1 March 2021
E22434.E09.001_Rev0

EI Australia
Suite 6.01, 55 Miller Street
PYRMONT, NSW 2009

ABN 42 909 129 957

E service@eiaustralia.com.au
W www.eiaustralia.com.au
T 02 9516 0722

Attn: Mr Raja Jamal
C/- Perpetual Corporate Trust Limited
Level 21, Governor Phillip Tower, 1 Farrer Place,
SYDNEY NSW 2000

Dear Raja,

Detailed Site Investigation & Remediation Action Plan Review
Proposed Co-Living Development
175-177 Cleveland Street, Redfern NSW

Introduction

At the request of Perpetual Corporate Trust Limited (The Client), EI Australia (EI) is pleased to provide this review of the following contamination reports:

- Detailed Site Investigation Report, 1-5 Woodburn Street, Redfern, by EI Australia, ref. E22434 AA dated 18 September 2015.
- Remediation Action Plan, 175-177 Cleveland Street & 1-5 Woodburn Street, Redfern NSW, by EI Australia, ref. E22434 AB_Rev1 dated 14 March 2016.

The purpose of this letter is to review the comments and recommendations provided in the Detailed Site Investigation (DSI) and Remediation Action Plan (RAP) in light of modifications to the proposed development which have occurred since. EI understand that this review is required in support of the development application.

At the time of the previous reports above, the proposed development consisted of construction of a multistorey commercial & residential building over a two level basement car park across the majority of the site area. Based on revised architectural plans (**Attachment A**) provided by the client, EI understand the proposed development will now comprise of a co-living development also comprising of multiple storeys over a one to two level basement car park / common area. EI provide the following comments:

- The proposed land use remains unchanged – residential with limited access to soils (HIL B)
- The change in basement depth does not require modification of the remediation strategy outlined in the RAP.
- The DSI achieves its purpose of enabling the developer to meet its obligations under the *Contaminated Land Management Act 1997* (CLM Act), for the assessment and management of contaminated soil and/or groundwater.
- The RAP achieves its purpose of guiding remediation works required to make the site suitable for the proposed residential land use.

Based on the above, EI consider that the previous comments and recommendations provided in the DSI and RAP referenced above are still valid in principal and remain unchanged.

Limitations

This report has been prepared for the exclusive use of Perpetual Corporate Trust Limited who is the only intended beneficiary of EI's work. The scope of the inspections carried out for the purpose of this report is limited to those agreed with Perpetual Corporate Trust Limited.

No other party should rely on the document without the prior written consent of EI, and EI undertakes no duty, or accepts any responsibility or liability, to any third party who purports to rely upon this document without EI's approval.

EI has used a degree of care and skill ordinarily exercised in similar investigations by reputable members of the geotechnical industry in Australia as at the date of this document. No other warranty, expressed or implied, is made or intended. Each section of this report must be read in conjunction with the whole of this report, including its appendices and attachments.

The conclusions presented in this report are based on a limited investigation of conditions, with specific sampling locations chosen to be as representative as possible under the given circumstances. EI's professional opinions are reasonable and based on its professional judgment, experience, training and results from analytical data. EI may also have relied upon information provided by the Client and other third parties to prepare this document, some of which may not have been verified by EI.

EI's professional opinions contained in this document are subject to modification if additional information is obtained through further investigation, observations, or validation testing and analysis during remedial activities. In some cases, further testing and analysis may be required, which may result in a further report with different conclusions.

Closure

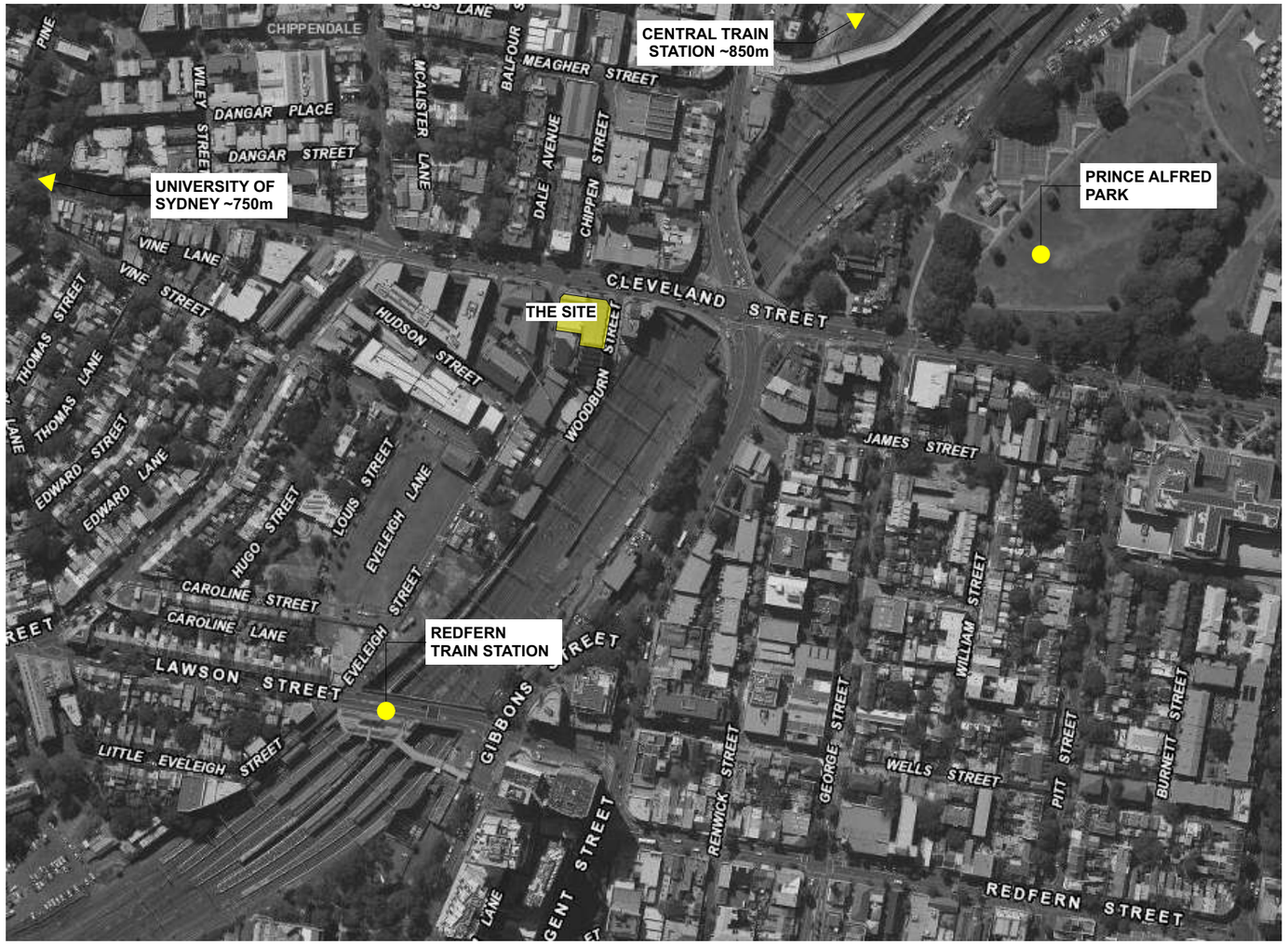
Please do not hesitate to contact the undersigned should you have any questions.

For and on behalf of,
EI Australia

Author:

Linda Xiao
Civil/Environmental Engineer – Project Coordinator

Attachment A – Architectural Plans



MARK SHAPIRO ARCHITECTS

T 0421 996 467
W markshapiro.com.au
E mark@markshapiro.com.au
NSW REG. 9789
ABN 646 2000 7678

ISSUE	DATE	REVISION
A	26/2/21	ISSUE FOR DEVELOPMENT APPLICATION

CLIENT:
EG Funds Management
Level 21, Governor Phillip Tower,
1 Farrer Place, Sydney, 2000

PROJECT:
PROPOSED CO-LIVING DEVELOPMENT
175-177 CLEVELAND STREET, REDFERN

DRAWING:
SITE LOCATION PLAN

PROJECT NO:
20008

PLOTTED: 1/3/21

DRAWING NO: **DA1000**
REV: **A**

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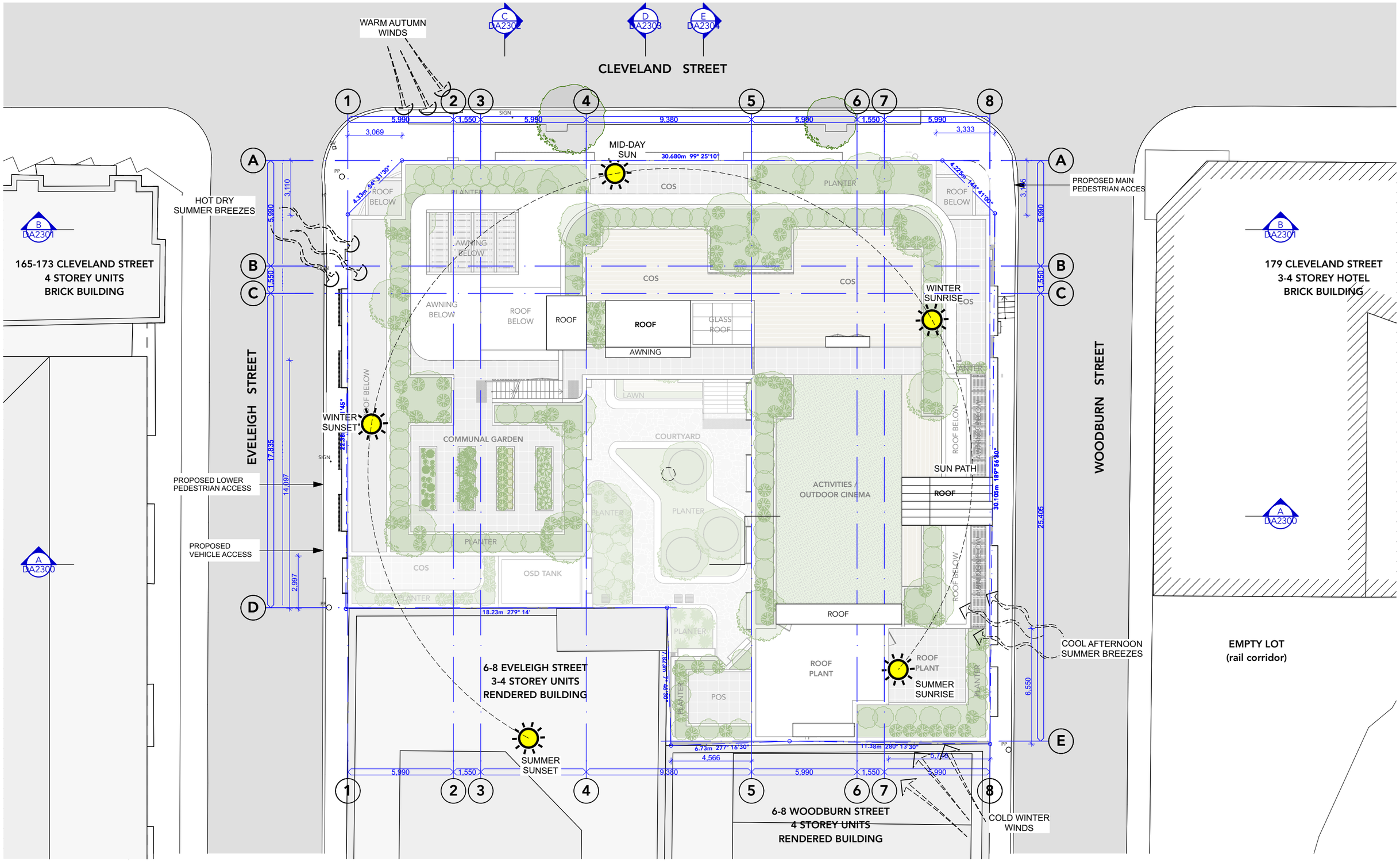

1 SITE ANALYSIS PLAN
1:200

MARK SHAPIRO ARCHITECTS
T 0421 996 467
W markshapiro.com.au
E mark@markshapiro.com.au
NSW REG. 9789
ABN 646 2000 7678

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EG Funds Management
Level 21, Governor Phillip Tower,
1 Farrer Place, Sydney, 2000

PROJECT:
PROPOSED CO-LIVING DEVELOPMENT
175-177 CLEVELAND STREET, REDFERN

DRAWING:
SITE ANALYSIS PLAN

PROJECT NO:
20008

PLOTTED: 1/3/21

DRAWING NO: **DA1200**
REV: **A**

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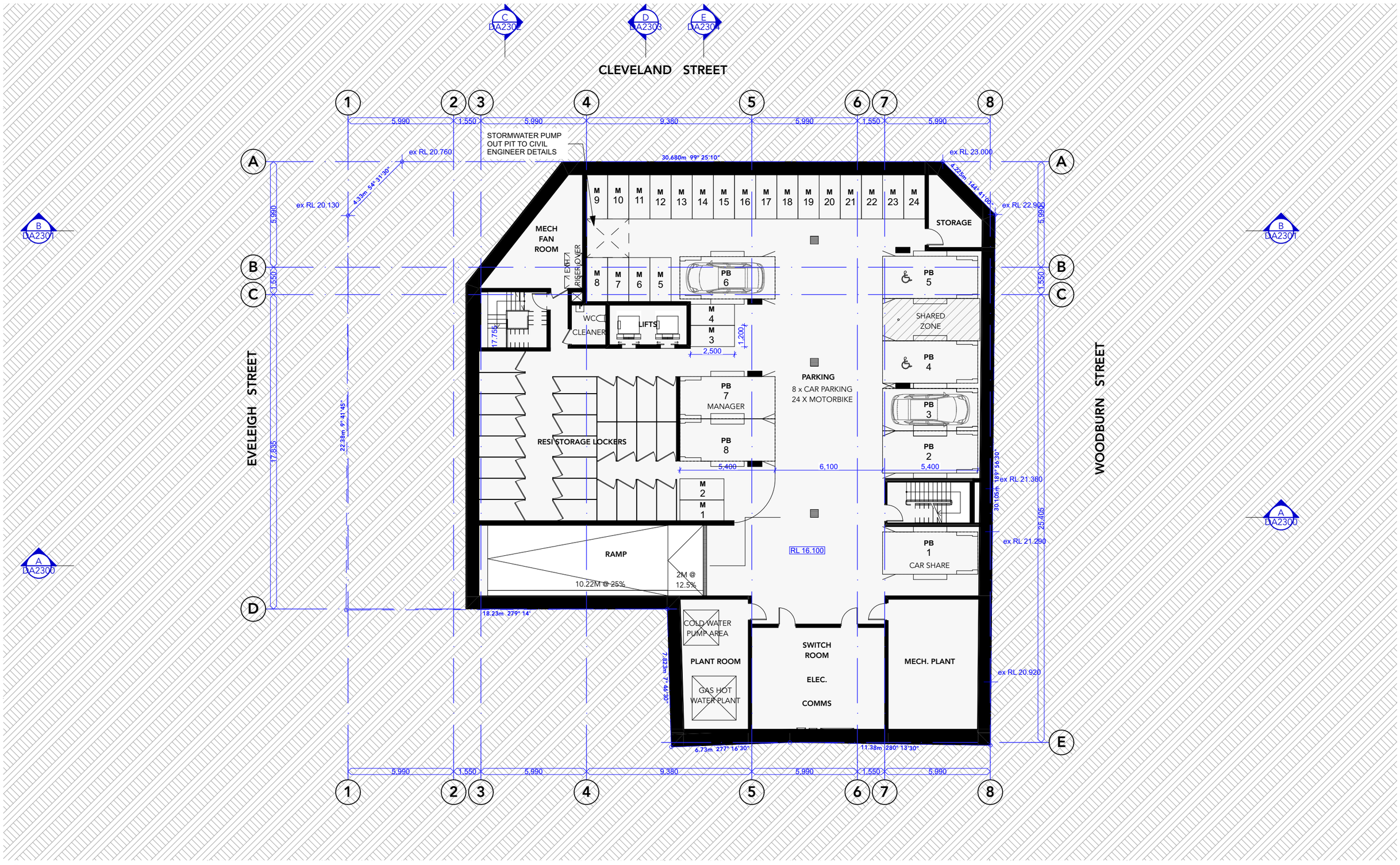

1 BASEMENT
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MARK SHAPIRO ARCHITECTS
T 0421 996 467
W markshapiro.com.au
E mark@markshapiro.com.au
NSW REG. 9789
ABN 646 2000 7678

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BASIX COMMITMENTS
(ALL OTHER BASIX COMMITMENTS AS PER BASIX CERTIFICATE)
ENERGY
AIRCONDITIONING: 3 PHASE <2.5
HOT WATER: CENTRAL GAS
LIFTS: GEARLESS TRACTION WITH VVVF MOTOR
LIGHTING
REFER BASIX COMMITTMENTS
WATER
SHOWERHEADS: 4 STAR
TOILETS: 4 STAR
BATHROOM TAPS: 4 STAR
KITCHEN TAPS: 4 STAR

THERMAL COMFORT OPTIONS
INSULATION: REFER SECTION J
GLAZING TYPE: REFER SECTION J

CLIENT:
EG Funds Management
Level 21, Governor Phillip Tower,
1 Farrer Place, Sydney, 2000

PROJECT:
PROPOSED CO-LIVING DEVELOPMENT
175-177 CLEVELAND STREET, REDFERN

DRAWING:
BASEMENT PLAN

PROJECT NO:
20008

PLOTTED: 1/3/21

DRAWING NO: **DA2001**
REV: **A**

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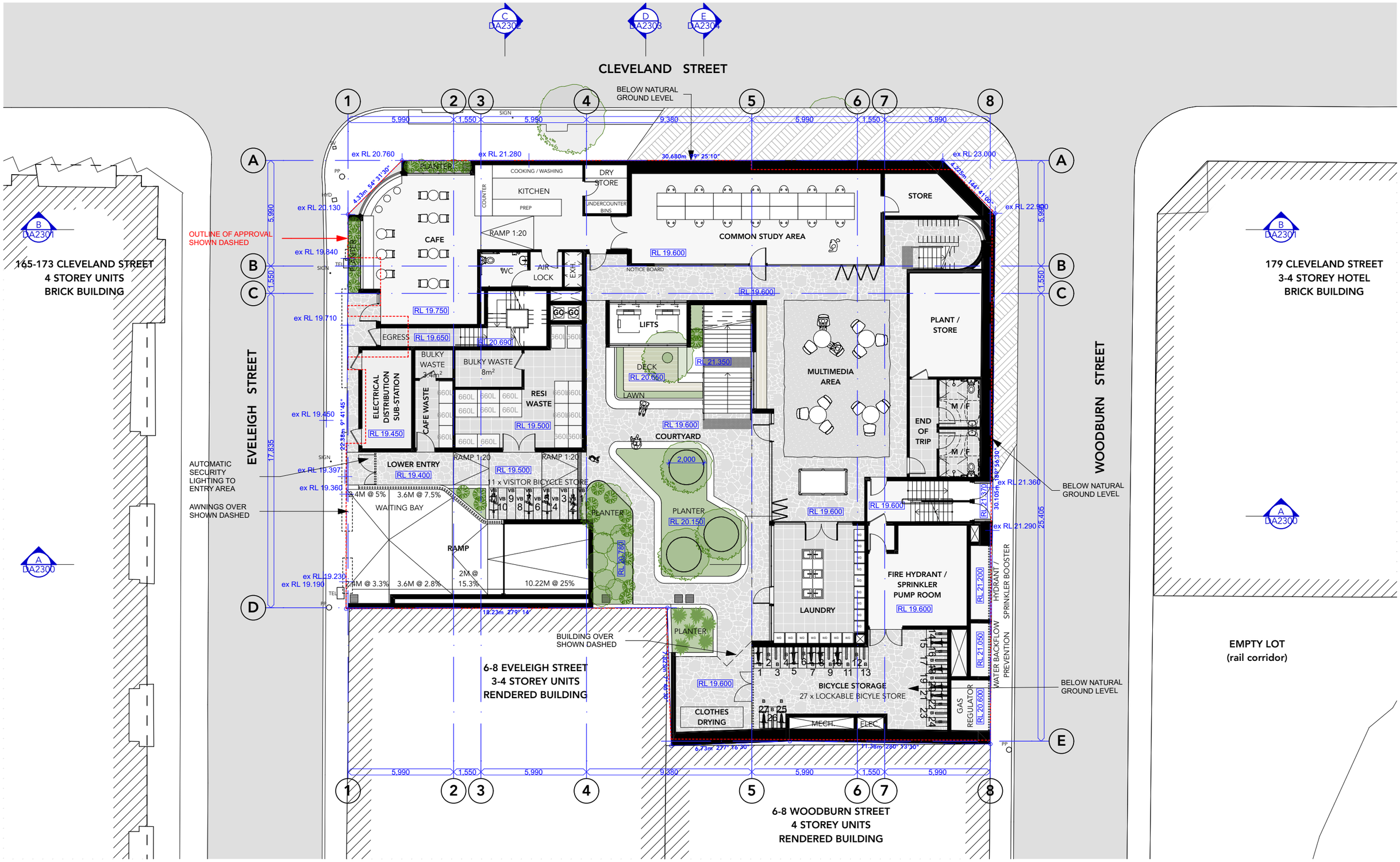

1 GROUND LEVEL
1:200

MARK SHAPIRO ARCHITECTS
T 0421 996 467
W markshapiro.com.au
E mark@markshapiro.com.au
NSW REG. 9789
ABN 646 2000 7678

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HOT WATER: CENTRAL GAS
LIFTS: GEARLESS TRACTION WITH VVVF MOTOR
LIGHTING
REFER BASIX COMMITTMENTS
WATER
SHOWERHEADS: 4 STAR
TOILETS: 4 STAR
BATHROOM TAPS: 4 STAR
KITCHEN TAPS: 4 STAR
THERMAL COMFORT OPTIONS
INSULATION: REFER SECTION J
GLAZING TYPE: REFER SECTION J

CLIENT:
EG Funds Management
Level 21, Governor Phillip Tower,
1 Farrer Place, Sydney, 2000

PROJECT:
PROPOSED CO-LIVING DEVELOPMENT
175-177 CLEVELAND STREET, REDFERN

DRAWING:
GROUND FLOOR PLAN

PROJECT NO:
20008
PLOTTED: 1/3/21

DRAWING NO: **DA2002** REV: **A**

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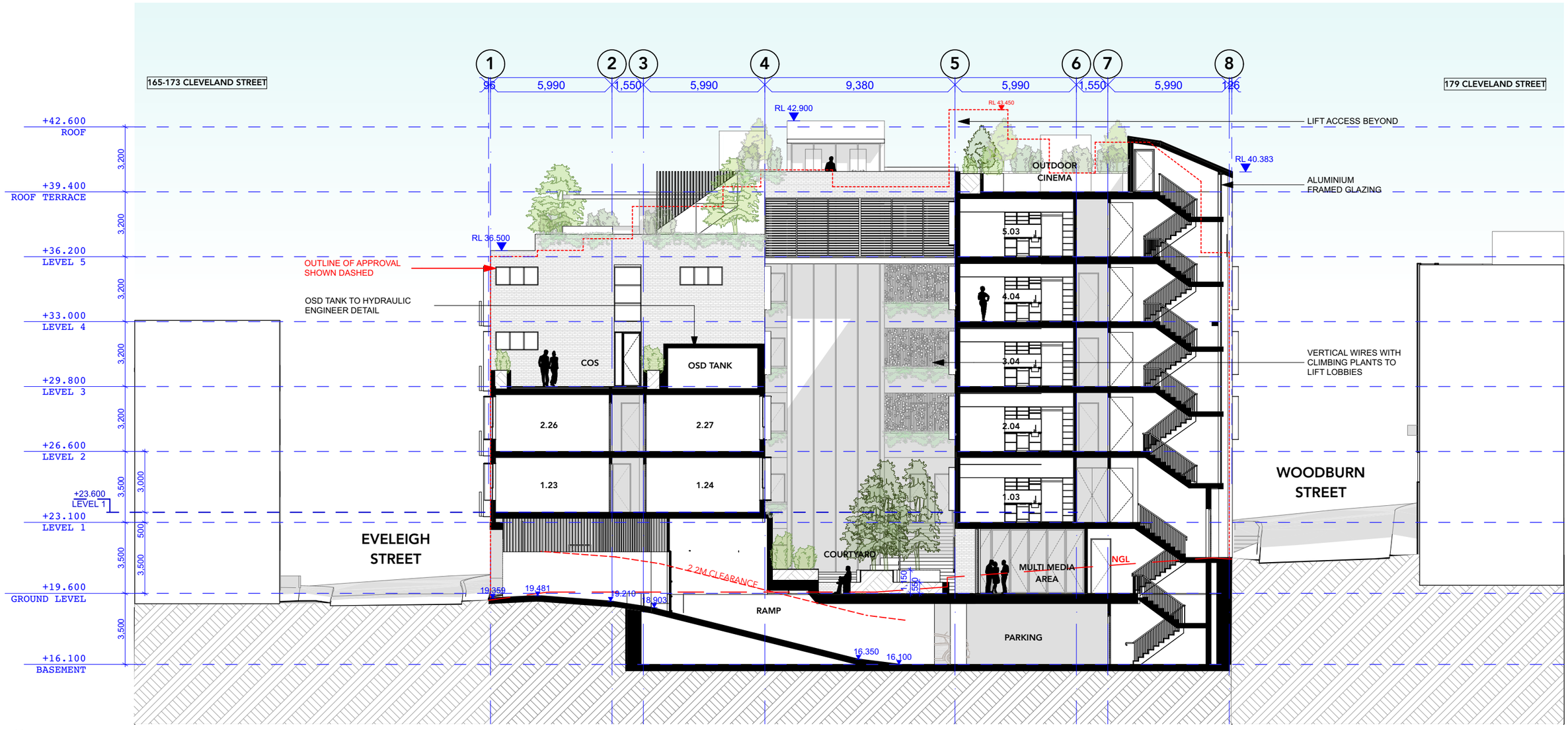

1 SECTION A
1:200

MARK SHAPIRO ARCHITECTS
T 0421 996 467
W markshapiro.com.au
E mark@markshapiro.com.au
NSW REG. 9789
ABN 646 2000 7678

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LIFTS: GEARLESS TRACTION WITH VVVF MOTOR
LIGHTING
REFER BASIX COMMITTMENTS
WATER
SHOWERHEADS: 4 STAR
TOILETS: 4 STAR
BATHROOM TAPS: 4 STAR
KITCHEN TAPS: 4 STAR
THERMAL COMFORT OPTIONS
INSULATION: REFER SECTION J
GLAZING TYPE: REFER SECTION J

CLIENT:
EG Funds Management
Level 21, Governor Phillip Tower,
1 Farrer Place, Sydney, 2000

PROJECT:
PROPOSED CO-LIVING DEVELOPMENT
175-177 CLEVELAND STREET, REDFERN

DRAWING:
SECTION A

PROJECT NO:
20008

PLOTTED: 1/3/21

DRAWING NO: **DA2300**
REV: **A**

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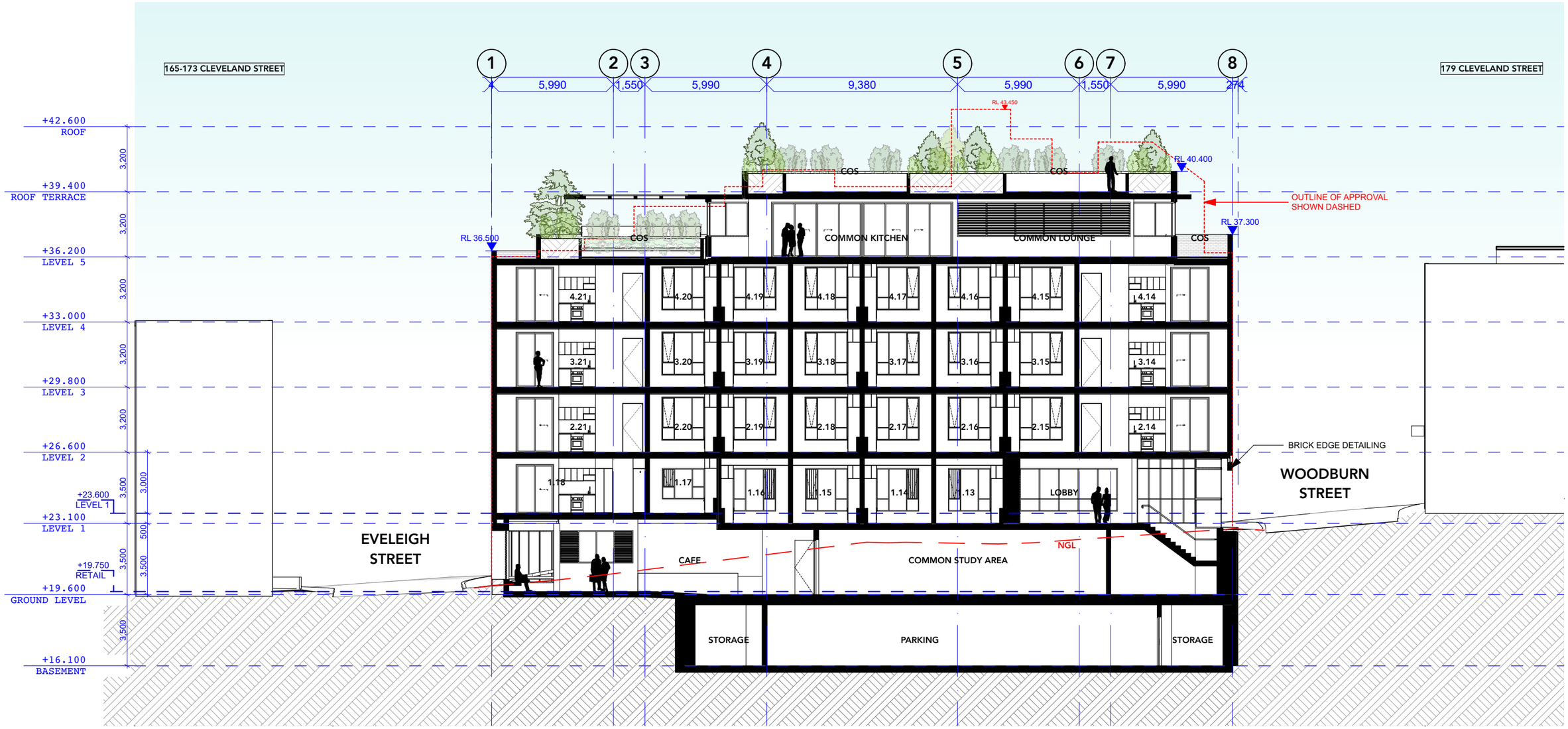

1 SECTION B
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MARK SHAPIRO ARCHITECTS

T 0421 996 467
W markshapiro.com.au
E mark@markshapiro.com.au
NSW REG. 9789
ABN 646 2000 7678

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HOT WATER: CENTRAL GAS
LIFTS: GEARLESS TRACTION WITH VVVF MOTOR
LIGHTING
REFER BASIX COMMITTMENTS
WATER
SHOWERHEADS: 4 STAR
TOILETS: 4 STAR
BATHROOM TAPS: 4 STAR
KITCHEN TAPS: 4 STAR

THERMAL COMFORT OPTIONS
INSULATION: REFER SECTION J
GLAZING TYPE: REFER SECTION J

CLIENT:
EG Funds Management
Level 21, Governor Phillip Tower,
1 Farrer Place, Sydney, 2000

PROJECT:
PROPOSED CO-LIVING DEVELOPMENT
175-177 CLEVELAND STREET, REDFERN

DRAWING:
SECTION B

PROJECT NO:
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PLOTTED: 1/3/21

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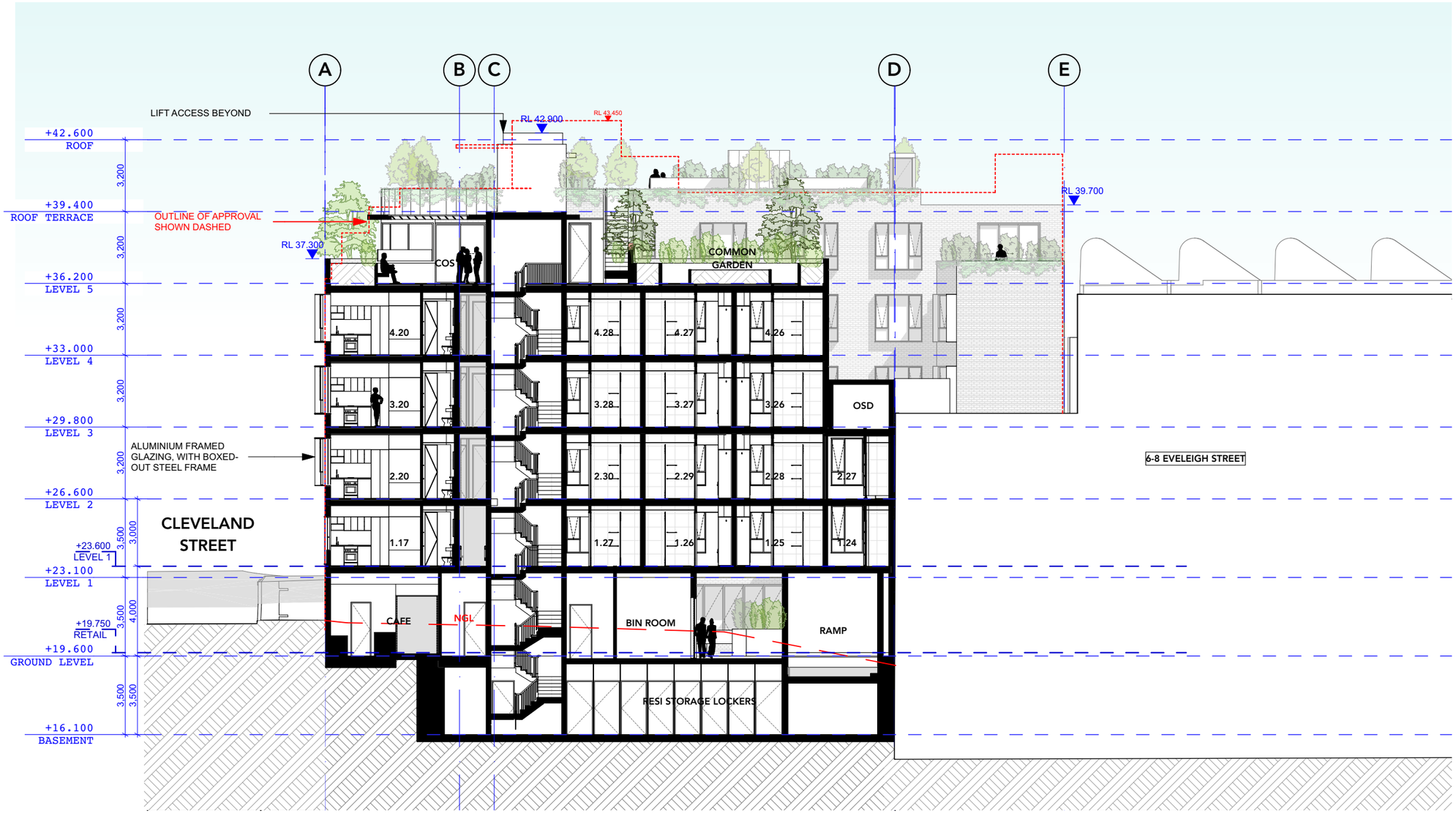

1 SECTION C
1:200

MARK SHAPIRO ARCHITECTS

T 0421 996 467
W markshapiro.com.au
E mark@markshapiro.com.au
NSW REG. 9789
ABN 646 2000 7678

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HOT WATER: CENTRAL GAS
LIFTS: GEARLESS TRACTION WITH VVVF MOTOR
LIGHTING
REFER BASIX COMMITTMENTS
WATER
SHOWERHEADS: 4 STAR
TOILETS: 4 STAR
BATHROOM TAPS: 4 STAR
KITCHEN TAPS: 4 STAR

THERMAL COMFORT OPTIONS
INSULATION: REFER SECTION J
GLAZING TYPE: REFER SECTION J

CLIENT:
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Level 21, Governor Phillip Tower,
1 Farrer Place, Sydney, 2000

PROJECT:
PROPOSED CO-LIVING DEVELOPMENT
175-177 CLEVELAND STREET, REDFERN

DRAWING:
SECTION C

PROJECT NO:
20008

PLOTTED: 1/3/21

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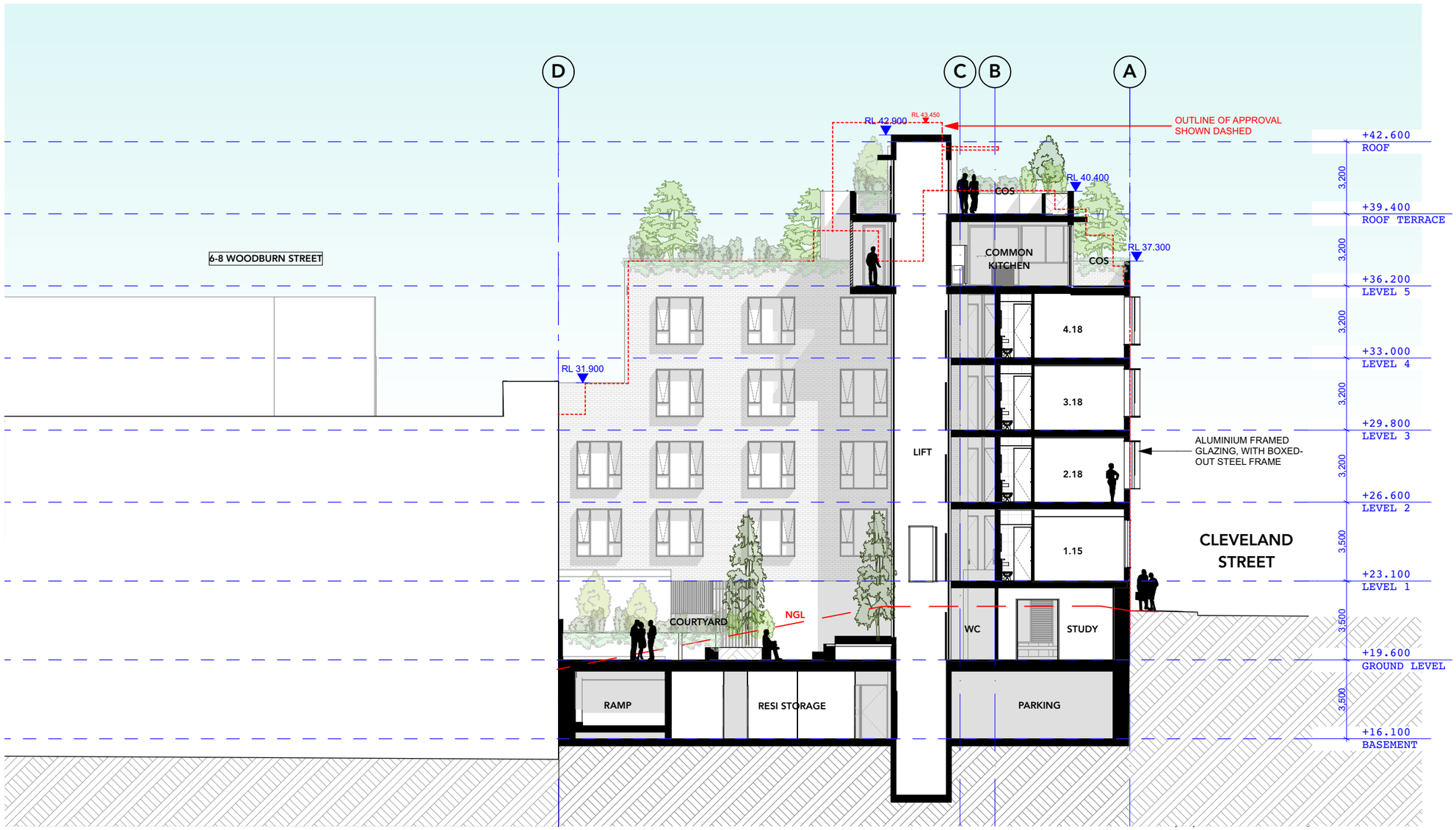

1 SECTION D
1:200

MARK SHAPIRO ARCHITECTS
T 0421 996 467
W markshapiro.com.au
E mark@markshapiro.com.au
NSW REG. 9789
ABN 646 2000 7678

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SHOWERHEADS: 4 STAR
TOILETS: 4 STAR
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KITCHEN TAPS: 4 STAR
THERMAL COMFORT OPTIONS
INSULATION: REFER SECTION J
GLAZING TYPE: REFER SECTION J

CLIENT:
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Level 21, Governor Phillip Tower,
1 Farrer Place, Sydney, 2000

PROJECT:
PROPOSED CO-LIVING DEVELOPMENT
175-177 CLEVELAND STREET, REDFERN

DRAWING:
SECTION D

PROJECT NO:
20008

PLOTTED: 1/3/21

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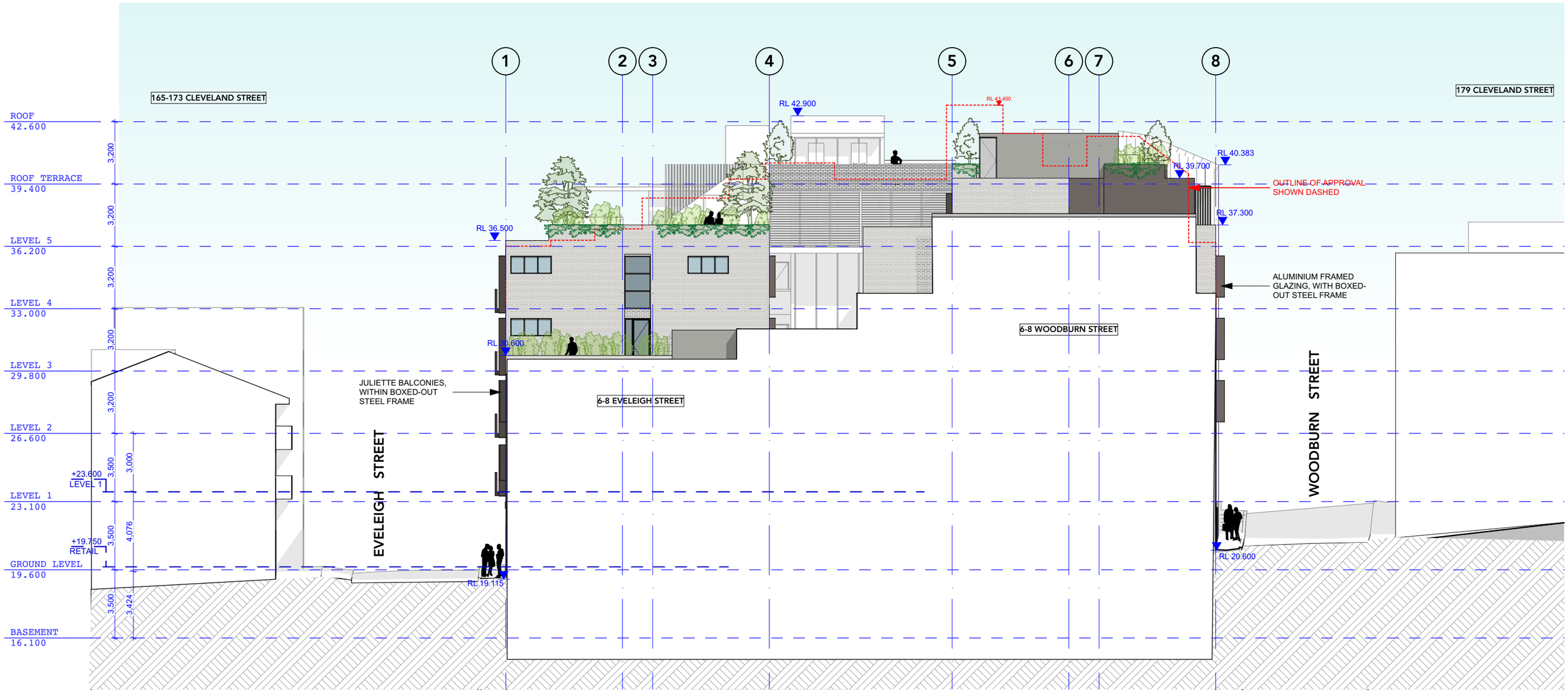

1 SOUTH ELEVATION
1:200

MARK SHAPIRO ARCHITECTS
T 0421 996 467
W markshapiro.com.au
E mark@markshapiro.com.au
NSW REG. 9789
ABN 646 2000 7678

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THERMAL COMFORT OPTIONS
INSULATION: REFER SECTION J
GLAZING TYPE: REFER SECTION J

CLIENT:
EG Funds Management
Level 21, Governor Phillip Tower,
1 Farrer Place, Sydney, 2000

PROJECT:
PROPOSED CO-LIVING DEVELOPMENT
175-177 CLEVELAND STREET, REDFERN

DRAWING:
SOUTH ELEVATION

PROJECT NO:
20008
PLOTTED: 1/3/21

DRAWING NO: **DA2402**
REV: **A**

FILE: 20008 175-177 Cleveland Street, Redfern DA 200210.pln

PLATINUM PROPERTY ADVISORS PTY LTD

DETAILED SITE INVESTIGATION REPORT
PROPOSED MIXED USE DEVELOPMENT
1-5 WOODBURN STREET, REDFERN

Report E22434 AA
18 September 2015

Environmental Investigations Australia
Contamination | Remediation | Geotechnical

REPORT DISTRIBUTION

Detailed Site Investigation Report
Proposed Mixed Use Development
1-5 Woodburn Street, Redfern

EI Report No.: E22434 AA
Date: 18 September 2015

Copies		Recipient
1	Soft Copy (PDF – Secured, issued by email)	Platinum Property Advisors Pty Ltd 42-48 The Promenade, King Street Wharf, Sydney NSW
	Original (Saved to Digital Archives)	Environmental Investigations Suite 6.01, 55 Miller Street, PYRMONT NSW 2009

Author	Technical Reviewer
	
JESSIE SIXSMITH Environmental Scientist	MALCOLM DALE Snr Principal / Environmental Scientist

Revision	Details	Date	Amended By
0	Original	18 September 2015	

EXECUTIVE SUMMARY

Background

Platinum Property Advisors Pty Ltd engaged Environmental Investigations Australia Pty Ltd (EI) to conduct a Detailed Site Investigation Report (Stage 2 DSI) for the former industrial property located at 1-5 Woodburn Street, Redfern ('the site'). This environmental assessment was completed as part of a development application process through City of Sydney Council to allow site development for the construction of a mixed use eight-storey building over a two-level basement car park. The proposed development will include the adjacent properties located immediately north (177 Cleveland Street) and immediately west (175 Cleveland Street).

