%

QUALITY CONTROL svTRH (C10-C40) in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			03/05/2016	[NT]	[NT]	LCS-3	03/05/2016
Date analysed	-			04/05/2016	[NT]	[NT]	LCS-3	04/05/2016
TRH C_{10} - C_{14}	mg/kg	50	Org-003	<50	[NT]	[NT]	LCS-3	102%
TRH C_{15} - C_{28}	mg/kg	100	Org-003	<100	[NT]	[NT]	LCS-3	107%
TRH C_{29} - C_{36}	mg/kg	100	Org-003	<100	[NT]	[NT]	LCS-3	81%
TRH $>C_{10}$-C_{16}	mg/kg	50	Org-003	<50	[NT]	[NT]	LCS-3	102%
TRH $>C_{16}$-C_{34}	mg/kg	100	Org-003	<100	[NT]	[NT]	LCS-3	107%
TRH $>C_{34}$-C_{40}	mg/kg	100	Org-003	<100	[NT]	[NT]	LCS-3	81%
Surrogate o-Terphenyl	%		Org-003	84	[NT]	[NT]	LCS-3	92%

QUALITY CONTROL Acid Extractable metals in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			03/05/2016	[NT]	[NT]	LCS-3	03/05/2016
Date analysed	-			03/05/2016	[NT]	[NT]	LCS-3	03/05/2016
Arsenic	mg/kg	4	Metals-020 ICP-AES	<4	[NT]	[NT]	LCS-3	104%
Cadmium	mg/kg	0.4	Metals-020 ICP-AES	<0.4	[NT]	[NT]	LCS-3	98%
Chromium	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	LCS-3	102%
Copper	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	LCS-3	102%
Lead	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	LCS-3	98%
Mercury	mg/kg	0.1	Metals-021 CV-AAS	<0.1	[NT]	[NT]	LCS-3	84%

QUALITY CONTROL Acid Extractable metals in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Nickel	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	LCS-3	95%
Zinc	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	LCS-3	99%

Report Comments:

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

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

Quality Control Definitions

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

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

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

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

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

Laboratory Acceptance Criteria

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

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.
Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS

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Project	**E22974 - 80-88 Regent St, Redfern, NSW**
Order Number	**E22974**
Samples	7

LABORATORY DETAILS

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SGS Reference	**SE152112 R0**
Date Received	12/5/2016
Date Reported	19/5/2016

COMMENTS

Accredited for compliance with ISO/IEC 17025. NATA accredited laboratory 2562(4354).

VOC/VPH_The Limit of Reporting (LOR) has been raised due to interferences from the sample matrix.

SIGNATORIES

Andy Sutton
Senior Organic Chemist

Dong Liang
Metals/Inorganics Team Leader

Ly Kim Ha
Organic Section Head

VOCs in Water [AN433/AN434] Tested: 16/5/2016

			BH01M	BH06M	QD-1	GWQR-1	GWQB-1
			WATER	WATER	WATER	WATER	WATER
			-	-	-	-	-
			11/5/2016	11/5/2016	11/5/2016	11/5/2016	11/5/2016
PARAMETER	**UOM**	**LOR**	**SE152112.001**	**SE152112.002**	**SE152112.003**	**SE152112.004**	**SE152112.005**
Benzene	µg/L	0.5	<2.5↑	<0.5	<2.5↑	<0.5	<0.5
Toluene	µg/L	0.5	<2.5↑	<0.5	<2.5↑	<0.5	<0.5
Ethylbenzene	µg/L	0.5	<2.5↑	<0.5	<2.5↑	<0.5	<0.5
m/p-xylene	µg/L	1	<5↑	<1	<5↑	<1	<1
o-xylene	µg/L	0.5	<2.5↑	<0.5	<2.5↑	<0.5	<0.5
Total Xylenes	µg/L	1.5	<7.5↑	<1.5	<7.5↑	<1.5	<1.5
Total BTEX	µg/L	3	<15↑	<3	<15↑	<3	<3
Naphthalene	µg/L	0.5	<2.5↑	<0.5	<2.5↑	<0.5	<0.5
Dichlorodifluoromethane (CFC-12)	µg/L	5	<25↑	<5	-	-	-
Chloromethane	µg/L	5	<25↑	<5	-	-	-
Vinyl chloride (Chloroethene)	µg/L	0.3	<1.5↑	<0.3	-	-	-
Bromomethane	µg/L	10	<50↑	<10	-	-	-
Chloroethane	µg/L	5	<25↑	<5	-	-	-
Trichlorofluoromethane	µg/L	1	<5↑	<1	-	-	-
Acetone (2-propanone)	µg/L	10	<50↑	<10	-	-	-
Iodomethane	µg/L	5	<25↑	<5	-	-	-
1,1-dichloroethene	µg/L	0.5	<2.5↑	<0.5	-	-	-
Acrylonitrile	µg/L	0.5	<2.5↑	<0.5	-	-	-
Dichloromethane (Methylene chloride)	µg/L	5	<25↑	<5	-	-	-
Allyl chloride	µg/L	2	<10↑	<2	-	-	-
Carbon disulfide	µg/L	2	<10↑	<2	-	-	-
trans-1,2-dichloroethene	µg/L	0.5	<2.5↑	<0.5	-	-	-
MtBE (Methyl-tert-butyl ether)	µg/L	2	<10↑	<2	-	-	-
1,1-dichloroethane	µg/L	0.5	<2.5↑	<0.5	-	-	-
Vinyl acetate	µg/L	10	<50↑	<10	-	-	-
MEK (2-butanone)	µg/L	10	<50↑	<10	-	-	-
cis-1,2-dichloroethene	µg/L	0.5	<2.5↑	<0.5	-	-	-
Bromochloromethane	µg/L	0.5	<2.5↑	<0.5	-	-	-
Chloroform (THM)	µg/L	0.5	<2.5↑	<0.5	-	-	-
2,2-dichloropropane	µg/L	0.5	<2.5↑	<0.5	-	-	-
1,2-dichloroethane	µg/L	0.5	<2.5↑	<0.5	-	-	-
1,1,1-trichloroethane	µg/L	0.5	<2.5↑	<0.5	-	-	-
1,1-dichloropropene	µg/L	0.5	<2.5↑	<0.5	-	-	-
Carbon tetrachloride	µg/L	0.5	<2.5↑	<0.5	-	-	-
Dibromomethane	µg/L	0.5	<2.5↑	<0.5	-	-	-
1,2-dichloropropane	µg/L	0.5	<2.5↑	<0.5	-	-	-
Trichloroethene (Trichloroethylene,TCE)	µg/L	0.5	<2.5↑	<0.5	-	-	-
2-nitropropane	µg/L	100	<500↑	<100	-	-	-
Bromodichloromethane (THM)	µg/L	0.5	<2.5↑	<0.5	-	-	-
MIBK (4-methyl-2-pentanone)	µg/L	5	<25↑	<5	-	-	-
cis-1,3-dichloropropene	µg/L	0.5	<2.5↑	<0.5	-	-	-
trans-1,3-dichloropropene	µg/L	0.5	<2.5↑	<0.5	-	-	-
1,1,2-trichloroethane	µg/L	0.5	<2.5↑	<0.5	-	-	-
1,3-dichloropropane	µg/L	0.5	<2.5↑	<0.5	-	-	-
Dibromochloromethane (THM)	µg/L	0.5	<2.5↑	<0.5	-	-	-
2-hexanone (MBK)	µg/L	5	<25↑	<5	-	-	-
1,2-dibromoethane (EDB)	µg/L	0.5	<2.5↑	<0.5	-	-	-
Tetrachloroethene (Perchloroethylene,PCE)	µg/L	0.5	<2.5↑	<0.5	-	-	-
1,1,1,2-tetrachloroethane	µg/L	0.5	<2.5↑	<0.5	-	-	-
Chlorobenzene	µg/L	0.5	<2.5↑	<0.5	-	-	-
Bromoform (THM)	µg/L	0.5	<2.5↑	<0.5	-	-	-
cis-1,4-dichloro-2-butene	µg/L	1	<5↑	<1	-	-	-
Styrene (Vinyl benzene)	µg/L	0.5	<2.5↑	<0.5	-	-	-
1,1,2,2-tetrachloroethane	µg/L	0.5	<2.5↑	<0.5	-	-	-
1,2,3-trichloropropane	µg/L	0.5	<2.5↑	<0.5	-	-	-
trans-1,4-dichloro-2-butene	µg/L	1	<5↑	<1	-	-	-

VOCs in Water [AN433/AN434] Tested: 16/5/2016 (continued)

			BH01M	BH06M	QD-1	GWQR-1	GWQB-1
			WATER	WATER	WATER	WATER	WATER
			-	-	-	-	-
			11/5/2016	11/5/2016	11/5/2016	11/5/2016	11/5/2016
PARAMETER	**UOM**	**LOR**	**SE152112.001**	**SE152112.002**	**SE152112.003**	**SE152112.004**	**SE152112.005**
Isopropylbenzene (Cumene)	µg/L	0.5	<2.5↑	<0.5	-	-	-
Bromobenzene	µg/L	0.5	<2.5↑	<0.5	-	-	-
n-propylbenzene	µg/L	0.5	<2.5↑	<0.5	-	-	-
2-chlorotoluene	µg/L	0.5	<2.5↑	<0.5	-	-	-
4-chlorotoluene	µg/L	0.5	<2.5↑	<0.5	-	-	-
1,3,5-trimethylbenzene	µg/L	0.5	<2.5↑	<0.5	-	-	-
tert-butylbenzene	µg/L	0.5	<2.5↑	<0.5	-	-	-
1,2,4-trimethylbenzene	µg/L	0.5	<2.5↑	<0.5	-	-	-
sec-butylbenzene	µg/L	0.5	<2.5↑	<0.5	-	-	-
1,3-dichlorobenzene	µg/L	0.5	<2.5↑	<0.5	-	-	-
1,4-dichlorobenzene	µg/L	0.3	<1.5↑	<0.3	-	-	-
p-isopropyltoluene	µg/L	0.5	<2.5↑	<0.5	-	-	-
1,2-dichlorobenzene	µg/L	0.5	<2.5↑	<0.5	-	-	-
n-butylbenzene	µg/L	0.5	<2.5↑	<0.5	-	-	-
1,2-dibromo-3-chloropropane	µg/L	0.5	<2.5↑	<0.5	-	-	-
1,2,4-trichlorobenzene	µg/L	0.5	<2.5↑	<0.5	-	-	-
Hexachlorobutadiene	µg/L	0.5	<2.5↑	<0.5	-	-	-
1,2,3-trichlorobenzene	µg/L	0.5	<2.5↑	<0.5	-	-	-
Total VOC	µg/L	10	-	-	-	-	-

VOCs in Water [AN433/AN434] Tested: 16/5/2016 (continued)

PARAMETER	UOM	LOR	Trip Blank WATER - 11/5/2016 SE152112.006	Trip Spike WATER - 11/5/2016 SE152112.007
Benzene	µg/L	0.5	<0.5	[106%]
Toluene	µg/L	0.5	<0.5	[115%]
Ethylbenzene	µg/L	0.5	<0.5	[113%]
m/p-xylene	µg/L	1	<1	[114%]
o-xylene	µg/L	0.5	<0.5	[113%]
Total Xylenes	µg/L	1.5	<1.5	-
Total BTEX	µg/L	3	<3	-
Naphthalene	µg/L	0.5	<0.5	-
Dichlorodifluoromethane (CFC-12)	µg/L	5	-	-
Chloromethane	µg/L	5	-	-
Vinyl chloride (Chloroethene)	µg/L	0.3	-	-
Bromomethane	µg/L	10	-	-
Chloroethane	µg/L	5	-	-
Trichlorofluoromethane	µg/L	1	-	-
Acetone (2-propanone)	µg/L	10	-	-
Iodomethane	µg/L	5	-	-
1,1-dichloroethene	µg/L	0.5	-	-
Acrylonitrile	µg/L	0.5	-	-
Dichloromethane (Methylene chloride)	µg/L	5	-	-
Allyl chloride	µg/L	2	-	-
Carbon disulfide	µg/L	2	-	-
trans-1,2-dichloroethene	µg/L	0.5	-	-
MtBE (Methyl-tert-butyl ether)	µg/L	2	-	-
1,1-dichloroethane	µg/L	0.5	-	-
Vinyl acetate	µg/L	10	-	-
MEK (2-butanone)	µg/L	10	-	-
cis-1,2-dichloroethene	µg/L	0.5	-	-
Bromochloromethane	µg/L	0.5	-	-
Chloroform (THM)	µg/L	0.5	-	-
2,2-dichloropropane	µg/L	0.5	-	-
1,2-dichloroethane	µg/L	0.5	-	-
1,1,1-trichloroethane	µg/L	0.5	-	-
1,1-dichloropropene	µg/L	0.5	-	-
Carbon tetrachloride	µg/L	0.5	-	-
Dibromomethane	µg/L	0.5	-	-
1,2-dichloropropane	µg/L	0.5	-	-
Trichloroethene (Trichloroethylene,TCE)	µg/L	0.5	-	-
2-nitropropane	µg/L	100	-	-
Bromodichloromethane (THM)	µg/L	0.5	-	-
MIBK (4-methyl-2-pentanone)	µg/L	5	-	-
cis-1,3-dichloropropene	µg/L	0.5	-	-
trans-1,3-dichloropropene	µg/L	0.5	-	-
1,1,2-trichloroethane	µg/L	0.5	-	-
1,3-dichloropropane	µg/L	0.5	-	-
Dibromochloromethane (THM)	µg/L	0.5	-	-
2-hexanone (MBK)	µg/L	5	-	-
1,2-dibromoethane (EDB)	µg/L	0.5	-	-
Tetrachloroethene (Perchloroethylene,PCE)	µg/L	0.5	-	-
1,1,1,2-tetrachloroethane	µg/L	0.5	-	-
Chlorobenzene	µg/L	0.5	-	-
Bromoform (THM)	µg/L	0.5	-	-
cis-1,4-dichloro-2-butene	µg/L	1	-	-
Styrene (Vinyl benzene)	µg/L	0.5	-	-
1,1,2,2-tetrachloroethane	µg/L	0.5	-	-
1,2,3-trichloropropane	µg/L	0.5	-	-
trans-1,4-dichloro-2-butene	µg/L	1	-	-

VOCs in Water [AN433/AN434] Tested: 16/5/2016 (continued)

PARAMETER	UOM	LOR	Trip Blank WATER - 11/5/2016 SE152112.006	Trip Spike WATER - 11/5/2016 SE152112.007
Isopropylbenzene (Cumene)	µg/L	0.5	-	-
Bromobenzene	µg/L	0.5	-	-
n-propylbenzene	µg/L	0.5	-	-
2-chlorotoluene	µg/L	0.5	-	-
4-chlorotoluene	µg/L	0.5	-	-
1,3,5-trimethylbenzene	µg/L	0.5	-	-
tert-butylbenzene	µg/L	0.5	-	-
1,2,4-trimethylbenzene	µg/L	0.5	-	-
sec-butylbenzene	µg/L	0.5	-	-
1,3-dichlorobenzene	µg/L	0.5	-	-
1,4-dichlorobenzene	µg/L	0.3	-	-
p-isopropyltoluene	µg/L	0.5	-	-
1,2-dichlorobenzene	µg/L	0.5	-	-
n-butylbenzene	µg/L	0.5	-	-
1,2-dibromo-3-chloropropane	µg/L	0.5	-	-
1,2,4-trichlorobenzene	µg/L	0.5	-	-
Hexachlorobutadiene	µg/L	0.5	-	-
1,2,3-trichlorobenzene	µg/L	0.5	-	-
Total VOC	µg/L	10	-	-

Volatile Petroleum Hydrocarbons in Water [AN433/AN434/AN410] Tested: 16/5/2016

PARAMETER	UOM	LOR	**BH01M** WATER - 11/5/2016 **SE152112.001**	**BH06M** WATER - 11/5/2016 **SE152112.002**	**QD-1** WATER - 11/5/2016 **SE152112.003**	**GWQR-1** WATER - 11/5/2016 **SE152112.004**	**GWQB-1** WATER - 11/5/2016 **SE152112.005**
TRH C6-C9	µg/L	40	<200↑	<40	<200↑	<40	<40
Benzene (F0)	µg/L	0.5	<2.5↑	<0.5	<2.5↑	<0.5	<0.5
TRH C6-C10	µg/L	50	<250↑	<50	<250↑	<50	<50
TRH C6-C10 minus BTEX (F1)	µg/L	50	<250↑	<50	<250↑	<50	<50

TRH (Total Recoverable Hydrocarbons) in Water [AN403] Tested: 16/5/2016

PARAMETER	UOM	LOR	BH01M WATER - 11/5/2016 SE152112.001	BH06M WATER - 11/5/2016 SE152112.002	QD-1 WATER - 11/5/2016 SE152112.003	GWQR-1 WATER - 11/5/2016 SE152112.004	GWQB-1 WATER - 11/5/2016 SE152112.005
TRH C10-C14	µg/L	50	<50	<50	<50	<50	<50
TRH C15-C28	µg/L	200	<200	<200	<200	<200	<200
TRH C29-C36	µg/L	200	<200	<200	<200	<200	<200
TRH C37-C40	µg/L	200	<200	<200	<200	<200	<200
TRH >C10-C16 (F2)	µg/L	60	<60	<60	<60	<60	<60
TRH >C16-C34 (F3)	µg/L	500	<500	<500	<500	<500	<500
TRH >C34-C40 (F4)	µg/L	500	<500	<500	<500	<500	<500
TRH C10-C36	µg/L	450	<450	<450	<450	<450	<450
TRH C10-C40	µg/L	650	<650	<650	<650	<650	<650

PAH (Polynuclear Aromatic Hydrocarbons) in Water [AN420] Tested: 16/5/2016

PARAMETER	UOM	LOR	BH01M WATER - 11/5/2016 SE152112.001	BH06M WATER - 11/5/2016 SE152112.002
Naphthalene	µg/L	0.1	<0.1	<0.1
2-methylnaphthalene	µg/L	0.1	<0.1	<0.1
1-methylnaphthalene	µg/L	0.1	<0.1	<0.1
Acenaphthylene	µg/L	0.1	<0.1	<0.1
Acenaphthene	µg/L	0.1	<0.1	<0.1
Fluorene	µg/L	0.1	<0.1	<0.1
Phenanthrene	µg/L	0.1	<0.1	<0.1
Anthracene	µg/L	0.1	<0.1	<0.1
Fluoranthene	µg/L	0.1	<0.1	<0.1
Pyrene	µg/L	0.1	<0.1	<0.1
Benzo(a)anthracene	µg/L	0.1	<0.1	<0.1
Chrysene	µg/L	0.1	<0.1	<0.1
Benzo(b&j)fluoranthene	µg/L	0.1	<0.1	<0.1
Benzo(k)fluoranthene	µg/L	0.1	<0.1	<0.1
Benzo(a)pyrene	µg/L	0.1	<0.1	<0.1
Indeno(1,2,3-cd)pyrene	µg/L	0.1	<0.1	<0.1
Dibenzo(ah)anthracene	µg/L	0.1	<0.1	<0.1
Benzo(ghi)perylene	µg/L	0.1	<0.1	<0.1
Total PAH (18)	µg/L	1	<1	<1

Total Phenolics in Water [AN289] Tested: 16/5/2016

PARAMETER	UOM	LOR	BH01M WATER - 11/5/2016 SE152112.001	BH06M WATER - 11/5/2016 SE152112.002
Total Phenols	mg/L	0.01	<0.01	<0.01

Trace Metals (Dissolved) in Water by ICPMS [AN318] Tested: 13/5/2016

PARAMETER	UOM	LOR	BH01M WATER - 11/5/2016 SE152112.001	BH06M WATER - 11/5/2016 SE152112.002	QD-1 WATER - 11/5/2016 SE152112.003	GWQR-1 WATER - 11/5/2016 SE152112.004	GWQB-1 WATER - 11/5/2016 SE152112.005
Arsenic, As	µg/L	1	<1	4	<1	<1	<1
Cadmium, Cd	µg/L	0.1	0.2	<0.1	0.3	<0.1	<0.1
Chromium, Cr	µg/L	1	<1	<1	<1	<1	<1
Copper, Cu	µg/L	1	<1	<1	<1	<1	<1
Lead, Pb	µg/L	1	<1	<1	<1	<1	<1
Nickel, Ni	µg/L	1	3	4	3	<1	<1
Zinc, Zn	µg/L	5	98	25	90	<5	<5

Mercury (dissolved) in Water [AN311/AN312] Tested: 18/5/2016

PARAMETER	UOM	LOR	BH01M WATER - 11/5/2016 SE152112.001	BH06M WATER - 11/5/2016 SE152112.002	QD-1 WATER - 11/5/2016 SE152112.003	GWQR-1 WATER - 11/5/2016 SE152112.004	GWQB-1 WATER - 11/5/2016 SE152112.005
Mercury	mg/L	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001

METHOD	METHODOLOGY SUMMARY
AN020	Unpreserved water sample is filtered through a 0.45µm membrane filter and acidified with nitric acid similar to APHA3030B.
AN289	Analysis of Total Phenols in Soil Sediment and Water: Steam distillable phenols react with 4-aminoantipyrine at pH 7.9±0.1 in the presence of potassium ferricyanide to form a coloured antipyrine dye analysed by Discrete Analyser. Reference APHA 5530 B/D.
AN311/AN312	Mercury by Cold Vapour AAS in Waters: Mercury ions are reduced by stannous chloride reagent in acidic solution to elemental mercury. This mercury vapour is purged by nitrogen into a cold cell in an atomic absorption spectrometer or mercury analyser. Quantification is made by comparing absorbances to those of the calibration standards. Reference APHA 3112/3500.
AN318	Determination of elements at trace level in waters by ICP-MS technique, in accordance with USEPA 6020A.
AN403	Total Recoverable Hydrocarbons: Determination of Hydrocarbons by gas chromatography after a solvent extraction. Detection is by flame ionisation detector (FID) that produces an electronic signal in proportion to the combustible matter passing through it. Total Recoverable Hydrocarbons (TRH) are routinely reported as four alkane groupings based on the carbon chain length of the compounds: C6-C9, C10-C14, C15-C28 and C29-C36 and in recognition of the NEPM 1999 (2013), >C10-C16 (F2), >C16-C34 (F3) and >C34-C40 (F4). F2 is not corrected for Naphthalene.
AN403	Additionally, the volatile C6-C9/C6-C10 fractions may be determined by a purge and trap technique and GC/MS because of the potential for volatiles loss. Total Petroleum Hydrocarbons (TPH) follows the same method of analysis after silica gel cleanup of the solvent extract. Aliphatic/Aromatic Speciation follows the same method of analysis after fractionation of the solvent extract over silica with differential polarity of the eluent solvents .
AN403	The GC/FID method is not well suited to the analysis of refined high boiling point materials (ie lubricating oils or greases) but is particularly suited for measuring diesel, kerosene and petrol if care to control volatility is taken. This method will detect naturally occurring hydrocarbons, lipids, animal fats, phenols and PAHs if they are present at sufficient levels, dependent on the use of specific cleanup/fractionation techniques. Reference USEPA 3510B, 8015B.
AN420	(SVOCs) including OC, OP, PCB, Herbicides, PAH, Phthalates and Speciated Phenols (etc) in soils, sediments and waters are determined by GCMS/ECD technique following appropriate solvent extraction process (Based on USEPA 3500C and 8270D).
AN433/AN434/AN410	VOCs and C6-C9 Hydrocarbons by GC-MS P&T: VOC`s are volatile organic compounds. The sample is presented to a gas chromatograph via a purge and trap (P&T) concentrator and autosampler and is detected with a Mass Spectrometer (MSD). Solid samples are initially extracted with methanol whilst liquid samples are processed directly. References: USEPA 5030B, 8020A, 8260.
AN433/AN434	VOCs and C6-C9 Hydrocarbons by GC-MS P&T: VOC`s are volatile organic compounds. The sample is presented to a gas chromatograph via a purge and trap (P&T) concentrator and autosampler and is detected with a Mass Spectrometer (MSD). Solid samples are initially extracted with methanol whilst liquid samples are processed directly. References: USEPA 5030B, 8020A, 8260.

FOOTNOTES

*	NATA accreditation does not cover the performance of this service.	-	Not analysed.	UOM	Unit of Measure.
**	Indicative data, theoretical holding time exceeded.	NVL	Not validated.	LOR	Limit of Reporting.
		IS	Insufficient sample for analysis.	↑↓	Raised/lowered Limit of Reporting.
		LNR	Sample listed, but not received.		

Samples analysed as received.
Solid samples expressed on a dry weight basis.

Where "Total" analyte groups are reported (for example, Total PAHs, Total OC Pesticides) the total will be calculated as the sum of the individual analytes, with those analytes that are reported as <LOR being assumed to be zero. The summed (Total) limit of reporting is calculated by summing the individual analyte LORs and dividing by two. For example, where 16 individual analytes are being summed and each has an LOR of 0.1 mg/kg, the "Totals" LOR will be 1.6 / 2 (0.8 mg/kg). Where only 2 analytes are being summed, the " Total" LOR will be the sum of those two LORs.

Some totals may not appear to add up because the total is rounded after adding up the raw values.

If reported, measurement uncertainty follow the ± sign after the analytical result and is expressed as the expanded uncertainty calculated using a coverage factor of 2, providing a level of confidence of approximately 95%, unless stated otherwise in the comments section of this report.

Results reported for samples tested under test methods with codes starting with ARS-SOP, radionuclide or gross radioactivity concentrations are expressed in becquerel (Bq) per unit of mass or volume or per wipe as stated on the report. Becquerel is the SI unit for activity and equals one nuclear transformation per second.
Note that in terms of units of radioactivity:

a. 1 Bq is equivalent to 27 pCi
b. 37 MBq is equivalent to 1 mCi

For results reported for samples tested under test methods with codes starting with ARS-SOP, less than (<) values indicate the detection limit for each radionuclide or parameter for the measurement system used. The respective detection limits have been calculated in accordance with ISO 11929.

