HEC
HAYES ENVIRONMENTAL CONSULTING

ABN 32 295 203 367

STAGE 1
PRELIMINARY ENVIRONMENTAL SITE INVESTIGATION

73 VISTA STREET, SANS SOUCI NSW 2219

Hayes Environmental Consulting Pty Ltd
Report No. EP1422 AB

31 March, 2017

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HEC Ref: EP1422 AB
Date: 31 March, 2017

Mr Tom Nanevski
Nanevski Developments Pty Ltd
34 Plimsoll Street
SANS SOUCI NSW 2219

RE: STAGE 1 PRELIMINARY ENVIRONMENTAL SITE INVESTIGATION; 73 VISTA STREET, SANS SOUCI NSW 2219

1.0 Introduction

Hayes Environmental Consulting Pty Ltd (HEC) hereby submits a report for its stage 1 preliminary environmental investigation of the property 73 Vista Street, Sans Souci, New South Wales (henceforth referred to as "the site").

It was understood that a Planning Proposal for re-zoning of the site had been submitted to Georges River Council. It was further understood that Georges River Council required a preliminary site investigation, in accordance with State Environmental Planning Policy No. 55 *Remediation of Land*, to support the corresponding proposal.

This preliminary environmental investigation was equivalent to a Tier 1 Risk Assessment, as defined under the NEPC (2013) *National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013*. The principal objective was to assess the potential for contamination to exist on the site. This report documents the findings of all related tasks performed by HEC, including reviews of historical information and a previous assessment report, field observations, soil profile descriptions, results of laboratory analyses and conclusions regarding the site's suitability for residential use.

The work reported herein followed standard environmental procedures, in accordance with the NSW Environment Protection Authority's *Guidelines for Consultants Reporting on Contaminated Sites* (OEH, 2011). Reference was also made to *Managing Land Contamination. Planning Guidelines SEPP 55 - Remediation of Land* (DUAP / EPA, 1998).

2.0 Site Characteristics and History

Property Identification, Location and Description

The site was located approximately 50m south (west) of the T-intersection of Vista and Nelson Streets, in Sans Souci NSW (*Ref.* Figure 1). It was further identified as comprising the following Lots and Deposited Plans (DPs), in the Parish of St George and County of Cumberland:

- Lot 1 in DP 320605;
- Lot 1 in DP 1115986; and
- Lots 392 and 489 in DP 752056.

The site was irregularly shaped, covering a total area of 2122.6m^2 (*Ref.* Attachment A and Figure 2). Vista Street lined the eastern site boundary (and frontage), beyond which were residential properties (low density). Further residences (low density) were situated to the north. Anderson Park lined the southern boundary, while the waterline of Kogarah Bay (Georges River) was immediately west of the site.

At the time of this investigation, the site was vacant (unoccupied), having previously been used for residential purposes. A two storey, brick and terracotta tile house was situated in the north eastern portion, while a brick and terracotta tile garage / boat shed and ramp were situated in the south western portion. A sloping, bitumen driveway provided access to the shed from Vista Street. The site remainder was vegetated.

Topography and Site Drainage

The geographical coordinates of the site were 33^{o}59'55"S and 151^{o}7'25"E. The local topography was gently undulating to flat, with the site being perched on the side of a sandstone crest (cut in part), the overall downslope of which being to the west (approximately 5-10^o), towards Kogarah Bay.

Information on regional topographic conditions, referenced from the Central Mapping Authority of NSW *Botany Bay 9130-3-S Topographic Map 1:25,000* (CMA, 1987) and Land and Property Information NSW *Port Hacking 9129-4-N Topographic & Orthophoto Map 1:25,000* (LPI, 2001), was consistent with this description and indicated that the site's elevation was approximately 10m Australian Height Datum (i.e. 10m AHD) at the Vista Street frontage, grading to less than 2m AHD at the Kogarah Bay sea wall. Based on the supplied survey plan (*Ref*. Attachment A), the relative elevations ranged from 8.53m AHD (north eastern corner) to 1.32m AHD (south western corner).

Surface water should flow in a westerly direction, towards Kogarah Bay (*Ref*. Figure 1). Kogarah Bay drains into the Georges River, immediately south of the site. Runoff and groundwater originating from the site would find its way to this system.

Regional Geology and Soil Landscape

Information on regional sub-surface conditions, referenced from the Department of Mineral Resources geological map *Wollongong - Port Hacking 1:100,000 Geological Series Sheet 9029-9129* (DMR, 1985), indicated that the site overlies an interface between Man-made Fill (*mf*) and Hawkesbury Sandstone (*Rh*). The man-made fill included "dredged estuarine sand and mud, coal washing, industrial and household waste". Hawkesbury Sandstone is characterised by "medium to coarse-grained quartz sandstone, very minor shale and laminite lenses".

The Soil Conservation Service of NSW *Soil Landscapes of the Wollongong - Port Hacking 1:100,000 Sheet* (Hazelton and Tille, 1990), indicated that the site overlies Disturbed Terrain (*xx*). According to Hazelton and Tille (1990), this landscape type includes level plains to undulating terrain (slopes <5%), which have been extensively disturbed by human activity to a depth of at least 1m below ground level (BGL). The original soil has been removed, greatly disturbed or buried. The land fill comprises soil, rock, building and/or waste materials, and the original vegetation has typically been completely cleared. The fill soils tend also to be impermeable, showing poor drainage and localised very low fertility.

The *Port Hacking Acid Sulfate Soil Risk Map* (1:25,000 scale; Flewin, 1997) indicated that the site overlies an interface of *Disturbed Terrain* (i.e. a filled area) and *No Known Occurrence* (for which acid sulfate soils (ASSs) are not known or expected to occur and "land management activities are not likely to be affected by ASS materials"). The map also placed the site within an area of 2-4m AHD.

Summary of Site History

Based on anecdotal information from the former site occupants, as well as land titles information and Council records:

- the site is situated within an area zoned *E4 Environmental Living*, on the Kogarah Local Environmental Plan 2012; although
- the flat, grassed section to the west of the original mean high water mark is zoned *W2 Regional Waterways*, on the Kogarah Local Environmental Plan 2012;
- the surroundings have consistently been dominated by residential and recreational properties, such as Anderson Park (which is zoned *RE1 Public Recreation*);
- the existing two storey, brick residence was built in 1943; and
- neither the site, nor its immediate surroundings, have been used for market gardening (i.e. crop cultivation), although the flat, low-lying sand plains east of the site (beyond Rocky Point Road) underwent farming activities, followed by intensive land filling operations, in the early to mid 1900s (prior to residential development).

3.0 Previous Assessment

A copy of the following environmental report was made available to HEC during the course of this investigation (*Ref.* Attachment B):

- STS GeoEnvironmental Pty Ltd (STS) "*Geotechnical Investigation and Acid Sulfate Soil Assessment for Nanevski Developments Pty Ltd; 73 Vista Street, Sans Souci, New South Wales*" (STS Project 20537/5961C; STS Report 15/2181A; dated September 2015).

This assessment included a site inspection, mechanical auger drilling of four boreholes (BH1-BH4) for sub-surface profiling, dynamic cone penetrometer (DCP) testing and laboratory analysis of "selected representative soil samples" for pH, chloride and sulfate contents, as well as suspension peroxide oxidation combined acidity and sulfate (SPOCAS). The principal findings relevant to this investigation were as follows:

- "The site was occupied by a residential building, asphalt driveway and separate garage. Site vegetation comprised grass, trees and shrubs. The surrounding properties are residential in nature. The ground surface falls approximately 5 to 6 metres to the west."
- "The subsurface conditions generally consist of fill overlying clayey sands, sandy clays and weathered sandstone. Fill was present in all boreholes to depths of 0.5 to 0.8 metres. Where present, natural clayey sands and sandy clays were encountered to depths of 1.5 to 2.1 metres.

The consistency of these materials varies between soft and very stiff. Weathered sandstone underlies the site to the depth of auger refusal, 1.6 to 3.0 metres."

- "Groundwater was observed in three of the boreholes, at depths of 1.2 to 1.3 metres."

- Based on the pH, chloride and sulfate contents, "the exposure classification for the onsite soils is non-aggressive for steel and concrete".

- Based on the SPOCAS analyses, actual and/or potential ASSs were not present to any significant extent and "an ASS management plan will not be required provided onsite dewatering does not lower the groundwater level outside the site".

- Based on the STS site inspection and field work, the natural soils and weathered sandstone on this site are "not likely to be contaminated and may be classified as *virgin excavated natural material* (VENM)", allowing their "beneficial reuse as clean fill".

4.0 Regulatory Compliance

On 22 March, 2017, an on-line search of the *Contaminated Land - Record of EPA Notices* was conducted, this being a database that is maintained by the NSW Environment Protection Authority (EPA). This search confirmed that the EPA had no involvement, or regulation, under Section 58 of the *Contaminated Land Management Act 1997* for any property in Vista Street, Sans Souci NSW. Section 58 of the *CLM Act 1997* relates to the investigation, remediation and management of sites where contamination poses a significant risk of harm, and includes Sections 35 and 36 of the *Environmentally Hazardous Chemicals Act 1985*.

On 22 March, 2017, an on-line search of the public register for licences, applications, notices, audits, pollution studies and reduction programs under the *Protection of the Environment Operations Act 1997* (*POEO Act 1997*) was conducted, this being another database that is maintained by the EPA. This search confirmed that the EPA had no involvement, or regulation, under the *POEO Act 1997* for any property in Vista Street, Sans Souci NSW.

5.0 Field Observations

The site was inspected by HEC on 24 March, 2017, at which time the following observations were made (*Ref.* Figures 1 and 2 and Attachment A).

- The site was located within a mixed residential (low density) and recreational area. Anderson Park was situated to the south of the site and the waterline of Kogarah Bay was immediately to the west.

- The site was an irregular-shaped block of land. Based on the supplied survey plan, the total area was 2122.6m^2.

- The site was perched on the side of a sandstone crest, which appeared to have undergone a cut operation (in part, at least) at the Vista Street boundary. The overall downslope across the site was 5-10^o to the west.

- Kogarah Bay (Georges River) was immediately west of the site. At the western site boundary, the top of the sea wall was 1.1-1.2m higher in elevation compared to the sediment floor of the adjacent waterline. The wall itself was comprised of brick, concrete, terracotta and sandstone fragments (i.e. coarse building rubble fill).

- A two storey, brick and terracotta tile house was situated in the north eastern portion of the site. A brick, terracotta tile and sandstone boat shed and ramp were situated in the south western portion. These buildings were considered to be at least 60-70 years old. They were vacant (unoccupied / empty) at the time of the inspection.

- All building footings and paving were in reasonable condition and displayed no signs of the effects of corrosion, salt scalding, iron oxide (i.e. orange brown) colouration or staining.

- A sloping, bitumen driveway provided access to the boat shed from Vista Street. This paving was in good condition and displayed minimal weathering and no evidence of corrosion or (salt / iron oxide) staining.

- Brick, timber and sandstone fencing lined the site boundaries. All fencing was in good condition and displayed no visual evidence corrosion.

- Apart from some building form work equipment (timber, scaffolding frames and fencing), stored on the western, flat, grassed section, the remainder of the site was vegetated.

- A range of native and non-native plants was present on the site, including small to medium sized trees, (flowering) shrubs, succulents, ferns, palms, groundcovers, grasses and weeds. The diversity of vegetation indicated that phytotoxicity was not a concern for site soils.

- No visual sign of contamination was encountered on any part of the site at the time of the inspection, including ash, oily filming and fragments of fibre cement sheeting (FCS).

- No suspicious odour was encountered on any part of the site at the time of the inspection.

- There was no evidence to suggest that an underground fuel storage tank (UST) was present on the site. No chemical container of environmental significance was encountered on the site at the time of the inspection.

- All parts of the site were found to be free of any odours and visual signs of contamination resulting from ASSs (e.g. no hydrogen sulfide (H_2S) odour, iron staining or corrosion was detected).

- There was no visual evidence of contamination resulting from high levels of salts (e.g. soil scalding or acid salt deposits).

- No surface ponding, derived from seepage water, was observed on the site.

6.0 Soil Sampling

Sampling Methodology and Observations

The field work component of this investigation included soil sampling at eight, separate borehole locations (BH1-BH8; *Ref.* Figure 2). This number of locations (8) complied with the minimum density requirement recommended under the EPA (1995) *Sampling Design Guidelines* for an area of 2122.6m^2.

The locations were selected to provide site coverage, with allowance for structural obstacles (e.g. footings, paving, stored form work equipment and underground and overhead services). Bores BH1, BH3, BH4 and BH8 were located the western, flat, grassed section of the site (i.e. on the area west of the original mean high water mark, zoned *W2 Regional Waterways*).

All eight test boreholes were drilled on 24 March, 2017 by Sydney Geotechnics Pty Ltd using a ute-mounted, mechanical drilling rig with 100mm diameter, solid stem flight augers. The extents of drilling were 1.9m BGL, 0.3m BGL, 0.4m BGL, 1.8m BGL, 0.9m BGL, 0.5m BGL, 0.4m BGL and 1.5m BGL, respectively, refusing on weathered sandstone at each location.

Graphic borehole logs were maintained for the test holes and included layer descriptions and other field observations. They were generally consistent with those recorded by STS as part of their geotechnical / ASS assessment (*Ref.* Section 3), and are presented in Attachment C. The following additional notes were made during the sampling program.

- The subsurface conditions to 0.3-1.9m BGL (at least) involved:
    - dark grey brown, fine to medium grained, (clayey) silty sand, topsoil fill (0.1-0.3m thickness); overlying
    - (yellow/red) brown, sand-dominated filling (0-1.7m thickness); and/or
    - grey, fine to medium grained, natural, alluvial, silty sand (0-1m thickness); and/or
    - weathered Hawkesbury Sandstone.
- The grey, fine to medium grained, natural, alluvial, silty sand was encountered at BH5 (from 0.3m BGL onwards), BH6 (from 0.2m BGL onwards), BH7 (from 0.2m BGL onwards) and BH8 (from 0.5m BGL onwards).
- Groundwater inflow was encountered in bores BH1 (to 1.3m BGL) and BH4 (as slight seepage).
- No visual sign of contamination, including oily filming and fragments of metal and FCS, was observed in any of the examined soils.
- No suspicious odour (including H_2S) was detected in any of the examined soils.

- No soils containing pale yellow deposits/coatings of jarosite, indicative of actual ASSs, were observed at any of the sampling locations. No dark blue grey or dark greenish grey muds or sands, indicative of potential ASSs, were observed at any of the sampling locations.

- White marine shell fragments and/or grit were not observed in any of the examined soils.

Soil samples for laboratory submission were collected from all eight borehole locations, as follows:

- BH1-1 (0.1-0.2m BGL) and BH1-2 (0.8-1m BGL);
- BH2-1 (0.1-0.2m BGL);
- BH3-1 (0.1-0.2m BGL);
- BH4-1 (0.1-0.2m BGL) and BH4-2 (1.5-1.7m BGL);
- BH5-1 (0.1-0.2m BGL) and BH5-2 (0.7-0.9m BGL);
- BH6-1 (0.1-0.2m BGL) and BH6-2 (0.4-0.5m BGL);
- BH7-1 (0.1-0.2m BGL) and BH7-2 (0.3-0.4m BGL); and
- BH8-1 (0.2-0.3m BGL) and BH8-2 (1.3-1.4m BGL).

Sample Handling & Transportation

A stainless steel, hand trowel was used to transfer soil from the auger flights into 125g laboratory-supplied, glass jars and clear, plastic (polyethylene), snap-lock bags. Each jar was filled, capped with a Teflon-lined, screw-on lid and stored immediately in an insulated chest containing ice. For those samples designated for asbestos screening, a plastic snap-lock bag was third to half-filled, sealed, double-bagged and then stored in an insulated chest.

All samples were transported under refrigerated conditions to SGS Environmental Services (SGS), using strict chain-of-custody procedures. Sample receipt advice was provided by SGS to indicate the condition of the samples upon receipt and a copy of this is presented, along with a copies of the completed chain-of-custody certificates, in Attachment D.

7.0 Laboratory Analyses

The samples considered to be most representative of the (fill) soils on the site were assigned to be analysed for the following parameters:

- the heavy metals arsenic (As), cadmium (Cd), chromium (Cr), copper (Cu), lead (Pb), mercury (Hg), nickel (Ni) and zinc (Zn);

- total recoverable hydrocarbons (TRHs);

- the monocyclic aromatic hydrocarbons benzene, toluene, ethyl benzene and xylenes (BTEX);

- polycyclic aromatic hydrocarbons (PAHs);

- organochlorine pesticides (OCPs);

- organophosphate pesticides (OPPs);

- polychlorinated biphenyls (PCBs); and
- asbestos.

This analytical program included the standard parameters recommended by the EPA under the EPA (1994) *Table 1 Minimum Soil Sampling Protocol* for imported fill and the DEC (2005) *Guidelines for Assessing Former Orchards and Market Gardens*.

Further tests for other volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), creosotes and cyanides were not included in the analytical program, since there was no indication of the use of such materials on the site and/or no unusual odours or visual signs suggesting the presence of these contaminants were detected during the field work.

All laboratory analyses were conducted using NATA-registered methods, the results from which are presented in detail in copies of the laboratory analytical reports (*Ref.* Attachment E). They are also summarised in Attachment F.

Quality control (QC) was monitored with the use of intra-laboratory QC testing, which comprised surrogate and matrix spikes, control samples, certified reference materials, duplicates and method blanks (*Ref.* Attachment E). In summary, internal laboratory surrogate / matrix spike, control, reference material and duplicate recovery results were within the pre-determined acceptance limits and method blanks did not identify any detectable levels of the tested analytes. It was therefore concluded that internal laboratory QC was effectively maintained and that the reported soil data were free of systematic, method biases and field sampling errors.

8.0 Discussion of Laboratory Results in Relation to the Adopted Criteria

Investigation Criteria

The laboratory results were interpreted with respect to the NEPC (2013) *Residential A Health-based Investigation Levels* (and *Health Screening Levels*) for residential settings with garden / accessible soil. These thresholds are presented in Schedule B1 of the *National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013*. They provided the basis for the Tier 1 Health Risk Assessment.

Note that thresholds for certain parameters are not provided under the NEPC (2013) publication, and for this reason the following document was referenced for appropriate default criteria (or interpretation):

- Friebel and Nadebaum (2011) *Soil Health Screening Level A for Direct Contact*, for the $>C_{16}$-C_{34} (F3) and $>C_{34}$-C_{40} (F4) aliphatic hydrocarbons.

The adopted health investigation levels (HILs) are presented alongside the analytical results in Table AF1 (*Ref.* Attachment F).

The Tier 1 Ecological Risk Assessment involved *Ecological Screening Levels* (ESLs), which were determined following the methodology (or taken directly from the tables) presented in Schedules B1 and B5b of the *National Environment Protection (Assessment of Site Contamination)*

Amendment Measure 2013 (NEPC, 2013). Where appropriate, the following documents were referenced for default criteria and/or ambient background concentrations:

- NEPC (1999) *National Environmental Protection (Assessment of Site Contamination) Measure 1999*, specifically the *Interim Urban Ecological Investigation Levels* and the *Background Ranges*; and

- Olszowy *et al*. (1995) *Trace Element Concentrations in Soils from Rural and Urban Areas of Australia*.

The adopted (calculated) ESLs are presented alongside the analytical results in Table AF1 (*Ref.* Attachment F).

In accordance with the *Protection of the Environment Operations Act 1997*, the EPA requires that excavated soils designated for off-site disposal must be classified with reference to the EPA (2014a) *Waste Classification Guidelines*. These thresholds are referred to as the *Waste Criteria* and are presented alongside the analytical results in Table AF1 (*Ref.* Attachment F).

Assessment of Soil Quality with Respect to Residential Land Use

Heavy Metals

The heavy metal concentrations in the tested samples were all found to comply with the adopted HILs. Only one breach of the ESLs was identified, that being for copper in BH3-1 (630 mg/kg).

The majority of the values were within published background ranges (as per Olszowy *et al*. (1995) and Table 5-A, Schedule B(1) of NEPC (1999)).

TRHs and BTEX

No detectable concentration of any of the screened TRH fractions was identified in the tested samples, with all laboratory quantitation limits being below the adopted HILs and ESLs.

No detectable concentration of any of the BTEX compounds was identified in the tested samples, with all laboratory quantitation limits being below the adopted HILs and ESLs.

PAHs

No detectable concentration of any of the screened PAH compounds was identified in samples BH1-1, BH2-1, BH3-1, BH4-1, BH6-1 and BH8-1, with all laboratory quantitation limits being below the adopted HILs and ESLs (where available).

Traces of various PAHs were identified in the remaining samples (BH5-1, BH6-2, BH7-1 and BH8-2); however, in each case the total PAH, naphthalene and sum carcinogenic PAH concentrations were within the corresponding HIL (and ESL, for naphthalene at least).

PCBs, OCPs and OPPs

No detectable concentration of any of the screened PCBs (arochlors), OCPs and OPPs was identified in the tested samples, with all laboratory quantitation limits being below the adopted HILs and ESLs (where available).

Asbestos

Asbestos was not detected in any of the tested, topsoil fill samples (BH1-1, BH2-1, BH3-1, BH4-1, BH5-1, BH6-1, BH7-1 and BH8-1).

Classification of Soils for Off-site Disposal

Subject to determination of the leachable (weak acid - extractable) lead and PAH concentrations for representative samples using the *Toxicity Characteristics Leaching Procedure* (TCLP), the contaminant total concentrations indicated that the site fill soils (≤0.2-1.9m BGL) would be classified as *General Solid Waste (Non-Putrescible)*, under the EPA (2014a) *Waste Classification Guidelines*.

The deeper (undisturbed), grey, natural, alluvial, silty sand and weathered Hawkesbury Sandstone, were expected to be classified as VENM; however, further assessment following the *Excavated Natural Material Order 2014* (given under Part 9, Clause 93 of the *Protection of the Environment Operations (Waste) Regulation 2014 - Resource Recovery Order*) is required to confirm this.

9.0 Conclusions and Recommendations

Based on the findings of this stage 1 preliminary environmental investigation:

- the site had continuously been used for residential purposes since the early 1940s (at least);

- the site was free of statutory notices issued by the EPA under the *Contaminated Land Management Act 1997* and the *Protection of the Environment Operations Act 1997*;

- the subsurface to 0.3-1.9m BGL (at least) involved:

    - dark grey brown, (clayey) silty sand, topsoil fill (0.1-0.3m thickness); overlying
    - (yellow/red) brown, sand-dominated filling (0-1.7m thickness); and/or
    - grey, natural, alluvial, silty sand (0-1m thickness); and/or
    - weathered Hawkesbury Sandstone;

- ASSs were not expected to be present on the site;

- the representative soil samples collected from across the site were characterised by laboratory testing as meeting the adopted EPA-endorsed acceptance criteria for residential exposure settings with gardens and accessible soil, for the parameters tested; indicating that

- the near surface (≤0.3-1.9m BGL) soil layers were not contaminated; and

- underlying these soils was weathered Hawkesbury Sandstone.

It was therefore considered that the potential for site contamination was low and that the local soils and groundwater were unlikely to pose any significant risk to human health or the environment. On this basis, the site was regarded as being suitable for residential use, in accordance with Clause 7 of *State Environmental Planning Policy No. 55 - Remediation of Land*.

Recommendations

HEC hereby makes the following recommendations in relation to any future site development:

1. All waste materials designated for off-site disposal must be removed to appropriate landfill facilities by a suitably qualified contractor in accordance with the EPA (2014a) *Waste Classification Guidelines*.

2. Any soils to be imported onto the site will require some form of validation which confirms their suitability for the approved land use.

10.0 Statement of Limitations

This report has been prepared in accordance with the proposal between Hayes Environmental Consulting Pty Ltd and its client, Nanevski Developments Pty Ltd, dated 16 March, 2017 (*HEC Ref*. PN1422.2). The limitations contained in that proposal apply to this report.

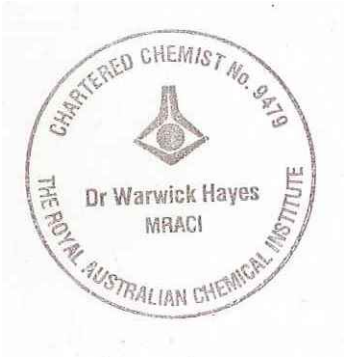
This report relies upon data, surveys, measurements and/or results taken at, or under, the particular times and conditions specified in this report. Any conclusions or recommendations only apply to the findings at that particular time. Although land use may not be have been specified, the conclusions drawn by HEC are also based on interpretations of anecdotal and visual information that were made available during the course of this investigation.