Objectives

The main objectives of the assessment were to:

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

Findings

The work was conducted with reference to the regulatory framework outlined in Section 1.3 of this report and assessment findings indicated the following:

- The site comprises a rectangular shaped block bound by a vacant lot followed by Cleveland Street (north), commercial buildings followed by Eveleigh Street (west), commercial and residential buildings (south) and Woodburn street followed by commercial and residential buildings (east). Current site buildings include a large, two-storey commercial building occupying the entire are of the site;
- A review of historical aerial photographs and land title records identified the site was used for commercial purposes since at least the 1930s. The current site building has been present on site, with minimal changes since at least the 1930s. From 22 July 1959 until 18 February, 1983 the property was leased to Superfine Printing Co. Pty Limited.
- Records made available by City of Sydney Council identified two applications for the installation of mechanical ventilation at the site. Based on the available information, the use of this ventilation system is currently unknown;
- The site was free of statutory notices issued by the NSW EPA/DECC. Surrounding properties identified during this search were considered a low risk of off-site contamination sources due to their proximity to the site (>500m) and being hydraulically across-gradient / down-gradient;
- A search carried out by WorkCover NSW Authority did not locate any records relating to historical storage of dangerous goods on-site;
- Soil sampling and analysis were conducted at five test bore locations (BH1M, BH2 – BH5) down to a maximum depth of 8.0 m bgl. Sampling regime was considered to be appropriate for investigation purposes and comprised a broad grid sampling pattern, with allowance for structural obstacles (e.g. building walls, underground and overhanging services and other physical obstructions);

- The sub-surface layers comprised of fill materials of various constituents, comprising dark brown to grey gravelly sands, underlain by residual clays and the Ashfield Shale at depth (approximately 5.0 m bgl in BH1M);
- Groundwater was encountered at a depth of approximately 7. 3 m bgl (BH1M);
- Multiple level soil sampling was undertaken within fill and natural soils (where achieved). Exceedances of the adopted criteria were detected within soil and fill samples for the following;
  - Heavy metal concentrations for lead were reported at concentrations exceeding the HIL-B criteria in exceedances above the HIL-B criteria for BH2_0.7-0.8 (1,400 mg/kg), BH3_0.1-0.2 (1,800 mg/kg) and BH5_0.1-0.2 (1,300 mg/kg) collected within fill material. Due to hand auger refusal, the underlying natural soil could not be sampled and therefore no vertical delineation could be achieved;
  - Carcinogenic PAH's (BaP TEQ) concentrations were detected above the HIL-B criteria in samples BH2_0.7-0.8 (7.4 mg/kg), BH3_0.1-0.2 (14 mg/kg) and BH3_0.5-0.6 (9.6 mg/kg). Vertical delineation within the underlying natural soils was not achieved due to hand auger refusal in fill material;
  - Organochloride pesticides for aldrin and dieldrin in BH5_0.1-0.2 for (18.7 mg/kg). Due to hand auger refusal in fill material, vertical delineation within the underlying natural soil material could not be achieved;
- As the on-site groundwater conditions have not been characterised, the risk associated with groundwater contamination is currently unknown, EI recommend further investigation to characterise on-site groundwater conditions. This investigation can be undertaken during the remediation of soils on site; and
- On review of the Conceptual Site Model (CSM) developed as part of this ESA, it was concluded that the model remains valid for the proposed development. However, the following data gaps require closure by further investigations (also described in Section 10) :
  - An assessment of onsite groundwater quality with regard to potential onsite contamination sources;
  - Further characterisation of soil material on site, including deeper sampling of fill and natural soils to close current data gaps, adequately characterise onsite soils and to vertically delineate contamination. It is recommend that these works be performed once unrestricted internal access to building structures is available; and
  - The potential presence of hazardous building materials contained within the structure and on painted surfaces of the existing buildings.

Conclusions and Recommendations

Based on the findings of this report and with consideration of the Statement of Limitations (Section 13), EI conclude that contamination was identified at the site during this DSI. Concentrations exceeding human health based SILs were identified in surface fill material across the site. The contamination can be remediated in accordance with SEPP 55 to allow the site to be used for residential/commercial purposes as outlined in the proposed development plans. The following recommendations should be implemented:

1 Conduct a Hazardous Materials Survey (HMS) on structures present at the site. EI recommend that a HMS is conducted prior to demolition of site structures.

2 Undertake an additional intrusive investigation to further delineate the extent of the contamination identified within the soils on site, once the site becomes readily accessible (i.e. following demolition of site structures). This investigation will also involve the sampling of the on-site groundwater monitoring well (BH1M) to characterise the on-site groundwater conditions and the associated risks at the site.

3 Preparation and implementation of a Remediation Action Plan (RAP) to outline the remediation of the HIL-B exceedances identified during this DSI and any additional contamination identified during the additional investigation, including groundwater (if necessary). The RAP should also develop further soil and groundwater investigations to close/clarify any data gaps identified during this investigation.

4 Any material being removed from site (including virgin excavated natural materials or VENM) be classified for off-site disposal in accordance the DECCW (2009) Waste Classification Guidelines.

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

6 Validate that the excavated areas are left free of contamination by comparing analytical results for excavation surfaces and any backfill material, against the respective DECC/EPA thresholds.

7 Preparation of a final site validation report by a qualified environmental consultant, certifying site suitability for the proposed development.

CONTENTS

TABLES (In Text)

TABLES

FIGURES

APPENDICES

1 INTRODUCTION

1.1 BACKGROUND AND PURPOSE

Platinum Property Advisors Pty Ltd engaged Environmental Investigations Australia Pty Ltd (EI) to conduct a Detailed Site Investigation Report (DSI) for site characterisation purposes for the property located at 1-5 Woodburn Street, Redfern ('the site').

As shown in Figure 1, the site is currently a vacant two storey commercial building and is located approximately 2km south of the Sydney central business district, comprising Lots 3 & 4 Section 2 DP977379 and Lot 5 DP68798. The site is situated within the Local Government Area of City of Sydney and site covers a total area of approximately 420 m^2 as depicted in the site plan presented as Figure 2.

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

1.2 PROPOSED DEVELOPMENT

JPR Architects Pty Ltd (JPR) supplied EI with pre-DA concept drawings:

- Basement Level 02 to Level 07 Loft, Project No. 2014067, Drawing No. SK02 to SK09, Revision A, dated 8 October 2014; and
- Section A and Section B, Project No. 2014067, Drawing No. SK11 and SK12, Revision A, dated 29 September 2014.

Based on the drawings provided, EI understands that the proposed development will include the adjacent properties located immediately north (177 Cleveland Street) and immediately west (175 Cleveland Street). The development will involve the construction of an eight-storey building over a two-level basement car park. Commercial/ retail land use will occupy the ground floor level, with residential apartments above. Basement excavation will involve the excavation of sub-surface material across the entire area of the site, to a depth to approximately 9.0 m below existing ground level (m bgl). Development Plans are provided in Appendix A.

1.3 REGULATORY FRAMEWORK

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

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

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

1.4 PROJECT OBJECTIVES

In accordance with the Concept Approval the proponent is required to undertake a detailed contamination assessment for any future development applications. The primary objectives of this investigation were therefore to:

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

1.5 SCOPE OF WORKS

In order to achieve the above objectives and in keeping the project cost-effective while generally complying with the OEH (2011) guidelines for consultants reporting on contaminated sites, the scope of works was as follows:

1.5.1 Desktop Study

- A review of relevant topographical, geological, hydrogeological and soil landscape maps for the project area;
- Search of historical aerial photographs archived at NSW Land and Property Information to review previous site use and the historical sequence of land development in the neighbouring area;
- A land titles search, also conducted through NSW Land and Property Information for information relating to historical ownership of the site;
- A search of City of Sydney records for information relating to operational site history and/or relevant environmental incidents;
- A search of NSW EPA Land Information records under the Contaminated Land Management Act (1997) and Protection of the Environment Operations Act (1997);
- A search of the Stored Chemical Information Database (SCID) and microfiche records held by WorkCover NSW relating to possible underground tank approvals and locations; and
- A review of existing underground services on site.

1.5.2 Field Work & Laboratory Analysis

- A detailed site walkover inspection;
- Drilling of boreholes at five locations (BH1M and BH2 to BH5) across accessible areas of the site, in accordance with the minimum sampling protocol recommended under EPA (1995);
- Installation of one groundwater monitoring well to a maximum depth of 6m (or prior refusal), constructed to standard environmental protocols to investigate potential groundwater contamination;

- Multiple level soil sampling within fill and natural soils and one round of groundwater sampling from the constructed groundwater monitoring well; and
- Laboratory analysis of selected soil and groundwater samples for relevant analytical parameters as determined from the site history survey and field observations during the investigation programme.

1.5.3 Data Analysis and Reporting

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

2 SITE DESCRIPTION

2.1 PROPERTY IDENTIFICATION, LOCATION AND PHYSICAL SETTING

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

Table 2-1 Site Identification, Location and Zoning

Attribute	Description
Street Address	1-5 Woodburn Street, Redfern
Location Description	The site is located approximately 2 km south of the Sydney CBD, a rectangular shaped block bound by a vacant lot followed by Cleveland Street (north), commercial buildings followed by Eveleigh Street (west), commercial and residential buildings (south) and Woodburn street followed by commercial and residential buildings (east). Northeast corner of site: GDA94-MGA55 Easting: 888552.006, Northing: 6242191.854 (Source: http://maps.six.nsw.gov.au)
Site Area	The site covers an area of approximately 430 m^2 (Source: http://maps.six.nsw.gov.au).
Site Owner	Platinum Property Advisors Pty Ltd
Lot and Deposited Plan (DP)	Lots 3 & 4 Section 2 DP977379 and Lot 5 DP68798
State Survey Marks	Two State Survey Marks (SSM) are situated in close proximity to the site: SS176731 and SS25335D both located on the corner of Regent Street and Cleveland Street (Source: http://maps.six.nsw.gov.au).
Local Government Authority	City of Sydney
Parish	Alexandria
County	Cumberland County
Current Zoning	MD – SEPP Major Development 2005 (City of Sydney Local Environment Plan, 2012)
Current Land Uses	Vacant two-storey commercial building

At the time of this assessment the site was occupied by a vacant, large, two-storey commercial building occupying the entire are of the site. The assessment area is illustrated in Figure 2.

2.2 SURROUNDING LAND USE

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

Table 2-2 Surrounding Land Uses

Direction Relative to Site	Land Use Description
North	Vacant sealed car park followed by Cleveland Street and commercial / residential buildings
South	High density residential apartments.
East	Woodburn Street followed by commercial / residential and a NSW railway corridor.
West	Commercial buildings followed by Eveleigh Street.

Chippendale Childcare Centre is located approximately 440 m north west of the site, Redfern Occasional Childcare centre is located approximately 440 m south east of the site.

2.3 REGIONAL SETTING

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

Table 2-3 Regional Setting Information

Attribute	Description
Topography	The site has a gradual decline towards the south from approximate RL 22.2m AHD at the northern corner, to approximate RL 20.92m AHD at the southern corner (Ref. Project Surveyors drawing no. B1753 Rev B. dated 15.10.15).
Site Drainage	Consistent with the general slope of the site, stormwater is assumed to flow south west into drainage systems which flow in a northerly direction towards Blackwattle Bay.
Regional Geology	With reference to the 1:100 000 scale Geological Series Sheet 9130 (Sydney) indicates the site likely to be underlain by the Ashfield Shale, which is characterised by black to dark grey shale and laminite. A Quaternary alluvial deposit (Qha) is located in close proximity (north) to the site which is consists of silty to peaty quartz sand, silt and clay. Ferruginous and humic cementation in places and common shell layers. Outcrops of Quaternary aged Aeolian Sands (Botany Sands) are mapped approximately 90 m to the south-east of the site. Recent investigations in the area have indicated Aeolian Sands are present 50m to the south on Eveleigh Street. An infilled paleo channel (man-made fill over alluvial soils) is present approximately 75 m to the north.

Attribute	Description
Soil Landscapes	The Soil Conservation Service of NSW Sydney 1:100,000 Soil Landscapes Series Sheet 9130 (2nd Edition) indicates that the residual landscape of the region of the site comprises the Blacktown Landscape. Soils are generally shallow to moderately deep (<100 cm) red and brown podzolic soils on crests, upper slopes and well-drained areas, and deep (150-300 cm) yellow podzolic soils and soloths on lower slopes and in areas of poor drainage. Land use is dominantly intensive residential and light and heavy industry. Soil Limitations include moderately reactive highly plastic subsoil, low soil fertility, and poor soil drainage.
Acid Sulphate Soil Risk	With reference to the Botany Bay Acid Sulfate Soil Risk Map (1:25,000 scale; Murphy, 1997), the subject land lies within the map class description of No Known Occurrence. In such cases, acid sulphate soils (ASS) are not known or expected to occur and "land management activities are not likely to be affected by ASS materials". Some ASS is likely to be present along the foreshores of Shepherds Bay, but the development does not extend to this area. In accordance with the Sydney Local Environmental Plan 2012 Acid Sulfate Soils Map – Sheet ASS_009, the site does not fall within any category of Acid Sulfate Soils (ASS). For an unclassified site, works do not require development consent from council regarding ASS.
Depth to Groundwater	Onsite groundwater conditions, including groundwater flow direction, are discussed in Section 8.2.
Nearest Surface Water Feature	Blackwattle Bay, which is located approximately 1.8 km north west of the site. Blackwattle Bay is understood to be a marine water system for impact assessment purposes.
Groundwater Flow Direction	Consistent with the general slope of the site, groundwater flow direction in the vicinity of the site is inferred to be towards Alexandra Canal located approximately 2.4km south of the site.

2.4 GROUNDWATER BORE RECORDS AND LOCAL GROUNDWATER USE

An online search of registered groundwater bores was conducted by EI on the 4th of September 2015 through the NSW Office of Water (Ref. http:// realtimedata.water.nsw.gov.au/water.stm). There were forty three (43) registered monitoring bore located within 500 km of the site. No standing water level data for the monitoring bores was recorded within the database.

EI undertook a geotechnical investigation on the adjacent properties associated with this development (175 Cleveland Street, Redfern), which identified groundwater to be at depths ranging from 2.40 to 4.23 m bgl (EI ref. E22434 GA, dated 18 March, 2015).

2.5 SITE WALKOVER INSPECTION

EI staff made a number of observations during a detailed site inspection on 3 September 2015. A detailed photo log is provided in Appendix B, with the recorded observations summarised below:

- The site is currently occupied by a two-storey concrete and steel building in average condition, occupying the entire area of the site (Photo 1);
- The site slopes towards the south, with storm water discharging into the local storm water system;
- The site buildings are currently disused, with the building interiors consisting of a large open area on the ground floor and offices occupying on the top floor (Photo 2);
- A hoist system is present which was previously used to lift equipment onto the top floor through an opening (Photo 3 and Photo 4);
- Site pavements were in average condition;
- Visible stains associated with previous printing activities (i.e. ink or oil) were evident in places across the concreted floor and walls on the ground level (Photo 5 and Photo 6);
- A small outdoor area was present in the south west corner of the site, which contained various waste materials (Photo 7);
- No vegetation was present at the site;
- No obvious odours were observed in any part of the site; and
- No evidence indicative of underground petroleum storage systems (UPSS) was observed on site.

3 PREVIOUS INVESTIGATIONS

To the best of EI's knowledge the site has not been subject to any previous environmental investigations.

4 SUMMARY OF SITE HISTORY AND SEARCHES

4.1 SITE LAND TITLES INFORMATION / HISTORIC AERIAL REVIEW

A historical land titles search was conducted through Legal Liaison Pty Ltd. Copies of relevant documents resulting from this search are presented in Appendix C. A summary of all the previous and current registered proprietors along with information obtained from the available historical aerial photographs, in relation to past potential land uses are presented in Table 4-1. The historical aerial photographs reviewed as part of this DSI included:

- 1930: February 1930, Run 16, Map 3428 B/W – Commonwealth Australia Crown
- 1943: Sydney 1943 Imagery (source : http://maps.six.nsw.gov.au/)
- 1951: May 1951, Run 14, Map 467 – 47 B/W – Lands Photo
- 1961: Run 36E Map 1042 B/W, Lands photo, Cumberland 1961 series – Department of Lands NSW 5011
- 1986 : 02 August 1986, Run 23E, Map 127 – Department of Lands NSW 3527
- 1994: October 1994, Run 11, Map 153-164 – Land and Property Information NSW 4244
- 2002: 16 March 2002, Run 11, Map 97-109 – Department of Lands NSW 4724

Table 4-1 Summary of Owners and Historical Aerial Photography

Date of Acquisition and term held	Ownership Summary	Site description based on historical aerial photographs	Potential Land Uses
As regards Lots 3 & 4 Section 2 D.P. 977379			
06.09.1912 (1912 to 1936)	Emily Jane Cary (Married Woman) (& Her Deceased Estate)	1930: Both lots are occupied by a large, commercial-type building which covers the entire area of the site.	Commercial
20.02.1936 (1936 to 1938)	Perpetual Trustee Company (Limited) Euroma May Cary (Widow) Lilian Emily Croll (Feme Sole)	-	Commercial
24.07.1938 (1938 to 1938)	Albert Wilson (Engineer)	-	Commercial
05.08.1938 (1938 to 1981)	A.Wilson Pty Limited	1943: The site structures appear predominantly unchanged from the 1930 aerial photograph. It is evident that the structures are the existing buildings currently on site. 1951: The site appears predominantly unchanged from the 1943 aerial photograph. 1961: The site appears predominantly unchanged from the 1951 aerial photograph.	Commercial

Date of Acquisition and term held	Ownership Summary	Site description based on historical aerial photographs	Potential Land Uses
30.06.1981 (1981 to 1992)	Albert Bowman Wilson (Grazier)	1986: The site appears predominantly unchanged from the 1961 aerial photograph.	Commercial
03.06.1992 (1992 to date)	# Laumark Pty Limited	1994: The site appears predominantly unchanged from the 1986 aerial photograph. 2002: The site appears predominantly unchanged from the 1994 aerial photograph.	Commercial
Easements: - NIL Leases: • 22.06.1959 to Superfine Printing Co. Pty Limited (Book 2561 No. 886) – expired 15.09.1964 • 16.07.1964 to Superfine Printing Co. Pty Limited (Book 2712 No. 167) – expired 16.09.1964 • 01.08.1974 to Superfine Printing Co. Pty Limited (Book 3166 No. 394) – expired 18.02.1983			
As regards Lot 5 D.P. 68798			
21.04.1914 (1914 to 1936)	Emily Jane Cary (Married Woman) (& Her Deceased Estate)	1930: The lot is occupied by a large, commercial-type building which covers the entire area of the site.	Commercial
20.02.1936 (1936 to 1938)	Perpetual Trustee Company (Limited) Euroma May Cary (Widow) Lilian Emily Croll (Feme Sole)	-	Commercial
24.07.1938 (1938 to 1938)	Albert Wilson (Engineer)	-	Commercial
05.08.1938 (1938 to 1981)	A.Wilson Pty Limited	1943: The site structures appear predominantly unchanged from the 1930 aerial photograph. It is evident that the structures are the existing buildings currently on site. 1951: The site appears predominantly unchanged from the 1943 aerial photograph. 1961: The site appears predominantly unchanged from the 1951 aerial photograph.	Commercial
30.06.1981 (1981 to 1992)	Albert Bowman Wilson (Grazier)	1986: The site appears predominantly unchanged from the 1961 aerial photograph.	Commercial

Date of Acquisition and term held	Ownership Summary	Site description based on historical aerial photographs	Potential Land Uses
19.06.1992 (1992 to date)	# Laumark Pty Limited	1994: The site appears predominantly unchanged from the 1986 aerial photograph. 2002: The site appears predominantly unchanged from the 1994 aerial photograph.	Commercial
Easements: - NIL Leases: • 22.06.1959 to Superfine Printing Co. Pty Limited – expired 15.09.1964 • 16.07.1964 to Superfine Printing Co. Pty Limited – expired 16.09.1964 • 06.08.1969 to Superfine Printing Co. Pty Limited – expired 25.09.1974 • 01.08.1974 to Superfine Printing Co. Pty Limited – expired 18.02.1983			

Overall, the allotment known as 1-5 Woodburn Street, Redfern appears to have been used for commercial land uses since at least the 1930s. The current site building has been present on site, with minimal changes since at least the 1930s. From 22 July 1959 until 18 February, 1983 the property has been leased to Superfine Printing Co. Pty Limited.

4.2 Surrounding Lands Historical Aerial Photography Review

As part of the Site Land Titles Information / Historic Aerial Review, an assessment of surrounding land uses using historical aerial photographs sourced from NSW Land and Property Information was carried out. A summary of the pertinent information identified at surrounding land parcels from the reviewed photographs is presented in Table 4-2.

Table 4-2 Summary of Aerial Photograph Review

Aerial Photograph	Surrounding land uses based on historical aerial photographs
February 1930 Run 16, Map 3428 B/W Commonwealth Australia Crown	Land use to the south east and east appears primarily residential with small commercial-type buildings scatted around the area. The land use to the north is dominantly commercial. A railway corridor running north east to south west is present in close proximity and on the eastern side of the site. Cleared land is present further to the east of the site.
1943 Sydney 1943 Imagery http://maps.six.nsw.gov.au/	Land remains primarily unchanged from previous aerial photograph.
May 1951 Run 14, Map 467 - 47 B/W Lands Photo	Land remains primarily unchanged from previous aerial photograph with the exception of an increase in the number of commercial type buildings north and south east of the site.

Aerial Photograph	Surrounding land uses based on historical aerial photographs
1961 Run 36E Map 1042 B/W Lands photo, Cumberland 1961 series NSW 5011	Land remains primarily unchanged from previous aerial photograph.
2 August 1986 Run 23E, Map 127 Department of Lands NSW 3527 Colour imagery 1:16,000 Scale	Land remains primarily unchanged from previous aerial photograph.
October 1994 Run 11, Map 153-164 Land and Property Information NSW 4244 Colour imagery 1:12,000 Scale	Surrounding land use appears remain primarily unchanged from the previous aerial photograph, with the exception of an increase in the number of residential / commercial high-rise buildings predominantly to the north of the site.
16 March 2002 Run 11, Map 97-109 Department of Lands NSW 4724 Colour imagery 1:25,000 Scale	Land remains primarily unchanged from previous aerial photograph.

4.3 COUNCIL INFORMATION

A search of site history records held by Sydney City Council (SCC) in relation to the site was initiated on 26 August 2015. The inspected records were found to date back to 1948 and a summary of relevant documents reviewed (i.e. development applications, letters of reference/complaints) is presented in Table 4-3.

Table 4-3 Summary of Historical Records Archived at Sydney City Council

Period / Year	Series (Council Ref)	Description
1962	2772/1962	Application for the installation of mechanical ventilation Applicant: Planet Ventilations Pty Ltd Submitted: 20.11.62 Status: Granted 13.12.62
1963	140/1963	Application for the installation of mechanical ventilation Applicant Planet Ventilations Pty Ltd Submitted: 24.1.63 Approved: 14.02.63

In summary, records made available by City of Sydney Council included two applications for the installation of mechanical ventilation at the site. Based on the available information, the use of this ventilation system is currently unknown;

4.4 WorkCover NSW Authority Search

A search by WorkCover NSW Authority records relating to the site was requested on 26 August 2015 by EI. The search did not locate any records relating to historical storage of dangerous goods onsite. A copy is provided in Appendix D.

4.5 Hazardous Chemicals and Regulatory Compliance

Contaminated Land – Record of EPA Notices Section 58 of CLM Act

An on-line search of the Contaminated Land – Record of EPA Notices, maintained by the NSW OEH, was conducted on 10 September 2015. This search confirmed that the NSW OEH has no regulatory involvement under Section 58 of the Contaminated Land Management Act 1997 in relation to the site or surrounding area. 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. The following nearby sites were identified on the register:

- 887-893 Bourke Street, Waterloo – Jeffman Pty Ltd and Lawrence Dry Cleaners Pty Ltd issued with two current amendment or repeal of Order or Notice (20154405 and 20144422), current Management Order (20111403), current Declaration of Remediation Site (21084), current Agreed Voluntary Investigation Proposal (19024), declaration of investigation area (15026), former Management Order (20101404) and former Agreed Voluntary Remediation Proposal (26112). This property is located approximately 1.5 km south east of the site and hydraulically across-gradient;
- Burren Street, Eveleigh – Rail Corp issued with two former Agreed Voluntary Investigation Proposals (19013 and 19009). This property is located approximately 1.6 km south west of the site and hydraulically across-gradient.

Due to the proximity of the above properties to the site (>500m) and hydraulically across-gradient, EI considers the risk of off-site contamination migration (if present) to be low.

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

A search through the List of NSW Contaminated Sites notified to the EPA under Section 60 of the CLM Act 2008 was also conducted on 10 September 2015. This list is maintained by NSW EPA and includes properties on which contamination has been identified. Not all notified land is deemed to be impacted significantly enough to warrant regulation by the EPA. The site has not been notified as contaminated to the EPA. The following nearby sites were identified on the register:

- 101a Marriott Street, Redfern – former printing works regulation under the CLM Act not required, located 1.2 km south east of the site and hydraulically across-gradient;
- 116 Regent Street, Redfern – BP Service Station currently underassessment, located 530 m south and hydraulically down-gradient from the site;
- 387-429 Wattle Street – Shell Coles Express Service Station currently underassessment, located 950 m north west and hydraulically across-gradient from the site.

Due to the proximity of the above properties to the site (>500m) and hydraulically across-gradient / down-gradient, EI considers the risk of off-site contamination migration (if present) to be low.

Protection of the Environment Operations Act public register

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

5 CONCEPTUAL SITE MODEL

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

5.1 CHEMICAL HAZARDS AND CONTAMINATION SOURCES

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

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

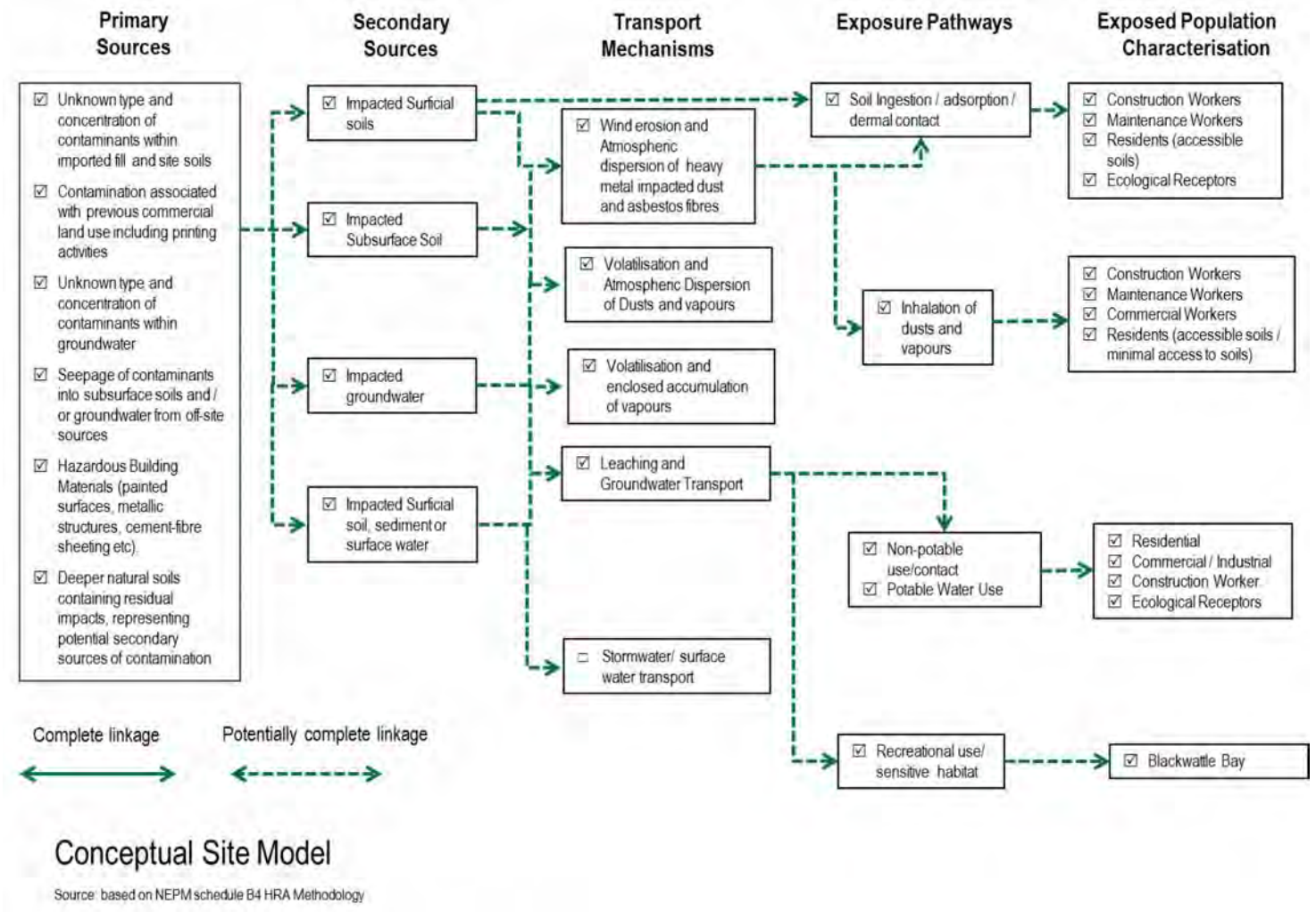
Based on the findings of the site contamination appraisal the chemicals of concern (COC) at the site are considered to be:

- Soil – heavy metals (HMs), TPH, PAH, the monocyclic aromatic hydrocarbon compounds benzene, toluene, ethylbenzene and xylenes (BTEX), organochlorine and organophosphate pesticides (OCP/ OPP), polychlorinated biphenyls (PCB) and asbestos.
- Groundwater – HMs, TPH, BTEX, PAH and volatile organic compounds (VOC), including chlorinated VOC (VOCC) such as trichloroethylene (TCE).

5.2 POTENTIAL SOURCES, EXPOSURE PATHWAYS AND RECEPTORS

Potential contamination sources, exposure pathways and human and environmental receptors that were considered relevant for this assessment are summarised along with a qualitative assessment of the potential risks posed by complete exposure pathways in Table 5-1.

Table 5-1 Preliminary Conceptual Site Model



Conceptual Site Model

Source: based on NEPM schedule B4 HRA Methodology

5.3 DATA GAPS

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

6 SAMPLING, ANALYTICAL AND QUALITY PLAN (SAQP)

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

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

6.1 DATA QUALITY OBJECTIVES (DQO)

In accordance with the USEPA (2006) Data Quality Assessment and the DEC (2006) Guidelines for the NSW Site Auditor Scheme, the process of developing Data Quality Objectives (DQO) was used by the EI assessment team to determine the appropriate level of data quality needed for the specific data requirements of the project. The DQO process that was applied for this assessment is documented in Table 6-1.

Table 6-1 Summary of Project Data Quality Objectives

DQO Steps (NSW DEC, 2006)	US EPA (2006) (modified)	Details	Comments (changes during investigation)
1. State the Problem Summarise the contamination problem that will require new environmental data, and identify the resources available to resolve the problem; develop a conceptual site model	Give a concise description of the problem Develop a conceptual model of the environmental hazard to be investigated. Identify resources available.	The site is to be developed for mixed land use including construction of an eight-storey building over a two-level basement car park. Commercial/ retail land use will occupy the ground floor level, with residential apartments above. Historical information and previous investigation results indicate the potential for contamination to be present on site within soil and/or groundwater from various potential sources, as detailed in Section 5.1: Based on this there is the potential for the site to be impacted by chemicals to an extent that soil and groundwater are unsuitable for redevelopment in its current state. The Conceptual Site Model is provided in Section 5	
2. Identify the Goal of the Study (Identify the decisions) Identify the decisions that need to be made on the contamination problem and the new environmental data required to make them	Identify principal study question(s). Consider alternative outcomes or actions that may result from answering the question(s). For decision problems, develop decision statement(s), organise multiple decisions. For estimation problems, state what needs to be estimated and key assumptions.	Based on the objectives outlined in Section 1.4, the decisions that need to be made are 1. Has the nature, extent and source of any soil, vapour and/or groundwater impacts onsite been defined? 2. What impact do the site specific, geologic and hydrogeological conditions have on the fate and transport of any impacts that may be identified? 3. Does the level of impact coupled with the fate and transport of identified contaminants represent an unacceptable risk to identified human and/or environmental receptors on or offsite? Does the collected data provide sufficient information to allow the selection and design of an appropriate remedial strategy, if necessary?	

DQO Steps (NSW DEC, 2006)	US EPA (2006) (modified)	Details	Comments (changes during investigation)
3. Identify Information Inputs (Identify inputs to decision) Identify the information needed to support any decision and specify which inputs require new environmental measurements	Identify types and sources of information needed to resolve decisions or produce estimates. Identify the basis of information that will guide or support choices to be made in later steps of the DQO Process. Select appropriate sampling and analysis methods for generating the information.	Inputs to the decision making process include: • Aerial photographs, historical Land Title records, WorkCover hazardous chemical storage records, proposed development plans, Council requirements as stipulated in Development Consent letters; • Areas of concern identified during the site inspection prior to intrusive investigations; and • Defining the basis for any decisions that are to be made from field screening measurements; and • Soil samples obtained from an intrusive investigation locations, and to depths deemed appropriate for detailed investigation purposes (or prior auger refusal).	Due to building height restrictions for hydraulic drilling rig, four of the five boreholes were drilled using hand auger. Four test bores did not achieve the planned investigation depth (natural soil material) due to buried impenetrable fill material which resulted in hand auger refusal.
4. Define the Boundaries of the Study Specify the spatial and temporal aspects of the environmental media that the data must represent to support decision	Define the target land-use and receptors of interest and its relevant spatial boundaries. Define what constitutes a sampling unit. Specify temporal boundaries and other practical constraints associated with sample/data collection. Specify the smallest unit on which decisions or estimates will be made.	Lateral – the lot is bound by Cleveland Street (north), high density residential (south), Woodburn Street followed by commercial/ residential and a NSW railway corridor (east) and commercial buildings followed by Eveleigh Street (west). Vertical – from the existing ground level to the base of the proposed excavations – approximately 9.0 m bgl. Temporal – The results were valid on the day the samples were collected and will remain valid as long as no changes occur on site or contamination (if present) does not migrate on site.	
5. Develop the Analytic Approach (Develop a decision rule) To define the parameter of interest, specify the action level, and integrate previous DQO outputs into a single statement that describes a logical basis for choosing from alternative actions	Specify appropriate land-use parameters for making decisions or estimates. For decision problems, choose a workable Action Level and generate an “If then else” decision rule which involves it. For estimation problems, specify the methodology and the estimation procedure.	The decision rules for the investigation were: • If the concentrations of contaminants in the soils data exceed the land use criteria; then assess the need to further investigate the extent of impacts onsite; and • Decision criteria for QA/QC measures are defined by the Data Quality Indicators (DQI) in Table 6-2.	

DQO Steps (NSW DEC, 2006)	US EPA (2006) (modified)	Details	Comments (changes during investigation)
6. Specify Performance or Acceptance Criteria (Specify limits on decision errors) Specify the decision-maker's acceptable limits on decision errors, which are used to establish performance goals for limiting uncertainties in the data	For decision problems, specify the decision rule as a statistical hypothesis test, examine consequences of making incorrect decisions from the test, and place acceptable limits on the likelihood of making decision errors. For estimation problems, specify acceptable limits on estimation uncertainty.	Specific limits for this project were in accordance with the appropriate guidance made by the NSW EPA, appropriate indicators of data quality and standard procedures for field sampling and handling. This should include the following points to quantify tolerable limits: • A decision can be made based on a probability that 95% Upper Confidence Limits (UCL) of the data will satisfy the given site criteria. Therefore a limit on the decision error will be 5% that a conclusive statement may be incorrect; • A decision can be made based on the probability that a contamination hotspot of a certain circular diameter will be detected with 95% confidence using a selected density of systematic data points. The decision error will be limited to a probability of 5% that a contamination hotspot may not be detected; and • If contaminant concentrations in groundwater exceed the adopted criteria, further investigation will be considered prudent. If no contamination is detected in groundwater, further action will not be warranted.	
7. Develop the Detailed Plan for Obtaining Data (Optimise the design for obtaining data) Identify the most resource-effective sampling and analysis design for general data that are expected to satisfy the DQOs	Compile all data and outputs generated in Steps 1 to 6. Use this information to identify alternative sampling designs that fit your intended use Select and document a design that will yield data to best achieve your data quality.	Written instructions will be issued to guide field personnel in the required fieldwork activities. Soil samples would be collected in the source zones identified in previous contamination assessments and further sampling and analysis would be undertaken to characterise the material for waste disposal. Validation sampling procedures that would be implemented to optimise data collection for achieving the DQOs.	

6.2 DATA QUALITY INDICATORS

To ensure that the investigation data collected was of an acceptable quality, the investigation data set was assessed against the data quality indicators (DQI) outlined in Table 6-2, which related to both field and laboratory-based procedures. The assessment of data quality is discussed in Section 8.

Table 6-2 Data Quality Indicators

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

7 ASSESSMENT METHODOLOGY

7.1 SAMPLING RATIONALE

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

- Sampling fill and natural soils from 5 test bore locations located systematically across the site using a grid-based sampling pattern to characterise in-situ soils;
- Sampling groundwater during a single groundwater monitoring event (GME) at one monitoring well located close to the down gradient site boundary to assess for potential groundwater impacts; and
- Laboratory analysis of representative soil and groundwater samples for the identified chemicals of concern.

7.2 INVESTIGATION CONSTRAINTS

The number of test bores drilled and monitoring wells installed during the investigation phase did not achieve the planned investigation scope described in Section 7.1 due to a number of physical obstructions, which comprised:

- Limited access to internal areas of the buildings;
- Limited head-clearance for the mechanical drilling rig; and
- Buried impenetrable materials (buried deep slabs and rock boulders), which caused auger refusal.

Due to drilling rig access restrictions, BH2 – BH5 were drilled using the manual auger method for soil sampling purposes.

7.3 ASSESSMENT CRITERIA

The assessment criteria proposed for this project are outlined in Table 7-1. These were selected from available published guidelines that are endorsed by national or state regulatory authorities, with due consideration of the exposure scenario that is expected for various parts of the site, the likely exposure pathways and the identified potential receptors.

Table 7-1 Adopted Investigation Levels for Soil and Groundwater

Environmental Media	Adopted Guidelines	Rationale
Soil	NEPM, 2013 Soil HILs, EILs, HSLs, ESLs & Management Limits for TPHs	Soil Health-based Investigation Levels (HILs) All samples to be assessed against the NEPM 2013 HIL-B thresholds for residential sites with gardens/accessible soils. Soil Health-based Screening Levels (HSLs) The NEPM 2013 Soil HSL-A&B thresholds for low-high density residential sites for vapour intrusion would be applied to assess for potential human health impacts from residual vapours resulting from petroleum, BTEX & naphthalene. Soils asbestos results to be assessed against the NEPM 2013 Soil HSL thresholds for "all forms of asbestos". Management Limits for Petroleum Hydrocarbons Should the ESLs and HSLs be exceeded for petroleum hydrocarbons, all soil samples would also assessed against the NEPM 2013 Management Limits for the TRH fractions F1 – F4 to assess propensity for phase-separated hydrocarbons (PSH), fire and explosive hazards & adverse effects on buried infrastructure.
Groundwater	NEPM, 2013 GILs for Marine Waters	Groundwater Investigation Levels (GILs) for Marine Water NEPM 2013 provides GILs for typical, slightly-moderately disturbed aquatic ecosystems, which are based on the ANZECC & ARMCANZ 2000 Trigger Values (TVs) for the 95% level of protection of aquatic ecosystems; however, the 99% TVs were applied for the bio-accumulative metals cadmium and mercury. The marine criteria were considered relevant as the closest, potential surface water receptor was Blackwattle Bay, located 1.8 km north west of the site and understood to be tidally influenced.
	NEPM, 2013 Groundwater HSLs for Vapour Intrusion	Health-based Screening Levels (HSLs) The NEPM 2013 groundwater HSLs for vapour intrusion were used to assess for potential human health impacts from residual vapours resulting from petroleum, BTEX and naphthalene impacts. The HSL A and HSL B thresholds for low and medium-density residential sites were applied for groundwater.
	NEPM, 2013 GILs for Drinking purposes	Drinking Water GILs The NEPM (2013) GILs for drinking water quality were applied for specific parameters, for which freshwater/marine GILs were not provided. These were based on the Australian Drinking Water Guidelines (Ref. NHMRC, 2011).