The QC criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here : http://www.sgs.com.au/~/media/Local/Australia/Documents/Technical Documents/MP-AU-ENV-QU-022 QA QC Plan.pdf

This document is issued, on the Client's behalf, by the Company under its General Conditions of Service available on request and accessible at http://www.sgs.com/en/terms-and-conditions. The Client's attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein.

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APPENDIX G

QA/QC Assessment

G1 QUALITY CONTROL PROGRAM

G1.1 INTRODUCTION

For the purpose of assessing the quality of data presented in this Contaminant Delineation Report, EI collected field QC samples for analysis. The primary laboratory, SGS Australia Pty Ltd (SGS) and secondary laboratory, Envirolab Services Pty Ltd (Envirolab) also prepared and analysed internal QC samples. Details of the field and laboratory QC samples, with the allowable data acceptance ranges are presented in **Table G-1**.

Table G-1 Sampling Data Quality Indicators

QA/QC Measures	Data Quality Indicators
Precision – A quantitative measure of the variability (or reproducibility) of data	Data precision would be assessed by reviewing the performance of blind field duplicate sample sets, through calculation of relative percentage differences (RPD). Data precision would be deemed acceptable if RPDs are found to be less than 30%. RPDs that exceed this range may be considered acceptable where: • Results are less than 10 times the limits of reporting (LOR); • Results are less than 20 times the LOR and the RPD is less than 50%; or • Heterogeneous materials or volatile compounds are encountered.
Accuracy – A quantitative measure of the closeness of reported data to the "true" value	Data accuracy would be assessed through the analysis of: • Method blanks, which are analysed for the analytes targeted in the primary samples; • Matrix spike and matrix spike duplicate sample sets; • Laboratory control samples; and • Calibration of instruments against known standards.
Representativeness – The confidence (expressed qualitatively) that data are representative of each medium present onsite	To ensure the data produced by the laboratory is representative of conditions encountered in the field, the laboratory would carry out the following: • Blank samples will be run in parallel with field samples to confirm there are no unacceptable instances of laboratory artefacts; • Review of relative percentage differences (RPD) values for field and laboratory duplicates to provide an indication that the samples are generally homogeneous, with no unacceptable instances of significant sample matrix heterogeneities; and • The appropriateness of collection methodologies, handling, storage and preservation techniques will be assessed to ensure/confirm there was minimal opportunity for sample interference or degradation (i.e. volatile loss during transport due to incorrect preservation / transport methods).
Completeness – A measure of the amount of useable data from a data collection activity	Analytical data sets acquired during the assessment will be evaluated as complete, upon confirmation that: • Standard operating procedures (SOPs) for sampling protocols were adhered to; and • Copies of all COC documentation are presented, reviewed and found to be properly completed. It can therefore be considered whether the proportion of "useable data" generated in the data collection activities is sufficient for the purposes of the land use assessment.

QA/QC Measures	Data Quality Indicators
Comparability – The confidence (expressed qualitatively) that data may be considered to be equivalent for each sampling and analytical event	Given that a reported data set can comprise several data sets from separate sampling episodes, issues of comparability between data sets are reduced through adherence to SOPs and regulator-endorsed or published guidelines and standards on each data gathering activity. In addition the data will be collected by experienced samplers and NATA-accredited laboratory methodologies will be employed in all laboratory testing programs.

G1.2 CALCULATION OF RELATIVE PERCENTAGE DIFFERENCE (RPD)

The RPD values were calculated using the following equation:

$$RPD = \frac{|C_O - C_R|}{[(C_O + C_R)/2]} \times 100$$

Where:

C_O = Concentration obtained for the primary sample; and

C_R = Concentration obtained for the blind replicate or split duplicate sample.

G2 FIELD QA/QC DATA EVALUATION

The field quality assurance/quality control (QA/QC) soil and groundwater samples collected during the investigations were as follows:

- Blind field duplicates;
- Inter-laboratory duplicates;
- Trip blanks;
- Trip spikes; and
- Rinsate blanks.

Analytical results for tested soil and groundwater QA/QC samples, including calculated RPD values between primary and duplicate samples, are presented in **Table G-2** and **Table G-3**, respectively.

G2.1 SOIL INVESTIGATION & SOIL VALIDATION

G2.1.1 Blind Field Duplicates

One blind field duplicate (BFD) soil sample was collected during the soil sampling program conducted on the 29 April 2016:

- Sample QD-01 was collected from the primary sample BH04_0.15-0.25.

The preparation of the BFD sample involved the collection of a bulk quantity of soil from the same sampling point without mixing, before dividing the material into identical sampling vessels. The duplicate sample was then presented blind to the primary laboratory (SGS) to avoid any potential analytical bias. BFD soil samples were analysed for TRHs, BTEX and selected heavy metals and calculated RPD values were found to be within the Data Acceptance Criteria (**Appendix H**, **Table QC5**), with the exception of Mercury (56.41%). This result was considered to reflect the non-homogenous nature of the fill material, which is a typical characteristic of disturbed fill soils in Sydney’s older, urban-industrial precincts.

G2.1.2 Inter-Laboratory Duplicate

Sample QT-01 was collected as an inter-laboratory duplicate (ILD) of the primary sample BH04_0.15-0.25 on 29 April 2016. The preparation of the ILD sample was identical to the BFD sample, as described above, and was analysed for PCBs. The calculated RPD value exceeded the Data Acceptance Criteria (75% RPD, **Appendix H, Table QC5**) for total Chromium (65.19%) and zinc (50.98 %) due to material heterogeneity, as was the case for BFD samples.

Furthermore, soil samples were placed immediately into jars following sampling to reduce the loss of volatiles from samples. Analytical results indicated that the samples collected were representative of the soils present at respective sampling locations.

G2.1.3 Trip Blank

One trip blank (TB) sample was prepared and analysed by the primary laboratory for BTEX. Analytical results for this sample were below the laboratory LOR, indicating that ideal sample transport and handling conditions were achieved.

G2.1.4 Trip Spike

One trip spike (TS) sample was submitted to the primary laboratory for BTEX analysis, the results for which were reported within the RPD acceptance levels for trip spike recovery. It was therefore concluded that satisfactory sample transport and handling conditions were achieved.

G2.1.5 Rinsate Blank

One rinsate blank (RB) sample QR-01 was submitted to the primary laboratory for heavy metals, TRH and BTEX analysis, the results for which were reported below laboratory LOR with the exception of zinc (150 µg/L) which can be attributed to an error within the laboratory prepared rinsate batch; therefore, it was concluded that decontamination procedures performed during the field works had been effective.

G2.2 GROUNDWATER INVESTIGATION

G2.2.1 Blind Field Duplicates

One groundwater BFD sample were collected during fieldwork on 11 May 2016.

- The sample QD-01 was from parent sample BH01M.

The preparation of BFD samples involved the decanting of the groundwater collected from the respective monitoring well into two separate groups of appropriately labelled sampling containers. Volumes were split equally between the groups of sampling bottles such that the sample contained in each individual bottle, contained a similar proportion of each water volume. Sample mixing did not occur prior to decanting, in order to preserve the concentrations of volatiles potentially present within the sample. The duplicate sample was then presented blind to the primary laboratory (SGS) to avoid any potential analytical bias. The BFDs were analysed for TRHs, BTEX, selected heavy metals, PAHs and VOCs. The RPD values calculated for all the analytes tested were found to be within the Data Acceptance Criteria (DAC).

G2.2.1 Inter-Laboratory Duplicate

An inter-laboratory Duplicate sample for groundwater was not collected during the GME. EI consider the blind-field duplicate RPD values to be sufficient for investigation purposes with two groundwater monitoring wells.

G2.2.3 Trip Blanks

One trip blank (TB) sample (Trip Blank), prepared by the primary laboratory, were analysed for BTEX and VOCs by the primary laboratory during groundwater testing. TB results were reported below the laboratory LOR, indicating that ideal sample transport and handling conditions were achieved.

G2.2.4 Trip Spikes

One TS samples (Trip Spike) was submitted to the primary laboratory for BTEX analysis, the results for which were all reported within the RPD acceptance levels for trip spike recovery. It was therefore concluded that satisfactory sample transport and handling conditions were achieved.

G2.2.5 Rinsate Blanks

One rinsate sample (GWQR-1) and one rinsate blank sample (GWB-1) were submitted to the primary laboratory for TRHs, BTEX and selected heavy metals analyses. Analytical results were reported below the laboratory LOR. In view of this finding it was concluded that decontamination procedures performed during the field works had been effective.

G2.4 ASSESSMENT OF FIELD QA/QC DATA

All samples were classified in the field with respect to soil/fill characteristics and any observable signs of contamination based on visual and odour assessment, in regards to soil and groundwater.

All samples, including field QC samples, were transported to the primary and secondary laboratories under strict Chain-of-Custody conditions and appropriate copies of relevant documentation were included in the respective reports.

The overall completeness of documentation produced under the field program of the subject assessment was considered to be adequate for the purposes of drawing valid conclusions regarding the environmental condition of the site.

Based on the results of the field QA/QC data EI considered the field QA/QC programme carried out during the data gap closure investigations to be appropriate and the results to be acceptable.

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G3 LABORATORY QA/QC

G3.1 LABORATORY ACCREDITATION

To undertake all analytical testing, EI commissioned SGS as the primary laboratory and Envirolab as the secondary laboratory. SGS and Envirolab, both established analytical laboratories which operate in accordance with the guidelines set out in ISO/IEC Guide 25 "General requirements for the competence of calibration and testing laboratories", conducted all respective analyses using National Association Testing Authorities (NATA)-registered procedures.

In relation to contingencies, should the pre-determined DQOs not be achieved, in accordance with each laboratory's QC policy (**Appendix H**), respective tests would be accordingly repeated. Should the results again fall outside the DQOs, then sample heterogeneity may be assumed and written comment will be provided to this effect on the final laboratory certificate. The laboratory QA/QC reports are included in **Appendix H**.

G3.2 SAMPLE HOLDING TIMES

Sample holding times were generally within the laboratory DQOs, which were consistent with standard environmental protocols as tabulated in **Appendix H**, **Tables QC1** and **QC2**.

G3.3 TEST METHODS AND PRACTICAL QUANTITATION LIMITS (PQLS)

Practical Quantitation Limits for all tested parameters during the assessment of soils and groundwater are presented in **Appendix H**, **Tables QC3** and **QC4**.

G3.4 METHOD BLANKS

Concentrations of all parameters in method blanks during the assessment were below the laboratory PQLs and were therefore within the DAC.

G3.5 LABORATORY DUPLICATE SAMPLES

The Laboratory Control Samples (LCS) for the analysis batches showed calculated RPDs that were within acceptable ranges and conformed to the DAC with the exception of TRH C_{10}-C_{28} (95%) for sample LB100614.022 due to sample heterogeneity.

G3.7 MATRIX SPIKES

All matrix spikes for the respective sample batches were within acceptable ranges and conformed to the DAC, with the exception of Copper (-158%) for sample LB100631.004 due to sample heterogeneity and lead (20%) and zinc (-26%) for sample LB100633.004 due to a significant concentration of analyte which exceeded the spike level.

G3.8 SURROGATE

Recovery results for all surrogate samples conformed to the DAC.

G3.9 CONCLUDING REMARK

Based on the laboratory QA/QC results EI considers that although a small number of discrepancies were identified, which in most cases could be attributed to the non-homogenous nature of the submitted samples, the data generally confirms that the analytical results for the various phases of laboratory testing were valid and useable for interpretation purposes.

APPENDIX H

Laboratory QA/AC Policies and DQOs

STATEMENT OF QA/QC PERFORMANCE

SE151756 R0

CLIENT DETAILS

Contact	Benjamin Yuan
Client	Environmental Investigations
Address	Suite 6.01, 55 Miller Street NSW 2009
Telephone	02 9516 0722
Facsimile	02 9516 0741
Email	benjamin.yuan@eiaustralia.com.au
Project	**E22974 - 80-88 Regent St - Redfern**
Order Number	**E22974**
Samples	15

LABORATORY DETAILS

Manager	Huong Crawford
Laboratory	SGS Alexandria Environmental
Address	Unit 16, 33 Maddox St Alexandria NSW 2015
Telephone	+61 2 8594 0400
Facsimile	+61 2 8594 0499
Email	au.environmental.sydney@sgs.com
SGS Reference	**SE151756 R0**
Date Received	02 May 2016
Date Reported	10 May 2016

COMMENTS

All the laboratory data for each environmental matrix was compared to SGS' stated Data Quality Objectives (DQO). Comments arising from the comparison were made and are reported below.

The data relating to sampling was taken from the Chain of Custody document and was supplied by the Client.
This QA/QC Statement must be read in conjunction with the referenced Analytical Report.
The Statement and the Analytical Report must not be reproduced except in full.

All Data Quality Objectives were met with the exception of the following:

Duplicate	TRH (Total Recoverable Hydrocarbons) in Soil	1 item
Matrix Spike	Total Recoverable Metals in Soil/Waste Solids/Materials by ICPOES	1 item
	Total Recoverable Metals in Soil/Waste Solids/Materials by ICPOES	2 items

SAMPLE SUMMARY

Sample counts by matrix	14 Soils, 1 Water	Type of documentation received	COC
Date documentation received	2/5/2016	Samples received in good order	Yes
Samples received without headspace	Yes	Sample temperature upon receipt	8.3°C
Sample container provider	SGS	Turnaround time requested	Standard
Samples received in correct containers	Yes	Sufficient sample for analysis	Yes
Sample cooling method	Ice Bricks	Samples clearly labelled	Yes
Complete documentation received	Yes		

SGS holding time criteria are drawn from current regulations and are highly dependent on sample container preservation as specified in the SGS “Field Sampling Guide for Containers and Holding Time” (ref: GU-(AU)-ENV.001). Soil samples guidelines are derived from NEPM "Schedule B(3) Guideline on Laboratory Analysis of Potentially Contaminated Soils". Water sample guidelines are derived from "AS/NZS 5667.1 : 1998 Water Quality - sampling part 1" and APHA "Standard Methods for the Examination of Water and Wastewater" 21st edition 2005.

Extraction and analysis holding time due dates listed are calculated from the date sampled, although holding times may be extended after laboratory extraction for some analytes. The due dates are the suggested dates that samples may be held before extraction or analysis and still be considered valid.

Extraction and analysis dates are shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria. If the sampled date is not supplied then compliance with criteria cannot be determined. If the received date is after one or both due dates then holding time will fail by default.

Fibre Identification in soil

Method: ME-(AU)-[ENV]AN602

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH01M_0.1-0.2	SE151756.001	LB100727	29 Apr 2016	02 May 2016	29 Apr 2017	06 May 2016	29 Apr 2017	09 May 2016
BH02_0.5-0.6	SE151756.003	LB100727	29 Apr 2016	02 May 2016	29 Apr 2017	06 May 2016	29 Apr 2017	09 May 2016
BH03_0.7-0.8	SE151756.004	LB100727	29 Apr 2016	02 May 2016	29 Apr 2017	06 May 2016	29 Apr 2017	09 May 2016
BH04_0.15-0.25	SE151756.006	LB100727	29 Apr 2016	02 May 2016	29 Apr 2017	06 May 2016	29 Apr 2017	09 May 2016
BH05_0.75-0.85	SE151756.007	LB100727	29 Apr 2016	02 May 2016	29 Apr 2017	06 May 2016	29 Apr 2017	09 May 2016
BH06M_0.1-0.2	SE151756.009	LB100727	29 Apr 2016	02 May 2016	29 Apr 2017	06 May 2016	29 Apr 2017	09 May 2016
BH07_0.1-0.2	SE151756.011	LB100727	29 Apr 2016	02 May 2016	29 Apr 2017	06 May 2016	29 Apr 2017	09 May 2016

Mercury (dissolved) in Water

Method: ME-(AU)-[ENV]AN311/AN312

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
QR-01	SE151756.012	LB100694	29 Apr 2016	02 May 2016	27 May 2016	06 May 2016	27 May 2016	06 May 2016

Mercury in Soil

Method: ME-(AU)-[ENV]AN312

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH01M_0.1-0.2	SE151756.001	LB100639	29 Apr 2016	02 May 2016	27 May 2016	05 May 2016	27 May 2016	09 May 2016
BH01M_0.9-1.0	SE151756.002	LB100639	29 Apr 2016	02 May 2016	27 May 2016	05 May 2016	27 May 2016	09 May 2016
BH02_0.5-0.6	SE151756.003	LB100639	29 Apr 2016	02 May 2016	27 May 2016	05 May 2016	27 May 2016	09 May 2016
BH03_0.7-0.8	SE151756.004	LB100639	29 Apr 2016	02 May 2016	27 May 2016	05 May 2016	27 May 2016	09 May 2016
BH03_1.8-1.9	SE151756.005	LB100639	29 Apr 2016	02 May 2016	27 May 2016	05 May 2016	27 May 2016	09 May 2016
BH04_0.15-0.25	SE151756.006	LB100639	29 Apr 2016	02 May 2016	27 May 2016	05 May 2016	27 May 2016	09 May 2016
BH05_0.75-0.85	SE151756.007	LB100639	29 Apr 2016	02 May 2016	27 May 2016	05 May 2016	27 May 2016	09 May 2016
BH05_1.8-1.9	SE151756.008	LB100639	29 Apr 2016	02 May 2016	27 May 2016	05 May 2016	27 May 2016	09 May 2016
BH06M_0.1-0.2	SE151756.009	LB100639	29 Apr 2016	02 May 2016	27 May 2016	05 May 2016	27 May 2016	09 May 2016
BH06M_0.9-1.0	SE151756.010	LB100639	29 Apr 2016	02 May 2016	27 May 2016	05 May 2016	27 May 2016	09 May 2016
BH07_0.1-0.2	SE151756.011	LB100639	29 Apr 2016	02 May 2016	27 May 2016	05 May 2016	27 May 2016	09 May 2016
QD-01	SE151756.015	LB100639	29 Apr 2016	02 May 2016	27 May 2016	05 May 2016	27 May 2016	09 May 2016

Moisture Content

Method: ME-(AU)-[ENV]AN002

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH01M_0.1-0.2	SE151756.001	LB100642	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	10 May 2016	07 May 2016
BH01M_0.9-1.0	SE151756.002	LB100642	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	10 May 2016	07 May 2016
BH02_0.5-0.6	SE151756.003	LB100642	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	10 May 2016	07 May 2016
BH03_0.7-0.8	SE151756.004	LB100642	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	10 May 2016	07 May 2016
BH03_1.8-1.9	SE151756.005	LB100642	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	10 May 2016	07 May 2016
BH04_0.15-0.25	SE151756.006	LB100642	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	10 May 2016	07 May 2016
BH05_0.75-0.85	SE151756.007	LB100642	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	10 May 2016	07 May 2016
BH05_1.8-1.9	SE151756.008	LB100642	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	10 May 2016	07 May 2016
BH06M_0.1-0.2	SE151756.009	LB100642	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	10 May 2016	07 May 2016
BH06M_0.9-1.0	SE151756.010	LB100642	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	10 May 2016	07 May 2016
BH07_0.1-0.2	SE151756.011	LB100642	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	10 May 2016	07 May 2016
Trip Blank	SE151756.013	LB100642	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	10 May 2016	07 May 2016
QD-01	SE151756.015	LB100642	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	10 May 2016	07 May 2016

OC Pesticides in Soil

Method: ME-(AU)-[ENV]AN400/AN420

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH01M_0.1-0.2	SE151756.001	LB100614	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
BH01M_0.9-1.0	SE151756.002	LB100614	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
BH02_0.5-0.6	SE151756.003	LB100614	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
BH03_0.7-0.8	SE151756.004	LB100614	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
BH03_1.8-1.9	SE151756.005	LB100614	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
BH04_0.15-0.25	SE151756.006	LB100614	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
BH05_0.75-0.85	SE151756.007	LB100614	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
BH05_1.8-1.9	SE151756.008	LB100614	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
BH06M_0.1-0.2	SE151756.009	LB100614	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
BH06M_0.9-1.0	SE151756.010	LB100614	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
BH07_0.1-0.2	SE151756.011	LB100614	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
QD-01	SE151756.015	LB100614	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016

OP Pesticides in Soil

Method: ME-(AU)-[ENV]AN400/AN420

Sample Name	Sample No.	QC Ref

SGS holding time criteria are drawn from current regulations and are highly dependent on sample container preservation as specified in the SGS “Field Sampling Guide for Containers and Holding Time” (ref: GU-(AU)-ENV.001). Soil samples guidelines are derived from NEPM "Schedule B(3) Guideline on Laboratory Analysis of Potentially Contaminated Soils". Water sample guidelines are derived from "AS/NZS 5667.1 : 1998 Water Quality - sampling part 1" and APHA "Standard Methods for the Examination of Water and Wastewater" 21st edition 2005.

Extraction and analysis holding time due dates listed are calculated from the date sampled, although holding times may be extended after laboratory extraction for some analytes. The due dates are the suggested dates that samples may be held before extraction or analysis and still be considered valid.

Extraction and analysis dates are shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria. If the sampled date is not supplied then compliance with criteria cannot be determined. If the received date is after one or both due dates then holding time will fail by default.

OP Pesticides in Soil (continued)

Method: ME-(AU)-[ENV]AN400/AN420

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH01M_0.1-0.2	SE151756.001	LB100614	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
BH01M_0.9-1.0	SE151756.002	LB100614	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
BH02_0.5-0.6	SE151756.003	LB100614	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
BH03_0.7-0.8	SE151756.004	LB100614	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
BH03_1.8-1.9	SE151756.005	LB100614	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
BH04_0.15-0.25	SE151756.006	LB100614	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
BH05_0.75-0.85	SE151756.007	LB100614	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
BH05_1.8-1.9	SE151756.008	LB100614	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
BH06M_0.1-0.2	SE151756.009	LB100614	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
BH06M_0.9-1.0	SE151756.010	LB100614	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
BH07_0.1-0.2	SE151756.011	LB100614	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
QD-01	SE151756.015	LB100614	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN420

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH01M_0.1-0.2	SE151756.001	LB100614	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
BH01M_0.9-1.0	SE151756.002	LB100614	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
BH02_0.5-0.6	SE151756.003	LB100614	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
BH03_0.7-0.8	SE151756.004	LB100614	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
BH03_1.8-1.9	SE151756.005	LB100614	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
BH04_0.15-0.25	SE151756.006	LB100614	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
BH05_0.75-0.85	SE151756.007	LB100614	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
BH05_1.8-1.9	SE151756.008	LB100614	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
BH06M_0.1-0.2	SE151756.009	LB100614	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
BH06M_0.9-1.0	SE151756.010	LB100614	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
BH07_0.1-0.2	SE151756.011	LB100614	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
QD-01	SE151756.015	LB100614	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016

PCBs in Soil

Method: ME-(AU)-[ENV]AN400/AN420

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH01M_0.1-0.2	SE151756.001	LB100614	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
BH01M_0.9-1.0	SE151756.002	LB100614	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
BH02_0.5-0.6	SE151756.003	LB100614	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
BH03_0.7-0.8	SE151756.004	LB100614	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
BH03_1.8-1.9	SE151756.005	LB100614	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
BH04_0.15-0.25	SE151756.006	LB100614	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
BH05_0.75-0.85	SE151756.007	LB100614	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
BH05_1.8-1.9	SE151756.008	LB100614	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
BH06M_0.1-0.2	SE151756.009	LB100614	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
BH06M_0.9-1.0	SE151756.010	LB100614	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
BH07_0.1-0.2	SE151756.011	LB100614	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
QD-01	SE151756.015	LB100614	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016

Total Recoverable Metals in Soil/Waste Solids/Materials by ICPOES

Method: ME-(AU)-[ENV]AN040/AN320

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH01M_0.1-0.2	SE151756.001	LB100631	29 Apr 2016	02 May 2016	26 Oct 2016	05 May 2016	26 Oct 2016	09 May 2016
BH01M_0.9-1.0	SE151756.002	LB100631	29 Apr 2016	02 May 2016	26 Oct 2016	05 May 2016	26 Oct 2016	09 May 2016
BH02_0.5-0.6	SE151756.003	LB100631	29 Apr 2016	02 May 2016	26 Oct 2016	05 May 2016	26 Oct 2016	09 May 2016
BH03_0.7-0.8	SE151756.004	LB100631	29 Apr 2016	02 May 2016	26 Oct 2016	05 May 2016	26 Oct 2016	09 May 2016
BH03_1.8-1.9	SE151756.005	LB100631	29 Apr 2016	02 May 2016	26 Oct 2016	05 May 2016	26 Oct 2016	09 May 2016
BH04_0.15-0.25	SE151756.006	LB100631	29 Apr 2016	02 May 2016	26 Oct 2016	05 May 2016	26 Oct 2016	09 May 2016
BH05_0.75-0.85	SE151756.007	LB100631	29 Apr 2016	02 May 2016	26 Oct 2016	05 May 2016	26 Oct 2016	09 May 2016
BH05_1.8-1.9	SE151756.008	LB100631	29 Apr 2016	02 May 2016	26 Oct 2016	05 May 2016	26 Oct 2016	09 May 2016
BH06M_0.1-0.2	SE151756.009	LB100633	29 Apr 2016	02 May 2016	26 Oct 2016	05 May 2016	26 Oct 2016	09 May 2016
BH06M_0.9-1.0	SE151756.010	LB100633	29 Apr 2016	02 May 2016	26 Oct 2016	05 May 2016	26 Oct 2016	09 May 2016
BH07_0.1-0.2	SE151756.011	LB100633	29 Apr 2016	02 May 2016	26 Oct 2016	05 May 2016	26 Oct 2016	09 May 2016
QD-01	SE151756.015	LB100633	29 Apr 2016	02 May 2016	26 Oct 2016	05 May 2016	26 Oct 2016	09 May 2016

Trace Metals (Dissolved) in Water by ICPMS

Method: ME-(AU)-[ENV]AN318

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
QR-01	SE151756.012	LB100611	29 Apr 2016	02 May 2016	26 Oct 2016	05 May 2016	26 Oct 2016	06 May 2016

SGS holding time criteria are drawn from current regulations and are highly dependent on sample container preservation as specified in the SGS “Field Sampling Guide for Containers and Holding Time” (ref: GU-(AU)-ENV.001). Soil samples guidelines are derived from NEPM "Schedule B(3) Guideline on Laboratory Analysis of Potentially Contaminated Soils". Water sample guidelines are derived from "AS/NZS 5667.1 : 1998 Water Quality - sampling part 1" and APHA "Standard Methods for the Examination of Water and Wastewater" 21st edition 2005.