Numerical data 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 (borehole) 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.

No warranties are made as to the information provided in this report. All conclusions and recommendations made in this report are of the professional opinions of HEC personnel involved with the project and while normal checking of the accuracy of data has been conducted, any circumstances outside the scope of this report or which are not made known to HEC personnel and which may impact on those opinions are not the responsibility of HEC.

Should you require additional information or clarification regarding any aspect of this report, please call the undersigned on (02) 9528 0879 or 0413 356 802.

For and on behalf of,
HAYES ENVIRONMENTAL CONSULTING PTY LTD



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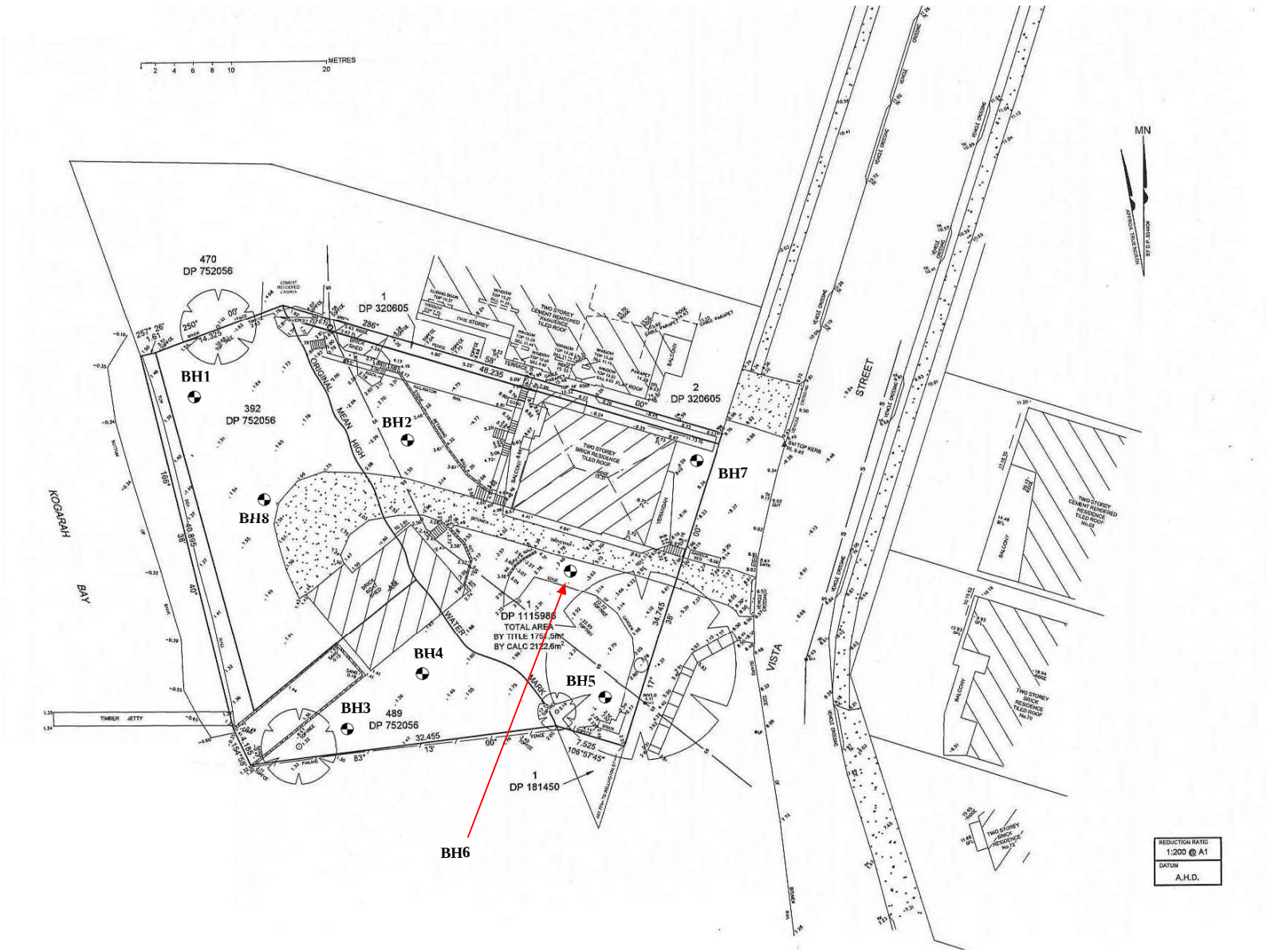
FIGURES

N

Scale = 1 : 20 000

Figure 1. Site Locality

HEC Project EP1422
Stage 1 Preliminary Environmental Site Investigation
73 Vista Street, Sans Souci NSW 2219
Hayes Environmental Consulting Pty Ltd ABN 32 295 203 367



HEC borehole / soil sampling location

Figure 2. Site Plan with Sampling Locations

HEC Project EP1422

Stage 1 Preliminary Environmental Site Investigation

73 Vista Street, Sans Souci NSW 2219

Hayes Environmental Consulting Pty Ltd ABN 32 295 203 367

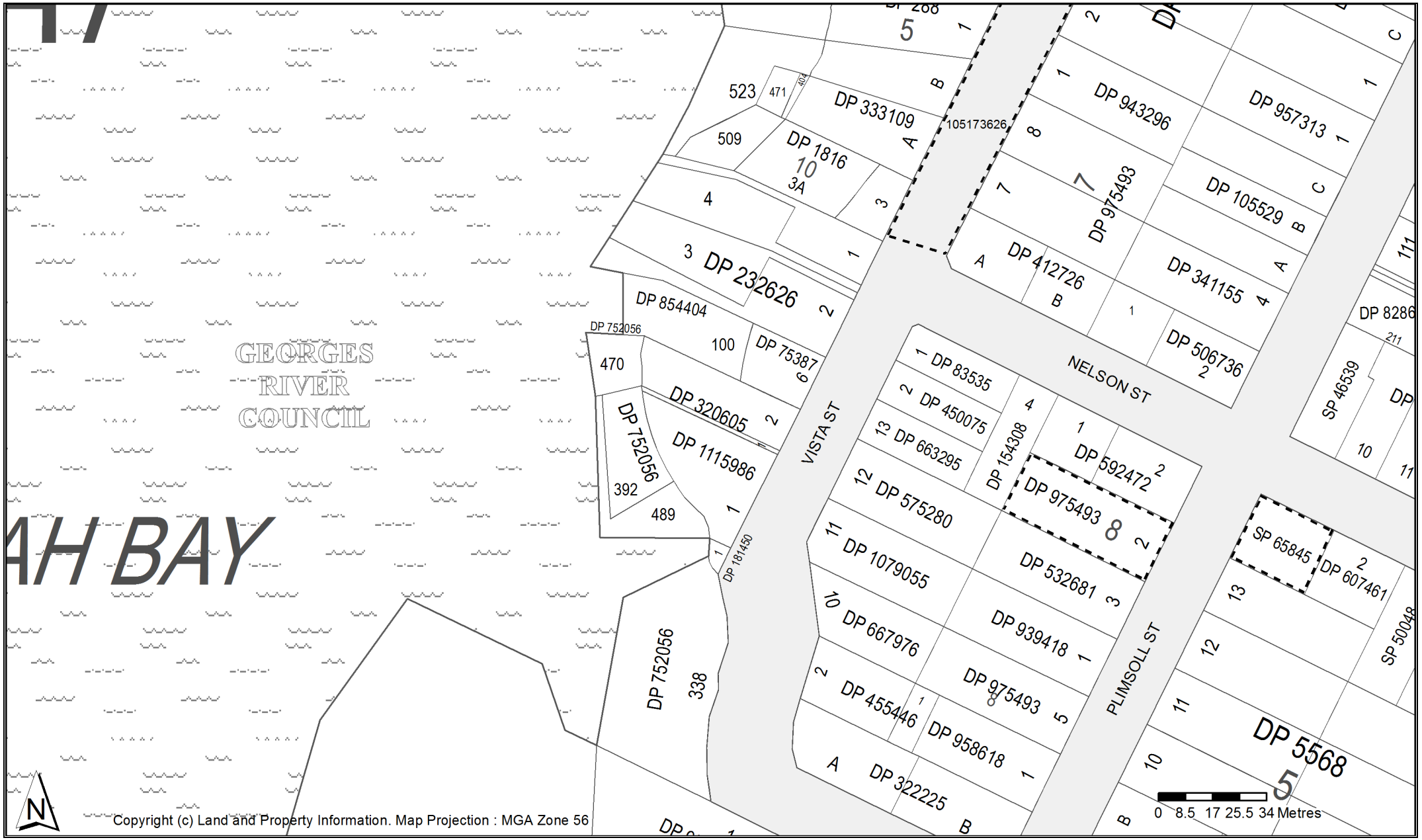
ATTACHMENT A

CADASTRAL PLAN, AERIAL PHOTOGRAPHY AND SITE SURVEY PLAN

Cadastral Records Enquiry Report

Requested Parcel : Lot 1 DP 320605 **Identified Parcel :** Lot 1 DP 320605

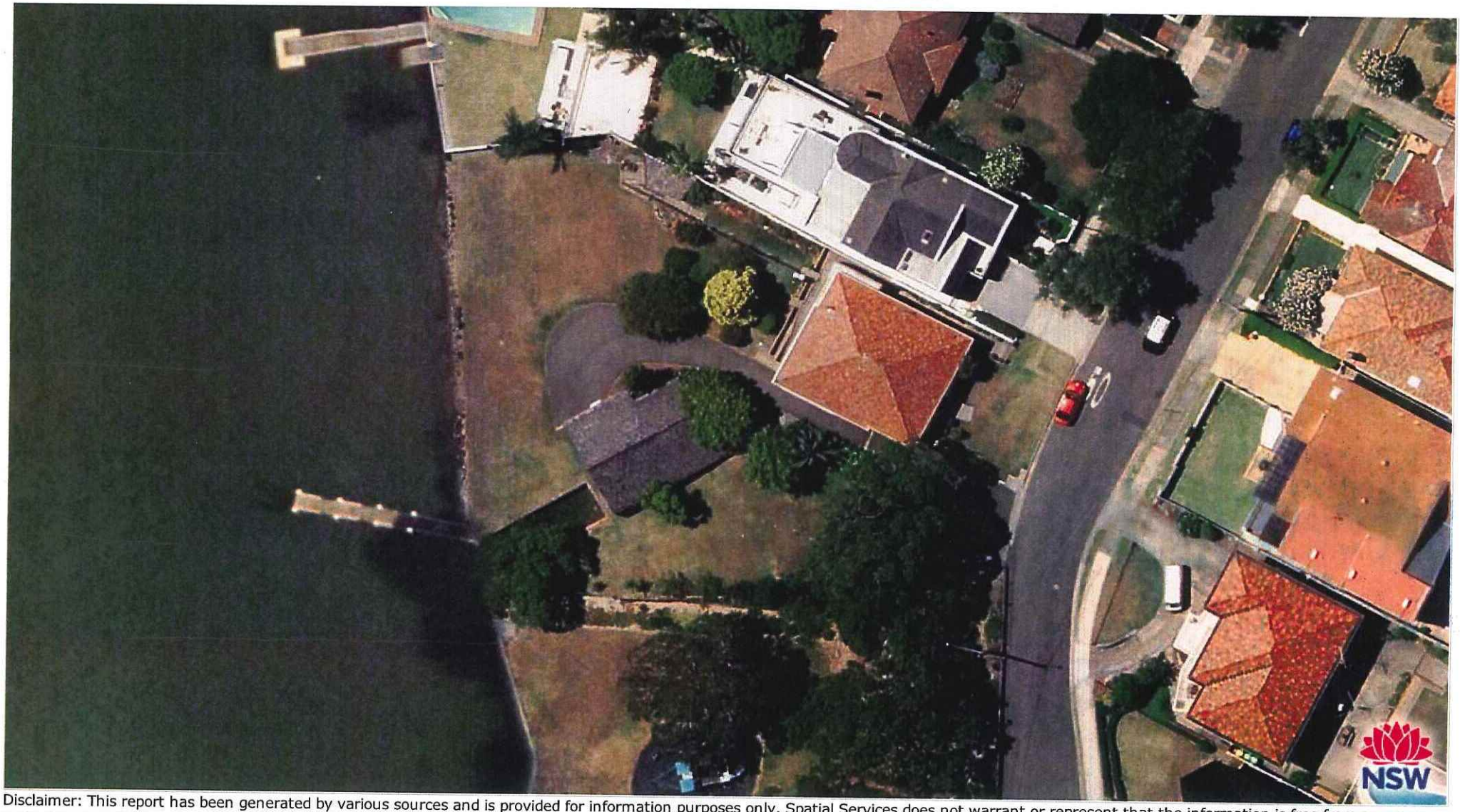
Locality : SANS SOUCI **LGA :** GEORGES RIVER **Parish :** ST GEORGE **County :** CUMBERLAND




73 Vista St
Vista St
Nelson St
Plimsoll St
Wellington St
© 2016 Google
Google Earth
2000
Imagery Date: 10/16/2015 33°59'55.49" S 151°07'24.02" E elev 8 m eye alt 363 m

EP1422 Stage 1 PESI

73 Vista Street, Sans Souci NSW 2219



METRES
2 4 6 8 10 20

MN
APPROX. TRUE NORTH
494454 A.H.D.

470
DP 752056

1
DP 320605

2
DP 320605

392
DP 752056

489
DP 752056

1
DP 1115986
TOTAL AREA
BY TITLE 1751.5m²
BY CALC 2122.6m²

1
DP 181450

KOGARAH BAY

ORIGINAL MEAN HIGH WATER MARK

VISTA STREET

257° 26' 1.61
250° 00' 14.325
286° 48.235
166° 40.895
98° 40"
177° 34.745
38"
83° 13' 32.455
154° 58' 4.185
00" 7.525
106°57'45"
00" 59'

ONE STOREY BRICK SHED

TWO STOREY CEMENT RENDERED RESIDENCE TILED ROOF

TWO STOREY BRICK RESIDENCE TILED ROOF

TWO STOREY CEMENT RENDERED RESIDENCE TILED ROOF No.68

TWO STOREY BRICK RESIDENCE TILED ROOF No.70

TWO STOREY BRICK RESIDENCE No.72

TERRACE

BALCONY

VERANDAH

GARDEN BED

TIMBER JETTY

PAILING

FENCE

BRICK WALL

RETAINING WALL

INCLINATOR RAIL

BM TOP KERB RL 9.48

WARNING! The location of walls and detail points in relation to boundaries is approximate only!

NOTES

1. COPYRIGHT This drawing and/or design is the property of Harrison Friedmann & Associates Pty Ltd and should not be reproduced in part or whole without the written permission of the company.
2. Bearings and distances of boundaries and areas are from Land and Property Information records only.They are on Magnetic Meridian. If accurate True North is required a further survey would be necessary.
3. NO BOUNDARY SURVEY HAS BEEN MADE. Relationship of improvements to boundaries is diagrammatic only. Boundary fences and retaining walls have not been accurately located and may not be shown on this plan.DO NOT SCALE OFF THIS PLAN. Where offsets from improvements, fences or walls to boundaries are critical for future building design and construction they MUST be confirmed by a further boundary survey. This survey has not investigated any subterranean structures.
4. The services information shown on this plan have been determined from visual inspection only. It is passed on with the understanding that no excavation or works will be commenced without a current services search of all services being obtained from "Dial before you dig" (DBYD) (phone 1100 or fax 1300 652 077) or from any individual service provider. Note that not all services providers are members of DBYD.
5. The location of Sydney Water's Sewer Main has been plotted approximately, based on visible maintenance holes and/or information from Sydney Water. This information can not be relied on. Any construction near Sydney Water Mains requires further investigation, a Service Protection Report (sewer pegout) and approval from Sydney Water.
6. The locations of spot levels are diagrammatic only. They are accurate to ± 0.3m in relation to boundaries. Levels critical to design, excavation or construction must be verified. If contours are shown they depict the topography rather than represent the exact level at any particular point. Care should be taken if extrapolating levels or contours.
7. The spread of the crown of the trees shown on this plan is diagrammatic only, based on the average spread observed in the field. Prior to any development proposal which might be affected by trees it is recommended that the tree spreads be verified by field inspection.
8. 8. Australian Height Datum was established from S.S.M. 133443 R.L. 10.961 located at the intersection of Vista & Nelson Street. . Datum source obtained from S.C.I.M.S. 29/10/2015.

ALL ABOVE NOTES ARE AN INTEGRAL PART OF THIS PLAN

Legend

BB	Bottom of Bank	G	Grate	TB	Top of Bank	VC	Vehicle Crossing	ML	Metal Lid
BFL	Balcony Floor Level	GFL	Garage Floor Level	TF	Top of Fence	VFL	Verandah Floor Level	MH	Man Hole
BRW	Bottom Retaining Wall	GM	Gas Meter	TG	Top of Gutter	W	Window	MW	Monitoring Well
CONC	Concrete	INV	Invert Level	TK	Top of Kerb	WC	Toilet	PP	Power Pole
EC	Edge of Concrete	LW	Lower Window	TP	Telstra Pillar	WM	Water Meter	SP	Sign Pole
FL	Floor Level	PC	Pedestrian Crossing	TRK	Top of Rock	G	GAS	SV	Stop Valve
FP	Flag pole	PAR	Parapet	TRW	Top Retaining Wall	H	Hydrant	T	Telstra
		RL	Relative Level	TW	Top Wall	LH	Lamp Hole	T	Telstra Pillar
				USG	Underside of Gutter	LP	Light Pole	— s —	Approximate Location of Sydney Water Sewer Main (vide Hydra)
				UW	Upper Window	ML	Metal Lid		

HARRISON FRIEDMANN & ASSOCIATES PTY LTD
INCORPORATING THE PRACTICE OF: **MICHAEL J. STYNES** ABN 69 001 953 331
SURVEYORS, ENGINEERS, PLANNERS,
BUILDING, ENVIRONMENTAL & BUSHFIRE CONSULTANTS
WATER SERVICING CO-ORDINATOR FOR SYDNEY WATER
P.O. BOX 4025, KOGARAH BAY, N.S.W. 2217 365 PRINCES HIGHWAY, CARLTON, N.S.W. 2218
PHONE: (02) 8558 7100
FAX: (02) 9546 4418
EMAIL: mail@hfasurveyors.com.au
Liability is limited by a scheme approved under Professional Standards Legislation

PLAN SHOWING SITE DETAILS AND LEVELS
FOR BUILDING DESIGN PURPOSES
AT 73 VISTA STREET, SANS SOUCI
LOT 1 DP 1115986, LOT 1 DP 320605, LOT 392 DP 752056
AND LOT 489 DP 752056

FOR NANEVSKI DEVELOPMENTS

REDUCTION RATIO 1:200 @ A1	SURVEYED / DRAWN ML/RM
DATUM A.H.D.	CHECKED
DATE 28/10/2015	REFERENCE **55030DT** SHEET 1 OF 1

ATTACHMENT B

STS GEOENVIRONMENTAL REPORT

STS GeoEnvironmental Pty Ltd
Geotechnical and Environmental Solutions

GEOTECHNICAL INVESTIGATION AND ACID SULFATE SOIL ASSESSMENT

FOR

NANEVSKI DEVELOPMENTS PTY LTD

73 Vista Street, Sans Souci, New South Wales

Report No: 15/2181A

Project No: 20537/5961C

September 2015

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www.stsgeo.com.au | enquiries@stsgeo.com.au
ABN 61 162 976 543 | **ACN** 162 976 543

Table of Contents

1. INTRODUCTION

This report presents the results of a combined Geotechnical Investigation and Acid Sulfate Soil (ASS) assessment carried out by STS GeoEnvironmental Pty Limited (STS) for a proposed new residential development to be constructed at 73 Vista Street, Sans Souci. We have been informed the proposed development includes two basement levels that will require excavating about 6 metres below the existing ground surface. We understand that the site is located within a Class 2 Acid Sulfate Soils area and therefore Council requires an assessment to be undertaken.

The purpose of the investigation was to:

- assess the subsurface conditions over the site,
- site classification to AS2870,
- provide recommendations regarding the appropriate foundation system for the site including design parameters,
- provide parameters for the temporary and permanent support of the excavation,
- comment on soil aggressiveness to buried steel and concrete,
- undertake an ASS assessment, and
- determine if an ASS Management Plan is required.

The investigation was undertaken at the request of Tom Nanevski of Nanevski Developments Pty Ltd.

Our scope of work did not include a contamination assessment.

2. NATURE OF THE INVESTIGATION

2.1. Fieldwork

The fieldwork consisted of drilling four (4) boreholes numbered BH1 to BH4 inclusive, at the locations shown on Drawing No. 15/2181. They were drilled using an Edson RP70 drilling rig owned and operated by STS. Soils were drilled using rotary solid flight augers. Soils strengths

were determined by undertaking Dynamic Cone Penetrometer (DCP) tests at each borehole location.

Drilling operations were undertaken by one of STS's senior geologists who also logged the subsurface conditions encountered.

The subsurface conditions observed are recorded on the borehole logs given in Appendix A. An explanation of the terms used on the logs is also given in Appendix A. Notes relating to geotechnical reports are also attached.

2.2. Laboratory Testing

In order to the soils for their aggressiveness selected representative soil samples were tested to determine the following:

- pH
- sulphate content

Based on field observations, four soil samples were also selected for laboratory analysis for the Acid Sulfate Soils assessment. The samples were dispatched to Australian Laboratory Services (ALS) for analysis using the Suspension Peroxide Oxidation Combined Acidity and Sulphate (SPOCAS) method. The method allows both a measure of the existing and potential acidity.

Detailed test reports are given in Appendix B.

3. GEOLOGY AND SITE CONDITIONS

The Sydney geological series sheet at a scale of 1:100,000 shows Triassic Age Hawkesbury Sandstone underlies the site. Rocks within this formation comprise mainly medium to coarse grained quartz sandstone. Consistent with the geological setting, weathered sandstone was observed in Kogarah Bay adjacent to the site

At the time of the fieldwork, the site was occupied by a residential building asphalt driveway and separate garage. Site vegetation comprised grass, trees and shrubs. The surrounding properties are residential in nature.

The ground surface falls approximately 5 to 6 metres to the west.

4. SUBSURFACE CONDITIONS

When making an assessment of the subsurface conditions across a site from a limited number of boreholes there is the possibility that variations may occur between test locations. The

data derived from the site investigation programme are extrapolated across the site to form a geological model and an engineering opinion is rendered about overall subsurface conditions and their likely behaviour with regard to the proposed development. The actual conditions at the site may differ from those inferred, since no subsurface exploration programme, no matter how comprehensive, can reveal all subsurface details and anomalies.

The subsurface conditions generally consist of fill overlying clayey sands, sandy clays and weathered sandstone. Fill was present in all boreholes to depths of 0.5 to 0.8 metres. Where present, natural clayey sands and sandy clays, were encountered, to depths of 1.5 to 2.1 metres. The consistency of these materials varies between soft and very stiff. Weathered sandstone underlies the site to the depth of auger refusal, 1.6 to 3.0 metres.

Groundwater was observed in three of the boreholes at depths of 1.2 to 1.3 metres.

5. GEOTECHNICAL DISCUSSION

5.1. Site Classification to AS2870

The classification has been prepared in accordance with the guidelines set out in the "Residential Slabs and Footings" Code, AS2870 – 2011.

Because there are buildings and trees present, abnormal moisture conditions (AMC) prevail at the site (Refer to Section 1.3.3 of AS2870).

Because of the AMC and fill present, the site is classified *a problem site (P).*

5.2. Excavation Conditions and Support

Based on subsurface conditions observed in the boreholes, it is expected that the proposed basement excavations will encounter fill clayey sands, sandy clays and weathered sandstone. Excavators without assistance should be able to remove the fill and soils.

Excavators alone without assistance will not be able to remove any significant amount of rock below the depth of auger refusal as shown on the borehole logs. Hydraulic breakers mounted on an excavator or jack hammers will be required to break up the majority of the rock below these depths before it can be removed using an excavator.

Particular care will be required to ensure that buildings or other developments on adjacent properties are not damaged when excavating the rock. The adjacent buildings may be founded directly on the underlying bedrock. Buildings founded directly on rock can often be very susceptible to damage from vibrations.