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

7.4 SOIL INVESTIGATIONS

The soil investigations conducted at the site are described in Table 7-2. Test bore locations are illustrated in Figure 2.

Table 7-2 Summary of Soil Investigation Methodology

Activity/Item	Details
Fieldwork	A detailed site walk-over inspection was undertaken on 3 September 2015. Five test boreholes (BH1M, BH2 – BH5) were drilled to depths between 0.4 m bgl to 8 mbgl on 9 September 2015. Hand auger refusal was encountered in fill material at BH2 to BH5. Underlying natural material was reached in BH1M. BH1M was converted to a groundwater monitoring bore with a final depth of 8 m bgl.
Drilling Method & Investigation Depth	Due to height restrictions of the buildings, four of the five test bores were drilled by hand auger. Final bore depths were: 8 m bgl for BH1M, 1.5 m bgl for BH2, 0.5 m bgl for BH3, 0.4 m bgl for BH4 and 0.6 m bgl for BH5.
Soil Logging	Soils were classified in the field with respect to lithological characteristics and evaluated on a qualitative basis for odour and visual signs of contamination, and anthropogenic inclusions. Soil classifications and descriptions were based on Unified Soil Classification System (USCS) and Australian Standard (AS) 4482.1-2005. Bore logs are presented in Appendix E.
Field Observations (including visual and olfactory signs of potential contamination)	A summary of field observations is provided, as follows: • A weak to moderate solvent / paint odour was detected in fill material of BH2 at a depth of approximately 0.7 – 0.8 m bgl; • A small ash layer was observedat approximately 1.2 m bgl in BH2 with a moderate hydrocarbon odour; and • Potential asbestos containing material (ACM) was observed in BH3 at approximately 0.4 m bgl.
Soil Sampling	• Soil samples were collected from the hand auger using dedicated nitrile gloves and placed into laboratory-supplied, acid-washed, solvent-rinsed glass jars. • Blind field duplicates were separated from the primary samples and placed into glass jars. • A small amount of duplicate was collected from each soil samples and placed into zip-lock bag for Photo-ionisation Detector (PID) screening. • A small amount of duplicate was separated from all fill samples and placed into a zip-lock bag for asbestos analysis.
Decontamination Procedures	Drilling Equipment – Hand augers were decontaminated between sampling locations with a diluted solution of Decon 90 and potable water potable water until the augers were was free of all residual materials, then rinsed with potable water. Sampling Equipment – Samples were collected via hand with a new pair of dedicated nitrile glovesdisposable gloves put on for each sample and were placed collected into the appropriate laboratory prepared and pre-labelled sample jars.
Sample Preservation	Samples were stored in a refrigerated (ice-filled) chest, whilst on-site and in transit to the laboratory. All samples were submitted and analysed within the required holding period, as documented in laboratory reports discussed in a later section.
Management of Soil Cuttings	Soil cuttings were used as backfill for completed boreholes.

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

7.5 GROUNDWATER INVESTIGATIONS

The groundwater investigations conducted at the site are described in Table 7-3. Monitoring well locations are illustrated in Figure 2.

Table 7-3 Summary of Groundwater Investigation Methodology

Activity/Item	Details
Fieldwork	Groundwater monitoring well BH1M was installed 9 September 2015 and developed on10.09.2015; whereas, water level gauging, well purging, field testing and groundwater sampling was conducted on 12.12.2013.
Well Construction	Test bores were converted to groundwater monitoring wells as follows: • One 8 m deep, onsite, down-gradient well identified as BH1M. The well was drilled by HartGeo Pty Ltd with a hydraulic, ute-mounted, drilling rig using ø 200 mm solid flight augers. Well construction details are tabulated in Table 9-2 and documented in borehole logs presented in Appendix E.
Well Construction (continued)	Well construction was in general accordance with the standards described in NUDLC, 2012 and involved the following: • 50 mm, Class 18 uPVC, threaded, machine-slotted screen and casing, with slotted intervals in shallow wells set to screen to at least 500 mm above the standing water level to allow sampling of phase-separated hydrocarbon product, if present; • base and top of each well was sealed with a uPVC cap; • annular, graded sand filter was used to approximately 300mm above top of screen interval; • granular bentonite was applied above annular filter to seal the screened interval; • drill cuttings were used to backfill the bore annulus to just below ground level; and • surface completion comprised a steel road box cover set in neat cement and finished flush with the concrete slab level.
Well Development	Well development was conducted for the well directly following installation. This involved agitation within the full length of the water column using a dedicated HDPE, disposable bailer and the removal of several well volumes.
Well Survey (Elevation and location)	Well elevations at ground level were extrapolated from the spot elevations marked on the survey plan provided by the client. Well elevations at ground level were extrapolated in metres relative to Australian Height Datum (m AHD).
Groundwater sampling	No groundwater sampling was undertaken during this DSI due to access restrictions.

8 DATA QUALITY ASSESSMENT

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

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

- suitable records of fieldwork observations including borehole logs;
- relevant and appropriate sampling plan (density, type, and location);
- use of approved and appropriate sampling methods;
- preservation and storage of samples upon collection and during transport to the laboratory;
- complete field and analytical laboratory sample COC procedures and documentation;
- sample holding times within acceptable limits;
- use of appropriate analytical procedures and NATA-accredited laboratories; and
- required LOR (to allow for comparison with adopted IL);
- frequency of conducting quality control measurements;
- laboratory blanks;
- field duplicates;
- laboratory duplicates;
- matrix spike/matrix spike duplicates (MS/MSDs);
- surrogates (or System Monitoring Compounds);
- analytical results for replicated samples, including field and laboratory duplicates and inter-laboratory duplicates, expressed as Relative Percentage Difference (RPD); and
- checking for the occurrence of apparently unusual or anomalous results, e.g. laboratory results that appear to be inconsistent with field observations or measurements.

The findings of the data quality assessment in relation to the soil and groundwater investigations at the site are discussed in detail in Appendix I. QA/QC policies and DQDs are presented in Appendix J.

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

9 RESULTS

9.1 SOIL INVESTIGATION RESULTS

9.1.1 Site Geology and Subsurface Conditions

The general site geology encountered during the drilling of the soil investigation boreholes, installation of monitoring wells may be described as a layer of anthropogenic filling overlying residual clays, with Ashfield Shale at depth. The geological information obtained during the investigation is summarised in Table 9-1 and borehole logs from these works are presented in Appendix E.

Table 9-1 Generalised Subsurface Profile (m bgl)

Layer	Description	Depth to top & bottom of layer (m bgl)
Fill	Gravelly SAND: fine grained, dark brown to grey, with sub-angular gravel, small piece of metal (BH2), ash layer at 1.2 m in BH2, potential asbestos containing material at 0.4 m at BH3, weak solvent odour at	0.1 – 1.5+
Residual Clay	Sandy CLAY: pale brown and orange, medium to high plasticity, ironstone mottles from approximately 1.3 m bgl.	BH1M 0.5 – 1.5
	Silty CLAY: pale grey to brown with ironstone mottles, grading to red / brown clay with depth/	BH1M 1.5 – 5.0
Weathered Ashfield Shale	SHALE: dark brown, extremely weathered.	BH1M 5.0 – 8.0 +

Notes: + Termination depth of borehole

9.1.2 Field Observations and PID Results

Soil samples were obtained from the test bores at various depths ranging between 0.0 m to 8.0 m bgl. All examined soil samples were evaluated on a qualitative basis for odour and visual signs of contamination (e.g. hydrocarbon odours, oil staining, petrochemical filming, asbestos fragments, ash, charcoal) and the following observations were noted:

- A weak to moderate solvent / paint odour was detected in fill material of BH2 at a depth of approximately 0.7 – 0.8 m bgl;
- A small ash layer was observed at approximately 1.2 m bgl in BH2 with a moderate hydrocarbon odour;
- Potential asbestos containing material (ACM) was observed in BH3 at approximately 0.4 m bgl; and
- VOC concentrations ranged from 0.2 to 1.4 parts per million (ppm) detected in soil headspace samples, which were field-screened using a portable PID fitted with a 10.9 eV lamp. The PID results are shown in the borehole logs (Appendix E).

9.2 GROUNDWATER INVESTIGATION RESULTS

9.2.1 Monitoring Well Construction

One groundwater monitoring well (BH1M) was installed on the site. BH1M was screened within the shallow aquifer of the Ashfield Shale formation. Well construction details for the installed groundwater monitoring wells are summarised in Table 8-2.

Table 8-2 Monitoring Well Construction Details

Well ID	Bore Depth (m bgl)	RL (GL)	RL (TOC)	Screen Interval (m bgl)	Lithology Screened
BH1M	8.0	20.0	19.9	3.0 – 8.0	Shale

Notes:
m bgl = metres below ground level.
RL = Reduced Level – Surveyed elevation in metres relative to Australian Height Datum (m AHD).
TOC = top of well casing
RL (TOC) = Surveyed elevation at TOC in m AHD.

9.2.2 Field Observations and Water Test Results

No groundwater sampling was undertaken during this DSI. Further explanation of groundwater conditions and associated risks at the site is provided in Section 10.7.

9.3 LABORATORY ANALYTICAL RESULTS

9.3.1 Soil Analytical Results

A summary of laboratory results showing test sample quantities, minimum/maximum analyte concentrations and samples found to exceed the SILs, is presented in Table 9-3. More detailed tabulations of results showing the tested concentrations for individual samples alongside the adopted soil criteria are presented in Table T1 at the end of this report. Completed documentation used to track soil sample movements and laboratory receipt (i.e. COC and SRA forms) are copied in Appendix G and all laboratory analytical reports for tested soil samples are presented in Appendix H.

Table 9-3 Summary of Soil Analytical Results

Primary samples	Analyte	Min. Conc. (mg/kg)	Max. Conc. (mg/kg)	Sample locations exceeding investigation levels
Hydrocarbons				
8	F1	<25	<25	None
8	F2	<25	25	None
8	F3 (>C_{16-34})	<90	320	None
8	F4(>C_{34}-C_{40})	<120	<120	None
8	Benzene	<0.1	<0.1	None
8	Toluene	<0.1	<0.1	None
8	Ethyl benzene	<0.1	<0.1	None
8	Total xylenes	<0.3	<0.3	None
8	Benzo(a)pyrene	<0.1	10	None
OCPs				
5	Total (excluding Aldrin and Dieldrin)	<0.1	0.5	None
5	Aldrin and Dieldrin	<0.1	18.7	Exceedance of HIL-B criteria detected in sample BH5_0.1-0.2 (18.7 mg/kg).
OPPs				
5	Total	ND	ND	None
Heavy Metal				
8	Arsenic	<3	6	None
8	Cadmium	<0.3	0.9	None
8	Chromium (Total)	5.1	9.8	None
8	Copper	1	39	None
8	Lead	9	1,800	Exceedances above the HIL-B criteria for BH2_0.7-0.8 (1,400 mg/kg), BH3_0.1-0.2 (1,800 mg/kg) and BH5_0.1-0.2 (1,300 mg/kg).
8	Mercury	0.01	0.28	None
8	Nickel	1.1	6.9	None
8	Zinc	4.3	630	None
PAHs				
8	Carcinogenic PAHs (as B(a)P TEQ)	<0.2	14	Exceedances above the HIL-B criteria for BH2_0.7-0.8 (7.4 mg/kg), BH3_0.1-0.2 (14 mg/kg) and BH3_0.5-0.6 (9.6 mg/kg)
8	Benzo(a)pyrene	<0.1	14	
8	Total PAHs	<0.8	170	None
7	Naphthalene	<0.1	0.6	None
PCBs				
5	Total PCBs	<1	<1	None

Primary samples	Analyte	Min. Conc. (mg/kg)	Max. Conc. (mg/kg)	Sample locations exceeding investigation levels
Asbestos				
5	Asbestos	No asbestos detected	No asbestos detected	None

10 SITE CHARACTERISATION DISCUSSION

10.1 CONCEPTUAL SITE MODEL

On the basis of investigation findings the preliminary CSM discussed in Section 5 was considered to appropriately identify contamination sources, migration mechanisms and exposure pathways, as well as potential onsite and offsite receptors. Previously known data gaps, as outlined in Section 5.4 have largely been addressed; however, the following remaining data gaps need to be addressed in subsequent investigation works:

- An assessment of onsite groundwater quality with regard to potential onsite contamination sources;
- Further characterisation of soil material on site, including deeper sampling of fill and natural soils to close current data gaps, adequately characterise onsite soils and to vertically delineate contamination. It is recommend that these works be performed once unrestricted internal access to building structures is available; and
- The potential presence of hazardous building materials contained within the structure and on painted surfaces of the existing buildings.

10.2 ASBESTOS RISK

No asbestos was reported in fill soils at all five locations investigated during this DSI, possible ACM was noted in BH3 at approximately 0.4 m bgl; EI recommend further investigation to assess the potential of ACM in the fill material on site.

10.3 RESIDUAL PETROLEUM HYDROCARBONS

- No exceedances above the HIL-B criteria were detected for TRH or BTEX in soil samples analysed.
- Elevated concentrations of the F3 fraction were detected in soil samples BH2_0.2-0.3 (150 mg/kg), BH2_0.7-0.8 (320 mg/kg), BH3_0.1-0.2 (210 mg/kg) and BH3_0.5-0.6 (160 mg/kg) indicating the presence of hydrocarbons within the fill material on site. However, as these concentrations are below the HSL A and HSL B criteria (2,500 mg/kg) EI considers the risk to be low.

10.4 PAHS IN SOIL

No exceedances above the HIL-B criteria were detected for Benzo(a)pyrene, naphthalene and total PAHs in soil samples analysed;

Exceedances above the HIL-B criteria for carcinogenic PAHs (as B(a) TEQ) were detected for samples BH2_0.7-0.8 (7.4 mg/kg), BH3_0.1-0.2 (14 mg/kg) and BH3_0.5-0.6 (9.6 mg/kg). As the concentration for BH3_0.1-0.2 is >2.5x the criteria (4 mg/kg) this exceedance is considered a contamination hotspot. Vertical delineation within the underlying natural soil material was not achieved due to hand auger refusal in fill material. Therefore, EI recommends further investigation to delineate the extent of the contamination and the depth of fill material on site.

10.5 PESTICIDES IN SOIL

No exceedances above the HIL-B criteria were detected for pesticides, with the exception of BH5_0.1-0.2 for Aldrin and dieldrin (18.7 mg/kg). Due to hand auger refusal in fill material, vertical delineation within the underlying natural material could not be achieved.

10.6 Heavy Metal Concentrations in Soil

Heavy metal concentrations in soil samples analysed during this DSI were at concentrations below the adopted HIL-B criteria (residential with minimal opportunities for soil access) with the exception of lead for BH2_0.7-0.8 (1,400 mg/kg), BH3_0.1-0.2 (1,800 mg/kg) and BH5_0.1-0.2 (1,300 mg/kg).

Vertical delineation was achieved for BH3_0.1-0.2 with the deeper fill sample BH3_0.5-0.6 being below the HIL-B criteria (800 mg/kg) indicating the exceedance to be characteristic of the non-homogeneous fill material on site. Due to hand auger refusal in fill material at BH2 and BH5, vertical delineation was not achieved.

10.7 Groundwater Condition

One down-gradient groundwater monitoring well (BH1M) was installed during this investigation. However, no groundwater sampling was undertaken due to access restrictions.

With regards to potential offsite contamination sources impacting onsite groundwater quality, EI note that a previous Stage 1 and Stage 2 Environmental Site Investigation was undertaken by Geo-environmental Engineering (report ID G14002RED-R01F, dated 25 May 2014) on the adjoining properties (175 - 177 Cleveland Street) included within the proposed development. This investigation did not identify any significant groundwater contamination in the immediate area, including volatile contaminants (which are the main drivers of risk) within groundwater. We also note that records made available by the EPA (Section 4.5) do not indicate the presence of immediate up gradient sources of contamination which are likely to impact on the site.

As the on-site groundwater conditions have not been characterised, the risk associated with on-site groundwater contamination is currently unknown, EI recommend further investigation to characterise on-site groundwater conditions. This investigation can be undertaken during the remediation of soils on site.

11 CONCLUSIONS

The property located at 1-5 Woodburn Street, Redfern was the subject of a Detailed Site Investigation, in order to assess the potential for on-site contamination associated with the identified current and former land uses. Based on the findings of this assessment it was concluded that:

- The site comprises a rectangular shaped block bound by a vacant lot followed by Cleveland Street (north), commercial buildings followed by Eveleigh Street (west), commercial and residential buildings (south) and Woodburn street followed by commercial and residential buildings (east). Current site buildings include a large, two-storey commercial building occupying the entire are of the site.
- The proposed development will include the adjacent properties dated 25 May 2014) on the adjoining properties (175 - 177 Cleveland Street) included within the proposed development. The development will involve the construction of an eight-storey building over a two-level basement car park. Commercial/ retail land use will occupy the ground floor level, with residential apartments above. Basement excavation will involve the excavation of sub-surface material across the entire area of the site, to a depth of approximately 9.0 m below existing ground level (m bgl).
- A review of historical aerial photographs and land title records identified the site was used for commercial purposes since at least the 1930s. The current site building has been present on site, with minimal changes since at least the 1930s. From 22 July 1959 until 18 February, 1983 the property was leased to Superfine Printing Co. Pty Limited.
- Records made available by City of Sydney Council identified two applications for the installation of mechanical ventilation at the site. Based on the available information, the use of this ventilation system is currently unknown;
- The site was free of statutory notices issued by the NSW EPA/DECC. Surrounding properties identified during this search were considered a low risk of off-site contamination sources due to their proximity to the site (>500m) and being hydraulically across-gradient / down-gradient.
- A search of WorkCover NSW Authority records relating to the site did not locate any records relating to historical storage of dangerous goods onsite.
- Soil sampling and analysis were conducted at five test bore locations (BH1M, BH2 – BH5) down to a maximum depth of 8.0 m bgl. Sampling regime was considered to be appropriate for investigation purposes and comprised a broad grid sampling pattern, with allowance for structural obstacles (e.g. building walls, underground and overhanging services and other physical obstructions);
- The sub-surface layers comprised of fill materials of various constituents, comprising dark brown to grey gravelly sands, underlain by residual clays and the Ashfield Shale at depth (approximately 5.0 m bgl in BH1M);
- Groundwater was encountered at a depth of approximately 7. 3 m bgl (BH1M);
- Multiple level soil sampling was undertaken within fill and natural soils (where achieved). Exceedances of the adopted criteria were detected within soil and fill samples for the following;
  - Heavy metal concentrations for lead were reported at concentrations exceeding the HIL-B criteria in exceedances above the HIL-B criteria for BH2_0.7-0.8 (1,400 mg/kg), BH3_0.1-0.2 (1,800 mg/kg) and BH5_0.1-0.2 (1,300 mg/kg) collected within fill material. Due to hand auger refusal, the underlying natural soil could not be sampled and therefore no vertical delineation could be achieved;

- Carcinogenic PAH's (BaP TEQ) concentrations were detected above the HIL-B criteria in samples BH2_0.7-0.8 (7.4 mg/kg), BH3_0.1-0.2 (14 mg/kg) and BH3_0.5-0.6 (9.6 mg/kg). Vertical delineation within the underlying natural soils was not achieved due to hand auger refusal in fill material; and
- Organochloride pesticides for aldrin and dieldrin in BH5_0.1-0.2 for (18.7 mg/kg). Due to hand auger refusal in fill material, vertical delineation within the underlying natural soil material could not be achieved.

- As the on-site groundwater conditions have not been characterised, the risk associated with groundwater contamination is currently unknown, EI recommend further investigation to characterise on-site groundwater conditions. This investigation can be undertaken during the remediation of soils on site.
- On review of the Conceptual Site Model (CSM) developed as part of this ESA, it was concluded that the model remains valid for the proposed development. However, the following data gaps require closure by further investigations (also described in Section 10) :
  - An assessment of onsite groundwater quality with regard to potential onsite contamination sources;
  - Further characterisation of soil material on site, including deeper sampling of fill and natural soils to close current data gaps, adequately characterise onsite soils and to vertically delineate contamination. It is recommend that these works be performed once unrestricted internal access to building structures is available; and
  - The potential presence of hazardous building materials contained within the structure and on painted surfaces of the existing buildings.

Based on the findings of this report and with consideration of the Statement of Limitations (Section 13), EI conclude that contamination was identified at the site during this DSI. Concentrations exceeding human health based SILs were identified in surface fill material across the site.

EI concludes the contamination can be remediated in accordance with SEPP 55 to allow the site to be used for residential/commercial purposes as outlined in the proposed development plans. A Remediation Action Plan (RAP) should be prepared prior to demolition and construction works. The RAP will include further investigation to delineate the extent of the contamination, and characterisation of groundwater conditions at the site. The RAP will ensure the soils and groundwater remaining on site are suitable for the proposed residential/commercial land use.

12 RECOMMENDATIONS

It is assumed that during the proposed construction of a basement level car park as part of the development, all fill and residual soil materials will be removed from the site, therefore in view of the above findings and in accordance with the NEPM 2013 guidelines, it is considered that the site will be made suitable for the proposed residential development on completion of the following recommendations:

1 Conduct a Hazardous Materials Survey (HMS) on structures present at the site. EI recommend that a HMS is conducted prior to demolition of site structures.

2 Undertake an additional intrusive investigation to further delineate the extent of the contamination identified within the soils on site, once the site becomes readily accessible (i.e. following demolition of site structures). This investigation will also involve the sampling of the on-site groundwater monitoring well (BH1M) to characterise the on-site groundwater conditions and the associated risks at the site.

3 Preparation and implementation of a Remediation Action Plan (RAP) to outline the remediation of the HIL-B exceedances identified during this DIS and any additional contamination identified during the additional investigation, including groundwater (if necessary). The RAP should also develop further soil and groundwater investigations to close/clarify any data gaps identified during this investigation.

4 Any material being removed from site (including virgin excavated natural materials or VENM) be classified for off-site disposal in accordance the DECCW (2009) Waste Classification Guidelines.

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

6 Validate that the excavated areas are left free of contamination by comparing analytical results for excavation surfaces and any backfill material, against the respective DECC/EPA thresholds.

7 Preparation of a final site validation report by a qualified environmental consultant, certifying site suitability for the proposed development.

13 STATEMENT OF LIMITATIONS

This report has been prepared for the exclusive use of [the client], who is the only intended beneficiary of EI's work. The scope of the investigations carried out for the purpose of this report is limited to those agreed with Platinum Property Advisors Pty on 2 September 2015.

No other party should rely on the document without the prior written consent of EI, and EI undertakes no duty, or accepts any responsibility or liability, to any third party who purports to rely upon this document without EI's approval.

EI has used a degree of care and skill ordinarily exercised in similar investigations by reputable members of the environmental industry in Australia as at the date of this document. No other warranty, expressed or implied, is made or intended. Each section of this report must be read in conjunction with the whole of this report, including its appendices and attachments.

The conclusions presented in this report are based on a limited investigation of conditions, with specific sampling locations chosen to be as representative as possible under the given circumstances.

EI's professional opinions are reasonable and based on its professional judgment, experience, training and results from analytical data. EI may also have relied upon information provided by the Client and other third parties to prepare this document, some of which may not have been verified by EI.

EI's professional opinions contained in this document are subject to modification if additional information is obtained through further investigation, observations, or validation testing and analysis during remedial activities. In some cases, further testing and analysis may be required, which may result in a further report with different conclusions.

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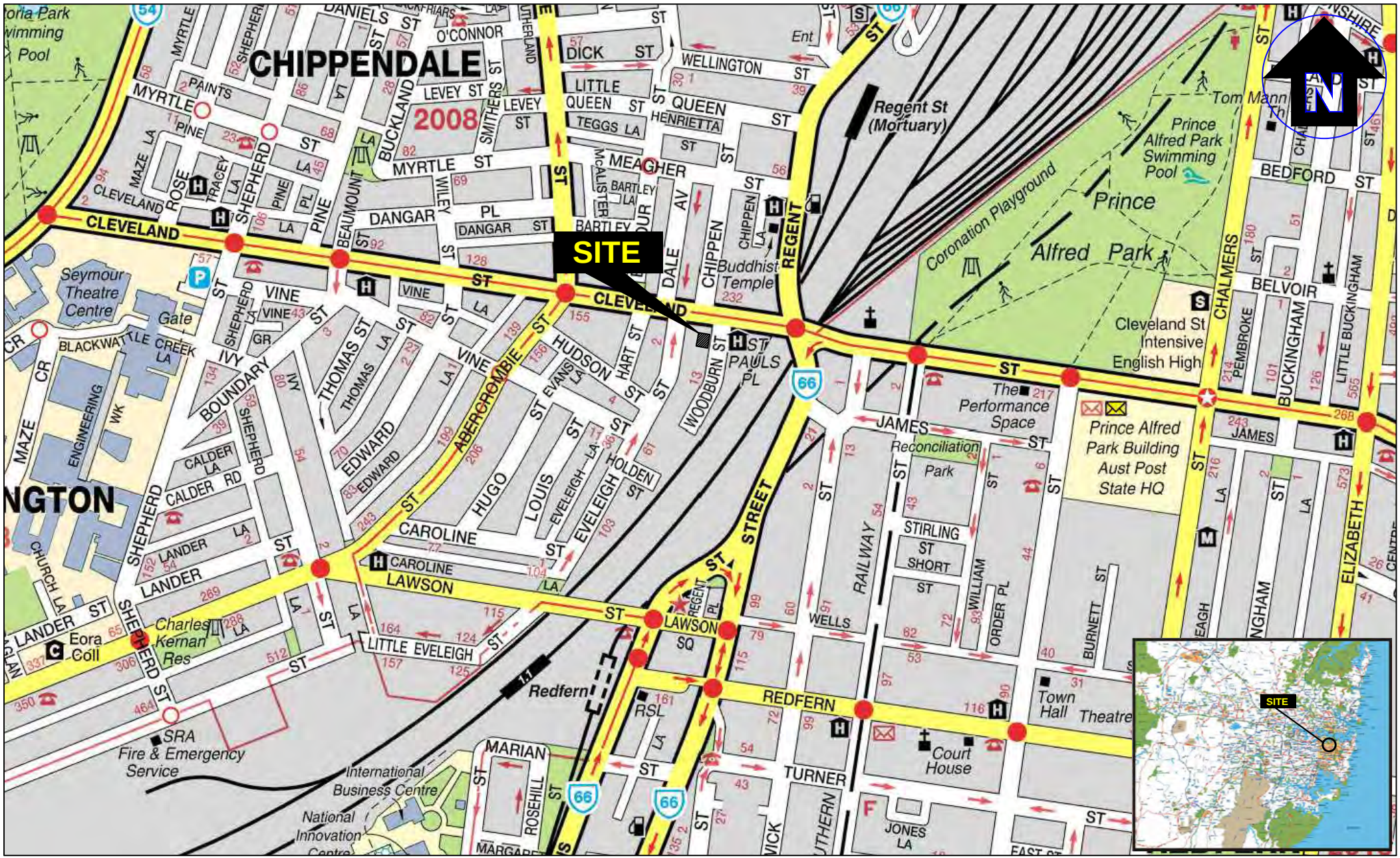
ABBREVIATIONS

ACM	Asbestos-containing materials
ASS	Acid sulfate soils
ANZECC	Australian and New Zealand Environment Conservation Council
ARMCANZ	Agriculture and Resource Management Council of Australia and New Zealand
B(a)P	Benzo(a)Pyrene
BH	Borehole
BTEX	Benzene, Toluene, Ethyl benzene, Xylene
COC	Chain of Custody
DEC	Department of Environment and Conservation, NSW (see OEH)
DECC	Department of Environment and Climate Change, NSW (see OEH)
DECCW	Department of Environment, Climate Change and Water, NSW (see OEH)
DA	Development Application
DO	Dissolved Oxygen
DP	Deposited Plan
EPA	Environment Protection Authority
EMP	Environmental Management Plan
F1	TRH C6 – C10 less the sum of BTEX concentrations (Ref. NEPM 2013, Schedule B1)
F2	TRH >C10 – C16 less the concentration of naphthalene (Ref. NEPM 2013, Schedule B1)
GIL	Groundwater Investigation Level
GME	Groundwater Monitoring Event
HIL	Health-based Investigation Level
HSL	Health-based Screening Level
km	Kilometres
m	Metres
m AHD	Metres Australian Height Datum
m BGL	Metres Below Ground Level
mg/m^3	Milligrams per cubic metre
mg/L	Milligrams per litre
µg/L	Micrograms per litre
MW	Monitoring well
NATA	National Association of Testing Authorities, Australia
NEPC	National Environmental Protection Council
NSW	New South Wales
OEH	Office of Environment and Heritage, NSW (formerly DEC, DECC, DECCW)
PAHs	Polycyclic Aromatic Hydrocarbons
pH	Measure of the acidity or basicity of an aqueous solution
PSH	Phase-separated hydrocarbons (also referred to as LNAPL)
PQL	Practical Quantitation Limit (limit of detection for respective laboratory instruments)
QA/QC	Quality Assurance / Quality Control
RAP	Remediation Action Plan
SRA	Sample receipt advice (document confirming laboratory receipt of samples)
SWL	Standing Water Level
TCLP	Toxicity Characteristics Leaching Procedure
TPH	Total Petroleum Hydrocarbons (superseded term equivalent to TRH)
TRH	Total Recoverable Hydrocarbons (non-specific analysis of organic compounds)
UCL	Upper Confidence Limit of the mean

USEPA	United States Environmental Protection Agency
VOCs	Volatile Organic Compounds (specific organic compounds which are volatile)
VOCCs	Volatile Organic Chlorinated Compounds (a sub-set of the VOC analysis suite)

FIGURES



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

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Approved:	E.G.
Date:	03-09-15
Approx Scale:	N.T.S

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Detailed Site Investigation
1-5 Woodburn Street,
Redfern, NSW
Site Locality Plan

Figure:
1

Project: E22434 AA

LEGEND

- Approximate Borehole Location (EI, 2015)
- Approximate Off-site Borehole/Monitoring Well Location
- Approximate Borehole/Monitoring Well
- Approximate Development Boundary
- Approximate Investigation Area

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Ph (02) 9516 0722 Fax (02) 9518 5088

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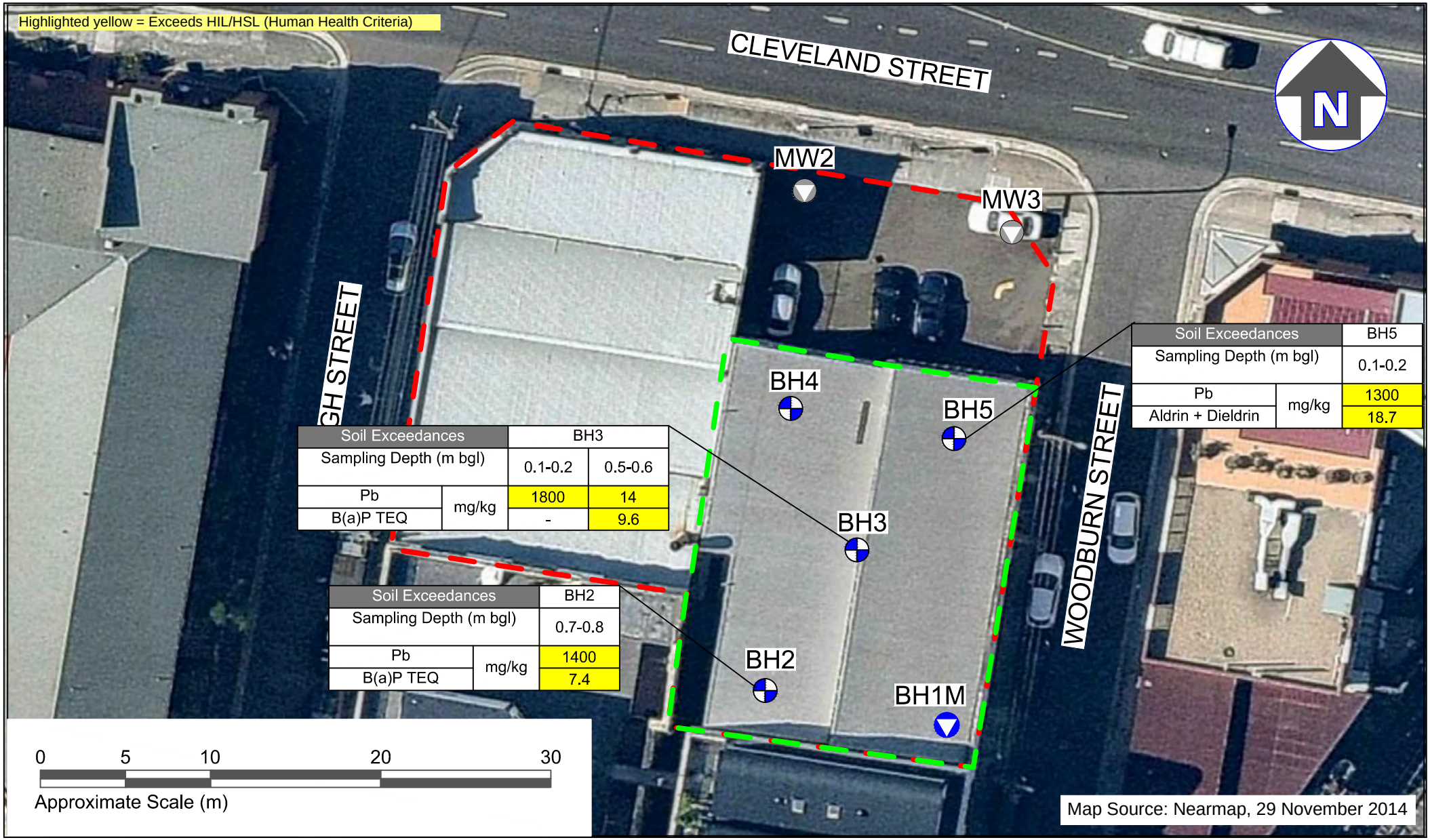
Detailed Site Investigation
1-5 Woodburn Street, Redfern, NSW
Site Layout and Sampling Plan

Figure: 2

Project: E22434 AA



LEGEND

- Approximate Borehole Location (EI, 2015)
- Approximate Off-site Borehole/Monitoring Well Location
- Approximate Borehole/Monitoring Well
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- Approximate Investigation Area

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Platinum Property Advisors Pty Ltd
Detailed Site Investigation
1-5 Woodburn Street, Redfern, NSW
Sample Exceedance Locations

Figure: 3

Project: E22434 AA

TABLES

Table T1 - Summary of Soil Analytical results

Sample ID	Sampling Date	Heavy Metals								PAHs				BTEX				TRH				OCPs					OPPs	Total PCBs	Asbestos
		As	Cd	Cr[#]	Cu	Pb	Hg	Ni	Zn	Carcinogenic PAHs (as B(a)P TEQ)	Benzo(a)pyrene	Total PAHs	Naphthalene	Benzene	Toluene	Ethylbenzene	Total Xylenes	F1[2]	F2[3]	F3 (>C_{16}-C_{34})	F4 (>C_{34}-C_{40})	Heptachlor	Aldrin + Dieldrin	Edrin Ketone	Chlordane (Alpha + Gamma)	trans-Nonachlor			
BH1-0.1-0.2	9/09/2015	3	0.4	8	15	1200	0.17	6.3	310	0.3	0.2	3.6	<0.1	<0.1	<0.1	<0.1	<0.3	<25	<25	<90	<120	<0.1	ND	<0.1	<0.1	<0.1	ND	ND	ND
BH1-1.0-1.2		<3	<0.3	9.4	1	15	0.01	1.1	4.3	<0.2	<0.1	<0.8	<0.1	<0.1	<0.1	<0.1	<0.3	<25	<25	<90	<120	NT	NT	NT	NT	NT	NT	NT	NT
BH2-0.2-0.3		<3	<0.3	7.5	7.7	9	0.01	6.1	74	<0.2	<0.1	<0.8	<0.1	<0.1	<0.1	<0.1	<0.3	<25	<25	150	<120	<0.1	ND	<0.1	<0.1	<0.1	ND	ND	ND
BH2-0.7-0.8		6	0.9	9.4	35	1400	0.28	6.9	630	7.4	5.2	75	0.5	<0.1	<0.1	<0.1	<0.3	<25	<25	320	<120	NT	NT	NT	NT	NT	NT	NT	NT
BH3-0.1-0.2		4	<0.3	6.2	11	1800	0.12	1.3	340	14	10	120	0.8	<0.1	<0.1	<0.1	<0.3	<25	<25	210	<120	<0.1	ND	<0.1	<0.1	<0.1	ND	ND	NT
BH3-0.5-0.8		5	0.4	9.8	16	800	0.15	1.6	590	9.6	6.8	87	0.7	<0.1	<0.1	<0.1	<0.3	<25	<25	160	<120	NT	NT	NT	NT	NT	NT	NT	ND
BH4-0.1-0.2		<3	<0.3	5.1	39	140	0.08	3.8	140	<0.2	<0.1	0.8	<0.1	<0.1	<0.1	<0.1	<0.3	<25	<25	<90	<120	<0.1	ND	<0.1	<0.1	<0.1	ND	ND	ND
BH5-0.1-0.2		<3	<0.3	5.4	20	1300	0.15	2.3	310	0.2	0.1	1.3	<0.1	<0.1	<0.1	<0.1	<0.3	<25	<25	<90	<120	0.2	18.7	0.1	0.9	0.2	ND	ND	ND
SILs																													
HIL B - Residential with minimal opportunities for soil access		500	150	500 Cr(VI)	30,000	1,200	120	1,200	60,000	4	NR	400										20	10	NR	90	NR	NR	1	
HSL A & HSL B - Residential		Source depths (0 m to <1 m. BGL)											3	0.5	160	55	40	45	110										
Soil texture classification –Sand [1]		Source depths (1 m to <2 m. BGL)											NL	0.5	220	NL	60	70	240										
Management Limits – Residential, parkland and public open space Coarse grained soil texture[1]																		700	1000	2500									
Asbestos contamination HSL – Residential B Bonded ACM (%w/w)																													0.04
Asbestos contamination HSL for Non Bonded / Friable Asbestos (%w/w)																													0.001

Notes: All results are recorded in mg/kg

Highlighted values indicates concentration exceeds Human Health Based Soil Criteria

Highlighted values indicates concentration exceeds EIL / ESL.

HIL B	NEPC 1999 Amendment 2013 'HIL B" Health Based Investigation Levels applicable for residential exposure settings with minimal opportunities for soil access, including dwellings with fully and permanently paved yard space such as high rise buildings and apartments.
EILs/ESLs	Ecological Investigation Level and Ecological Screening Level criteria urban residential and public open space
*	EILs/ESLs criteria only applied to boreholes drilled within propsed deep soil areas.
#	Thresholds are for Chromium VI. It is assumed all detected Chromium is Chromium (VI), as Chromium (III) would be too unstable to exist under normal circumstances.
NR	No current published criterion.
NL	Not Limiting' If the derived soil vapour limit exceeds the soil concentration at which the pore water phase cannot dissolve any more of the individual chemical
ND	'Not detected' i.e. all concentrations of the compounds within the analyte group were found to be below the laboratory limits of detection.
NT	'Not Tested' i.e. the sample as not analysed.
1	Coarse Grained soil values were applied, being the most conservative of the material types.