Extraction and analysis holding time due dates listed are calculated from the date sampled, although holding times may be extended after laboratory extraction for some analytes. The due dates are the suggested dates that samples may be held before extraction or analysis and still be considered valid.

Extraction and analysis dates are shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria. If the sampled date is not supplied then compliance with criteria cannot be determined. If the received date is after one or both due dates then holding time will fail by default.

TRH (Total Recoverable Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN403

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH01M_0.1-0.2	SE151756.001	LB100614	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
BH01M_0.9-1.0	SE151756.002	LB100614	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
BH02_0.5-0.6	SE151756.003	LB100614	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
BH03_0.7-0.8	SE151756.004	LB100614	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
BH03_1.8-1.9	SE151756.005	LB100614	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
BH04_0.15-0.25	SE151756.006	LB100614	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
BH05_0.75-0.85	SE151756.007	LB100614	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
BH05_1.8-1.9	SE151756.008	LB100614	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
BH06M_0.1-0.2	SE151756.009	LB100614	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
BH06M_0.9-1.0	SE151756.010	LB100614	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
BH07_0.1-0.2	SE151756.011	LB100614	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
QD-01	SE151756.015	LB100614	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016

TRH (Total Recoverable Hydrocarbons) in Water

Method: ME-(AU)-[ENV]AN403

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
QR-01	SE151756.012	LB100569	29 Apr 2016	02 May 2016	06 May 2016	05 May 2016	14 Jun 2016	09 May 2016

VOC's in Soil

Method: ME-(AU)-[ENV]AN433/AN434

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH01M_0.1-0.2	SE151756.001	LB100578	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
BH01M_0.9-1.0	SE151756.002	LB100578	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
BH02_0.5-0.6	SE151756.003	LB100578	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
BH03_0.7-0.8	SE151756.004	LB100578	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
BH03_1.8-1.9	SE151756.005	LB100578	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
BH04_0.15-0.25	SE151756.006	LB100578	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
BH05_0.75-0.85	SE151756.007	LB100578	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
BH05_1.8-1.9	SE151756.008	LB100578	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
BH06M_0.1-0.2	SE151756.009	LB100578	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
BH06M_0.9-1.0	SE151756.010	LB100578	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
BH07_0.1-0.2	SE151756.011	LB100578	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
Trip Blank	SE151756.013	LB100578	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
Trip Spike	SE151756.014	LB100578	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
QD-01	SE151756.015	LB100578	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016

VOCs in Water

Method: ME-(AU)-[ENV]AN433/AN434

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
QR-01	SE151756.012	LB100686	29 Apr 2016	02 May 2016	06 May 2016	06 May 2016	15 Jun 2016	09 May 2016

Volatile Petroleum Hydrocarbons in Soil

Method: ME-(AU)-[ENV]AN433/AN434/AN410

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH01M_0.1-0.2	SE151756.001	LB100578	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
BH01M_0.9-1.0	SE151756.002	LB100578	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
BH02_0.5-0.6	SE151756.003	LB100578	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
BH03_0.7-0.8	SE151756.004	LB100578	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
BH03_1.8-1.9	SE151756.005	LB100578	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
BH04_0.15-0.25	SE151756.006	LB100578	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
BH05_0.75-0.85	SE151756.007	LB100578	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
BH05_1.8-1.9	SE151756.008	LB100578	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
BH06M_0.1-0.2	SE151756.009	LB100578	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
BH06M_0.9-1.0	SE151756.010	LB100578	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
BH07_0.1-0.2	SE151756.011	LB100578	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
Trip Blank	SE151756.013	LB100578	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
Trip Spike	SE151756.014	LB100578	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016
QD-01	SE151756.015	LB100578	29 Apr 2016	02 May 2016	13 May 2016	05 May 2016	14 Jun 2016	09 May 2016

Volatile Petroleum Hydrocarbons in Water

Method: ME-(AU)-[ENV]AN433/AN434/AN410

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
QR-01	SE151756.012	LB100686	29 Apr 2016	02 May 2016	06 May 2016	06 May 2016	15 Jun 2016	09 May 2016

Surrogate results are evaluated against upper and lower limit criteria established in the SGS QA /QC plan (Ref: MP-(AU)-[ENV]QU-022). At least two of three routine level soil sample surrogate spike recoveries for BTEX/VOC are to be within 70-130% where control charts have not been developed and within the established control limits for charted surrogates. Matrix effects may void this as an acceptance criterion. Water sample surrogate spike recoveries are to be within 40-130%. The presence of emulsions, surfactants and particulates may void this as an acceptance criterion.

Result is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

OC Pesticides in Soil

Method: ME-(AU)-[ENV]AN400/AN420

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Tetrachloro-m-xylene (TCMX) (Surrogate)	BH01M_0.1-0.2	SE151756.001	%	60 - 130%	84
	BH02_0.5-0.6	SE151756.003	%	60 - 130%	89
	BH03_0.7-0.8	SE151756.004	%	60 - 130%	89
	BH04_0.15-0.25	SE151756.006	%	60 - 130%	89
	BH05_0.75-0.85	SE151756.007	%	60 - 130%	86
	BH06M_0.1-0.2	SE151756.009	%	60 - 130%	91
	BH07_0.1-0.2	SE151756.011	%	60 - 130%	89

OP Pesticides in Soil

Method: ME-(AU)-[ENV]AN400/AN420

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
2-fluorobiphenyl (Surrogate)	BH01M_0.1-0.2	SE151756.001	%	60 - 130%	86
	BH02_0.5-0.6	SE151756.003	%	60 - 130%	84
	BH03_0.7-0.8	SE151756.004	%	60 - 130%	78
	BH04_0.15-0.25	SE151756.006	%	60 - 130%	80
	BH05_0.75-0.85	SE151756.007	%	60 - 130%	84
	BH06M_0.1-0.2	SE151756.009	%	60 - 130%	80
	BH07_0.1-0.2	SE151756.011	%	60 - 130%	84
d14-p-terphenyl (Surrogate)	BH01M_0.1-0.2	SE151756.001	%	60 - 130%	90
	BH02_0.5-0.6	SE151756.003	%	60 - 130%	94
	BH03_0.7-0.8	SE151756.004	%	60 - 130%	78
	BH04_0.15-0.25	SE151756.006	%	60 - 130%	96
	BH05_0.75-0.85	SE151756.007	%	60 - 130%	96
	BH06M_0.1-0.2	SE151756.009	%	60 - 130%	94
	BH07_0.1-0.2	SE151756.011	%	60 - 130%	84

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN420

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
2-fluorobiphenyl (Surrogate)	BH01M_0.1-0.2	SE151756.001	%	70 - 130%	86
	BH01M_0.9-1.0	SE151756.002	%	70 - 130%	78
	BH02_0.5-0.6	SE151756.003	%	70 - 130%	84
	BH03_0.7-0.8	SE151756.004	%	70 - 130%	78
	BH03_1.8-1.9	SE151756.005	%	70 - 130%	80
	BH04_0.15-0.25	SE151756.006	%	70 - 130%	80
	BH05_0.75-0.85	SE151756.007	%	70 - 130%	84
	BH05_1.8-1.9	SE151756.008	%	70 - 130%	78
	BH06M_0.1-0.2	SE151756.009	%	70 - 130%	80
	BH06M_0.9-1.0	SE151756.010	%	70 - 130%	80
	BH07_0.1-0.2	SE151756.011	%	70 - 130%	84
d14-p-terphenyl (Surrogate)	BH01M_0.1-0.2	SE151756.001	%	70 - 130%	90
	BH01M_0.9-1.0	SE151756.002	%	70 - 130%	100
	BH02_0.5-0.6	SE151756.003	%	70 - 130%	94
	BH03_0.7-0.8	SE151756.004	%	70 - 130%	78
	BH03_1.8-1.9	SE151756.005	%	70 - 130%	98
	BH04_0.15-0.25	SE151756.006	%	70 - 130%	96
	BH05_0.75-0.85	SE151756.007	%	70 - 130%	96
	BH05_1.8-1.9	SE151756.008	%	70 - 130%	98
	BH06M_0.1-0.2	SE151756.009	%	70 - 130%	94
	BH06M_0.9-1.0	SE151756.010	%	70 - 130%	90
	BH07_0.1-0.2	SE151756.011	%	70 - 130%	84
d5-nitrobenzene (Surrogate)	BH01M_0.1-0.2	SE151756.001	%	70 - 130%	76
	BH01M_0.9-1.0	SE151756.002	%	70 - 130%	72
	BH02_0.5-0.6	SE151756.003	%	70 - 130%	74
	BH03_0.7-0.8	SE151756.004	%	70 - 130%	72
	BH03_1.8-1.9	SE151756.005	%	70 - 130%	74
	BH04_0.15-0.25	SE151756.006	%	70 - 130%	74
	BH05_0.75-0.85	SE151756.007	%	70 - 130%	74
	BH05_1.8-1.9	SE151756.008	%	70 - 130%	74
	BH06M_0.1-0.2	SE151756.009	%	70 - 130%	76
	BH06M_0.9-1.0	SE151756.010	%	70 - 130%	74
	BH07_0.1-0.2	SE151756.011	%	70 - 130%	74

Surrogate results are evaluated against upper and lower limit criteria established in the SGS QA/QC plan (Ref: MP-(AU)-[ENV]QU-022). At least two of three routine level soil sample surrogate spike recoveries for BTEX/VOC are to be within 70-130% where control charts have not been developed and within the established control limits for charted surrogates. Matrix effects may void this as an acceptance criterion. Water sample surrogate spike recoveries are to be within 40-130%. The presence of emulsions, surfactants and particulates may void this as an acceptance criterion.

Result is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

PCBs in Soil

Method: ME-(AU)-[ENV]AN400/AN420

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Tetrachloro-m-xylene (TCMX) (Surrogate)	BH01M_0.1-0.2	SE151756.001	%	60 - 130%	84
	BH02_0.5-0.6	SE151756.003	%	60 - 130%	89
	BH03_0.7-0.8	SE151756.004	%	60 - 130%	89
	BH04_0.15-0.25	SE151756.006	%	60 - 130%	89
	BH05_0.75-0.85	SE151756.007	%	60 - 130%	86
	BH06M_0.1-0.2	SE151756.009	%	60 - 130%	91
	BH07_0.1-0.2	SE151756.011	%	60 - 130%	89

VOC's in Soil

Method: ME-(AU)-[ENV]AN433/AN434

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Bromofluorobenzene (Surrogate)	BH01M_0.1-0.2	SE151756.001	%	60 - 130%	71
	BH01M_0.9-1.0	SE151756.002	%	60 - 130%	74
	BH02_0.5-0.6	SE151756.003	%	60 - 130%	72
	BH03_0.7-0.8	SE151756.004	%	60 - 130%	70
	BH03_1.8-1.9	SE151756.005	%	60 - 130%	72
	BH04_0.15-0.25	SE151756.006	%	60 - 130%	72
	BH05_0.75-0.85	SE151756.007	%	60 - 130%	74
	BH05_1.8-1.9	SE151756.008	%	60 - 130%	72
	BH06M_0.1-0.2	SE151756.009	%	60 - 130%	81
	BH06M_0.9-1.0	SE151756.010	%	60 - 130%	74
	BH07_0.1-0.2	SE151756.011	%	60 - 130%	74
	Trip Blank	SE151756.013	%	60 - 130%	75
	Trip Spike	SE151756.014	%	60 - 130%	105
	QD-01	SE151756.015	%	60 - 130%	71
d4-1,2-dichloroethane (Surrogate)	BH01M_0.1-0.2	SE151756.001	%	60 - 130%	75
	BH01M_0.9-1.0	SE151756.002	%	60 - 130%	90
	BH02_0.5-0.6	SE151756.003	%	60 - 130%	80
	BH03_0.7-0.8	SE151756.004	%	60 - 130%	85
	BH03_1.8-1.9	SE151756.005	%	60 - 130%	84
	BH04_0.15-0.25	SE151756.006	%	60 - 130%	81
	BH05_0.75-0.85	SE151756.007	%	60 - 130%	80
	BH05_1.8-1.9	SE151756.008	%	60 - 130%	84
	BH06M_0.1-0.2	SE151756.009	%	60 - 130%	78
	BH06M_0.9-1.0	SE151756.010	%	60 - 130%	87
	BH07_0.1-0.2	SE151756.011	%	60 - 130%	84
	Trip Blank	SE151756.013	%	60 - 130%	97
	Trip Spike	SE151756.014	%	60 - 130%	75
	QD-01	SE151756.015	%	60 - 130%	83
d8-toluene (Surrogate)	BH01M_0.1-0.2	SE151756.001	%	60 - 130%	71
	BH01M_0.9-1.0	SE151756.002	%	60 - 130%	85
	BH02_0.5-0.6	SE151756.003	%	60 - 130%	70
	BH03_0.7-0.8	SE151756.004	%	60 - 130%	75
	BH03_1.8-1.9	SE151756.005	%	60 - 130%	75
	BH04_0.15-0.25	SE151756.006	%	60 - 130%	73
	BH05_0.75-0.85	SE151756.007	%	60 - 130%	73
	BH05_1.8-1.9	SE151756.008	%	60 - 130%	72
	BH06M_0.1-0.2	SE151756.009	%	60 - 130%	81
	BH06M_0.9-1.0	SE151756.010	%	60 - 130%	81
	BH07_0.1-0.2	SE151756.011	%	60 - 130%	74
	Trip Blank	SE151756.013	%	60 - 130%	88
	Trip Spike	SE151756.014	%	60 - 130%	73
	QD-01	SE151756.015	%	60 - 130%	78
Dibromofluoromethane (Surrogate)	BH01M_0.1-0.2	SE151756.001	%	60 - 130%	76
	BH01M_0.9-1.0	SE151756.002	%	60 - 130%	90
	BH02_0.5-0.6	SE151756.003	%	60 - 130%	77
	BH03_0.7-0.8	SE151756.004	%	60 - 130%	85
	BH03_1.8-1.9	SE151756.005	%	60 - 130%	82
	BH04_0.15-0.25	SE151756.006	%	60 - 130%	80
	BH05_0.75-0.85	SE151756.007	%	60 - 130%	81
	BH05_1.8-1.9	SE151756.008	%	60 - 130%	82
	BH06M_0.1-0.2	SE151756.009	%	60 - 130%	77

Surrogate results are evaluated against upper and lower limit criteria established in the SGS QA/QC plan (Ref: MP-(AU)-[ENV]QU-022). At least two of three routine level soil sample surrogate spike recoveries for BTEX/VOC are to be within 70-130% where control charts have not been developed and within the established control limits for charted surrogates. Matrix effects may void this as an acceptance criterion. Water sample surrogate spike recoveries are to be within 40-130%. The presence of emulsions, surfactants and particulates may void this as an acceptance criterion.

Result is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

VOC's in Soil (continued)

Method: ME-(AU)-[ENV]AN433/AN434

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Dibromofluoromethane (Surrogate)	BH06M_0.9-1.0	SE151756.010	%	60 - 130%	88
	BH07_0.1-0.2	SE151756.011	%	60 - 130%	83
	Trip Blank	SE151756.013	%	60 - 130%	96
	Trip Spike	SE151756.014	%	60 - 130%	76
	QD-01	SE151756.015	%	60 - 130%	81

VOCs in Water

Method: ME-(AU)-[ENV]AN433/AN434

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Bromofluorobenzene (Surrogate)	QR-01	SE151756.012	%	40 - 130%	99
d4-1,2-dichloroethane (Surrogate)	QR-01	SE151756.012	%	40 - 130%	118
d8-toluene (Surrogate)	QR-01	SE151756.012	%	40 - 130%	116
Dibromofluoromethane (Surrogate)	QR-01	SE151756.012	%	40 - 130%	120

Volatile Petroleum Hydrocarbons in Soil

Method: ME-(AU)-[ENV]AN433/AN434/AN410

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Bromofluorobenzene (Surrogate)	BH01M_0.1-0.2	SE151756.001	%	60 - 130%	71
	BH01M_0.9-1.0	SE151756.002	%	60 - 130%	74
	BH02_0.5-0.6	SE151756.003	%	60 - 130%	72
	BH03_0.7-0.8	SE151756.004	%	60 - 130%	70
	BH03_1.8-1.9	SE151756.005	%	60 - 130%	72
	BH04_0.15-0.25	SE151756.006	%	60 - 130%	72
	BH05_0.75-0.85	SE151756.007	%	60 - 130%	74
	BH05_1.8-1.9	SE151756.008	%	60 - 130%	72
	BH06M_0.1-0.2	SE151756.009	%	60 - 130%	81
	BH06M_0.9-1.0	SE151756.010	%	60 - 130%	74
	BH07_0.1-0.2	SE151756.011	%	60 - 130%	74
	QD-01	SE151756.015	%	60 - 130%	71
d4-1,2-dichloroethane (Surrogate)	BH01M_0.1-0.2	SE151756.001	%	60 - 130%	75
	BH01M_0.9-1.0	SE151756.002	%	60 - 130%	90
	BH02_0.5-0.6	SE151756.003	%	60 - 130%	80
	BH03_0.7-0.8	SE151756.004	%	60 - 130%	85
	BH03_1.8-1.9	SE151756.005	%	60 - 130%	84
	BH04_0.15-0.25	SE151756.006	%	60 - 130%	81
	BH05_0.75-0.85	SE151756.007	%	60 - 130%	80
	BH05_1.8-1.9	SE151756.008	%	60 - 130%	84
	BH06M_0.1-0.2	SE151756.009	%	60 - 130%	78
	BH06M_0.9-1.0	SE151756.010	%	60 - 130%	87
	BH07_0.1-0.2	SE151756.011	%	60 - 130%	84
	QD-01	SE151756.015	%	60 - 130%	83
d8-toluene (Surrogate)	BH01M_0.1-0.2	SE151756.001	%	60 - 130%	71
	BH01M_0.9-1.0	SE151756.002	%	60 - 130%	85
	BH02_0.5-0.6	SE151756.003	%	60 - 130%	70
	BH03_0.7-0.8	SE151756.004	%	60 - 130%	75
	BH03_1.8-1.9	SE151756.005	%	60 - 130%	75
	BH04_0.15-0.25	SE151756.006	%	60 - 130%	73
	BH05_0.75-0.85	SE151756.007	%	60 - 130%	73
	BH05_1.8-1.9	SE151756.008	%	60 - 130%	72
	BH06M_0.1-0.2	SE151756.009	%	60 - 130%	81
	BH06M_0.9-1.0	SE151756.010	%	60 - 130%	81
	BH07_0.1-0.2	SE151756.011	%	60 - 130%	74
	QD-01	SE151756.015	%	60 - 130%	78
Dibromofluoromethane (Surrogate)	BH01M_0.1-0.2	SE151756.001	%	60 - 130%	76
	BH01M_0.9-1.0	SE151756.002	%	60 - 130%	90
	BH02_0.5-0.6	SE151756.003	%	60 - 130%	77
	BH03_0.7-0.8	SE151756.004	%	60 - 130%	85
	BH03_1.8-1.9	SE151756.005	%	60 - 130%	82
	BH04_0.15-0.25	SE151756.006	%	60 - 130%	80
	BH05_0.75-0.85	SE151756.007	%	60 - 130%	81
	BH05_1.8-1.9	SE151756.008	%	60 - 130%	82
	BH06M_0.1-0.2	SE151756.009	%	60 - 130%	77
	BH06M_0.9-1.0	SE151756.010	%	60 - 130%	88
	BH07_0.1-0.2	SE151756.011	%	60 - 130%	83

SURROGATES

Surrogate results are evaluated against upper and lower limit criteria established in the SGS QA/QC plan (Ref: MP-(AU)-[ENV]QU-022). At least two of three routine level soil sample surrogate spike recoveries for BTEX/VOC are to be within 70-130% where control charts have not been developed and within the established control limits for charted surrogates. Matrix effects may void this as an acceptance criterion. Water sample surrogate spike recoveries are to be within 40-130%. The presence of emulsions, surfactants and particulates may void this as an acceptance criterion.

Result is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

Volatile Petroleum Hydrocarbons in Soil (continued)

Method: ME-(AU)-[ENV]AN433/AN434/AN410

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Dibromofluoromethane (Surrogate)	QD-01	SE151756.015	%	60 - 130%	81

Volatile Petroleum Hydrocarbons in Water

Method: ME-(AU)-[ENV]AN433/AN434/AN410

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Bromofluorobenzene (Surrogate)	QR-01	SE151756.012	%	40 - 130%	99
d4-1,2-dichloroethane (Surrogate)	QR-01	SE151756.012	%	60 - 130%	118
d8-toluene (Surrogate)	QR-01	SE151756.012	%	40 - 130%	116
Dibromofluoromethane (Surrogate)	QR-01	SE151756.012	%	40 - 130%	120

Blank results are evaluated against the limit of reporting (LOR), for the chosen method and its associated instrumentation, typically 2.5 times the statistically determined method detection limit (MDL).

Result is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

Mercury (dissolved) in Water

Method: ME-(AU)-[ENV]AN311/AN312

Sample Number	Parameter	Units	LOR	Result
LB100694.001	Mercury	mg/L	0.0001	<0.0001

Mercury in Soil

Method: ME-(AU)-[ENV]AN312

Sample Number	Parameter	Units	LOR	Result
LB100639.001	Mercury	mg/kg	0.01	<0.01

OC Pesticides in Soil

Method: ME-(AU)-[ENV]AN400/AN420

Sample Number	Parameter	Units	LOR	Result
LB100614.001	Hexachlorobenzene (HCB)	mg/kg	0.1	<0.1
	Alpha BHC	mg/kg	0.1	<0.1
	Lindane	mg/kg	0.1	<0.1
	Heptachlor	mg/kg	0.1	<0.1
	Aldrin	mg/kg	0.1	<0.1
	Beta BHC	mg/kg	0.1	<0.1
	Delta BHC	mg/kg	0.1	<0.1
	Heptachlor epoxide	mg/kg	0.1	<0.1
	Alpha Endosulfan	mg/kg	0.2	<0.2
	Gamma Chlordane	mg/kg	0.1	<0.1
	Alpha Chlordane	mg/kg	0.1	<0.1
	p,p'-DDE	mg/kg	0.1	<0.1
	Dieldrin	mg/kg	0.2	<0.2
	Endrin	mg/kg	0.2	<0.2
	Beta Endosulfan	mg/kg	0.2	<0.2
	p,p'-DDD	mg/kg	0.1	<0.1
	p,p'-DDT	mg/kg	0.1	<0.1
	Endosulfan sulphate	mg/kg	0.1	<0.1
	Endrin Aldehyde	mg/kg	0.1	<0.1
	Methoxychlor	mg/kg	0.1	<0.1
	Endrin Ketone	mg/kg	0.1	<0.1
	Isodrin	mg/kg	0.1	<0.1
	Mirex	mg/kg	0.1	<0.1
Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	%	-	85

OP Pesticides in Soil

Method: ME-(AU)-[ENV]AN400/AN420

Sample Number	Parameter	Units	LOR	Result
LB100614.001	Dichlorvos	mg/kg	0.5	<0.5
	Dimethoate	mg/kg	0.5	<0.5
	Diazinon (Dimpylate)	mg/kg	0.5	<0.5
	Fenitrothion	mg/kg	0.2	<0.2
	Malathion	mg/kg	0.2	<0.2
	Chlorpyrifos (Chlorpyrifos Ethyl)	mg/kg	0.2	<0.2
	Parathion-ethyl (Parathion)	mg/kg	0.2	<0.2
	Bromophos Ethyl	mg/kg	0.2	<0.2
	Methidathion	mg/kg	0.5	<0.5
	Ethion	mg/kg	0.2	<0.2
	Azinphos-methyl (Guthion)	mg/kg	0.2	<0.2
Surrogates	2-fluorobiphenyl (Surrogate)	%	-	82
	d14-p-terphenyl (Surrogate)	%	-	114

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN420

Sample Number	Parameter	Units	LOR	Result
LB100614.001	Naphthalene	mg/kg	0.1	<0.1
	2-methylnaphthalene	mg/kg	0.1	<0.1
	1-methylnaphthalene	mg/kg	0.1	<0.1
	Acenaphthylene	mg/kg	0.1	<0.1
	Acenaphthene	mg/kg	0.1	<0.1
	Fluorene	mg/kg	0.1	<0.1
	Phenanthrene	mg/kg	0.1	<0.1
	Anthracene	mg/kg	0.1	<0.1

Blank results are evaluated against the limit of reporting (LOR), for the chosen method and its associated instrumentation, typically 2.5 times the statistically determined method detection limit (MDL).