Excavations methods should be adopted which limit ground vibrations at the adjoining developments to not more than 10 mm/sec. Vibration monitoring will be required to verify that this is achieved. However, if the contractor adopts methods and/or equipment in accordance with the recommendations in Table 5.1 for a ground vibration limit of 5 mm/sec, vibration monitoring may not be required.

Table 5.1 – Recommendations for Rock Breaking Equipment

Distance from adjoining structure (m)	**Maximum Peak Particle Velocity 5 mm/sec**		**Maximum Peak Particle Velocity 10 mm/sec**	
	Equipment	Operating Limit (% of Maximum Capacity)	Equipment	Operating Limit (% of Maximum Capacity)
1.5 to 2.5	Hand operated jackhammer only	100	300 kg rock hammer	50
2.5 to 5.0	300 kg rock hammer	50	300 kg rock hammer or 600 kg rock hammer	100 50
5.0 to 10.0	300 kg rock hammer or 600 kg rock hammer	100 50	600 kg rock hammer or 900 kg rock hammer	100 50

*Vibration monitoring is recommended for 10 mm/sec vibration limit.

The limits of 5 mm/sec and 10 mm/sec are expected to be achievable if rock breaker equipment or other excavation methods are restricted as indicated in Table 5.1.

At all times, the excavation equipment must be operated by experienced personnel, according to the manufacturer's instructions and in a manner consistent with minimising vibration effects.

Use of other techniques (eg. grinding, rock sawing), although less productive, would reduce or possibly eliminate risks of damage to property through vibration effects transmitted via the ground. Such techniques may be considered if an alternative to rock breaking is required.

If rock sawing is carried out around excavation boundaries in not less than 1 metre deep lifts, a 900 kg rock hammer could be used at up to 100% maximum operating capacity with an assessed peak particle velocity not exceeding 5 mm/sec, subject to observation and confirmation by a geotechnical engineer at the commencement of excavation.

It should be noted that vibrations that are below threshold levels for building damage may be experienced at adjoining developments.

Saw cutting should be carried out before any rock breaking is commenced on the site. It would be appropriate before commencing excavation to undertake a dilapidation survey of any adjacent structures that may potentially be damaged. This will provide a reasonable basis for assessing any future claims of damage.

It is of course important that the onsite excavations are adequately supported at all times and do not endanger the adjacent properties.

Temporary slopes in the soils may be constructed at a maximum angle of 1.5 (H) to 1 (V). Where this is not possible it will be necessary to provide temporary support.

When considering the design of the supports, it will be necessary to allow for the loading from structures in adjoining properties, any groundsurface slope and the water table present. Where the structures in adjoining properties are within the zone of influence of the excavation, it will be necessary to adopt K_o conditions when designing the temporary support. Anchors or props can be used to provide the required support. If anchors extend into adjoining property, it will be necessary to obtain the permission of the property owners. Anchors should be installed into the weathered rock. When props or anchors are used for support, a rectangular earth pressure distribution should be adopted on the active side of the support. K_o should also be used to design the permanent support.

The following parameters are suggested for the design of the retaining wall system where there is a level ground surface:

Soil and Weathered Sandstone to the depth of auger refusal:

Active Earth Pressure Coefficient (K_a)	=	0.4
At Rest Pressure Coefficient (K_o)	=	0.55
Total (Bulk) Density	=	20 kN/m^3

Weathered Sandstone/Shale below the depth of auger refusal:

Earth Pressure Coefficient	=	0.1 or 10 kPa (whichever is lesser)
Passive Earth Pressure Coefficient (K_p)	=	4.5 (sandstone only)
Total (Bulk) Density	=	22 kN/m^3

Based on the groundwater observations in the boreholes, the proposed basement excavation extends below the groundwater table. This has implications for both the construction and long term phases of the project.

The support system selected must be impermeable, otherwise lowering the water table beyond site boundaries will likely cause ground settlement and possible damage to the roadways and buildings on adjacent properties. Dewatering beyond site boundaries may also impact on any adjacent Acid Sulfate Soils that may be present.

Provided that an impermeable system is installed, we have calculated that the total volume of water to be extracted during the construction of the basement would be in the order of 0.3 megalitres.

Contiguous pile walls are often used for support, however, experience indicates they are difficult to make watertight if there is considerable water flow. A version of this system is secant piles, where adjoining piles drill into one another. This system would usually be more watertight and has been successfully used in similar ground conditions. Hawkesbury Sandstone is typically relatively impermeable. Because no information is available regarding the fracturing of the rock and therefore its permeability, the secant piles should be taken to the base of the proposed excavation

Steel sheet pile walls are often used to support excavations. Because of their nature, they are very difficult to make watertight, however, when used together with shotcrete they may be successfully employed. In order to be successful, the sheet piles would need to penetrate into the underlying sandstone. This is not considered possible.

Regardless of which system is adopted, a specialist piling contractor should be used to construct the works.

5.3. Foundation Design

After the basement excavation has been completed the exposed material will likely comprise weathered sandstone. An allowable bearing pressure of 1000 kPa may be used to proportion pad and/or strip footings founded in this material. Higher capacities are possible; however this will necessitate coring the rock to determine the presence of joints and other discontinuities.

In order to ensure the bearing values given can be achieved, care should be taken to ensure that the base of excavations are free of all loose material prior to concreting. It is recommended that all footing excavations be protected with a layer of blinding concrete as soon as possible, preferably immediately after excavating, cleaning, inspection and approval. The possible presence of groundwater needs to be considered when pouring concrete.

5.4. Soil Aggressiveness

The aggressiveness or erosion potential of an environment in building materials, particularly concrete and steel is dependent on the levels of soil pH and the types of salts present, generally sulphates and chlorides. In order to determine the degree of aggressiveness, the test values obtained are compared to Tables 6.4.2 (C) and 6.5.2 (C) in AS2159 – 2009 Piling – Design and Installation. The test results are summarised in Table 5.2 below.

Table 5.2 – Soil Aggressiveness Summary Table

Sample No.	Location	Depth (m)	pH	Sulfate (mg/kg)	Chloride (mg/kg)
S1	BH1	0.5	7.7	210	320
S2	BH2	1.5	7.6	220	1290

The report results range between:

- pH - 7.6 and 7.7
- soluble SO_4 - 210 and 220 mg/kg (ppm)
- Chloride Cl - 320 and 1290 mg/kg (ppm)

The soils on the site consist of low permeability silty clays. Therefore, the soil conditions B are considered appropriate.

A review of the durability aspects indicates that:

- pH : minimum value of 7.6
- SO_4 : maximum value of 210 mg/kg (ppm) < 5000 ppm
- Cl : maximum value of 1290 mg/kg (ppm) <5000 ppm

The exposure classification for the onsite soils is non-aggressive for steel and concrete.

6. ACID SULFATE SOIL ASSESSMENT

6.1. Introduction

ASS are the common name given to sediments and soils containing iron sulfides which, when exposed to oxygen generate sulfuric acid. Natural processes formed the majority of acid sulfate sediments when certain conditions existed in the Holocene geological period (the last 10,000 years). Formation conditions require the presence of iron-rich sediments, sulfate (usually from seawater), removal of reaction products such as bicarbonate, the presence of sulfate reducing bacteria and a plentiful supply of organic matter. It should be noted that these conditions exist in mangroves, salt marsh vegetation or tidal areas, and at the bottom of coastal rivers and lakes.

The relatively specific conditions under which acid sulfate soils are formed usually limit their occurrence to low lying parts of coastal floodplains, rivers and creeks. This includes areas with saline or brackish water such as deltas, coastal flats, backswamps and seasonal or permanent freshwater swamps that were formerly brackish. Due to flooding and stormwater erosion, these sulfidic sediments may continue to be re-distributed through the sands and sediments of the estuarine floodplain region. Sulfidic sediment may be found at any depth in suitable coastal sediments – usually beneath the water table.

Any lowering in the water table that covers and protects potential ASS will result in their aeration and the exposure of iron sulfide sediments to oxygen. The lowering in the water table can occur naturally due to seasonal fluctuations and drought or any human intervention, when carrying out any excavations during site development. Potential ASS can also be the exposed to air during physical disturbance with the material at the disturbance face, as well as the extracted material, both potentially being oxidised. The oxidation of iron sulfide sediments in potential ASS results in ASS soils.

Successful management of areas with ASS is possible but must take into account the specific nature of the site and the environmental consequences of development. While it is preferable that sites exhibiting acid sulfate characteristics not be disturbed, management techniques have been devised to minimise and manage impacts in certain circumstances.

When works involving the disturbance of soil or the change of groundwater levels are proposed in coastal areas, a preliminary assessment should be undertaken to determine whether acid sulfate soils are present and if the proposed works are likely to disturb these soils.

6.2. Presence of ASS

Reference to the Port Hacking ASS Risk Map indicates the property is within an area designated as AP4. This indicates a low probability of ASS being present with a surface elevation of greater than X2. This suggests the area is distributed (filled) terrain, and if any ASS is present, it would be encountered at depths greater than 2 metres. It should be noted that maps are a guide only.

The following geomorphic or site criteria are normally used to determine if acid sulfate soils are likely to be present:

- sediments of recent geological age (Holocene)
- soil horizons less than 5 in AHD
- marine or estuarine sediments and tidal lakes
- in coastal wetlands or back swamp areas

6.3. Assessment

Some of the site and geomorphic criteria noted above apply to the site.

In order to assess the significance of the ASS potential, the laboratory results carried out were compared to action criteria contained in ASSM (1998) summarised in Table 6.1. The action criteria trigger the need to prepare an ASSMP and are based on the percentage of oxidisable sulphur (or equivalent TPA and TSA) for broad categories of soil types. Works in soils that exceed these action criteria must prepare a management plan and obtain development consent.

As the soils encountered on the site primarily consisted of clayey sands and sandy clays, the fine texture grade criteria are the most appropriate and have been adopted for this assessment.

Table 6.1 – ASS Action Criteria

Type of material		Action Criteria if 1-1000 tonnes ASS disturbed		Action Criteria if more than 1000 tonnes ASS disturbed	
Texture Range (McDonald et al 1990)	**Approx. clay content (%<0.02mm)**	**Sulphur Trail %S oxidisable (oven dry basis) eg S_{TOS} or S_{POS}**	**Acid Trail Mol H^+/tonne (oven dry basis) eg TPA or TSA_S**	**Sulphur Trail %S oxidisable (oven dry basis) eg S_{TOS} or S_{POS}**	**Acid Trail Mol H^+/tonne (oven dry basis) eg TPA or TSA_S**
Coarse Texture (CT) Sands to loamy sands	≥5	0.03	18	0.03	18
Medium Texture (MT) Sandy loams to light clays	5-50	0.06	36	0.03	18
Fine Texture (FT) Medium to heavy clays and silty clays	≥40	0.1	62	0.03	18

The laboratory test results are summarised in relation to the action criteria in Table 6.2.

Table 6.2 – SPOCAS TEST RESULTS SUMMARY

Analysis	Unit	LOR	ASS1 BH2 @ 1.0 m	ASS2 BH3 @ 0.5 m	ASS3 BH3 @ 1.5 m	ASS4 BH4 @ 0.4 m	Action Criteria[1] <1000 tonnes disturbed
pH before Oxidation	NA	0.1	9.4	8.5	8.9	7.6	-
pH after Oxidation	NA	0.1	8.0	7.8	6.7	6.9	<3 (high risk)
S (POS)	%	0.02	0.095	<0.02	<0.02	<0.02	0.03
TPA	mole/tonne	2	<2	<2	<2	<2	18
TSA	Mole/tonne	2	<2	<2	<2	<2	18

1 = ASSMAC (1998)

Action Criteria Exceeded

The results of the soil sample analyses are compared to the above criteria in Table 6.2, and the analytical laboratory reports for the testing performed are provided in Appendix B.

The results show that the peroxide oxidisable sulfur (POS) percentages are less than the action criteria values except for ASS1. The titratable peroxide acidity (TPA) concentrations measured in the samples are below the 'Acid Trail' criterion of 18 mol H+/tonne. All the pH values are either in the neutral or alkaline range, which indicates non acidic conditions. Therefore, the POS value for ASS1 is considered to be due to something else other than then presence of ASS.

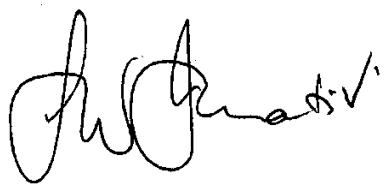
Based on the above an ASS Management Plan will not be required provided onsite dewatering does not lower the groundwater level outside the site.

7. VENM CLASSIFICATION

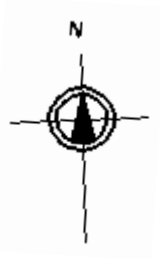
Based on the findings of our site inspection, the natural clayey silty sands, clayey sands, sandy clays and weathered sandstone that is proposed to be excavated from the site is not likely to be contaminated and may be classified as virgin excavated natural material (VENM). That is, it would be suitable for beneficial reuse as clean fill. However, any building waste, topsoil or imported fill materials are not included in this classification; these materials should be screened and excluded from the VENM materials. Care should be taken not to mix any of these materials with the natural VENM.

8. FINAL COMMENTS

During construction, should the subsurface conditions vary from those inferred above, we would be contacted to determine if any changes should be made to our recommendations.



Laurie Ihnativ, BE, MEngSc, MBA, FIE Aust.
Manager, STS GeoEnvironmental Pty Limited



SMEC TESTING SERVICES Pty. Ltd.	Scale: Unknown	Date: August 2015
Client: NANEVSKI DEVELOPMENTS PTY LIMITED		
GEOTECHNICAL INVESTIGATION **73 VISTA STREET, SANS SOUCI** **BOREHOLE AND PENETROMETER LOCATIONS**	Project No. 20537/5961C	
	Drawing No: 15/2181	

NOTES RELATING TO GEOTECHNICAL REPORTS

Introduction

These notes have been provided to outline the methodology and limitations inherent in geotechnical reporting. The issues discussed are not relevant to all reports and further advice should be sought if there are any queries regarding any advice or report.

When copies of reports are made, they should be reproduced in full.

Geotechnical Reports

Geotechnical reports are prepared by qualified personnel on the information supplied or obtained and are based on current engineering standards of interpretation and analysis.

Information may be gained from limited subsurface testing, surface observations, previous work and is supplemented by knowledge of the local geology and experience of the range of properties that may be exhibited by the materials present. For this reason, geotechnical reports should be regarded as interpretative rather than factual documents, limited to some extent by the scope of information on which they rely.

Where the report has been prepared for a specific purpose (eg. design of a three-storey building), the information and interpretation may not be appropriate if the design is changed (eg. a twenty storey building). In such cases, the report and the sufficiency of the existing work should be reviewed by SMEC Testing Services Pty Limited in the light of the new proposal.

Every care is taken with the report content, however, it is not always possible to anticipate or assume responsibility for the following conditions:

- Unexpected variations in ground conditions. The potential for this depends on the amount of investigative work undertaken.
- Changes in policy or interpretation by statutory authorities.
- The actions of contractors responding to commercial pressures.

If these occur, SMEC Testing Services Pty Limited would be pleased to resolve the matter through further investigation, analysis or advice.

Unforeseen Conditions

Should conditions encountered on site differ markedly from those anticipated from the information contained in the report, SMEC Testing Services Pty Limited should be notified immediately. Early identification of site anomalies generally results in any problems being more readily resolved and allows re-interpretation and assessment of the implications for future work.

Subsurface Information

Logs of a borehole, recovered core, test pit, excavated face or cone penetration test are an engineering and/or geological interpretation of the subsurface conditions. The reliability of the logged information depends on the drilling/testing method, sampling and/or observation spacings and the ground conditions. It is not always possible or economic to obtain continuous high quality data. It should also be recognised that the volume or material observed or tested is only a fraction of the total subsurface profile.

Interpretation of subsurface information and application to design and construction must take into consideration the spacing of the test locations, the frequency of observations and testing, and the possibility that geological boundaries may vary between observation points.

Groundwater observations and measurements outside of specially designed and constructed piezometers should be treated with care for the following reasons:

- In low permeability soils groundwater may not seep into an excavation or bore in the short time it is left open.
- A localised perched water table may not represent the true water table.
- Groundwater levels vary according to rainfall events or season.
- Some drilling and testing procedures mask or prevent groundwater inflow.

The installation of piezometers and long term monitoring of groundwater levels may be required to adequately identify groundwater conditions.

Supply of Geotechnical Information or Tendering Purposes

It is recommended tenderers are provided with as much geological and geotechnical information that is available and that where there are uncertainties regarding the ground conditions, prospective tenders should be provided with comments discussing the range of likely conditions in addition to the investigation data.

APPENDIX A – BOREHOLE LOGS AND EXPLANATION SHEETS

SMEC Testing Services Pty Ltd

GEOTECHNICAL LOG - NON CORE BOREHOLE

Client: Nanevski Developments Pty Limited
Project: 73 Vista Street, Sans Souci
Location: Refer to Drawing No. 15/2181

Project No. 20537/5961C
Date : August 10, 2015
Logged: JK

BOREHOLE NO.: BH 1

Sheet 1 of 1

WATER TABLE	SAMPLES	DEPTH (m)	DESCRIPTION OF DRILLED PRODUCT (Soil type, colour, grain size, plasticity, minor components, observations)	SYMBOL	CONSISTENCY (cohesive soils) or RELATIVE DENSITY (sands and gravels)	MOISTURE
			CLAYEY SILTY SAND: dark brown, fine grained FILL	CL	SOFT	M
			GRAVELLY SANDY CLAY: orange brown with light grey, fine to medium grained sand, low plasticity, some sandstone gravel	CL	SOFT BECOMING FIRM	M-D
		1.0			VERY STIFF	
WT			FILL			
			WEATHERED SANDSTONE: orange brown with light grey, fine to medium grained		EXTREMELY LOW STRENGTH	M-D
		2.0	AUGER REFUSAL AT 2.1 M ON WEATHERED SANDSTONE			
		3.0				
		4.0				
		5.0				

NOTES: D - disturbed sample U - undisturbed tube sample B - bulk sample
WT - level of water table or free water N - Standard Penetration Test (SPT)

See explanation sheets for meaning of all descriptive terms and symbols

Contractor: STS
Equipment: Edson RP70
Hole Diameter (mm): 100
Angle from Vertical (°) 0

SMEC Testing Services Pty Ltd

GEOTECHNICAL LOG - NON CORE BOREHOLE

Client: Nanevski Developments Pty Limited
Project: 73 Vista Street, Sans Souci
Location: Refer to Drawing No. 15/2181

Project No. 20537/5961C
Date : August 10, 2015
Logged: JK

BOREHOLE NO.: BH 2

Sheet 1 of 1

WATER TABLE	SAMPLES	DEPTH (m)	DESCRIPTION OF DRILLED PRODUCT (Soil type, colour, grain size, plasticity, minor components, observations)	SYMBOL	CONSISTENCY (cohesive soils) or RELATIVE DENSITY (sands and gravels)	MOISTURE
			CLAYEY SILTY SAND: dark brown, fine to medium grained FILL	SC	FIRM	M
			CLAYEY SILTY SAND: dark grey with orange brown, fine to medium grained, trace of sandstone gravel FILL	SC	SOFT AND FIRM	M
WT	ASS1 @ 1.0 m	1.0	CLAYEY SILTY SAND: dark grey, fine to medium grained	SC	FIRM AND SOFT	M-VM
		2.0	WEATHERED SANDSTONE: light grey with orange brown, fine to medium grained, clay seams		EXTREMELY LOW STRENGTH	M-D
		3.0	AUGER REFUSAL AT 3.0 M ON WEATHERED SANDSTONE			
		4.0				
		5.0				

NOTES: D - disturbed sample U - undisturbed tube sample B - bulk sample
WT - level of water table or free water N - Standard Penetration Test (SPT)

See explanation sheets for meaning of all descriptive terms and symbols

Contractor: STS
Equipment: Edson RP70
Hole Diameter (mm): 100
Angle from Vertical (°) 0

SMEC Testing Services Pty Ltd

GEOTECHNICAL LOG - NON CORE BOREHOLE

Client: Nanevski Developments Pty Limited
Project: 73 Vista Street, Sans Souci
Location: Refer to Drawing No. 15/2181

Project No. 20537/5961C
Date : August 10, 2015
Logged: JK

BOREHOLE NO.: BH 3

Sheet 1 of 1

WATER TABLE	SAMPLES	DEPTH (m)	DESCRIPTION OF DRILLED PRODUCT (Soil type, colour, grain size, plasticity, minor components, observations)	SYMBOL	CONSISTENCY (cohesive soils) or RELATIVE DENSITY (sands and gravels)	MOISTURE
			CLAYEY SILTY SAND: dark grey/brown, fine to medium grained FILL	SC	SOFT	M
	ASS2 @ 0.5 m		GRAVELLY CLAYEY SAND: orange brown with light grey, fine to medium grained sandstone gravel	SC	SOFT AND FIRM	M
		1.0	FILL			
			CLAYEY SAND: orange brown, fine to medium grained	SC	FIRM	M-VM
WT	ASS3 @ 1.5 m					
	S2 @ 2.0 m	2.0				
			WEATHERED SANDSTONE: orange brown, fine tom medium grained		EXTREMELY LOW STRENGTH	M-D
			AUGER REFUSAL AT 2.6 M ON WEATHERED SANDSTONE			
		3.0				
		4.0				
		5.0				

NOTES: D - disturbed sample U - undisturbed tube sample B - bulk sample
WT - level of water table or free water N - Standard Penetration Test (SPT)

See explanation sheets for meaning of all descriptive terms and symbols

Contractor: STS
Equipment: Edson RP70
Hole Diameter (mm): 100
Angle from Vertical (°) 0

SMEC Testing Services Pty Ltd

GEOTECHNICAL LOG - NON CORE BOREHOLE

Client: Nanevski Developments Pty Limited
Project: 73 Vista Street, Sans Souci
Location: Refer to Drawing No. 15/2181

Project No. 20537/5961C
Date : August 10, 2015
Logged: JK

BOREHOLE NO.: BH 4

Sheet 1 of 1

WATER TABLE	SAMPLES	DEPTH (m)	DESCRIPTION OF DRILLED PRODUCT (Soil type, colour, grain size, plasticity, minor components, observations)	SYMBOL	CONSISTENCY (cohesive soils) or RELATIVE DENSITY (sands and gravels)	MOISTURE
	ASS4 @ 0.4 m		CLAYEY SILTY SAND: dark grey/brown, fine to medium grained TOPSOIL/FILL	SC	FIRM	M
		1.0	CLAYEY SAND: orange brown, fine to medium grained	SC	FIRM TO STIFF	M
			SANDY CLAY: orange brown, fine tom medium grained, low plasticity	CL	FIRM TO STIFF	M
			WEATHERED SANDSTONE:: orange brown, fine tom medium grained		EXTREMELY LOW STRENGTH	M-D
		2.0	AUGER REFUSAL AT 1.6 M ON WEATHERED SANDSTONE			
		3.0				
		4.0				
		5.0				

NOTES: D - disturbed sample U - undisturbed tube sample B - bulk sample
WT - level of water table or free water N - Standard Penetration Test (SPT)

See explanation sheets for meaning of all descriptive terms and symbols

Contractor: STS
Equipment: Edson RP70
Hole Diameter (mm): 100
Angle from Vertical (°) 0

SMEC Testing Services Pty Ltd
14/1 Cowpasture Place, Wetherill Park NSW 2164
Phone: (02)9756 2166 Fax: (02)9756 1137 Email: enquiries@smectesting.com.au

Dynamic Cone Penetrometer Test Report

Project: 73 VISTA STREET, SANS SOUCI — Project No.: 20537/5961C
Client: NANEVSKI DEVELOPMENTS PTY LIMITED — Report No.: 15/2181
Address: 34 Plimsoll Street Sans Souci — Report Date: 19/08/2015
Test Method: AS 1289.6.3.2 — Page: 1 of 1

Site No.	P1	P2	P3	P4		
Location	Refer to Drawing No. 15/2181	Refer to Drawing No. 15/2181	Refer to Drawing No. 15/2181	Refer to Drawing No. 15/2181		
Starting Level	Surface Level	Surface Level	Surface Level	Surface Level		
Depth (m)	Penetration Resistance (blows / 150mm)					
0.00 - 0.15	1	2	1	1		
0.15 - 0.30	2	1	2	2		
0.30 - 0.45	1	3	2	2		
0.45 - 0.60	1	4	3	2		
0.60 - 0.75	2	2	1	3		
0.75 - 0.90	3	2	2	3		
0.90 - 1.05	22	2	2	4		
1.05 - 1.20	Refusal	2	2	3		
1.20 - 1.35		1	2	4		
1.35 - 1.50		1	3	22		
1.50 - 1.65		2	2	Refusal		
1.65 - 1.80		22	2			
1.80 - 1.95		Refusal	3			
1.95 - 2.10			22			
2.10 - 2.25			Refusal			
2.25 - 2.40						
2.40 - 2.55						
2.55 - 2.70						
2.70 - 2.85						
2.85 - 3.00						
3.00 - 3.15						
3.15 - 3.30						
3.30 - 3.45						
3.45 - 3.60						
3.60 - 3.75						

Remarks: * Pre drilled prior to testing

Technician: JK

Approved Signatory.....
Laurie Ihnativ - Manager

E1. CLASSIFICATION OF SOILS

E1.1 Soil Classification and the Unified System

An assessment of the site conditions usually includes an appraisal of the data available by combining values of engineering properties obtained by the site investigation with descriptions, from visual observation of the materials present on site.