APPENDIX A
PROPOSED DEVELOPMENT PLANS

175 CLEVELAND STREET REDFERN

PROPOSED MIXED USE MULTI UNIT RESIDENTIAL DEVELOPMENT

CONCEPT PLAN

FOR PRE DA DISCUSSION WITH **DEPARTMENT OF PLANNING**

BY

JPR Architects Pty Ltd
Level 4, 50 Stanley Street
East Sydney NSW 2010
Tel +61 2 9366 1133
Fax +61 2 9366 1100
ABN 52 255 001 003
www.jpra.com.au

17.09.2014

CONCEPTUAL PLAN

SITE ANALYSIS

FILE: 2014067_SK3_CLEVELAND ST OPT 02_09.pln

0 5 10 15m

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Level 4, 50 Stanley Street
East Sydney NSW 2010
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SITE ANALYSIS

PROJECT NO: 2014067
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SCALE: 1:500 @A3
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PLOTTED: 7/10/2014

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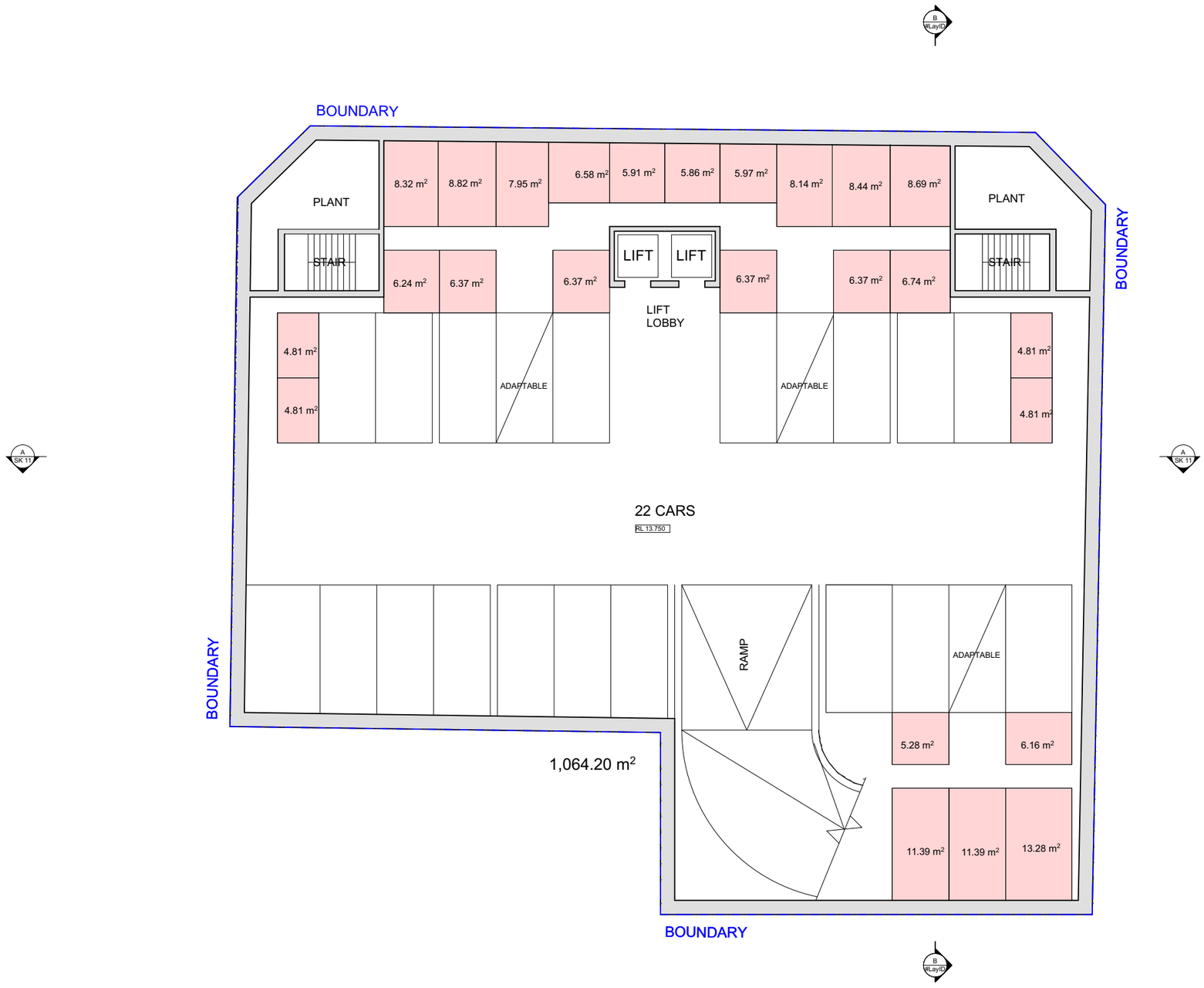

CONCEPTUAL PLAN

BASEMENT LEVEL 02

FILE: 2014067_DA_CLEVELAND ST.pln

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ABN 52 255 001 003
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DRAWING:
BASEMENT LEVEL 2

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DRAWN BY: RM,JC
SCALE: 1:200@A3
DRAWING NO: REV:
PLOTTED: 8/10/2014

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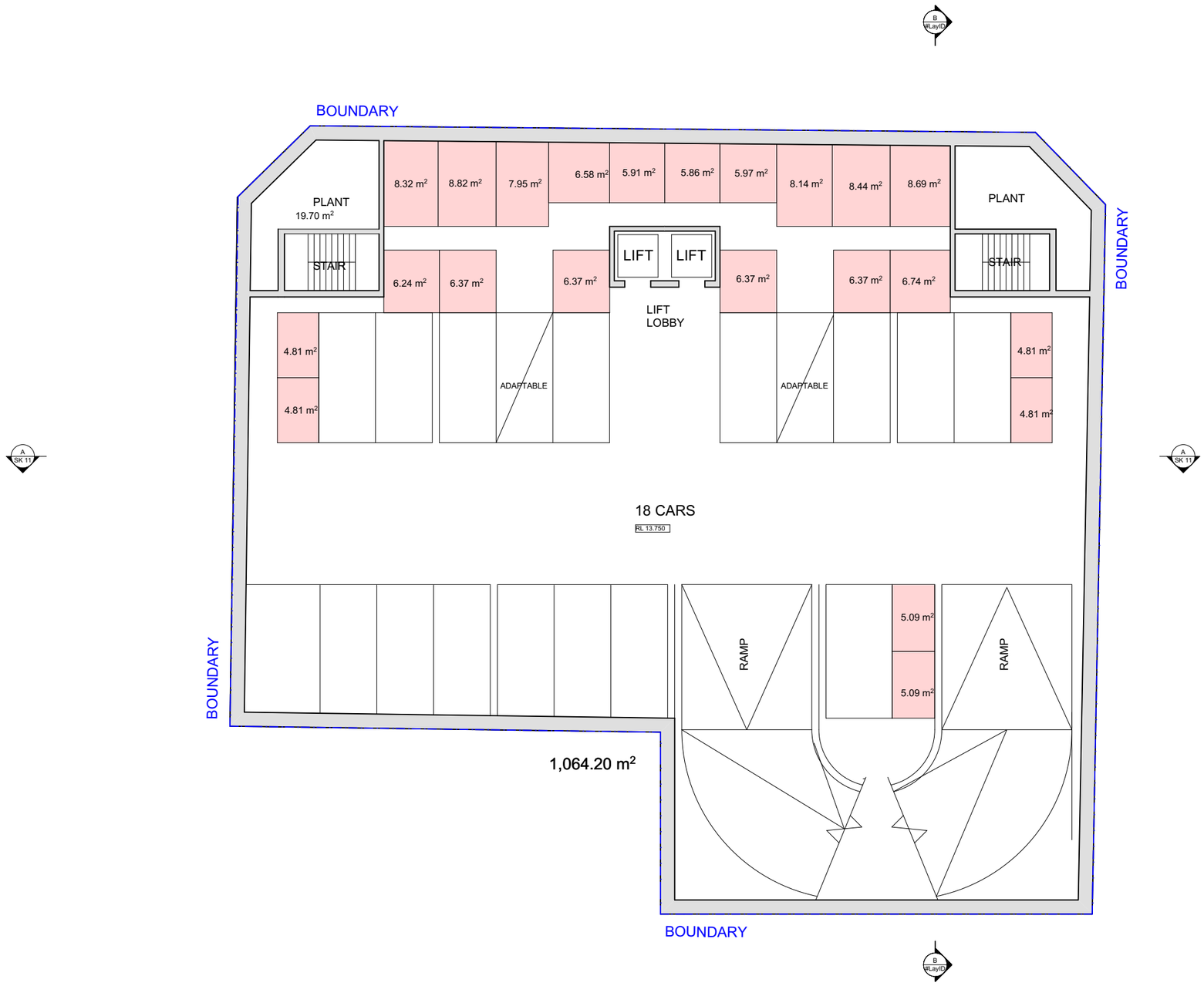

CONCEPTUAL PLAN

BASEMENT LEVEL 01

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Tel +61 2 9366 1133
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DRAWING:
BASEMENT LEVEL 1

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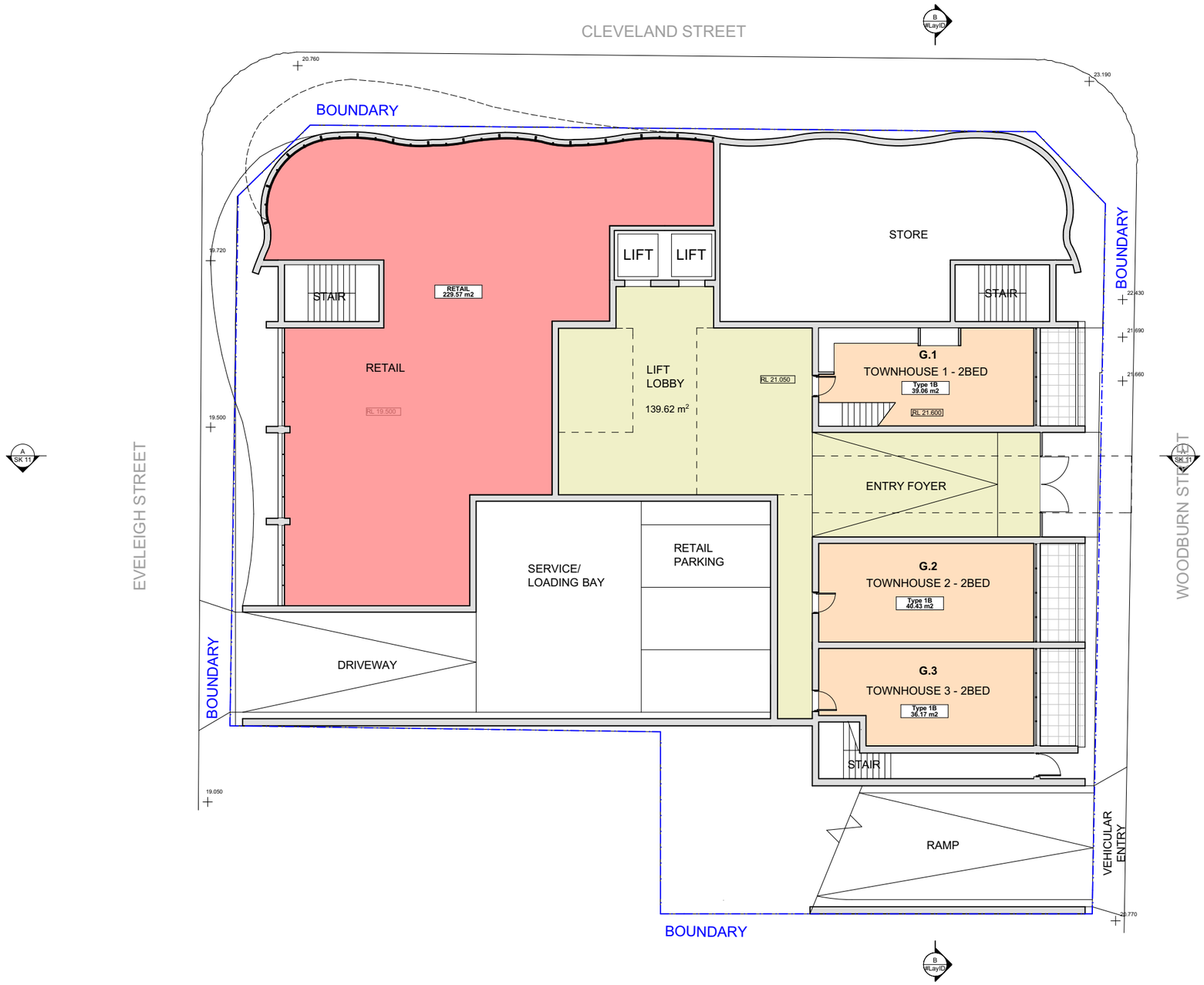

CONCEPTUAL PLAN

GROUND FLOOR

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GROUND FLOOR PLAN

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SK 04 A

CLEVELAND STREET

EVELEIGH STREET

WOODBURN STREET

BOUNDARY

BOUNDARY

BOUNDARY

BOUNDARY

1.1
STUDIO
Type 1C
41.72 m2

1.2
STUDIO
Type 1C
45.45 m2

1.3
STUDIO
Type 1C
45.43 m2

1.4
STUDIO
Type 1C
43.03 m2

LIFT

LIFT

STAIR

10.93 m²

RL 24.100
LOBBY
8.17 m²

11.21 m²

STAIR

1.5
1 BED
Type 1C
50.43 m2

VOID

VOID

Type 1B
39.06 m2

1.6
2 BED
Type 1C
75.43 m2

441.32 m²
135.75 m²

VOID

PODIUM
LANDSCAPE

TOWNHOUSE - 2BED
Type 1B
40.43 m2

TOWNHOUSE - 2BED
Type 1B
40.25 m2

1.7
1 BED
Type 1C
50.06 m2

STAIR

1.8
1 BED
Type 1C
56.19 m2

LIGHT
COURT

CONCEPTUAL PLAN

LEVEL 01

FILE: 2014067_DA_CLEVELAND ST.pln

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JPR Architects Pty Ltd
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East Sydney NSW 2010
Tel +61 2 9366 1133
Fax +61 2 9366 1100
ABN 52 255 001 003
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DRAWING:
LEVEL 01 PLAN

PROJECT NO: 2014067
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SK 05 A

CONCEPTUAL PLAN

LEVELS 02 TO 04 TYPICAL

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East Sydney NSW 2010
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Fax +61 2 9366 1100
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DRAWING:
LEVELS 02 TO 04 TYPICAL FLOOR PLAN

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CONCEPTUAL PLAN

LEVEL 05

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DRAWING:
LEVEL 05 FLOOR PLAN

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CONCEPTUAL PLAN

LEVEL 06

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Fax +61 2 9366 1100
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LEVEL 06 FLOOR PLAN

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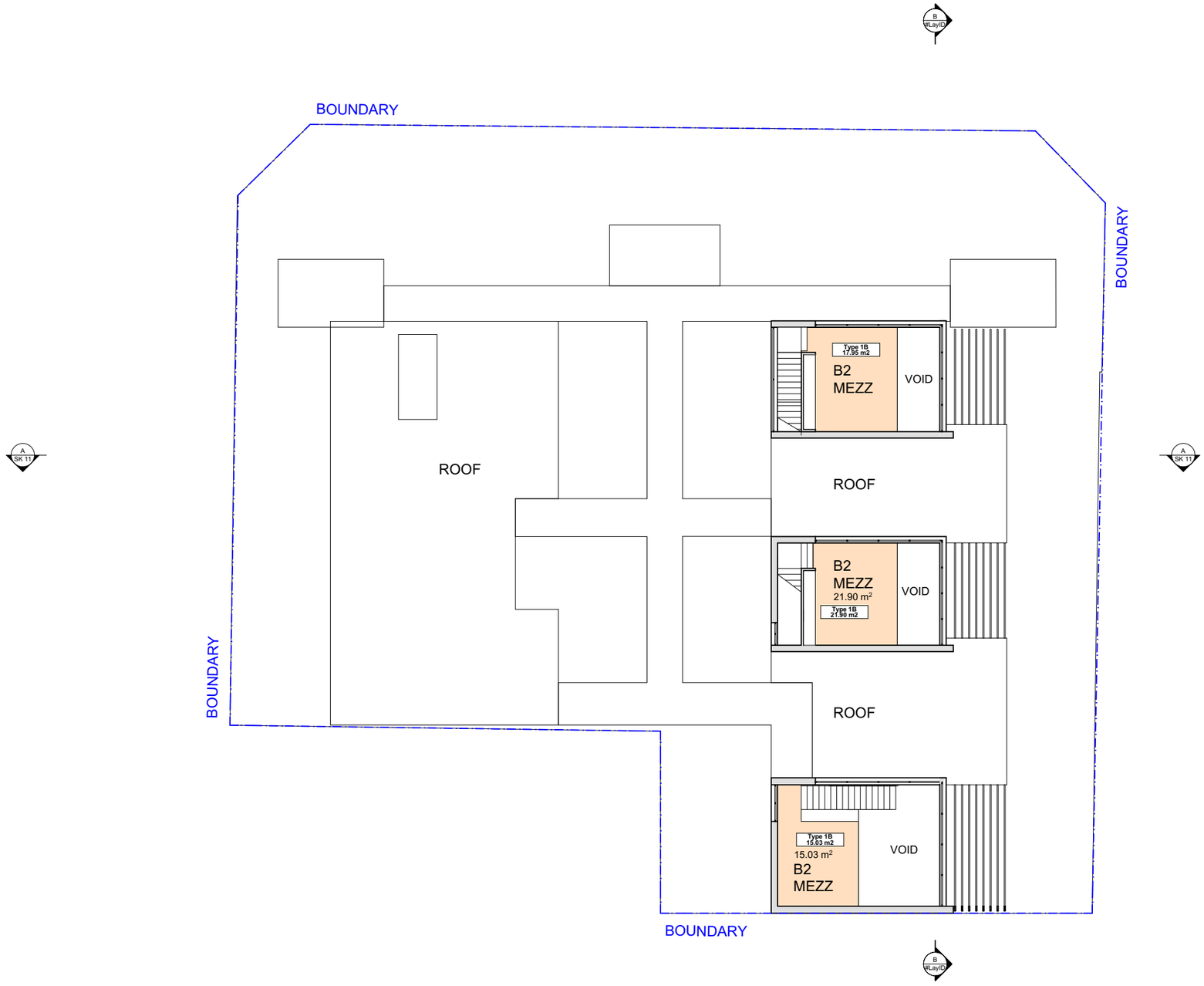

CONCEPTUAL PLAN

LEVEL 07 LOFT

FILE: 2014067_DA_CLEVELAND ST.pln

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LEVEL 07 LOFT FLOOR PLAN

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DRAWING NO: REV:
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SK 09 A

175 CLEVELAND ST REDFERN
DEVELOPMENT MATRIX

	UNIT MIX							GFA
	STUDIO	1 BED	**PENTHOUSE** 1 BED LOFT	**TH** 2 BEDS	2 BEDS	**PENTHOUSE** 2 BED LOFTS	TOTAL	
GROUND				3			3	255.28
LEVEL 1	4	3			1		8	572.91
LEVEL 2	6	5			1		12	650
LEVEL 3	6	5			1		12	650
LEVEL 4	6	5			1		12	650
LEVEL 5	6	5			1		12	650
LEVEL 6		2	1			2	5	336
TOTAL	28	25	1	3	5	2	64	3764.19
		26		10				
	43.8%	41%		11%				

CAR PARKING				TOTAL
RESIDENTS				
RATIO	0.2	0.4	0.8	
REQUIRED	5.6	10.4	8	24
TOTAL CAR PARKING REQUIRED				
RESIDENTS	24			
VISITORS	6			
COMMERCIAL	5			
	35 CARS			

SITE AREA	1060 m2	APPROX.
GFA PROPOSED		
RETAIL	230 m2	
RESIDENTIAL	0 m2	
TOTAL	230 m2	
PROPOSED FSR	0.22 :1	
ALLOWABLE FSR	3 :1	

DEVELOPMENT MATRIX

JPRA
JPR Architects Pty Ltd
Level 4, 50 Stanley Street
East Sydney NSW 2010
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Fax +61 2 9366 1100
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PLOTTED: 8/10/2014

SK 10 A

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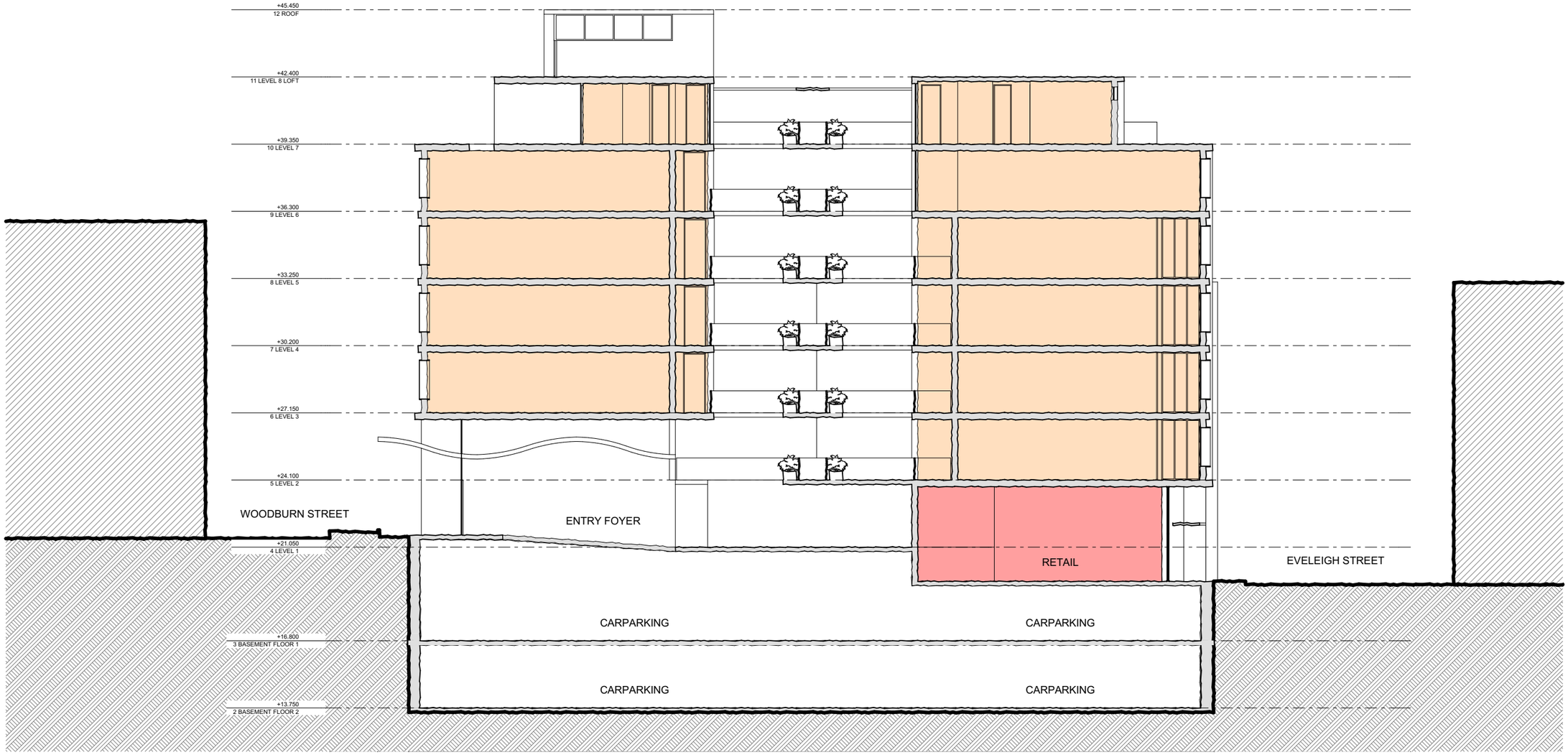

SECTION A

CONCEPTUAL SECTION

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Fax +61 2 9366 1100
ABN 52 255 091 003
www.jpra.com.au

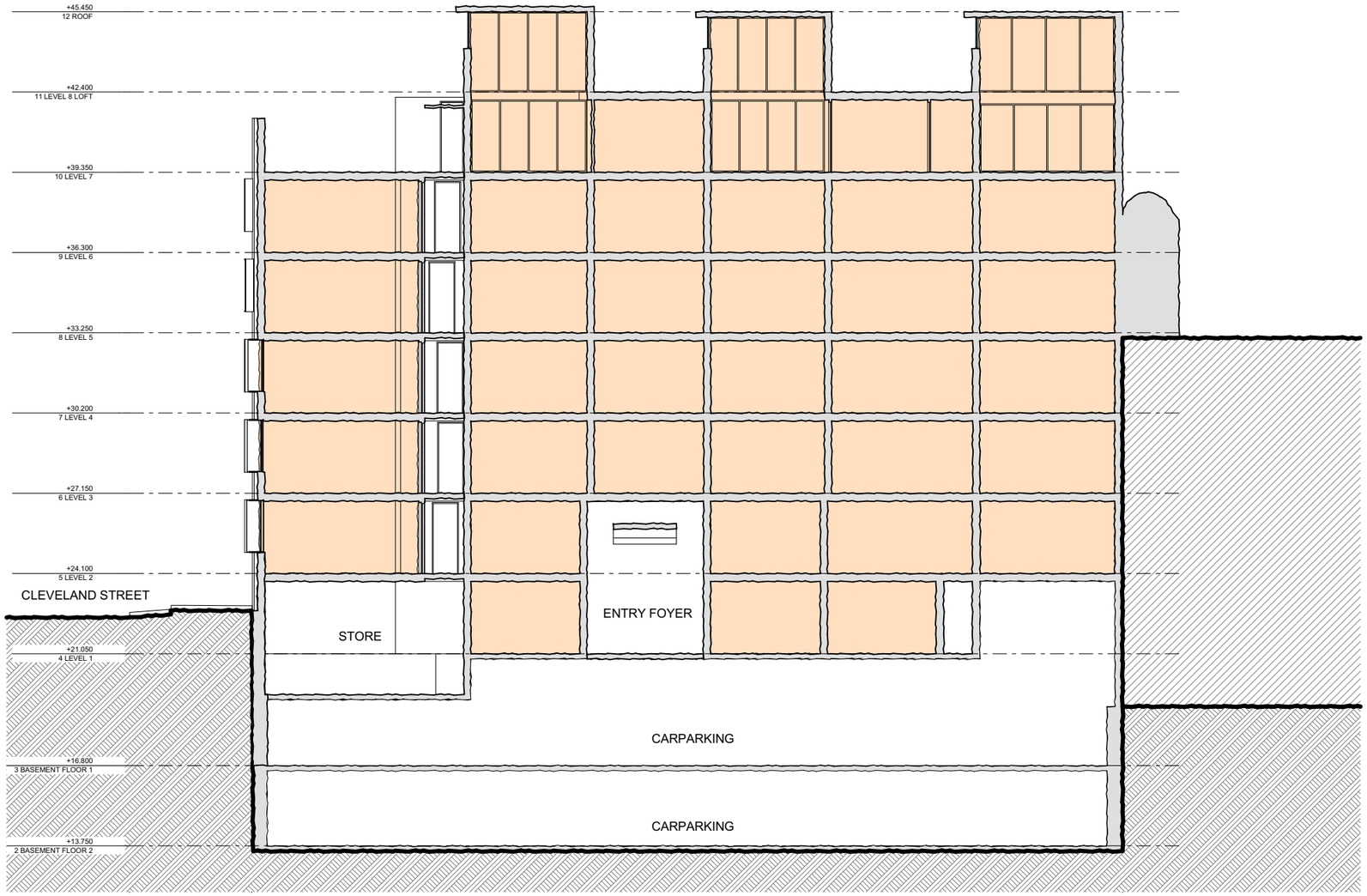
PROJECT:
175 CLEVELAND ST REDFERN

175 CLEVELAND ST
REDFERN NSW
DRAWING:
SECTION A

PROJECT NO: 2014067
DRAWN BY: RM,JC
SCALE: 1:200@A3
DRAWING NO: REV:
PLOTTED: 29/09/2014

SK 11 A

FILE: 2014067_SK3_CLEVELAND ST OPT 02_09.pln



SECTION B

CONCEPTUAL SECTION

JPR Architects Pty Ltd has prepared these concept plans from incomplete informaon and without measured survey plans of the site and without input from relevant consultants and therefore does not take responsibility for the accuracy of the output provided herein. Whilst every endeavour has been made to provide reliability in this document, the user must make their own enquiries as to the informaon contained herein before making any decisions based on this document.

0 2 4 6m

DRAWING NOT TO SCALE IF REPRODUCED

JPRA
JPR Architects Pty Ltd
Level 4, 50 Stanley Street
East Sydney NSW 2010
Tel +61 2 9366 1133
Fax +61 2 9366 1100
ABN 52 255 001 003
www.jpra.com.au

PROJECT:
175 CLEVELAND ST REDFERN

175 CLEVELAND ST
REDFERN NSW
DRAWING:
SECTION B

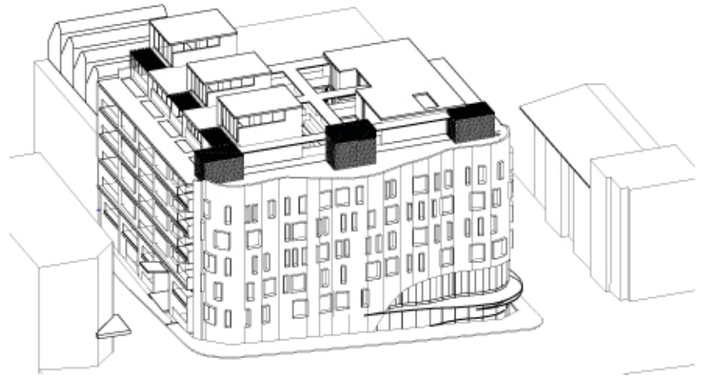
PROJECT NO: 2014067
DRAWN BY: RM,JC
SCALE: 1:2000 @A3
DRAWING NO: REV:
PLOTTED: 29/09/2014

SK 12 A

FILE: 2014067_SK3_CLEVELAND ST OPT 02_09.pln

8 am - 21 **JUNE**

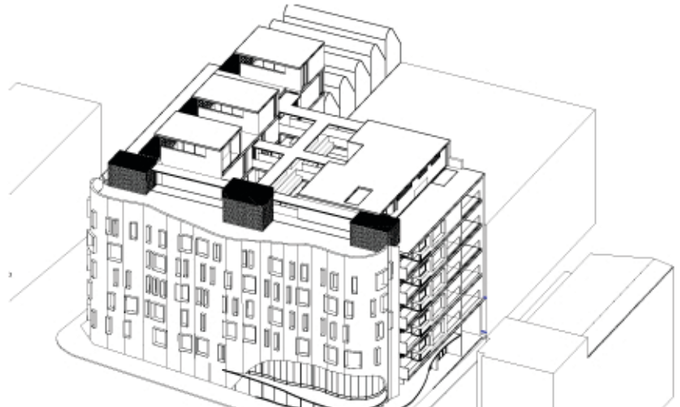
9 am - 21 **JUNE**



10 am - 21 **JUNE**

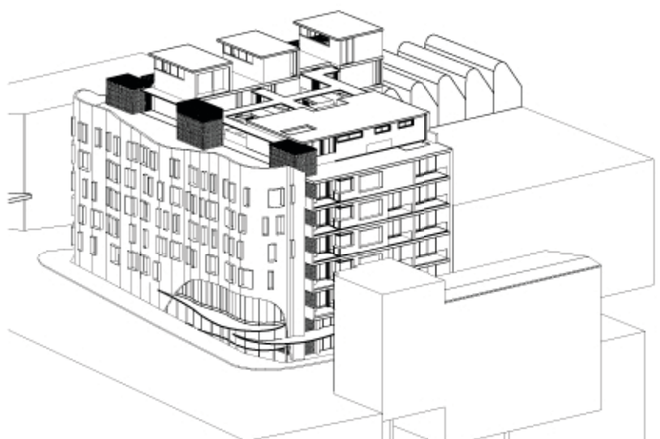
11 am - 21 **JUNE**

12 pm - 21 **JUNE**

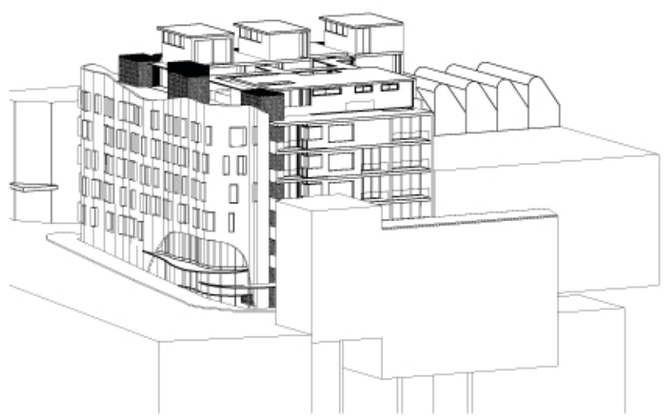


1 pm - 21 **JUNE**

2 pm - 21 **JUNE**



3 pm - 21 **JUNE**



4 pm - 21 **JUNE**

SUN EYE VIEWS

JPRA
JPR Architects Pty Ltd
Level 4, 50 Stanley Street
East Sydney NSW 2010
Tel +61 2 9380 1133
Fax +61 2 9380 1199
ABN 52 255 081 003
www.jpra.com.au

PROJECT:
175 CLEVELAND ST REDFERN

175 CLEVELAND ST
REDFERN NSW
DRAWING:
SUN EYE VIEWS

PROJECT NO: 2014067
DRAWN BY: RM,JC
SCALE: N.T.S. @A3
DRAWING NO: REV:
PLOTTED: 29/09/2014

SK 13 A

FILE: 2014067_SK3_CLEVELAND ST OPT 02_09.pln

Title I.L.U. SOLAR ANALYSIS (21 June) WINTER SOLSTICE

Legend			
0.5	SUNLIGHT TO WINDOW & BALCONY	REFER TO DRAWINGS NO.	

Floor level	Unit no.	Orientation	HOURS OF DAYLIGHT 8:00	8:30	9:00	9:30	10.00	10.30	11:00	11:30	12:00	12:30	13:00	13:30	14:00	14:30	15:00	15:30	16:00	8AM - 4PM Hours of Sunlight	8AM - 4PM Complying Units 3 hrs min	8AM - 4PM Hours of Sunlight	8AM - 4PM Complying Units 2 hrs min	8AM - 4PM Hours of Sunlight	8AM - 4PM Complying Units 1.5 hrs min	8.30AM - 3.30PM Hours of Sunlight	8.30AM - 3.30PM Complying Units 3 hrs min	8.30AM - 3.30PM Hours of Sunlight	8.30AM - 3.30PM Complying Units 2hrs min	8.30AM - 3.30PM Hours of Sunlight	8.30AM - 3.30PM Complying Units 1.5hrs min	9AM - 3PM Hours of Sunlight	9AM - 3PM Complying Units 3 hrs min	9AM - 3PM Hours of Sunlight	9AM - 3PM Complying Units 2hrs min	9AM - 3PM Hours of Sunlight	9AM - 3PM Complying Units 1.5hrs min
G	G.1		0.5	0.5																1	0	1	0	1	0	0.5	0	0.5	0	0.5	0	0	0	0	0	0	0
	G.2																			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	G.3																			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1.1		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5				7	1	7	1	7	1	6.5	1	6.5	1	6.5	1	6	1	6	1	6	1
	1.2		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5				7	1	7	1	7	1	6.5	1	6.5	1	6.5	1	6	1	6	1	6	1
	1.3		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5				7	1	7	1	7	1	6.5	1	6.5	1	6.5	1	6	1	6	1	6	1
	1.4		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5				7	1	7	1	7	1	6.5	1	6.5	1	6.5	1	6	1	6	1	6	1
	1.5		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5						6	1	6	1	6	1	5.5	1	5.5	1	5.5	1	5	1	5	1	5	1
	1.6												0.5	0.5	0.5	0.5				2	0	2	1	2	1	2	0	2	1	2	1	2	0	2	1	2	1
	1.7												0.5	0.5						1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0
	1.8														0.5	0.5				1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0
	1.9																			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	2.1				0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5				6	1	6	1	6	1	6	1	6	1	6	1	6	1	6	1	6	1
	2.2		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5				7	1	7	1	7	1	6.5	1	6.5	1	6.5	1	6	1	6	1	6	1
	2.3		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5				7	1	7	1	7	1	6.5	1	6.5	1	6.5	1	6	1	6	1	6	1
	2.4		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5				7	1	7	1	7	1	6.5	1	6.5	1	6.5	1	6	1	6	1	6	1
	2.5		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5						6	1	6	1	6	1	5.5	1	5.5	1	5.5	1	5	1	5	1	5	1
	2.6												0.5	0.5	0.5	0.5				2	0	2	1	2	1	2	0	2	1	2	1	2	0	2	1	2	1
	2.7												0.5	0.5	0.5	0.5				2	0	2	1	2	1	2	0	2	1	2	1	2	0	2	1	2	1
	2.8														0.5	0.5	0.5	0.5		2	0	2	1	2	1	1.5	0	1.5	0	1.5	1	1	0	1	0	1	0
	2.9		0.5	0.5	0.5	0.5														2	0	2	1	2	1	1.5	0	1.5	0	1.5	1	1	0	1	0	1	0
	2.10				0.5	0.5	0.5	0.5												2	0	2	1	2	1	2	0	2	1	2	1	2	0	2	1	2	1
	2.11																			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	2.12																			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	2.13																			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	3.1				0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5				6	1	6	1	6	1	6	1	6	1	6	1	6	1	6	1	6	1
	3.2		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5				7	1	7	1	7	1	6.5	1	6.5	1	6.5	1	6	1	6	1	6	1
	3.3		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5				7	1	7	1	7	1	6.5	1	6.5	1	6.5	1	6	1	6	1	6	1
	3.4		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5				7	1	7	1	7	1	6.5	1	6.5	1	6.5	1	6	1	6	1	6	1
	3.5		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5						6	1	6	1	6	1	5.5	1	5.5	1	5.5	1	5	1	5	1	5	1
	3.6												0.5	0.5	0.5	0.5	0.5			2.5	0	2.5	1	2.5	1	2.5	0	2.5	1	2.5	1	2	0	2	1	2	1
	3.7												0.5	0.5	0.5	0.5	0.5			2.5	0	2.5	1	2.5	1	2.5	0	2.5	1	2.5	1	2	0	2	1	2	1
	3.8														0.5	0.5	0.5			1.5	0	1.5	0	1.5	0	1.5	0	1.5	0	1.5	1	1	0	1	0	1	0
	3.9		0.5	0.5	0.5	0.5														2	0	2	1	2	1	1.5	0	1.5	0	1.5	1	1	0	1	0	1	0
	3.10				0.5	0.5	0.5	0.5												2	0	2	1	2	1	2	0	2	1	2	1	2	0	2	1	2	1
	3.11				0.5	0.5														1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0
	3.12				0.5	0.5	0.5	0.5												2	0	2	1	2	1	2	0	2	1	2	1	2	0	2	1	2	1
	3.13				0.5	0.5														1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0
4	4.1				0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5				6	1	6	1	6	1	6	1	6	1	6	1	6	1	6	1	6	1
	4.2		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5				7	1	7	1	7	1	6.5	1	6.5	1	6.5	1	6	1	6	1	6	1
	4.3		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5				7	1	7	1	7	1	6.5	1	6.5	1	6.5	1	6	1	6	1	6	1
	4.4		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5				7	1	7	1	7	1	6.5	1	6.5	1	6.5	1	6	1	6	1	6	1
	4.5		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5						6	1	6	1	6	1	5.5	1	5.5	1	5.5	1	5	1	5	1	5	1
	4.6												0.5	0.5	0.5	0.5	0.5	0.5		3	1	3	1	3	1	2.5	0	2.5	1	2.5	1	2	0	2	1	2	1
	4.7												0.5	0.5	0.5	0.5	0.5	0.5		3	1	3	1	3	1	2.5	0	2.5	1	2.5	1	2	0	2	1	2	1
	4.8														0.5	0.5	0.5	0.5		2	0	2	1	2	1	1.5	0	1.5	0	1.5	1	1	0	1	0	1	0
	4.9		0.5	0.5	0.5	0.5														2	0	2	1	2	1	1.5	0	1.5	0	1.5	1	1	0	1	0	1	0
	4.10		0.5	0.5	0.5	0.5	0.5	0.5												3	1	3	1	3	1	2.5	0	2.5	1	2.5	1	2	0	2	1	2	1
	4.11		0.5	0.5	0.5	0.5														2	0	2	1	2	1	1.5	0	1.5	0	1.5	1	1	0	1	0	1	0
	4.12		0.5	0.5	0.5	0.5	0.5	0.5												3	1	3	1	3	1	2.5	0	2.5	1	2.5	1	2	0	2	1	2	1
	4.13		0.5	0.5	0.5	0.5														2	0	2	1	2	1	1.5	0	1.5	0	1.5	1	1	0	1	0	1	0
5	5.1				0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5				6	1	6	1	6	1	6	1	6	1	6	1	6	1	6	1	6	1
	5.2		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5				7	1	7	1	7	1	6.5	1	6.5	1	6.5	1	6	1	6	1	6	1
	5.3		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5				7	1	7	1	7	1	6.5	1	6.5	1	6.5	1	6	1	6	1	6	1
	5.4		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5				7	1	7	1	7	1	6.5	1	6.5	1	6.5	1	6	1	6	1	6	1
	5.5		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5						6	1	6	1	6	1	5.5	1	5.5	1	5.5	1	5	1	5	1	5	1
	5.6												0.5	0.5	0.5	0.5	0.5	0.5		3	1	3	1	3	1	2.5	0	2.5	1	2.5	1	2	0	2	1	2	1
	5.7								0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5		5	1	5	1	5	1	4.5	1	4.5	1	4.5	1	4	1	4	1	4	1
	5.8		0.5	0.5	0.5	0.5														2	0	2	1	2	1	1.5	0	1.5	0	1.5	1	1	0	1	0	1	0
	5.9		0.5	0.5	0.5	0.5	0.5	0.5												3	1	3	1	3	1	2.5	0	2.5	1	2.5	1	2	0	2	1	2	1
	5.10		0.5	0.5	0.5	0.5	0.5	0.5												3	1	3	1	3	1	2.5	0	2.5	1	2.5	1	2	0	2	1	2	1
	5.11		0.5	0.5	0.5	0.5	0.5	0.5												3	1	3	1	3	1	2.5	0	2.5	1	2.5	1	2	0	2	1	2	1
	5.12		0.5	0.5	0.5	0.5	0.5	0.5												3	1	3	1	3	1	2.5	0	2.5	1	2.5	1	2	0	2	1	2	1
6	6.1				0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5		7	1	7	1	7	1	6.5	1	6.5	1	6.5	1	6	1	6	1	6	1
	6.2		0.5	0.5	0.5	0.5	0.5	0.5												3	1	3	1	3	1	2.5	0	2.5	1	2.5	1	2	0	2	1	2	1
	6.3		0.5	0.5	0.5	0.5	0.5	0.5												3	1	3	1	3	1	2.5	0	2.5	1	2.5	1	2	0	2	1	2	1
	6.4		0.5	0.5	0.5	0.5	0.5	0.5												3	1	3	1	3	1	2.5	0	2.5	1	2.5	1	2	0	2	1	2	1
TOTAL NUMBER OF UNITS	67																				39 58.21%		55 82.09%		56 83.58%		27 40.30%		47 70.15%		56 83.58%		27 40.30%		47 70.15%		47 70.15%

SOLAR ANALYSIS

JPR Architects Pty Ltd has prepared these concept plans from incomplete informaon and without measured survey plans of the site and without input from relevant consultants and therefore does not take responsibility for the accuracy of the output provided herein. Whilst every endeavour has been made to provide reliability in this document, the user must make their own enquiries as to the informaon contained herein before making any decisions based on this document.