Result is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

PAH (Polynuclear Aromatic Hydrocarbons) in Soil (continued)

Method: ME-(AU)-[ENV]AN420

Sample Number		Parameter	Units	LOR	Result
LB100614.001		Fluoranthene	mg/kg	0.1	<0.1
		Pyrene	mg/kg	0.1	<0.1
		Benzo(a)anthracene	mg/kg	0.1	<0.1
		Chrysene	mg/kg	0.1	<0.1
		Benzo(a)pyrene	mg/kg	0.1	<0.1
		Indeno(1,2,3-cd)pyrene	mg/kg	0.1	<0.1
		Dibenzo(ah)anthracene	mg/kg	0.1	<0.1
		Benzo(ghi)perylene	mg/kg	0.1	<0.1
		Total PAH (18)	mg/kg	0.8	<0.8
	Surrogates	d5-nitrobenzene (Surrogate)	%	-	74
		2-fluorobiphenyl (Surrogate)	%	-	84
		d14-p-terphenyl (Surrogate)	%	-	86

PCBs in Soil

Method: ME-(AU)-[ENV]AN400/AN420

Sample Number		Parameter	Units	LOR	Result
LB100614.001		Arochlor 1016	mg/kg	0.2	<0.2
		Arochlor 1221	mg/kg	0.2	<0.2
		Arochlor 1232	mg/kg	0.2	<0.2
		Arochlor 1242	mg/kg	0.2	<0.2
		Arochlor 1248	mg/kg	0.2	<0.2
		Arochlor 1254	mg/kg	0.2	<0.2
		Arochlor 1260	mg/kg	0.2	<0.2
		Arochlor 1262	mg/kg	0.2	<0.2
		Arochlor 1268	mg/kg	0.2	<0.2
		Total PCBs (Arochlors)	mg/kg	1	<1
	Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	%	-	85

Total Recoverable Metals in Soil/Waste Solids/Materials by ICPOES

Method: ME-(AU)-[ENV]AN040/AN320

Sample Number	Parameter	Units	LOR	Result
LB100631.001	Arsenic, As	mg/kg	3	<3
	Cadmium, Cd	mg/kg	0.3	<0.3
	Chromium, Cr	mg/kg	0.3	<0.3
	Copper, Cu	mg/kg	0.5	<0.5
	Lead, Pb	mg/kg	1	<1
	Nickel, Ni	mg/kg	0.5	<0.5
	Zinc, Zn	mg/kg	0.5	<0.5
LB100633.001	Arsenic, As	mg/kg	3	<3
	Cadmium, Cd	mg/kg	0.3	<0.3
	Chromium, Cr	mg/kg	0.3	<0.3
	Copper, Cu	mg/kg	0.5	<0.5
	Lead, Pb	mg/kg	1	<1
	Nickel, Ni	mg/kg	0.5	<0.5
	Zinc, Zn	mg/kg	0.5	<0.5

Trace Metals (Dissolved) in Water by ICPMS

Method: ME-(AU)-[ENV]AN318

Sample Number	Parameter	Units	LOR	Result
LB100611.001	Arsenic, As	µg/L	1	<1
	Cadmium, Cd	µg/L	0.1	<0.1
	Chromium, Cr	µg/L	1	<1
	Copper, Cu	µg/L	1	<1
	Lead, Pb	µg/L	1	<1
	Nickel, Ni	µg/L	1	<1
	Zinc, Zn	µg/L	5	<5

TRH (Total Recoverable Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN403

Sample Number	Parameter	Units	LOR	Result
LB100614.001	TRH C10-C14	mg/kg	20	<20
	TRH C15-C28	mg/kg	45	<45
	TRH C29-C36	mg/kg	45	<45
	TRH C37-C40	mg/kg	100	<100
	TRH C10-C36 Total	mg/kg	110	<110

Blank results are evaluated against the limit of reporting (LOR), for the chosen method and its associated instrumentation, typically 2.5 times the statistically determined method detection limit (MDL).

Result is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

TRH (Total Recoverable Hydrocarbons) in Water

Method: ME-(AU)-[ENV]AN403

Sample Number		Parameter	Units	LOR	Result
LB100569.001		TRH C10-C14	µg/L	50	<50
		TRH C15-C28	µg/L	200	<200
		TRH C29-C36	µg/L	200	<200
		TRH C37-C40	µg/L	200	<200

VOC's in Soil

Method: ME-(AU)-[ENV]AN433/AN434

Sample Number		Parameter	Units	LOR	Result
LB100578.001	Monocyclic Aromatic Hydrocarbons	Benzene	mg/kg	0.1	<0.1
		Toluene	mg/kg	0.1	<0.1
		Ethylbenzene	mg/kg	0.1	<0.1
		m/p-xylene	mg/kg	0.2	<0.2
		o-xylene	mg/kg	0.1	<0.1
	Polycyclic VOCs	Naphthalene	mg/kg	0.1	<0.1
	Surrogates	Dibromofluoromethane (Surrogate)	%	-	82
		d4-1,2-dichloroethane (Surrogate)	%	-	79
		d8-toluene (Surrogate)	%	-	76
		Bromofluorobenzene (Surrogate)	%	-	73
	Totals	Total BTEX	mg/kg	0.6	<0.6

VOCs in Water

Method: ME-(AU)-[ENV]AN433/AN434

Sample Number		Parameter	Units	LOR	Result
LB100686.001	Monocyclic Aromatic Hydrocarbons	Benzene	µg/L	0.5	<0.5
		Toluene	µg/L	0.5	<0.5
		Ethylbenzene	µg/L	0.5	<0.5
		m/p-xylene	µg/L	1	<1
		o-xylene	µg/L	0.5	<0.5
	Polycyclic VOCs	Naphthalene	µg/L	0.5	<0.5
	Surrogates	Dibromofluoromethane (Surrogate)	%	-	129
		d4-1,2-dichloroethane (Surrogate)	%	-	128
		d8-toluene (Surrogate)	%	-	125
		Bromofluorobenzene (Surrogate)	%	-	97

Volatile Petroleum Hydrocarbons in Soil

Method: ME-(AU)-[ENV]AN433/AN434/AN410

Sample Number		Parameter	Units	LOR	Result
LB100578.001		TRH C6-C9	mg/kg	20	<20
	Surrogates	Dibromofluoromethane (Surrogate)	%	-	82
		d4-1,2-dichloroethane (Surrogate)	%	-	79
		d8-toluene (Surrogate)	%	-	76

Volatile Petroleum Hydrocarbons in Water

Method: ME-(AU)-[ENV]AN433/AN434/AN410

Sample Number		Parameter	Units	LOR	Result
LB100686.001		TRH C6-C9	µg/L	40	<40
	Surrogates	Dibromofluoromethane (Surrogate)	%	-	129
		d4-1,2-dichloroethane (Surrogate)	%	-	128
		d8-toluene (Surrogate)	%	-	125
		Bromofluorobenzene (Surrogate)	%	-	97

Duplicates are calculated as Relative Percentage Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

Mercury in Soil

Method: ME-(AU)-[ENV]AN312

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE151756.009	LB100639.014	Mercury	mg/kg	0.01	0.56	0.76	38	30
SE151797.008	LB100639.024	Mercury	mg/kg	0.01	0.13	0.14	66	5

Moisture Content

Method: ME-(AU)-[ENV]AN002

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE151756.004	LB100642.011	% Moisture	%w/w	0.5	11	11	39	2
SE151775.001	LB100642.022	% Moisture	%w/w	0.5	19	21	35	10
SE151798.023	LB100642.033	% Moisture	%w/w	0.5	31	32	33	3
SE151842.002	LB100642.039	% Moisture	%w/w	0.5	91.7	91.5	31	0

OC Pesticides in Soil

Method: ME-(AU)-[ENV]AN400/AN420

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE151756.006	LB100614.014		Hexachlorobenzene (HCB)	mg/kg	0.1	<0.1	<0.1	200	0
			Alpha BHC	mg/kg	0.1	<0.1	<0.1	200	0
			Lindane	mg/kg	0.1	<0.1	<0.1	200	0
			Heptachlor	mg/kg	0.1	<0.1	<0.1	200	0
			Aldrin	mg/kg	0.1	<0.1	<0.1	200	0
			Beta BHC	mg/kg	0.1	<0.1	<0.1	200	0
			Delta BHC	mg/kg	0.1	<0.1	<0.1	200	0
			Heptachlor epoxide	mg/kg	0.1	<0.1	<0.1	200	0
			o,p'-DDE	mg/kg	0.1	<0.1	<0.1	200	0
			Alpha Endosulfan	mg/kg	0.2	<0.2	<0.2	200	0
			Gamma Chlordane	mg/kg	0.1	<0.1	<0.1	200	0
			Alpha Chlordane	mg/kg	0.1	<0.1	<0.1	200	0
			trans-Nonachlor	mg/kg	0.1	<0.1	<0.1	200	0
			p,p'-DDE	mg/kg	0.1	<0.1	<0.1	200	0
			Dieldrin	mg/kg	0.2	<0.2	<0.2	200	0
			Endrin	mg/kg	0.2	<0.2	<0.2	200	0
			o,p'-DDD	mg/kg	0.1	<0.1	<0.1	200	0
			o,p'-DDT	mg/kg	0.1	<0.1	<0.1	200	0
			Beta Endosulfan	mg/kg	0.2	<0.2	<0.2	200	0
			p,p'-DDD	mg/kg	0.1	<0.1	<0.1	200	0
			p,p'-DDT	mg/kg	0.1	<0.1	<0.1	200	0
			Endosulfan sulphate	mg/kg	0.1	<0.1	<0.1	200	0
			Endrin Aldehyde	mg/kg	0.1	<0.1	<0.1	200	0
			Methoxychlor	mg/kg	0.1	<0.1	<0.1	200	0
			Endrin Ketone	mg/kg	0.1	<0.1	<0.1	200	0
			Isodrin	mg/kg	0.1	<0.1	<0.1	200	0
			Mirex	mg/kg	0.1	<0.1	<0.1	200	0
		Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	mg/kg	-	0.13	0.13	30	1

OP Pesticides in Soil

Method: ME-(AU)-[ENV]AN400/AN420

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE151756.006	LB100614.014		Dichlorvos	mg/kg	0.5	<0.5	<0.5	200	0
			Dimethoate	mg/kg	0.5	<0.5	<0.5	200	0
			Diazinon (Dimpylate)	mg/kg	0.5	<0.5	<0.5	200	0
			Fenitrothion	mg/kg	0.2	<0.2	<0.2	200	0
			Malathion	mg/kg	0.2	<0.2	<0.2	200	0
			Chlorpyrifos (Chlorpyrifos Ethyl)	mg/kg	0.2	<0.2	<0.2	200	0
			Parathion-ethyl (Parathion)	mg/kg	0.2	<0.2	<0.2	200	0
			Bromophos Ethyl	mg/kg	0.2	<0.2	<0.2	200	0
			Methidathion	mg/kg	0.5	<0.5	<0.5	200	0
			Ethion	mg/kg	0.2	<0.2	<0.2	200	0
			Azinphos-methyl (Guthion)	mg/kg	0.2	<0.2	<0.2	200	0
		Surrogates	2-fluorobiphenyl (Surrogate)	mg/kg	-	0.4	0.4	30	7
			d14-p-terphenyl (Surrogate)	mg/kg	-	0.5	0.5	30	2

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN420

Original	Duplicate	Parameter	Units	LOR

Duplicates are calculated as Relative Percentage Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

PAH (Polynuclear Aromatic Hydrocarbons) in Soil (continued)

Method: ME-(AU)-[ENV]AN420

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE151756.006	LB100614.014		Naphthalene	mg/kg	0.1	<0.1	<0.1	200	0
			2-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	200	0
			1-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	200	0
			Acenaphthylene	mg/kg	0.1	<0.1	<0.1	200	0
			Acenaphthene	mg/kg	0.1	<0.1	<0.1	200	0
			Fluorene	mg/kg	0.1	<0.1	<0.1	200	0
			Phenanthrene	mg/kg	0.1	0.1	0.2	99	21
			Anthracene	mg/kg	0.1	<0.1	<0.1	200	0
			Fluoranthene	mg/kg	0.1	0.5	0.5	50	8
			Pyrene	mg/kg	0.1	0.7	0.6	45	15
			Benzo(a)anthracene	mg/kg	0.1	0.4	0.4	55	20
			Chrysene	mg/kg	0.1	0.4	0.3	59	17
			Benzo(b&j)fluoranthene	mg/kg	0.1	0.4	0.4	56	21
			Benzo(k)fluoranthene	mg/kg	0.1	0.3	0.2	68	31
			Benzo(a)pyrene	mg/kg	0.1	0.5	0.4	52	25
			Indeno(1,2,3-cd)pyrene	mg/kg	0.1	0.3	0.2	70	40
			Dibenzo(ah)anthracene	mg/kg	0.1	<0.1	<0.1	200	0
			Benzo(ghi)perylene	mg/kg	0.1	0.5	0.3	57	56
			Carcinogenic PAHs, BaP TEQ <LOR=0	TEQ (mg/kg)	0.2	0.7	0.5	44	25
			Carcinogenic PAHs, BaP TEQ <LOR=LOR	TEQ (mg/kg)	0.3	0.8	0.6	54	21
			Carcinogenic PAHs, BaP TEQ <LOR=LOR/2	TEQ (mg/kg)	0.2	0.7	0.6	42	23
			Total PAH (18)	mg/kg	0.8	4.2	3.4	51	21
		Surrogates	d5-nitrobenzene (Surrogate)	mg/kg	-	0.4	0.4	30	0
			2-fluorobiphenyl (Surrogate)	mg/kg	-	0.4	0.4	30	7
			d14-p-terphenyl (Surrogate)	mg/kg	-	0.5	0.5	30	2

PCBs in Soil

Method: ME-(AU)-[ENV]AN400/AN420

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE151756.006	LB100614.014		Arochlor 1016	mg/kg	0.2	<0.2	<0.2	200	0
			Arochlor 1221	mg/kg	0.2	<0.2	<0.2	200	0
			Arochlor 1232	mg/kg	0.2	<0.2	<0.2	200	0
			Arochlor 1242	mg/kg	0.2	<0.2	<0.2	200	0
			Arochlor 1248	mg/kg	0.2	<0.2	<0.2	200	0
			Arochlor 1254	mg/kg	0.2	<0.2	<0.2	200	0
			Arochlor 1260	mg/kg	0.2	<0.2	<0.2	200	0
			Arochlor 1262	mg/kg	0.2	<0.2	<0.2	200	0
			Arochlor 1268	mg/kg	0.2	<0.2	<0.2	200	0
			Total PCBs (Arochlors)	mg/kg	1	<1	<1	200	0
		Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	mg/kg	-	0	0	30	1

Total Recoverable Metals in Soil/Waste Solids/Materials by ICPOES

Method: ME-(AU)-[ENV]AN040/AN320

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE151751.002	LB100631.014	Lead, Pb	mg/kg	1	14	11	38	26
SE151756.008	LB100631.024	Arsenic, As	mg/kg	3	7	6	46	9
		Cadmium, Cd	mg/kg	0.3	0.5	0.5	90	13
		Chromium, Cr	mg/kg	0.3	29	25	32	13
		Copper, Cu	mg/kg	0.5	1.0	1.0	81	4
		Lead, Pb	mg/kg	1	14	13	37	5
		Nickel, Ni	mg/kg	0.5	2.0	1.8	56	6
		Zinc, Zn	mg/kg	0.5	7.2	5.9	61	19
SE151797.007	LB100633.014	Arsenic, As	mg/kg	3	10	10	40	8
		Cadmium, Cd	mg/kg	0.3	0.5	0.5	91	6
		Chromium, Cr	mg/kg	0.3	38	38	31	1
		Copper, Cu	mg/kg	0.5	45	46	31	2
		Lead, Pb	mg/kg	1	44	44	32	2
		Nickel, Ni	mg/kg	0.5	22	21	32	1
		Zinc, Zn	mg/kg	0.5	190	190	31	1
SE151838.001	LB100633.023	Cadmium, Cd	mg/kg	0.3	0.4	0.6	88	28

TRH (Total Recoverable Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN403

Original	Duplicate	Parameter	Units	LOR

DUPLICATES

Duplicates are calculated as Relative Percentage Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

TRH (Total Recoverable Hydrocarbons) in Soil (continued)

Method: ME-(AU)-[ENV]AN403

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE151756.006	LB100614.014		TRH C10-C14	mg/kg	20	<20	<20	200	0
			TRH C15-C28	mg/kg	45	<45	<45	200	0
			TRH C29-C36	mg/kg	45	<45	<45	200	0
			TRH C37-C40	mg/kg	100	<100	<100	200	0
			TRH C10-C36 Total	mg/kg	110	<110	<110	200	0
			TRH C10-C40 Total	mg/kg	210	<210	<210	200	0
		TRH F Bands	TRH >C10-C16 (F2)	mg/kg	25	<25	<25	200	0
			TRH >C10-C16 (F2) - Naphthalene	mg/kg	25	<25	<25	200	0
			TRH >C16-C34 (F3)	mg/kg	90	<90	<90	200	0
			TRH >C34-C40 (F4)	mg/kg	120	<120	<120	200	0
SE151883.001	LB100614.022		TRH C10-C14	mg/kg	20	<20	<20	200	0
			TRH C15-C28	mg/kg	45	130	<45	87	95 ②
			TRH C29-C36	mg/kg	45	<45	<45	200	0
			TRH C37-C40	mg/kg	100	<100	<100	200	0
			TRH C10-C36 Total	mg/kg	110	130	<110	168	14
			TRH C10-C40 Total	mg/kg	210	<210	<210	200	0
		TRH F Bands	TRH >C10-C16 (F2)	mg/kg	25	<25	<25	200	0
			TRH >C10-C16 (F2) - Naphthalene	mg/kg	25	<25	<25	200	0
			TRH >C16-C34 (F3)	mg/kg	90	140	<90	121	42
			TRH >C34-C40 (F4)	mg/kg	120	<120	<120	200	0

VOC's in Soil

Method: ME-(AU)-[ENV]AN433/AN434

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE151756.010	LB100578.014	Monocyclic Aromatic	Benzene	mg/kg	0.1	<0.1	<0.1	200	0
			Toluene	mg/kg	0.1	<0.1	<0.1	200	0
			Ethylbenzene	mg/kg	0.1	<0.1	<0.1	200	0
			m/p-xylene	mg/kg	0.2	<0.2	<0.2	200	0
			o-xylene	mg/kg	0.1	<0.1	<0.1	200	0
		Polycyclic	Naphthalene	mg/kg	0.1	<0.1	<0.1	200	0
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	4.4	4.4	50	0
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.4	4.4	50	1
			d8-toluene (Surrogate)	mg/kg	-	4.1	3.9	50	3
			Bromofluorobenzene (Surrogate)	mg/kg	-	3.7	4.1	50	11
		Totals	Total Xylenes*	mg/kg	0.3	<0.3	<0.3	200	0
			Total BTEX	mg/kg	0.6	<0.6	<0.6	200	0
SE151756.011	LB100578.020	Monocyclic Aromatic	Benzene	mg/kg	0.1	<0.1	0	200	0
			Toluene	mg/kg	0.1	<0.1	0	200	0
			Ethylbenzene	mg/kg	0.1	<0.1	0.01	200	0
			m/p-xylene	mg/kg	0.2	<0.2	0.01	200	0
			o-xylene	mg/kg	0.1	<0.1	0	200	0
		Polycyclic	Naphthalene	mg/kg	0.1	<0.1	0.01	200	0
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	4.2	4.3	50	4
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.2	4.31	50	2
			d8-toluene (Surrogate)	mg/kg	-	3.7	3.88	50	5
			Bromofluorobenzene (Surrogate)	mg/kg	-	3.7	3.5	50	5
		Totals	Total Xylenes*	mg/kg	0.3	<0.3	0.01	200	0
			Total BTEX	mg/kg	0.6	<0.6	0.02	200	0

Volatile Petroleum Hydrocarbons in Soil

Method: ME-(AU)-[ENV]AN433/AN434/AN410

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE151756.010	LB100578.014		TRH C6-C10	mg/kg	25	<25	<25	200	0
			TRH C6-C9	mg/kg	20	<20	<20	200	0
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	4.4	4.4	30	0
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.4	4.4	30	1
			d8-toluene (Surrogate)	mg/kg	-	4.1	3.9	30	3
			Bromofluorobenzene (Surrogate)	mg/kg	-	3.7	4.1	30	11
		VPH F Bands	Benzene (F0)	mg/kg	0.1	<0.1	<0.1	200	0
			TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	<25	200	0
SE151756.011	LB100578.020		TRH C6-C10	mg/kg	25	<25	0.61	200	0
			TRH C6-C9	mg/kg	20	<20	0.42	200	0
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	4.2	4.3	30	4
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.2	4.31	30	2

DUPLICATES

Duplicates are calculated as Relative Percentage Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

Volatile Petroleum Hydrocarbons in Soil (continued)

Method: ME-(AU)-[ENV]AN433/AN434/AN410

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE151756.011	LB100578.020	Surrogates	d8-toluene (Surrogate)	mg/kg	-	3.7	3.88	30	5
			Bromofluorobenzene (Surrogate)	mg/kg	-	3.7	3.5	30	5
		VPH F Bands	Benzene (F0)	mg/kg	0.1	<0.1	0	200	0
			TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	0.59	200	0

Laboratory Control Standard (LCS) results are evaluated against an expected result, typically the concentration of analyte spiked into the control during the sample preparation stage, producing a percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA /QC plan (Ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

Mercury in Soil

Method: ME-(AU)-[ENV]AN312

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB100639.002	Mercury	mg/kg	0.01	0.20	0.2	70 - 130	101

OC Pesticides in Soil

Method: ME-(AU)-[ENV]AN400/AN420

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB100614.002		Heptachlor	mg/kg	0.1	0.2	0.2	60 - 140	91
		Aldrin	mg/kg	0.1	0.2	0.2	60 - 140	91
		Delta BHC	mg/kg	0.1	0.2	0.2	60 - 140	83
		Dieldrin	mg/kg	0.2	<0.2	0.2	60 - 140	88
		Endrin	mg/kg	0.2	<0.2	0.2	60 - 140	97
		p,p'-DDT	mg/kg	0.1	0.2	0.2	60 - 140	76
	Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	mg/kg	-	0.13	0.15	40 - 130	85

OP Pesticides in Soil

Method: ME-(AU)-[ENV]AN400/AN420

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB100614.002		Dichlorvos	mg/kg	0.5	1.9	2	60 - 140	97
		Diazinon (Dimpylate)	mg/kg	0.5	1.6	2	60 - 140	80
		Chlorpyrifos (Chlorpyrifos Ethyl)	mg/kg	0.2	1.7	2	60 - 140	85
		Ethion	mg/kg	0.2	1.6	2	60 - 140	78
	Surrogates	2-fluorobiphenyl (Surrogate)	mg/kg	-	0.4	0.5	40 - 130	78
		d14-p-terphenyl (Surrogate)	mg/kg	-	0.5	0.5	40 - 130	102

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN420

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB100614.002		Naphthalene	mg/kg	0.1	3.7	4	60 - 140	93
		Acenaphthylene	mg/kg	0.1	3.6	4	60 - 140	89
		Acenaphthene	mg/kg	0.1	3.5	4	60 - 140	88
		Phenanthrene	mg/kg	0.1	3.5	4	60 - 140	89
		Anthracene	mg/kg	0.1	3.5	4	60 - 140	87
		Fluoranthene	mg/kg	0.1	3.6	4	60 - 140	90
		Pyrene	mg/kg	0.1	3.9	4	60 - 140	96
		Benzo(a)pyrene	mg/kg	0.1	3.5	4	60 - 140	87
	Surrogates	d5-nitrobenzene (Surrogate)	mg/kg	-	0.4	0.5	40 - 130	76
		2-fluorobiphenyl (Surrogate)	mg/kg	-	0.4	0.5	40 - 130	80
		d14-p-terphenyl (Surrogate)	mg/kg	-	0.4	0.5	40 - 130	80

PCBs in Soil

Method: ME-(AU)-[ENV]AN400/AN420

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB100614.002	Arochlor 1260	mg/kg	0.2	0.5	0.4	60 - 140	128

Total Recoverable Metals in Soil/Waste Solids/Materials by ICPOES

Method: ME-(AU)-[ENV]AN040/AN320

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB100631.002	Arsenic, As	mg/kg	3	51	50	80 - 120	102
	Cadmium, Cd	mg/kg	0.3	50	50	80 - 120	99
	Chromium, Cr	mg/kg	0.3	50	50	80 - 120	100
	Copper, Cu	mg/kg	0.5	49	50	80 - 120	98
	Lead, Pb	mg/kg	1	51	50	80 - 120	101
	Nickel, Ni	mg/kg	0.5	51	50	80 - 120	102
	Zinc, Zn	mg/kg	0.5	50	50	80 - 120	99
LB100633.002	Arsenic, As	mg/kg	3	51	50	80 - 120	101
	Cadmium, Cd	mg/kg	0.3	49	50	80 - 120	99
	Chromium, Cr	mg/kg	0.3	50	50	80 - 120	99
	Copper, Cu	mg/kg	0.5	49	50	80 - 120	97
	Lead, Pb	mg/kg	1	51	50	80 - 120	101
	Nickel, Ni	mg/kg	0.5	51	50	80 - 120	101
	Zinc, Zn	mg/kg	0.5	50	50	80 - 120	99

Trace Metals (Dissolved) in Water by ICPMS

Method: ME-(AU)-[ENV]AN318

Sample Number	Parameter	Units	LOR

Laboratory Control Standard (LCS) results are evaluated against an expected result, typically the concentration of analyte spiked into the control during the sample preparation stage, producing a percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA /QC plan (Ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

Trace Metals (Dissolved) in Water by ICPMS (continued)

Method: ME-(AU)-[ENV]AN318

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB100611.002		Arsenic, As	µg/L	1	22	20	80 - 120	108
		Cadmium, Cd	µg/L	0.1	21	20	80 - 120	105
		Chromium, Cr	µg/L	1	21	20	80 - 120	106
		Copper, Cu	µg/L	1	22	20	80 - 120	108
		Lead, Pb	µg/L	1	22	20	80 - 120	111
		Nickel, Ni	µg/L	1	21	20	80 - 120	107
		Zinc, Zn	µg/L	5	20	20	80 - 120	102