The system used by SMEC in the identification of soil is the Unified Soil Classification system (USC) which was developed by the US Army Corps of Engineers during World War II and has since gained international acceptance and has been adopted in its metricated form by the Standards Association of Australia.

The Australian Site Investigation Code (AS1726-1981, Appendix D) recommends that the description of a soil includes the USC group symbols which are an integral component of the system.

The soil description should contain the following information in order:

Soil composition

- SOIL NAME and USC classification symbol (IN BLOCK LETTERS)
- plasticity or particle characteristics
- colour
- secondary and minor constituents (name estimated proportion, plasticity or particle characteristics, colour

Soil condition

- moisture condition
- consistency or density index

Soil structure

- structure (zoning, defects, cementing)

Soil origin

interpretation based on observation eg FILL, TOPSOIL, RESIDUAL, ALLUVIUM.

E1.2 Soil Composition

(a) Soil Name and Classification Symbol

The USC system is summarized in Figure E1.2.1. The primary division separates soil types on the basis of particle size into:

- Coarse grained soils - more than 50% of the material less than 60 mm is larger than 0.06 mm (60 µm).

- Fine grained soils - more than 50% of the material less than 60 mm is smaller than 0.06 mm (60 µm).

Initial classification is by particle size as shown in Table E1.2.1. Further classification of fine grained soils is based on plasticity.

TABLE E1.2.1 - CLASSIFICATION BY PARTICLE SIZE

NAME	SUB-DIVISION	SIZE
Clay (1)		< 2 µm
Silt (2)		2 µm to 60 µm
Sand	Fine Medium Coarse	60 µm to 200 µm 200 µm to 600 µm 600 µm to 2 mm
Gravel (3)	Fine Medium Coarse	2 mm to 6 mm 6 mm to 20 mm 20 mm to 60 mm
Cobbles (3)		60 mm to 200 mm
Boulders (3)		> 200 mm

Where a soil contains an appropriate amount of secondary material, the name includes each of the secondary components (greater than 12%) in increasing order of significance, eg sandy silty clay.

Minor components of a soil are included in the description by means of the terms “some” and “trace” as defined in Table E1.2.2.

TABLE E1.2.2 - MINOR SOIL COMPONENTS

TERM	DESCRIPTION	APPROXIMATE PROPORTION (%)
Trace	presence just detectable, little or no influence on soil properties	0-5
Some	presence easily detectable, little influence on soil properties	5-12

The USC group symbols should be included with each soil description as shown in Table E1.2.3

TABLE E1.2.3 - SOIL GROUP SYMBOLS

SOIL TYPE	PREFIX
Gravel	G
Sand	S
Silt	M
Clay	C
Organic	O
Peat	Pt

The group symbols are combined with qualifiers which indicate grading, plasticity or secondary components as shown on Table E1.2.4

TABLE E1.2.4 - SOIL GROUP QUALIFIERS

SUBGROUP	SUFFIX
Well graded	W
Poorly Graded	P
Silty	M
Clayey	C
Liquid Limit <50% - low to medium plasticity	L
Liquid Limit >50% - low to medium plasticity	H

(b) Grading

"Well graded" Good representation of all particle sizes from the largest to the smallest.

"Poorly graded" One or more intermediate sizes poorly represented

"Gap graded" One or more intermediate sizes absent

"Uniformly graded" Essentially single size material.

(c) Particle shape and texture

The shape and surface texture of the coarse grained particles should be described.

Angularity may be expressed as "rounded", "sub-rounded", "sub-angular" or "angular".

Particle **form** can be "equidimensional", "flat" or elongate".

Surface texture can be "glassy", "smooth", "rough", pitted" or striated".

(d) Colour

The colour of the soil should be described in the moist condition using simple terms such as:

Black White Grey Red
Brown Orange Yellow Green
Blue

These may be modified as necessary by "light" or "dark". Borderline colours may be described as a combination of two colours, eg. red-brown.

For soils that contain more than one colour terms such as:

- Speckled Very small (<10 mm dia) patches
- Mottled Irregular
- Blotched Large irregular (>75 mm dia)
- Streaked Randomly oriented streaks

(e) Minor Components

Secondary and minor components should be individually described in a similar manner to the dominant component.

E1.3 ***S****oil Condition*

(a) Moisture

Soil moisture condition is described as "dry", "moist" or "wet".

The moisture categories are defined as:
Dry (D) - Little or no moisture evident. Soils are running.
Moist (M) - Darkened in colour with cool feel. Granular soil particles tend to adhere. No free water evident upon remoulding of cohesive soils.

In addition the moisture content of cohesive soils can be estimated in relation to their liquid or plastic limit.

(b) Consistency

Estimates of the consistency of a clay or silt soil may be made from manual examination, hand penetrometer test, SPT results or from laboratory tests to determine undrained shear or unconfined compressive strengths. The classification of consistency is defined in Table E1.3.1.

TABLE E1.3.1 - CONSISTENCY OF FINE-GRAINED SOILS

TERM	UNCONFINED STRENGTH (kPa)	FIELD IDENTIFICATION
Very Soft	<25	Easily penetrated by fist. Sample exudes between fingers when squeezed in the fist.
Soft	25 – 50	Easily moulded in fingers. Easily penetrated 50 mm by thumb.
Firm	50 – 100	Can be moulded by strong pressure in the fingers. Penetrated only with great effort.
Stiff	100 – 200	Cannot be moulded in fingers. Indented by thumb but penetrated only with great effort.
Very Stiff	200 – 400	Very tough. Difficult to cut with knife. Readily indented with thumb nail.
Hard	>400	Brittle, can just be scratched with thumb nail. Tends to break into fragments.

Unconfined compressive strength as derived by a hand penetrometer can be taken as approximately double the undrained shear strength ($q_u = 2\ c_u$).

(c) Density Index

The insitu density index of granular soils can be assessed from the results of SPT or cone penetrometer tests. Density index should not be estimated visually.

TABLE E1.3.2 - DENSITY OF GRANULAR SOILS

TERM	SPT N VALUE	STATIC CONE VALUE q_c (MPa)	DENSITY INDEX (%)
Very Loose	0 – 3	0 - 2	0 - 15
Loose	3 – 8	2 - 5	15 - 35
Medium Dense	8 – 25	5 - 15	35 - 65
Dense	25 – 42	15 - 20	65 - 85
Very Dense	>42	>20	>85

E1.4 Soil Structure

(a) Zoning

A sample may consist of several zones differing in colour, grain size or other properties. Terms to classify these zones are:

Layer - continuous across exposure or sample
Lens - discontinuous with lenticular shape
Pocket - irregular inclusion
Each zone should be described, their distinguishing features, and the nature of the interzone boundaries.

(b) Defects

Defects which are present in the sample can include:

- fissures
- roots (containing organic matter)
- tubes (hollow)
- casts (infilled)

Defects should be described giving details of dimensions and frequency. Fissure orientation, planarity, surface condition and infilling should be noted. If there is a tendency to break into blocks, block dimensions should be recorded

E1.5 Soil Origin

Information which may be interpretative but which may contribute to the usefulness of the material description should be included. The most common interpreted feature is the origin of the soil. The assessment of the probable origin is based on the soil material description, soil structure and its relationship to other soil and rock materials.

Common terms used are:

“Residual Soil” - Material which appears to have been derived by weathering from the underlying rock. There is no evidence of transport.

“Colluvium” - Material which appears to have been transported from its original location. The method of movement is usually the combination of gravity and erosion.

“Landslide Debris” - An extreme form of colluvium where the soil has been transported by mass movement. The material is obviously distributed and contains distinct defects related to the slope failure.

“Alluvium” - Material which has been transported essentially by water. Usually associated with former stream activity.

“Fill” - Material which has been transported and placed by man. This can range from natural soils which have been placed in a controlled manner in engineering construction to dumped waste material. A description of the constituents should include an assessment of the method of placement.

E1.6 Fine Grained Soils

The physical properties of fine grained soils are dominated by silts and clays.

The definition of clay and silt soils is governed by their Atterberg Limits. Clay soils are characterised by the properties of cohesion and plasticity with cohesion defines as the ability to deform without rupture. Silts exhibit cohesion but have low plasticity or are non-plastic.

The field characteristics of clay soils include:

- dry lumps have appreciable dry strength and cannot be powdered
- volume changes occur with moisture content variation
- feels smooth when moist with a greasy appearance when cut.

The field characteristics of silt soils include:

- dry lumps have negligible dry strength and can be powdered easily
- dilatancy - an increase in volume due to shearing - is indicted by the presence of a shiny film of water after a hand sample is shaken. The water disappears upon remoulding. Very fine grained sands may also exhibit dilatancy.
- low plasticity index
- feels gritty to the teeth

E1.7 Organic Soils

Organic soils are distinguished from other soils by their appreciable content of vegetable matter, usually derived from plant remains.

The soil usually has a distinctive smell and low bulk density.

The USC system uses the symbol Pt for partly decomposed organic material. The O symbol is combined with suffixes “O” or “H” depending on plasticity.

Where roots or root fibres are present their frequency and the depth to which they are encountered should be recorded. The presence of roots or root fibres does not necessarily mean the material is an “organic material” by classification.

Coal and lignite should be described as such and not simply as organic matter.

APPENDIX B – LABORATORY TEST RESULTS

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1528106**	Page	: 1 of 6
Client	: **SMEC TESTING SERVICES PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: ALL REPORTS (ENQUIRIES)	Contact	:
Address	: P O BOX 6989 WETHERILL PARK NSW, AUSTRALIA 2164	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: enquiries@smectesting.com.au	E-mail	:
Telephone	: ----	Telephone	: +61-2-8784 8555
Facsimile	: ----	Facsimile	: +61-2-8784 8500
Project	: 20537/5961C	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Order number	: 12292	Date Samples Received	: 11-Aug-2015 16:20
C-O-C number	:	Date Analysis Commenced	: 13-Aug-2015
Sampler	: ----	Issue Date	: 17-Aug-2015 14:20
Site	: ----		
		No. of samples received	: 6
Quote number	: ----	No. of samples analysed	: 6

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

Accredited for compliance with ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics
Satishkumar Trivedi	Acid Sulfate Soils Supervisor	Brisbane Acid Sulphate Soils

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.

- ASS: EA029 (SPOCAS): Retained Acidity not required because pH KCl greater than or equal to 4.5
- ASS: EA029 (SPOCAS): Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime ($CaCO_3$) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from kg/t dry weight to kg/m3 in-situ soil, multiply reported results x wet bulk density of soil in t/m3.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	ASS1	ASS2	ASS3	ASS4	S1
				Client sampling date / time	[11-Aug-2015]	[11-Aug-2015]	[11-Aug-2015]	[11-Aug-2015]	[11-Aug-2015]
Compound	CAS Number	LOR	Unit		ES1528106-001	ES1528106-002	ES1528106-003	ES1528106-004	ES1528106-005
					Result	Result	Result	Result	Result
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		----	----	----	----	7.7
EA029-A: pH Measurements									
pH KCl (23A)	----	0.1	pH Unit		9.4	8.5	8.9	7.6	----
pH OX (23B)	----	0.1	pH Unit		8.0	7.8	6.7	6.9	----
EA029-B: Acidity Trail									
Titratable Actual Acidity (23F)	----	2	mole H+ / t		<2	<2	<2	<2	----
Titratable Peroxide Acidity (23G)	----	2	mole H+ / t		<2	<2	<2	<2	----
Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t		<2	<2	<2	<2	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S		<0.020	<0.020	<0.020	<0.020	----
sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.02	% pyrite S		<0.020	<0.020	<0.020	<0.020	----
sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.02	% pyrite S		<0.020	<0.020	<0.020	<0.020	----
EA029-C: Sulfur Trail									
KCl Extractable Sulfur (23Ce)	----	0.02	% S		0.124	<0.020	0.021	<0.020	----
Peroxide Sulfur (23De)	----	0.02	% S		0.219	<0.020	0.033	0.021	----
Peroxide Oxidisable Sulfur (23E)	----	0.02	% S		0.095	<0.020	<0.020	0.021	----
acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t		59	<10	<10	13	----
EA029-D: Calcium Values									
KCl Extractable Calcium (23Vh)	----	0.02	% Ca		0.263	0.341	0.087	0.213	----
Peroxide Calcium (23Wh)	----	0.02	% Ca		0.706	0.738	0.096	0.253	----
Acid Reacted Calcium (23X)	----	0.02	% Ca		0.442	0.396	<0.020	0.040	----
acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t		221	198	<10	20	----
sulfidic - Acid Reacted Calcium (s-23X)	----	0.02	% S		0.354	0.317	<0.020	0.032	----
EA029-E: Magnesium Values									
KCl Extractable Magnesium (23Sm)	----	0.02	% Mg		0.024	<0.020	<0.020	<0.020	----
Peroxide Magnesium (23Tm)	----	0.02	% Mg		0.063	0.045	0.021	0.022	----
Acid Reacted Magnesium (23U)	----	0.02	% Mg		0.039	0.045	0.021	0.022	----
Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t		32	37	17	18	----
sulfidic - Acid Reacted Magnesium (s-23U)	----	0.02	% S		0.052	0.059	0.028	0.029	----
EA029-F: Excess Acid Neutralising Capacity									
Excess Acid Neutralising Capacity (23Q)	----	0.02	% CaCO3		1.76	1.06	0.270	0.344	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	ASS1	ASS2	ASS3	ASS4	S1
				Client sampling date / time	[11-Aug-2015]	[11-Aug-2015]	[11-Aug-2015]	[11-Aug-2015]	[11-Aug-2015]
Compound	CAS Number	LOR	Unit		ES1528106-001	ES1528106-002	ES1528106-003	ES1528106-004	ES1528106-005
					Result	Result	Result	Result	Result
EA029-F: Excess Acid Neutralising Capacity - Continued									
acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t		**353**	**213**	**54**	**69**	**----**
sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.02	% S		**0.565**	**0.341**	**0.086**	**0.110**	**----**
EA029-H: Acid Base Accounting									
ANC Fineness Factor	----	0.5	-		**1.5**	**1.5**	**1.5**	**1.5**	**----**
Net Acidity (sulfur units)	----	0.02	% S		<0.02	<0.02	<0.02	<0.02	**----**
Net Acidity (acidity units)	----	10	mole H+ / t		<10	<10	<10	<10	**----**
Liming Rate	----	1	kg CaCO3/t		<1	<1	<1	<1	**----**
EA055: Moisture Content									
^ **Moisture Content (dried @ 103°C)**	----	1	%		**----**	**----**	**----**	**----**	**16.9**
ED040S : Soluble Sulfate by ICPAES									
Sulfate as SO4 2-	14808-79-8	10	mg/kg		**----**	**----**	**----**	**----**	**210**
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	10	mg/kg		**----**	**----**	**----**	**----**	**320**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	S2	----	----	----	----
			Client sampling date / time	[11-Aug-2015]	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1528106-006	--------	--------	--------	--------
				Result	Result	Result	Result	Result
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	7.6	----	----	----	----
EA029-A: pH Measurements								
pH KCl (23A)	----	0.1	pH Unit	----	----	----	----	----
pH OX (23B)	----	0.1	pH Unit	----	----	----	----	----
EA029-B: Acidity Trail								
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	----	----	----	----
Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	----	----	----	----	----
Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	----	----	----	----	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	----	----	----	----
sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.02	% pyrite S	----	----	----	----	----
sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.02	% pyrite S	----	----	----	----	----
EA029-C: Sulfur Trail								
KCl Extractable Sulfur (23Ce)	----	0.02	% S	----	----	----	----	----
Peroxide Sulfur (23De)	----	0.02	% S	----	----	----	----	----
Peroxide Oxidisable Sulfur (23E)	----	0.02	% S	----	----	----	----	----
acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	----	----	----	----	----
EA029-D: Calcium Values								
KCl Extractable Calcium (23Vh)	----	0.02	% Ca	----	----	----	----	----
Peroxide Calcium (23Wh)	----	0.02	% Ca	----	----	----	----	----
Acid Reacted Calcium (23X)	----	0.02	% Ca	----	----	----	----	----
acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	----	----	----	----	----
sulfidic - Acid Reacted Calcium (s-23X)	----	0.02	% S	----	----	----	----	----
EA029-E: Magnesium Values								
KCl Extractable Magnesium (23Sm)	----	0.02	% Mg	----	----	----	----	----
Peroxide Magnesium (23Tm)	----	0.02	% Mg	----	----	----	----	----
Acid Reacted Magnesium (23U)	----	0.02	% Mg	----	----	----	----	----
Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	----	----	----	----	----
sulfidic - Acid Reacted Magnesium (s-23U)	----	0.02	% S	----	----	----	----	----
EA029-F: Excess Acid Neutralising Capacity								
Excess Acid Neutralising Capacity (23Q)	----	0.02	% CaCO3	----	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	S2	----	----	----	----
				Client sampling date / time	[11-Aug-2015]	----	----	----	----
Compound	CAS Number	LOR	Unit		ES1528106-006	--------	--------	--------	--------
					Result	Result	Result	Result	Result
EA029-F: Excess Acid Neutralising Capacity - Continued									
acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t		**----**	----	----	----	----
sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.02	% S		**----**	----	----	----	----
EA029-H: Acid Base Accounting									
ANC Fineness Factor	----	0.5	-		**----**	----	----	----	----
Net Acidity (sulfur units)	----	0.02	% S		**----**	----	----	----	----
Net Acidity (acidity units)	----	10	mole H+ / t		**----**	----	----	----	----
Liming Rate	----	1	kg CaCO3/t		**----**	----	----	----	----
EA055: Moisture Content									
^ **Moisture Content (dried @ 103°C)**	----	1	%		**20.5**	----	----	----	----
ED040S : Soluble Sulfate by ICPAES									
Sulfate as SO4 2-	14808-79-8	10	mg/kg		**220**	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	10	mg/kg		**1290**	----	----	----	----

ATTACHMENT C

BOREHOLE LOGS

Project No: EP1422

Log of Borehole: BH1

Project: Stage 1 PESI; 73 Vista Street, Sans Souci NSW 2219

Client: Nanevski Developments Pty Ltd

Location: North West Corner (adjacent to sea wall)

Engineer: Sydney Geotechnics Pty Ltd

SUBSURFACE PROFILE			Sample	Volatile Organic Concentration (Field PID) ppm 25 50 75	Lab Analysis
Depth	Symbol	Description			
0		Ground Surface			
		Topsoil Fill dark grey brown, fine to medium grained, clayey silty sand, grass roots, moist, no odour	BH1-1		metals/TRH/BTEX/PAH OCP/OPP/PCB/asbestos
		Fill dark yellow / red brown, medium grained, gravelly silty sand, moist / wet, no odour			
		Refusal on weathered sandstone at 1.9m BGL Inflow to 1.3m BGL			
			BH1-2		
1					
2		End of Borehole			

Hole Size: 100mm

Drill Method: Mechanical Auger

Drill Date: 24 March, 2017

HEC HAYES ENVIRONMENTAL CONSULTING

Hayes Environmental Consulting Pty Ltd
ABN 32 295 203 367
ACN 102 528 192

Checked by: WH

Sheet: 1 of 1

Project No: EP1422

Log of Borehole: BH2

Project: Stage 1 PESI; 73 Vista Street, Sans Souci NSW 2219

Client: Nanevski Developments Pty Ltd

Location: Mid-North Portion (adjacent to stone retaining wall)

Engineer: Sydney Geotechnics Pty Ltd

SUBSURFACE PROFILE			Sample	Volatile Organic Concentration (Field PID) ppm 25 50 75	Lab Analysis
Depth	Symbol	Description			
0		Ground Surface			
		Topsoil Fill dark grey brown, fine to medium grained, silty sand, some sandstone gravel, grass roots, moist, no odour	BH2-1		metals/TRH/BTEX/PAH OCP/OPP/PCB/asbestos
		Refusal on weathered sandstone at 0.3m BGL No inflow			
		End of Borehole			
1					
2					

Hole Size: 100mm

Drill Method: Mechanical Auger

Drill Date: 24 March, 2017

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ABN 32 295 203 367
ACN 102 528 192

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Sheet: 1 of 1

Project No: EP1422

Log of Borehole: BH3

Project: Stage 1 PESI; 73 Vista Street, Sans Souci NSW 2219

Client: Nanevski Developments Pty Ltd

Location: South West Corner (adjacent to boat shed ramp)

Engineer: Sydney Geotechnics Pty Ltd

SUBSURFACE PROFILE			Sample	Volatile Organic Concentration (Field PID) ppm 25 50 75	Lab Analysis
Depth	Symbol	Description			
0		Ground Surface			
		Topsoil Fill dark grey brown, fine to medium grained, silty sand, grass roots, moist, no odour	BH3-1		metals/TRH/BTEX/PAH OCP/OPP/PCB/asbestos
		Fill grey brown, fine to medium grained, silty sand, moist, no odour			
		Refusal on weathered sandstone at 0.4m BGL No inflow			
		End of Borehole			
1					
2					

Hole Size: 100mm

Drill Method: Mechanical Auger

Drill Date: 24 March, 2017

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ACN 102 528 192

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Project No: EP1422

Log of Borehole: BH4

Project: Stage 1 PESI; 73 Vista Street, Sans Souci NSW 2219

Client: Nanevski Developments Pty Ltd

Location: Mid-South Portion (adjacent to boat shed)

Engineer: Sydney Geotechnics Pty Ltd

SUBSURFACE PROFILE

Depth	Symbol	Description	Sample	Volatile Organic Concentration (Field PID) ppm 25 50 75	Lab Analysis
0		Ground Surface			
		Topsoil Fill dark grey brown, fine to medium grained, silty sand, grass roots, moist, no odour	BH4-1		metals/TRH/BTEX/PAH OCP/OPP/PCB/asbestos
		Fill yellow brown, fine to medium grained, sand, moist, no odour			
1			BH4-2		
		Gravelly Clayey Sand yellow brown, fine to coarse grained, EWR, moist, no odour			
2		Refusal on weathered sandstone at 1.8m BGL Slight seepage			
		End of Borehole			

Hole Size: 100mm

Drill Method: Mechanical Auger

Drill Date: 24 March, 2017

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ACN 102 528 192

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Sheet: 1 of 1

Project No: EP1422

Log of Borehole: BH5

Project: Stage 1 PESI; 73 Vista Street, Sans Souci NSW 2219

Client: Nanevski Developments Pty Ltd

Location: South East Corner

Engineer: Sydney Geotechnics Pty Ltd

SUBSURFACE PROFILE			Sample	Volatile Organic Concentration (Field PID) ppm 25 50 75	Lab Analysis
Depth	Symbol	Description			
0		Ground Surface			
		Topsoil Fill dark grey brown, fine to medium grained, silty sand, grass roots, moist, no odour	BH5-1		metals/TRH/BTEX/PAH OCP/OPP/PCB/asbestos
		Silty Sand grey, fine to medium grained, alluvium, moist, no odour Refusal on weathered sandstone at 0.9m BGL No inflow	BH5-2		
1		End of Borehole			
2					