JPR Architects Pty Ltd
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PROJECT:
175 CLEVELAND ST REDFERN

175 CLEVELAND ST
REDFERN NSW

DRAWING:
SOLAR ANALYSIS

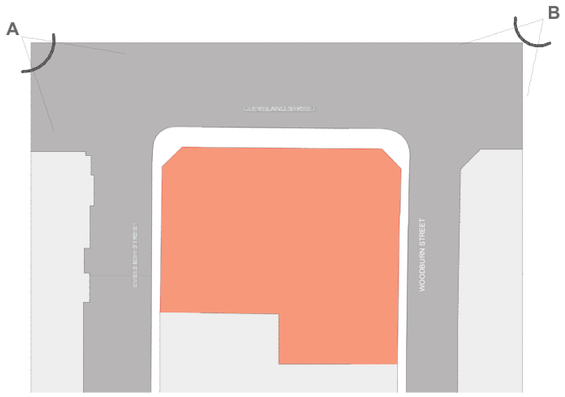
PROJECT NO: 2014067
DRAWN BY: RM,JC
SCALE: N.T.S. @A3
DRAWING NO: REV:
PLOTTED: 29/09/2014

SK 14 A

FILE: 2014067_SK3_CLEVELAND ST OPT 02_09.pln

VIEW A

VIEW B



URBAN ANALYSIS

FILE: 2014067_SK3_CLEVELAND ST OPT 02_09.pln

JPRA
JPR Architects Pty Ltd
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175 CLEVELAND ST
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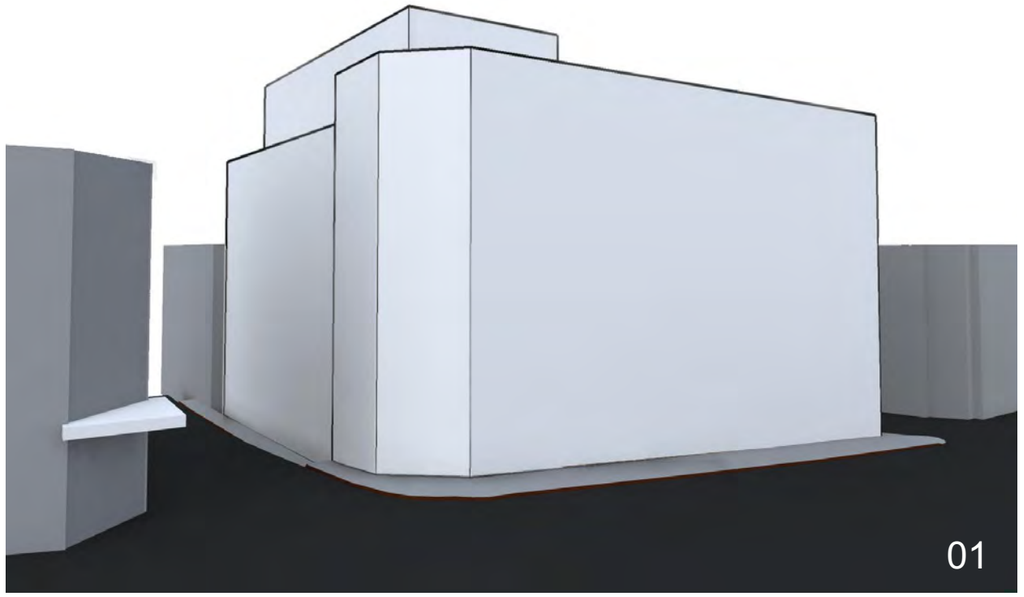
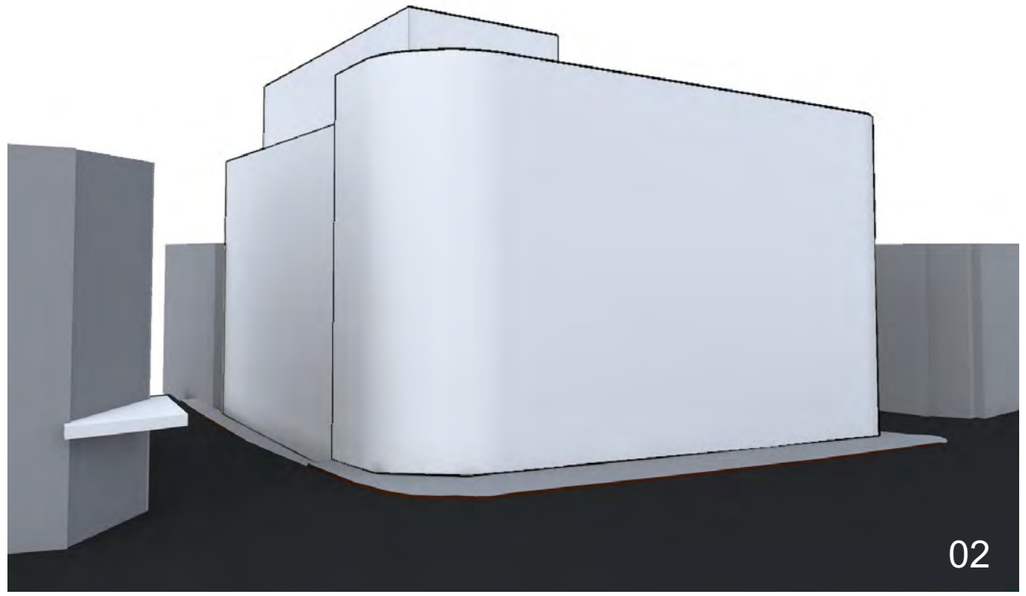
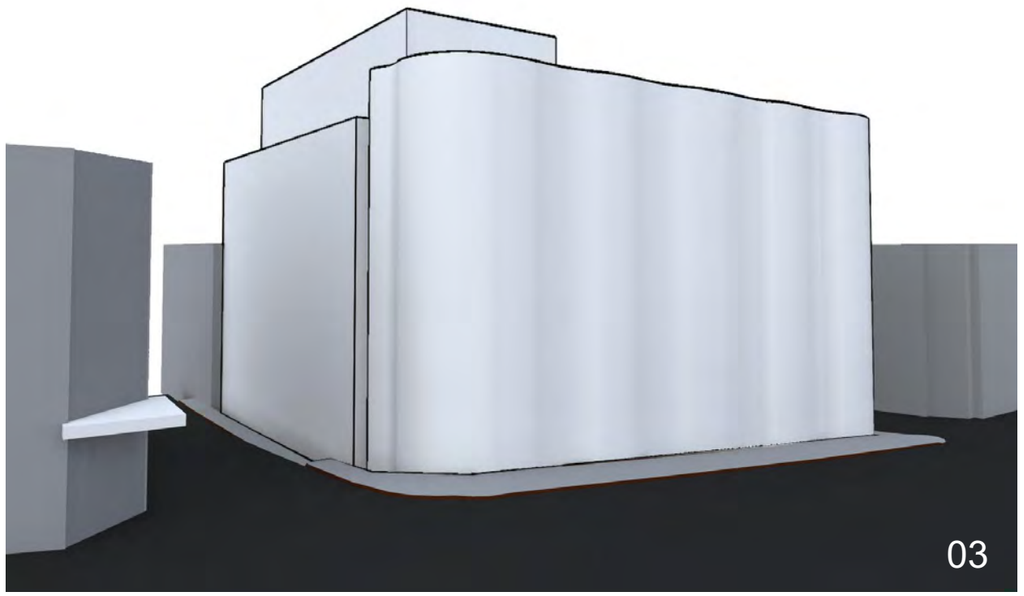
DRAWING:
URBAN ANALYSIS

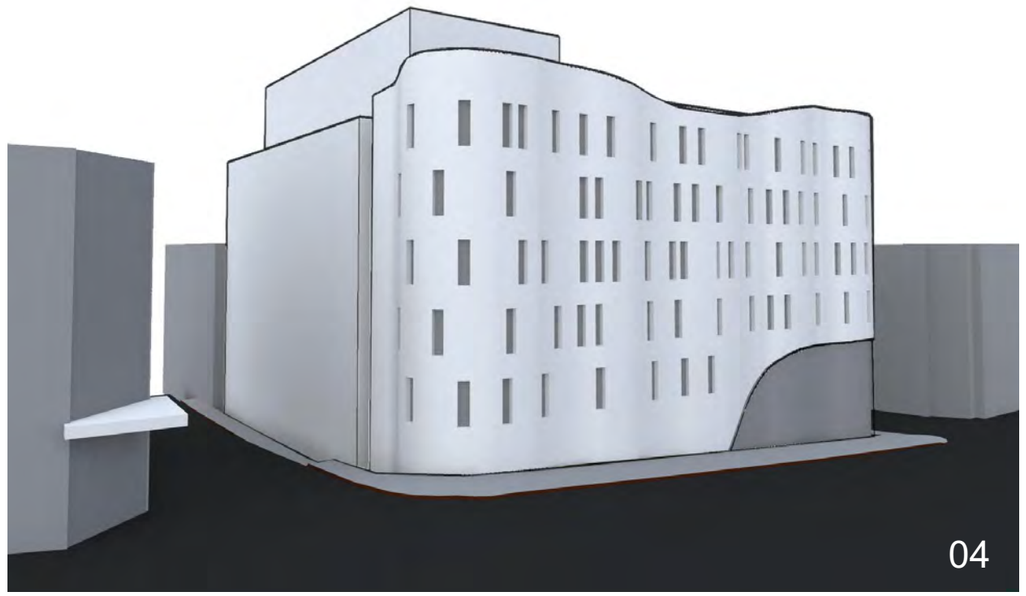
PROJECT NO: 2014067
DRAWN BY: RM,JC
SCALE: N.T.S. @A3
DRAWING NO: REV:
PLOTTED: 29/09/2014

SK 15 A









DIAGRAMMATIC MASSING

FILE: 2014067_SK3_CLEVELAND ST OPT 02_09.pln

JPRA
JPR Architects Pty Ltd
Level 4, 50 Stanley Street
East Sydney NSW 2010
Tel +61 2 9366 1133
Fax +61 2 9366 1100
ABN 52 255 001 003
www.jpra.com.au

PROJECT:
175 CLEVELAND ST REDFERN

175 CLEVELAND ST
REDFERN NSW
DRAWING:
DIAGRAMMATIC MASSING

PROJECT NO: 2014067
DRAWN BY: RM,JC
SCALE: N.T.S. @A3
DRAWING NO: REV:
PLOTTED: 29/09/2014

SK 16 A

ARTIST IMPRESSION

VIEW FROM CLEVELAND STREET

FILE: 2014067_SK3_CLEVELAND ST OPT 02_09.pln

JPRA

JPR Architects Pty Ltd
Level 4, 50 Stanley Street
East Sydney NSW 2010
Tel +61 2 9366 1133
Fax +61 2 9366 1100
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www.jpra.com.au

PROJECT:
175 CLEVELAND ST REDFERN

175 CLEVELAND ST
REDFERN NSW
DRAWING:
ARTIST IMPRESSION

PROJECT NO: 2014067
DRAWN BY: RM,JC
SCALE: N.T.S. @A3
DRAWING NO: REV:
PLOTTED: 29/09/2014

SK 17 A

PHOTOMONTAGE

FILE: 2014067_SK3_CLEVELAND ST OPT 02_09.pln

JPRA
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Level 4, 50 Stanley Street
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Tel +61 2 9366 1133
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PROJECT:
175 CLEVELAND ST REDFERN

175 CLEVELAND ST
REDFERN NSW
DRAWING:
PHOTOMONTAGE

PROJECT NO: 2014067
DRAWN BY: RM,JC
SCALE: N.T.S. @A3
DRAWING NO: REV:
PLOTTED: 29/09/2014

SK 18 A

APPENDIX B
Site Photographs

Photo 1: Site buildings located at 1-5 Woodburn Street, Redfern NSW.

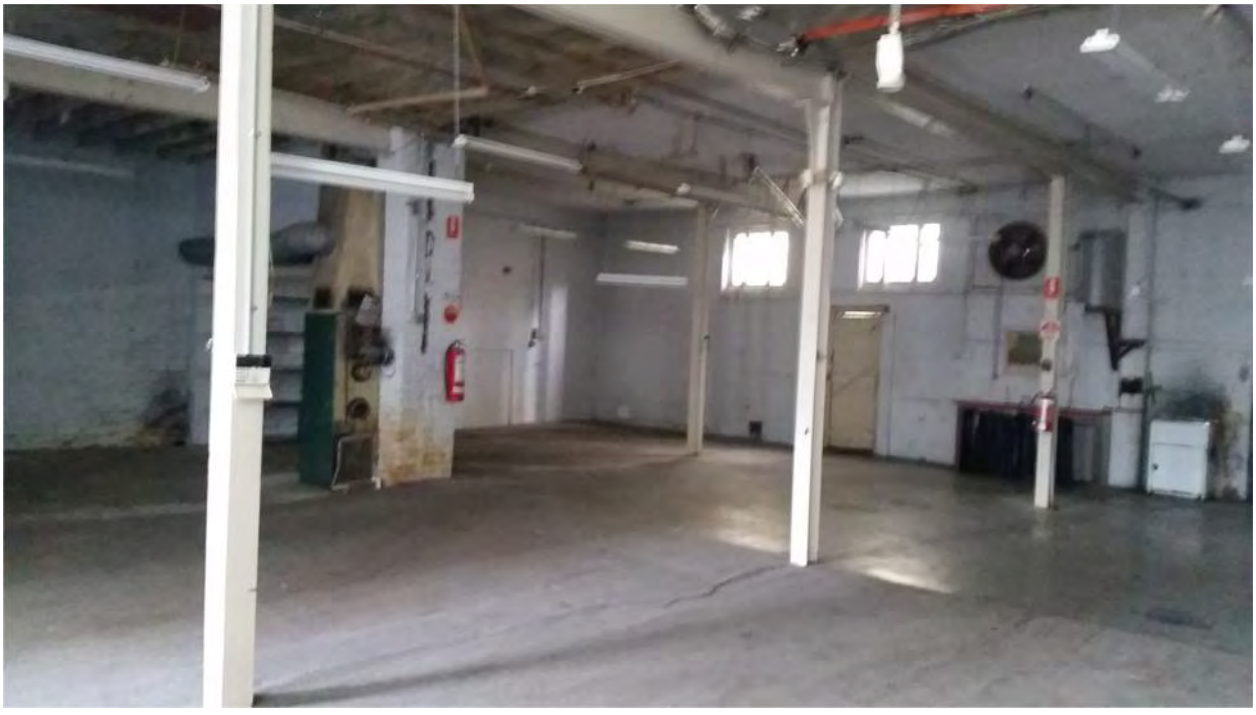


Photo 2: Ground floor level previously used for commercial printing activities.

Photo 3 and Photo 4: Hoist system located on the ground floor which was used to lift equipment onto the top floor via an opening (Photo 4).

Photo 5: Staining present on the ground floor level.

Photo 5: Staining associated with previous printing operations on the ground floor level.

Photo 5: Outdoor area located within the south west corner of the site, occupied by various waste materials.

APPENDIX C
Historical Property Titles Search

NSW Land & Property Information
A division of the Department of Finance & Services

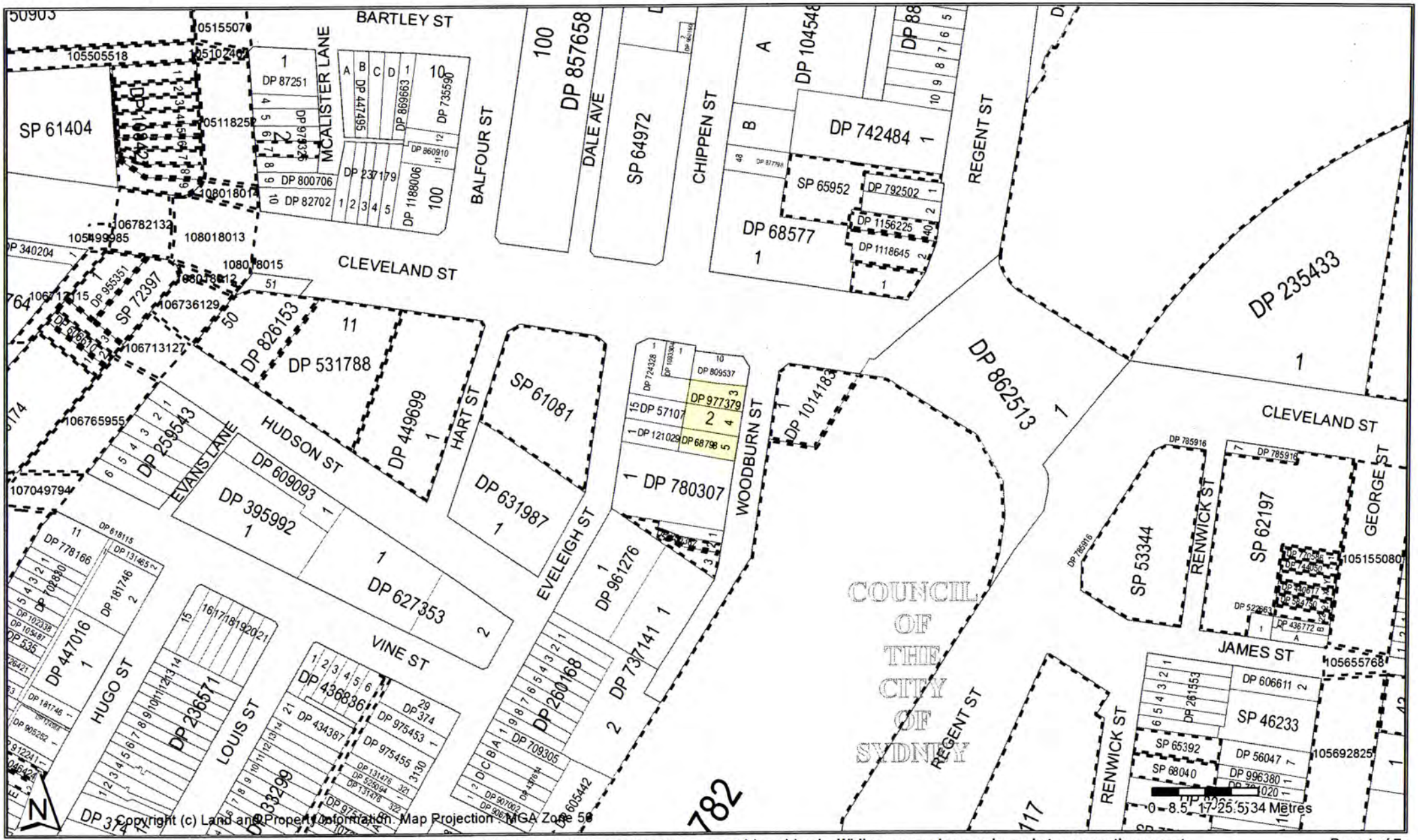
Cadastral Records Enquiry Report

Ref : MARK

Requested Parcel : Lot 4 Section 2 DP 977379

Identified Parcel : Lot 4 Section 2 DP 977379

Locality : REDFERN **LGA :** SYDNEY **Parish :** ALEXANDRIA **County :** CUMBERLAND



Report Generated 3:10:53 PM, 26 August, 2015

This information is provided as a searching aid only. While every endeavour is made to ensure the current cadastral pattern is accurately reflected, the Registrar General cannot guarantee the information provided. For all ACTIVITY PRIOR to SEPT 2002 you must refer to the RGs Charting and Reference Maps.

FRAME 1

3872 (4)

FP977379

See also Roll Plan 135 & 70(A)

— PLAN OF —

DE MESTRE'S SUBDIVISION OF 2.0.32 P. PART OF CHIPPENDALE ESTATE

Parish of Alexandria ; County of Cumberland

Scale: 30 feet to an Inch

CITY OF SYDNEY

Sold by Auction 1842

Prepared from Original Plan Cat 9d 21(W)

Early Title Appn 278

Q – 116 conveyance to P. De Mestre

W. Gray purchased De Mestre's land &c. 383·11 Remaining all lands of De Mestre re his Insolvent Estate numerous ags

Part of 95 ac Gt to Wm Chippendale 31st Aug. 1819

The property of W. Hutchinson Esq.

HART ST

YARNOLD ST

STREET

30.5.44.

Land hatched red resumed by Chief Commissioner for Railways and Tramways Vide G.G. 4th Feb'y 1911 Fos. 36 & 37 and L.T. 494432

AMENDMENTS AND/OR ADDITIONS NOTED ON PLAN IN REGISTRAR GENERAL'S OFFICE.

I, Bruce Richard Davies, Under Secretary for Lands and Registrar General for New South Wales, certify that this negative is a photograph made as a permanent record of a document in my custody this day.

20th August, 1984

ONE INCH SCALE

Plan Form No 5 (for Apps etc)

F P 68798 (E)

Municipality of City of Sydney.
Shire of
R.P.A. 18798

PLAN D.P. 68798 (6)

of lot 5 Section 2 Chippendale Estate

Parish of Alexandria County of Cumberland

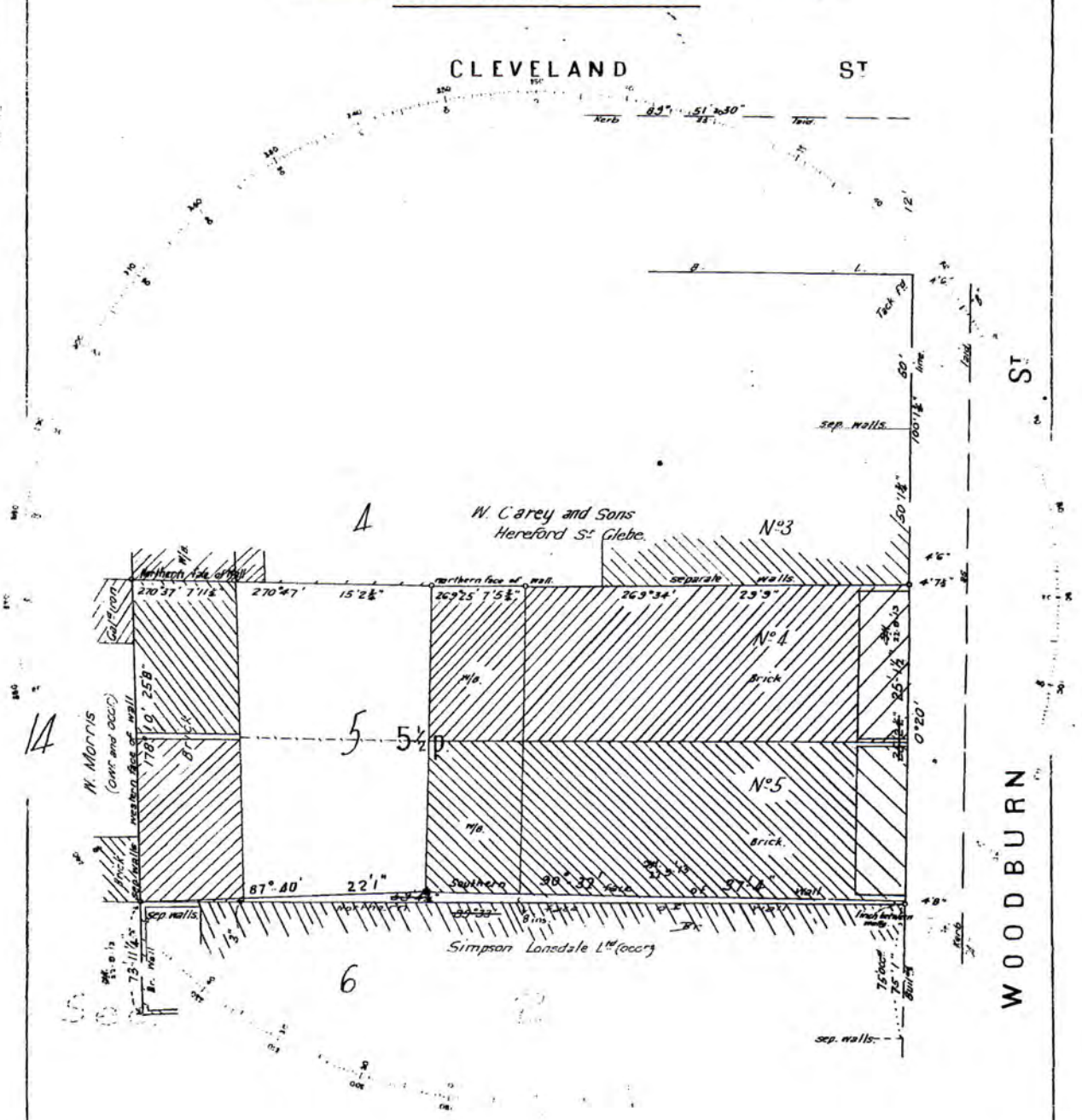
Scale 10 feet to an inch

CONVERSION TABLE ADDED IN REGISTRAR GENERAL'S DEPARTMENT

DP 68798

FEET	INCHES	METRES
-	3	0.076
-	8	0.203
3	2 3/8	0.975
4	6	1.372
4	7 1/2	1.410
4	8	1.422
7	5 3/4	2.280
7	11 1/4	2.419
12	-	3.658
15	2 3/4	4.692
20	-	6.096
22	1	6.731
22	9 1/8	6.937
25	1 1/2	7.658
25	8	7.823
29	9	9.068
37	4	11.379
47	-	14.326
50	-	15.240
50	1 3/4	15.284
51	-	15.545
59	4 1/2	18.098
73	11 1/4	22.536
75	-	22.860
75	1	22.885
100	1 3/4	30.524
178	-	54.254

AC	RD	P	SQ M
-	-	5 1/2	139.1



I Frederick Rupert Hardy of 375 George St Sydney
Licensed Surveyor, specially Licensed under the Real Property Act, do hereby solemnly and sincerely declare that the boundaries and measurements shown in this Plan are correct for the purposes of the said Act and that the survey of the land to which the plan relates has been made* under my immediate supervision and I make this solemn declaration conscientiously believing the same to be true, and by virtue of the provisions of the Oaths Act 1900

Subscribed and declared before me at
this 1st day of July A.D. 1913.

J P

Frederick Hardy
Licensed Surveyor

Date of Survey June 1913.

Datum line of Azimuth A B

* Where made by me or under my immediate supervision as the case may be

LAND AND PROPERTY INFORMATION NEW SOUTH WALES - HISTORICAL SEARCH

SEARCH DATE

26/8/2015 6:56PM

FOLIO: 3/2/977379

First Title(s): OLD SYSTEM
Prior Title(s): CA54684

Recorded	Number	Type of Instrument	C.T. Issue
11/9/1992	CA54684	CONVERSION ACTION	FOLIO CREATED EDITION 1
5/9/1997		AMENDMENT: LOCAL GOVT AREA	
14/3/2004	AA472866	DEPARTMENTAL DEALING	
17/4/2015	AJ411761	CAVEAT	

*** END OF SEARCH ***

LAND AND PROPERTY INFORMATION NEW SOUTH WALES - TITLE SEARCH

FOLIO: 3/2/977379

SEARCH DATE	TIME	EDITION NO	DATE
31/8/2015	5:27 PM	1	11/9/1992

LAND

LOT 3 OF SECTION 2 IN DEPOSITED PLAN 977379
AT CHIPPENDALE
LOCAL GOVERNMENT AREA SYDNEY
PARISH OF ALEXANDRIA COUNTY OF CUMBERLAND
TITLE DIAGRAM DP977379

FIRST SCHEDULE

LAUMARK PTY. LIMITED (CA54684)

SECOND SCHEDULE (5 NOTIFICATIONS)

---

1 RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S)
2 QUALIFIED TITLE. CAUTION PURSUANT TO SECTION 28J OF THE REAL PROPERTY ACT, 1900. ENTERED 11.9.1992 BK 3875 NO 701
3 LIMITED TITLE. LIMITATION PURSUANT TO SECTION 28T(4) OF THE REAL PROPERTY ACT, 1900. THE BOUNDARIES OF THE LAND COMPRISED HEREIN HAVE NOT BEEN INVESTIGATED BY THE REGISTRAR GENERAL.
4 BK 3875 NO 700 MORTGAGE TO NATIONAL AUSTRALIA BANK LIMITED
* 5 AJ411761 CAVEAT BY HIGH QUALITY BUILDING PTY LTD & HIGH QUALITY BUILDING NO 2 PTY LTD

NOTATIONS

NOTE: THE CERTIFICATE OF TITLE FOR THIS FOLIO OF THE REGISTER DOES NOT INCLUDE SECURITY FEATURES INCLUDED ON COMPUTERISED CERTIFICATES OF TITLE ISSUED FROM 4TH JANUARY, 2004. IT IS RECOMMENDED THAT STRINGENT PROCESSES ARE ADOPTED IN VERIFYING THE IDENTITY OF THE PERSON(S) CLAIMING A RIGHT TO DEAL WITH THE LAND COMPRISED IN THIS FOLIO.
UNREGISTERED DEALINGS: DM AJ734893 T AJ734894.

*** END OF SEARCH ***

mg PRINTED ON 31/8/2015

LAND AND PROPERTY INFORMATION NEW SOUTH WALES - HISTORICAL SEARCH

SEARCH DATE

26/8/2015 6:56PM

FOLIO: 4/2/977379

First Title(s): OLD SYSTEM
Prior Title(s): CA54684

Recorded	Number	Type of Instrument	C.T. Issue
11/9/1992	CA54684	CONVERSION ACTION	FOLIO CREATED EDITION 1
5/9/1997		AMENDMENT: LOCAL GOVT AREA	
14/3/2004	AA472866	DEPARTMENTAL DEALING	
17/4/2015	AJ411761	CAVEAT	

*** END OF SEARCH ***

LAND AND PROPERTY INFORMATION NEW SOUTH WALES - TITLE SEARCH

FOLIO: 4/2/977379

SEARCH DATE	TIME	EDITION NO	DATE
31/8/2015	5:27 PM	1	11/9/1992

LAND

LOT 4 OF SECTION 2 IN DEPOSITED PLAN 977379
AT CHIPPENDALE
LOCAL GOVERNMENT AREA SYDNEY
PARISH OF ALEXANDRIA COUNTY OF CUMBERLAND
TITLE DIAGRAM DP977379

FIRST SCHEDULE

LAUMARK PTY. LIMITED (CA54684)

SECOND SCHEDULE (5 NOTIFICATIONS)

---

1 RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S)
2 QUALIFIED TITLE. CAUTION PURSUANT TO SECTION 28J OF THE REAL PROPERTY ACT, 1900. ENTERED 11.9.1992 BK 3875 NO 701
3 LIMITED TITLE. LIMITATION PURSUANT TO SECTION 28T(4) OF THE REAL PROPERTY ACT, 1900. THE BOUNDARIES OF THE LAND COMPRISED HEREIN HAVE NOT BEEN INVESTIGATED BY THE REGISTRAR GENERAL.
4 BK 3875 NO 700 MORTGAGE TO NATIONAL AUSTRALIA BANK LIMITED
* 5 AJ411761 CAVEAT BY HIGH QUALITY BUILDING PTY LTD & HIGH QUALITY BUILDING NO 2 PTY LTD

NOTATIONS

NOTE: THE CERTIFICATE OF TITLE FOR THIS FOLIO OF THE REGISTER DOES NOT INCLUDE SECURITY FEATURES INCLUDED ON COMPUTERISED CERTIFICATES OF TITLE ISSUED FROM 4TH JANUARY, 2004. IT IS RECOMMENDED THAT STRINGENT PROCESSES ARE ADOPTED IN VERIFYING THE IDENTITY OF THE PERSON(S) CLAIMING A RIGHT TO DEAL WITH THE LAND COMPRISED IN THIS FOLIO.
UNREGISTERED DEALINGS: DM AJ734893 T AJ734894.

*** END OF SEARCH ***

mg PRINTED ON 31/8/2015

LAND AND PROPERTY INFORMATION NEW SOUTH WALES - HISTORICAL SEARCH

SEARCH DATE
26/8/2015 6:57PM

FOLIO: 5/68798

First Title(s): SEE PRIOR TITLE(S)
Prior Title(s): VOL 4975 FOL 63

Recorded	Number	Type of Instrument	C.T. Issue
18/12/1988		TITLE AUTOMATION PROJECT	LOT RECORDED FOLIO NOT CREATED
24/4/1990		CONVERTED TO COMPUTER FOLIO	FOLIO CREATED CT NOT ISSUED
24/7/1991	Z803518	DEPARTMENTAL DEALING	
19/6/1992	E541227	TRANSFER	
19/6/1992	E541228	MORTGAGE	EDITION 1
4/9/1997		AMENDMENT: LOCAL GOVT AREA	
14/3/2004	AA472866	DEPARTMENTAL DEALING	
17/4/2015	AJ411761	CAVEAT	

*** END OF SEARCH ***

LAND AND PROPERTY INFORMATION NEW SOUTH WALES - TITLE SEARCH

FOLIO: 5/68798

SEARCH DATE	TIME	EDITION NO	DATE
31/8/2015	5:27 PM	1	19/6/1992

LAND

LOT 5 IN DEPOSITED PLAN 68798
AT CHIPPENDALE
LOCAL GOVERNMENT AREA SYDNEY
PARISH OF ALEXANDRIA COUNTY OF CUMBERLAND
TITLE DIAGRAM DP68798

FIRST SCHEDULE

LAUMARK PTY LIMITED (T E541227)

SECOND SCHEDULE (4 NOTIFICATIONS)

---

1 RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S)
2 H381143 COVENANT
3 E541228 MORTGAGE TO NATIONAL AUSTRALIA BANK LIMITED
* 4 AJ411761 CAVEAT BY HIGH QUALITY BUILDING PTY LTD & HIGH QUALITY BUILDING NO 2 PTY LTD

NOTATIONS

NOTE: THE CERTIFICATE OF TITLE FOR THIS FOLIO OF THE REGISTER DOES NOT INCLUDE SECURITY FEATURES INCLUDED ON COMPUTERISED CERTIFICATES OF TITLE ISSUED FROM 4TH JANUARY, 2004. IT IS RECOMMENDED THAT STRINGENT PROCESSES ARE ADOPTED IN VERIFYING THE IDENTITY OF THE PERSON(S) CLAIMING A RIGHT TO DEAL WITH THE LAND COMPRISED IN THIS FOLIO.
UNREGISTERED DEALINGS: DM AJ734892 T AJ734894.

*** END OF SEARCH ***

APPENDIX D
NSW WorkCover Dangerous Goods Search

APPENDIX E
Borehole Logs

BOREHOLE: BH1M

Environmental Investigations Australia
Contamination | Remediation | Geotechnical

Project	Proposed Mixed Use Development			Sheet	1 OF 1
Location	1-5 Woodburn Street, Redfern	East	333597.7 m	Date Started	9/9/15
Position	Refer to Figure 2	North	6248664.0 m MGA94 Zone 56	Date Completed	9/9/15
Job No.	E22434	Contractor	HartGeo	Logged JS	Date: 9/9/15
Client	Platimum Resturant Group Pty Ltd	Drill Rig	Ute Mounted Rig	Checked JS	Date:18/9/15
		Inclination	-90°		

Drilling					Sampling		Field Material Description						
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	PIEZOMETER DETAILS ID / Static Water Level
DT	-		0	0.10	BH1M_0.1-0.2 D 0.10-0.20 m PID = 0.3 ppm			-	CONCRETE: 100mm thick.	-		BH1M
								-	FILL: Gravelly SAND; fine grained, brown to orange, with sub-angular gravel, no odour.	D		
				0.60	BH1M_0.5-0.6 D 0.50-0.60 m PID = 0.5 ppm			CL-CH	Sandy CLAY; pale brown with orange mottles, with fine grained sand, medium to high plasticity, ironstone nodules from 1.3 m bgl, no odour.			
			1		BH1M_1.0-1.2 D 1.00-1.20 m PID = 1.4 ppm							
				1.50	BH1M_1.4-1.5 D 1.40-1.50 m PID = 0.9 ppm			SC	Silty CLAY; pale grey to brown, with ironstone mottles, grading to red-brown clay with depth, medium to high plasticity, no odour.			
AD/T	E		2									
			3									
			4							M - W		
			5	5.00				-	SHALE; brown, extremely weathered, no odour.			
			6									
			7									
			8	8.00					Hole Terminated at 8.00 m Borehole coverted into monitoring well.			
			9									
			10									

PIEZOMETER DETAILS: Concrete Gatic Cover; Cuttings; Bentonite; 1 x 50 mm uPVC Casing; Sand; 1 x 50 mm uPVC Screen

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

BOREHOLE: BH2

Environmental Investigations Australia
Contamination | Remediation | Geotechnical

Project	Proposed Mixed Use Development				
Location	1-5 Woodburn Street, Redfern	East	333586.4 m	Sheet	1 OF 1
Position	Refer to Figure 2	North	6248660.4 m MGA94 Zone 56	Date Started	9/9/15
Job No.	E22434	Contractor	N/A	Date Completed	9/9/15
Client	Platimum Resturant Group Pty Ltd	Drill Rig	Hand Auger	Logged JS	Date: 9/9/15
		Inclination	-90°	Checked JS	Date: 18/9/15

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
DT	-		0	0.20				-	CONCRETE: 200mm thick.	-		CONCRETE HARDSTAND
HA	H	GWNE	1	0.70	BH2_0.2-0.3 D 0.20-0.30 m PID = 0.2 ppm			-	FILL: Gravelly SAND; fine grained, pale brown to grey, gravel is sub-angular, grading to dark brown with depth, no odour.			FILL
				1.00	BH2_0.5-0.6 D 0.50-0.60 m PID = 0.3 ppm			-	FILL: Gravelly SAND; fine grained, pale white to grey, gravel is angular, piece of metal present, weak to moderate solvent / paint odour.			
				1.50	BH2_0.7-0.8 D 0.70-0.80 m PID = 0.6 ppm			-	Fill: Gravelly SAND; fine grained, dark black to brown, gravel is sub-angular, ash layer at 1.2 m bgl, moderate hydrocarbon odour.			
					BH2_1.4-1.5 D 1.40-1.50 m PID = 0.4 ppm				Hole Terminated at 1.50 m Refusal.			

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

BOREHOLE: BH3

Environmental Investigations Australia
Contamination | Remediation | Geotechnical

Project	Proposed Mixed Use Development			Sheet	1 OF 1
Location	1-5 Woodburn Street, Redfern	East	333592.9 m	Date Started	9/9/15
Position	Refer to Figure 2	North	6248674.3 m MGA94 Zone 56	Date Completed	9/9/15
Job No.	E22434	Contractor	N/A	Logged JS	Date: 9/9/15
Client	Platimum Resturant Group Pty Ltd	Drill Rig	Hand Auger	Checked JS	Date: 18/9/15
		Inclination	-90°		

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
DT	-		0	0.10				-	CONCRETE: 100mm thick.	-		CONCRETE HARDSTAND
HA	H	GWNE			BH3_0.1-0.2 D 0.10-0.20 m PID = 0.3 ppm			-	FILL: Gravelly SAND; fine grained, dark brown, with sub-angular gravel, potential asbestos containing material at 0.4 m bgl, no odour.	D		FILL
				0.60	BH3_0.5-0.6 D 0.50-0.60 m PID = 0.3 ppm				Hole Terminated at 0.60 m Refusal.			
			1									
			2									
			3									
			4									
			5									
			6									
			7									
			8									
			9									
			10									

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

BOREHOLE: BH4

Environmental Investigations Australia
Contamination | Remediation | Geotechnical

Project	Proposed Mixed Use Development				
Location	1-5 Woodburn Street, Redfern	East	333597.6 m	Sheet	1 OF 1
Position	Refer to Figure 2	North	6248683.1 m MGA94 Zone 56	Date Started	9/9/15
Job No.	E22434	Contractor	N/A	Date Completed	9/9/15
Client	Platimum Resturant Group Pty Ltd	Drill Rig	Hand Auger	Logged JS	Date: 9/9/15
		Inclination	-90°	Checked JS	Date: 18/9/15

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
DT	-	GWNE	0	0.20				-	CONCRETE: 200mm thick.	-		CONCRETE HARDSTAND
HA	H			0.40	BH4_0.1-0.2 D 0.10-0.20 m PID = 0.3 ppm BH4_0.3-0.4 D 0.30-0.40 m PID = 0.4 ppm			-	FILL: Gravelly SAND; light brown, with sub-angular gravel and cobbles, no odour.	D		FILL
									Hole Terminated at 0.40 m Refusal.			
			1									
			2									
			3									
			4									
			5									
			6									
			7									
			8									
			9									
			10									

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

BOREHOLE: BH5

Environmental Investigations Australia
Contamination | Remediation | Geotechnical

Project	Proposed Mixed Use Development			Sheet	1 OF 1
Location	1-5 Woodburn Street, Redfern	East	333599.0 m	Date Started	9/9/15
Position	Refer to Figure 2	North	6248682.7 m MGA94 Zone 56	Date Completed	9/9/15
Job No.	E22434	Contractor	N/A	Logged JS	Date: 9/9/15
Client	Platimum Resturant Group Pty Ltd	Drill Rig	Hand Auger	Checked JS	Date: 18/9/15
		Inclination	-90°		

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
DT	-	GWNE	0	0.20				-	CONCRETE: 200mm thick.	-		CONCRETE HARDSTAND
HA	M				BH5_0.1-0.2 D 0.10-0.20 m PID = 0.3 ppm			-	FILL: Gravelly SAND; fine to medium grained, with sub-angular gravel, no odour.	D		FILL
				0.50 0.60	BH5_0.5-0.6 S 0.50-0.60 m PID = 0.4 ppm			-	Fill: Sandy Clay; fine grained, brown to black, medium plasticity, no odour.			
			1						Hole Terminated at 0.60 m Refusal.			
			2									
			3									
			4									
			5									
			6									
			7									
			8									
			9									
			10									

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

Environmental Investigations Australia
Contamination | Remediation | Geotechnical

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

DRILLING/EXCAVATION METHOD

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

PENETRATION/EXCAVATION RESISTANCE

L **Low resistance.** Rapid penetration/ excavation possible with little effort from equipment used.

M **Medium resistance.** Penetration/ excavation possible at an acceptable rate with moderate effort from equipment used.

H **High resistance.** Penetration/ excavation is possible but at a slow rate and requires significant effort from equipment used.

R **Refusal/ Practical Refusal.** No further progress possible without risk of damage or unacceptable wear to equipment used.

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

WATER

Water level at date shown

Water inflow

Partial water loss

Complete water loss

GROUNDWATER NOT OBSERVED — Observation of groundwater, whether present or not, was not possible due to drilling water, surface seepage or cave-in of the borehole/ test pit.

GROUNDWATER NOT ENCOUNTERED — Borehole/ test pit was dry soon after excavation. However, groundwater could be present in less permeable strata. Inflow may have been observed had the borehole/ test pit been left open for a longer period.

SAMPLING AND TESTING

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

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

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

ROCK CORE RECOVERY

TCR = Total Core Recovery (%)

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

SCR = Solid Core Recovery (%)

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

RQD = Rock Quality Designation (%)

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

MATERIAL BOUNDARIES

———— = inferred boundary

- - - - - - - - = probable boundary

— ?— ?— ?— ? = possible boundary

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METHOD OF SOIL DESCRIPTION USED ON BOREHOLE AND TEST PIT LOGS

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

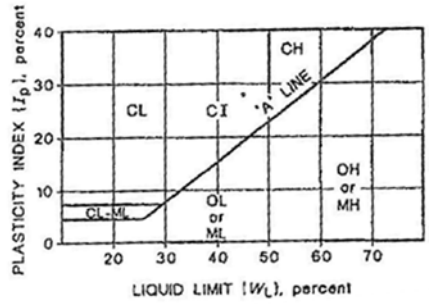
CLASSIFICATION AND INFERRED STRATIGRAPHY

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

PARTICLE SIZE CHARACTERISTICS

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

PLASTICITY PROPERTIES



USCS SYMBOLS

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

MOISTURE CONDITION

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

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

CONSISTENCY

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

DENSITY

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

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

MINOR COMPONENTS

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

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TERMS FOR ROCK MATERIAL STRENGTH AND WEATHERING

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

STRENGTH

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

 # Rock Strength Test Results

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

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

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

ROCK MATERIAL WEATHERING

Symbol		Term	Field Guide
RS		Residual Soil	Soil developed on extremely weathered rock; the mass structure and substance fabric are no longer evident; there is a large change in volume but the soil has not been significantly transported.
EW		Extremely Weathered	Rock is weathered to such an extent that it has soil properties - i.e. it either disintegrates or can be remoulded, in water.
DW	HW	Distinctly Weathered	Rock strength usually changed by weathering. The rock may be highly discoloured, usually by iron staining. Porosity may be increased by leaching, or may be decreased due to deposition of weathering products in pores. In some environments it is convenient to subdivide into Highly Weathered and Moderately Weathered, with the degree of alteration typically less for MW.
	MW		
SW		Slightly Weathered	Rock slightly discoloured but shows little or no change of strength relative to fresh rock.
FR		Fresh	Rock shows no sign of decomposition or staining.

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ABBREVIATIONS AND DESCRIPTIONS FOR ROCK MATERIAL AND DEFECTS

CLASSIFICATION AND INFERRED STRATIGRAPHY

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

ROCK MATERIAL DESCRIPTION

Layering

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

Structure

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

ABBREVIATIONS AND DESCRIPTIONS FOR DEFECT TYPES

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

ABBREVIATIONS AND DESCRIPTIONS FOR DEFECT SHAPE AND ROUGHNESS

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

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

ABBREVIATIONS AND DESCRIPTIONS FOR DEFECT COATING

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

DEFECT APERTURE

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

APPENDIX F
Field Data Sheets

ENVIRONMENTAL INVESTIGATIONS
Suite 6.01, 55 Miller Street, Pyrmont NSW 2009
Tel: 02 9516 0722 Fax: 02 9518 5088
E-mail: service@eiaustralia.com.au
Web: www.eiaustralia.com.au

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CALIBRATION CERTIFICATE FOR PHOTO IONISATION DETECTOR

Instrument: Mini RAE Plus PID / Mini RAE 3000

Instrument Conditions: Good

EI Serial Number: 102736 (Mini RAE PLUS) / 592-906667 (Mini RAE 3000)

Calibration gas species: Iso-butylene.

Calibration gas concentration: 100 ppm, balance Zero air.

Gas bottle number: 02

This' PID has been referenced to Benzene so that the concentration is displayed as

100.1 ppm at 100 span setting.

The PID is initially zero calibrated.

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

Cylinder certificate is available upon request.