TRH (Total Recoverable Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN403

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB100614.002		TRH C10-C14	mg/kg	20	39	40	60 - 140	98
		TRH C15-C28	mg/kg	45	<45	40	60 - 140	93
		TRH C29-C36	mg/kg	45	<45	40	60 - 140	75
	TRH F Bands	TRH >C10-C16 (F2)	mg/kg	25	39	40	60 - 140	98
		TRH >C16-C34 (F3)	mg/kg	90	<90	40	60 - 140	85
		TRH >C34-C40 (F4)	mg/kg	120	<120	20	60 - 140	65

TRH (Total Recoverable Hydrocarbons) in Water

Method: ME-(AU)-[ENV]AN403

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB100569.002		TRH C10-C14	µg/L	50	1000	1200	60 - 140	84
		TRH C15-C28	µg/L	200	1200	1200	60 - 140	98
		TRH C29-C36	µg/L	200	1300	1200	60 - 140	109
	TRH F Bands	TRH >C10-C16 (F2)	µg/L	60	1100	1200	60 - 140	92
		TRH >C16-C34 (F3)	µg/L	500	1300	1200	60 - 140	106
		TRH >C34-C40 (F4)	µg/L	500	670	600	60 - 140	112

VOC's in Soil

Method: ME-(AU)-[ENV]AN433/AN434

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB100578.002	Monocyclic	Benzene	mg/kg	0.1	2.7	2.9	60 - 140	94
	Aromatic	Toluene	mg/kg	0.1	3.2	2.9	60 - 140	110
		Ethylbenzene	mg/kg	0.1	2.1	2.9	60 - 140	71
		m/p-xylene	mg/kg	0.2	5.0	5.8	60 - 140	86
		o-xylene	mg/kg	0.1	2.2	2.9	60 - 140	77
	Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	3.8	5	60 - 140	76
		d4-1,2-dichloroethane (Surrogate)	mg/kg	-	3.7	5	60 - 140	74
		d8-toluene (Surrogate)	mg/kg	-	3.7	5	60 - 140	74
		Bromofluorobenzene (Surrogate)	mg/kg	-	5.4	5	60 - 140	107

VOCs in Water

Method: ME-(AU)-[ENV]AN433/AN434

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB100686.002	Monocyclic	Benzene	µg/L	0.5	47	45.45	60 - 140	103
	Aromatic	Toluene	µg/L	0.5	50	45.45	60 - 140	110
		Ethylbenzene	µg/L	0.5	52	45.45	60 - 140	113
		m/p-xylene	µg/L	1	99	90.9	60 - 140	109
		o-xylene	µg/L	0.5	51	45.45	60 - 140	112
	Surrogates	Dibromofluoromethane (Surrogate)	µg/L	-	4.9	5	60 - 140	98
		d4-1,2-dichloroethane (Surrogate)	µg/L	-	5.0	5	60 - 140	99
		d8-toluene (Surrogate)	µg/L	-	5.1	5	60 - 140	102
		Bromofluorobenzene (Surrogate)	µg/L	-	5.3	5	60 - 140	105

Volatile Petroleum Hydrocarbons in Soil

Method: ME-(AU)-[ENV]AN433/AN434/AN410

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB100578.002		TRH C6-C10	mg/kg	25	<25	24.65	60 - 140	86
		TRH C6-C9	mg/kg	20	<20	23.2	60 - 140	83
	Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	3.8	5	60 - 140	76
		d4-1,2-dichloroethane (Surrogate)	mg/kg	-	3.7	5	60 - 140	74
		d8-toluene (Surrogate)	mg/kg	-	3.7	5	60 - 140	74
		Bromofluorobenzene (Surrogate)	mg/kg	-	5.4	5	60 - 140	107
	VPH F Bands	TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	7.25	60 - 140	82

Volatile Petroleum Hydrocarbons in Water

Method: ME-(AU)-[ENV]AN433/AN434/AN410

Sample Number	Parameter	Units	LOR

Laboratory Control Standard (LCS) results are evaluated against an expected result, typically the concentration of analyte spiked into the control during the sample preparation stage, producing a percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA /QC plan (Ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

Volatile Petroleum Hydrocarbons in Water (continued)

Method: ME-(AU)-[ENV]AN433/AN434/AN410

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB100686.002		TRH C6-C10	µg/L	50	900	946.63	60 - 140	95
		TRH C6-C9	µg/L	40	680	818.71	60 - 140	83
	Surrogates	Dibromofluoromethane (Surrogate)	µg/L	-	4.9	5	60 - 140	98
		d4-1,2-dichloroethane (Surrogate)	µg/L	-	5.0	5	60 - 140	99
		d8-toluene (Surrogate)	µg/L	-	5.1	5	60 - 140	102
		Bromofluorobenzene (Surrogate)	µg/L	-	5.3	5	60 - 140	105
	VPH F Bands	TRH C6-C10 minus BTEX (F1)	µg/L	50	600	639.67	60 - 140	94

Matrix Spike (MS) results are evaluated as the percentage recovery of an expected result, typically the concentration of analyte spiked into a field sub-sample during the sample preparation stage. The original sample's result is subtracted from the sub-sample result before determining the percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA/QC plan (ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

Mercury (dissolved) in Water

Method: ME-(AU)-[ENV]AN311/AN312

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE151707.017	LB100694.004	Mercury	mg/L	0.0001	0.0082	<0.0001	0.008	102

Mercury in Soil

Method: ME-(AU)-[ENV]AN312

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE151737.028	LB100639.004	Mercury	mg/kg	0.01	0.22	0.06282169653	0.2	78

OC Pesticides in Soil

Method: ME-(AU)-[ENV]AN400/AN420

QC Sample	Sample Number	Parameter	Units	LOR	Original	Spike	Recovery%
SE151737.025	LB100614.024	Hexachlorobenzene (HCB)	mg/kg	0.1	0	-	-
		Alpha BHC	mg/kg	0.1	0	-	-
		Lindane	mg/kg	0.1	0	-	-
		Heptachlor	mg/kg	0.1	0	0.2	87
		Aldrin	mg/kg	0.1	0	0.2	85
		Beta BHC	mg/kg	0.1	0	-	-
		Delta BHC	mg/kg	0.1	0	0.2	77
		Heptachlor epoxide	mg/kg	0.1	0	-	-
		o,p'-DDE	mg/kg	0.1	0	-	-
		Alpha Endosulfan	mg/kg	0.2	0	-	-
		Gamma Chlordane	mg/kg	0.1	0	-	-
		Alpha Chlordane	mg/kg	0.1	0	-	-
		trans-Nonachlor	mg/kg	0.1	0	-	-
		p,p'-DDE	mg/kg	0.1	0	-	-
		Dieldrin	mg/kg	0.2	0	0.2	85
		Endrin	mg/kg	0.2	0	0.2	91
		o,p'-DDD	mg/kg	0.1	0	-	-
		o,p'-DDT	mg/kg	0.1	0	-	-
		Beta Endosulfan	mg/kg	0.2	0	-	-
		p,p'-DDD	mg/kg	0.1	0	-	-
		p,p'-DDT	mg/kg	0.1	0	0.2	78
		Endosulfan sulphate	mg/kg	0.1	0	-	-
		Endrin Aldehyde	mg/kg	0.1	0	-	-
		Methoxychlor	mg/kg	0.1	0	-	-
		Endrin Ketone	mg/kg	0.1	0	-	-
		Isodrin	mg/kg	0.1	0	-	-
		Mirex	mg/kg	0.1	0	-	-
	Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	mg/kg	-	0.126	-	88

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN420

QC Sample	Sample Number	Parameter	Units	LOR	Original	Spike	Recovery%
SE151737.024	LB100614.023	Naphthalene	mg/kg	0.1	0	4	91
		2-methylnaphthalene	mg/kg	0.1	0	-	-
		1-methylnaphthalene	mg/kg	0.1	0	-	-
		Acenaphthylene	mg/kg	0.1	0	4	91
		Acenaphthene	mg/kg	0.1	0	4	90
		Fluorene	mg/kg	0.1	0	-	-
		Phenanthrene	mg/kg	0.1	0.01	4	89
		Anthracene	mg/kg	0.1	0	4	89
		Fluoranthene	mg/kg	0.1	0.03	4	94
		Pyrene	mg/kg	0.1	0.03	4	101
		Benzo(a)anthracene	mg/kg	0.1	0.04	-	-
		Chrysene	mg/kg	0.1	0.03	-	-
		Benzo(b&j)fluoranthene	mg/kg	0.1	0.02	-	-
		Benzo(k)fluoranthene	mg/kg	0.1	0.03	-	-
		Benzo(a)pyrene	mg/kg	0.1	0.01	4	96
		Indeno(1,2,3-cd)pyrene	mg/kg	0.1	0.01	-	-
		Dibenzo(ah)anthracene	mg/kg	0.1	0	-	-
		Benzo(ghi)perylene	mg/kg	0.1	0.01	-	-
		Carcinogenic PAHs, BaP TEQ <LOR=0	TEQ	0.2	0	-	-

Matrix Spike (MS) results are evaluated as the percentage recovery of an expected result, typically the concentration of analyte spiked into a field sub-sample during the sample preparation stage. The original sample's result is subtracted from the sub-sample result before determining the percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA/QC plan (ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

PAH (Polynuclear Aromatic Hydrocarbons) in Soil (continued)

Method: ME-(AU)-[ENV]AN420

QC Sample	Sample Number		Parameter	Units	LOR	Original	Spike	Recovery%
SE151737.024	LB100614.023		Carcinogenic PAHs, BaP TEQ <LOR=LOR	TEQ (mg/kg)	0.3	0.242	-	-
			Carcinogenic PAHs, BaP TEQ <LOR=LOR/2	TEQ (mg/kg)	0.2	0.121	-	-
			Total PAH (18)	mg/kg	0.8	0	-	-
		Surrogates	d5-nitrobenzene (Surrogate)	mg/kg	-	0.39	-	76
			2-fluorobiphenyl (Surrogate)	mg/kg	-	0.41	-	84
			d14-p-terphenyl (Surrogate)	mg/kg	-	0.43	-	84

PCBs in Soil

Method: ME-(AU)-[ENV]AN400/AN420

QC Sample	Sample Number		Parameter	Units	LOR	Original	Spike	Recovery%
SE151737.025	LB100614.023		Arochlor 1016	mg/kg	0.2	0	-	-
			Arochlor 1221	mg/kg	0.2	0	-	-
			Arochlor 1232	mg/kg	0.2	0	-	-
			Arochlor 1242	mg/kg	0.2	0	-	-
			Arochlor 1248	mg/kg	0.2	0	-	-
			Arochlor 1254	mg/kg	0.2	0	-	-
			Arochlor 1260	mg/kg	0.2	0	0.4	106
			Arochlor 1262	mg/kg	0.2	0	-	-
			Arochlor 1268	mg/kg	0.2	0	-	-
			Total PCBs (Arochlors)	mg/kg	1	0	-	-
		Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	mg/kg	-	0.126	-	79

Total Recoverable Metals in Soil/Waste Solids/Materials by ICPOES

Method: ME-(AU)-[ENV]AN040/AN320

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE151737.022	LB100631.004		Arsenic, As	mg/kg	3	54	4.02046596619	50	101
			Cadmium, Cd	mg/kg	0.3	43	0.69754042941	50	86
			Chromium, Cr	mg/kg	0.3	81	29.2236028627	50	103
			Copper, Cu	mg/kg	0.5	120	70.6078422415	50	107
			Lead, Pb	mg/kg	1	150	33.2110400487	50	-158 ⑨
			Nickel, Ni	mg/kg	0.5	61	15.0257971676	50	92
			Zinc, Zn	mg/kg	0.5	190	31.5542409014	50	113
SE151756.009	LB100633.004		Arsenic, As	mg/kg	3	57	18	50	78
			Cadmium, Cd	mg/kg	0.3	43	1.0	50	83
			Chromium, Cr	mg/kg	0.3	50	9.2	50	82
			Copper, Cu	mg/kg	0.5	170	130	50	76
			Lead, Pb	mg/kg	1	300	290	50	20 ⑤
			Nickel, Ni	mg/kg	0.5	48	6.5	50	83
			Zinc, Zn	mg/kg	0.5	500	510	50	-26 ⑤

Trace Metals (Dissolved) in Water by ICPMS

Method: ME-(AU)-[ENV]AN318

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE151747.001	LB100611.004		Copper, Cu	µg/L	1	23	1.592	20	109
			Zinc, Zn	µg/L	5	28	6.04	20	112

TRH (Total Recoverable Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN403

QC Sample	Sample Number		Parameter	Units	LOR	Original	Spike	Recovery%
SE151737.024	LB100614.023		TRH C10-C14	mg/kg	20	0	40	83
			TRH C15-C28	mg/kg	45	0	40	88
			TRH C29-C36	mg/kg	45	0	40	85
			TRH C37-C40	mg/kg	100	0	-	-
			TRH C10-C36 Total	mg/kg	110	0	-	-
			TRH C10-C40 Total	mg/kg	210	0	-	-
		TRH F Bands	TRH >C10-C16 (F2)	mg/kg	25	0	40	85
			TRH >C10-C16 (F2) - Naphthalene	mg/kg	25	0	-	-
			TRH >C16-C34 (F3)	mg/kg	90	0	40	93
			TRH >C34-C40 (F4)	mg/kg	120	0	-	-

VOC's in Soil

Method: ME-(AU)-[ENV]AN433/AN434

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE151756.001	LB100578.004	Monocyclic Aromatic	Benzene	mg/kg	0.1	2.6	<0.1	2.9	90
			Toluene	mg/kg	0.1	3.2	<0.1	2.9	110
			Ethylbenzene	mg/kg	0.1	1.8	<0.1	2.9	61
			m/p-xylene	mg/kg	0.2	4.2	<0.2	5.8	72

Matrix Spike (MS) results are evaluated as the percentage recovery of an expected result, typically the concentration of analyte spiked into a field sub-sample during the sample preparation stage. The original sample's result is subtracted from the sub-sample result before determining the percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA/QC plan (ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

VOC's in Soil (continued)

Method: ME-(AU)-[ENV]AN433/AN434

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE151756.001	LB100578.004	Monocyclic	o-xylene	mg/kg	0.1	1.9	<0.1	2.9	67
		Polycyclic	Naphthalene	mg/kg	0.1	<0.1	<0.1	-	-
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	3.8	3.8	-	76
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	3.9	3.8	-	79
			d8-toluene (Surrogate)	mg/kg	-	3.7	3.5	-	73
			Bromofluorobenzene (Surrogate)	mg/kg	-	5.0	3.6	-	99
		Totals	Total Xylenes*	mg/kg	0.3	6.1	<0.3	-	-
			Total BTEX	mg/kg	0.6	14	<0.6	-	-

Volatile Petroleum Hydrocarbons in Soil

Method: ME-(AU)-[ENV]AN433/AN434/AN410

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE151756.001	LB100578.004		TRH C6-C10	mg/kg	25	<25	<25	24.65	84
			TRH C6-C9	mg/kg	20	<20	<20	23.2	82
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	3.8	3.8	-	76
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	3.9	3.8	-	79
			d8-toluene (Surrogate)	mg/kg	-	3.7	3.5	-	73
			Bromofluorobenzene (Surrogate)	mg/kg	-	5.0	3.6	-	99
		VPH F Bands	Benzene (F0)	mg/kg	0.1	2.6	<0.1	-	-
			TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	<25	7.25	97

MATRIX SPIKE DUPLICATES

Matrix spike duplicates are calculated as Relative Percent Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The original result is the analyte concentration of the matrix spike. The Duplicate result is the analyte concentration of the matrix spike duplicate.

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

No matrix spike duplicates were required for this job.

FOOTNOTES

Samples analysed as received.

Solid samples expressed on a dry weight basis.

QC criteria are subject to internal review according to the SGS QA/QC plan and may be provided on request or alternatively can be found here: http://www.sgs.com.au/~/media/Local/Australia/Documents/Technical Documents/MP-AU-ENV-QU-022 QA QC Plan.pdf

*	NATA accreditation does not cover tthe performance of this service.
-	Sample not analysed for this analyte.
IS	Insufficient sample for analysis.
LNR	Sample listed, but not received.
LOR	Limit of reporting.
QFH	QC result is above the upper tolerance.
QFL	QC result is below the lower tolerance.

①	At least 2 of 3 surrogates are within acceptance criteria.
②	RPD failed acceptance criteria due to sample heterogeneity.
③	Results less than 5 times LOR preclude acceptance criteria for RPD.
④	Recovery failed acceptance criteria due to matrix interference.
⑤	Recovery failed acceptance criteria due to the presence of significant concentration of analyte (i.e. the concentration of analyte exceeds the spike level).
⑥	LOR was raised due to sample matrix interference.
⑦	LOR was raised due to dilution of significantly high concentration of analyte in sample.
⑧	Reanalysis of sample in duplicate confirmed sample heterogeneity and inconsistency of results.
⑨	Recovery failed acceptance criteria due to sample heterogeneity.
⑩	LOR was raised due to high conductivity of the sample (required dilution).
†	Refer to Analytical Report comments for further information.

STATEMENT OF QA/QC PERFORMANCE

SE152112 R0

CLIENT DETAILS

Contact	Jessie Sixsmith
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Project	**E22974 - 80-88 Regent St, Redfern, NSW**
Order Number	**E22974**
Samples	7

LABORATORY DETAILS

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SGS Reference	**SE152112 R0**
Date Received	12 May 2016
Date Reported	19 May 2016

COMMENTS

All the laboratory data for each environmental matrix was compared to SGS' stated Data Quality Objectives (DQO). Comments arising from the comparison were made and are reported below.

The data relating to sampling was taken from the Chain of Custody document and was supplied by the Client.
This QA/QC Statement must be read in conjunction with the referenced Analytical Report.
The Statement and the Analytical Report must not be reproduced except in full.

All Data Quality Objectives were met (within the SGS Alexandria Environmental laboratory).

SAMPLE SUMMARY

Sample counts by matrix	7 Water	Type of documentation received	COC
Date documentation received	12/5/2016	Samples received in good order	Yes
Samples received without headspace	Yes	Sample temperature upon receipt	7.1°C
Sample container provider	SGS	Turnaround time requested	Standard
Samples received in correct containers	Yes	Sufficient sample for analysis	Yes
Sample cooling method	Ice Bricks	Samples clearly labelled	Yes
Complete documentation received	Yes		

HOLDING TIME SUMMARY

SGS holding time criteria are drawn from current regulations and are highly dependent on sample container preservation as specified in the SGS “Field Sampling Guide for Containers and Holding Time” (ref: GU-(AU)-ENV.001). Soil samples guidelines are derived from NEPM "Schedule B(3) Guideline on Laboratory Analysis of Potentially Contaminated Soils". Water sample guidelines are derived from "AS/NZS 5667.1 : 1998 Water Quality - sampling part 1" and APHA "Standard Methods for the Examination of Water and Wastewater" 21st edition 2005.

Extraction and analysis holding time due dates listed are calculated from the date sampled, although holding times may be extended after laboratory extraction for some analytes. The due dates are the suggested dates that samples may be held before extraction or analysis and still be considered valid.

Extraction and analysis dates are shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria. If the sampled date is not supplied then compliance with criteria cannot be determined. If the received date is after one or both due dates then holding time will fail by default.

Mercury (dissolved) in Water

Method: ME-(AU)-[ENV]AN311/AN312

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH01M	SE152112.001	LB101439	11 May 2016	12 May 2016	08 Jun 2016	18 May 2016	08 Jun 2016	18 May 2016
BH06M	SE152112.002	LB101439	11 May 2016	12 May 2016	08 Jun 2016	18 May 2016	08 Jun 2016	18 May 2016
QD-1	SE152112.003	LB101439	11 May 2016	12 May 2016	08 Jun 2016	18 May 2016	08 Jun 2016	18 May 2016
GWQR-1	SE152112.004	LB101439	11 May 2016	12 May 2016	08 Jun 2016	18 May 2016	08 Jun 2016	18 May 2016
GWQB-1	SE152112.005	LB101439	11 May 2016	12 May 2016	08 Jun 2016	18 May 2016	08 Jun 2016	18 May 2016

PAH (Polynuclear Aromatic Hydrocarbons) in Water

Method: ME-(AU)-[ENV]AN420

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH01M	SE152112.001	LB101302	11 May 2016	12 May 2016	18 May 2016	16 May 2016	25 Jun 2016	19 May 2016
BH06M	SE152112.002	LB101302	11 May 2016	12 May 2016	18 May 2016	16 May 2016	25 Jun 2016	19 May 2016
QD-1	SE152112.003	LB101302	11 May 2016	12 May 2016	18 May 2016	16 May 2016	25 Jun 2016	19 May 2016
GWQR-1	SE152112.004	LB101302	11 May 2016	12 May 2016	18 May 2016	16 May 2016	25 Jun 2016	19 May 2016
GWQB-1	SE152112.005	LB101302	11 May 2016	12 May 2016	18 May 2016	16 May 2016	25 Jun 2016	19 May 2016

Total Phenolics in Water

Method: ME-(AU)-[ENV]AN289

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH01M	SE152112.001	LB101246	11 May 2016	12 May 2016	08 Jun 2016	16 May 2016	08 Jun 2016	16 May 2016
BH06M	SE152112.002	LB101246	11 May 2016	12 May 2016	08 Jun 2016	16 May 2016	08 Jun 2016	16 May 2016

Trace Metals (Dissolved) in Water by ICPMS

Method: ME-(AU)-[ENV]AN318

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH01M	SE152112.001	LB101139	11 May 2016	12 May 2016	07 Nov 2016	13 May 2016	07 Nov 2016	16 May 2016
BH06M	SE152112.002	LB101139	11 May 2016	12 May 2016	07 Nov 2016	13 May 2016	07 Nov 2016	16 May 2016
QD-1	SE152112.003	LB101139	11 May 2016	12 May 2016	07 Nov 2016	13 May 2016	07 Nov 2016	16 May 2016
GWQR-1	SE152112.004	LB101139	11 May 2016	12 May 2016	07 Nov 2016	13 May 2016	07 Nov 2016	16 May 2016
GWQB-1	SE152112.005	LB101139	11 May 2016	12 May 2016	07 Nov 2016	13 May 2016	07 Nov 2016	16 May 2016

TRH (Total Recoverable Hydrocarbons) in Water

Method: ME-(AU)-[ENV]AN403

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH01M	SE152112.001	LB101302	11 May 2016	12 May 2016	18 May 2016	16 May 2016	25 Jun 2016	19 May 2016
BH06M	SE152112.002	LB101302	11 May 2016	12 May 2016	18 May 2016	16 May 2016	25 Jun 2016	19 May 2016
QD-1	SE152112.003	LB101302	11 May 2016	12 May 2016	18 May 2016	16 May 2016	25 Jun 2016	19 May 2016
GWQR-1	SE152112.004	LB101302	11 May 2016	12 May 2016	18 May 2016	16 May 2016	25 Jun 2016	19 May 2016
GWQB-1	SE152112.005	LB101302	11 May 2016	12 May 2016	18 May 2016	16 May 2016	25 Jun 2016	19 May 2016

VOCs in Water

Method: ME-(AU)-[ENV]AN433/AN434

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH01M	SE152112.001	LB101259	11 May 2016	12 May 2016	18 May 2016	16 May 2016	25 Jun 2016	19 May 2016
BH06M	SE152112.002	LB101259	11 May 2016	12 May 2016	18 May 2016	16 May 2016	25 Jun 2016	19 May 2016
QD-1	SE152112.003	LB101259	11 May 2016	12 May 2016	18 May 2016	16 May 2016	25 Jun 2016	19 May 2016
GWQR-1	SE152112.004	LB101259	11 May 2016	12 May 2016	18 May 2016	16 May 2016	25 Jun 2016	19 May 2016
GWQB-1	SE152112.005	LB101259	11 May 2016	12 May 2016	18 May 2016	16 May 2016	25 Jun 2016	19 May 2016
Trip Blank	SE152112.006	LB101259	11 May 2016	12 May 2016	18 May 2016	16 May 2016	25 Jun 2016	19 May 2016
Trip Spike	SE152112.007	LB101259	11 May 2016	12 May 2016	18 May 2016	16 May 2016	25 Jun 2016	19 May 2016

Volatile Petroleum Hydrocarbons in Water

Method: ME-(AU)-[ENV]AN433/AN434/AN410

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH01M	SE152112.001	LB101259	11 May 2016	12 May 2016	18 May 2016	16 May 2016	25 Jun 2016	19 May 2016
BH06M	SE152112.002	LB101259	11 May 2016	12 May 2016	18 May 2016	16 May 2016	25 Jun 2016	19 May 2016
QD-1	SE152112.003	LB101259	11 May 2016	12 May 2016	18 May 2016	16 May 2016	25 Jun 2016	18 May 2016
GWQR-1	SE152112.004	LB101259	11 May 2016	12 May 2016	18 May 2016	16 May 2016	25 Jun 2016	18 May 2016
GWQB-1	SE152112.005	LB101259	11 May 2016	12 May 2016	18 May 2016	16 May 2016	25 Jun 2016	18 May 2016
Trip Blank	SE152112.006	LB101259	11 May 2016	12 May 2016	18 May 2016	16 May 2016	25 Jun 2016	19 May 2016
Trip Spike	SE152112.007	LB101259	11 May 2016	12 May 2016	18 May 2016	16 May 2016	25 Jun 2016	19 May 2016

Surrogate results are evaluated against upper and lower limit criteria established in the SGS QA/QC plan (Ref: MP-(AU)-[ENV]QU-022). At least two of three routine level soil sample surrogate spike recoveries for BTEX/VOC are to be within 70-130% where control charts have not been developed and within the established control limits for charted surrogates. Matrix effects may void this as an acceptance criterion. Water sample surrogate spike recoveries are to be within 40-130%. The presence of emulsions, surfactants and particulates may void this as an acceptance criterion.