Hole Size: 100mm

Drill Method: Mechanical Auger

Drill Date: 24 March, 2017

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Sheet: 1 of 1

Project No: EP1422

Log of Borehole: BH6

Project: Stage 1 PESI; 73 Vista Street, Sans Souci NSW 2219

Client: Nanevski Developments Pty Ltd

Location: Mid-East Portion

Engineer: Sydney Geotechnics Pty Ltd

SUBSURFACE PROFILE			Sample	Volatile Organic Concentration (Field PID) ppm 25 50 75	Lab Analysis
Depth	Symbol	Description			
0		Ground Surface			
		Topsoil Fill dark grey brown, fine to medium grained, silty sand, grass roots, moist, no odour	BH6-1		metals/TRH/BTEX/PAH OCP/OPP/PCB/asbestos
		Silty Sand grey, fine to medium grained, alluvium, moist, no odour	BH6-2		metals/TRH/BTEX/PAH
		Refusal on weathered sandstone at 0.5m BGL No inflow			
		End of Borehole			
1					
2					

Hole Size: 100mm

Drill Method: Mechanical Auger

Drill Date: 24 March, 2017

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ACN 102 528 192

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Sheet: 1 of 1

Project No: EP1422

Log of Borehole: BH7

Project: Stage 1 PESI; 73 Vista Street, Sans Souci NSW 2219

Client: Nanevski Developments Pty Ltd

Location: North East Corner

Engineer: Sydney Geotechnics Pty Ltd

SUBSURFACE PROFILE

Depth	Symbol	Description	Sample	Volatile Organic Concentration (Field PID) ppm 25 50 75	Lab Analysis
0		Ground Surface			
		Topsoil Fill dark grey brown, fine to medium grained, silty sand, grass roots, moist, no odour	BH7-1		metals/TRH/BTEX/PAH OCP/OPP/PCB/asbestos
		Silty Sand grey brown, fine to medium grained, alluvium, moist, no odour	BH7-2		
		Refusal on weathered sandstone at 0.4m BGL No inflow			
		End of Borehole			
1					
2					

Hole Size: 100mm

Drill Method: Mechanical Auger

Drill Date: 24 March, 2017

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ACN 102 528 192

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Sheet: 1 of 1

Project No: EP1422

Log of Borehole: BH8

Project: Stage 1 PESI; 73 Vista Street, Sans Souci NSW 2219

Client: Nanevski Developments Pty Ltd

Location: Mid-West Portion (end of bitumen driveway)

Engineer: Sydney Geotechnics Pty Ltd

SUBSURFACE PROFILE			Sample	Volatile Organic Concentration (Field PID) ppm 25 50 75	Lab Analysis
Depth	Symbol	Description			
0		Ground Surface			
		Topsoil Fill dark grey brown, fine to medium grained, silty sand, grass roots, moist, no odour			
		Fill grey brown, fine to medium grained, clayey silty sand, some sandstone gravel, moist, no odour	BH8-1		metals/TRH/BTEX/PAH OCP/OPP/PCB/asbestos
		Silty Sand grey, fine to medium grained, alluvium, moist, no odour			
1		Refusal on weathered sandstone at 1.5m BGL No inflow	BH8-2		metals/TRH/BTEX/PAH
		End of Borehole			
2					

Hole Size: 100mm

Drill Method: Mechanical Auger

Drill Date: 24 March, 2017

HEC HAYES ENVIRONMENTAL CONSULTING

Hayes Environmental Consulting Pty Ltd
ABN 32 295 203 367
ACN 102 528 192

Checked by: WH

Sheet: 1 of 1

ATTACHMENT D

CHAIN-OF-CUSTODY CERTIFICATES AND SAMPLE RECEIPT ADVICE

SGS

CHAIN OF CUSTODY & ANALYSIS REQUEST

SGS Environmental Services
Unit 16, 33 Maddox Street
Alexandria NSW 2015
Telephone No: (02) 85940400
Facsimile No: (02) 85940499
Email: AU.SAMPLERECEIPT.SYDNEY@SGS.COM

Company Name:	HEC	Project Name/No:	Stage 1 PESI; 73 Vista Street, Sans Souci NSW 2219
Address:	1 Bindea Street, Jannali NSW 2226		EP1422
	PO Box 741, Jannali NSW 2226	Results Required By:	31 March, 2017
		Telephone:	02 9528 0879 / 0413 356 802
Contact Name:	Warwick Hayes	Email Results:	warwick@hayesenviro.com.au

Client Sample ID	Date Sampled	Lab Sample ID	WATER	SOIL	PRESERVATIVE	NO OF CONTAINERS	heavy metals (M8)	C_6-C_{40} TRHs	BTEX	PAHs	OCPs	OPPs	PCBs	asbestos (ID)	pH / EC (1:5)
BH1-1	24/3/2017	1		✓	ICE	2	✓	✓	✓	✓	✓	✓	✓	✓	
BH1-2		1		✓	ICE	1									
BH2-1		2		✓	ICE	2	✓	✓	✓	✓	✓	✓	✓	✓	
BH3-1		3		✓	ICE	2	✓	✓	✓	✓	✓	✓	✓	✓	
BH4-1		4		✓	ICE	2	✓	✓	✓	✓	✓	✓	✓	✓	
BH4-2				✓	ICE	1									
BH5-1		5		✓	ICE	2	✓	✓	✓	✓	✓	✓	✓	✓	
BH5-2				✓	ICE	1									

SGS EHS Alexandria Laboratory
SE163508 COC
Received: 24 – Mar – 2017

Relinquished By: Warwick Hayes	Date/Time: 24 MARCH, 2017 / 12.00pm	Received By: C. AS	Date/Time 24/3 12pm.
Relinquished By:	Date/Time:	Received By:	Date/Time
Samples Intact: Yes/ No	Temperature: Ambient / ~~Chilled~~	Sample Cooler Sealed: (Yes)/ No	Laboratory Quotation No: ENVI-2CRSA1
	Comments: ICE 2.6°C		

CHAIN OF CUSTODY & ANALYSIS REQUEST

SGS Environmental Services
Unit 16, 33 Maddox Street
Alexandria NSW 2015
Telephone No: (02) 85940400
Facsimile No: (02) 85940499
Email: AU.SAMPLERECEIPT.SYDNEY@SGS.COM

Company Name:	HEC	Project Name/No:	Stage 1 PESI; 73 Vista Street, Sans Souci NSW 2219
Address:	1 Bindea Street, Jannali NSW 2226		EP1422
	PO Box 741, Jannali NSW 2226	Results Required By:	31 March, 2017
		Telephone:	02 9528 0879 / 0413 356 802
Contact Name:	Warwick Hayes	Email Results:	warwick@hayesenviro.com.au

Client Sample ID	Date Sampled	Lab Sample ID	WATER	SOIL	PRESERVATIVE	NO OF CONTAINERS	heavy metals (M8)	C_6-C_{40} TRHs	BTEX	PAHs	OCPs	OPPs	PCBs	asbestos (ID)	pH / EC (1:5)							
BH6-1	24/3/2017	6		✓	ICE	2	✓	✓	✓	✓	✓	✓	✓	✓								
BH6-2	↓	7		✓	ICE	1	✓	✓	✓	✓												
BH7-1		8		✓	ICE	2	✓	✓	✓	✓	✓	✓	✓	✓								
BH7-2				✓	ICE	1																
BH8-1		9		✓	ICE	2	✓	✓	✓	✓	✓	✓	✓	✓								
BH8-2		10		✓	ICE	1	✓	✓	✓	✓												

Relinquished By: Warwick Hayes	Date/Time: 24 MARCH, 2017 / 12.00 pm	Received By:	Date/Time 24/3 12pm
Relinquished By:	Date/Time:	Received By:	Date/Time
Samples Intact: Yes/ No	Temperature: Ambient / Chilled	Sample Cooler Sealed: Yes/ No	Laboratory Quotation No: ENVI-2CRSA1
	Comments:		

SAMPLE RECEIPT ADVICE

SE163508

CLIENT DETAILS

Contact	Warwick Hayes
Client	Hayes Environmental Consulting
Address	1 Bindea Street PO Box 741 Jannali NSW 2226
Telephone	02 9528 0879
Facsimile	02 9475 5266
Email	warwick@hayesenviro.com.au
Project	**EP1422 73 Vista St, San Souci NSW 2219**
Order Number	(Not specified)
Samples	10

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	Fri 24/3/2017
Report Due	Fri 31/3/2017
SGS Reference	**SE163508**

SUBMISSION DETAILS

This is to confirm that 10 samples were received on Friday 24/3/2017. Results are expected to be ready by Friday 31/3/2017. Please quote SGS reference SE163508 when making enquiries. Refer below for details relating to sample integrity upon receipt.

Samples clearly labelled	Yes	Complete documentation received	Yes
Sample container provider	SGS	Sample cooling method	Ice
Samples received in correct containers	Yes	Sample counts by matrix	10 Soil
Date documentation received	24/3/2017	Type of documentation received	COC
Number of eskies/boxes received		Samples received in good order	Yes
Samples received without headspace	Yes	Sample temperature upon receipt	2.6°C
Sufficient sample for analysis	Yes	Turnaround time requested	Standard

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

COMMENTS

SAMPLE RECEIPT ADVICE

SE163508

CLIENT DETAILS

Client Hayes Environmental Consulting

Project EP1422 73 Vista St, San Souci NSW 2219

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	BH1-1	28	13	26	11	7	10	12	8
002	BH2-1	28	13	26	11	7	10	12	8
003	BH3-1	28	13	26	11	7	10	12	8
004	BH4-1	28	13	26	11	7	10	12	8
005	BH5-1	28	13	26	11	7	10	12	8
006	BH6-1	28	13	26	11	7	10	12	8
007	BH6-2	-	-	26	-	7	10	12	8
008	BH7-1	28	13	26	11	7	10	12	8
009	BH8-1	28	13	26	11	7	10	12	8
010	BH8-2	-	-	26	-	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

SE163508

CLIENT DETAILS

Client Hayes Environmental Consulting

Project EP1422 73 Vista St, San Souci NSW 2219

SUMMARY OF ANALYSIS

No.	Sample ID	Fibre Identification in soil	Mercury in Soil	Moisture Content
001	BH1-1	2	1	1
002	BH2-1	2	1	1
003	BH3-1	2	1	1
004	BH4-1	2	1	1
005	BH5-1	2	1	1
006	BH6-1	2	1	1
007	BH6-2	-	1	1
008	BH7-1	2	1	1
009	BH8-1	2	1	1
010	BH8-2	-	1	1

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 .

ATTACHMENT E

LABORATORY ANALYTICAL REPORTS

ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS

Contact	Warwick Hayes
Client	Hayes Environmental Consulting
Address	1 Bindea Street PO Box 741 Jannali NSW 2226
Telephone	02 9528 0879
Facsimile	02 9475 5266
Email	warwick@hayesenviro.com.au
Project	**EP1422 73 Vista St, San Souci NSW 2219**
Order Number	(Not specified)
Samples	10

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	**SE163508 R0**
Date Received	24/3/2017
Date Reported	31/3/2017

COMMENTS

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

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

Asbestos analysed by Approved Identifier Yusuf Kuthpudin.

SIGNATORIES

Bennet Lo
Senior Organic Chemist/Metals Chemist

Kamrul Ahsan
Senior Chemist

Ly Kim Ha
Organic Section Head

Ravee Sivasubramaniam
Hygiene Team Leader

VOC's in Soil [AN433] Tested: 27/3/2017

PARAMETER	UOM	LOR	BH1-1 SOIL - 24/3/2017 SE163508.001	BH2-1 SOIL - 24/3/2017 SE163508.002	BH3-1 SOIL - 24/3/2017 SE163508.003	BH4-1 SOIL - 24/3/2017 SE163508.004	BH5-1 SOIL - 24/3/2017 SE163508.005
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	BH6-1 SOIL - 24/3/2017 SE163508.006	BH6-2 SOIL - 24/3/2017 SE163508.007	BH7-1 SOIL - 24/3/2017 SE163508.008	BH8-1 SOIL - 24/3/2017 SE163508.009	BH8-2 SOIL - 24/3/2017 SE163508.010
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

Volatile Petroleum Hydrocarbons in Soil [AN433] Tested: 27/3/2017

PARAMETER	UOM	LOR	BH1-1 SOIL - 24/3/2017 SE163508.001	BH2-1 SOIL - 24/3/2017 SE163508.002	BH3-1 SOIL - 24/3/2017 SE163508.003	BH4-1 SOIL - 24/3/2017 SE163508.004	BH5-1 SOIL - 24/3/2017 SE163508.005
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

PARAMETER	UOM	LOR	BH6-1 SOIL - 24/3/2017 SE163508.006	BH6-2 SOIL - 24/3/2017 SE163508.007	BH7-1 SOIL - 24/3/2017 SE163508.008	BH8-1 SOIL - 24/3/2017 SE163508.009	BH8-2 SOIL - 24/3/2017 SE163508.010
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

TRH (Total Recoverable Hydrocarbons) in Soil [AN403] Tested: 27/3/2017

PARAMETER	UOM	LOR	BH1-1 SOIL - 24/3/2017 SE163508.001	BH2-1 SOIL - 24/3/2017 SE163508.002	BH3-1 SOIL - 24/3/2017 SE163508.003	BH4-1 SOIL - 24/3/2017 SE163508.004	BH5-1 SOIL - 24/3/2017 SE163508.005
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

PARAMETER	UOM	LOR	BH6-1 SOIL - 24/3/2017 SE163508.006	BH6-2 SOIL - 24/3/2017 SE163508.007	BH7-1 SOIL - 24/3/2017 SE163508.008	BH8-1 SOIL - 24/3/2017 SE163508.009	BH8-2 SOIL - 24/3/2017 SE163508.010
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

PAH (Polynuclear Aromatic Hydrocarbons) in Soil [AN420] Tested: 27/3/2017

PARAMETER	UOM	LOR	BH1-1 SOIL - 24/3/2017 SE163508.001	BH2-1 SOIL - 24/3/2017 SE163508.002	BH3-1 SOIL - 24/3/2017 SE163508.003	BH4-1 SOIL - 24/3/2017 SE163508.004	BH5-1 SOIL - 24/3/2017 SE163508.005
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	<0.1	0.3
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	0.1	0.1	<0.1	1.6
Anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	0.4
Fluoranthene	mg/kg	0.1	<0.1	0.2	0.2	<0.1	2.8
Pyrene	mg/kg	0.1	<0.1	0.3	0.2	0.1	4.6
Benzo(a)anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	1.3
Chrysene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	1.3
Benzo(b&j)fluoranthene	mg/kg	0.1	<0.1	0.1	<0.1	<0.1	1.5
Benzo(k)fluoranthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	0.7
Benzo(a)pyrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	1.3
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	0.7
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	<0.1	0.6
Carcinogenic PAHs, BaP TEQ <LOR=0	TEQ	0.2	<0.2	<0.2	<0.2	<0.2	1.9
Carcinogenic PAHs, BaP TEQ <LOR=LOR	TEQ (mg/kg)	0.3	<0.3	<0.3	<0.3	<0.3	1.9
Carcinogenic PAHs, BaP TEQ <LOR=LOR/2	TEQ (mg/kg)	0.2	<0.2	<0.2	<0.2	<0.2	1.9
Total PAH (18)	mg/kg	0.8	<0.8	<0.8	<0.8	<0.8	17
Total PAH (NEPM/WHO 16)	mg/kg	0.8	<0.8	<0.8	<0.8	<0.8	17

PARAMETER	UOM	LOR	BH6-1 SOIL - 24/3/2017 SE163508.006	BH6-2 SOIL - 24/3/2017 SE163508.007	BH7-1 SOIL - 24/3/2017 SE163508.008	BH8-1 SOIL - 24/3/2017 SE163508.009	BH8-2 SOIL - 24/3/2017 SE163508.010
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	0.1	0.5	<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	0.3	<0.1	<0.1
Phenanthrene	mg/kg	0.1	<0.1	1.3	3.0	<0.1	0.1
Anthracene	mg/kg	0.1	<0.1	0.3	0.7	<0.1	<0.1
Fluoranthene	mg/kg	0.1	<0.1	2.6	3.8	0.1	0.3
Pyrene	mg/kg	0.1	<0.1	4.0	5.5	0.2	0.5
Benzo(a)anthracene	mg/kg	0.1	<0.1	1.2	1.8	<0.1	0.1
Chrysene	mg/kg	0.1	<0.1	1.1	1.6	<0.1	0.1
Benzo(b&j)fluoranthene	mg/kg	0.1	<0.1	1.2	1.8	<0.1	0.1
Benzo(k)fluoranthene	mg/kg	0.1	<0.1	0.5	0.8	<0.1	<0.1
Benzo(a)pyrene	mg/kg	0.1	<0.1	1.0	1.6	<0.1	0.1
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	<0.1	0.6	1.0	<0.1	<0.1
Dibenzo(ah)anthracene	mg/kg	0.1	<0.1	0.1	0.2	<0.1	<0.1
Benzo(ghi)perylene	mg/kg	0.1	<0.1	0.5	0.8	<0.1	<0.1
Carcinogenic PAHs, BaP TEQ <LOR=0	TEQ	0.2	<0.2	1.5	2.4	<0.2	<0.2
Carcinogenic PAHs, BaP TEQ <LOR=LOR	TEQ (mg/kg)	0.3	<0.3	1.5	2.4	<0.3	<0.3
Carcinogenic PAHs, BaP TEQ <LOR=LOR/2	TEQ (mg/kg)	0.2	<0.2	1.5	2.4	<0.2	<0.2
Total PAH (18)	mg/kg	0.8	<0.8	14	23	<0.8	1.4
Total PAH (NEPM/WHO 16)	mg/kg	0.8	<0.8	14	23	<0.8	1.4

OC Pesticides in Soil [AN420] Tested: 27/3/2017

PARAMETER	UOM	LOR	BH1-1 SOIL - 24/3/2017 SE163508.001	BH2-1 SOIL - 24/3/2017 SE163508.002	BH3-1 SOIL - 24/3/2017 SE163508.003	BH4-1 SOIL - 24/3/2017 SE163508.004	BH5-1 SOIL - 24/3/2017 SE163508.005
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	<0.1	<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	<0.2	<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 [AN420] Tested: 27/3/2017 (continued)

PARAMETER	UOM	LOR	BH6-1 SOIL - 24/3/2017 SE163508.006	BH7-1 SOIL - 24/3/2017 SE163508.008	BH8-1 SOIL - 24/3/2017 SE163508.009
Hexachlorobenzene (HCB)	mg/kg	0.1	<0.1	<0.1	<0.1
Alpha BHC	mg/kg	0.1	<0.1	<0.1	<0.1
Lindane	mg/kg	0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	0.1	<0.1	<0.1	<0.1
Beta BHC	mg/kg	0.1	<0.1	<0.1	<0.1
Delta BHC	mg/kg	0.1	<0.1	<0.1	<0.1
Heptachlor epoxide	mg/kg	0.1	<0.1	<0.1	<0.1
o,p'-DDE	mg/kg	0.1	<0.1	<0.1	<0.1
Alpha Endosulfan	mg/kg	0.2	<0.2	<0.2	<0.2
Gamma Chlordane	mg/kg	0.1	<0.1	<0.1	<0.1
Alpha Chlordane	mg/kg	0.1	<0.1	<0.1	<0.1
trans-Nonachlor	mg/kg	0.1	<0.1	<0.1	<0.1
p,p'-DDE	mg/kg	0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	0.2	<0.2	<0.2	<0.2
Endrin	mg/kg	0.2	<0.2	<0.2	<0.2
o,p'-DDD	mg/kg	0.1	<0.1	<0.1	<0.1
o,p'-DDT	mg/kg	0.1	<0.1	<0.1	<0.1
Beta Endosulfan	mg/kg	0.2	<0.2	<0.2	<0.2
p,p'-DDD	mg/kg	0.1	<0.1	<0.1	<0.1
p,p'-DDT	mg/kg	0.1	<0.1	<0.1	<0.1
Endosulfan sulphate	mg/kg	0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	0.1	<0.1	<0.1	<0.1
Endrin Ketone	mg/kg	0.1	<0.1	<0.1	<0.1
Isodrin	mg/kg	0.1	<0.1	<0.1	<0.1
Mirex	mg/kg	0.1	<0.1	<0.1	<0.1

OP Pesticides in Soil [AN420] Tested: 27/3/2017

PARAMETER	UOM	LOR	BH1-1 SOIL - 24/3/2017 SE163508.001	BH2-1 SOIL - 24/3/2017 SE163508.002	BH3-1 SOIL - 24/3/2017 SE163508.003	BH4-1 SOIL - 24/3/2017 SE163508.004	BH5-1 SOIL - 24/3/2017 SE163508.005
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	BH6-1 SOIL - 24/3/2017 SE163508.006	BH7-1 SOIL - 24/3/2017 SE163508.008	BH8-1 SOIL - 24/3/2017 SE163508.009
Dichlorvos	mg/kg	0.5	<0.5	<0.5	<0.5
Dimethoate	mg/kg	0.5	<0.5	<0.5	<0.5
Diazinon (Dimpylate)	mg/kg	0.5	<0.5	<0.5	<0.5
Fenitrothion	mg/kg	0.2	<0.2	<0.2	<0.2
Malathion	mg/kg	0.2	<0.2	<0.2	<0.2
Chlorpyrifos (Chlorpyrifos Ethyl)	mg/kg	0.2	<0.2	<0.2	<0.2
Parathion-ethyl (Parathion)	mg/kg	0.2	<0.2	<0.2	<0.2
Bromophos Ethyl	mg/kg	0.2	<0.2	<0.2	<0.2
Methidathion	mg/kg	0.5	<0.5	<0.5	<0.5
Ethion	mg/kg	0.2	<0.2	<0.2	<0.2
Azinphos-methyl (Guthion)	mg/kg	0.2	<0.2	<0.2	<0.2

PCBs in Soil [AN420] Tested: 27/3/2017

PARAMETER	UOM	LOR	BH1-1 SOIL - 24/3/2017 SE163508.001	BH2-1 SOIL - 24/3/2017 SE163508.002	BH3-1 SOIL - 24/3/2017 SE163508.003	BH4-1 SOIL - 24/3/2017 SE163508.004	BH5-1 SOIL - 24/3/2017 SE163508.005
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	BH6-1 SOIL - 24/3/2017 SE163508.006	BH7-1 SOIL - 24/3/2017 SE163508.008	BH8-1 SOIL - 24/3/2017 SE163508.009
Arochlor 1016	mg/kg	0.2	<0.2	<0.2	<0.2
Arochlor 1221	mg/kg	0.2	<0.2	<0.2	<0.2
Arochlor 1232	mg/kg	0.2	<0.2	<0.2	<0.2
Arochlor 1242	mg/kg	0.2	<0.2	<0.2	<0.2
Arochlor 1248	mg/kg	0.2	<0.2	<0.2	<0.2
Arochlor 1254	mg/kg	0.2	<0.2	<0.2	<0.2
Arochlor 1260	mg/kg	0.2	<0.2	<0.2	<0.2
Arochlor 1262	mg/kg	0.2	<0.2	<0.2	<0.2
Arochlor 1268	mg/kg	0.2	<0.2	<0.2	<0.2
Total PCBs (Arochlors)	mg/kg	1	<1	<1	<1

Total Recoverable Metals in Soil/Waste Solids/Materials by ICPOES [AN040/AN320] Tested: 30/3/2017

PARAMETER	UOM	LOR	BH1-1 SOIL - 24/3/2017 SE163508.001	BH2-1 SOIL - 24/3/2017 SE163508.002	BH3-1 SOIL - 24/3/2017 SE163508.003	BH4-1 SOIL - 24/3/2017 SE163508.004	BH5-1 SOIL - 24/3/2017 SE163508.005
Arsenic, As	mg/kg	3	6	4	9	7	6
Cadmium, Cd	mg/kg	0.3	0.7	0.7	0.5	1.7	<0.3
Chromium, Cr	mg/kg	0.3	42	11	17	8.8	8.2
Copper, Cu	mg/kg	0.5	19	40	630	19	15
Lead, Pb	mg/kg	1	71	110	140	54	96
Nickel, Ni	mg/kg	0.5	13	4.2	6.3	3.2	1.5
Zinc, Zn	mg/kg	0.5	57	100	120	62	42