Signed: [signature]

Date: 08-09-15

APPENDIX G
Chain of Custody and Sample Receipt Forms

Sheet 1 of 2

Site: 1-5 Woodburn Street, Redfern

Project No: E22434

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

Sample ID	Laboratory ID	Container Type	Sampling Date	Sampling Time	Sample Matrix: WATER	SOIL	OTHERS (i.e. Fibro, Paint, etc.)	Analysis: HM[A] /TRH/BTEX/PAHs OCP/OP/PCB/Asbestos	HM[A] /TRH/BTEX/PAHs	HM[A] /TRH/BTEX	TRH/BTEX/Lead	TRH/BTEX	PAHs	VOCs	Asbestos	pH / CEC (cation exchange)	pH / EC (electrical conductivity)	sPOCAS	HM[A]/TRH/BTEX/PAH/OCP/OP/PCB	HoLd		TCLP PAHs	TCLP HM[A]	TCLP HM[B]
BH1-0.1-0.2	1	J,ZLB	9-9-15	AM		X		X																
BH1-0.5-0.6		J																		X				
BH1-1.0-1.2	2	J							X															
BH1-1.4-1.5		J																		X				
BH2-0.2-0.3	3	J,ZLB						X																
BH2-0.5-0.6		J																		X				
BH2-0.7-0.8	4	J							X															
BH2-1.4-1.5		J																		X				
BH3-0.1-0.2	5	J,ZLB																	X					
BH3-0.5-0.8	6	J							X						X									
BH4-0.1-0.2	7	J,ZLB						X																
BH4-0.3-0.4		J	↓	↓		↓														X				

SGS Alexandria Environmental
SE143465 COC
Received: 10 – Sep – 2015

Comments

HM[A]
Arsenic
Cadmium
Chromium
Copper
Lead
Mercury
Nickel
ZinC

HM[B]
Arsenic
Cadmium
Chromium
Lead
Mercury
Nickel

LABORATORY TURNAROUND

- ☐ Standard
- ☐ 24 Hours
- ☐ 48 Hours
- ☒ 72 Hours
- ☐ Other_____

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

Sampler's Comments:

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

Sampler's Name (EI):	Received by (SGS):
Print: Jessie Sixsmith	Print: Priscilla Tourancy
Signature:	Signature:
Date: 10-09-15	Date: 10/9/15 @ 1530.

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

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

Sheet 2 of 2

Site: 1-5 Woodburn Street, Redfern

Project No: E22434

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

Sample ID	Laboratory ID	Container Type	Sampling Date	Sampling Time	Sample Matrix: WATER	SOIL	OTHERS (i.e. Fibro, Paint, etc.)	Analysis: HM [A] /TRH/BTEX/PAHs OCP/OP/PCB/Asbestos	HM [A] /TRH/BTEX/PAHs	HM [A] /TRH/BTEX	TRH/BTEX/Lead	TRH/BTEX	PAHs	VOCs	Asbestos	pH / CEC (cation exchange)	pH / EC (electrical conductivity)	sPOCAS	BTEX	Hold		TCLP PAHs	TCLP HM [A]	TCLP HM [B]
BHS-0.1-0.2	8	J, ZLB	9-9-15	Am		X		X																
BHS-0.5-0.6		J				X														X				
QD-01	9	J				X				X														
QR-01	10	P, VC, S			X					X														
Trip blank	11	J				X													X					
Trip Spike	12	VC				X													X					

Comments

HM [A]
Arsenic
Cadmium
Chromium
Copper
Lead
Mercury
Nickel
ZinC

HM [B]
Arsenic
Cadmium
Chromium
Lead
Mercury
Nickel

LABORATORY TURNAROUND

- ☐ Standard
- ☐ 24 Hours
- ☐ 48 Hours
- ☒ 72 Hours
- ☐ Other_____

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

Sampler's Comments:

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

Sampler's Name (EI):	Received by (SGS):
Print: Jesse Sixsmith	Print:
Signature:	Signature:
Date: 10-09-15	Date:

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

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

SAMPLE RECEIPT ADVICE

SE143465

CLIENT DETAILS

Contact	Jessie Sixsmith
Client	Environmental Investigations
Address	Suite 6.01, 55 Miller Street NSW 2009
Telephone	02 9516 0722
Facsimile	02 9516 0741
Email	Jessie.Sixsmith@eiaustralia.com.au
Project	**E22434 1-5 Woodburn Street, Redfern**
Order Number	**E22434**
Samples	12

LABORATORY DETAILS

Manager	Huong Crawford
Laboratory	SGS Alexandria Environmental
Address	Unit 16, 33 Maddox St Alexandria NSW 2015
Telephone	+61 2 8594 0400
Facsimile	+61 2 8594 0499
Email	au.environmental.sydney@sgs.com
Samples Received	Thu 10/9/2015
Report Due	Tue 15/9/2015
SGS Reference	**SE143465**

SUBMISSION DETAILS

This is to confirm that 12 samples were received on Thursday 10/9/2015. Results are expected to be ready by Tuesday 15/9/2015. Please quote SGS reference SE143465 when making enquiries. Refer below for details relating to sample integrity upon receipt.

Sample counts by matrix	11 Soils, 1 Water	Type of documentation received	COC
Date documentation received	10/9/2015	Samples received in good order	Yes
Samples received without headspace	Yes	Sample temperature upon receipt	6°C
Sample container provider	SGS	Turnaround time requested	Three Days
Samples received in correct containers	Yes	Sufficient sample for analysis	Yes
Sample cooling method	Ice Bricks	Samples clearly labelled	Yes
Complete documentation received	Yes		

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

COMMENTS

6 soil samples unmarked for analyses on the COC have been placed on hold.

SAMPLE RECEIPT ADVICE

SE143465

CLIENT DETAILS

Client Environmental Investigations

Project E22434 1-5 Woodburn Street, Redfern

SUMMARY OF ANALYSIS

No.	Sample ID	OC Pesticides in Soil	OP Pesticides in Soil	PAH (Polynuclear Aromatic Hydrocarbons) in Soil	PCBs in Soil	Total Recoverable Metals in Soil by ICPOES	TRH (Total Recoverable Hydrocarbons) in Soil	VOC's in Soil	Volatile Petroleum Hydrocarbons in Soil
001	BH1-0.1-0.2	28	13	25	11	7	10	12	8
002	BH1-1.0-1.2	-	-	25	-	7	10	12	8
003	BH2-0.2-0.3	28	13	25	11	7	10	12	8
004	BH2-0.7-0.8	-	-	25	-	7	10	12	8
005	BH3-0.1-0.2	28	13	25	11	7	10	12	8
006	BH3-0.5-0.8	-	-	25	-	7	10	12	8
007	BH4-0.1-0.2	28	13	25	11	7	10	12	8
008	BH5-0.1-0.2	28	13	25	11	7	10	12	8
009	QD-01	-	-	-	-	7	10	12	8
011	Trip Blank	-	-	-	-	-	-	12	8
012	Trip Spike	-	-	-	-	-	-	12	8

CONTINUED OVERLEAF

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

SAMPLE RECEIPT ADVICE

SE143465

CLIENT DETAILS

Client Environmental Investigations

Project E22434 1-5 Woodburn Street, Redfern

SUMMARY OF ANALYSIS

No.	Sample ID	Fibre Identification in soil	Mercury in Soil	Moisture Content	TRH (Total Recoverable Hydrocarbons) in Water	VOCs in Water	Volatile Petroleum Hydrocarbons in Water
001	BH1-0.1-0.2	2	1	1	-	-	-
002	BH1-1.0-1.2	-	1	1	-	-	-
003	BH2-0.2-0.3	2	1	1	-	-	-
004	BH2-0.7-0.8	-	1	1	-	-	-
005	BH3-0.1-0.2	-	1	1	-	-	-
006	BH3-0.5-0.8	2	1	1	-	-	-
007	BH4-0.1-0.2	2	1	1	-	-	-
008	BH5-0.1-0.2	2	1	1	-	-	-
009	QD-01	-	1	1	-	-	-
010	QR-01	-	-	-	9	12	8
011	Trip Blank	-	-	1	-	-	-

CONTINUED OVERLEAF

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

SAMPLE RECEIPT ADVICE

SE143465

CLIENT DETAILS

Client Environmental Investigations

Project E22434 1-5 Woodburn Street, Redfern

SUMMARY OF ANALYSIS

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

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

Sheet 1 of 1

Site: I-5 Wood burn Street Redfern

Project No: E22434

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

Sample ID	Laboratory ID	Container Type	Sampling Date	Sampling Time	WATER	SOIL	OTHERS (i.e. Fibro, Paint, etc.)	HM [A] /TRH/BTEX/PAHs OCP/OP/PCB/Asbestos	HM [A] /TRH/BTEX/PAHs	HM [A] /TRH/BTEX	TRH/BTEX/Lead	TRH/BTEX	PAHs	VOCs	Asbestos	pH / CEC (cation exchange)	pH / EC (electrical conductivity)	sPOCAS					TCLP PAHs	TCLP HM [B]
QT-01	1	J	9-9-15	AM		X				X														

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

Job No: 134172
Date Received: 11/9
Time Received: 1335
Received by: PH
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

Comments

HM [A]
Arsenic
Cadmium
Chromium
Copper
Lead
Mercury
Nickel
ZinC

HM [B]
Arsenic
Cadmium
Chromium
Lead
Mercury
Nickel

LABORATORY TURNAROUND

- ☐ Standard
- ☐ 24 Hours
- ☐ 48 Hours
- ☒ 72 Hours
- ☐ Other_____

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

Sampler's Comments:

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

Sampler's Name (EI):	Received by (Envirolab):
Print: JESSIE SIXSMITH	Print: PH
Signature: JSmith	Signature:
Date: 10-9-15	Date: 11/9 1335

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

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

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

SAMPLE RECEIPT ADVICE

Client Details	
Client	Environmental Investigations
Attention	J Sixsmith

Sample Login Details	
Your Reference	E22434, Redfern
Envirolab Reference	134172
Date Sample Received	11/09/2015
Date Instructions Received	11/09/2015
Date Results Expected to be Reported	15/09/2015

Sample Condition	
Samples received in appropriate condition for analysis	YES
No. of Samples Provided	1 Soil
Turnaround Time Requested	72hr
Temperature on receipt (°C)	23.1
Cooling Method	Ice Pack
Sampling Date Provided	YES

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

Please direct any queries to:

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

Sample and Testing Details on following page

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

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

APPENDIX H
Laboratory Analytical Reports

ANALYTICAL REPORT

WORLD RECOGNISED ACCREDITATION

CLIENT DETAILS

Contact	Jessie Sixsmith
Client	Environmental Investigations
Address	Suite 6.01, 55 Miller Street NSW 2009
Telephone	02 9516 0722
Facsimile	02 9516 0741
Email	Jessie.Sixsmith@eiaustralia.com.au
Project	**E22434 1-5 Woodburn Street, Redfern**
Order Number	**E22434**
Samples	12

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	**SE143465 R0**
Date Received	10/9/2015
Date Reported	15/9/2015

COMMENTS

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

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

Sample #6: A portion of the sample supplied has been sub-sampled for asbestos according to SGS In-house procedures.
We therefore cannot guarantee that the sub-sample is representative of the entire sample supplied.
SGS Environmental Services recommends supplying approximately 50-100g of sample in a separate container.

Asbestos analysed by Approved Identifier Yusuf Kuthpudin.

SIGNATORIES

Andy Sutton
Senior Organic Chemist

Dong Liang
Metals/Inorganics Team Leader

Kamrul Ahsan
Senior Chemist

Ly Kim Ha
Organic Section Head

Ravee Sivasubramaniam
Asbestos Analyst/Hygiene Team Leader

VOC's in Soil [AN433/AN434] Tested: 11/9/2015

PARAMETER	UOM	LOR	BH1-0.1-0.2 SOIL - 9/9/2015 SE143465.001	BH1-1.0-1.2 SOIL - 9/9/2015 SE143465.002	BH2-0.2-0.3 SOIL - 9/9/2015 SE143465.003	BH2-0.7-0.8 SOIL - 9/9/2015 SE143465.004	BH3-0.1-0.2 SOIL - 9/9/2015 SE143465.005
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	**0.2**	**0.3**

PARAMETER	UOM	LOR	BH3-0.5-0.8 SOIL - 9/9/2015 SE143465.006	BH4-0.1-0.2 SOIL - 9/9/2015 SE143465.007	BH5-0.1-0.2 SOIL - 9/9/2015 SE143465.008	QD-01 SOIL - 9/9/2015 SE143465.009	Trip Blank SOIL - 9/9/2015 SE143465.011
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	**0.2**	<0.1	<0.1	<0.1	<0.1

PARAMETER	UOM	LOR	Trip Spike SOIL - 9/9/2015 SE143465.012
Benzene	mg/kg	0.1	{128%]
Toluene	mg/kg	0.1	[129%]
Ethylbenzene	mg/kg	0.1	[123%]
m/p-xylene	mg/kg	0.2	[121%]
o-xylene	mg/kg	0.1	[116%]
Total Xylenes*	mg/kg	0.3	-
Total BTEX*	mg/kg	0.6	-
Naphthalene	mg/kg	0.1	-

Volatile Petroleum Hydrocarbons in Soil [AN433/AN434/AN410] Tested: 11/9/2015

PARAMETER	UOM	LOR	BH1-0.1-0.2 SOIL - 9/9/2015 SE143465.001	BH1-1.0-1.2 SOIL - 9/9/2015 SE143465.002	BH2-0.2-0.3 SOIL - 9/9/2015 SE143465.003	BH2-0.7-0.8 SOIL - 9/9/2015 SE143465.004	BH3-0.1-0.2 SOIL - 9/9/2015 SE143465.005
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	BH3-0.5-0.8 SOIL - 9/9/2015 SE143465.006	BH4-0.1-0.2 SOIL - 9/9/2015 SE143465.007	BH5-0.1-0.2 SOIL - 9/9/2015 SE143465.008	QD-01 SOIL - 9/9/2015 SE143465.009	Trip Blank SOIL - 9/9/2015 SE143465.011
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: 11/9/2015

PARAMETER	UOM	LOR	BH1-0.1-0.2 SOIL - 9/9/2015 SE143465.001	BH1-1.0-1.2 SOIL - 9/9/2015 SE143465.002	BH2-0.2-0.3 SOIL - 9/9/2015 SE143465.003	BH2-0.7-0.8 SOIL - 9/9/2015 SE143465.004	BH3-0.1-0.2 SOIL - 9/9/2015 SE143465.005
TRH C10-C14	mg/kg	20	<20	<20	<20	<20	<20
TRH C15-C28	mg/kg	45	<45	<45	<45	**250**	**170**
TRH C29-C36	mg/kg	45	<45	<45	**170**	**98**	**49**
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	**150**	**320**	**210**
TRH >C34-C40 (F4)	mg/kg	120	<120	<120	<120	<120	<120
TRH C10-C36 Total	mg/kg	110	<110	<110	**170**	**350**	**220**
TRH C10-C40 Total	mg/kg	210	<210	<210	<210	**350**	**220**

PARAMETER	UOM	LOR	BH3-0.5-0.8 SOIL - 9/9/2015 SE143465.006	BH4-0.1-0.2 SOIL - 9/9/2015 SE143465.007	BH5-0.1-0.2 SOIL - 9/9/2015 SE143465.008	QD-01 SOIL - 9/9/2015 SE143465.009
TRH C10-C14	mg/kg	20	<20	<20	<20	<20
TRH C15-C28	mg/kg	45	**220**	<45	<45	<45
TRH C29-C36	mg/kg	45	**59**	<45	<45	<45
TRH C37-C40	mg/kg	100	<100	<100	<100	<100
TRH >C10-C16 (F2)	mg/kg	25	<25	<25	<25	<25
TRH >C10-C16 (F2) - Naphthalene	mg/kg	25	<25	<25	<25	<25
TRH >C16-C34 (F3)	mg/kg	90	**160**	<90	<90	<90
TRH >C34-C40 (F4)	mg/kg	120	<120	<120	<120	<120
TRH C10-C36 Total	mg/kg	110	**280**	<110	<110	<110
TRH C10-C40 Total	mg/kg	210	**280**	<210	<210	<210

PAH (Polynuclear Aromatic Hydrocarbons) in Soil [AN420] Tested: 11/9/2015

PARAMETER	UOM	LOR	BH1-0.1-0.2 SOIL - 9/9/2015 SE143465.001	BH1-1.0-1.2 SOIL - 9/9/2015 SE143465.002	BH2-0.2-0.3 SOIL - 9/9/2015 SE143465.003	BH2-0.7-0.8 SOIL - 9/9/2015 SE143465.004	BH3-0.1-0.2 SOIL - 9/9/2015 SE143465.005
Naphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	0.5	0.8
2-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	0.5	0.2
1-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	0.5	0.1
Acenaphthylene	mg/kg	0.1	<0.1	<0.1	<0.1	2.7	1.7
Acenaphthene	mg/kg	0.1	<0.1	<0.1	<0.1	0.4	<0.1
Fluorene	mg/kg	0.1	<0.1	<0.1	<0.1	1.8	0.9
Phenanthrene	mg/kg	0.1	0.6	<0.1	<0.1	12	16
Anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	2.2	3.4
Fluoranthene	mg/kg	0.1	0.7	<0.1	<0.1	13	20
Pyrene	mg/kg	0.1	0.6	<0.1	<0.1	11	18
Benzo(a)anthracene	mg/kg	0.1	0.2	<0.1	<0.1	6.6	11
Chrysene	mg/kg	0.1	0.3	<0.1	<0.1	4.3	7.2
Benzo(b&j)fluoranthene	mg/kg	0.1	0.3	<0.1	<0.1	6.0	11
Benzo(k)fluoranthene	mg/kg	0.1	0.2	<0.1	<0.1	2.6	4.7
Benzo(a)pyrene	mg/kg	0.1	0.2	<0.1	<0.1	5.2	10
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	0.1	<0.1	<0.1	2.7	4.5
Dibenzo(a&h)anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	0.4	1.1
Benzo(ghi)perylene	mg/kg	0.1	0.2	<0.1	<0.1	2.8	4.7
Carcinogenic PAHs, BaP TEQ <LOR=0*	TEQ	0.2	0.3	<0.2	<0.2	7.4	14
Carcinogenic PAHs, BaP TEQ <LOR=LOR*	TEQ (mg/kg)	0.3	0.4	<0.3	<0.3	7.4	14
Carcinogenic PAHs, BaP TEQ <LOR=LOR/2*	TEQ (mg/kg)	0.2	0.3	<0.2	<0.2	7.4	14
Total PAH	mg/kg	0.8	3.6	<0.8	<0.8	75	120

PARAMETER	UOM	LOR	BH3-0.5-0.8 SOIL - 9/9/2015 SE143465.006	BH4-0.1-0.2 SOIL - 9/9/2015 SE143465.007	BH5-0.1-0.2 SOIL - 9/9/2015 SE143465.008
Naphthalene	mg/kg	0.1	0.7	<0.1	<0.1
2-methylnaphthalene	mg/kg	0.1	0.3	<0.1	<0.1
1-methylnaphthalene	mg/kg	0.1	0.2	<0.1	<0.1
Acenaphthylene	mg/kg	0.1	1.6	<0.1	<0.1
Acenaphthene	mg/kg	0.1	0.1	<0.1	<0.1
Fluorene	mg/kg	0.1	1.1	<0.1	<0.1
Phenanthrene	mg/kg	0.1	12	<0.1	0.1
Anthracene	mg/kg	0.1	2.5	<0.1	<0.1
Fluoranthene	mg/kg	0.1	16	0.1	0.2
Pyrene	mg/kg	0.1	15	0.1	0.2
Benzo(a)anthracene	mg/kg	0.1	8.4	<0.1	<0.1
Chrysene	mg/kg	0.1	5.3	0.1	0.1
Benzo(b&j)fluoranthene	mg/kg	0.1	7.8	<0.1	0.1
Benzo(k)fluoranthene	mg/kg	0.1	2.8	<0.1	<0.1
Benzo(a)pyrene	mg/kg	0.1	6.8	<0.1	0.1
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	3.5	<0.1	<0.1
Dibenzo(a&h)anthracene	mg/kg	0.1	0.5	<0.1	<0.1
Benzo(ghi)perylene	mg/kg	0.1	3.8	<0.1	<0.1
Carcinogenic PAHs, BaP TEQ <LOR=0*	TEQ	0.2	9.6	<0.2	<0.2
Carcinogenic PAHs, BaP TEQ <LOR=LOR*	TEQ (mg/kg)	0.3	9.6	<0.3	<0.3
Carcinogenic PAHs, BaP TEQ <LOR=LOR/2*	TEQ (mg/kg)	0.2	9.6	<0.2	0.2
Total PAH	mg/kg	0.8	87	0.8	1.3

OC Pesticides in Soil [AN400/AN420] Tested: 11/9/2015

PARAMETER	UOM	LOR	BH1-0.1-0.2 SOIL - 9/9/2015 SE143465.001	BH2-0.2-0.3 SOIL - 9/9/2015 SE143465.003	BH3-0.1-0.2 SOIL - 9/9/2015 SE143465.005	BH4-0.1-0.2 SOIL - 9/9/2015 SE143465.007	BH5-0.1-0.2 SOIL - 9/9/2015 SE143465.008
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	**0.2**
Aldrin	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	**8.7**
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	**0.6**
Alpha Chlordane	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	**0.3**
trans-Nonachlor	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	**0.2**
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	**10**
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

OP Pesticides in Soil [AN400/AN420] Tested: 11/9/2015

PARAMETER	UOM	LOR	BH1-0.1-0.2 SOIL - 9/9/2015 SE143465.001	BH2-0.2-0.3 SOIL - 9/9/2015 SE143465.003	BH3-0.1-0.2 SOIL - 9/9/2015 SE143465.005	BH4-0.1-0.2 SOIL - 9/9/2015 SE143465.007	BH5-0.1-0.2 SOIL - 9/9/2015 SE143465.008
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

PCBs in Soil [AN400/AN420] Tested: 11/9/2015

PARAMETER	UOM	LOR	BH1-0.1-0.2 SOIL - 9/9/2015 SE143465.001	BH2-0.2-0.3 SOIL - 9/9/2015 SE143465.003	BH3-0.1-0.2 SOIL - 9/9/2015 SE143465.005	BH4-0.1-0.2 SOIL - 9/9/2015 SE143465.007	BH5-0.1-0.2 SOIL - 9/9/2015 SE143465.008
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

Total Recoverable Metals in Soil by ICPOES [AN040/AN320] Tested: 12/9/2015

PARAMETER	UOM	LOR	BH1-0.1-0.2 SOIL - 9/9/2015 SE143465.001	BH1-1.0-1.2 SOIL - 9/9/2015 SE143465.002	BH2-0.2-0.3 SOIL - 9/9/2015 SE143465.003	BH2-0.7-0.8 SOIL - 9/9/2015 SE143465.004	BH3-0.1-0.2 SOIL - 9/9/2015 SE143465.005
Arsenic, As	mg/kg	3	3	<3	<3	6	4
Cadmium, Cd	mg/kg	0.3	0.4	<0.3	<0.3	0.9	<0.3
Chromium, Cr	mg/kg	0.3	8.0	9.4	7.5	9.4	6.2
Copper, Cu	mg/kg	0.5	15	1.0	7.7	35	11
Lead, Pb	mg/kg	1	1200	15	9	1400	1800
Nickel, Ni	mg/kg	0.5	6.3	1.1	6.1	6.9	1.3
Zinc, Zn	mg/kg	0.5	310	4.3	74	630	340

PARAMETER	UOM	LOR	BH3-0.5-0.8 SOIL - 9/9/2015 SE143465.006	BH4-0.1-0.2 SOIL - 9/9/2015 SE143465.007	BH5-0.1-0.2 SOIL - 9/9/2015 SE143465.008	QD-01 SOIL - 9/9/2015 SE143465.009
Arsenic, As	mg/kg	3	5	<3	<3	<3
Cadmium, Cd	mg/kg	0.3	0.4	<0.3	<0.3	<0.3
Chromium, Cr	mg/kg	0.3	9.8	5.1	5.4	9.0
Copper, Cu	mg/kg	0.5	16	39	20	0.9
Lead, Pb	mg/kg	1	800	140	1300	14
Nickel, Ni	mg/kg	0.5	1.6	3.8	2.3	1.1
Zinc, Zn	mg/kg	0.5	590	140	310	3.9

Mercury in Soil [AN312] Tested: 12/9/2015

PARAMETER	UOM	LOR	BH1-0.1-0.2 SOIL - 9/9/2015 SE143465.001	BH1-1.0-1.2 SOIL - 9/9/2015 SE143465.002	BH2-0.2-0.3 SOIL - 9/9/2015 SE143465.003	BH2-0.7-0.8 SOIL - 9/9/2015 SE143465.004	BH3-0.1-0.2 SOIL - 9/9/2015 SE143465.005
Mercury	mg/kg	0.01	0.17	0.01	0.01	0.28	0.12

PARAMETER	UOM	LOR	BH3-0.5-0.8 SOIL - 9/9/2015 SE143465.006	BH4-0.1-0.2 SOIL - 9/9/2015 SE143465.007	BH5-0.1-0.2 SOIL - 9/9/2015 SE143465.008	QD-01 SOIL - 9/9/2015 SE143465.009
Mercury	mg/kg	0.01	0.15	0.08	0.15	0.01

Moisture Content [AN002] Tested: 11/9/2015

PARAMETER	UOM	LOR	BH1-0.1-0.2 SOIL - 9/9/2015 SE143465.001	BH1-1.0-1.2 SOIL - 9/9/2015 SE143465.002	BH2-0.2-0.3 SOIL - 9/9/2015 SE143465.003	BH2-0.7-0.8 SOIL - 9/9/2015 SE143465.004	BH3-0.1-0.2 SOIL - 9/9/2015 SE143465.005
% Moisture	%w/w	0.5	7.5	11	9.3	7.1	11

PARAMETER	UOM	LOR	BH3-0.5-0.8 SOIL - 9/9/2015 SE143465.006	BH4-0.1-0.2 SOIL - 9/9/2015 SE143465.007	BH5-0.1-0.2 SOIL - 9/9/2015 SE143465.008	QD-01 SOIL - 9/9/2015 SE143465.009	Trip Blank SOIL - 9/9/2015 SE143465.011
% Moisture	%w/w	0.5	10	4.2	15	12	<0.5

Fibre Identification in soil [AN602] Tested: 14/9/2015

PARAMETER	UOM	LOR	BH1-0.1-0.2 SOIL - 9/9/2015 SE143465.001	BH2-0.2-0.3 SOIL - 9/9/2015 SE143465.003	BH3-0.5-0.8 SOIL - 9/9/2015 SE143465.006	BH4-0.1-0.2 SOIL - 9/9/2015 SE143465.007	BH5-0.1-0.2 SOIL - 9/9/2015 SE143465.008
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

VOCs in Water [AN433/AN434] Tested: 14/9/2015

PARAMETER	UOM	LOR	QR-01 WATER - 9/9/2015 SE143465.010
Benzene	µg/L	0.5	<0.5
Toluene	µg/L	0.5	<0.5
Ethylbenzene	µg/L	0.5	<0.5
m/p-xylene	µg/L	1	<1
o-xylene	µg/L	0.5	<0.5
Total Xylenes	µg/L	1.5	<1.5
Total BTEX	µg/L	3	<3
Naphthalene	µg/L	0.5	<0.5

Volatile Petroleum Hydrocarbons in Water [AN433/AN434/AN410] Tested: 14/9/2015

PARAMETER	UOM	LOR	QR-01 WATER - 9/9/2015 SE143465.010
TRH C6-C9	µg/L	40	<40
Benzene (F0)	µg/L	0.5	<0.5
TRH C6-C10	µg/L	50	<50
TRH C6-C10 minus BTEX (F1)	µg/L	50	<50

TRH (Total Recoverable Hydrocarbons) in Water [AN403] Tested: 11/9/2015

PARAMETER	UOM	LOR	QR-01 WATER - 9/9/2015 SE143465.010
TRH C10-C14	µg/L	50	<50
TRH C15-C28	µg/L	200	<200
TRH C29-C36	µg/L	200	<200
TRH C37-C40	µg/L	200	<200
TRH >C10-C16 (F2)	µg/L	60	<60
TRH >C16-C34 (F3)	µg/L	500	<500
TRH >C34-C40 (F4)	µg/L	500	<500
TRH C10-C36	µg/L	450	<450
TRH C10-C40	µg/L	650	<650

Trace Metals (Dissolved) in Water by ICPMS [AN318] Tested: 12/9/2015

PARAMETER	UOM	LOR	QR-01 WATER - 9/9/2015 SE143465.010
Arsenic, As	µg/L	1	<1
Cadmium, Cd	µg/L	0.1	<0.1
Chromium, Cr	µg/L	1	<1
Copper, Cu	µg/L	1	<1
Lead, Pb	µg/L	1	<1
Nickel, Ni	µg/L	1	<1
Zinc, Zn	µg/L	5	<5

Mercury (dissolved) in Water [AN311/AN312] Tested: 14/9/2015

PARAMETER	UOM	LOR	QR-01 WATER - 9/9/2015 SE143465.010
Mercury	mg/L	0.0001	<0.0001

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

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

FOOTNOTES

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

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

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

The QC criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here: http://www.sgs.com.au/~/media/Local/Australia/Documents/ Technical%20Documents/MP-AU-ENV-QU-022%20QA%20QC%20Plan.pdf

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

CERTIFICATE OF ANALYSIS 134172

Client:

Environmental Investigations
Suite 6.01, 55 Miller Street
Pyrmont
NSW 2009

Attention: J Sixsmith

Sample log in details:

Your Reference:	**E22434, Redfern**		
No. of samples:	1 Soil		
Date samples received / completed instructions received	11/09/15	/	11/09/15

Analysis Details:

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

Report Details:

Date results requested by: / Issue Date:	15/09/15	/	15/09/15
Date of Preliminary Report:	Not Issued		

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

Results Approved By:

Jacinta Hurst
Laboratory Manager

vTRH(C6-C10)/BTEXN in Soil		
Our Reference:	UNITS	134172-1
Your Reference	----------	QT-01
Date Sampled	----------	09/09/2015
Type of sample		Soil
Date extracted	-	14/09/2015
Date analysed	-	14/09/2015
TRHC$_6$ - C$_9$	mg/kg	<25
TRHC$_6$ - C$_{10}$	mg/kg	<25
vTPHC$_6$ - C$_{10}$ less BTEX (F1)	mg/kg	<25
Benzene	mg/kg	<0.2
Toluene	mg/kg	<0.5
Ethylbenzene	mg/kg	<1
m+p-xylene	mg/kg	<2
o-Xylene	mg/kg	<1
naphthalene	mg/kg	<1
Surrogate aaa-Trifluorotoluene	%	90

svTRH (C10-C40) in Soil		
Our Reference:	UNITS	134172-1
Your Reference	----------	QT-01
Date Sampled	----------	09/09/2015
Type of sample		Soil
Date extracted	-	14/09/2015
Date analysed	-	15/09/2015
TRHC$_{10}$ - C$_{14}$	mg/kg	<50
TRHC$_{15}$ - C$_{28}$	mg/kg	<100
TRHC$_{29}$ - C$_{36}$	mg/kg	<100
TRH>C$_{10}$-C$_{16}$	mg/kg	<50
TRH>C$_{10}$ - C$_{16}$ less Naphthalene (F2)	mg/kg	<50
TRH>C$_{16}$-C$_{34}$	mg/kg	<100
TRH>C$_{34}$-C$_{40}$	mg/kg	<100
Surrogate o-Terphenyl	%	82

Acid Extractable metals in soil		
Our Reference:	UNITS	134172-1
Your Reference	----------	QT-01
Date Sampled	----------	09/09/2015
Type of sample		Soil
Date prepared	-	14/09/2015
Date analysed	-	14/09/2015
Arsenic	mg/kg	<4
Cadmium	mg/kg	<0.4
Chromium	mg/kg	11
Copper	mg/kg	<1
Lead	mg/kg	16
Mercury	mg/kg	<0.1
Nickel	mg/kg	2
Zinc	mg/kg	4

Moisture		
Our Reference:	UNITS	134172-1
Your Reference	----------	QT-01
Date Sampled	----------	09/09/2015
Type of sample		Soil
Date prepared	-	14/09/2015
Date analysed	-	15/09/2015
Moisture	%	12

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

QUALITY CONTROL vTRH(C6-C10)/BTEXN in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			14/09/2015	[NT]	[NT]	LCS-5	14/09/2015
Date analysed	-			14/09/2015	[NT]	[NT]	LCS-5	14/09/2015
TRHC$_6$ - C$_9$	mg/kg	25	Org-016	<25	[NT]	[NT]	LCS-5	111%
TRHC$_6$ - C$_{10}$	mg/kg	25	Org-016	<25	[NT]	[NT]	LCS-5	111%
Benzene	mg/kg	0.2	Org-016	<0.2	[NT]	[NT]	LCS-5	98%
Toluene	mg/kg	0.5	Org-016	<0.5	[NT]	[NT]	LCS-5	101%
Ethylbenzene	mg/kg	1	Org-016	<1	[NT]	[NT]	LCS-5	119%
m+p-xylene	mg/kg	2	Org-016	<2	[NT]	[NT]	LCS-5	119%
o-Xylene	mg/kg	1	Org-016	<1	[NT]	[NT]	LCS-5	117%
naphthalene	mg/kg	1	Org-014	<1	[NT]	[NT]	[NR]	[NR]
Surrogate aaa-Trifluorotoluene	%		Org-016	95	[NT]	[NT]	LCS-5	96%
QUALITY CONTROL svTRH (C10-C40) in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			14/09/2015	[NT]	[NT]	LCS-5	14/09/2015
Date analysed	-			15/09/2015	[NT]	[NT]	LCS-5	15/09/2015
TRHC$_{10}$ - C$_{14}$	mg/kg	50	Org-003	<50	[NT]	[NT]	LCS-5	107%
TRHC$_{15}$ - C$_{28}$	mg/kg	100	Org-003	<100	[NT]	[NT]	LCS-5	93%
TRHC$_{29}$ - C$_{36}$	mg/kg	100	Org-003	<100	[NT]	[NT]	LCS-5	78%
TRH>C$_{10}$-C$_{16}$	mg/kg	50	Org-003	<50	[NT]	[NT]	LCS-5	107%
TRH>C$_{16}$-C$_{34}$	mg/kg	100	Org-003	<100	[NT]	[NT]	LCS-5	93%
TRH>C$_{34}$-C$_{40}$	mg/kg	100	Org-003	<100	[NT]	[NT]	LCS-5	78%
Surrogate o-Terphenyl	%		Org-003	85	[NT]	[NT]	LCS-5	81%
QUALITY CONTROL Acid Extractable metals in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			14/09/2015	[NT]	[NT]	LCS-9	14/09/2015
Date analysed	-			14/09/2015	[NT]	[NT]	LCS-9	14/09/2015
Arsenic	mg/kg	4	Metals-020 ICP-AES	<4	[NT]	[NT]	LCS-9	111%
Cadmium	mg/kg	0.4	Metals-020 ICP-AES	<0.4	[NT]	[NT]	LCS-9	107%
Chromium	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	LCS-9	106%
Copper	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	LCS-9	108%
Lead	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	LCS-9	102%
Mercury	mg/kg	0.1	Metals-021 CV-AAS	<0.1	[NT]	[NT]	LCS-9	98%

QUALITY CONTROL Acid Extractable metals in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Nickel	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	LCS-9	100%
Zinc	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	LCS-9	104%

Report Comments:

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

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

Quality Control Definitions

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

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

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

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

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

Laboratory Acceptance Criteria

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

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

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

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

APPENDIX I
QA/QC Assessment

I1 QUALITY CONTROL PROGRAM

I1.1 INTRODUCTION

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

Table I-1 Sampling Data Quality Indicators

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

I1.2 CALCULATION OF RELATIVE PERCENTAGE DIFFERENCE (RPD)

The RPD values were calculated using the following equation:

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

C_O = Concentration obtained from the primary sample.

C_R = Concentration obtained from the blind replicate or split sample.

I2 FIELD QA/QC DATA EVALUATION

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

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

The results of the QA/QC samples collected during the investigation and validation phases of sampling, including the calculated RPD values between primary and duplicate samples, are presented in Table I-2.

I2.1 SOIL INVESTIGATION & SOIL VALIDATION

I2.1.1 Blind Field Duplicate

One (1) blind field duplicate (BFD) sample was collected for each sampling event. The preparation of the BFD sample involved the collection of a bulk quantity of soil from the same sampling point without mixing, before dividing the material into identical sampling vessels. The duplicate sample was then presented blind to the primary laboratory (SGS) to avoid any potential analytical bias. The BFD was analysed for TPH, BTEX, selected heavy metals and in some cases PCBs with the RPD values calculated found to be within the Data Acceptance Criteria (Appendix J).

I2.1.2 Inter Laboratory Duplicate

One (1) inter laboratory duplicate (ILD) sample was collected for each sampling event. The preparation of the ILD sample was identical to the BFD sample as described above and analysed for TPH, BTEX and selected heavy metals. The RPD values calculated for the ILD sample was found to be within the Data Acceptance Criteria, with the exception of Mercury (163.64 %) and Nickel (58.06 %) for soil investigation sample QT-01 indicating that the RPDs for the samples were found to be higher than the expected range for homogenous soils. These exceedences are due to the low concentrations detected

Furthermore, soil samples were placed immediately into jars following sampling to reduce the loss of volatiles from samples. Results of soil sampling indicated that the samples collected were representative of the soils present at respective sampling locations; therefore, EI conclude that the samples collected are representative of the soils present at the respective sampling locations.

I2.1.3 Trip Blank

One (1) trip blank (TB) sample, prepared by the primary laboratory, was analysed for BTEX by the primary laboratory. The soil TB sample results were reported below the laboratory LOR, indicating that ideal sample transport and handling conditions were achieved.

Table I-2 Summary of QA/QC results for soil investigation samples

Sample identification	Description	TRH				BTEX				Heavy metals							
		F1*	F2**	F3 (>C_{16} - C_{34})	F4 (>C_{34} - C_{40})	Benzene	Toluene	Ethylbenzene	Xylene (total)	Arsenic	Cadmium	Chromium (Total)	Copper	Lead	Mercury	Nickel	Zinc
Intra-laboratory Duplicate - Soil Investigation																	
BH1M_0.1-0.2	Fill	<25	<25	230	<120	<0.1	<0.1	<0.1	<0.3	<3	<0.3	9.4	1	15	0.01	1.1	4.3
QD-01	BFD of BH1M_0.1-0.2	<25	<25	340	<120	<0.1	<0.1	<0.1	<0.3	<3	<0.3	9	0.9	14	0.01	1.1	3.9
RPD		0.00	0.00	0.00	38.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.35	10.53	6.90	0.00	0.00
Inter-laboratory Duplicate - Soil Investigation																	
BH1M_0.1-0.2	Fill	<25	<25	230	<120	<0.1	<0.1	<0.1	<0.3	<3	<0.3	9.4	1	15	0.01	1.1	4.3
QT-01	BFT of BH1M_0.1-0.2	<25	<50	200	<100	<0.2	<0.5	<1	<1	<4	<0.4	11	<1	16	<0.1	2	4
RPD		0.00	0.00	NA	13.95	NA	NA	NA	NA	NA	NA	NA	15.69	0.00	6.45	163.64	58.06
Rinsate Blanks																	
R10	De-ionised water	<50	<60	<500	<500	<0.5	<0.5	<0.5	<1.5	<1	<0.1	<1	<1	<1	<0.0001	<1	<5

NOTE: All results are reported in mg/kg (soil) or µg/L (water)

66.67 RPD calculated by halving detection limit exceeds 30-50% range referenced from AS4482.1 (2005)

52.87 RPD exceeds 30-50% range referenced from AS4482.1 (2005)

I2.1.4 Rinsate Blank

One (1) rinsate blank (RB) sample per sampling event was submitted to the primary laboratory for TPH, BTEX and selected heavy metals. The RB sample results were reported below the laboratory LOR, therefore it was concluded that decontamination procedures performed during the field works had been effective.

I2.2.3 Assessment of Field QA/QC Data

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

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

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

Based on the results of the field QA/QC data, EI considered the field QA/QC programme carried out during the remediation and validation works to be appropriate and the results to be acceptable.

I3 LABORATORY QA/QC

I3.1 LABORATORY ACCREDITATION

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

In relation to contingencies, should the pre-determined DQOs not be achieved, in accordance with each laboratory’s QC policy, respective tests are accordingly repeated. Should the results again fall outside the DQOs, then sample heterogeneity may be assumed and written comment will be provided to this effect on the final laboratory certificate.

I3.2 SAMPLE HOLDING TIMES

All sample holding times were generally within standard environmental protocols as tabulated in Appendix J.

I3.3 TEST METHODS AND PRACTICAL QUANTITATION LIMITS (PQLS)

Practical Quantitation Limits for the tested parameters during the assessments of soils are presented in Appendix J.

I3.4 METHOD BLANKS

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

I3.5 LABORATORY DUPLICATE SAMPLES

The Laboratory Control Samples (LCS) for the analysis batches were within acceptable ranges and conformed to the DAC, with the exception of Zinc for se143465.003 due to sample heterogeneity.

I3.6 LABORATORY CONTROL SAMPLES

The Laboratory Control Samples (LCS) for the analysis batches were within acceptable ranges and conformed to the DAC.

I3.7 MATRIX SPIKES

The matrix spikes of the analysis batches were within acceptable ranges and conformed to the DAC, with the exception of samples SE143440.008 whose recovery in Lead exceeded the acceptance criteria due to matrix interference.