Result is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

PAH (Polynuclear Aromatic Hydrocarbons) in Water

Method: ME-(AU)-[ENV]AN420

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
2-fluorobiphenyl (Surrogate)	BH01M	SE152112.001	%	40 - 130%	90
	BH06M	SE152112.002	%	40 - 130%	86
d14-p-terphenyl (Surrogate)	BH01M	SE152112.001	%	40 - 130%	106
	BH06M	SE152112.002	%	40 - 130%	110
d5-nitrobenzene (Surrogate)	BH01M	SE152112.001	%	40 - 130%	72
	BH06M	SE152112.002	%	40 - 130%	68

VOCs in Water

Method: ME-(AU)-[ENV]AN433/AN434

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Bromofluorobenzene (Surrogate)	BH01M	SE152112.001	%	40 - 130%	102
	BH06M	SE152112.002	%	40 - 130%	104
	QD-1	SE152112.003	%	40 - 130%	84
	GWQR-1	SE152112.004	%	40 - 130%	87
	GWQB-1	SE152112.005	%	40 - 130%	88
	Trip Blank	SE152112.006	%	40 - 130%	87
	Trip Spike	SE152112.007	%	40 - 130%	111
d4-1,2-dichloroethane (Surrogate)	BH01M	SE152112.001	%	40 - 130%	80
	BH06M	SE152112.002	%	40 - 130%	77
	QD-1	SE152112.003	%	40 - 130%	109
	GWQR-1	SE152112.004	%	40 - 130%	113
	GWQB-1	SE152112.005	%	40 - 130%	117
	Trip Blank	SE152112.006	%	40 - 130%	115
	Trip Spike	SE152112.007	%	40 - 130%	98
d8-toluene (Surrogate)	BH01M	SE152112.001	%	40 - 130%	100
	BH06M	SE152112.002	%	40 - 130%	101
	QD-1	SE152112.003	%	40 - 130%	102
	GWQR-1	SE152112.004	%	40 - 130%	98
	GWQB-1	SE152112.005	%	40 - 130%	99
	Trip Blank	SE152112.006	%	40 - 130%	95
	Trip Spike	SE152112.007	%	40 - 130%	92
Dibromofluoromethane (Surrogate)	BH01M	SE152112.001	%	40 - 130%	78
	BH06M	SE152112.002	%	40 - 130%	77
	QD-1	SE152112.003	%	40 - 130%	111
	GWQR-1	SE152112.004	%	40 - 130%	116
	GWQB-1	SE152112.005	%	40 - 130%	119
	Trip Blank	SE152112.006	%	40 - 130%	119
	Trip Spike	SE152112.007	%	40 - 130%	100

Volatile Petroleum Hydrocarbons in Water

Method: ME-(AU)-[ENV]AN433/AN434/AN410

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Bromofluorobenzene (Surrogate)	BH01M	SE152112.001	%	40 - 130%	100
	BH06M	SE152112.002	%	40 - 130%	96
	QD-1	SE152112.003	%	40 - 130%	84
	GWQR-1	SE152112.004	%	40 - 130%	87
	GWQB-1	SE152112.005	%	40 - 130%	88
d4-1,2-dichloroethane (Surrogate)	BH01M	SE152112.001	%	60 - 130%	84
	BH06M	SE152112.002	%	60 - 130%	80
	QD-1	SE152112.003	%	60 - 130%	109
	GWQR-1	SE152112.004	%	60 - 130%	113
	GWQB-1	SE152112.005	%	60 - 130%	117
d8-toluene (Surrogate)	BH01M	SE152112.001	%	40 - 130%	79
	BH06M	SE152112.002	%	40 - 130%	77
	QD-1	SE152112.003	%	40 - 130%	102
	GWQR-1	SE152112.004	%	40 - 130%	98
	GWQB-1	SE152112.005	%	40 - 130%	99
Dibromofluoromethane (Surrogate)	BH01M	SE152112.001	%	40 - 130%	86
	BH06M	SE152112.002	%	40 - 130%	84
	QD-1	SE152112.003	%	40 - 130%	111
	GWQR-1	SE152112.004	%	40 - 130%	116
	GWQB-1	SE152112.005	%	40 - 130%	119

Blank results are evaluated against the limit of reporting (LOR), for the chosen method and its associated instrumentation, typically 2.5 times the statistically determined method detection limit (MDL).

Result is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

Mercury (dissolved) in Water

Method: ME-(AU)-[ENV]AN311/AN312

Sample Number	Parameter	Units	LOR	Result
LB101439.001	Mercury	mg/L	0.0001	<0.0001

PAH (Polynuclear Aromatic Hydrocarbons) in Water

Method: ME-(AU)-[ENV]AN420

Sample Number		Parameter	Units	LOR	Result
LB101302.001		Naphthalene	µg/L	0.1	<0.1
		2-methylnaphthalene	µg/L	0.1	<0.1
		1-methylnaphthalene	µg/L	0.1	<0.1
		Acenaphthylene	µg/L	0.1	<0.1
		Acenaphthene	µg/L	0.1	<0.1
		Fluorene	µg/L	0.1	<0.1
		Phenanthrene	µg/L	0.1	<0.1
		Anthracene	µg/L	0.1	<0.1
		Fluoranthene	µg/L	0.1	<0.1
		Pyrene	µg/L	0.1	<0.1
		Benzo(a)anthracene	µg/L	0.1	<0.1
		Chrysene	µg/L	0.1	<0.1
		Benzo(a)pyrene	µg/L	0.1	<0.1
		Indeno(1,2,3-cd)pyrene	µg/L	0.1	<0.1
		Dibenzo(ah)anthracene	µg/L	0.1	<0.1
		Benzo(ghi)perylene	µg/L	0.1	<0.1
	Surrogates	d5-nitrobenzene (Surrogate)	%	-	82
		2-fluorobiphenyl (Surrogate)	%	-	76
		d14-p-terphenyl (Surrogate)	%	-	94

Total Phenolics in Water

Method: ME-(AU)-[ENV]AN289

Sample Number	Parameter	Units	LOR	Result
LB101246.001	Total Phenols	mg/L	0.01	<0.01

Trace Metals (Dissolved) in Water by ICPMS

Method: ME-(AU)-[ENV]AN318

Sample Number	Parameter	Units	LOR	Result
LB101139.001	Arsenic, As	µg/L	1	<1
	Cadmium, Cd	µg/L	0.1	<0.1
	Chromium, Cr	µg/L	1	<1
	Copper, Cu	µg/L	1	<1
	Lead, Pb	µg/L	1	<1
	Nickel, Ni	µg/L	1	<1
	Zinc, Zn	µg/L	5	<5

TRH (Total Recoverable Hydrocarbons) in Water

Method: ME-(AU)-[ENV]AN403

Sample Number	Parameter	Units	LOR	Result
LB101302.001	TRH C10-C14	µg/L	50	<50
	TRH C15-C28	µg/L	200	<200
	TRH C29-C36	µg/L	200	<200
	TRH C37-C40	µg/L	200	<200

VOCs in Water

Method: ME-(AU)-[ENV]AN433/AN434

Sample Number		Parameter	Units	LOR	Result
LB101259.001	Fumigants	2,2-dichloropropane	µg/L	0.5	<0.5
		1,2-dichloropropane	µg/L	0.5	<0.5
		cis-1,3-dichloropropene	µg/L	0.5	<0.5
		trans-1,3-dichloropropene	µg/L	0.5	<0.5
		1,2-dibromoethane (EDB)	µg/L	0.5	<0.5
	Halogenated Aliphatics	Dichlorodifluoromethane (CFC-12)	µg/L	5	<5
		Chloromethane	µg/L	5	<5
		Vinyl chloride (Chloroethene)	µg/L	0.3	<0.3
		Bromomethane	µg/L	10	<10
		Chloroethane	µg/L	5	<5
		Trichlorofluoromethane	µg/L	1	<1
		Iodomethane	µg/L	5	<5

METHOD BLANKS

Blank results are evaluated against the limit of reporting (LOR), for the chosen method and its associated instrumentation, typically 2.5 times the statistically determined method detection limit (MDL).

Result is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

VOCs in Water (continued)

Method: ME-(AU)-[ENV]AN433/AN434

Sample Number		Parameter	Units	LOR	Result
LB101259.001	Halogenated Aliphatics	1,1-dichloroethene	µg/L	0.5	<0.5
		Dichloromethane (Methylene chloride)	µg/L	5	<5
		Allyl chloride	µg/L	2	<2
		trans-1,2-dichloroethene	µg/L	0.5	<0.5
		1,1-dichloroethane	µg/L	0.5	<0.5
		cis-1,2-dichloroethene	µg/L	0.5	<0.5
		Bromochloromethane	µg/L	0.5	<0.5
		1,2-dichloroethane	µg/L	0.5	<0.5
		1,1,1-trichloroethane	µg/L	0.5	<0.5
		1,1-dichloropropene	µg/L	0.5	<0.5
		Carbon tetrachloride	µg/L	0.5	<0.5
		Dibromomethane	µg/L	0.5	<0.5
		Trichloroethene (Trichloroethylene,TCE)	µg/L	0.5	<0.5
		1,1,2-trichloroethane	µg/L	0.5	<0.5
		1,3-dichloropropane	µg/L	0.5	<0.5
		Tetrachloroethene (Perchloroethylene,PCE)	µg/L	0.5	<0.5
		1,1,1,2-tetrachloroethane	µg/L	0.5	<0.5
		cis-1,4-dichloro-2-butene	µg/L	1	<1
		1,1,2,2-tetrachloroethane	µg/L	0.5	<0.5
		1,2,3-trichloropropane	µg/L	0.5	<0.5
		trans-1,4-dichloro-2-butene	µg/L	1	<1
		1,2-dibromo-3-chloropropane	µg/L	0.5	<0.5
		Hexachlorobutadiene	µg/L	0.5	<0.5
	Halogenated Aromatics	Chlorobenzene	µg/L	0.5	<0.5
		Bromobenzene	µg/L	0.5	<0.5
		2-chlorotoluene	µg/L	0.5	<0.5
		4-chlorotoluene	µg/L	0.5	<0.5
		1,3-dichlorobenzene	µg/L	0.5	<0.5
		1,4-dichlorobenzene	µg/L	0.3	<0.3
		1,2-dichlorobenzene	µg/L	0.5	<0.5
		1,2,4-trichlorobenzene	µg/L	0.5	<0.5
		1,2,3-trichlorobenzene	µg/L	0.5	<0.5
	Monocyclic Aromatic Hydrocarbons	Benzene	µg/L	0.5	<0.5
		Toluene	µg/L	0.5	<0.5
		Ethylbenzene	µg/L	0.5	<0.5
		m/p-xylene	µg/L	1	<1
		o-xylene	µg/L	0.5	<0.5
		Styrene (Vinyl benzene)	µg/L	0.5	<0.5
		Isopropylbenzene (Cumene)	µg/L	0.5	<0.5
		n-propylbenzene	µg/L	0.5	<0.5
		1,3,5-trimethylbenzene	µg/L	0.5	<0.5
		tert-butylbenzene	µg/L	0.5	<0.5
		1,2,4-trimethylbenzene	µg/L	0.5	<0.5
		sec-butylbenzene	µg/L	0.5	<0.5
		p-isopropyltoluene	µg/L	0.5	<0.5
		n-butylbenzene	µg/L	0.5	<0.5
	Nitrogenous Compounds	Acrylonitrile	µg/L	0.5	<0.5
	Oxygenated Compounds	Acetone (2-propanone)	µg/L	10	<10
		MtBE (Methyl-tert-butyl ether)	µg/L	2	<1
		Vinyl acetate	µg/L	10	<10
		MEK (2-butanone)	µg/L	10	<10
		MIBK (4-methyl-2-pentanone)	µg/L	5	<5
		2-hexanone (MBK)	µg/L	5	<5
	Polycyclic VOCs	Naphthalene	µg/L	0.5	<0.5
	Sulphonated	Carbon disulfide	µg/L	2	<2
	Surrogates	Dibromofluoromethane (Surrogate)	%	-	119
		d4-1,2-dichloroethane (Surrogate)	%	-	115
		d8-toluene (Surrogate)	%	-	98
		Bromofluorobenzene (Surrogate)	%	-	85
	Trihalomethanes	Chloroform (THM)	µg/L	0.5	<0.5
		Bromodichloromethane (THM)	µg/L	0.5	<0.5

Blank results are evaluated against the limit of reporting (LOR), for the chosen method and its associated instrumentation, typically 2.5 times the statistically determined method detection limit (MDL).

Result is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

VOCs in Water (continued)

Method: ME-(AU)-[ENV]AN433/AN434

Sample Number		Parameter	Units	LOR	Result
LB101259.001	Trihalomethanes	Dibromochloromethane (THM)	µg/L	0.5	<0.5
		Bromoform (THM)	µg/L	0.5	<0.5

Volatile Petroleum Hydrocarbons in Water

Method: ME-(AU)-[ENV]AN433/AN434/AN410

Sample Number		Parameter	Units	LOR	Result
LB101259.001		TRH C6-C9	µg/L	40	<40
	Surrogates	Dibromofluoromethane (Surrogate)	%	-	119
		d4-1,2-dichloroethane (Surrogate)	%	-	115
		d8-toluene (Surrogate)	%	-	98
		Bromofluorobenzene (Surrogate)	%	-	85

Duplicates are calculated as Relative Percentage Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

Mercury (dissolved) in Water

Method: ME-(AU)-[ENV]AN311/AN312

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE152112.004	LB101439.016	Mercury	µg/L	0.0001	<0.0001	-0.0076	200	0
SE152241.002	LB101439.023	Mercury	µg/L	0.0001	<0.0001	<0.0001	200	0

Total Phenolics in Water

Method: ME-(AU)-[ENV]AN289

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE152103.001	LB101246.004	Total Phenols	mg/L	0.01	<0.05	<0.05	200	0
SE152147.009	LB101246.016	Total Phenols	mg/L	0.01	0.00977	0.00249	200	0

Trace Metals (Dissolved) in Water by ICPMS

Method: ME-(AU)-[ENV]AN318

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE152112.002	LB101139.014	Arsenic, As	µg/L	1	4	3	43	8
		Cadmium, Cd	µg/L	0.1	<0.1	<0.1	192	0
		Chromium, Cr	µg/L	1	<1	<1	200	0
		Copper, Cu	µg/L	1	<1	<1	140	0
		Lead, Pb	µg/L	1	<1	<1	200	0
		Nickel, Ni	µg/L	1	4	4	40	11
		Zinc, Zn	µg/L	5	25	22	36	13
SE152120.011	LB101139.020	Arsenic, As	µg/L	1	<1	<1	200	0
		Cadmium, Cd	µg/L	0.1	<0.1	<0.1	200	0
		Chromium, Cr	µg/L	1	<1	<1	200	0
		Copper, Cu	µg/L	1	<1	<1	200	0
		Lead, Pb	µg/L	1	<1	<1	200	0
		Nickel, Ni	µg/L	1	<1	<1	200	0
		Zinc, Zn	µg/L	5	120	130	19	2

VOCs in Water

Method: ME-(AU)-[ENV]AN433/AN434

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE152160.004	LB101259.019	Monocyclic Aromatic	Benzene	µg/L	0.5	<0.5	0.02	200	0
			Toluene	µg/L	0.5	<0.5	0.26	200	0
			Ethylbenzene	µg/L	0.5	<0.5	0.02	200	0
			m/p-xylene	µg/L	1	<1	0.08	200	0
			o-xylene	µg/L	0.5	<0.5	0.02	200	0
		Polycyclic	Naphthalene	µg/L	0.5	<0.5	0.03	200	0
		Surrogates	Dibromofluoromethane (Surrogate)	µg/L	-	5.81	5.74	30	1
			d4-1,2-dichloroethane (Surrogate)	µg/L	-	5.59	5.49	30	2
			d8-toluene (Surrogate)	µg/L	-	5.08	4.84	30	5
			Bromofluorobenzene (Surrogate)	µg/L	-	4.11	4.09	30	0

Volatile Petroleum Hydrocarbons in Water

Method: ME-(AU)-[ENV]AN433/AN434/AN410

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE152160.004	LB101259.019		TRH C6-C10	µg/L	50	<50	1.94	200	0
			TRH C6-C9	µg/L	40	<40	2.69	200	0
		Surrogates	Dibromofluoromethane (Surrogate)	µg/L	-	5.81	5.74	30	1
			d4-1,2-dichloroethane (Surrogate)	µg/L	-	5.59	5.49	30	2
			d8-toluene (Surrogate)	µg/L	-	5.08	4.84	30	5
			Bromofluorobenzene (Surrogate)	µg/L	-	4.11	4.09	30	0
		VPH F Bands	Benzene (F0)	µg/L	0.5	<0.5	0.02	200	0
			TRH C6-C10 minus BTEX (F1)	µg/L	50	<50	1.54	200	0

Laboratory Control Standard (LCS) results are evaluated against an expected result, typically the concentration of analyte spiked into the control during the sample preparation stage, producing a percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA /QC plan (Ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

PAH (Polynuclear Aromatic Hydrocarbons) in Water

Method: ME-(AU)-[ENV]AN420

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB101302.002		Naphthalene	µg/L	0.1	27	40	60 - 140	69
		Acenaphthylene	µg/L	0.1	32	40	60 - 140	80
		Acenaphthene	µg/L	0.1	30	40	60 - 140	74
		Phenanthrene	µg/L	0.1	34	40	60 - 140	85
		Anthracene	µg/L	0.1	40	40	60 - 140	99
		Fluoranthene	µg/L	0.1	30	40	60 - 140	75
		Pyrene	µg/L	0.1	26	40	60 - 140	65
		Benzo(a)pyrene	µg/L	0.1	40	40	60 - 140	100
	Surrogates	d5-nitrobenzene (Surrogate)	µg/L	-	0.5	0.5	40 - 130	90
		2-fluorobiphenyl (Surrogate)	µg/L	-	0.4	0.5	40 - 130	88
		d14-p-terphenyl (Surrogate)	µg/L	-	0.5	0.5	40 - 130	102

Total Phenolics in Water

Method: ME-(AU)-[ENV]AN289

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB101246.002	Total Phenols	mg/L	0.01	0.25	0.25	80 - 120	99

Trace Metals (Dissolved) in Water by ICPMS

Method: ME-(AU)-[ENV]AN318

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB101139.002	Arsenic, As	µg/L	1	22	20	80 - 120	111
	Cadmium, Cd	µg/L	0.1	22	20	80 - 120	110
	Chromium, Cr	µg/L	1	21	20	80 - 120	107
	Copper, Cu	µg/L	1	22	20	80 - 120	109
	Lead, Pb	µg/L	1	21	20	80 - 120	107
	Nickel, Ni	µg/L	1	21	20	80 - 120	107
	Zinc, Zn	µg/L	5	22	20	80 - 120	108

TRH (Total Recoverable Hydrocarbons) in Water

Method: ME-(AU)-[ENV]AN403

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB101302.002		TRH C10-C14	µg/L	50	1100	1200	60 - 140	94
		TRH C15-C28	µg/L	200	1200	1200	60 - 140	100
		TRH C29-C36	µg/L	200	1300	1200	60 - 140	105
	TRH F Bands	TRH >C10-C16 (F2)	µg/L	60	1200	1200	60 - 140	96
		TRH >C16-C34 (F3)	µg/L	500	1200	1200	60 - 140	102
		TRH >C34-C40 (F4)	µg/L	500	670	600	60 - 140	112

VOCs in Water

Method: ME-(AU)-[ENV]AN433/AN434

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB101259.002	Halogenated Aliphatics	1,1-dichloroethene	µg/L	0.5	50	45.45	60 - 140	110
		1,2-dichloroethane	µg/L	0.5	50	45.45	60 - 140	109
		Trichloroethene (Trichloroethylene,TCE)	µg/L	0.5	50	45.45	60 - 140	109
	Halogenated Monocyclic Aromatic	Chlorobenzene	µg/L	0.5	50	45.45	60 - 140	109
		Benzene	µg/L	0.5	50	45.45	60 - 140	110
		Toluene	µg/L	0.5	50	45.45	60 - 140	110
		Ethylbenzene	µg/L	0.5	50	45.45	60 - 140	109
		m/p-xylene	µg/L	1	100	90.9	60 - 140	110
		o-xylene	µg/L	0.5	50	45.45	60 - 140	109
	Surrogates	Dibromofluoromethane (Surrogate)	µg/L	-	5.1	5	60 - 140	102
		d4-1,2-dichloroethane (Surrogate)	µg/L	-	5.1	5	60 - 140	102
		d8-toluene (Surrogate)	µg/L	-	4.9	5	60 - 140	97
		Bromofluorobenzene (Surrogate)	µg/L	-	4.6	5	60 - 140	91
	Trihalomethan	Chloroform (THM)	µg/L	0.5	50	45.45	60 - 140	109

Volatile Petroleum Hydrocarbons in Water

Method: ME-(AU)-[ENV]AN433/AN434/AN410

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB101259.002		TRH C6-C10	µg/L	50	960	946.63	60 - 140	101
		TRH C6-C9	µg/L	40	780	818.71	60 - 140	95
	Surrogates	Dibromofluoromethane (Surrogate)	µg/L	-	4.8	5	60 - 140	96
		d4-1,2-dichloroethane (Surrogate)	µg/L	-	4.7	5	60 - 140	94
		d8-toluene (Surrogate)	µg/L	-	4.8	5	60 - 140	95
		Bromofluorobenzene (Surrogate)	µg/L	-	5.6	5	60 - 140	113
	VPH F Bands	TRH C6-C10 minus BTEX (F1)	µg/L	50	640	639.67	60 - 140	101

MATRIX SPIKES

Matrix Spike (MS) results are evaluated as the percentage recovery of an expected result, typically the concentration of analyte spiked into a field sub-sample during the sample preparation stage. The original sample's result is subtracted from the sub-sample result before determining the percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA/QC plan (ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

Mercury (dissolved) in Water

Method: ME-(AU)-[ENV]AN311/AN312

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE152076.001	LB101439.004	Mercury	mg/L	0.0001	0.0081	-0.0072	0.008	102

Total Phenolics in Water

Method: ME-(AU)-[ENV]AN289

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE152150.001	LB101246.017	Total Phenols	mg/L	0.01	0.24	<0.05	0.25	93

MATRIX SPIKE DUPLICATES

Matrix spike duplicates are calculated as Relative Percent Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The original result is the analyte concentration of the matrix spike. The Duplicate result is the analyte concentration of the matrix spike duplicate.

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

No matrix spike duplicates were required for this job.

Samples analysed as received.

Solid samples expressed on a dry weight basis.

QC criteria are subject to internal review according to the SGS QA/QC plan and may be provided on request or alternatively can be found here: http://www.sgs.com.au/~/media/Local/Australia/Documents/Technical Documents/MP-AU-ENV-QU-022 QA QC Plan.pdf

*	NATA accreditation does not cover tthe performance of this service.
-	Sample not analysed for this analyte.
IS	Insufficient sample for analysis.
LNR	Sample listed, but not received.
LOR	Limit of reporting.
QFH	QC result is above the upper tolerance.
QFL	QC result is below the lower tolerance.

①	At least 2 of 3 surrogates are within acceptance criteria.
②	RPD failed acceptance criteria due to sample heterogeneity.
③	Results less than 5 times LOR preclude acceptance criteria for RPD.
④	Recovery failed acceptance criteria due to matrix interference.
⑤	Recovery failed acceptance criteria due to the presence of significant concentration of analyte (i.e. the concentration of analyte exceeds the spike level).
⑥	LOR was raised due to sample matrix interference.
⑦	LOR was raised due to dilution of significantly high concentration of analyte in sample.
⑧	Reanalysis of sample in duplicate confirmed sample heterogeneity and inconsistency of results.
⑨	Recovery failed acceptance criteria due to sample heterogeneity.
⑩	LOR was raised due to high conductivity of the sample (required dilution).
†	Refer to Analytical Report comments for further information.

QA QC PLAN

Approved: T. Pilbeam

SGS Environmental Services is accredited by NATA for Chemical Testing (Reg.No.2562) and Quality System compliance to ISO/IEC 17025. The QC parameters contained within are designed to meet NEPM 1999 requirements.

Quality Control samples included in any analytical run are listed below.