PARAMETER	UOM	LOR	BH6-1 SOIL - 24/3/2017 SE163508.006	BH6-2 SOIL - 24/3/2017 SE163508.007	BH7-1 SOIL - 24/3/2017 SE163508.008	BH8-1 SOIL - 24/3/2017 SE163508.009	BH8-2 SOIL - 24/3/2017 SE163508.010
Arsenic, As	mg/kg	3	<3	4	<3	20	5
Cadmium, Cd	mg/kg	0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Chromium, Cr	mg/kg	0.3	5.2	5.6	7.5	15	4.2
Copper, Cu	mg/kg	0.5	2.2	13	27	27	6.4
Lead, Pb	mg/kg	1	11	68	110	37	35
Nickel, Ni	mg/kg	0.5	0.7	1.3	1.4	4.1	1.1
Zinc, Zn	mg/kg	0.5	7.6	38	53	41	25

Mercury in Soil [AN312] Tested: 29/3/2017

PARAMETER	UOM	LOR	BH1-1 SOIL - 24/3/2017 SE163508.001	BH2-1 SOIL - 24/3/2017 SE163508.002	BH3-1 SOIL - 24/3/2017 SE163508.003	BH4-1 SOIL - 24/3/2017 SE163508.004	BH5-1 SOIL - 24/3/2017 SE163508.005
Mercury	mg/kg	0.05	<0.05	**0.08**	<0.05	<0.05	**0.08**

PARAMETER	UOM	LOR	BH6-1 SOIL - 24/3/2017 SE163508.006	BH6-2 SOIL - 24/3/2017 SE163508.007	BH7-1 SOIL - 24/3/2017 SE163508.008	BH8-1 SOIL - 24/3/2017 SE163508.009	BH8-2 SOIL - 24/3/2017 SE163508.010
Mercury	mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05

Moisture Content [AN002] Tested: 29/3/2017

PARAMETER	UOM	LOR	BH1-1 SOIL - 24/3/2017 SE163508.001	BH2-1 SOIL - 24/3/2017 SE163508.002	BH3-1 SOIL - 24/3/2017 SE163508.003	BH4-1 SOIL - 24/3/2017 SE163508.004	BH5-1 SOIL - 24/3/2017 SE163508.005
% Moisture	%w/w	0.5	17	17	19	9.7	12

PARAMETER	UOM	LOR	BH6-1 SOIL - 24/3/2017 SE163508.006	BH6-2 SOIL - 24/3/2017 SE163508.007	BH7-1 SOIL - 24/3/2017 SE163508.008	BH8-1 SOIL - 24/3/2017 SE163508.009	BH8-2 SOIL - 24/3/2017 SE163508.010
% Moisture	%w/w	0.5	16	20	15	15	16

Fibre Identification in soil [AN602] Tested: 30/3/2017

PARAMETER	UOM	LOR	BH1-1 SOIL - 24/3/2017 SE163508.001	BH2-1 SOIL - 24/3/2017 SE163508.002	BH3-1 SOIL - 24/3/2017 SE163508.003	BH4-1 SOIL - 24/3/2017 SE163508.004	BH5-1 SOIL - 24/3/2017 SE163508.005
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	BH6-1 SOIL - 24/3/2017 SE163508.006	BH7-1 SOIL - 24/3/2017 SE163508.008	BH8-1 SOIL - 24/3/2017 SE163508.009
Asbestos Detected	No unit	-	No	No	No
Estimated Fibres*	%w/w	0.01	<0.01	<0.01	<0.01

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.
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.
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
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	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%20Documents/MP-AU-ENV-QU-022%20QA%20QC%20Plan.pdf

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ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS

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Facsimile	02 9475 5266
Email	warwick@hayesenviro.com.au
Project	**EP1422 73 Vista St, San Souci NSW 2219**
Order Number	(Not specified)
Samples	8

LABORATORY DETAILS

Manager	Huong Crawford
Laboratory	SGS Alexandria Environmental
Address	Unit 16, 33 Maddox St Alexandria NSW 2015
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Facsimile	+61 2 8594 0499
Email	au.environmental.sydney@sgs.com
SGS Reference	**SE163508 R0**
Date Received	24 Mar 2017
Date Reported	31 Mar 2017

COMMENTS

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

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

Asbestos analysed by Approved Identifier Yusuf Kuthpudin .

SIGNATORIES

Bennet Lo
Senior Organic Chemist/Metals Chemis

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	
SE163508.001	BH1-1	Soil	190g sand,soil,rocks	24 Mar 2017	No Asbestos Found Organic Fibres Detected	<0.01
SE163508.002	BH2-1	Soil	278g sand,soil,rocks	24 Mar 2017	No Asbestos Found Organic Fibres Detected	<0.01
SE163508.003	BH3-1	Soil	192g clay,sand,soil,rocks	24 Mar 2017	No Asbestos Found Organic Fibres Detected	<0.01
SE163508.004	BH4-1	Soil	333g sand,soil,rocks	24 Mar 2017	No Asbestos Found	<0.01
SE163508.005	BH5-1	Soil	192g sand,soil,rocks	24 Mar 2017	No Asbestos Found Organic Fibres Detected	<0.01
SE163508.006	BH6-1	Soil	305g sand,soil,rocks	24 Mar 2017	No Asbestos Found	<0.01
SE163508.008	BH7-1	Soil	201g sand,soil,rocks	24 Mar 2017	No Asbestos Found	<0.01
SE163508.009	BH8-1	Soil	233g sand,soil,rocks	24 Mar 2017	No Asbestos Found	<0.01

METHOD SUMMARY

SE163508 R0

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%20Documents/MP-AU-ENV-QU-022%20QA%20QC%20Plan.pdf

STATEMENT OF QA/QC PERFORMANCE

SE163508 R0

CLIENT DETAILS

Contact	Warwick Hayes
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Email	au.environmental.sydney@sgs.com
SGS Reference	**SE163508 R0**
Date Received	24 Mar 2017
Date Reported	31 Mar 2017

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:

Matrix Spike	Total Recoverable Metals in Soil/Waste Solids/Materials by ICPOES	1 item

SAMPLE SUMMARY

Samples clearly labelled	Yes	Complete documentation received	Yes
Sample container provider	SGS	Sample cooling method	Ice
Samples received in correct containers	Yes	Sample counts by matrix	10 Soil
Date documentation received	24/3/2017	Type of documentation received	COC
Number of eskies/boxes received		Samples received in good order	Yes
Samples received without headspace	Yes	Sample temperature upon receipt	2.6°C
Sufficient sample for analysis	Yes	Turnaround time requested	Standard

HOLDING TIME SUMMARY

SE163508 R0

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
BH1-1	SE163508.001	LB121401	24 Mar 2017	24 Mar 2017	24 Mar 2018	30 Mar 2017	24 Mar 2018	31 Mar 2017
BH2-1	SE163508.002	LB121401	24 Mar 2017	24 Mar 2017	24 Mar 2018	30 Mar 2017	24 Mar 2018	31 Mar 2017
BH3-1	SE163508.003	LB121401	24 Mar 2017	24 Mar 2017	24 Mar 2018	30 Mar 2017	24 Mar 2018	31 Mar 2017
BH4-1	SE163508.004	LB121401	24 Mar 2017	24 Mar 2017	24 Mar 2018	30 Mar 2017	24 Mar 2018	31 Mar 2017
BH5-1	SE163508.005	LB121401	24 Mar 2017	24 Mar 2017	24 Mar 2018	30 Mar 2017	24 Mar 2018	31 Mar 2017
BH6-1	SE163508.006	LB121401	24 Mar 2017	24 Mar 2017	24 Mar 2018	30 Mar 2017	24 Mar 2018	31 Mar 2017
BH7-1	SE163508.008	LB121401	24 Mar 2017	24 Mar 2017	24 Mar 2018	30 Mar 2017	24 Mar 2018	31 Mar 2017
BH8-1	SE163508.009	LB121401	24 Mar 2017	24 Mar 2017	24 Mar 2018	30 Mar 2017	24 Mar 2018	31 Mar 2017

Mercury in Soil

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH1-1	SE163508.001	LB121321	24 Mar 2017	24 Mar 2017	21 Apr 2017	29 Mar 2017	21 Apr 2017	31 Mar 2017
BH2-1	SE163508.002	LB121321	24 Mar 2017	24 Mar 2017	21 Apr 2017	29 Mar 2017	21 Apr 2017	31 Mar 2017
BH3-1	SE163508.003	LB121321	24 Mar 2017	24 Mar 2017	21 Apr 2017	29 Mar 2017	21 Apr 2017	31 Mar 2017
BH4-1	SE163508.004	LB121321	24 Mar 2017	24 Mar 2017	21 Apr 2017	29 Mar 2017	21 Apr 2017	31 Mar 2017
BH5-1	SE163508.005	LB121321	24 Mar 2017	24 Mar 2017	21 Apr 2017	29 Mar 2017	21 Apr 2017	31 Mar 2017
BH6-1	SE163508.006	LB121321	24 Mar 2017	24 Mar 2017	21 Apr 2017	29 Mar 2017	21 Apr 2017	31 Mar 2017
BH6-2	SE163508.007	LB121321	24 Mar 2017	24 Mar 2017	21 Apr 2017	29 Mar 2017	21 Apr 2017	31 Mar 2017
BH7-1	SE163508.008	LB121321	24 Mar 2017	24 Mar 2017	21 Apr 2017	29 Mar 2017	21 Apr 2017	31 Mar 2017
BH8-1	SE163508.009	LB121321	24 Mar 2017	24 Mar 2017	21 Apr 2017	29 Mar 2017	21 Apr 2017	31 Mar 2017
BH8-2	SE163508.010	LB121322	24 Mar 2017	24 Mar 2017	21 Apr 2017	29 Mar 2017	21 Apr 2017	31 Mar 2017

Moisture Content

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH1-1	SE163508.001	LB121265	24 Mar 2017	24 Mar 2017	07 Apr 2017	29 Mar 2017	03 Apr 2017	30 Mar 2017
BH2-1	SE163508.002	LB121265	24 Mar 2017	24 Mar 2017	07 Apr 2017	29 Mar 2017	03 Apr 2017	30 Mar 2017
BH3-1	SE163508.003	LB121265	24 Mar 2017	24 Mar 2017	07 Apr 2017	29 Mar 2017	03 Apr 2017	30 Mar 2017
BH4-1	SE163508.004	LB121265	24 Mar 2017	24 Mar 2017	07 Apr 2017	29 Mar 2017	03 Apr 2017	30 Mar 2017
BH5-1	SE163508.005	LB121265	24 Mar 2017	24 Mar 2017	07 Apr 2017	29 Mar 2017	03 Apr 2017	30 Mar 2017
BH6-1	SE163508.006	LB121265	24 Mar 2017	24 Mar 2017	07 Apr 2017	29 Mar 2017	03 Apr 2017	30 Mar 2017
BH6-2	SE163508.007	LB121265	24 Mar 2017	24 Mar 2017	07 Apr 2017	29 Mar 2017	03 Apr 2017	30 Mar 2017
BH7-1	SE163508.008	LB121265	24 Mar 2017	24 Mar 2017	07 Apr 2017	29 Mar 2017	03 Apr 2017	30 Mar 2017
BH8-1	SE163508.009	LB121265	24 Mar 2017	24 Mar 2017	07 Apr 2017	29 Mar 2017	03 Apr 2017	30 Mar 2017
BH8-2	SE163508.010	LB121265	24 Mar 2017	24 Mar 2017	07 Apr 2017	29 Mar 2017	03 Apr 2017	30 Mar 2017

OC Pesticides in Soil

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH1-1	SE163508.001	LB121057	24 Mar 2017	24 Mar 2017	07 Apr 2017	27 Mar 2017	06 May 2017	30 Mar 2017
BH2-1	SE163508.002	LB121057	24 Mar 2017	24 Mar 2017	07 Apr 2017	27 Mar 2017	06 May 2017	30 Mar 2017
BH3-1	SE163508.003	LB121057	24 Mar 2017	24 Mar 2017	07 Apr 2017	27 Mar 2017	06 May 2017	30 Mar 2017
BH4-1	SE163508.004	LB121057	24 Mar 2017	24 Mar 2017	07 Apr 2017	27 Mar 2017	06 May 2017	30 Mar 2017
BH5-1	SE163508.005	LB121057	24 Mar 2017	24 Mar 2017	07 Apr 2017	27 Mar 2017	06 May 2017	30 Mar 2017
BH6-1	SE163508.006	LB121057	24 Mar 2017	24 Mar 2017	07 Apr 2017	27 Mar 2017	06 May 2017	30 Mar 2017
BH6-2	SE163508.007	LB121057	24 Mar 2017	24 Mar 2017	07 Apr 2017	27 Mar 2017	06 May 2017	30 Mar 2017
BH7-1	SE163508.008	LB121057	24 Mar 2017	24 Mar 2017	07 Apr 2017	27 Mar 2017	06 May 2017	30 Mar 2017
BH8-1	SE163508.009	LB121057	24 Mar 2017	24 Mar 2017	07 Apr 2017	27 Mar 2017	06 May 2017	30 Mar 2017
BH8-2	SE163508.010	LB121057	24 Mar 2017	24 Mar 2017	07 Apr 2017	27 Mar 2017	06 May 2017	30 Mar 2017

OP Pesticides in Soil

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH1-1	SE163508.001	LB121057	24 Mar 2017	24 Mar 2017	07 Apr 2017	27 Mar 2017	06 May 2017	31 Mar 2017
BH2-1	SE163508.002	LB121057	24 Mar 2017	24 Mar 2017	07 Apr 2017	27 Mar 2017	06 May 2017	31 Mar 2017
BH3-1	SE163508.003	LB121057	24 Mar 2017	24 Mar 2017	07 Apr 2017	27 Mar 2017	06 May 2017	31 Mar 2017
BH4-1	SE163508.004	LB121057	24 Mar 2017	24 Mar 2017	07 Apr 2017	27 Mar 2017	06 May 2017	31 Mar 2017
BH5-1	SE163508.005	LB121057	24 Mar 2017	24 Mar 2017	07 Apr 2017	27 Mar 2017	06 May 2017	31 Mar 2017
BH6-1	SE163508.006	LB121057	24 Mar 2017	24 Mar 2017	07 Apr 2017	27 Mar 2017	06 May 2017	31 Mar 2017
BH6-2	SE163508.007	LB121057	24 Mar 2017	24 Mar 2017	07 Apr 2017	27 Mar 2017	06 May 2017	31 Mar 2017
BH7-1	SE163508.008	LB121057	24 Mar 2017	24 Mar 2017	07 Apr 2017	27 Mar 2017	06 May 2017	31 Mar 2017
BH8-1	SE163508.009	LB121057	24 Mar 2017	24 Mar 2017	07 Apr 2017	27 Mar 2017	06 May 2017	31 Mar 2017
BH8-2	SE163508.010	LB121057	24 Mar 2017	24 Mar 2017	07 Apr 2017	27 Mar 2017	06 May 2017	31 Mar 2017

HOLDING TIME SUMMARY

SE163508 R0

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.

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
BH1-1	SE163508.001	LB121057	24 Mar 2017	24 Mar 2017	07 Apr 2017	27 Mar 2017	06 May 2017	31 Mar 2017
BH2-1	SE163508.002	LB121057	24 Mar 2017	24 Mar 2017	07 Apr 2017	27 Mar 2017	06 May 2017	31 Mar 2017
BH3-1	SE163508.003	LB121057	24 Mar 2017	24 Mar 2017	07 Apr 2017	27 Mar 2017	06 May 2017	31 Mar 2017
BH4-1	SE163508.004	LB121057	24 Mar 2017	24 Mar 2017	07 Apr 2017	27 Mar 2017	06 May 2017	31 Mar 2017
BH5-1	SE163508.005	LB121057	24 Mar 2017	24 Mar 2017	07 Apr 2017	27 Mar 2017	06 May 2017	31 Mar 2017
BH6-1	SE163508.006	LB121057	24 Mar 2017	24 Mar 2017	07 Apr 2017	27 Mar 2017	06 May 2017	31 Mar 2017
BH6-2	SE163508.007	LB121057	24 Mar 2017	24 Mar 2017	07 Apr 2017	27 Mar 2017	06 May 2017	31 Mar 2017
BH7-1	SE163508.008	LB121057	24 Mar 2017	24 Mar 2017	07 Apr 2017	27 Mar 2017	06 May 2017	31 Mar 2017
BH8-1	SE163508.009	LB121057	24 Mar 2017	24 Mar 2017	07 Apr 2017	27 Mar 2017	06 May 2017	31 Mar 2017
BH8-2	SE163508.010	LB121057	24 Mar 2017	24 Mar 2017	07 Apr 2017	27 Mar 2017	06 May 2017	31 Mar 2017

PCBs in Soil

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH1-1	SE163508.001	LB121057	24 Mar 2017	24 Mar 2017	07 Apr 2017	27 Mar 2017	06 May 2017	30 Mar 2017
BH2-1	SE163508.002	LB121057	24 Mar 2017	24 Mar 2017	07 Apr 2017	27 Mar 2017	06 May 2017	30 Mar 2017
BH3-1	SE163508.003	LB121057	24 Mar 2017	24 Mar 2017	07 Apr 2017	27 Mar 2017	06 May 2017	30 Mar 2017
BH4-1	SE163508.004	LB121057	24 Mar 2017	24 Mar 2017	07 Apr 2017	27 Mar 2017	06 May 2017	30 Mar 2017
BH5-1	SE163508.005	LB121057	24 Mar 2017	24 Mar 2017	07 Apr 2017	27 Mar 2017	06 May 2017	30 Mar 2017
BH6-1	SE163508.006	LB121057	24 Mar 2017	24 Mar 2017	07 Apr 2017	27 Mar 2017	06 May 2017	30 Mar 2017
BH6-2	SE163508.007	LB121057	24 Mar 2017	24 Mar 2017	07 Apr 2017	27 Mar 2017	06 May 2017	30 Mar 2017
BH7-1	SE163508.008	LB121057	24 Mar 2017	24 Mar 2017	07 Apr 2017	27 Mar 2017	06 May 2017	30 Mar 2017
BH8-1	SE163508.009	LB121057	24 Mar 2017	24 Mar 2017	07 Apr 2017	27 Mar 2017	06 May 2017	30 Mar 2017
BH8-2	SE163508.010	LB121057	24 Mar 2017	24 Mar 2017	07 Apr 2017	27 Mar 2017	06 May 2017	30 Mar 2017

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
BH1-1	SE163508.001	LB121347	24 Mar 2017	24 Mar 2017	20 Sep 2017	30 Mar 2017	20 Sep 2017	31 Mar 2017
BH2-1	SE163508.002	LB121347	24 Mar 2017	24 Mar 2017	20 Sep 2017	30 Mar 2017	20 Sep 2017	31 Mar 2017
BH3-1	SE163508.003	LB121347	24 Mar 2017	24 Mar 2017	20 Sep 2017	30 Mar 2017	20 Sep 2017	31 Mar 2017
BH4-1	SE163508.004	LB121347	24 Mar 2017	24 Mar 2017	20 Sep 2017	30 Mar 2017	20 Sep 2017	31 Mar 2017
BH5-1	SE163508.005	LB121347	24 Mar 2017	24 Mar 2017	20 Sep 2017	30 Mar 2017	20 Sep 2017	31 Mar 2017
BH6-1	SE163508.006	LB121347	24 Mar 2017	24 Mar 2017	20 Sep 2017	30 Mar 2017	20 Sep 2017	31 Mar 2017
BH6-2	SE163508.007	LB121347	24 Mar 2017	24 Mar 2017	20 Sep 2017	30 Mar 2017	20 Sep 2017	31 Mar 2017
BH7-1	SE163508.008	LB121347	24 Mar 2017	24 Mar 2017	20 Sep 2017	30 Mar 2017	20 Sep 2017	31 Mar 2017
BH8-1	SE163508.009	LB121347	24 Mar 2017	24 Mar 2017	20 Sep 2017	30 Mar 2017	20 Sep 2017	31 Mar 2017
BH8-2	SE163508.010	LB121347	24 Mar 2017	24 Mar 2017	20 Sep 2017	30 Mar 2017	20 Sep 2017	31 Mar 2017

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
BH1-1	SE163508.001	LB121057	24 Mar 2017	24 Mar 2017	07 Apr 2017	27 Mar 2017	06 May 2017	30 Mar 2017
BH2-1	SE163508.002	LB121057	24 Mar 2017	24 Mar 2017	07 Apr 2017	27 Mar 2017	06 May 2017	30 Mar 2017
BH3-1	SE163508.003	LB121057	24 Mar 2017	24 Mar 2017	07 Apr 2017	27 Mar 2017	06 May 2017	30 Mar 2017
BH4-1	SE163508.004	LB121057	24 Mar 2017	24 Mar 2017	07 Apr 2017	27 Mar 2017	06 May 2017	30 Mar 2017
BH5-1	SE163508.005	LB121057	24 Mar 2017	24 Mar 2017	07 Apr 2017	27 Mar 2017	06 May 2017	30 Mar 2017
BH6-1	SE163508.006	LB121057	24 Mar 2017	24 Mar 2017	07 Apr 2017	27 Mar 2017	06 May 2017	30 Mar 2017
BH6-2	SE163508.007	LB121057	24 Mar 2017	24 Mar 2017	07 Apr 2017	27 Mar 2017	06 May 2017	30 Mar 2017
BH7-1	SE163508.008	LB121057	24 Mar 2017	24 Mar 2017	07 Apr 2017	27 Mar 2017	06 May 2017	30 Mar 2017
BH8-1	SE163508.009	LB121057	24 Mar 2017	24 Mar 2017	07 Apr 2017	27 Mar 2017	06 May 2017	30 Mar 2017
BH8-2	SE163508.010	LB121057	24 Mar 2017	24 Mar 2017	07 Apr 2017	27 Mar 2017	06 May 2017	30 Mar 2017

VOC's in Soil

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH1-1	SE163508.001	LB121047	24 Mar 2017	24 Mar 2017	07 Apr 2017	27 Mar 2017	06 May 2017	29 Mar 2017
BH2-1	SE163508.002	LB121047	24 Mar 2017	24 Mar 2017	07 Apr 2017	27 Mar 2017	06 May 2017	29 Mar 2017
BH3-1	SE163508.003	LB121047	24 Mar 2017	24 Mar 2017	07 Apr 2017	27 Mar 2017	06 May 2017	29 Mar 2017
BH4-1	SE163508.004	LB121047	24 Mar 2017	24 Mar 2017	07 Apr 2017	27 Mar 2017	06 May 2017	29 Mar 2017
BH5-1	SE163508.005	LB121047	24 Mar 2017	24 Mar 2017	07 Apr 2017	27 Mar 2017	06 May 2017	29 Mar 2017
BH6-1	SE163508.006	LB121047	24 Mar 2017	24 Mar 2017	07 Apr 2017	27 Mar 2017	06 May 2017	29 Mar 2017
BH6-2	SE163508.007	LB121047	24 Mar 2017	24 Mar 2017	07 Apr 2017	27 Mar 2017	06 May 2017	29 Mar 2017
BH7-1	SE163508.008	LB121047	24 Mar 2017	24 Mar 2017	07 Apr 2017	27 Mar 2017	06 May 2017	29 Mar 2017
BH8-1	SE163508.009	LB121047	24 Mar 2017	24 Mar 2017	07 Apr 2017	27 Mar 2017	06 May 2017	29 Mar 2017
BH8-2	SE163508.010	LB121047	24 Mar 2017	24 Mar 2017	07 Apr 2017	27 Mar 2017	06 May 2017	29 Mar 2017

HOLDING TIME SUMMARY

SE163508 R0

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.