APPENDIX J
Laboratory QA/AC Policies and DQOs

STATEMENT OF QA/QC PERFORMANCE

SE143465 R0

CLIENT DETAILS

Contact	Jessie Sixsmith
Client	Environmental Investigations
Address	Suite 6.01, 55 Miller Street NSW 2009
Telephone	02 9516 0722
Facsimile	02 9516 0741
Email	Jessie.Sixsmith@eiaustralia.com.au
Project	**E22434 1-5 Woodburn Street, Redfern**
Order Number	**E22434**
Samples	12

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	**SE143465 R0**
Date Received	10 Sep 2015
Date Reported	15 Sep 2015

COMMENTS

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

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

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

Duplicate	Total Recoverable Metals in Soil by ICPOES	1 item
Matrix Spike	Total Recoverable Metals in Soil by ICPOES	2 items

SAMPLE SUMMARY

Sample counts by matrix	11 Soils, 1 Water	Type of documentation received	COC
Date documentation received	10/9/2015	Samples received in good order	Yes
Samples received without headspace	Yes	Sample temperature upon receipt	6°C
Sample container provider	SGS	Turnaround time requested	Three Days
Samples received in correct containers	Yes	Sufficient sample for analysis	Yes
Sample cooling method	Ice Bricks	Samples clearly labelled	Yes
Complete documentation received	Yes		

HOLDING TIME SUMMARY

SE143465 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
BH1-0.1-0.2	SE143465.001	LB085068	09 Sep 2015	10 Sep 2015	08 Sep 2016	14 Sep 2015	08 Sep 2016	15 Sep 2015
BH2-0.2-0.3	SE143465.003	LB085068	09 Sep 2015	10 Sep 2015	08 Sep 2016	14 Sep 2015	08 Sep 2016	15 Sep 2015
BH3-0.5-0.8	SE143465.006	LB085068	09 Sep 2015	10 Sep 2015	08 Sep 2016	14 Sep 2015	08 Sep 2016	15 Sep 2015
BH4-0.1-0.2	SE143465.007	LB085068	09 Sep 2015	10 Sep 2015	08 Sep 2016	14 Sep 2015	08 Sep 2016	15 Sep 2015
BH5-0.1-0.2	SE143465.008	LB085068	09 Sep 2015	10 Sep 2015	08 Sep 2016	14 Sep 2015	08 Sep 2016	15 Sep 2015

Mercury (dissolved) in Water

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
QR-01	SE143465.010	LB085024	09 Sep 2015	10 Sep 2015	07 Oct 2015	14 Sep 2015	07 Oct 2015	14 Sep 2015

Mercury in Soil

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH1-0.1-0.2	SE143465.001	LB084973	09 Sep 2015	10 Sep 2015	07 Oct 2015	12 Sep 2015	07 Oct 2015	15 Sep 2015
BH1-1.0-1.2	SE143465.002	LB084973	09 Sep 2015	10 Sep 2015	07 Oct 2015	12 Sep 2015	07 Oct 2015	15 Sep 2015
BH2-0.2-0.3	SE143465.003	LB084973	09 Sep 2015	10 Sep 2015	07 Oct 2015	12 Sep 2015	07 Oct 2015	15 Sep 2015
BH2-0.7-0.8	SE143465.004	LB084973	09 Sep 2015	10 Sep 2015	07 Oct 2015	12 Sep 2015	07 Oct 2015	15 Sep 2015
BH3-0.1-0.2	SE143465.005	LB084973	09 Sep 2015	10 Sep 2015	07 Oct 2015	12 Sep 2015	07 Oct 2015	15 Sep 2015
BH3-0.5-0.8	SE143465.006	LB084973	09 Sep 2015	10 Sep 2015	07 Oct 2015	12 Sep 2015	07 Oct 2015	15 Sep 2015
BH4-0.1-0.2	SE143465.007	LB084973	09 Sep 2015	10 Sep 2015	07 Oct 2015	12 Sep 2015	07 Oct 2015	15 Sep 2015
BH5-0.1-0.2	SE143465.008	LB084973	09 Sep 2015	10 Sep 2015	07 Oct 2015	12 Sep 2015	07 Oct 2015	15 Sep 2015
QD-01	SE143465.009	LB084973	09 Sep 2015	10 Sep 2015	07 Oct 2015	12 Sep 2015	07 Oct 2015	15 Sep 2015

Moisture Content

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH1-0.1-0.2	SE143465.001	LB084927	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	16 Sep 2015	14 Sep 2015
BH1-1.0-1.2	SE143465.002	LB084927	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	16 Sep 2015	14 Sep 2015
BH2-0.2-0.3	SE143465.003	LB084927	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	16 Sep 2015	14 Sep 2015
BH2-0.7-0.8	SE143465.004	LB084927	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	16 Sep 2015	14 Sep 2015
BH3-0.1-0.2	SE143465.005	LB084927	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	16 Sep 2015	14 Sep 2015
BH3-0.5-0.8	SE143465.006	LB084927	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	16 Sep 2015	14 Sep 2015
BH4-0.1-0.2	SE143465.007	LB084927	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	16 Sep 2015	14 Sep 2015
BH5-0.1-0.2	SE143465.008	LB084927	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	16 Sep 2015	14 Sep 2015
QD-01	SE143465.009	LB084927	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	16 Sep 2015	14 Sep 2015
Trip Blank	SE143465.011	LB084927	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	16 Sep 2015	14 Sep 2015

OC Pesticides in Soil

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH1-0.1-0.2	SE143465.001	LB084938	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	21 Oct 2015	15 Sep 2015
BH1-1.0-1.2	SE143465.002	LB084938	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	21 Oct 2015	15 Sep 2015
BH2-0.2-0.3	SE143465.003	LB084938	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	21 Oct 2015	15 Sep 2015
BH2-0.7-0.8	SE143465.004	LB084938	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	21 Oct 2015	15 Sep 2015
BH3-0.1-0.2	SE143465.005	LB084938	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	21 Oct 2015	15 Sep 2015
BH3-0.5-0.8	SE143465.006	LB084938	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	21 Oct 2015	15 Sep 2015
BH4-0.1-0.2	SE143465.007	LB084938	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	21 Oct 2015	15 Sep 2015
BH5-0.1-0.2	SE143465.008	LB084938	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	21 Oct 2015	15 Sep 2015
QD-01	SE143465.009	LB084938	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	21 Oct 2015	15 Sep 2015

OP Pesticides in Soil

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH1-0.1-0.2	SE143465.001	LB084938	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	21 Oct 2015	14 Sep 2015
BH1-1.0-1.2	SE143465.002	LB084938	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	21 Oct 2015	15 Sep 2015
BH2-0.2-0.3	SE143465.003	LB084938	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	21 Oct 2015	14 Sep 2015
BH2-0.7-0.8	SE143465.004	LB084938	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	21 Oct 2015	15 Sep 2015
BH3-0.1-0.2	SE143465.005	LB084938	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	21 Oct 2015	14 Sep 2015
BH3-0.5-0.8	SE143465.006	LB084938	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	21 Oct 2015	15 Sep 2015
BH4-0.1-0.2	SE143465.007	LB084938	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	21 Oct 2015	14 Sep 2015
BH5-0.1-0.2	SE143465.008	LB084938	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	21 Oct 2015	14 Sep 2015
QD-01	SE143465.009	LB084938	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	21 Oct 2015	15 Sep 2015

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

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

Sample Name	Sample No.	QC Ref

HOLDING TIME SUMMARY

SE143465 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 (continued)

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH1-0.1-0.2	SE143465.001	LB084938	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	21 Oct 2015	14 Sep 2015
BH1-1.0-1.2	SE143465.002	LB084938	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	21 Oct 2015	14 Sep 2015
BH2-0.2-0.3	SE143465.003	LB084938	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	21 Oct 2015	14 Sep 2015
BH2-0.7-0.8	SE143465.004	LB084938	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	21 Oct 2015	14 Sep 2015
BH3-0.1-0.2	SE143465.005	LB084938	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	21 Oct 2015	14 Sep 2015
BH3-0.5-0.8	SE143465.006	LB084938	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	21 Oct 2015	14 Sep 2015
BH4-0.1-0.2	SE143465.007	LB084938	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	21 Oct 2015	14 Sep 2015
BH5-0.1-0.2	SE143465.008	LB084938	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	21 Oct 2015	14 Sep 2015
QD-01	SE143465.009	LB084938	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	21 Oct 2015	15 Sep 2015

PCBs in Soil

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH1-0.1-0.2	SE143465.001	LB084938	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	21 Oct 2015	15 Sep 2015
BH1-1.0-1.2	SE143465.002	LB084938	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	21 Oct 2015	15 Sep 2015
BH2-0.2-0.3	SE143465.003	LB084938	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	21 Oct 2015	15 Sep 2015
BH2-0.7-0.8	SE143465.004	LB084938	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	21 Oct 2015	15 Sep 2015
BH3-0.1-0.2	SE143465.005	LB084938	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	21 Oct 2015	15 Sep 2015
BH3-0.5-0.8	SE143465.006	LB084938	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	21 Oct 2015	15 Sep 2015
BH4-0.1-0.2	SE143465.007	LB084938	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	21 Oct 2015	15 Sep 2015
BH5-0.1-0.2	SE143465.008	LB084938	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	21 Oct 2015	15 Sep 2015
QD-01	SE143465.009	LB084938	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	21 Oct 2015	15 Sep 2015

Total Recoverable Metals in Soil by ICPOES

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH1-0.1-0.2	SE143465.001	LB084980	09 Sep 2015	10 Sep 2015	07 Mar 2016	12 Sep 2015	07 Mar 2016	15 Sep 2015
BH1-1.0-1.2	SE143465.002	LB084980	09 Sep 2015	10 Sep 2015	07 Mar 2016	12 Sep 2015	07 Mar 2016	15 Sep 2015
BH2-0.2-0.3	SE143465.003	LB084980	09 Sep 2015	10 Sep 2015	07 Mar 2016	12 Sep 2015	07 Mar 2016	15 Sep 2015
BH2-0.7-0.8	SE143465.004	LB084980	09 Sep 2015	10 Sep 2015	07 Mar 2016	12 Sep 2015	07 Mar 2016	15 Sep 2015
BH3-0.1-0.2	SE143465.005	LB084980	09 Sep 2015	10 Sep 2015	07 Mar 2016	12 Sep 2015	07 Mar 2016	15 Sep 2015
BH3-0.5-0.8	SE143465.006	LB084980	09 Sep 2015	10 Sep 2015	07 Mar 2016	12 Sep 2015	07 Mar 2016	15 Sep 2015
BH4-0.1-0.2	SE143465.007	LB084980	09 Sep 2015	10 Sep 2015	07 Mar 2016	12 Sep 2015	07 Mar 2016	15 Sep 2015
BH5-0.1-0.2	SE143465.008	LB084980	09 Sep 2015	10 Sep 2015	07 Mar 2016	12 Sep 2015	07 Mar 2016	15 Sep 2015
QD-01	SE143465.009	LB084980	09 Sep 2015	10 Sep 2015	07 Mar 2016	12 Sep 2015	07 Mar 2016	15 Sep 2015

Trace Metals (Dissolved) in Water by ICPMS

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
QR-01	SE143465.010	LB084964	09 Sep 2015	10 Sep 2015	07 Mar 2016	12 Sep 2015	07 Mar 2016	15 Sep 2015

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
BH1-0.1-0.2	SE143465.001	LB084938	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	21 Oct 2015	15 Sep 2015
BH1-1.0-1.2	SE143465.002	LB084938	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	21 Oct 2015	15 Sep 2015
BH2-0.2-0.3	SE143465.003	LB084938	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	21 Oct 2015	15 Sep 2015
BH2-0.7-0.8	SE143465.004	LB084938	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	21 Oct 2015	15 Sep 2015
BH3-0.1-0.2	SE143465.005	LB084938	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	21 Oct 2015	15 Sep 2015
BH3-0.5-0.8	SE143465.006	LB084938	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	21 Oct 2015	15 Sep 2015
BH4-0.1-0.2	SE143465.007	LB084938	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	21 Oct 2015	15 Sep 2015
BH5-0.1-0.2	SE143465.008	LB084938	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	21 Oct 2015	15 Sep 2015
QD-01	SE143465.009	LB084938	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	21 Oct 2015	15 Sep 2015

TRH (Total Recoverable Hydrocarbons) in Water

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
QR-01	SE143465.010	LB084917	09 Sep 2015	10 Sep 2015	16 Sep 2015	11 Sep 2015	21 Oct 2015	15 Sep 2015

VOC's in Soil

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH1-0.1-0.2	SE143465.001	LB084924	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	21 Oct 2015	15 Sep 2015
BH1-1.0-1.2	SE143465.002	LB084924	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	21 Oct 2015	15 Sep 2015
BH2-0.2-0.3	SE143465.003	LB084924	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	21 Oct 2015	15 Sep 2015
BH2-0.7-0.8	SE143465.004	LB084924	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	21 Oct 2015	15 Sep 2015
BH3-0.1-0.2	SE143465.005	LB084924	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	21 Oct 2015	15 Sep 2015

HOLDING TIME SUMMARY

SE143465 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.

VOC's in Soil (continued)

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH3-0.5-0.8	SE143465.006	LB084924	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	21 Oct 2015	15 Sep 2015
BH4-0.1-0.2	SE143465.007	LB084924	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	21 Oct 2015	15 Sep 2015
BH5-0.1-0.2	SE143465.008	LB084924	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	21 Oct 2015	15 Sep 2015
QD-01	SE143465.009	LB084924	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	21 Oct 2015	15 Sep 2015
Trip Blank	SE143465.011	LB084924	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	21 Oct 2015	15 Sep 2015
Trip Spike	SE143465.012	LB084924	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	21 Oct 2015	15 Sep 2015

VOCs in Water

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
QR-01	SE143465.010	LB085040	09 Sep 2015	10 Sep 2015	16 Sep 2015	14 Sep 2015	24 Oct 2015	15 Sep 2015

Volatile Petroleum Hydrocarbons in Soil

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH1-0.1-0.2	SE143465.001	LB084924	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	21 Oct 2015	15 Sep 2015
BH1-1.0-1.2	SE143465.002	LB084924	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	21 Oct 2015	15 Sep 2015
BH2-0.2-0.3	SE143465.003	LB084924	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	21 Oct 2015	15 Sep 2015
BH2-0.7-0.8	SE143465.004	LB084924	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	21 Oct 2015	15 Sep 2015
BH3-0.1-0.2	SE143465.005	LB084924	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	21 Oct 2015	15 Sep 2015
BH3-0.5-0.8	SE143465.006	LB084924	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	21 Oct 2015	15 Sep 2015
BH4-0.1-0.2	SE143465.007	LB084924	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	21 Oct 2015	15 Sep 2015
BH5-0.1-0.2	SE143465.008	LB084924	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	21 Oct 2015	15 Sep 2015
QD-01	SE143465.009	LB084924	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	21 Oct 2015	15 Sep 2015
Trip Blank	SE143465.011	LB084924	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	21 Oct 2015	15 Sep 2015
Trip Spike	SE143465.012	LB084924	09 Sep 2015	10 Sep 2015	23 Sep 2015	11 Sep 2015	21 Oct 2015	15 Sep 2015

Volatile Petroleum Hydrocarbons in Water

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
QR-01	SE143465.010	LB085040	09 Sep 2015	10 Sep 2015	16 Sep 2015	14 Sep 2015	24 Oct 2015	15 Sep 2015

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

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

OC Pesticides in Soil

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

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Tetrachloro-m-xylene (TCMX) (Surrogate)	BH1-0.1-0.2	SE143465.001	%	60 - 130%	104
	BH2-0.2-0.3	SE143465.003	%	60 - 130%	102
	BH3-0.1-0.2	SE143465.005	%	60 - 130%	104
	BH4-0.1-0.2	SE143465.007	%	60 - 130%	101
	BH5-0.1-0.2	SE143465.008	%	60 - 130%	105

OP Pesticides in Soil

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

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
2-fluorobiphenyl (Surrogate)	BH1-0.1-0.2	SE143465.001	%	60 - 130%	72
	BH2-0.2-0.3	SE143465.003	%	60 - 130%	76
	BH3-0.1-0.2	SE143465.005	%	60 - 130%	80
	BH4-0.1-0.2	SE143465.007	%	60 - 130%	76
	BH5-0.1-0.2	SE143465.008	%	60 - 130%	74
d14-p-terphenyl (Surrogate)	BH1-0.1-0.2	SE143465.001	%	60 - 130%	102
	BH2-0.2-0.3	SE143465.003	%	60 - 130%	116
	BH3-0.1-0.2	SE143465.005	%	60 - 130%	100
	BH4-0.1-0.2	SE143465.007	%	60 - 130%	110
	BH5-0.1-0.2	SE143465.008	%	60 - 130%	110

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

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

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
2-fluorobiphenyl (Surrogate)	BH1-0.1-0.2	SE143465.001	%	70 - 130%	72
	BH1-1.0-1.2	SE143465.002	%	70 - 130%	72
	BH2-0.2-0.3	SE143465.003	%	70 - 130%	76
	BH2-0.7-0.8	SE143465.004	%	70 - 130%	94
	BH3-0.1-0.2	SE143465.005	%	70 - 130%	80
	BH3-0.5-0.8	SE143465.006	%	70 - 130%	84
	BH4-0.1-0.2	SE143465.007	%	70 - 130%	76
	BH5-0.1-0.2	SE143465.008	%	70 - 130%	74
d14-p-terphenyl (Surrogate)	BH1-0.1-0.2	SE143465.001	%	70 - 130%	102
	BH1-1.0-1.2	SE143465.002	%	70 - 130%	108
	BH2-0.2-0.3	SE143465.003	%	70 - 130%	116
	BH2-0.7-0.8	SE143465.004	%	70 - 130%	112
	BH3-0.1-0.2	SE143465.005	%	70 - 130%	100
	BH3-0.5-0.8	SE143465.006	%	70 - 130%	112
	BH4-0.1-0.2	SE143465.007	%	70 - 130%	110
	BH5-0.1-0.2	SE143465.008	%	70 - 130%	110
d5-nitrobenzene (Surrogate)	BH1-0.1-0.2	SE143465.001	%	70 - 130%	92
	BH1-1.0-1.2	SE143465.002	%	70 - 130%	92
	BH2-0.2-0.3	SE143465.003	%	70 - 130%	94
	BH2-0.7-0.8	SE143465.004	%	70 - 130%	94
	BH3-0.1-0.2	SE143465.005	%	70 - 130%	80
	BH3-0.5-0.8	SE143465.006	%	70 - 130%	92
	BH4-0.1-0.2	SE143465.007	%	70 - 130%	94
	BH5-0.1-0.2	SE143465.008	%	70 - 130%	90

PCBs in Soil

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

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Tetrachloro-m-xylene (TCMX) (Surrogate)	BH1-0.1-0.2	SE143465.001	%	60 - 130%	104
	BH2-0.2-0.3	SE143465.003	%	60 - 130%	102
	BH3-0.1-0.2	SE143465.005	%	60 - 130%	104
	BH4-0.1-0.2	SE143465.007	%	60 - 130%	101
	BH5-0.1-0.2	SE143465.008	%	60 - 130%	105

VOC's in Soil

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

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Bromofluorobenzene (Surrogate)	BH1-0.1-0.2	SE143465.001	%	60 - 130%	84
	BH1-1.0-1.2	SE143465.002	%	60 - 130%	81
	BH2-0.2-0.3	SE143465.003	%	60 - 130%	90
	BH2-0.7-0.8	SE143465.004	%	60 - 130%	90
	BH3-0.1-0.2	SE143465.005	%	60 - 130%	83
	BH3-0.5-0.8	SE143465.006	%	60 - 130%	87
	BH4-0.1-0.2	SE143465.007	%	60 - 130%	85

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

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

VOC's in Soil (continued)

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

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Bromofluorobenzene (Surrogate)	BH5-0.1-0.2	SE143465.008	%	60 - 130%	76
	QD-01	SE143465.009	%	60 - 130%	84
	Trip Blank	SE143465.011	%	60 - 130%	87
	Trip Spike	SE143465.012	%	60 - 130%	91
d4-1,2-dichloroethane (Surrogate)	BH1-0.1-0.2	SE143465.001	%	60 - 130%	80
	BH1-1.0-1.2	SE143465.002	%	60 - 130%	72
	BH2-0.2-0.3	SE143465.003	%	60 - 130%	83
	BH2-0.7-0.8	SE143465.004	%	60 - 130%	81
	BH3-0.1-0.2	SE143465.005	%	60 - 130%	73
	BH3-0.5-0.8	SE143465.006	%	60 - 130%	82
	BH4-0.1-0.2	SE143465.007	%	60 - 130%	82
	BH5-0.1-0.2	SE143465.008	%	60 - 130%	77
	QD-01	SE143465.009	%	60 - 130%	78
	Trip Blank	SE143465.011	%	60 - 130%	87
	Trip Spike	SE143465.012	%	60 - 130%	92
d8-toluene (Surrogate)	BH1-0.1-0.2	SE143465.001	%	60 - 130%	86
	BH1-1.0-1.2	SE143465.002	%	60 - 130%	81
	BH2-0.2-0.3	SE143465.003	%	60 - 130%	85
	BH2-0.7-0.8	SE143465.004	%	60 - 130%	83
	BH3-0.1-0.2	SE143465.005	%	60 - 130%	78
	BH3-0.5-0.8	SE143465.006	%	60 - 130%	86
	BH4-0.1-0.2	SE143465.007	%	60 - 130%	88
	BH5-0.1-0.2	SE143465.008	%	60 - 130%	76
	QD-01	SE143465.009	%	60 - 130%	86
	Trip Blank	SE143465.011	%	60 - 130%	90
	Trip Spike	SE143465.012	%	60 - 130%	92
Dibromofluoromethane (Surrogate)	BH1-0.1-0.2	SE143465.001	%	60 - 130%	73
	BH1-1.0-1.2	SE143465.002	%	60 - 130%	71
	BH2-0.2-0.3	SE143465.003	%	60 - 130%	75
	BH2-0.7-0.8	SE143465.004	%	60 - 130%	73
	BH3-0.1-0.2	SE143465.005	%	60 - 130%	71
	BH3-0.5-0.8	SE143465.006	%	60 - 130%	74
	BH4-0.1-0.2	SE143465.007	%	60 - 130%	75
	BH5-0.1-0.2	SE143465.008	%	60 - 130%	71
	QD-01	SE143465.009	%	60 - 130%	70
	Trip Blank	SE143465.011	%	60 - 130%	78
	Trip Spike	SE143465.012	%	60 - 130%	82

VOCs in Water

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

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Bromofluorobenzene (Surrogate)	QR-01	SE143465.010	%	40 - 130%	97
d4-1,2-dichloroethane (Surrogate)	QR-01	SE143465.010	%	40 - 130%	126
d8-toluene (Surrogate)	QR-01	SE143465.010	%	40 - 130%	102
Dibromofluoromethane (Surrogate)	QR-01	SE143465.010	%	40 - 130%	119

Volatile Petroleum Hydrocarbons in Soil

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

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Bromofluorobenzene (Surrogate)	BH1-0.1-0.2	SE143465.001	%	60 - 130%	84
	BH1-1.0-1.2	SE143465.002	%	60 - 130%	81
	BH2-0.2-0.3	SE143465.003	%	60 - 130%	90
	BH2-0.7-0.8	SE143465.004	%	60 - 130%	90
	BH3-0.1-0.2	SE143465.005	%	60 - 130%	83
	BH3-0.5-0.8	SE143465.006	%	60 - 130%	87
	BH4-0.1-0.2	SE143465.007	%	60 - 130%	85
	BH5-0.1-0.2	SE143465.008	%	60 - 130%	76
	QD-01	SE143465.009	%	60 - 130%	84
	Trip Blank	SE143465.011	%	60 - 130%	87
d4-1,2-dichloroethane (Surrogate)	BH1-0.1-0.2	SE143465.001	%	60 - 130%	80
	BH1-1.0-1.2	SE143465.002	%	60 - 130%	72
	BH2-0.2-0.3	SE143465.003	%	60 - 130%	83
	BH2-0.7-0.8	SE143465.004	%	60 - 130%	81
	BH3-0.1-0.2	SE143465.005	%	60 - 130%	73

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

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

Volatile Petroleum Hydrocarbons in Soil (continued)

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

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
d4-1,2-dichloroethane (Surrogate)	BH3-0.5-0.8	SE143465.006	%	60 - 130%	82
	BH4-0.1-0.2	SE143465.007	%	60 - 130%	82
	BH5-0.1-0.2	SE143465.008	%	60 - 130%	77
	QD-01	SE143465.009	%	60 - 130%	78
	Trip Blank	SE143465.011	%	60 - 130%	87
d8-toluene (Surrogate)	BH1-0.1-0.2	SE143465.001	%	60 - 130%	86
	BH1-1.0-1.2	SE143465.002	%	60 - 130%	81
	BH2-0.2-0.3	SE143465.003	%	60 - 130%	85
	BH2-0.7-0.8	SE143465.004	%	60 - 130%	83
	BH3-0.1-0.2	SE143465.005	%	60 - 130%	78
	BH3-0.5-0.8	SE143465.006	%	60 - 130%	86
	BH4-0.1-0.2	SE143465.007	%	60 - 130%	88
	BH5-0.1-0.2	SE143465.008	%	60 - 130%	76
	QD-01	SE143465.009	%	60 - 130%	86
	Trip Blank	SE143465.011	%	60 - 130%	90
Dibromofluoromethane (Surrogate)	BH1-0.1-0.2	SE143465.001	%	60 - 130%	73
	BH1-1.0-1.2	SE143465.002	%	60 - 130%	71
	BH2-0.2-0.3	SE143465.003	%	60 - 130%	75
	BH2-0.7-0.8	SE143465.004	%	60 - 130%	73
	BH3-0.1-0.2	SE143465.005	%	60 - 130%	71
	BH3-0.5-0.8	SE143465.006	%	60 - 130%	74
	BH4-0.1-0.2	SE143465.007	%	60 - 130%	75
	BH5-0.1-0.2	SE143465.008	%	60 - 130%	71
	QD-01	SE143465.009	%	60 - 130%	70
	Trip Blank	SE143465.011	%	60 - 130%	78

Volatile Petroleum Hydrocarbons in Water

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

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Bromofluorobenzene (Surrogate)	QR-01	SE143465.010	%	40 - 130%	97
d4-1,2-dichloroethane (Surrogate)	QR-01	SE143465.010	%	60 - 130%	126
d8-toluene (Surrogate)	QR-01	SE143465.010	%	40 - 130%	102
Dibromofluoromethane (Surrogate)	QR-01	SE143465.010	%	40 - 130%	119

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

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

Mercury (dissolved) in Water

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

Sample Number	Parameter	Units	LOR	Result
LB085024.001	Mercury	mg/L	0.0001	0.0000

Mercury in Soil

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

Sample Number	Parameter	Units	LOR	Result
LB084973.001	Mercury	mg/kg	0.01	<0.01

OC Pesticides in Soil

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

Sample Number		Parameter	Units	LOR	Result
LB084938.001		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)	%	-	95

OP Pesticides in Soil

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

Sample Number		Parameter	Units	LOR	Result
LB084938.001		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)	%	-	84
		d14-p-terphenyl (Surrogate)	%	-	104

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

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

Sample Number	Parameter	Units	LOR	Result
LB084938.001	Naphthalene	mg/kg	0.1	<0.1
	2-methylnaphthalene	mg/kg	0.1	<0.1
	1-methylnaphthalene	mg/kg	0.1	<0.1
	Acenaphthylene	mg/kg	0.1	<0.1
	Acenaphthene	mg/kg	0.1	<0.1
	Fluorene	mg/kg	0.1	<0.1
	Phenanthrene	mg/kg	0.1	<0.1
	Anthracene	mg/kg	0.1	<0.1

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

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

PAH (Polynuclear Aromatic Hydrocarbons) in Soil (continued)

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

Sample Number		Parameter	Units	LOR	Result
LB084938.001		Fluoranthene	mg/kg	0.1	<0.1
		Pyrene	mg/kg	0.1	<0.1
		Benzo(a)anthracene	mg/kg	0.1	<0.1
		Chrysene	mg/kg	0.1	<0.1
		Benzo(a)pyrene	mg/kg	0.1	<0.1
		Indeno(1,2,3-cd)pyrene	mg/kg	0.1	<0.1
		Dibenzo(a&h)anthracene	mg/kg	0.1	<0.1
		Benzo(ghi)perylene	mg/kg	0.1	<0.1
		Total PAH	mg/kg	0.8	<0.8
	Surrogates	d5-nitrobenzene (Surrogate)	%	-	102
		2-fluorobiphenyl (Surrogate)	%	-	84
		d14-p-terphenyl (Surrogate)	%	-	104

PCBs in Soil

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

Sample Number		Parameter	Units	LOR	Result
LB084938.001		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)	%	-	95

Total Recoverable Metals in Soil by ICPOES

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

Sample Number	Parameter	Units	LOR	Result
LB084980.001	Arsenic, As	mg/kg	3	<3
	Cadmium, Cd	mg/kg	0.3	<0.3
	Chromium, Cr	mg/kg	0.3	<0.3
	Copper, Cu	mg/kg	0.5	<0.5
	Lead, Pb	mg/kg	1	<1
	Nickel, Ni	mg/kg	0.5	<0.5
	Zinc, Zn	mg/kg	0.5	<0.5

Trace Metals (Dissolved) in Water by ICPMS

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

Sample Number	Parameter	Units	LOR	Result
LB084964.001	Arsenic, As	µg/L	1	<1
	Cadmium, Cd	µg/L	0.1	<0.1
	Chromium, Cr	µg/L	1	<1
	Copper, Cu	µg/L	1	<1
	Lead, Pb	µg/L	1	<1
	Nickel, Ni	µg/L	1	<1
	Zinc, Zn	µg/L	5	<5

TRH (Total Recoverable Hydrocarbons) in Soil

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

Sample Number	Parameter	Units	LOR	Result
LB084938.001	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

TRH (Total Recoverable Hydrocarbons) in Water

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

Sample Number	Parameter	Units	LOR	Result
LB084917.001	TRH C10-C14	µg/L	50	<50
	TRH C15-C28	µg/L	200	<200
	TRH C29-C36	µg/L	200	<200
	TRH C37-C40	µg/L	200	<200

VOC's in Soil

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

Sample Number	Parameter	Units	LOR

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.

VOC's in Soil (continued)

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

Sample Number		Parameter	Units	LOR	Result
LB084924.001	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)	%	-	81
		d4-1,2-dichloroethane (Surrogate)	%	-	83
		d8-toluene (Surrogate)	%	-	91
		Bromofluorobenzene (Surrogate)	%	-	87
	Totals	Total BTEX*	mg/kg	0.6	<0.6

VOCs in Water

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

Sample Number		Parameter	Units	LOR	Result
LB085040.001	Monocyclic Aromatic	Benzene	µg/L	0.5	<0.5
	Hydrocarbons	Toluene	µg/L	0.5	<0.5
		Ethylbenzene	µg/L	0.5	<0.5
		m/p-xylene	µg/L	1	<1
		o-xylene	µg/L	0.5	<0.5
	Polycyclic VOCs	Naphthalene	µg/L	0.5	<0.5
	Surrogates	Dibromofluoromethane (Surrogate)	%	-	127
		d4-1,2-dichloroethane (Surrogate)	%	-	128
		d8-toluene (Surrogate)	%	-	94
		Bromofluorobenzene (Surrogate)	%	-	114

Volatile Petroleum Hydrocarbons in Soil

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

Sample Number		Parameter	Units	LOR	Result
LB084924.001		TRH C6-C9	mg/kg	20	<20
	Surrogates	Dibromofluoromethane (Surrogate)	%	-	81
		d4-1,2-dichloroethane (Surrogate)	%	-	83
		d8-toluene (Surrogate)	%	-	91

Volatile Petroleum Hydrocarbons in Water

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

Sample Number		Parameter	Units	LOR	Result
LB085040.001		TRH C6-C9	µg/L	40	<40
	Surrogates	Dibromofluoromethane (Surrogate)	%	-	127
		d4-1,2-dichloroethane (Surrogate)	%	-	128
		d8-toluene (Surrogate)	%	-	94
		Bromofluorobenzene (Surrogate)	%	-	114

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

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

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

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

Mercury (dissolved) in Water

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

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE143465.010	LB085024.017	Mercury	µg/L	0.0001	<0.0001	0.0000	200	43

Mercury in Soil

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

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE143465.004	LB084973.014	Mercury	mg/kg	0.01	0.28	0.23	50	17
SE143475.004	LB084973.024	Mercury	mg/kg	0.01	0.0322244779	0.0386713005	171	0

Moisture Content

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

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE143465.005	LB084927.011	% Moisture	%w/w	0.5	11	11	39	0
SE143475.005	LB084927.022	% Moisture	%w/w	0.5	18.9530685920	8.1506849315	35	4
SE143475.015	LB084927.033	% Moisture	%w/w	0.5	20.0972447325	20.1834862385	35	0
SE143475.025	LB084927.044	% Moisture	%w/w	0.5	28.8490284005	28.4226190476	33	1
SE143475.035	LB084927.055	% Moisture	%w/w	0.5	19.5751138088	20.2723146747	35	3
SE143475.045	LB084927.066	% Moisture	%w/w	0.5	12.9844961240	13.9194139194	37	7
SE143475.047	LB084927.069	% Moisture	%w/w	0.5	11.3636363636	10.9890109890	39	3

OC Pesticides in Soil

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

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE143465.005	LB084938.009		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
			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	-	0.16	0.159	30	2
SE143475.001	LB084938.015		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

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]AN400/AN420

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE143475.001	LB084938.015		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	-	0.157	0.162	30	3

OP Pesticides in Soil

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

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE143465.005	LB084938.010		Dichlorvos	mg/kg	0.5	<0.5	0	200	0
			Dimethoate	mg/kg	0.5	<0.5	0	200	0
			Diazinon (Dimpylate)	mg/kg	0.5	<0.5	0	200	0
			Fenitrothion	mg/kg	0.2	<0.2	0	200	0
			Malathion	mg/kg	0.2	<0.2	0.04	200	0
			Chlorpyrifos (Chlorpyrifos Ethyl)	mg/kg	0.2	<0.2	0	200	0
			Parathion-ethyl (Parathion)	mg/kg	0.2	<0.2	0.04	200	0
			Bromophos Ethyl	mg/kg	0.2	<0.2	0	200	0
			Methidathion	mg/kg	0.5	<0.5	0	200	0
			Ethion	mg/kg	0.2	<0.2	0	200	0
			Azinphos-methyl (Guthion)	mg/kg	0.2	<0.2	0.01	200	0
		Surrogates	2-fluorobiphenyl (Surrogate)	mg/kg	-	0.4	0.42	30	5
			d14-p-terphenyl (Surrogate)	mg/kg	-	0.5	0.51	30	2
SE143475.001	LB084938.016		Dichlorvos	mg/kg	0.5	0	0	200	0
			Dimethoate	mg/kg	0.5	0	0	200	0
			Diazinon (Dimpylate)	mg/kg	0.5	0.02	0.03	200	0
			Fenitrothion	mg/kg	0.2	0.01	0	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	0.01	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	0	200	0
		Surrogates	2-fluorobiphenyl (Surrogate)	mg/kg	-	0.37	0.36	30	3
			d14-p-terphenyl (Surrogate)	mg/kg	-	0.53	0.5	30	6

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

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

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE143465.005	LB084938.010	Naphthalene	mg/kg	0.1	0.8	0.75	43	0
		2-methylnaphthalene	mg/kg	0.1	0.2	0.2	81	5
		1-methylnaphthalene	mg/kg	0.1	0.1	0.16	99	21
		Acenaphthylene	mg/kg	0.1	1.7	1.93	36	13
		Acenaphthene	mg/kg	0.1	<0.1	0.14	117	33
		Fluorene	mg/kg	0.1	0.9	1.09	40	20
		Phenanthrene	mg/kg	0.1	16	19.15	31	15
		Anthracene	mg/kg	0.1	3.4	3.7	33	7
		Fluoranthene	mg/kg	0.1	20	22.9	30	12
		Pyrene	mg/kg	0.1	18	20.22	31	10
		Benzo(a)anthracene	mg/kg	0.1	11	11.8	31	8
		Chrysene	mg/kg	0.1	7.2	7.16	31	1
		Benzo(b&j)fluoranthene	mg/kg	0.1	11	11.15	31	5

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 %
SE143465.005	LB084938.010		Benzo(k)fluoranthene	mg/kg	0.1	4.7	4.06	32	14
			Benzo(a)pyrene	mg/kg	0.1	10	9.79	31	3
			Indeno(1,2,3-cd)pyrene	mg/kg	0.1	4.5	4.54	32	0
			Dibenzo(a&h)anthracene	mg/kg	0.1	1.1	0.97	40	12
			Benzo(ghi)perylene	mg/kg	0.1	4.7	4.51	32	4
			Carcinogenic PAHs, BaP TEQ <LOR=0*	TEQ (mg/kg)	0.2	14	13.9737	11	2
			Carcinogenic PAHs, BaP TEQ <LOR=LOR*	TEQ (mg/kg)	0.3	14	13.9737	12	2
			Carcinogenic PAHs, BaP TEQ <LOR=LOR/2*	TEQ (mg/kg)	0.2	14	13.9737	11	2
			Total PAH	mg/kg	0.8	120	124.22	31	7
		Surrogates	d5-nitrobenzene (Surrogate)	mg/kg	-	0.4	0.47	30	16
			2-fluorobiphenyl (Surrogate)	mg/kg	-	0.4	0.42	30	5
			d14-p-terphenyl (Surrogate)	mg/kg	-	0.5	0.51	30	2
SE143475.001	LB084938.016		Naphthalene	mg/kg	0.1	0	0	200	0
			2-methylnaphthalene	mg/kg	0.1	0	0	200	0
			1-methylnaphthalene	mg/kg	0.1	0	0	200	0
			Acenaphthylene	mg/kg	0.1	0	0	200	0
			Acenaphthene	mg/kg	0.1	0	0	200	0
			Fluorene	mg/kg	0.1	0	0	200	0
			Phenanthrene	mg/kg	0.1	0	0	200	0
			Anthracene	mg/kg	0.1	0	0	200	0
			Fluoranthene	mg/kg	0.1	0.01	0.01	200	0
			Pyrene	mg/kg	0.1	0.01	0.01	200	0
			Benzo(a)anthracene	mg/kg	0.1	0.02	0.02	200	0
			Chrysene	mg/kg	0.1	0.01	0.02	200	0
			Benzo(b&j)fluoranthene	mg/kg	0.1	0.01	0.01	200	0
			Benzo(k)fluoranthene	mg/kg	0.1	0.01	0.01	200	0
			Benzo(a)pyrene	mg/kg	0.1	0	0	200	0
			Indeno(1,2,3-cd)pyrene	mg/kg	0.1	0	0	200	0
			Dibenzo(a&h)anthracene	mg/kg	0.1	0	0	200	0
			Benzo(ghi)perylene	mg/kg	0.1	0	0.01	200	0
			Carcinogenic PAHs, BaP TEQ <LOR=0*	TEQ (mg/kg)	0.2	0	0	200	0
			Carcinogenic PAHs, BaP TEQ <LOR=LOR*	TEQ (mg/kg)	0.3	0.242	0.242	134	0
			Carcinogenic PAHs, BaP TEQ <LOR=LOR/2*	TEQ (mg/kg)	0.2	0.121	0.121	175	0
			Total PAH	mg/kg	0.8	0.07	0.09	200	0
		Surrogates	d5-nitrobenzene (Surrogate)	mg/kg	-	0.45	0.43	30	5
			2-fluorobiphenyl (Surrogate)	mg/kg	-	0.37	0.36	30	3
			d14-p-terphenyl (Surrogate)	mg/kg	-	0.53	0.5	30	6

PCBs in Soil

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

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE143465.005	LB084938.009		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	0.159	30	2
SE143475.001	LB084938.015		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

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.

PCBs in Soil (continued)

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

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE143475.001	LB084938.015	Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	mg/kg	-	0.157	0.162	30	3

Total Recoverable Metals in Soil by ICPOES

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

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE143465.003	LB084980.014		Arsenic, As	mg/kg	3	<3	<3	115	10
			Cadmium, Cd	mg/kg	0.3	<0.3	<0.3	200	0
			Chromium, Cr	mg/kg	0.3	7.5	9.3	36	21
			Copper, Cu	mg/kg	0.5	7.7	8.2	36	7
			Lead, Pb	mg/kg	1	9	10	41	4
			Nickel, Ni	mg/kg	0.5	6.1	6.1	38	1
			Zinc, Zn	mg/kg	0.5	74	150	32	69 ②
SE143475.003	LB084980.024		Arsenic, As	mg/kg	3	7.93564635249	.1268637661	42	14
			Cadmium, Cd	mg/kg	0.3	0.733438889	10.7353006134	71	0
			Chromium, Cr	mg/kg	0.3	14.3234330446	5.053196383(	33	5
			Copper, Cu	mg/kg	0.5	11.4031135433	3.720577014(	31	5
			Lead, Pb	mg/kg	1	20.3016346988	21.101323990(	35	4
			Nickel, Ni	mg/kg	0.5	21.2365336592	1.8196715671	32	3
			Zinc, Zn	mg/kg	0.5	15.4316277911	8.271784527	32	2

Trace Metals (Dissolved) in Water by ICPMS

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

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE143465.010	LB084964.023		Arsenic, As	µg/L	1	<1	<1	200	0
			Cadmium, Cd	µg/L	0.1	<0.1	<0.1	200	0
			Chromium, Cr	µg/L	1	<1	<1	200	0
			Copper, Cu	µg/L	1	<1	<1	200	0
			Lead, Pb	µg/L	1	<1	<1	200	0
			Nickel, Ni	µg/L	1	<1	<1	171	0
			Zinc, Zn	µg/L	5	<5	<5	188	0

TRH (Total Recoverable Hydrocarbons) in Soil

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

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE143465.005	LB084938.009		TRH C10-C14	mg/kg	20	<20	0	200	0
			TRH C15-C28	mg/kg	45	170	204	54	21
			TRH C29-C36	mg/kg	45	49	80	100	48
			TRH C37-C40	mg/kg	100	<100	0	200	0
			TRH C10-C36 Total	mg/kg	110	220	284	74	28
			TRH C10-C40 Total	mg/kg	210	220	284	114	28
		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	210	267	68	26
			TRH >C34-C40 (F4)	mg/kg	120	<120	0	200	0
SE143475.001	LB084938.015		TRH C10-C14	mg/kg	20	0	0	200	0
			TRH C15-C28	mg/kg	45	0	0	200	0
			TRH C29-C36	mg/kg	45	0	0	200	0
			TRH C37-C40	mg/kg	100	0	0	200	0
			TRH C10-C36 Total	mg/kg	110	0	0	200	0
			TRH C10-C40 Total	mg/kg	210	0	0	200	0
		TRH F Bands	TRH >C10-C16 (F2)	mg/kg	25	0	0	200	0
			TRH >C10-C16 (F2) - Naphthalene	mg/kg	25	0	0	200	0
			TRH >C16-C34 (F3)	mg/kg	90	0	0	200	0
			TRH >C34-C40 (F4)	mg/kg	120	0	0	200	0

VOC's in Soil

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

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE143465.009	LB084924.026	Monocyclic	Benzene	mg/kg	0.1	<0.1	0	200	0
		Aromatic	Toluene	mg/kg	0.1	<0.1	0.01	200	0
			Ethylbenzene	mg/kg	0.1	<0.1	0	200	0
			m/p-xylene	mg/kg	0.2	<0.2	0	200	0
			o-xylene	mg/kg	0.1	<0.1	0	200	0
		Polycyclic	Naphthalene	mg/kg	0.1	<0.1	0	200	0
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	3.5	3.72	50	6
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	3.9	4.15	50	6
			d8-toluene (Surrogate)	mg/kg	-	4.3	4.07	50	5

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.