Reagent/Analysis Blank (BLK) **Method Blank (MB)**	Sample free reagents carried through the preparation/extraction/digestion procedure and analysed at the beginning of every sample batch analysis. A reagent blank is prepared and analysed with every batch of samples plus with each new batch of solvent prior to use.
Sample Matrix Spike (MS) & Matrix Spike Duplicate (MSD)	Sample replicates spiked with identical concentrations of target analyte(s). The spiking occurs during the sample preparation and prior to the extraction/digestion procedure. They are used to document the precision and bias of a method in a given sample matrix. Where there is not enough sample available to prepare a spiked sample, another known soil/sand or water may be used. A duplicate spiked sample is analysed at least every 20 samples.
Surrogate Spike (SS)	At least one but up to three surrogate compounds are added to all samples requiring analysis for organics prior to extraction. Used to determine the extraction efficiency. They are organic compounds which are similar to the target analyte(s) in chemical composition and behaviour in the analytical process, but which are not normally found in environmental samples. Where possible they are surrogate compounds recommended by the USEPA.
Control Matrix Spike (CMS)	To ensure spike recoveries can be determined for every batch of samples a control matrix is spiked with identical concentrations of target analyte(s) and then analysed. These results allow recoveries to be determined in the event that the matrix spikes are unusable (eg. matrix spikes performed on heavily contaminated samples). These are analysed at least every 20 samples.
Internal Standard (IS)	Added to all samples requiring analysis for organics (where relevant) after the extraction process; the compounds serve to give a standard of retention time and response, which is invariant from run-to-run with the instruments. Where possible they are standard compounds recommended by the USEPA.
Lab Duplicates (D)	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.
Lab Control Standards/Samples (LCS)	Prepared from a source independent of the calibration standards. At least one control standard is included in each run to confirm calibration validity. Thereafter they are analysed at least every one in 20 samples plus at the end of each analytical run. This data is not reported.
Continuous Calibration Verification (CCV) or **Calibration Check Standard & Blank**	A calibration check standard or CCV and blank are run after every 20 samples of an instrumental analysis run to assess analytical drift. Calibration Standards are checked old versus new with a criteria of ±10%

Quality Assurance Programs are listed below:

Statistical analysis of Quality Control data (SQC)	Quality control data is plotted on control charts using the APHA procedure with warning and control limits at 2 and 3 standard deviations respectively. See also QMS Procedure “Statistical Quality Control”.
Certified Reference Materials (CRM/SRM)	Certified Reference Materials and Standards are regularly analysed. These materials/standards have certified reference values for various parameters.
Proficiency Testing	Regular proficiency test samples are analysed by our laboratories. SGS Environmental participates in a number of programs. Results and proficiency status are compiled and sent to participating laboratory post data interpretation. Failure to comply with acceptable values result in further investigations.
Inter-laboratory & Intra-laboratory Testing	SGS Environmental Services has schedules in the Quality Systems to participate in Inter/Intra laboratory testing conducted internally and by other parties.
Data Acceptance Criteria Unless otherwise specified in the method or method manual the following general criteria apply to all inorganic tests. All recoveries are to be reported to 3 significant figures.	Failure to meet the internal acceptance criteria will result in sample batch repeats dependent upon investigation outcomes. For data to be accepted: Inorganics (water samples) • For all inorganic analytes the Reagent & Method Blanks must be less than the LOR. • The Calibration Check Standards or Continuous Calibration Verification (CCV) must be within ±15%. • Control Standards must be 80-120% of the accepted value. • The Calibration Check Blanks must be less than the LOR. • Lab Duplicates RPD to be <15%*. Note: If client field duplicates do not meet this criteria it may indicate heterogeneity and shall be noted on the data reports for QC samples. • Sample (and if applicable Control) Matrix Spike[♫] Duplicate recovery RPD to be <30%. • Where CRMs are used, results to be within ±2 standard deviations of the expected value. Inorganics (soil samples) • For all inorganic analytes the Reagent & Method Blanks must be less than the LOR. • The Calibration Check Standards or Continuous Calibration Verification (CCV) must be within ±15%. • Control Standards must be 80-120% of the accepted value. • The Calibration Check Blanks must be less than the LOR. • Lab duplicate RPD to be <30%* for sample results greater than 10 times LOR. • Sample Matrix Spike Duplicate (MS[♫]/MSD) recovery RPD to be <30%. In the event that the matrix spike has been applied to samples whose matrix or contamination is problematic to the method then these acceptance criteria apply to the Control Matrix Spike (CMS/D). • Where CRMs are used, results to be within ± 2 standard deviations of the expected value.

Data Acceptance Criteria Unless otherwise specified in the method or method manual the following general criteria apply to all organic tests. All recoveries are to be reported to 3 significant figures.	Organics • Volatile & extractable Reagent & Method Blanks must contain levels less than or equal to LOR. • The Calibration Check Standards or Continuous Calibration Verification (CCV) must be within ±25%. Some analytes may have specific criteria. • Control Standards (LCS/CMS) and Certified Reference Materials (CRM) recoveries are to be within established control limits or as a default 60-140% unless compound specific limits apply. • Retention times are to vary by no more than 0.2 min. • **At least two of three** routine level soil sample Surrogate Spike (SS) recoveries are to be within 70-130% where control charts have not been developed and within the established control limits for charted surrogates. Matrix effects may void this as acceptance criterion. Any recoveries outside these limits will have comment. • Water sample Surrogates Spike (SS) recoveries are to be within 40-130%. The presence of emulsions, surfactants and particulates may void this as an acceptance criterion. Any recoveries outside these limits will have comment. • Lab Duplicates (D) must have a RPD <30%*. • Sample Matrix Spike Duplicate (MS[♬]/MSD) recovery RPD to be <30%. In the event that the matrix spike has been applied to samples whose matrix or contamination is problematic to the method then these acceptance criteria apply to the Control Matrix Spike (CMS/D).

*Only if results are at least 10 times the LOR otherwise no acceptance criteria for RPD's apply. Application of more stringent criteria shall be applied for clean water sample from water boards and any other nominated client contracts. Nominal 10xLOR criteria are dropped to 5xLOR where specified.

[♬] Matrix do not readily equate to definitive recovery due to inherent matrix interferences and thus do not have recovery compliance values set. As a guide inorganic recoveries should be between 70-130% and for organics 60-130%

Batch Structure Summary

An analytical batch is nominally considered as 20 samples or smaller. As a standard template the following should be **used as a guide** according to the above Quality Control Types:

1	MB	16	UNK_DUP
2	STD1	17	MS
3	STD2	18	MS_DUP
4	STD3	19	UNK 11
5	LCS	20	UNK 12
6	BLK	21	UNK 13
7	UNK 1	22	UNK 14
8	UNK 2	23	UNK 15
9	UNK 3	24	UNK 16
10	UNK 4	25	UNK 17
11	UNK 5	26	UNK 18
12	UNK 6	27	UNK 19
13	UNK 7	28	UNK 20 (SS if applicable)
14	UNK 8	29	UNK_DUP
15	UNK 9	30	CCV
16	UNK 10 (SS if applicable)	31	CRM / SRM / CMS / LCS

Table QC1 - Containers, Preservation Requirements and Holding Times - Soil

Parameter	Container	Preservation	Maximum Holding Time
Acid digestible metals and metalloids - Total and TCLP (As,Cd.,Cu,Cr,Ni,Pb,Zn)	Glass with Teflon Lid	Nil	6 months
Mercury	Glass with Teflon Lid	Nil	28 days
TPH / BTEX / VOC / SVOC / CHC	Glass with Teflon Lid	4^{o}C, zero headspace	14 days
PAHs (total and TCLP)	Glass with Teflon Lid	4^{o}C [1]	14 days
Phenols	Glass with Teflon Lid	4^{o}C [1]	14 days
OCPs, OPPs and total PCBs	Glass with Teflon Lid	4^{o}C [1]	14 days
Asbestos	Sealed Plastic Bag	Nil	N/A

Table QC2 - Containers, Preservation Requirements and Holding Times - Water

Parameter	Container Volume (mL)	Preservation	Maximum Holding Time
Heavy Metals	125mL Plastic	Field filtration 0.45µm HNO_3 / 4^{o}C	6 months
Cyanide	125mL Amber Glass	pH > 12 NaOH / 4^{o}C	6 months
TPH (C6-C9) / BTEX / VOCs SVOCs / CHCs	4 x 43mL Glass	HCl / 4^{o}C [1]	14 days
TPH (C10-C36) / PAH / Phenolics OCP / OPP / TDS / pH	3 x 1L Amber Glass	None / 4^{o}C [1]	28 days

Notes: [1] = Extraction within 14 days, Analysis within 40 days.

Table QC3 - Analytical Parameters, PQLs and Methods - Soil

Parameter	Unit	PQL	Method Reference
Metals in Soil			
Arsenic - As[1]	mg / kg	1	USEPA 200.7
Cadmium - Cd[1]	mg / kg	0.5	USEPA 200.7
Chromium - Cr[1]	mg / kg	1	USEPA 200.7
Copper - Cu[1]	mg / kg	1	USEPA 200.7
Lead - Pb[1]	mg / kg	1	USEPA 200.7
Mercury - Hg[2]	mg / kg	0.1	USEPA 7471A
Nickel - Ni[1]	mg / kg	1	USEPA 200.7
Zinc - Zn[1]	mg / kg	1	USEPA 200.7
Total Petroleum Hydrocarbons (TPHs) in Soil			
C_6-C_9 fraction	mg / kg	25	USEPA 8260
C_{10}-C_{14} fraction	mg / kg	50	USEPA 8000
C_{15}-C_{28} fraction	mg / kg	100	USEPA 8000
C_{29}-C_{36} fraction	mg / kg	100	USEPA 8000
BTEX in Soil			
Benzene	mg / kg	1	USEPA 8260
Toluene	mg / kg	1	USEPA 8260
Ethylbenzene	mg / kg	1	USEPA 8260
m & p Xylene	mg / kg	2	USEPA 8260
o- Xylene	mg / kg	1	USEPA 8260
Other Organic Contaminants in Soil			
PAHs	mg / kg	0.05-0.2	USEPA 8270
CHCs	mg / kg	1	USEPA 8260
VOCs	mg / kg	1	USEPA 8260
SVOCs	mg / kg	1	USEPA 8260
OCPs	mg / kg	0.1	USEPA 8140, 8080
OPPs	mg / kg	0.1	USEPA 8140, 8080
PCBs	mg / kg	0.1	USEPA 8080
Phenolics	mg / kg	5	APHA 5530
Asbestos			
Asbestos	mg / kg	Presence / Absence	AS4964-2004

Notes:

1. Acid Soluble Metals by ICP-AES

2. Total Recoverable Mercury

Table QC4 - Analytical Parameters, PQLs and Methods - Groundwater

Parameter	Unit	PQL	Method	Parameter	Unit	PQL	Method
Heavy Metals				***Chlorinated Hydrocarbons (CHCs)***			
Antimony - Sb	μg/L	1	USEPA 200.8	1,2-dichlorobenzene	μg/L	1	USEPA 8260B
Arsenic - As	μg/L	1	USEPA 200.8	1,3-dichlorobenzene	μg/L	1	USEPA 8260B
Beryllium - Be	μg/L	0.5	USEPA 200.8	1,4-dichlorobenzene	μg/L	1	USEPA 8260B
Cadmium - Cd	μg/L	0.1	USEPA 200.8	1,2,3-trichlorobenzene	μg/L	1	USEPA 8260B
Chromium - Cr	μg/L	1	USEPA 200.8	1,2,4-trichlorobenzene	μg/L	1	USEPA 8260B
Cobalt - Co	μg/L	1	USEPA 200.8	Hexachlorobutadeine	μg/L	1	USEPA 8260B
Copper - Cu	μg/L	1	USEPA 200.8	1,1,2-trichloroethane	μg/L	1	USEPA 8260B
Lead - Pb	μg/L	1	USEPA 200.8	Hexachloroethane	μg/L	10	USEPA 8270D
Mercury - Hg	μg/L	0.5	USEPA 7471A	Other CHCs	μg/L	1	USEPA 8260B
Molybdenum - Mo	μg/L	1	USEPA 200.8	***Volatile Organic Compounds (VOCs)***			
Nickel - Ni	μg/L	1	USEPA 200.8	Aniline	μg/L	10	USEPA 8260B
Selenium - Se	μg/L	1	USEPA 200.8	2,4-dichloroaniline	μg/L	10	USEPA 8260B
Silver - Ag	μg/L	1	USEPA 200.8	3,4-dichloroaniline	μg/L	10	USEPA 8260B
Tin (inorg.) - Sn	μg/L	1	USEPA 200.8	Nitrobenzene	μg/L	50	USEPA 8260B
Nickel - Ni	μg/L	1	USEPA 200.8	2,4-dinitrotoluene	μg/L	50	USEPA 8260B
Zinc - Zn	μg/L	1	USEPA 200.8	2,4,6-trinitrotoluene	μg/L	50	USEPA 8260B
Total Petroleum Hydrocarbons (TPHs)				***Phenolic Compounds***			
C_6-C_9 fraction	μg/L	10	USEPA 8220A / 8000	Phenol	μg/L	10	USEPA 8041
C_{10}-C_{14} fraction	μg/L	50	USEPA 8000	2-chlorophenol	μg/L	10	USEPA 8041
C_{15}-C_{28} fraction	μg/L	100	USEPA 8000	4-chlorophenol	μg/L	10	USEPA 8041
C_{29}-C_{36} fraction	μg/L	100	USEPA 8000	2, 4-dichlorophenol	μg/L	10	USEPA 8041
BTEX				2,4,6-trichlorophenol	μg/L	10	USEPA 8041
Benzene	μg/L	1	USEPA 8220A	2,3,4,6-tetrachlorophenol	μg/L	10	USEPA 8041
Toluene	μg/L	1	USEPA 8220A	Pentachlorophenol	μg/L	10	USEPA 8041
Ethylbenzene	μg/L	1	USEPA 8220A	2,4-dinitrophenol	μg/L	10	USEPA 8041
m- & p-Xylene	μg/L	2	USEPA 8220A	***Miscellaneous Parameters***			
o-Xylene	μg/L	1	USEPA 8220A	Total Cyanide	μg/L	5	APHA 4500C&E-CN
Polyciclic Aromatic Hydrocarbons (PAHs)				Fluoride	μg/L	10	APHA 4500 F-C
PAHs	μg/L	0.1	USEPA 8270	Salinity (TDS)	mg/L	1	APHA 2510
Benzo(a)pyrene	μg/L	0.01	USEPA 8270	pH	units	0.1	APHA 4500H+
OrganoChlorine Pesticides (OCPs)				***OrganoPhosphate Pesticides (OPPs)***			
Aldrin	μg/L	0.001	USEPA 8081	Azinphos Methyl	μg/L	0.01	USEPA 8141
Chlordane	μg/L	0.001	USEPA 8081	Chloropyrifos	μg/L	0.01	USEPA 8141
DDT	μg/L	0.001	USEPA 8081	Diazinon	μg/L	0.01	USEPA 8141
Dieldrin	μg/L	0.001	USEPA 8081	Dimethoate	μg/L	0.01	USEPA 8141
Endosulfan	μg/L	0.001	USEPA 8081	Fenitrothion	μg/L	0.01	USEPA 8141
Endrin	μg/L	0.001	USEPA 8081	Malathion	μg/L	0.01	USEPA 8141
Heptachlor	μg/L	0.001	USEPA 8081	Parathion	μg/L	0.01	USEPA 8141
Lindane	μg/L	0.001	USEPA 8081	Temephos	μg/L	0.01	USEPA 8141
Toxaphene	μg/L	0.001	USEPA 8081	***Polychlorinated Biphenyls (PCBs)***			
				Individual PCBs	μg/L	0.01	USEPA 8081

Table QC5 - QC Sample Data Acceptance Criteria

QC Sample Type	Method of Assessment	Acceptable Range
Field QC		
Blind Duplicates and Split Samples	The assessment of split duplicate is undertaken by calculating the Relative Percent Difference (RPD) of the duplicate concentration compared with the primary sample concentration. The RPD is defined as: $RPD = 100 \times \frac{\| X_1 - X_2 \|}{mean (X1, X2)}$ Where: X_1 and X_2 are the concentrations of the primary and duplicate samples.	The acceptable range depends upon the levels detected: - 0-150% RPD (when the average concentration is <5 times the LOR/PQL) - 0-75% RPD (when the average concentration is 5 to 10 times the LOR/PQL) - 0-50% RPD (when the average concentration is >10 times the LOR/PQL)
Rinsate & Trip Blanks	Each blank is analysed as per the original samples.	Analytical Result <LOR/PQL
Laboratory prepared Trip Spike	The Trip Spike is analysed after returning from the field and the % recovery of the known spike is calculated.	70 - 130%
Laboratory QC		
Laboratory Duplicates	Assessment of Lab Duplicate RPD as per Blind Duplicates and Split Samples.	Lab Duplicate RPD < 15% (Inorganics) Lab Duplicate RPD < 30% (Organics) for sample results > 10 LOR
Surrogates Matrix Spikes Laboratory Control Samples	Assessment is undertaken by determining the percent recovery of the known surrogate spike (SS) or addition to the sample. $\% \text{ Recovery} = 100 \times \frac{C - A}{B}$ Where: A = Concentration of analyte determined in the original sample; B = Added Concentration; and C = Calculated Concentration.	at least 2 SS recoveries to be within 70-130% subject to matrix effects (Organics) 80-120% (Inorganics / Metals) 60-140% (Organics) 10-140% (SVOC and Speciated Phenols) If the result is outside the above ranges, the result must be <3x Standard Deviation of the Historical Mean (calculated over the past 12 months).
Sample Matrix Spike Duplicates	Recovery RPD	<30% (Inorganics & Organics)
Calibration Check Standars	Continuous Calibration Verification (CCV)	CCV must be within ±15% (inorganics) CCV must be within ±25% (inorganics)
Reagent, Method & Calibration Check Blanks	Each blank is analysed as per the original samples.	Analytical Result <LOR/PQL

Note: PQL - Laboratory Practical Quantitation Limit (PQL) or the minimum detection limit for a particular analyte.
LOR = Limit of Reporting

1 OBJECTIVE

This procedure will be used by the laboratory to comply with NEPM requirements for QA/QC reporting (and is typical of other regulatory requirements).

This procedure is applicable to all Environmental samples eg from Environmental Consultants. Samples from non-Environmental Consultants such as Councils, mines or trade waste etc do not necessarily have to conform with these requirements, however, it will be the Envirolab Group's default policy that this procedure be used whenever possible.

2 DEFINITIONS

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.

Blank

This is the component of the analytical signal which is not derived from the sample but from reagents, glassware, instrument etc, can be determined by processing solvents, acids and reagents in exactly the same manner as for samples. Other terms cited in literature, but not used here include: Reagent Blank, Control Blank, Method Blank.

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. Other terms cited in literature include Laboratory Fortified Matrix. It is suggested that the spiking concentration be near the middle of the working calibration range.

Surrogate Spike

Surrogates are known additions to each standard, sample, blank, matrix spike and LCS in a process batch, of compounds which are similar to the analyte of interest in terms of:

a) extraction
b) recovery through clean up procedures
c) response to chromatography or other determinations

but which:

d) are not expected to be found in real samples
e) will not interfere with quantification of any analyte of interest
f) may be separately and independently quantified

These are only applicable to organic testing.

Internal Standards

Internal standards are used to check the consistency of the analytical step (e.g. injections, retention times, potential instrument suppression/enhancement etc) and provide a reference against which results may be adjusted in case of variation. For many organic and metals analyses, internal standards are added after all extraction, cleanup and concentration steps, to each final extract solution/sample/standard.

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. Other terms cited in literature include: laboratory control standard, quality control check sample, laboratory fortified blank.

Process Batch

A group of samples which behave similarly with respect to the sampling or the testing procedures being employed and which are processed as a unit for QC purposes. It is important that all factors within a process batch be the same. If any factors change e.g. reagents, staff, standards then a new process batch is deemed to have begun. A process batch is considered to be $\leq$20 samples.

Percent Recovery

Percent recovery describes the capability of the method to recover a known amount of analyte added to the sample.

% Recovery = C-A / B x 100

where: A = natural concentration of analyte in the sample
B = concentration of analyte added to the sample
C = concentration of analyte determined in the spiked sample

RPD (Relative Percent Difference)

This calculation measures the precision between two figures. Commonly used to compare the precision of Duplicate results.

% RPD = ((Highest – Lowest)/Average) x 100

3 QC REQUIRED AND WHAT IS REPORTED

The following QC is required for all Environmental Samples, unless justified otherwise by a Manager/Supervisor.

Blank

At least one per process batch.
The Blanks must be labelled throughout the day e.g.: Blk_1, Blk_2 etc.
The Blank is analysed at a rate of one per $\leq$20 samples.

LCS

At least one per process batch.
The LCS's must be labelled throughout the day e.g.: LCS_1, LCS_2 etc.
The LCS is reported to all clients at a rate of one per $\leq$20 samples.

Duplicate

At least one per ten samples i.e. a Duplicate is carried $\leq$ 10 samples.
So, if there is one process batch of 100 samples there will be at least 10 Duplicates.
There are instances where there is insufficient sample for a duplicate analysis and hence the

frequency will not apply, however, every effort will be made to perform a duplicate in each process batch (water volumes supplied for VOC and SVOC are often insufficient).

The Duplicate is only reported to the client if it is performed on their sample.

Matrix Spike

One for each soil/water/air sample (where applicable) type e.g.: if a batch contains soils/waters/air samples then a matrix spike must be done on each sample type at a frequency of 5%, typically a matrix spike is carried out where $\geq$5 samples and then every 20.

The sample type is generally recorded on the Chain of Custody. If a client calls all samples 'soil' then we will treat all samples as 1 sample type (unless they are very obviously different).
If there is only one sample type e.g. soil, then a matrix spike is performed every 20 samples.

There is no requirement in NEPM for a Matrix Spike Duplicate.

The Matrix Spike is only reported to the client if it is performed on their sample.

Certified/Standard Reference Materials

Where available, CRMs/SRMs are analysed (particularly during validation/verification). Due to the high cost and lack of stability of many CRMs/SRMs, the frequency of analysis is relatively low. Typically SRMs are run for Metals only (e.g. AGAL series 6, 10, 12 for example) as they are cost effective and stable over a long period of time. Therefore once a week or once a month is not uncommon.

4 ACCEPTANCE CRITERIA

If QC fails, take corrective action promptly to determine and eliminate the source of the error. Do not report data until the cause of the problem is identified and either corrected or qualified by a supervisor.

Matrix Spikes

As a general rule, the recoveries of most analytes spiked into samples should fall within the range 60% - 140% and this range should be used as a guide in evaluating in house performance, exceptions exist within individual methods. (*see tables 1-3 below for global acceptance criteria*).

Matrix Spikes will regularly fail, often due to matrix interferences. If a Matrix Spike fails it should be investigated:

a) check calculations and transcriptions to ensure a mistake has not been made.

b) look at the background concentration of the sample. If sample background is high then recovery can be affected (sample heterogeneity). A useful rule of thumb is where background concentration of an analyte is >3* the spike level then the spike recovery is n/a, however, where the sample is very non-homogenous acceptable spike recovery may be difficult. As long as the LCS is acceptable (*see below*) then the Process Batch will be accepted.

c) If the LCS has also failed then the Process Batch is deemed to have failed and data should not be reported unless justified. The batch should be repeated after consultation with the supervisor, possibly replacing standards or reagents (see guidelines below).

If a matrix spike has failed yet the process batch has been accepted by the supervisor, the failed matrix spike should still be reported to the client (unless the spiked sample has very high background levels). This should be accompanied by an appropriate comment such as ‘percent recovery not available due to significant background levels of analyte in the sample’ or ‘the matrix spike recovery was outside recommended acceptance criteria, however, an acceptable recovery was achieved for the LCS. This indicates a sample matrix interference’.

Matrix spikes are not carried out for all tests. These exceptions are mainly the inorganic tests such as TSS, pH, EC etc. and OHS samples (tubes/badges/filters/swabs etc) where all the sample is extracted as opposed to a portion. In these cases an acceptable LCS is required.

Matrix spikes are also not reported for all analytes. For example in a SVOC run of >100 analytes it is acceptable to only spike a range of analytes e.g. some PAHs, some OCP, some OPP, some speciated Phenols etc.

Duplicates

Acceptable Duplicate data is judged by % RPD.

See tables 1-3 below for acceptance criteria, the acceptance criteria will increase as the analyte concentration approaches the PQL as measurement uncertainty will become a more significant factor.

If a water duplicate fails then repeat the analysis (if there is sufficient sample left). If the RPD% fails again it is likely to be due to a non-homogeneity or a matrix issue and an appropriate comment should be applied to the report such as ‘the duplicate is outside acceptable %RPD, re-analysis indicates possible sample heterogeneity’. All failed duplicate results should be reported, a triplicate should be reported to illustrate analyte variability where applicable. *Poor reproducibility for water samples is rare unless the sediment loading is significant*.

If a soil duplicate fails then it should be repeated (if there is sufficient sample left). If the RPD% fails again it is likely to be due to a matrix non-homogeneity issue and an appropriate comment should be applied to the report such as ‘the duplicate is outside acceptable %RPD, reanalysis indicates possible sample heterogeneity’. All failed duplicate results should be reported and a triplicate should be reported to illustrate analyte variability where applicable. Soil matrices are a common issue with poor analyte precision given samples are typically prepared field moist

If an air duplicate fails then it should be repeated (if there is sufficient sample left). Duplicates for air samples are only applicable for canister and air sample (tedlar) bag analyses, precision failures should be rare given the relative simplicity of the matrix, however variation will be higher near reporting limits (PQL).

Internal Standards

Acceptance criteria for internal standards are 70-130% for Metals and 50-150% for Organics, note exceptions may exist in individual methods – see tables 1 and 3 below.

If internal standards exceed this criteria they will need to be either re-vialed and re-run for organics or diluted and re-run for metals. If they continue to fail consult the supervisor.

Surrogates

Surrogate recoveries should generally be within the range of 60-140%, table 3 below.

High analyte concentrations may cause surrogates to fail – this needs to be annotated on the final report (e.g. for svTRH).

The surrogate recovery in BLKs and LCSs should be within Global Acceptance Criteria (GAC) or Analyte Specific Acceptance Criteria (ASAC) for labile surrogates (e.g. d5-phenol etc.). The GAC and ASAC are discussed in more detail below.

Certified/Standard Reference Materials

CRMs/SRM recoveries should generally be within the range of 70-130%. Some certified levels are below or within 10*PQL and therefore ±30% tolerance is not achievable on all instruments (e.g. some elements in AGAL12 will struggle with this criteria on ICP-OES but should be achieved on ICP-MS due to higher uncertainty based on PQL differences for the two instruments).

Global Acceptance Criteria (GAC) for Matrix Spikes, LCS and BLKS

The criteria specified below covers >90% of the analytes determined by the laboratory, however due to limitation of the methodology and/or the labile nature of some analytes there are analytes whose recovery is outside of this acceptance criteria (GAC). Therefore ***Analyte Specific Acceptance Criteria*** (ASAC) is applied for these analytes. The ASAC is determined from 6-12 months of LCS recovery data and is Defined as 3 x std dev from the mean LCS recovery %.