Volatile Petroleum Hydrocarbons in Soil — **Method: ME-(AU)-[ENV]AN433**

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH1-1	SE163508.001	LB121047	24 Mar 2017	24 Mar 2017	07 Apr 2017	27 Mar 2017	06 May 2017	29 Mar 2017
BH2-1	SE163508.002	LB121047	24 Mar 2017	24 Mar 2017	07 Apr 2017	27 Mar 2017	06 May 2017	29 Mar 2017
BH3-1	SE163508.003	LB121047	24 Mar 2017	24 Mar 2017	07 Apr 2017	27 Mar 2017	06 May 2017	29 Mar 2017
BH4-1	SE163508.004	LB121047	24 Mar 2017	24 Mar 2017	07 Apr 2017	27 Mar 2017	06 May 2017	29 Mar 2017
BH5-1	SE163508.005	LB121047	24 Mar 2017	24 Mar 2017	07 Apr 2017	27 Mar 2017	06 May 2017	29 Mar 2017
BH6-1	SE163508.006	LB121047	24 Mar 2017	24 Mar 2017	07 Apr 2017	27 Mar 2017	06 May 2017	29 Mar 2017
BH6-2	SE163508.007	LB121047	24 Mar 2017	24 Mar 2017	07 Apr 2017	27 Mar 2017	06 May 2017	29 Mar 2017
BH7-1	SE163508.008	LB121047	24 Mar 2017	24 Mar 2017	07 Apr 2017	27 Mar 2017	06 May 2017	29 Mar 2017
BH8-1	SE163508.009	LB121047	24 Mar 2017	24 Mar 2017	07 Apr 2017	27 Mar 2017	06 May 2017	29 Mar 2017
BH8-2	SE163508.010	LB121047	24 Mar 2017	24 Mar 2017	07 Apr 2017	27 Mar 2017	06 May 2017	29 Mar 2017

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]AN420

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Tetrachloro-m-xylene (TCMX) (Surrogate)	BH1-1	SE163508.001	%	60 - 130%	107
	BH2-1	SE163508.002	%	60 - 130%	107
	BH3-1	SE163508.003	%	60 - 130%	109
	BH4-1	SE163508.004	%	60 - 130%	108
	BH5-1	SE163508.005	%	60 - 130%	111
	BH6-1	SE163508.006	%	60 - 130%	109
	BH7-1	SE163508.008	%	60 - 130%	109
	BH8-1	SE163508.009	%	60 - 130%	113

OP Pesticides in Soil

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

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
2-fluorobiphenyl (Surrogate)	BH1-1	SE163508.001	%	60 - 130%	100
	BH2-1	SE163508.002	%	60 - 130%	94
	BH3-1	SE163508.003	%	60 - 130%	94
	BH4-1	SE163508.004	%	60 - 130%	96
	BH5-1	SE163508.005	%	60 - 130%	96
	BH6-1	SE163508.006	%	60 - 130%	94
	BH7-1	SE163508.008	%	60 - 130%	90
	BH8-1	SE163508.009	%	60 - 130%	94
d14-p-terphenyl (Surrogate)	BH1-1	SE163508.001	%	60 - 130%	100
	BH2-1	SE163508.002	%	60 - 130%	94
	BH3-1	SE163508.003	%	60 - 130%	94
	BH4-1	SE163508.004	%	60 - 130%	96
	BH5-1	SE163508.005	%	60 - 130%	96
	BH6-1	SE163508.006	%	60 - 130%	94
	BH7-1	SE163508.008	%	60 - 130%	88
	BH8-1	SE163508.009	%	60 - 130%	96

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

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

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
2-fluorobiphenyl (Surrogate)	BH1-1	SE163508.001	%	70 - 130%	100
	BH2-1	SE163508.002	%	70 - 130%	94
	BH3-1	SE163508.003	%	70 - 130%	94
	BH4-1	SE163508.004	%	70 - 130%	96
	BH5-1	SE163508.005	%	70 - 130%	96
	BH6-1	SE163508.006	%	70 - 130%	94
	BH6-2	SE163508.007	%	70 - 130%	94
	BH7-1	SE163508.008	%	70 - 130%	90
	BH8-1	SE163508.009	%	70 - 130%	94
	BH8-2	SE163508.010	%	70 - 130%	98
d14-p-terphenyl (Surrogate)	BH1-1	SE163508.001	%	70 - 130%	100
	BH2-1	SE163508.002	%	70 - 130%	94
	BH3-1	SE163508.003	%	70 - 130%	94
	BH4-1	SE163508.004	%	70 - 130%	96
	BH5-1	SE163508.005	%	70 - 130%	96
	BH6-1	SE163508.006	%	70 - 130%	94
	BH6-2	SE163508.007	%	70 - 130%	92
	BH7-1	SE163508.008	%	70 - 130%	88
	BH8-1	SE163508.009	%	70 - 130%	96
	BH8-2	SE163508.010	%	70 - 130%	98
d5-nitrobenzene (Surrogate)	BH1-1	SE163508.001	%	70 - 130%	104
	BH2-1	SE163508.002	%	70 - 130%	98
	BH3-1	SE163508.003	%	70 - 130%	96
	BH4-1	SE163508.004	%	70 - 130%	98
	BH5-1	SE163508.005	%	70 - 130%	96
	BH6-1	SE163508.006	%	70 - 130%	94
	BH6-2	SE163508.007	%	70 - 130%	98
	BH7-1	SE163508.008	%	70 - 130%	94
	BH8-1	SE163508.009	%	70 - 130%	96
	BH8-2	SE163508.010	%	70 - 130%	98

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]AN420

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Tetrachloro-m-xylene (TCMX) (Surrogate)	BH1-1	SE163508.001	%	60 - 130%	107
	BH2-1	SE163508.002	%	60 - 130%	107
	BH3-1	SE163508.003	%	60 - 130%	109
	BH4-1	SE163508.004	%	60 - 130%	108
	BH5-1	SE163508.005	%	60 - 130%	111
	BH6-1	SE163508.006	%	60 - 130%	109
	BH7-1	SE163508.008	%	60 - 130%	109
	BH8-1	SE163508.009	%	60 - 130%	113

VOC's in Soil

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

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Bromofluorobenzene (Surrogate)	BH1-1	SE163508.001	%	60 - 130%	80
	BH2-1	SE163508.002	%	60 - 130%	79
	BH3-1	SE163508.003	%	60 - 130%	79
	BH4-1	SE163508.004	%	60 - 130%	79
	BH5-1	SE163508.005	%	60 - 130%	76
	BH6-1	SE163508.006	%	60 - 130%	81
	BH6-2	SE163508.007	%	60 - 130%	75
	BH7-1	SE163508.008	%	60 - 130%	82
	BH8-1	SE163508.009	%	60 - 130%	79
	BH8-2	SE163508.010	%	60 - 130%	78
d4-1,2-dichloroethane (Surrogate)	BH1-1	SE163508.001	%	60 - 130%	86
	BH2-1	SE163508.002	%	60 - 130%	87
	BH3-1	SE163508.003	%	60 - 130%	90
	BH4-1	SE163508.004	%	60 - 130%	87
	BH5-1	SE163508.005	%	60 - 130%	91
	BH6-1	SE163508.006	%	60 - 130%	93
	BH6-2	SE163508.007	%	60 - 130%	90
	BH7-1	SE163508.008	%	60 - 130%	92
	BH8-1	SE163508.009	%	60 - 130%	95
	BH8-2	SE163508.010	%	60 - 130%	88
d8-toluene (Surrogate)	BH1-1	SE163508.001	%	60 - 130%	75
	BH2-1	SE163508.002	%	60 - 130%	73
	BH3-1	SE163508.003	%	60 - 130%	79
	BH4-1	SE163508.004	%	60 - 130%	75
	BH5-1	SE163508.005	%	60 - 130%	75
	BH6-1	SE163508.006	%	60 - 130%	79
	BH6-2	SE163508.007	%	60 - 130%	75
	BH7-1	SE163508.008	%	60 - 130%	76
	BH8-1	SE163508.009	%	60 - 130%	72
	BH8-2	SE163508.010	%	60 - 130%	72
Dibromofluoromethane (Surrogate)	BH1-1	SE163508.001	%	60 - 130%	89
	BH2-1	SE163508.002	%	60 - 130%	89
	BH3-1	SE163508.003	%	60 - 130%	74
	BH4-1	SE163508.004	%	60 - 130%	70
	BH5-1	SE163508.005	%	60 - 130%	72
	BH6-1	SE163508.006	%	60 - 130%	73
	BH6-2	SE163508.007	%	60 - 130%	72
	BH7-1	SE163508.008	%	60 - 130%	70
	BH8-1	SE163508.009	%	60 - 130%	72
	BH8-2	SE163508.010	%	60 - 130%	83

Volatile Petroleum Hydrocarbons in Soil

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

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Bromofluorobenzene (Surrogate)	BH1-1	SE163508.001	%	60 - 130%	80
	BH2-1	SE163508.002	%	60 - 130%	79
	BH3-1	SE163508.003	%	60 - 130%	79
	BH4-1	SE163508.004	%	60 - 130%	79
	BH5-1	SE163508.005	%	60 - 130%	76
	BH6-1	SE163508.006	%	60 - 130%	81
	BH6-2	SE163508.007	%	60 - 130%	75
	BH7-1	SE163508.008	%	60 - 130%	82

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**

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Bromofluorobenzene (Surrogate)	BH8-1	SE163508.009	%	60 - 130%	79
	BH8-2	SE163508.010	%	60 - 130%	78
d4-1,2-dichloroethane (Surrogate)	BH1-1	SE163508.001	%	60 - 130%	86
	BH2-1	SE163508.002	%	60 - 130%	87
	BH3-1	SE163508.003	%	60 - 130%	90
	BH4-1	SE163508.004	%	60 - 130%	87
	BH5-1	SE163508.005	%	60 - 130%	91
	BH6-1	SE163508.006	%	60 - 130%	93
	BH6-2	SE163508.007	%	60 - 130%	90
	BH7-1	SE163508.008	%	60 - 130%	92
	BH8-1	SE163508.009	%	60 - 130%	95
	BH8-2	SE163508.010	%	60 - 130%	88
d8-toluene (Surrogate)	BH1-1	SE163508.001	%	60 - 130%	75
	BH2-1	SE163508.002	%	60 - 130%	73
	BH3-1	SE163508.003	%	60 - 130%	79
	BH4-1	SE163508.004	%	60 - 130%	75
	BH5-1	SE163508.005	%	60 - 130%	75
	BH6-1	SE163508.006	%	60 - 130%	79
	BH6-2	SE163508.007	%	60 - 130%	75
	BH7-1	SE163508.008	%	60 - 130%	76
	BH8-1	SE163508.009	%	60 - 130%	72
	BH8-2	SE163508.010	%	60 - 130%	72
Dibromofluoromethane (Surrogate)	BH1-1	SE163508.001	%	60 - 130%	89
	BH2-1	SE163508.002	%	60 - 130%	89
	BH3-1	SE163508.003	%	60 - 130%	74
	BH4-1	SE163508.004	%	60 - 130%	70
	BH5-1	SE163508.005	%	60 - 130%	72
	BH6-1	SE163508.006	%	60 - 130%	73
	BH6-2	SE163508.007	%	60 - 130%	72
	BH7-1	SE163508.008	%	60 - 130%	70
	BH8-1	SE163508.009	%	60 - 130%	72
	BH8-2	SE163508.010	%	60 - 130%	83

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 in Soil

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

Sample Number	Parameter	Units	LOR	Result
LB121321.001	Mercury	mg/kg	0.05	<0.05
LB121322.001	Mercury	mg/kg	0.05	<0.05

OC Pesticides in Soil

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

Sample Number		Parameter	Units	LOR	Result
LB121057.001		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)	%	-	107

OP Pesticides in Soil

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

Sample Number		Parameter	Units	LOR	Result
LB121057.001		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)	%	-	100
		d14-p-terphenyl (Surrogate)	%	-	98

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

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

Sample Number	Parameter	Units	LOR	Result
LB121057.001	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
	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

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
LB121057.001		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)	%	-	102
		2-fluorobiphenyl (Surrogate)	%	-	100
		d14-p-terphenyl (Surrogate)	%	-	98

PCBs in Soil

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

Sample Number		Parameter	Units	LOR	Result
LB121057.001		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)	%	-	107

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

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

Sample Number		Parameter	Units	LOR	Result
LB121347.001		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

TRH (Total Recoverable Hydrocarbons) in Soil

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

Sample Number		Parameter	Units	LOR	Result
LB121057.001		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

VOC's in Soil

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

Sample Number		Parameter	Units	LOR	Result
LB121047.001	Monocyclic Aromatic	Benzene	mg/kg	0.1	<0.1
	Hydrocarbons	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)	%	-	98
		d4-1,2-dichloroethane (Surrogate)	%	-	119
		d8-toluene (Surrogate)	%	-	107
		Bromofluorobenzene (Surrogate)	%	-	110
	Totals	Total BTEX	mg/kg	0.6	<0.6

Volatile Petroleum Hydrocarbons in Soil

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

Sample Number		Parameter	Units	LOR	Result
LB121047.001		TRH C6-C9	mg/kg	20	<20
	Surrogates	Dibromofluoromethane (Surrogate)	%	-	98
		d4-1,2-dichloroethane (Surrogate)	%	-	119
		d8-toluene (Surrogate)	%	-	107

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 %
SE163486.013	LB121321.014	Mercury	mg/kg	0.05	0.11558347580	0.1149089554	73	1
SE163508.009	LB121321.024	Mercury	mg/kg	0.05	<0.05	<0.05	200	0
SE163516.014	LB121322.014	Mercury	mg/kg	0.05	<0.05	<0.05	200	0
SE163523.006	LB121322.023	Mercury	mg/kg	0.05	0.05968539320	0.1042253826	91	54

Moisture Content

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

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE163508.010	LB121265.011	% Moisture	%w/w	0.5	16	16	36	0
SE163516.007	LB121265.022	% Moisture	%w/w	0.5	14	14	37	1
SE163523.005	LB121265.033	% Moisture	%w/w	0.5	25.077399380	24.809160305	34	1
SE163523.006	LB121265.035	% Moisture	%w/w	0.5	22.015334063	22.606382978	34	3

OC Pesticides in Soil

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

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE163486.008	LB121057.027		Hexachlorobenzene (HCB)	mg/kg	0.1	0	0	200	0
			Alpha BHC	mg/kg	0.1	0	0	200	0
			Lindane	mg/kg	0.1	0	0	200	0
			Heptachlor	mg/kg	0.1	0	0	200	0
			Aldrin	mg/kg	0.1	0	0	200	0
			Beta BHC	mg/kg	0.1	0	0	200	0
			Delta BHC	mg/kg	0.1	0	0	200	0
			Heptachlor epoxide	mg/kg	0.1	0	0	200	0
			o,p'-DDE	mg/kg	0.1	0	0	200	0
			Alpha Endosulfan	mg/kg	0.2	0	0	200	0
			Gamma Chlordane	mg/kg	0.1	0	0	200	0
			Alpha Chlordane	mg/kg	0.1	0	0	200	0
			trans-Nonachlor	mg/kg	0.1	0	0	200	0
			p,p'-DDE	mg/kg	0.1	0	0	200	0
			Dieldrin	mg/kg	0.2	0	0	200	0
			Endrin	mg/kg	0.2	0	0	200	0
			o,p'-DDD	mg/kg	0.1	0	0	200	0
			o,p'-DDT	mg/kg	0.1	0	0	200	0
			Beta Endosulfan	mg/kg	0.2	0	0	200	0
			p,p'-DDD	mg/kg	0.1	0	0	200	0
			p,p'-DDT	mg/kg	0.1	0	0	200	0
			Endosulfan sulphate	mg/kg	0.1	0	0	200	0
			Endrin Aldehyde	mg/kg	0.1	0	0	200	0
			Methoxychlor	mg/kg	0.1	0	0	200	0
			Endrin Ketone	mg/kg	0.1	0	0	200	0
			Isodrin	mg/kg	0.1	0	0	200	0
			Mirex	mg/kg	0.1	0	0	200	0
		Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	mg/kg	-	0.153	0.148	30	3
SE163508.005	LB121057.028		Hexachlorobenzene (HCB)	mg/kg	0.1	<0.1	0	200	0
			Alpha BHC	mg/kg	0.1	<0.1	0	200	0
			Lindane	mg/kg	0.1	<0.1	0	200	0
			Heptachlor	mg/kg	0.1	<0.1	0	200	0
			Aldrin	mg/kg	0.1	<0.1	0	200	0
			Beta BHC	mg/kg	0.1	<0.1	0	200	0
			Delta BHC	mg/kg	0.1	<0.1	0	200	0
			Heptachlor epoxide	mg/kg	0.1	<0.1	0	200	0
			o,p'-DDE	mg/kg	0.1	<0.1	0	200	0
			Alpha Endosulfan	mg/kg	0.2	<0.2	0	200	0
			Gamma Chlordane	mg/kg	0.1	<0.1	0	200	0
			Alpha Chlordane	mg/kg	0.1	<0.1	0	200	0
			trans-Nonachlor	mg/kg	0.1	<0.1	0	200	0
			p,p'-DDE	mg/kg	0.1	<0.1	0	200	0
			Dieldrin	mg/kg	0.2	<0.2	0	200	0
			Endrin	mg/kg	0.2	<0.2	0	200	0
			o,p'-DDD	mg/kg	0.1	<0.1	0	200	0
			o,p'-DDT	mg/kg	0.1	<0.1	0	200	0
			Beta Endosulfan	mg/kg	0.2	<0.2	0	200	0
			p,p'-DDD	mg/kg	0.1	<0.1	0	200	0

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.

OC Pesticides in Soil (continued)

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

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE163508.005	LB121057.028		p,p'-DDT	mg/kg	0.1	<0.1	0	200	0
			Endosulfan sulphate	mg/kg	0.1	<0.1	0	200	0
			Endrin Aldehyde	mg/kg	0.1	<0.1	0	200	0
			Methoxychlor	mg/kg	0.1	<0.1	0	200	0
			Endrin Ketone	mg/kg	0.1	<0.1	0	200	0
			Isodrin	mg/kg	0.1	<0.1	0	200	0
			Mirex	mg/kg	0.1	<0.1	0	200	0
		Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	mg/kg	-	0.17	0.166	30	1

OP Pesticides in Soil

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

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE163486.008	LB121057.026		Dichlorvos	mg/kg	0.5	0.01	0.01	200	0
			Dimethoate	mg/kg	0.5	0.04	0.04	200	0
			Diazinon (Dimpylate)	mg/kg	0.5	0.07	0	200	0
			Fenitrothion	mg/kg	0.2	0.02	0.02	200	0
			Malathion	mg/kg	0.2	0	0	200	0
			Chlorpyrifos (Chlorpyrifos Ethyl)	mg/kg	0.2	0	0	200	0
			Parathion-ethyl (Parathion)	mg/kg	0.2	0	0	200	0
			Bromophos Ethyl	mg/kg	0.2	0	0	200	0
			Methidathion	mg/kg	0.5	0	0	200	0
			Ethion	mg/kg	0.2	0	0	200	0
			Azinphos-methyl (Guthion)	mg/kg	0.2	0.03	0.01	200	0
		Surrogates	2-fluorobiphenyl (Surrogate)	mg/kg	-	0.48	0.39	30	21
			d14-p-terphenyl (Surrogate)	mg/kg	-	0.49	0.41	30	18
SE163508.005	LB121057.031		Dichlorvos	mg/kg	0.5	<0.5	0.06	200	0
			Dimethoate	mg/kg	0.5	<0.5	0.01	200	0
			Diazinon (Dimpylate)	mg/kg	0.5	<0.5	0.01	200	0
			Fenitrothion	mg/kg	0.2	<0.2	0	200	0
			Malathion	mg/kg	0.2	<0.2	0.01	200	0
			Chlorpyrifos (Chlorpyrifos Ethyl)	mg/kg	0.2	<0.2	0.03	200	0
			Parathion-ethyl (Parathion)	mg/kg	0.2	<0.2	0.05	200	0
			Bromophos Ethyl	mg/kg	0.2	<0.2	0.04	200	0
			Methidathion	mg/kg	0.5	<0.5	0.02	200	0
			Ethion	mg/kg	0.2	<0.2	0	200	0
			Azinphos-methyl (Guthion)	mg/kg	0.2	<0.2	0	200	0
		Surrogates	2-fluorobiphenyl (Surrogate)	mg/kg	-	0.5	0.49	30	2
			d14-p-terphenyl (Surrogate)	mg/kg	-	0.5	0.47	30	2

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

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

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE163486.008	LB121057.026	Naphthalene	mg/kg	0.1	1.04	0.98	40	6
		2-methylnaphthalene	mg/kg	0.1	0.66	0.64	45	3
		1-methylnaphthalene	mg/kg	0.1	0.86	0.84	42	2
		Acenaphthylene	mg/kg	0.1	0.71	0.75	44	5
		Acenaphthene	mg/kg	0.1	1.98	1.9	35	4
		Fluorene	mg/kg	0.1	2.61	2.53	34	3
		Phenanthrene	mg/kg	0.1	11.92	12.25	31	3
		Anthracene	mg/kg	0.1	3.29	3.39	33	3
		Fluoranthene	mg/kg	0.1	14.54	15.13	31	4
		Pyrene	mg/kg	0.1	21.51	21.55	30	0
		Benzo(a)anthracene	mg/kg	0.1	5.82	5.92	32	2
		Chrysene	mg/kg	0.1	4.59	4.67	32	2
		Benzo(b&j)fluoranthene	mg/kg	0.1	6.32	6.29	32	0
		Benzo(k)fluoranthene	mg/kg	0.1	2.18	2.06	35	6
		Benzo(a)pyrene	mg/kg	0.1	4.98	4.99	32	0
		Indeno(1,2,3-cd)pyrene	mg/kg	0.1	2.84	2.79	34	2
		Dibenzo(ah)anthracene	mg/kg	0.1	0.59	0.59	47	0
		Benzo(ghi)perylene	mg/kg	0.1	2.44	2.37	34	3
		Carcinogenic PAHs, BaP TEQ <LOR=0	TEQ (mg/kg)	0.2	7.3433	7.3464	13	0
		Carcinogenic PAHs, BaP TEQ <LOR=LOR	TEQ (mg/kg)	0.3	7.3433	7.3464	14	0
		Carcinogenic PAHs, BaP TEQ <LOR=LOR/2	TEQ (mg/kg)	0.2	7.3433	7.3464	13	0
		Total PAH (18)	mg/kg	0.8	88.75	89.54	31	1

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 %
SE163486.008	LB121057.026	Surrogates	d5-nitrobenzene (Surrogate)	mg/kg	-	0.45	0.43	30	5
			2-fluorobiphenyl (Surrogate)	mg/kg	-	0.48	0.39	30	21
			d14-p-terphenyl (Surrogate)	mg/kg	-	0.49	0.41	30	18
SE163508.005	LB121057.031		Naphthalene	mg/kg	0.1	<0.1	0.03	200	0
			2-methylnaphthalene	mg/kg	0.1	<0.1	0.01	200	0
			1-methylnaphthalene	mg/kg	0.1	<0.1	0.01	200	0
			Acenaphthylene	mg/kg	0.1	0.3	0.21	73	17
			Acenaphthene	mg/kg	0.1	<0.1	0.03	200	0
			Fluorene	mg/kg	0.1	0.1	0.07	135	18
			Phenanthrene	mg/kg	0.1	1.6	1.29	37	21
			Anthracene	mg/kg	0.1	0.4	0.33	59	9
			Fluoranthene	mg/kg	0.1	2.8	2.69	34	5
			Pyrene	mg/kg	0.1	4.6	3.95	32	15
			Benzo(a)anthracene	mg/kg	0.1	1.3	1.29	38	3
			Chrysene	mg/kg	0.1	1.3	1.2	38	10
			Benzo(b&j)fluoranthene	mg/kg	0.1	1.5	1.35	37	9
			Benzo(k)fluoranthene	mg/kg	0.1	0.7	0.62	45	12
			Benzo(a)pyrene	mg/kg	0.1	1.3	1.18	38	9
			Indeno(1,2,3-cd)pyrene	mg/kg	0.1	0.7	0.63	45	9
			Dibenzo(ah)anthracene	mg/kg	0.1	0.1	0.11	113	17
			Benzo(ghi)perylene	mg/kg	0.1	0.6	0.49	49	15
			Carcinogenic PAHs, BaP TEQ <LOR=0	TEQ	0.2	1.9	1.6919	21	9
				TEQ (mg/kg)	0.2	1.9	1.6919	21	9
			Carcinogenic PAHs, BaP TEQ <LOR=LOR	TEQ (mg/kg)	0.3	1.9	1.6919	27	9
			Carcinogenic PAHs, BaP TEQ <LOR=LOR/2	TEQ (mg/kg)	0.2	1.9	1.6919	21	9
			Total PAH (18)	mg/kg	0.8	17	15.3	35	12
		Surrogates	d5-nitrobenzene (Surrogate)	mg/kg	-	0.5	0.49	30	2
			2-fluorobiphenyl (Surrogate)	mg/kg	-	0.5	0.49	30	2
			d14-p-terphenyl (Surrogate)	mg/kg	-	0.5	0.47	30	2

PCBs in Soil

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

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE163486.008	LB121057.027		Arochlor 1016	mg/kg	0.2	0	0	200	0
			Arochlor 1221	mg/kg	0.2	0	0	200	0
			Arochlor 1232	mg/kg	0.2	0	0	200	0
			Arochlor 1242	mg/kg	0.2	0	0	200	0
			Arochlor 1248	mg/kg	0.2	0	0	200	0
			Arochlor 1254	mg/kg	0.2	0	0	200	0
			Arochlor 1260	mg/kg	0.2	0	0	200	0
			Arochlor 1262	mg/kg	0.2	0	0	200	0
			Arochlor 1268	mg/kg	0.2	0	0	200	0
			Total PCBs (Arochlors)	mg/kg	1	0	0	200	0
		Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	mg/kg	-	0.153	0.148	30	3
SE163508.005	LB121057.028		Arochlor 1016	mg/kg	0.2	<0.2	0	200	0
			Arochlor 1221	mg/kg	0.2	<0.2	0	200	0
			Arochlor 1232	mg/kg	0.2	<0.2	0	200	0
			Arochlor 1242	mg/kg	0.2	<0.2	0	200	0
			Arochlor 1248	mg/kg	0.2	<0.2	0	200	0
			Arochlor 1254	mg/kg	0.2	<0.2	0	200	0
			Arochlor 1260	mg/kg	0.2	<0.2	0	200	0
			Arochlor 1262	mg/kg	0.2	<0.2	0	200	0
			Arochlor 1268	mg/kg	0.2	<0.2	0	200	0
			Total PCBs (Arochlors)	mg/kg	1	<1	0	200	0
		Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	mg/kg	-	0	0.166	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 %
SE163508.007	LB121347.014	Arsenic, As	mg/kg	3	4	4	54	4
		Cadmium, Cd	mg/kg	0.3	<0.3	<0.3	200	0
		Chromium, Cr	mg/kg	0.3	5.6	5.4	39	2
		Copper, Cu	mg/kg	0.5	13	13	34	2
		Lead, Pb	mg/kg	1	68	66	31	3

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.