VOC's in Soil (continued)

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

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE143465.009	LB084924.026	Surrogates	Bromofluorobenzene (Surrogate)	mg/kg	-	4.2	3.94	50	6
		Totals	Total Xylenes*	mg/kg	0.3	<0.3	0	200	0
			Total BTEX*	mg/kg	0.6	<0.6	0.01	200	0
SE143475.009	LB084924.025	Monocyclic	Benzene	mg/kg	0.1	0	0	200	0
		Aromatic	Toluene	mg/kg	0.1	0.01	0.01	200	0
			Ethylbenzene	mg/kg	0.1	0	0	200	0
			m/p-xylene	mg/kg	0.2	0	0	200	0
			o-xylene	mg/kg	0.1	0	0	200	0
		Polycyclic	Naphthalene	mg/kg	0.1	0	0	200	0
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	5.03	4.69	50	7
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	5.78	5.43	50	6
			d8-toluene (Surrogate)	mg/kg	-	4.99	4.93	50	1
			Bromofluorobenzene (Surrogate)	mg/kg	-	3.77	3.95	50	5
		Totals	Total Xylenes*	mg/kg	0.3	0	0	200	0
			Total BTEX*	mg/kg	0.6	0.01	0.01	200	0

Volatile Petroleum Hydrocarbons in Soil

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

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE143465.009	LB084924.026		TRH C6-C10	mg/kg	25	<25	1.54	200	0
			TRH C6-C9	mg/kg	20	<20	1.57	200	0
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	3.5	3.72	30	6
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	3.9	4.15	30	6
			d8-toluene (Surrogate)	mg/kg	-	4.3	4.07	30	5
			Bromofluorobenzene (Surrogate)	mg/kg	-	4.2	3.94	30	6
		VPH F Bands	Benzene (F0)	mg/kg	0.1	<0.1	0	200	0
			TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	1.53	200	0
SE143475.009	LB084924.025		TRH C6-C10	mg/kg	25	2.32	2.55	200	0
			TRH C6-C9	mg/kg	20	2.32	2.54	200	0
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	5.03	4.69	30	7
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	5.78	5.43	30	6
			d8-toluene (Surrogate)	mg/kg	-	4.99	4.93	30	1
			Bromofluorobenzene (Surrogate)	mg/kg	-	3.77	3.95	30	5
		VPH F Bands	Benzene (F0)	mg/kg	0.1	0	0	200	0
			TRH C6-C10 minus BTEX (F1)	mg/kg	25	2.31	2.54	200	0

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

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

Mercury in Soil

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

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB084973.002	Mercury	mg/kg	0.01	0.21	0.2	70 - 130	105

OC Pesticides in Soil

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

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB084938.002		Heptachlor	mg/kg	0.1	0.2	0.2	60 - 140	108
		Aldrin	mg/kg	0.1	0.2	0.2	60 - 140	105
		Delta BHC	mg/kg	0.1	0.2	0.2	60 - 140	98
		Dieldrin	mg/kg	0.2	0.2	0.2	60 - 140	105
		Endrin	mg/kg	0.2	0.2	0.2	60 - 140	114
		p,p'-DDT	mg/kg	0.1	0.2	0.2	60 - 140	104
	Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	mg/kg	-	0.14	0.15	40 - 130	94

OP Pesticides in Soil

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

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB084938.002		Dichlorvos	mg/kg	0.5	1.6	2	60 - 140	80
		Diazinon (Dimpylate)	mg/kg	0.5	2.1	2	60 - 140	105
		Chlorpyrifos (Chlorpyrifos Ethyl)	mg/kg	0.2	2.0	2	60 - 140	98
		Ethion	mg/kg	0.2	1.8	2	60 - 140	89
	Surrogates	2-fluorobiphenyl (Surrogate)	mg/kg	-	0.4	0.5	40 - 130	76
		d14-p-terphenyl (Surrogate)	mg/kg	-	0.5	0.5	40 - 130	98

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

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

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB084938.002		Naphthalene	mg/kg	0.1	4.3	4	60 - 140	107
		Acenaphthylene	mg/kg	0.1	4.3	4	60 - 140	108
		Acenaphthene	mg/kg	0.1	4.3	4	60 - 140	109
		Phenanthrene	mg/kg	0.1	4.0	4	60 - 140	101
		Anthracene	mg/kg	0.1	4.0	4	60 - 140	101
		Fluoranthene	mg/kg	0.1	4.2	4	60 - 140	105
		Pyrene	mg/kg	0.1	4.3	4	60 - 140	108
		Benzo(a)pyrene	mg/kg	0.1	4.4	4	60 - 140	109
	Surrogates	d5-nitrobenzene (Surrogate)	mg/kg	-	0.4	0.5	40 - 130	88
		2-fluorobiphenyl (Surrogate)	mg/kg	-	0.4	0.5	40 - 130	76
		d14-p-terphenyl (Surrogate)	mg/kg	-	0.5	0.5	40 - 130	98

PCBs in Soil

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

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB084938.002	Arochlor 1260	mg/kg	0.2	0.5	0.4	60 - 140	114

Total Recoverable Metals in Soil by ICPOES

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

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB084980.002	Arsenic, As	mg/kg	3	55	50	80 - 120	110
	Cadmium, Cd	mg/kg	0.3	57	50	80 - 120	113
	Chromium, Cr	mg/kg	0.3	59	50	80 - 120	117
	Copper, Cu	mg/kg	0.5	56	50	80 - 120	111
	Lead, Pb	mg/kg	1	56	50	80 - 120	113
	Nickel, Ni	mg/kg	0.5	58	50	80 - 120	115
	Zinc, Zn	mg/kg	0.5	57	50	80 - 120	114

Trace Metals (Dissolved) in Water by ICPMS

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

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB084964.002	Arsenic, As	µg/L	1	20	20	80 - 120	100
	Cadmium, Cd	µg/L	0.1	20	20	80 - 120	99
	Chromium, Cr	µg/L	1	21	20	80 - 120	104
	Copper, Cu	µg/L	1	21	20	80 - 120	106
	Lead, Pb	µg/L	1	20	20	80 - 120	100
	Nickel, Ni	µg/L	1	21	20	80 - 120	104
	Zinc, Zn	µg/L	5	21	20	80 - 120	103

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.

TRH (Total Recoverable Hydrocarbons) in Soil

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

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB084938.002		TRH C10-C14	mg/kg	20	40	40	60 - 140	100
		TRH C15-C28	mg/kg	45	<45	40	60 - 140	98
		TRH C29-C36	mg/kg	45	<45	40	60 - 140	78
	TRH F Bands	TRH >C10-C16 (F2)	mg/kg	25	39	40	60 - 140	98
		TRH >C16-C34 (F3)	mg/kg	90	<90	40	60 - 140	95
		TRH >C34-C40 (F4)	mg/kg	120	<120	20	60 - 140	75

TRH (Total Recoverable Hydrocarbons) in Water

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

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB084917.002		TRH C10-C14	µg/L	50	1100	1200	60 - 140	92
		TRH C15-C28	µg/L	200	1100	1200	60 - 140	96
		TRH C29-C36	µg/L	200	1100	1200	60 - 140	94
	TRH F Bands	TRH >C10-C16 (F2)	µg/L	60	1100	1200	60 - 140	94
		TRH >C16-C34 (F3)	µg/L	500	1200	1200	60 - 140	96
		TRH >C34-C40 (F4)	µg/L	500	600	600	60 - 140	100

VOC's in Soil

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

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB084924.002	Monocyclic	Benzene	mg/kg	0.1	1.8	2.9	60 - 140	60
	Aromatic	Toluene	mg/kg	0.1	2.4	2.9	60 - 140	84
		Ethylbenzene	mg/kg	0.1	2.4	2.9	60 - 140	83
		m/p-xylene	mg/kg	0.2	4.8	5.8	60 - 140	82
		o-xylene	mg/kg	0.1	2.4	2.9	60 - 140	84
	Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	4.1	5	60 - 140	82
		d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.4	5	60 - 140	87
		d8-toluene (Surrogate)	mg/kg	-	4.6	5	60 - 140	91
		Bromofluorobenzene (Surrogate)	mg/kg	-	4.7	5	60 - 140	94

VOCs in Water

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

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB085040.002	Monocyclic	Benzene	µg/L	0.5	57	45.45	60 - 140	126
	Aromatic	Toluene	µg/L	0.5	54	45.45	60 - 140	119
		Ethylbenzene	µg/L	0.5	60	45.45	60 - 140	132
		m/p-xylene	µg/L	1	100	90.9	60 - 140	114
		o-xylene	µg/L	0.5	61	45.45	60 - 140	135
	Surrogates	Dibromofluoromethane (Surrogate)	µg/L	-	4.6	5	60 - 140	91
		d4-1,2-dichloroethane (Surrogate)	µg/L	-	4.6	5	60 - 140	92
		d8-toluene (Surrogate)	µg/L	-	3.8	5	60 - 140	76
		Bromofluorobenzene (Surrogate)	µg/L	-	5.5	5	60 - 140	110

Volatile Petroleum Hydrocarbons in Soil

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

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB084924.002		TRH C6-C10	mg/kg	25	<25	24.65	60 - 140	90
		TRH C6-C9	mg/kg	20	<20	23.2	60 - 140	74
	Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	4.1	5	60 - 140	82
		d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.4	5	60 - 140	87
		d8-toluene (Surrogate)	mg/kg	-	4.6	5	60 - 140	91
		Bromofluorobenzene (Surrogate)	mg/kg	-	4.7	5	60 - 140	94
	VPH F Bands	TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	7.25	60 - 140	115

Volatile Petroleum Hydrocarbons in Water

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

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB085040.002		TRH C6-C10	µg/L	50	1100	946.63	60 - 140	119
		TRH C6-C9	µg/L	40	880	818.71	60 - 140	108
	Surrogates	Dibromofluoromethane (Surrogate)	µg/L	-	4.6	5	60 - 140	91
		d4-1,2-dichloroethane (Surrogate)	µg/L	-	4.6	5	60 - 140	92
		d8-toluene (Surrogate)	µg/L	-	3.8	5	60 - 140	76
		Bromofluorobenzene (Surrogate)	µg/L	-	5.5	5	60 - 140	110
	VPH F Bands	TRH C6-C10 minus BTEX (F1)	µg/L	50	790	639.67	60 - 140	123

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

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

Mercury (dissolved) in Water

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

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE143274.002	LB085024.004	Mercury	mg/L	0.0001	0.0067	<0.0001	0.008	84

Mercury in Soil

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

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE143440.009	LB084973.004	Mercury	mg/kg	0.01	0.20	0.03153044836	0.2	85

OP Pesticides in Soil

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

QC Sample	Sample Number		Parameter	Units	LOR	Original	Spike	Recovery%
SE143465.001	LB084938.004		Dichlorvos	mg/kg	0.5	<0.5	2	86
			Dimethoate	mg/kg	0.5	<0.5	-	-
			Diazinon (Dimpylate)	mg/kg	0.5	<0.5	2	98
			Fenitrothion	mg/kg	0.2	<0.2	-	-
			Malathion	mg/kg	0.2	<0.2	-	-
			Chlorpyrifos (Chlorpyrifos Ethyl)	mg/kg	0.2	<0.2	2	92
			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	95
			Azinphos-methyl (Guthion)	mg/kg	0.2	<0.2	-	-
		Surrogates	2-fluorobiphenyl (Surrogate)	mg/kg	-	0.4	-	78
			d14-p-terphenyl (Surrogate)	mg/kg	-	0.5	-	96

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

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

QC Sample	Sample Number		Parameter	Units	LOR	Original	Spike	Recovery%
SE143465.001	LB084938.004		Naphthalene	mg/kg	0.1	<0.1	4	105
			2-methylnaphthalene	mg/kg	0.1	<0.1	-	-
			1-methylnaphthalene	mg/kg	0.1	<0.1	-	-
			Acenaphthylene	mg/kg	0.1	<0.1	4	104
			Acenaphthene	mg/kg	0.1	<0.1	4	105
			Fluorene	mg/kg	0.1	<0.1	-	-
			Phenanthrene	mg/kg	0.1	0.6	4	88
			Anthracene	mg/kg	0.1	<0.1	4	100
			Fluoranthene	mg/kg	0.1	0.7	4	98
			Pyrene	mg/kg	0.1	0.6	4	98
			Benzo(a)anthracene	mg/kg	0.1	0.2	-	-
			Chrysene	mg/kg	0.1	0.3	-	-
			Benzo(b&j)fluoranthene	mg/kg	0.1	0.3	-	-
			Benzo(k)fluoranthene	mg/kg	0.1	0.2	-	-
			Benzo(a)pyrene	mg/kg	0.1	0.2	4	103
			Indeno(1,2,3-cd)pyrene	mg/kg	0.1	0.1	-	-
			Dibenzo(a&h)anthracene	mg/kg	0.1	<0.1	-	-
			Benzo(ghi)perylene	mg/kg	0.1	0.2	-	-
			Carcinogenic PAHs, BaP TEQ <LOR=0*	TEQ	0.2	0.3	-	-
			Carcinogenic PAHs, BaP TEQ <LOR=LOR*	TEQ (mg/kg)	0.3	0.4	-	-
			Carcinogenic PAHs, BaP TEQ <LOR=LOR/2*	TEQ (mg/kg)	0.2	0.3	-	-
			Total PAH	mg/kg	0.8	3.6	-	-
		Surrogates	d5-nitrobenzene (Surrogate)	mg/kg	-	0.5	-	90
			2-fluorobiphenyl (Surrogate)	mg/kg	-	0.4	-	78
			d14-p-terphenyl (Surrogate)	mg/kg	-	0.5	-	96

Total Recoverable Metals in Soil by ICPOES

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

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE143440.008	LB084980.004	Arsenic, As	mg/kg	3	57	17.27267254541	50	80
		Cadmium, Cd	mg/kg	0.3	45	0.50560347831	50	89
		Chromium, Cr	mg/kg	0.3	58	12.95542206584	50	90
		Copper, Cu	mg/kg	0.5	70	28.01278641755	50	84
		Lead, Pb	mg/kg	1	95	36.74950771218	50	56 ④
		Nickel, Ni	mg/kg	0.5	56	11.17883852372	50	89

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.

Total Recoverable Metals in Soil by ICPOES (continued)

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

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE143440.008	LB084980.004	Zinc, Zn	mg/kg	0.5	240	107.6129306295	50	60 ⑤

VOC's in Soil

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

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE143465.001	LB084924.004	Monocyclic	Benzene	mg/kg	0.1	2.2	<0.1	2.9	76
		Aromatic	Toluene	mg/kg	0.1	2.1	<0.1	2.9	72
			Ethylbenzene	mg/kg	0.1	2.3	<0.1	2.9	80
			m/p-xylene	mg/kg	0.2	4.5	<0.2	5.8	77
			o-xylene	mg/kg	0.1	2.3	<0.1	2.9	78
		Polycyclic	Naphthalene	mg/kg	0.1	<0.1	<0.1	-	-
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	3.6	3.7	-	71
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	3.9	4.0	-	78
			d8-toluene (Surrogate)	mg/kg	-	4.2	4.3	-	85
			Bromofluorobenzene (Surrogate)	mg/kg	-	4.3	4.2	-	87
		Totals	Total Xylenes*	mg/kg	0.3	6.7	<0.3	-	-
			Total BTEX*	mg/kg	0.6	13	<0.6	-	-

Volatile Petroleum Hydrocarbons in Soil

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

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE143465.001	LB084924.004		TRH C6-C10	mg/kg	25	<25	<25	24.65	81
			TRH C6-C9	mg/kg	20	<20	<20	23.2	62
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	3.6	3.7	-	71
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	3.9	4.0	-	78
			d8-toluene (Surrogate)	mg/kg	-	4.2	4.3	-	85
			Bromofluorobenzene (Surrogate)	mg/kg	-	4.3	4.2	-	87
		VPH F	Benzene (F0)	mg/kg	0.1	2.2	<0.1	-	-
		Bands	TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	<25	7.25	93

MATRIX SPIKE DUPLICATES

SE143465 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%20Documents/MP-AU-ENV-QU-022%20QA%20QC%20Plan.pdf

*	NATA accreditation does not cover tthe performance of this service.
-	Sample not analysed for this analyte.
^	Analysis performed by external laboratory.

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.

SGS Environmental Services is accredited by NATA for Chemical Testing (Reg.No.2562) and Quality System compliance to ISO/IEC 17025. The QC parameters contained within are designed to meet NEPM 1999 requirements.

Quality Control samples included in any analytical run are listed below.

Reagent/Analysis Blank (BLK) **Method Blank (MB)**	Sample free reagents carried through the preparation/extraction/digestion procedure and analysed at the beginning of every sample batch analysis. A reagent blank is prepared and analysed with every batch of samples plus with each new batch of solvent prior to use.
Sample Matrix Spike (MS) & Matrix Spike Duplicate (MSD)	Sample replicates spiked with identical concentrations of target analyte(s). The spiking occurs during the sample preparation and prior to the extraction/digestion procedure. They are used to document the precision and bias of a method in a given sample matrix. Where there is not enough sample available to prepare a spiked sample, another known soil/sand or water may be used. A duplicate spiked sample is analysed at least every 20 samples.
Surrogate Spike (SS)	At least one but up to three surrogate compounds are added to all samples requiring analysis for organics prior to extraction. Used to determine the extraction efficiency. They are organic compounds which are similar to the target analyte(s) in chemical composition and behaviour in the analytical process, but which are not normally found in environmental samples. Where possible they are surrogate compounds recommended by the USEPA.
Control Matrix Spike (CMS)	To ensure spike recoveries can be determined for every batch of samples a control matrix is spiked with identical concentrations of target analyte(s) and then analysed. These results allow recoveries to be determined in the event that the matrix spikes are unusable (eg. matrix spikes performed on heavily contaminated samples). These are analysed at least every 20 samples.
Internal Standard (IS)	Added to all samples requiring analysis for organics (where relevant) after the extraction process; the compounds serve to give a standard of retention time and response, which is invariant from run-to-run with the instruments. Where possible they are standard compounds recommended by the USEPA.
Lab Duplicates (D)	A separate portion of a sample being analysed that is treated the same as the other samples in the batch. One duplicate is processed at least every 10 samples.
Lab Control Standards/Samples (LCS)	Prepared from a source independent of the calibration standards. At least one control standard is included in each run to confirm calibration validity. Thereafter they are analysed at least every one in 20 samples plus at the end of each analytical run. This data is not reported.
Continuous Calibration Verification (CCV) or **Calibration Check Standard & Blank**	A calibration check standard or CCV and blank are run after every 20 samples of an instrumental analysis run to assess analytical drift. Calibration Standards are checked old versus new with a criteria of ±10%

Quality Assurance Programs are listed below:

Statistical analysis of Quality Control data (SQC)	Quality control data is plotted on control charts using the APHA procedure with warning and control limits at 2 and 3 standard deviations respectively. See also QMS Procedure "Statistical Quality Control".
Certified Reference Materials (CRM/SRM)	Certified Reference Materials and Standards are regularly analysed. These materials/standards have certified reference values for various parameters.
Proficiency Testing	Regular proficiency test samples are analysed by our laboratories. SGS Environmental participates in a number of programs. Results and proficiency status are compiled and sent to participating laboratory post data interpretation. Failure to comply with acceptable values result in further investigations.
Inter-laboratory & Intra-laboratory Testing	SGS Environmental Services has schedules in the Quality Systems to participate in Inter/Intra laboratory testing conducted internally and by other parties.
Data Acceptance Criteria Unless otherwise specified in the method or method manual the following general criteria apply to all inorganic tests. All recoveries are to be reported to 3 significant figures.	Failure to meet the internal acceptance criteria will result in sample batch repeats dependent upon investigation outcomes. For data to be accepted: <u>Inorganics (water samples)</u> • For all inorganic analytes the Reagent & Method Blanks must be less than the LOR. • The Calibration Check Standards or Continuous Calibration Verification (CCV) must be within ±15%. • Control Standards must be 80-120% of the accepted value. • The Calibration Check Blanks must be less than the LOR. • Lab Duplicates RPD to be <15%*. Note: If client <u>field</u> duplicates do not meet this criteria it may indicate heterogeneity and shall be noted on the data reports for QC samples. • Sample (and if applicable Control) Matrix Spike♬ Duplicate recovery RPD to be <30%. • Where CRMs are used, results to be within ± 2 standard deviations of the expected value. <u>Inorganics (soil samples)</u> • For all inorganic analytes the Reagent & Method Blanks must be less than the LOR. • The Calibration Check Standards or Continuous Calibration Verification (CCV) must be within ±15%. • Control Standards must be 80-120% of the accepted value. • The Calibration Check Blanks must be less than the LOR. • Lab duplicate RPD to be <30%* for sample results greater than 10 times LOR. • Sample Matrix Spike Duplicate (MS♬/MSD) recovery RPD to be <30%. In the event that the matrix spike has been applied to samples whose matrix or contamination is problematic to the method then these acceptance criteria apply to the Control Matrix Spike (CMS/D). • Where CRMs are used, results to be within ± 2 standard deviations of the expected value.

Data Acceptance Criteria Unless otherwise specified in the method or method manual the following general criteria apply to all organic tests. All recoveries are to be reported to 3 significant figures.	Organics • Volatile & extractable Reagent & Method Blanks must contain levels less than or equal to LOR. • The Calibration Check Standards or Continuous Calibration Verification (CCV) must be within ±25%. Some analytes may have specific criteria. • Control Standards (LCS/CMS) and Certified Reference Materials (CRM) recoveries are to be within established control limits or as a default 60-140% unless compound specific limits apply. • Retention times are to vary by no more than 0.2 min. • **At least two of three** routine level soil sample Surrogate Spike (SS) recoveries are to be within 70-130% where control charts have not been developed and within the established control limits for charted surrogates. Matrix effects may void this as acceptance criterion. Any recoveries outside these limits will have comment. • Water sample Surrogates Spike (SS) recoveries are to be within 40-130%. The presence of emulsions, surfactants and particulates may void this as an acceptance criterion. Any recoveries outside these limits will have comment. • Lab Duplicates (D) must have a RPD <30%*. • Sample Matrix Spike Duplicate (MS♬/MSD) recovery RPD to be <30%. In the event that the matrix spike has been applied to samples whose matrix or contamination is problematic to the method then these acceptance criteria apply to the Control Matrix Spike (CMS/D).

*Only if results are at least 10 times the LOR otherwise no acceptance criteria for RPD's apply. Application of more stringent criteria shall be applied for clean water sample from water boards and any other nominated client contracts. Nominal 10xLOR criteria are dropped to 5xLOR where specified.
♬Matrix do not readily equate to definitive recovery due to inherent matrix interferences and thus do not have recovery compliance values set. As a guide inorganic recoveries should be between 70-130% and for organics 60-130%

Batch Structure Summary

An analytical batch is nominally considered as 20 samples or smaller. As a standard template the following should be **used as a guide** according to the above Quality Control Types:

1	MB	16	UNK_DUP
2	STD1	17	MS
3	STD2	18	MS_DUP
4	STD3	19	UNK 11
5	LCS	20	UNK 12
6	BLK	21	UNK 13
7	UNK 1	22	UNK 14
8	UNK 2	23	UNK 15
9	UNK 3	24	UNK 16
10	UNK 4	25	UNK 17
11	UNK 5	26	UNK 18
12	UNK 6	27	UNK 19
13	UNK 7	28	UNK 20 (SS if applicable)
14	UNK 8	29	UNK_DUP
15	UNK 9	30	CCV
16	UNK 10 (SS if applicable)	31	CRM / SRM / CMS / LCS

Table QC1 - Containers, Preservation Requirements and Holding Times - Soil			
Parameter	Container	Preservation	Maximum Holding Time
Acid digestible metals and metalloids - Total and TCLP (As,Cd.,Cu,Cr,Ni,Pb,Zn)	Glass with Teflon Lid	Nil	6 months
Mercury	Glass with Teflon Lid	Nil	28 days
TPH / BTEX / VOC / SVOC / CHC	Glass with Teflon Lid	4^oC, zero headspace	14 days
PAHs (total and TCLP)	Glass with Teflon Lid	4^oC [1]	14 days
Phenols	Glass with Teflon Lid	4^oC [1]	14 days
OCPs, OPPs and total PCBs	Glass with Teflon Lid	4^oC [1]	14 days
Asbestos	Sealed Plastic Bag	Nil	N/A

Table QC2 - Containers, Preservation Requirements and Holding Times - Water			
Parameter	Container Volume (mL)	Preservation	Maximum Holding Time
Heavy Metals	125mL Plastic	Field filtration 0.45μm HNO_3 / 4^oC	6 months
Cyanide	125mL Amber Glass	pH > 12 NaOH / 4^oC	6 months
TPH (C6-C9) / BTEX / VOCs SVOCs / CHCs	4 x 43mL Glass	HCl / 4^oC [1]	14 days
TPH (C10-C36) / PAH / Phenolics OCP / OPP / TDS / pH	3 x 1L Amber Glass	None / 4^oC [1]	28 days

Notes: [1] = Extraction within 14 days, Analysis within 40 days.

Table QC3 - Analytical Parameters, PQLs and Methods - Soil			
Parameter	**Unit**	**PQL**	**Method Reference**
Metals in Soil			
Arsenic - As[1]	mg / kg	1	USEPA 200.7
Cadmium - Cd[1]	mg / kg	0.5	USEPA 200.7
Chromium - Cr[1]	mg / kg	1	USEPA 200.7
Copper - Cu[1]	mg / kg	1	USEPA 200.7
Lead - Pb[1]	mg / kg	1	USEPA 200.7
Mercury - Hg[2]	mg / kg	0.1	USEPA 7471A
Nickel - Ni[1]	mg / kg	1	USEPA 200.7
Zinc - Zn[1]	mg / kg	1	USEPA 200.7
Total Petroleum Hydrocarbons (TPHs) in Soil			
C_6-C_9 fraction	mg / kg	25	USEPA 8260
C_{10}-C_{14} fraction	mg / kg	50	USEPA 8000
C_{15}-C_{28} fraction	mg / kg	100	USEPA 8000
C_{29}-C_{36} fraction	mg / kg	100	USEPA 8000
BTEX in Soil			
Benzene	mg / kg	1	USEPA 8260
Toluene	mg / kg	1	USEPA 8260
Ethylbenzene	mg / kg	1	USEPA 8260
m & p Xylene	mg / kg	2	USEPA 8260
o- Xylene	mg / kg	1	USEPA 8260
Other Organic Contaminants in Soil			
PAHs	mg / kg	0.05-0.2	USEPA 8270
CHCs	mg / kg	1	USEPA 8260
VOCs	mg / kg	1	USEPA 8260
SVOCs	mg / kg	1	USEPA 8260
OCPs	mg / kg	0.1	USEPA 8140, 8080
OPPs	mg / kg	0.1	USEPA 8140, 8080
PCBs	mg / kg	0.1	USEPA 8080
Phenolics	mg / kg	5	APHA 5530
Asbestos			
Asbestos	mg / kg	Presence / Absence	AS4964-2004

Notes:

1. Acid Soluble Metals by ICP-AES
2. Total Recoverable Mercury

Table QC4 - Analytical Parameters, PQLs and Methods - Groundwater

Parameter	Unit	PQL	Method
Heavy Metals			
Antimony - Sb	µg/L	1	USEPA 200.8
Arsenic - As	µg/L	1	USEPA 200.8
Beryllium - Be	µg/L	0.5	USEPA 200.8
Cadmium - Cd	µg/L	0.1	USEPA 200.8
Chromium - Cr	µg/L	1	USEPA 200.8
Cobalt - Co	µg/L	1	USEPA 200.8
Copper - Cu	µg/L	1	USEPA 200.8
Lead - Pb	µg/L	1	USEPA 200.8
Mercury - Hg	µg/L	0.5	USEPA 7471A
Molybdenum - Mo	µg/L	1	USEPA 200.8
Nickel - Ni	µg/L	1	USEPA 200.8
Selenium - Se	µg/L	1	USEPA 200.8
Silver - Ag	µg/L	1	USEPA 200.8
Tin (inorg.) - Sn	µg/L	1	USEPA 200.8
Nickel - Ni	µg/L	1	USEPA 200.8
Zinc - Zn	µg/L	1	USEPA 200.8
Total Petroleum Hydrocarbons (TPHs)			
C_6-C_9 fraction	µg/L	10	USEPA 8220A / 8000
C_{10}-C_{14} fraction	µg/L	50	USEPA 8000
C_{15}-C_{28} fraction	µg/L	100	USEPA 8000
C_{29}-C_{36} fraction	µg/L	100	USEPA 8000
BTEX			
Benzene	µg/L	1	USEPA 8220A
Toluene	µg/L	1	USEPA 8220A
Ethylbenzene	µg/L	1	USEPA 8220A
m- & p-Xylene	µg/L	2	USEPA 8220A
o-Xylene	µg/L	1	USEPA 8220A
Polyciclic Aromatic Hydrocarbons (PAHs)			
PAHs	µg/L	0.1	USEPA 8270
Benzo(a)pyrene	µg/L	0.01	USEPA 8270
OrganoChlorine Pesticides (OCPs)			
Aldrin	µg/L	0.001	USEPA 8081
Chlordane	µg/L	0.001	USEPA 8081
DDT	µg/L	0.001	USEPA 8081
Dieldrin	µg/L	0.001	USEPA 8081
Endosulfan	µg/L	0.001	USEPA 8081
Endrin	µg/L	0.001	USEPA 8081
Heptachlor	µg/L	0.001	USEPA 8081
Lindane	µg/L	0.001	USEPA 8081
Toxaphene	µg/L	0.001	USEPA 8081

Parameter	Unit	PQL	Method
Chlorinated Hydrocarbons (CHCs)			
1,2-dichlorobenzene	µg/L	1	USEPA 8260B
1,3-dichlorobenzene	µg/L	1	USEPA 8260B
1,4-dichlorobenzene	µg/L	1	USEPA 8260B
1,2,3-trichlorobenzene	µg/L	1	USEPA 8260B
1,2,4-trichlorobenzene	µg/L	1	USEPA 8260B
Hexachlorobutadeine	µg/L	1	USEPA 8260B
1,1,2-trichloroethane	µg/L	1	USEPA 8260B
Hexachloroethane	µg/L	10	USEPA 8270D
Other CHCs	µg/L	1	USEPA 8260B
Volatile Organic Compounds (VOCs)			
Aniline	µg/L	10	USEPA 8260B
2,4-dichloroaniline	µg/L	10	USEPA 8260B
3,4-dichloroaniline	µg/L	10	USEPA 8260B
Nitrobenzene	µg/L	50	USEPA 8260B
2,4-dinitrotoluene	µg/L	50	USEPA 8260B
2,4,6-trinitrotoluene	µg/L	50	USEPA 8260B
Phenolic Compounds			
Phenol	µg/L	10	USEPA 8041
2-chlorophenol	µg/L	10	USEPA 8041
4-chlorophenol	µg/L	10	USEPA 8041
2, 4-dichlorophenol	µg/L	10	USEPA 8041
2,4,6-trichlorophenol	µg/L	10	USEPA 8041
2,3,4,6-tetrachlorophenol	µg/L	10	USEPA 8041
Pentachlorophenol	µg/L	10	USEPA 8041
2,4-dinitrophenol	µg/L	10	USEPA 8041
Miscellaneous Parameters			
Total Cyanide	µg/L	5	APHA 4500C&E-CN
Fluoride	µg/L	10	APHA 4500 F-C
Salinity (TDS)	mg/L	1	APHA 2510
pH	units	0.1	APHA 4500H+
OrganoPhosphate Pesticides (OPPs)			
Azinphos Methyl	µg/L	0.01	USEPA 8141
Chloropyrifos	µg/L	0.01	USEPA 8141
Diazinon	µg/L	0.01	USEPA 8141
Dimethoate	µg/L	0.01	USEPA 8141
Fenitrothion	µg/L	0.01	USEPA 8141
Malathion	µg/L	0.01	USEPA 8141
Parathion	µg/L	0.01	USEPA 8141
Temephos	µg/L	0.01	USEPA 8141
Polychlorinated Biphenyls (PCBs)			
Individual PCBs	µg/L	0.01	USEPA 8081

Table QC5 - QC Sample Data Acceptance Criteria

QC Sample Type	Method of Assessment	Acceptable Range
Field QC		
Blind Duplicates and Split Samples	The assessment of split duplicate is undertaken by calculating the Relative Percent Difference (RPD) of the duplicate concentration compared with the primary sample concentration. The RPD is defined as: $RPD = 100 \times \frac{\lvert X_1 - X_2 \rvert}{\text{mean}(X1, X2)}$ Where: X_1 and X_2 are the concentrations of the primary and duplicate samples.	The acceptable range depends upon the levels detected: - 0-150% RPD (when the average concentration is <5 times the LOR/PQL) - 0-75% RPD (when the average concentration is 5 to 10 times the LOR/PQL) - 0-50% RPD (when the average concentration is >10 times the LOR/PQL)
Rinsate & Trip Blanks	Each blank is analysed as per the original samples.	Analytical Result <LOR/PQL
Laboratory prepared Trip Spike	The Trip Spike is analysed after returning from the field and the % recovery of the known spike is calculated.	70 - 130%
Laboratory QC		
Laboratory Duplicates	Assessment of Lab Duplicate RPD as per Blind Duplicates and Split Samples.	Lab Duplicate RPD < 15% (Inorganics) Lab Duplicate RPD < 30% (Organics) for sample results > 10 LOR
Surrogates	Assessment is undertaken by determining the percent recovery of the known surrogate spike (SS) or addition to the sample.	at least 2 SS recoveries to be within 70-130% subject to matrix effects (Organics)
Matrix Spikes Laboratory Control Samples	$\%\ \text{Recovery} = 100 \times \frac{C - A}{B}$ Where: A = Concentration of analyte determined in the original sample; B = Added Concentration; and C = Calculated Concentration.	80-120% (Inorganics / Metals) 60-140% (Organics) 10-140% (SVOC and Speciated Phenols) If the result is outside the above ranges, the result must be <3x Standard Deviation of the Historical Mean (calculated over the past 12 months).
Sample Matrix Spike Duplicates	Recovery RPD	<30% (Inorganics & Organics)
Calibration Check Standards	Continuous Calibration Verification (CCV)	CCV must be within ±15% (inorganics) CCV must be within ±25% (inorganics)
Reagent, Method & Calibration Check Blanks	Each blank is analysed as per the original samples.	Analytical Result <LOR/PQL

Note: PQL - Laboratory Practical Quantitation Limit (PQL) or the minimum detection limit for a particular analyte.
LOR = Limit of Reporting

1 OBJECTIVE

This procedure will be used by sections to comply with NEPM requirements for QA/QC reporting.

This procedure is applicable to all Environmental samples eg from Environmental Consultants. Samples from non Environmental Consultants such as Councils, mines or trade waste etc do not have to conform with these requirements, however, it will be Envirolab Services policy that this procedure be used when ever possible.

2 DEFINITIONS

Duplicate

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

Blank

This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples. Other terms cited in literature, but not used here include: Reagent Blank, Control Blank, Method Blank.

Matrix Spike

A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist. Other terms cited in literature include Laboratory Fortified Matrix. It is suggested that the spiking concentration be near the middle of the calibration range.

Surrogate Spike

Surrogates are known additions to each sample, blank, matrix spike and LCS in a process batch, of compounds which are similar to the analyte of interest in terms of:

a) extraction
b) recovery through clean up procedures
c) response to chromatography or other determinations

but which:

d) are not expected to be found in real samples
e) will not interfere with quantification of any analyte of interest
f) may be separately and independently quantified

These are only applicable to organic testing.

Internal Standards

Internal standards are used to check the consistency of the analytical step (eg injection volumes, retention times etc) and provide a reference against which results may be adjusted in case of variation. For organic and some inorganic analysis, internal standards are added after all extraction, cleanup and concentration steps, to each final extract solution.

LCS (Laboratory Control Sample)

This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample. Other terms cited in literature include: laboratory control standard, quality control check sample, laboratory fortified blank.

Process Batch

A group of samples which behave similarly with respect to the sampling or the testing procedures being employed and which are processed as a unit for QC purposes. It is important that all factors within a process batch be the same. If any factors change eg

reagents, staff, standards then a new process batch is deemed to have begun.

Percent Recovery
Percent recovery describes the capability of the method to recover a known amount of analyte added to the sample.

% Recovery = C-A / B x 100

where: A = natural concentration of analyte in the sample
B = concentration of analyte added to the sample
C = concentration of analyte determined in the spiked sample

RPD (Relative Percent Difference)
This calculation measures the precision between two figures. Commonly used to compare the closeness of Duplicate results.

% RPD = Highest – Lowest/Average x 100

3 QC REQUIRED AND WHAT IS REPORTED

The following QC is required for all Environmental Samples, unless justified otherwise by a Supervisor.

Blank
At least one per process batch.
The Blanks must be labelled throughout the day eg: Blk_1-25/8/05, Blk_2-25/8/05 etc.
The Blank is reported to all clients.

LCS
At least one per process batch.
The LCS's must be labelled throughout the day eg: LCS_1-25/8/05, LCS_2-25/8/05 etc.
The LCS is reported to all clients.

Duplicate
At least one per process batch or one per ten samples, which ever is the smaller.
ie: A Duplicate is done every 10 samples.
So, if there is one process batch of 100 samples there will be 10 Duplicates.
Or, if there are 3 process batches, each of 2 samples making up the Process Batch there will be 1 Duplicate. The sample to undertake duplicate in this case is chosen by the analyst.
The Duplicate is only reported to the client if it is performed on their sample.

Matrix Spike
One for each soil or water type. eg: if a batch contains sediment, clay, compost, leachate, saline water etc then a matrix spike must be done on each sample type.
The sample type is generally judged by the Chain of Custody. If a client calls all samples 'soil' then we will treat all samples as 1 sample type (unless they are very obviously different).
If there is only one sample type eg soil, then a matrix spike is performed every 20 samples.
There is no requirement in NEPM for a Matrix Spike Duplicate.
The Matrix Spike is only reported to the client if it is performed on their sample.

4 ACCEPTANCE CRITERIA

Acceptance criteria for QC is generally specified in individual methods.
If QC fails, take corrective action promptly to determine and eliminate the source of the error. Do not report data until the cause of the problem is identified and either corrected or qualified by a supervisor.

Matrix Spikes
As a general rule, the recoveries of most analytes spiked into samples should fall within the range 70% - 130% and this range should be used as a guide in evaluating in house performance until in house limits are established.

Matrix Spikes will regularly fail, often due to matrix interferences. If a Matrix Spike fails it should be investigated:
a) check calculations and transcriptions to ensure a mistake has not been made.
b) look at the background concentration of the sample. If it is high then it is likely a matrix interference exists. As long as the LCS is acceptable then the Process Batch will be accepted.
c) If the LCS has also failed then the Process Batch is deemed to have failed and data should not be reported unless justified. The batch should be repeated after consultation with the supervisor, possibly replacing standards or reagents.

If a matrix spike has failed yet the process batch has been accepted by the supervisor, the failed matrix spike should still be reported to the client. This should be accompanied by an appropriate comment such as 'percent recovery not available due to significant background levels of analyte in the sample' or 'the matrix spike recovery was outside recommended acceptance criteria, however, an acceptable recovery was achieved for the LCS. This indicates a sample matrix interference'.

Matrix spikes are not carried out for all tests. These are mainly the inorganic tests such as TSS, pH, EC etc. In these cases an acceptable LCS is required.
Matrix spikes are also not reported for all analytes. For example in a SVOC run of 80 analytes it is acceptable to only spike a range of analytes.

LCS
As a general rule, the recoveries of most LCS's should fall within the range 70% - 130% or within the certificate value.

If an LCS fails it should be investigated.
a) check calculations and transcriptions to ensure a mistake has not been made.
b) If all other QC has passed, repeat the LCS. If the LCS fails again it should be remade and re analysed along with 10% of samples.
c) If the LCS fails after the second attempt there could be a problem with the LCS – consult the supervisor.
d) If an LCS and matrix spike fail the data cannot be accepted without qualification – consult the supervisor.
There should be an LCS available for all tests.

Duplicates
Acceptable Duplicate data is judged by % RPD.
>5 x PQL = 0-50% RPD is acceptable.
<5 x PQL = Any % is acceptable.

If a water duplicate fails you need to repeat it (if there is sufficient sample left), along with 10% of the positives from the batch.
If it fails again it is likely to be due to a matrix interference and an appropriate comment should be applied to the report such as 'the duplicate is outside acceptable %RPD, reanalysis indicates possible sample heterogeneity'. All failed duplicate results should be reported.

If a soil duplicate fails you need to repeat it (if there is sufficient sample left), along with 10% of the positive samples in the batch.
If it fails again it is likely to be due to a matrix interference and an appropriate comment

should be applied to the report such as 'the duplicate is outside acceptable %RPD, reanalysis indicates possible sample heterogeneity'. All failed duplicate results should be reported.

Surrogates
Surrogate recoveries should generally be within the range of 70-130%.
High analyte concentrations may cause surrogates to fail – this needs to be annotated on the final report.
A criteria of 50-150% is acceptable for <10% of samples in a batch – this is subject to a supervisors professional judgement and that all other QC is acceptable.

Internal Standards
Acceptance criteria for internal standards are 75-125%.
If internal standards exceed this criteria they will need to be either re-vialed and re run for organics or diluted and re run for metals. If they continue to fail consult the supervisor.

5 CHECKING THE CORRECTNESS OF ANALYTES

Anion Cation Balance
The anion and cation sums, when expressed as milliequivalents per litre, must balance because all potable waters are electrically neutral. As a minimum we must test: (Na/Ca/Mg/K and Alk/Cl/SO4).
The full calculation can be found in APHA or use the spreadsheet at
S drive;calculations;envirolab mass balance.
The acceptance criteria in APHA are very strict as they are based on potable water. The environmental waters we receive could rarely be termed potable so our % Difference has been determined to be 15%, with supervisor discretion.
If the % is >15 then by using the spreadsheet above you should be able to determine if there is a gross error – this particular test should then be repeated. If the repeat is confirmed then an appropriate comment must accompany the report such as 'the mass imbalance may be caused by other ions that have not been measured'.

TDS v Ions
Measured TDS should be similar or greater than ion calculated TDS. This is because the calculation will normally not involve ions such as F, Si, N03 etc.
0.6(alk) + Cl + SO4 + Na + Ca + Mg + K + = Approx TDS.

Measured EC and Ion sums
Both the anion & cation sums should be 1/100 of the measured EC value. If either of the 2 sums does not meet this criteria, that sum is suspect.
The calculation is: 100 x anion (or cation sum)meq/L = (0.9-1.1 EC)
The full calculation can be found in APHA or use the spreadsheet at
S drive/calculation/envirolab mass balance.

Measured TDS to EC Ratio
EC x (0.55-0.7) = TDS.
If it is outside this criteria one of the tests may be suspect. The exception is waters with high colloidal particulates that may contribute to a higher measured TDS result.

Metals – Total Recoverable v Dissolved.
In theory Total recoverable metals must be equal or higher than dissolved metals. If the difference is within the uncertainty of the individual tests then this should be stated on the report. If the difference is outside the uncertainty of the individual tests then one of the results is suspect and should be reanalysed.

Organics
Some simple checks to be aware of include:

C6-C9 should generally be greater than BTEX.

C10-C36 should be greater than PAH.

Naphthalene in VOC run should be similar to PAH run.

Nutrients
TKN should be greater than or equal to Ammonia. If the difference is within the uncertainty of the individual tests then this should be stated on the report. If the difference is outside the uncertainty of the individual tests then one of the results is suspect and should be reanalyzed.

6 CONTROL CHARTS

Control Charts should be updated after each batch of analysis. As a minimum the LCS & MS data will be entered, however, depending on the test other data such as duplicate RPD's etc may be plotted.
LCS data is a good indication of the health of the method. Matrix spike and duplicate data can vary significantly due to the nature of certain matrices so are not considered an ideal measure. If a MS result is grossly out due to a known interference there is no need to plot it.
Control charts are used to monitor trends and should alert the analyst to potential problems. These may be recorded manually or electronically. In theory all plotted data should lie within 2SD of the mean. If 4 successive points are showing a trend then action needs to be taken before the system reaches the CL.
The point at 2SD from the mean is referred to as WL (Warning Limits). If 2 consecutive results lie outside of the WL then the system is out of control and a supervisor must be consulted.
The point at 3SD from the mean is referred to as the CL (Control Limit). Results outside the CL should not be accepted unless there is a valid, documented reason.

7 STANDARDS / CALIBRATIONS

Calibration Check
For some methods such as organics and ICP a Calibration Check is done straight after the calibration. This should be an independent check (i.e. made from another source) and should be within 10% for metals and 20 % for organics. If it is outside this acceptance a new calibration will be necessary.

Continuing Calibration
A continuing calibration is done approximately every 10 samples for metals and 20 samples for organics and at the end of the run.
Acceptance should be 10% for metals and 20% for organics. If it is outside this acceptance a new calibration will be necessary.

New v's Old Standard Checks
New standards should always be compared to the old with an acceptance of 5%. For organics the acceptance criteria is 20%, as the new standard will also be compared against the independent check standard.

Expired Standards
Standards that have expired may still be used, however, need to be verified against another in date standard, CRM or confirmed by another lab. The expiry date may then be extended a further 6 months. For some analytes, such as metals, extending the expiry date for many years may be acceptable.