See GAC in the tables below.

Table 1 – Metals GAC

	ICV	**CCV**	**Internal Standards**	**LCS**	**PQL std**	**Calibration Blank**	**Matrix Spikes#**	**%RPD≥ 10*PQL[@]**	**5*PQL≥*sample* *%RPD*<10*PQL[@]**	**%RPD<5*PQL**
Dissolved Waters	±10%	±20%	70-130%	±20%	±50%	<1/2*PQL std	±30%	20	50	any
Impingers	±10%	±20%	70-130%	±20%	±50%	<1/2*PQL std	±30%	30	50	any
Total Waters	±10%	±20%	70-130%	±20%	±50%	<1/2*PQL std	±30%	30	50	any
Soils/Paint/Filters (if cut in pieces)	±10%	±20%	70-130%	±30%	±50%	<1/2*PQL std	±30%	40	50	any

n/a where background is ≥ 3* spike level
@ where an original and duplicate result are above and below a cut off (5* and 10*PQL), then the mean of the two defines the criteria used.

Table 2 – Inorganics GAC

	ICV (LCS in many cases)	CCV	PQL std	Calibration Blank	LCS	Matrix Spikes#	%RPD≥10*PQL@	5*PQL≥*sample %RPD*<10*PQL@	%RPD<5*PQL
Waters - Nutrients no preparation	±20%	±20%	±50%	<1/2*PQL std	±20%	±30%	20	50	any
Waters digested/distilled	±20%	±20%	±50%	<1/2*PQL std	±20%	±30%	30	50	any
Impingers	±20%	±20%	±50%	<1/2*PQL std	±20%	±30%	30	50	any
Soils/Filters (if cut in pieces)	±20%	±20%	±50%	<1/2*PQL std	±30%	±30%	30	50	any

n/a where background is ≥ 3* spike level
@ where an original and duplicate result are above and below a cut off (5* and 10*PQL) then the average defines the criteria used.

Table 3 - Organics (includes Air Toxics unless specified in the method) GAC (TD tubes are an exception for field duplicates)

	ICV (LCS in many cases)	CCV*	Internal Stds	PQL std	Calibration Blank	LCS$	Matrix Spikes#$ and Surrogates	%RPD≥5*PQL (although sampling may be the source of error)	%RPD<5*PQL
Waters/Air Toxic - VOC	±20%	±20%	50-150%	±50%	n/a	±20%	±40%	30	any
Waters extracted	±20%	±20%	50-150%	±50%	n/a	±40%	±40%	50	any
Soils	±20%	±20%	50-150%	±50%	n/a	±40%	±40%	50	any

n/a where background is ≥ 3* spike level
$ - there will be exception to this rule as some analytes are particularly labile and recovery as low as 10% has been documented in the literature (see ASAC).

@ where an original and duplicate result are above and below a cut off (5* and 10*PQL) then the average defines the criteria used.

See MICRO/ASBESTOS and ASS methods for acceptance criteria in those sections.

Decision Path for LCS

As a general rule, the recoveries of most LCS's should fall within the ranges specified in the tables above.

If an LCS fails it should be investigated:-

a) check calculations and transcriptions to ensure a basic mistake has not been made.

b) If all other QC has passed, repeat the LCS analysis. If the LCS fails again it should be re-made and re-analysed.

c) If the LCS fails after the second attempt there could be a problem with the LCS and hence the procedure – consult the supervisor.

If the failure is specific to the LCS then the Process Batch may be acceptable, if not, then repeat the process batch (if sufficient sample available). If insufficient sample is available then the data must be qualified with respect to the LCS result (for example a surrogate is half the expected value for all samples and LCS, this may be due to a setting on a pipette and is not reflective of poor extraction efficiency).

d) If the LCS fails the criteria in the GAC tables above, then compare to the ASAC for the individual analytes (i.e. 3 x stdev of LCS over 6-12 months). If within these criteria then the LCS is acceptable as long as above 10% recovery. Recovery below this limit implies the analytical method in not fit for purpose and hence the data must be qualified accordingly if reported.

There should be an LCS available for >99% of tests (exceptions include Asbestos for example).

Practical Quantitation Limit Checks (PQLs)

As can be seen from the tables above, a PQL standard run in the calibration or as a sample can be used to confirm the ability to determine the PQL on a sequence by sequence basis. This negates the need for MDL studies as the PQL is confirmed for each analytical sequence.

5 CHECKING THE CORRECTNESS OF ANALYSIS (see also form 346)

Anion Cation Balance

The anion and cation sums, when expressed as milliequivalents per litre, must approximately balance because all potable waters are electrically neutral.

As a minimum ion balance is determined from cations:-Na/Ca/Mg/K and anions:- Alk/Cl/SO_4.

The full calculation can be found in APHA and Form 213 - Mass Balance Calculation sheet can be used to determine the ion balance in Excel.

The acceptance criteria in APHA are very strict as they are based on potable water. The environmental waters we receive could rarely be termed potable so our % Difference has been determined to be ±15%, with supervisor discretion.

If the % is >15% for “cation total Meq vs anion total Meq” then there is a possibility of gross error and reruns/checks may be necessary. If the result is confirmed then an appropriate comment must accompany the report such as ‘the mass imbalance may be caused by other ions that have not been measured’. Extremes of pH can also cause an imbalance.

TDS v Ions

Measured TDS should be similar or greater than ion calculated TDS. This is because the calculation will normally not involve ions such as F, Si, NO_3 etc.

Note, as a guide in mg/L:-

0.6(alk) + Cl + SO_4 + Na + Ca + Mg + K + = Approx TDS.

Measured EC and Ion sums

Both the anion & cation sums (expressed as meq) should be 1/100 of the measured EC value. If either of the 2 sums does not meet this criteria, that sum is suspect.

The calculation is: 100 x anion (or cation sum) meq/L = (0.9-1.1 EC).

The full calculation can be found in APHA or use the spreadsheet i.e. Form 213 - Mass Balance Calculation sheet v1. Note another useful rule of thumb is that Chloride (mg/L) is $^1/_3$ of EC.

Measured TDS to EC Ratio

EC x (0.55-0.7) = TDS.

If it is outside this criteria one of the tests may be suspect. The exception is waters with high colloidal particulates that may contribute to a higher measured TDS result.

Metals – Total Recoverable v Dissolved.

In theory Total recoverable metals must be equal or higher than dissolved metals for the same water sample. If the difference is within the uncertainty of the individual tests then this should be noted on the worksheets. If the difference is outside the uncertainty of the individual tests then one of the results is suspect and should be re-analysed for confirmation/denial.

Metals – CrVI vs total dissolved Cr and FeII vs total dissolved Fe

The sample preservation for hexavalent Chromium, Ferrous Iron and the total dissolved Chromium and Iron are from different preservations. Hence different bottles are used during sampling which can lead to variations in results given:-

Cr^{VI} $\leq$ total dissolved Cr and Fe^{II} $\leq$ total dissolved Fe (taking into account some MU in analysis)

A common source of error is where samples for Cr^{VI} and Fe^{II} are not field filtered (into caustic and HCl preserved containers respectively), whereas the total dissolved metals are field filtered into HNO_3 preserved bottles. Therefore interaction with sediment can lead to higher Cr^{VI} and Fe^{II} numbers than would be given if filtered. Therefore, where this occurs a note should be recorded on the report and/or communicated to the customer/sampler.

Organics

Some simple checks to be aware of include:

C_6-C_{10} should generally be greater than BTEX.

>C_{10}-C_{36} should generally be greater than PAH.

Naphthalene in the VOC run should be similar to PAH (SVOC) run, however where the soil is non-homogenous then poor precision may exist. Additionally two different solvent mixes are used which can lead to variability in extraction efficiency.

Nutrients

TKN should be greater than or equal to Ammonia. If the difference is within the uncertainty of the individual tests then this should noted on the worksheets. If the difference is outside the uncertainty of the individual tests then one of the results is suspect and should be reanalysed for confirmation/denial. Use of different bottle for TKN and Ammonia can cause anomalies do to sampling variability.

See form 346 for more detail on checking correctness of data.

6 CONTROL CHARTS

Control Charts can be generated from LIMS as required. LCS data is used to construct these charts. LCS data is a good indication of the health of the method.

Matrix spike and duplicate data can vary significantly due to the nature of certain matrices so are not considered an ideal measure. If a MS result is grossly out due to a known interference then control data will be invalidated as the result is an outlier.

Control charts can used to monitor trends and should alert the analyst to potential problems. In theory all plotted data should lie within 2SD (Warning Limits =WL) of the mean or within the target recovery (e.g. GAC and ASAC recovery limits discussed above).

Results outside the CL or outside the target recovery (e.g. GAC and ASAC recovery limits discussed above) should not be accepted unless there is a valid, documented reason.

7 STANDARDS / CALIBRATIONS

Calibration standards are purchased either in commercial mixes that are traceable to NIST (wherever possible with CoAs) and/or as neat compounds/salts. Where possible, purity of neat compounds/salts is >>95% (as high as available but still cost effective). Standards used for calibration are prepared (working standards) as required and allocated a shelf life in accordance with the methods (in house and via international standards) and in consultation with approved suppliers and senior staff experience.

Calibration standards are verified by an independently sourced standard (where available) as described within individual methods. Standards that are used beyond the specified shelf-life (e.g. the default shelf-life for many commercial standards) must be verified by a standard that is within the specified shelf-life.

Note, inorganic salts with purity >>95% (>99% preferable) typically have a shelf life >10 years (the shelf life is typically not specified by the supplier). The standards from such salts are checked versus other sources of analyte regardless, for example a working standard from a $NaNO_3$ salt (as a Nitrate source) could be confirmed as acceptable for use by checking versus a working standard prepared from a KNO_3 salt (or a commercial mix of NO_3 where a CoA is supplied).

Calibration

In general calibrations are linear or linear through zero (i.e. through the blank). Exceptions to this rule occur where the chemistry is non-linear (e.g. some colourimetric chemistry) and quadratic fits can be used. Another example would be for labile Organic analytes where, for example, breakdown and/or adsorption effects become significant, therefore quadratic fits become necessary.

Calibration curves are constructed for each daily sequence for most instrumentation, the exceptions would be for some colourimetric chemistries where the reagents are very stable (e.g. $NH_3/NO_3/PO_4$/CrVI/TKN) and also for some GC-MS/ECD analyses where acceptable response is maintained for all analytes (can be confirmed with PQL standard analyses and S/N observation). To confirm the validity of the calibration curves an Independent Calibration Check (ICV) is run with a tolerance of ±20% of expected result (as described below).

For most methods an Independent Calibration Check (ICC or ICV where V = verification) is analysed straight after the calibration. This should be an independent check (i.e. made from another standard source) and acceptance is defined in the tables 1-3 in section 4 above. If it is outside this acceptance criteria, a new calibration may be necessary and/or calibration standards should be re-prepared and/or the Independent Calibration Check should be re-prepared.

Results may only be reported if within the calibration range (exceptions include ICPOES/IC/FID where linearity way beyond the top standard has been demonstrated in validation data). Results +10% beyond the top standard are acceptable in general where linear calibrations are used, *not* where quadratics are used.

The correlation coefficient (R^2) should be >0.995 for the vast majority of analytes (individual methods may have specific criteria). Where failures occurs, calibration points may be removed as a last resort (e.g. for a poor injection where internal standards are indicative) and should be a rarity as opposed to normal practice. In general 3-5 calibration standards are used to generate a response curve and/or a Continuing Calibration Verification (CCV) standard is run to ensure signal to noise is maintained.

Continuing Calibration

A continuing calibration is analysed approximately every 20 samples and at the end of the run. Acceptance should be ±20%. If it is outside this acceptance a new calibration will be necessary (the ability to maintain the detection limit (PQL) is a requirement i.e. run the PQL standard as described above with the required acceptance criteria (tables 1-3)).

New v's Old Standard Checks

New standards should always be compared to the old with an acceptance of ±10%.

Expired Standards

Standards that have expired may still be used, however, need to be verified against another in date standard, CRM or confirmed by another lab. The expiry date may then be extended a further 6 months (or less as deemed appropriate). For some analytes, such as metals, extending the expiry date for many years may be acceptable as there is known stability.

8 Intralaboratory Check Samples

Soils –

Internally prepared reference materials can be used to check the validity of analysis. Typically for soil, customer samples are collated and are then air dried, homogenised and sieved. The analyte concentrations are then determined by analysing 7-10 replicates to achieve a mean with an RSD%$\leq$30% (although concentration dependant). The results can then be internally (Melbourne ↔ Perth ↔ Sydney lab) verified and/or externally verified with another NATA accredited facility.

Once an acceptable mean and acceptance criteria has been established (professional judgement of the senior chemists can be utilised here), then the material can then be analysed periodically to check laboratory performance. Alternatively, if available, confirm against a CRM/SRM.

Other non-certified reference materials can be used to assess laboratory performance if suitably verified data has been generated (e.g. ELIG soil where 10 labs participated in generating data).

Waters –

The R&D Manager or delegate will periodically prepare QC samples for an ILCP between the labs in the Envirolab Group. Samples may be prepared from standard solutions, independant check solutions and/or solutions remaining from previous proficiency programs (stability may have to be ascertained. These solutions will generally be of known concentration.

Spike solutions using products may also be prepared for comparison purposes e.g. petrol for TRH/BTEX or Diesel for PAHs etc.

Table QC1 - Containers, Preservation Requirements and Holding Times - Soil

Parameter	Container	Preservation	Maximum Holding Time
Acid digestible metals and metalloids - Total and TCLP (As,Cd.,Cu,Cr,Ni,Pb,Zn)	Glass with Teflon Lid	Nil	6 months
Mercury	Glass with Teflon Lid	Nil	28 days
TPH / BTEX / VOC / SVOC / CHC	Glass with Teflon Lid	4^{o}C, zero headspace	14 days
PAHs (total and TCLP)	Glass with Teflon Lid	4^{o}C [1]	14 days
Phenols	Glass with Teflon Lid	4^{o}C [1]	14 days
OCPs, OPPs and total PCBs	Glass with Teflon Lid	4^{o}C [1]	14 days
Asbestos	Sealed Plastic Bag	Nil	N/A

Table QC2 - Containers, Preservation Requirements and Holding Times - Water

Parameter	Container Volume (mL)	Preservation	Maximum Holding Time
Heavy Metals	60mL Plastic	Field filtration 0.45µm HNO_3 / 4^{o}C	6 months
Mercury	60mL Plastic	Field filtration 0.45µm HNO_3 / 4^{o}C	~~6 months~~ 28 days
Cyanide	125mL Amber Glass or 125mL Opaque HDPE	pH > 12 NaOH / 4^{o}C	~~6 months~~ 14 days
TPH (C6-C9) / BTEX / VOCs SVOCs / CHCs	4 x 44mL Glass	HCl / 4^{o}C [1] or Sodium Bisulphate	14 days
TPH (C10-**C40**) / PAH / Phenolics OCP / OPP / TDS / pH	3 x 1L Amber Glass	None / 4^{o}C [1]	28 days (TDS is 7 days, pH is ideally a field test and should be analysed ASAP)

Notes: [1] = Extraction within 14 days, Analysis within 40 days.

Table QC3 - Analytical Parameters, PQLs and Methods - Soil *(Routine Levels)*

Parameter	Unit	PQL	Method Reference
Metals in Soil			
Arsenic - As[1]	mg / kg	4	USEPA 200.7 (also reference USEPA 6010C and 3050)
Cadmium - Cd[1]	mg / kg	0.4	USEPA 200.7 (also reference USEPA 6010C and 3050)
Chromium - Cr[1]	mg / kg	1	USEPA 200.7 (also reference USEPA 6010C and 3050)
Copper - Cu[1]	mg / kg	1	USEPA 200.7 (also reference USEPA 6010C and 3050)
Lead - Pb[1]	mg / kg	1	USEPA 200.7 (also reference USEPA 6010C and 3050)
Mercury - Hg[2]	mg / kg	0.1	USEPA 7471A (also reference USEPA 3050)
Nickel - Ni[1]	mg / kg	1	USEPA 200.7 (also reference USEPA 6010C and 3050)
Zinc - Zn[1]	mg / kg	1	USEPA 200.7 (also reference USEPA 6010C and 3050)
Total Petroleum Hydrocarbons (TRHs) in Soil			
old fractions			
C_6-C_9 fraction	mg / kg	25	USEPA 8260
C_{10}-C_{14} fraction	mg / kg	50	USEPA 8000
C_{15}-C_{28} fraction	mg / kg	100	USEPA 8000
C_{29}-C_{36} fraction	mg / kg	100	USEPA 8000
NEPM 2013 Fractions			
C_6-C_{10} fraction	mg / kg	25	USEPA 8260
$>C_{10}$-C_{16} fraction	mg / kg	50	USEPA 8000
$>C_{16}$-C_{34} fraction	mg / kg	100	USEPA 8000
$>C_{34}$-C_{40} fraction	mg / kg	100	USEPA 8000
BTEX in Soil			
Benzene	mg / kg	0.2	USEPA 8260
Toluene	mg / kg	0.5	USEPA 8260
Ethylbenzene	mg / kg	0.5	USEPA 8260
m & p Xylene	mg / kg	1	USEPA 8260
o- Xylene	mg / kg	0.5	USEPA 8260
Other Organic Contaminants in Soil			
PAHs	mg / kg	0.05-0.2	USEPA 8270
CHCs	mg / kg	1	USEPA 8260
VOCs	mg / kg	1	USEPA 8260
SVOCs	mg / kg	1	USEPA 8260
OCPs	mg / kg	0.1	USEPA 8140, 8080
OPPs	mg / kg	0.1	USEPA 8140, 8080
PCBs	mg / kg	0.1	USEPA 8080
Phenolics	mg / kg	5	APHA 5530
Asbestos			
Asbestos	mg / kg	Presence / Absence	AS4964-2004

Notes:

1. Acid Soluble Metals by ICP-AES

2. Total Recoverable Mercury

Table QC4 - Analytical Parameters, PQLs and Methods - Groundwater

Parameter	Unit	PQL	Method
Heavy Metals			
Antimony - Sb	μg/L	1	USEPA 200.8
Arsenic - As	μg/L	1	USEPA 200.8
Beryllium - Be	μg/L	0.5	USEPA 200.8
Cadmium - Cd	μg/L	0.1	USEPA 200.8
Chromium - Cr	μg/L	1	USEPA 200.8
Cobalt - Co	μg/L	1	USEPA 200.8
Copper - Cu	μg/L	1	USEPA 200.8
Lead - Pb	μg/L	1	USEPA 200.8
Mercury - Hg	μg/L	0.05	USEPA 7471A
Molybdenum - Mo	μg/L	1	USEPA 200.8
Nickel - Ni	μg/L	1	USEPA 200.8
Selenium - Se	μg/L	1	USEPA 200.8
Silver - Ag	μg/L	1	USEPA 200.8
Tin ~~(inorg.)~~ - Sn (all forms)	μg/L	1	USEPA 200.8
Nickel - Ni	μg/L	1	USEPA 200.8
Zinc - Zn	μg/L	1	USEPA 200.8
Total Petroleum Hydrocarbons (TRHs)			
C_6-C_9 fraction	μg/L	10	USEPA 8220A / 8000
C_{10}-C_{14} fraction	μg/L	50	USEPA 8000
C_{15}-C_{28} fraction	μg/L	100	USEPA 8000
C_{29}-C_{36} fraction	μg/L	100	USEPA 8000
NEPM 2013			
C_6-C_{10} fraction	μg/L	10	USEPA 8220A / 8000
>C_{10}-C_{16} fraction	μg/L	50	USEPA 8000
>C_{16}-C_{34} fraction	μg/L	100	USEPA 8000
>C_{34}-C_{40} fraction	μg/L	100	USEPA 8000
BTEX			
Benzene	μg/L	1	USEPA 8260
Toluene	μg/L	1	USEPA 8260
Ethylbenzene	μg/L	1	USEPA 8260
m- & p-Xylene	μg/L	2	USEPA 8260
o-Xylene	μg/L	1	USEPA 8260
Polyciclic Aromatic Hydrocarbons (PAHs)			
PAHs Level 2	μg/L	0.1	USEPA 8270
Benzo(a)pyrene Level 3	μg/L	0.01	USEPA 8270
OrganoChlorine Pesticides (OCPs) Trace Level			
Aldrin	μg/L	0.001	USEPA 8082A
Chlordane	μg/L	0.001	USEPA 8082A
DDT	μg/L	0.001	USEPA 8082A
Dieldrin	μg/L	0.001	USEPA 8082A
Endosulfan	μg/L	0.001	USEPA 8082A
Endrin	μg/L	0.001	USEPA 8082A
Heptachlor	μg/L	0.001	USEPA 8082A
Lindane	μg/L	0.001	USEPA 8082A
Toxaphene	μg/L	0.001	USEPA 8082A

Parameter	Unit	PQL	Method
Chlorinated Hydrocarbons (CHCs)			
1,2-dichlorobenzene	μg/L	1	USEPA 8260C
1,3-dichlorobenzene	μg/L	1	USEPA 8260C
1,4-dichlorobenzene	μg/L	1	USEPA 8260C
1,2,3-trichlorobenzene	μg/L	1	USEPA 8260C
1,2,4-trichlorobenzene	μg/L	1	USEPA 8260C
Hexachlorobutadeine	μg/L	1	USEPA 8260C
1,1,2-trichloroethane	μg/L	1	USEPA 8260C
Hexachloroethane	μg/L	10	USEPA 8270D
Other CHCs	μg/L	1	USEPA 8260C
Semi-Volatile Organic Compounds (SVOCs)			
Aniline	μg/L	10	USEPA 8270D
2,4-dichloroaniline	μg/L	10	USEPA 8270D
3,4-dichloroaniline	μg/L	10	USEPA 8270D
Nitrobenzene	μg/L	10	USEPA 8270D
2,4-dinitrotoluene	μg/L	10	USEPA 8270D
2,4,6-trinitrotoluene	μg/L	10	USEPA 8270D
Phenolic Compounds			
Phenol	μg/L	10	USEPA 8270D
2-chlorophenol	μg/L	10	USEPA 8270D
4-chlorophenol	μg/L	10	USEPA 8270D
2, 4-dichlorophenol	μg/L	10	USEPA 8270D
2,4,6-trichlorophenol	μg/L	10	USEPA 8270D
2,3,4,6-tetrachlorophenol	μg/L	10	USEPA 8270D
Pentachlorophenol	μg/L	10	USEPA 8270D
2,4-dinitrophenol	μg/L	100	USEPA 8270D
Miscellaneous Parameters			
Total Cyanide	μg/L	4	APHA 4500C&E-CN
Fluoride	μg/L	100	APHA 4500 F-C
Salinity (TDS)	mg/L	5	APHA 2510
pH	units	0.1	APHA 4500H+
OrganoPhosphate Pesticides (OPPs) Trace Level			
Azinphos Methyl	μg/L	0.01	USEPA 8082A/8270D
Chloropyrifos	μg/L	0.01	USEPA 8082A/8270D
Diazinon	μg/L	0.01	USEPA 8082A/8270D
Dimethoate	μg/L	0.01	USEPA 8082A/8270D
Fenitrothion	μg/L	0.01	USEPA 8082A/8270D
Malathion	μg/L	0.01	USEPA 8082A/8270D
Parathion	μg/L	0.01	USEPA 8082A/8270D
Temephos	μg/L	0.01	USEPA 8082A/8270D
Polychlorinated Biphenyls (PCBs) Trace Level			
Individual PCBs	μg/L	0.01	USEPA 8082A/8270D

Table QC5 - QC Sample Data Acceptance Criteria

QC Sample Type	Method of Assessment	Acceptable Range
Field QC		
Blind Duplicates and Split Samples	The assessment of split duplicate is undertaken by calculating the Relative Percent Difference (RPD) of the duplicate concentration compared with the primary sample concentration. The RPD is defined as: $\text{RPD} = 100 \times \frac{\lvert X_1 - X_2 \rvert}{\text{mean}(X1, X2)}$ Where: X_1 and X_2 are the concentrations of the primary and duplicate samples.	The acceptable range depends upon the levels detected: - 0-150% RPD (when the average concentration is <5 times the LOR/PQL) - 0-75% RPD (when the average concentration is 5 to 10 times the LOR/PQL) - 0-50% RPD (when the average concentration is >10 times the LOR/PQL)
Rinsate & Trip Blanks	Each blank is analysed as per the original samples.	Analytical Result <LOR/PQL
Laboratory prepared Trip Spike	The Trip Spike is analysed after returning from the field and the % recovery of the known spike is calculated.	70 - 130%
Laboratory QC		
Laboratory Duplicates	Assessment of Lab Duplicate RPD as per Blind Duplicates and Split Samples.	The acceptable range depends upon the levels detected: - Any RPD (when the average concentration is <5 times the PQL) - 0-50% RPD (when the average concentration is >5 times the PQL
Surrogates Matrix Spikes Laboratory Control Samples	Assessment is undertaken by determining the percent recovery of the known surrogate spike (SS) or addition to the sample. $\%\ \text{Recovery} = 100 \times \frac{C - A}{B}$ Where: A = Concentration of analyte determined in the original sample; B = Added Concentration; and C = Calculated Concentration.	60-140% (General Analytes) 70-130% (Inorganics / Metals) 60-140% (Organics) 10-140% (SVOC and Speciated Phenols) If the result is outside the above ranges, the result must be <3x Standard Deviation of the Historical Mean (calculated over the past 12 months).
Sample Matrix Spike Duplicates	Recovery RPD	<30% (Inorganics & Organics)
Method Blanks	Each blank is analysed as per the original samples.	Analytical Result <LOR/PQL

Note: PQL - Laboratory Practical Quantitation Limit (PQL) or the minimum detection limit for a particular analyte.
LOR = Limit of Reporting