Total Recoverable Metals in Soil/Waste Solids/Materials by ICPOES (continued)

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

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE163508.007	LB121347.014		Nickel, Ni	mg/kg	0.5	1.3	1.4	68	11
			Zinc, Zn	mg/kg	0.5	38	37	35	2
SE163637.006	LB121347.024		Arsenic, As	mg/kg	3	11	9	40	16
			Cadmium, Cd	mg/kg	0.3	<0.3	<0.3	167	0
			Chromium, Cr	mg/kg	0.3	9.4	8.7	36	7
			Copper, Cu	mg/kg	0.5	17	17	33	5
			Lead, Pb	mg/kg	1	14	13	38	9
			Nickel, Ni	mg/kg	0.5	7.3	8.0	37	8
			Zinc, Zn	mg/kg	0.5	43	45	35	4

TRH (Total Recoverable Hydrocarbons) in Soil

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

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE163486.008	LB121057.028		TRH C10-C14	mg/kg	20	17	23	130	14
			TRH C15-C28	mg/kg	45	480	500	39	4
			TRH C29-C36	mg/kg	45	297	330	44	11
			TRH C37-C40	mg/kg	100	0	0	200	0
			TRH C10-C36 Total	mg/kg	110	794	853	43	7
			TRH C10-C40 Total	mg/kg	210	812	885	55	9
		TRH F Bands	TRH >C10-C16 (F2)	mg/kg	25	37	44	92	17
			TRH >C10-C16 (F2) - Naphthalene	mg/kg	25	36.57	44	92	18
			TRH >C16-C34 (F3)	mg/kg	90	691	724	43	5
			TRH >C34-C40 (F4)	mg/kg	120	84	117	149	0
SE163508.005	LB121057.027		TRH C10-C14	mg/kg	20	<20	0	200	0
			TRH C15-C28	mg/kg	45	<45	0	200	0
			TRH C29-C36	mg/kg	45	<45	0	200	0
			TRH C37-C40	mg/kg	100	<100	0	200	0
			TRH C10-C36 Total	mg/kg	110	<110	0	200	0
			TRH C10-C40 Total	mg/kg	210	<210	0	200	0
		TRH F Bands	TRH >C10-C16 (F2)	mg/kg	25	<25	0	200	0
			TRH >C10-C16 (F2) - Naphthalene	mg/kg	25	<25	0	200	0
			TRH >C16-C34 (F3)	mg/kg	90	<90	0	200	0
			TRH >C34-C40 (F4)	mg/kg	120	<120	0	200	0

VOC's in Soil

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

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE163508.005	LB121047.014	Monocyclic	Benzene	mg/kg	0.1	<0.1	<0.1	200	0
		Aromatic	Toluene	mg/kg	0.1	<0.1	<0.1	155	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	-	3.6	3.6	50	1
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.5	4.5	50	0
			d8-toluene (Surrogate)	mg/kg	-	3.8	3.8	50	1
			Bromofluorobenzene (Surrogate)	mg/kg	-	3.8	4.0	50	6
		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
SE163508.010	LB121047.020	Monocyclic	Benzene	mg/kg	0.1	<0.1	<0.1	200	0
		Aromatic	Toluene	mg/kg	0.1	<0.1	<0.1	173	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	-	4.2	4.4	50	5
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.4	4.4	50	0
			d8-toluene (Surrogate)	mg/kg	-	3.6	3.5	50	3
			Bromofluorobenzene (Surrogate)	mg/kg	-	3.9	3.6	50	7
		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

Volatile Petroleum Hydrocarbons in Soil

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

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.

Volatile Petroleum Hydrocarbons in Soil (continued) — **Method: ME-(AU)-[ENV]AN433**

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE163508.005	LB121047.014		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	-	3.6	3.6	30	1
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.5	4.5	30	0
			d8-toluene (Surrogate)	mg/kg	-	3.8	3.8	30	1
			Bromofluorobenzene (Surrogate)	mg/kg	-	3.8	4.0	30	6
		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
SE163508.010	LB121047.020		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	-	4.2	4.4	30	5
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.4	4.4	30	0
			d8-toluene (Surrogate)	mg/kg	-	3.6	3.5	30	3
			Bromofluorobenzene (Surrogate)	mg/kg	-	3.9	3.6	30	7
		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

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 %
LB121321.002		Mercury	mg/kg	0.05	0.18	0.2	70 - 130	91
LB121322.002		Mercury	mg/kg	0.05	0.19	0.2	70 - 130	93

OC Pesticides in Soil

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

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB121057.002		Heptachlor	mg/kg	0.1	0.2	0.2	60 - 140	123
		Aldrin	mg/kg	0.1	0.2	0.2	60 - 140	125
		Delta BHC	mg/kg	0.1	0.2	0.2	60 - 140	123
		Dieldrin	mg/kg	0.2	0.2	0.2	60 - 140	118
		Endrin	mg/kg	0.2	0.2	0.2	60 - 140	123
		p,p'-DDT	mg/kg	0.1	0.2	0.2	60 - 140	124
	Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	mg/kg	-	0.16	0.15	40 - 130	105

OP Pesticides in Soil

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

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB121057.002		Dichlorvos	mg/kg	0.5	2.2	2	60 - 140	108
		Diazinon (Dimpylate)	mg/kg	0.5	2.6	2	60 - 140	129
		Chlorpyrifos (Chlorpyrifos Ethyl)	mg/kg	0.2	1.5	2	60 - 140	74
		Ethion	mg/kg	0.2	1.6	2	60 - 140	82
	Surrogates	2-fluorobiphenyl (Surrogate)	mg/kg	-	0.5	0.5	40 - 130	94
		d14-p-terphenyl (Surrogate)	mg/kg	-	0.5	0.5	40 - 130	90

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

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

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB121057.002		Naphthalene	mg/kg	0.1	4.2	4	60 - 140	105
		Acenaphthylene	mg/kg	0.1	4.3	4	60 - 140	107
		Acenaphthene	mg/kg	0.1	4.2	4	60 - 140	105
		Phenanthrene	mg/kg	0.1	4.1	4	60 - 140	103
		Anthracene	mg/kg	0.1	4.2	4	60 - 140	106
		Fluoranthene	mg/kg	0.1	4.2	4	60 - 140	105
		Pyrene	mg/kg	0.1	4.1	4	60 - 140	102
		Benzo(a)pyrene	mg/kg	0.1	4.2	4	60 - 140	104
	Surrogates	d5-nitrobenzene (Surrogate)	mg/kg	-	0.5	0.5	40 - 130	94
		2-fluorobiphenyl (Surrogate)	mg/kg	-	0.5	0.5	40 - 130	94
		d14-p-terphenyl (Surrogate)	mg/kg	-	0.5	0.5	40 - 130	90

PCBs in Soil

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

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB121057.002		Arochlor 1260	mg/kg	0.2	0.5	0.4	60 - 140	118

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 %
LB121347.002		Arsenic, As	mg/kg	3	57	50	80 - 120	114
		Cadmium, Cd	mg/kg	0.3	53	50	80 - 120	107
		Chromium, Cr	mg/kg	0.3	48	50	80 - 120	96
		Copper, Cu	mg/kg	0.5	53	50	80 - 120	107
		Lead, Pb	mg/kg	1	55	50	80 - 120	110
		Nickel, Ni	mg/kg	0.5	51	50	80 - 120	101
		Zinc, Zn	mg/kg	0.5	53	50	80 - 120	107

TRH (Total Recoverable Hydrocarbons) in Soil

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

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB121057.002		TRH C10-C14	mg/kg	20	36	40	60 - 140	90
		TRH C15-C28	mg/kg	45	<45	40	60 - 140	98
		TRH C29-C36	mg/kg	45	<45	40	60 - 140	80
	TRH F Bands	TRH >C10-C16 (F2)	mg/kg	25	37	40	60 - 140	93
		TRH >C16-C34 (F3)	mg/kg	90	<90	40	60 - 140	95
		TRH >C34-C40 (F4)	mg/kg	120	<120	20	60 - 140	75

VOC's in Soil

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

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.

VOC's in Soil (continued)

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

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB121047.002	Monocyclic	Benzene	mg/kg	0.1	2.1	2.9	60 - 140	72
	Aromatic	Toluene	mg/kg	0.1	2.0	2.9	60 - 140	70
		Ethylbenzene	mg/kg	0.1	2.4	2.9	60 - 140	83
		m/p-xylene	mg/kg	0.2	5.1	5.8	60 - 140	89
		o-xylene	mg/kg	0.1	2.6	2.9	60 - 140	91
	Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	4.0	5	60 - 140	81
		d4-1,2-dichloroethane (Surrogate)	mg/kg	-	5.0	5	60 - 140	101
		d8-toluene (Surrogate)	mg/kg	-	4.5	5	60 - 140	90
		Bromofluorobenzene (Surrogate)	mg/kg	-	4.9	5	60 - 140	97

Volatile Petroleum Hydrocarbons in Soil

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

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB121047.002		TRH C6-C10	mg/kg	25	<25	24.65	60 - 140	96
		TRH C6-C9	mg/kg	20	22	23.2	60 - 140	93
	Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	4.0	5	60 - 140	81
		d4-1,2-dichloroethane (Surrogate)	mg/kg	-	5.0	5	60 - 140	101
		d8-toluene (Surrogate)	mg/kg	-	4.5	5	60 - 140	90
		Bromofluorobenzene (Surrogate)	mg/kg	-	4.9	5	60 - 140	97
	VPH F Bands	TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	7.25	60 - 140	128

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 in Soil

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

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE163486.002	LB121321.004	Mercury	mg/kg	0.05	0.23	0.06395507214	0.2	83
SE163508.010	LB121322.004	Mercury	mg/kg	0.05	0.22	<0.05	0.2	89

OC Pesticides in Soil

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

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE163508.001	LB121057.026		Hexachlorobenzene (HCB)	mg/kg	0.1	0	<0.1	-	-
			Alpha BHC	mg/kg	0.1	0	<0.1	-	-
			Lindane	mg/kg	0.1	0	<0.1	-	-
			Heptachlor	mg/kg	0.1	0.248	<0.1	0.2	124
			Aldrin	mg/kg	0.1	0.248	<0.1	0.2	124
			Beta BHC	mg/kg	0.1	0	<0.1	-	-
			Delta BHC	mg/kg	0.1	0.246	<0.1	0.2	123
			Heptachlor epoxide	mg/kg	0.1	0	<0.1	-	-
			o,p'-DDE	mg/kg	0.1	0	<0.1	-	-
			Alpha Endosulfan	mg/kg	0.2	0	<0.2	-	-
			Gamma Chlordane	mg/kg	0.1	0	<0.1	-	-
			Alpha Chlordane	mg/kg	0.1	0	<0.1	-	-
			trans-Nonachlor	mg/kg	0.1	0	<0.1	-	-
			p,p'-DDE	mg/kg	0.1	0	<0.1	-	-
			Dieldrin	mg/kg	0.2	0.24	<0.2	0.2	120
			Endrin	mg/kg	0.2	0.243	<0.2	0.2	122
			o,p'-DDD	mg/kg	0.1	0	<0.1	-	-
			o,p'-DDT	mg/kg	0.1	0	<0.1	-	-
			Beta Endosulfan	mg/kg	0.2	0	<0.2	-	-
			p,p'-DDD	mg/kg	0.1	0	<0.1	-	-
			p,p'-DDT	mg/kg	0.1	0.25	<0.1	0.2	125
			Endosulfan sulphate	mg/kg	0.1	0	<0.1	-	-
			Endrin Aldehyde	mg/kg	0.1	0	<0.1	-	-
			Methoxychlor	mg/kg	0.1	0	<0.1	-	-
			Endrin Ketone	mg/kg	0.1	0	<0.1	-	-
			Isodrin	mg/kg	0.1	0	<0.1	-	-
			Mirex	mg/kg	0.1	0	<0.1	-	-
		Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	mg/kg	-	0.165	0.16	-	110

OP Pesticides in Soil

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

QC Sample	Sample Number		Parameter	Units	LOR	Original	Spike	Recovery%
SE163508.001	LB121057.027		Dichlorvos	mg/kg	0.5	<0.5	2	113
			Dimethoate	mg/kg	0.5	<0.5	-	-
			Diazinon (Dimpylate)	mg/kg	0.5	<0.5	2	132
			Fenitrothion	mg/kg	0.2	<0.2	-	-
			Malathion	mg/kg	0.2	<0.2	-	-
			Chlorpyrifos (Chlorpyrifos Ethyl)	mg/kg	0.2	<0.2	2	81
			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	2	90
			Azinphos-methyl (Guthion)	mg/kg	0.2	<0.2	-	-
		Surrogates	2-fluorobiphenyl (Surrogate)	mg/kg	-	0.5	-	94
			d14-p-terphenyl (Surrogate)	mg/kg	-	0.5	-	92

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

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

QC Sample	Sample Number	Parameter	Units	LOR	Original	Spike	Recovery%
SE163508.001	LB121057.027	Naphthalene	mg/kg	0.1	<0.1	4	107
		2-methylnaphthalene	mg/kg	0.1	<0.1	-	-
		1-methylnaphthalene	mg/kg	0.1	<0.1	-	-
		Acenaphthylene	mg/kg	0.1	<0.1	4	107
		Acenaphthene	mg/kg	0.1	<0.1	4	108
		Fluorene	mg/kg	0.1	<0.1	-	-
		Phenanthrene	mg/kg	0.1	<0.1	4	104
		Anthracene	mg/kg	0.1	<0.1	4	109
		Fluoranthene	mg/kg	0.1	<0.1	4	107

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%
SE163508.001	LB121057.027		Pyrene	mg/kg	0.1	<0.1	4	105
			Benzo(a)anthracene	mg/kg	0.1	<0.1	-	-
			Chrysene	mg/kg	0.1	<0.1	-	-
			Benzo(b&j)fluoranthene	mg/kg	0.1	<0.1	-	-
			Benzo(k)fluoranthene	mg/kg	0.1	<0.1	-	-
			Benzo(a)pyrene	mg/kg	0.1	<0.1	4	101
			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	-	-
			Carcinogenic PAHs, BaP TEQ <LOR=0	TEQ	0.2	<0.2	-	-
			Carcinogenic PAHs, BaP TEQ <LOR=LOR	TEQ (mg/kg)	0.3	<0.3	-	-
			Carcinogenic PAHs, BaP TEQ <LOR=LOR/2	TEQ (mg/kg)	0.2	<0.2	-	-
			Total PAH (18)	mg/kg	0.8	<0.8	-	-
		Surrogates	d5-nitrobenzene (Surrogate)	mg/kg	-	0.5	-	100
			2-fluorobiphenyl (Surrogate)	mg/kg	-	0.5	-	94
			d14-p-terphenyl (Surrogate)	mg/kg	-	0.5	-	92

PCBs in Soil

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

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE163508.001	LB121057.026		Arochlor 1016	mg/kg	0.2	0	<0.2	-	-
			Arochlor 1221	mg/kg	0.2	0	<0.2	-	-
			Arochlor 1232	mg/kg	0.2	0	<0.2	-	-
			Arochlor 1242	mg/kg	0.2	0	<0.2	-	-
			Arochlor 1248	mg/kg	0.2	0	<0.2	-	-
			Arochlor 1254	mg/kg	0.2	0	<0.2	-	-
			Arochlor 1260	mg/kg	0.2	0.481	<0.2	0.4	120
			Arochlor 1262	mg/kg	0.2	0	<0.2	-	-
			Arochlor 1268	mg/kg	0.2	0	<0.2	-	-
			Total PCBs (Arochlors)	mg/kg	1	0.481	<1	-	-
		Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	mg/kg	-	0.162	0	-	108

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%
SE163483.009	LB121347.004	Lead, Pb	mg/kg	1	300	270	50	56 ⓖ

TRH (Total Recoverable Hydrocarbons) in Soil

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

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE163508.001	LB121057.026		TRH C10-C14	mg/kg	20	42	<20	40	105
			TRH C15-C28	mg/kg	45	47	<45	40	118
			TRH C29-C36	mg/kg	45	45	<45	40	113
			TRH C37-C40	mg/kg	100	0	<100	-	-
			TRH C10-C36 Total	mg/kg	110	134	<110	-	-
			TRH C10-C40 Total	mg/kg	210	114	<210	-	-
		TRH F Bands	TRH >C10-C16 (F2)	mg/kg	25	43	<25	40	108
			TRH >C10-C16 (F2) - Naphthalene	mg/kg	25	43	<25	-	-
			TRH >C16-C34 (F3)	mg/kg	90	53	<90	40	85
			TRH >C34-C40 (F4)	mg/kg	120	18	<120	-	-

VOC's in Soil

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

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE163463.021	LB121047.004	Monocyclic	Benzene	mg/kg	0.1	2.4	<0.1	2.9	83
		Aromatic	Toluene	mg/kg	0.1	1.8	<0.1	2.9	61
			Ethylbenzene	mg/kg	0.1	2.0	<0.1	2.9	67
			m/p-xylene	mg/kg	0.2	4.3	<0.2	5.8	73
			o-xylene	mg/kg	0.1	2.2	<0.1	2.9	75
		Polycyclic	Naphthalene	mg/kg	0.1	<0.1	<0.1	-	-
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	3.7	4.3	-	73
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.6	4.1	-	92
			d8-toluene (Surrogate)	mg/kg	-	3.9	3.5	-	77
			Bromofluorobenzene (Surrogate)	mg/kg	-	4.2	3.9	-	85

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

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE163463.021	LB121047.004	Totals	Total Xylenes*	mg/kg	0.3	6.5	<0.3	-	-
			Total BTEX	mg/kg	0.6	13	<0.6	-	-

Volatile Petroleum Hydrocarbons in Soil

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

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE163463.021	LB121047.004		TRH C6-C10	mg/kg	25	<25	<25	24.65	89
			TRH C6-C9	mg/kg	20	<20	<20	23.2	83
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	3.7	4.3	-	73
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.6	4.1	-	92
			d8-toluene (Surrogate)	mg/kg	-	3.9	3.5	-	77
			Bromofluorobenzene (Surrogate)	mg/kg	-	4.2	3.9	-	85
		VPH F	Benzene (F0)	mg/kg	0.1	2.4	<0.1	-	-
		Bands	TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	<25	7.25	130

MATRIX SPIKE DUPLICATES

SE163508 R0

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.

ATTACHMENT F

SUMMARY OF THE
LABORATORY ANALYTICAL RESULTS

Table AF1. Summary of the laboratory analytical results for the representative, discrete soil samples (contamination testing).

ANALYTE	BH1-1 (0.1-0.2m BGL)	BH2-1 (0.1-0.2m BGL)	BH3-1 (0.1-0.2m BGL)	BH4-1 (0.1-0.2m BGL)	BH5-1 (0.1-0.2m BGL)	BH6-1 (0.1-0.2m BGL)	BH6-2 (0.4-0.5m BGL)	BH7-1 (0.1-0.2m BGL)	BH8-1 (0.2-0.3m BGL)	BH8-2 (1.3-1.4m BGL)	HILs	ESLs	Waste Criteria
Heavy Metals (mg/kg)													
arsenic	6	4	9	7	6	<3	4	<3	20	5	100	100	100
cadmium	0.7	0.7	0.5	1.7	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	20	3 [4]	20
chromium	42	11	17	8.8	8.2	5.2	5.6	7.5	15	4.2	100 [1]	190 [5]	100 [6]
copper	19	40	*630*	19	15	2.2	13	27	27	6.4	6000	380	NC
lead	71	110	140	54	96	11	68	110	37	35	300	1300	100
nickel	13	4.2	6.3	3.2	1.5	0.7	1.3	1.4	4.1	1.1	400	530	40
zinc	57	100	120	62	42	7.6	38	53	41	25	7400	530	NC
mercury	<0.05	0.08	<0.05	<0.05	0.08	<0.05	<0.05	<0.05	<0.05	<0.05	40	1 [4]	4
TRHs (mg/kg)													
C_6-C_{10} (F1)	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	45 [2]	180	NC / 650 [7]
>C_{10}-C_{16} (F2)	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	110 [2]	120	NC / total 10000 [7]
>C_{16}-C_{34} (F3)	<90	<90	<90	<90	<90	<90	<90	<90	<90	<90	4500 [3]	300	
>C_{34}-C_{40} (F4)	<120	<120	<120	<120	<120	<120	<120	<120	<120	<120	6300 [3]	2800	
BTEX (mg/kg)													
benzene	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.5 [2]	50	10
toluene	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	160 [2]	85	288
ethyl benzene	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	55 [2]	70	600
xylenes (total)	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	40 [2]	105	1000
PAHs (mg/kg)													
total PAHs	<0.8	<0.8	<0.8	<0.8	17	<0.8	14	23	<0.8	1.4	300	NC	NC / 200 [7]
naphthalene	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	3 [2]	170	NC
carcinogenic PAHs (as BaP TEQ)	<0.3	<0.3	<0.3	<0.3	1.9	<0.3	1.5	2.4	<0.3	<0.3	3	NC	NC
PCBs (mg/kg)													
total PCBs (Arochlors)	<1	<1	<1	<1	<1	<1		<1	<1		1	NC	NC / <50 [7]
OCPs (mg/kg)													
total OCPs	ND	ND	ND	ND	ND	ND		ND	ND		NC	NC	NC / <50 [7]
OPPs (mg/kg)													
total OPPs	ND	ND	ND	ND	ND	ND		ND	ND		NC	NC	NC / <250 [7]
Asbestos (ID)	ND	ND	ND	ND	ND	ND		ND	ND		ND / 0.001% w/w	NC	NC

Footnotes:

BGL = below ground level; ND = concentrations of all compounds tested were below estimated quantitation limits (i.e. not detected); NC = no currently available criterion; BaP = benzo(a)pyrene; TEQ = toxicity equivalent quotient

HILs are the NEPC (2013) *Residential A* health-based investigation levels for residential settings with gardens and accessible soil, unless otherwise indicated

[1] the 100 mg/kg limit applies to Cr (VI)

[2] NEPC (2013) *Health Screening Level A* for sandy soil (0- <1m BGL); F1 excludes sum BTEX concentration and F2 excludes naphthalene concentration

[3] Friebel and Nadebaum (2011) *Soil Health Screening Level A for Direct Contact*

ESLs determined via NEPC (2013) methodology, assuming coarse textured soil of pH 6.5 in an urban residential setting, unless otherwise indicated

[4] NEPC (1999) *Interim Urban Ecological Investigation Level*; [5] the 190 mg/kg limit applies to Cr (III)

Waste Criteria are the *CT1 General Solid Waste* thresholds, given under the EPA (2014) *Waste Classification Guidelines*, unless otherwise indicated

[6] this limit applies to chromium in the +6 oxidation state only; [7] *TCLP1/SCC1 General Solid Waste* thresholds, given under the EPA (2014) *Waste Classification Guidelines*