Mirvac Developments Pty Ltd
Phase 1 and 2 Environmental Site Assessment

SOPA Site 53
2 Figtree Drive
Sydney Olympic Park, NSW

16 July 2014
43567/58249 (Rev 0)
JBS&G

www.jbsg.com.au

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List of Abbreviations

A list of the common abbreviations used throughout this report is provided below.

ACM	Asbestos Containing Material
AEC	Area of Environmental Concern
Bgs	Below Ground Surface
BTEX	Benzene, toluene, ethylbenzene and xylenes
COPC	Contaminant of Potential Concern
DECCW	NSW Department of Environment, Climate Change and Water (now OEH)
DQI	Data Quality Indicator
DQO	Data Quality Objective
ESL	Ecological Screening Level
EPA	NSW Environmental Protection Authority
ESA	Environmental Site Assessment
ha	Hectare
HIL	Health Investigation Level
HSL	Health Screening Level
JBS&G	JBS&G Australia Pty Ltd
LOR	Limit of Reporting
MAH	Monocyclic Aromatic Hydrocarbon
OEH	NSW Office of Environment and Heritage
OCPs	Organochlorine Pesticides
PAHs	Polycyclic Aromatic Hydrocarbons
PCBs	Polychlorinated Biphenyls
PQL	Practical Quantitation Limit
QA/QC	Quality Assurance/Quality Control
RPD	Relative Percentage Difference
SAQP	Sampling, Analytical and Quality Plan
sVOC	Semi-volatile Organic Compounds
TPH	Total Petroleum Hydrocarbons
TRH	Total Recoverable Hydrocarbons
UST	Underground Storage Tank
VOC	Volatile Organic Compounds

Executive Summary

JBS&G Australia Pty Ltd (JBS&G) was engaged by Mirvac Developments Pty Ltd (Mirvac, the client) to conduct a Phase 1 and 2 Environmental Site Assessment (ESA) at 2 Figtree Drive, Sydney Olympic Park, NSW (the site). The site is legally identified as part of Lot 22 Deposited Plan (DP) 787402, and has a total site area of approximately 12,700 m^2 (Figures 1 and 2).

It is understood that Mirvac is considering acquisition of the site and requires a due diligence study to assist their decision making. It is further understood that the site is proposed to be developed to accommodate residential buildings with potential basement car parking facilities, as well as ground floor commercial/retail and child care facilities.

The objective of the investigation is to assess the potential for contamination at the site based on the historical site activities and to draw preliminary conclusions of the potential contamination status of the site.

The completed scope of work comprised a review of geological and hydrogeological data, council documentation, aerial photographs, NSW EPA records and Heritage records, a detailed site inspection to identify potential areas of environmental concern (AECs) and contaminants of potential concern (COPCs) identified in the historical review, soil sampling and analysis at 12 location, groundwater sampling and analysis at two locations and preparation of this ESA report.

The site has been predominantly vacant until sometime between 1982 and 1996 when the land was developed as a commercial property. The historical review identified the site was owned by Metropolitan Meat Industry Board and Homebush Abattoir between 1929 and 1993, however aerial photos over this time period show vacant land with roads suggesting abattoir activities did not take place at the site.

Based on the current investigation and limitations in **Section 11**, the following conclusions and recommendations are made with respect to the site:

- Fill is present across all of the site. Fill depths ranged from approximately 0.2 m to 2.6 m bgs. At least two types of fill materials were identified: a recovered aggregate fill comprising silty gravelly sand with brick, concrete and igneous gravels; and silty sand and clay fill with minor anthropogenic inclusions such as concrete and brick across the remainder of the site.
- Suspected asbestos eves were observed around the outside of the main buildings;
- Groundwater is anticipated to flow towards Homebush Bay to the north east of the site at a depth of 2- 3 m bgs;
- Concentrations of all COPCs identified for the site were reported below the adopted NEPC (2013) health based criteria for residential land use (HIL-A) with the exception of asbestos at one location (BH10) beneath a path between Buildings 1 and 2;
- Concentrations of all COPCs identified for the site were reported below the ecological criteria adopted for the site; and
- Groundwater does not show any evidence of being significantly impacted by the identified contaminants in the fill material, nor is there evidence of contamination migrating onto the site from up-gradient sources.

- Based on the reported contaminant concentrations, the fill would be classified as Special Waste (asbestos) with GSW for material beneath the pathway and GSW (potentially suitable for CTI-licensed facilities) for the remainder of the fill. It is likely that the majority of the fill (excluding asbestos impacted material) could achieve a higher classification (such as Excavated Natural Material (ENM).
- The fill material in the vicinity of the asbestos impacted location (BH10, beneath the pathway between the buildings) can be assessed to confirm whether it can be removed as Special Waste (Asbestos) with GSW.
- The remaining fill material can be assessed to confirm whether it can be removed as ENM or as GSW to a CTI licensed facility, separate to underlying natural clay soils and bedrock, which can be removed as Virgin Excavated Natural Material (VENM))
- A hazardous materials survey (HMS) of all on-site structures should be completed prior to demolition.
- Any unexpected finds can be addressed during the site development if required.

1. Introduction

1.1 Background and Objectives

JBS&G Australia Pty Ltd (JBS&G) was engaged by Mirvac Developments Pty Ltd (Mirvac, the client) to conduct a Phase 1 and 2 Environmental Site Assessment (ESA) at 2 Figtree Drive, Sydney Olympic Park, NSW (the site). The site is legally identified as part of Lot 22 Deposited Plan (DP) 787402, and has a total site area of approximately 12,700 m^2 (**Figures 1** and **2**).

It is understood that Mirvac is considering acquisition of the site and requires a due diligence study to assist their decision making. It is further understood that the site is proposed to be developed to accommodate residential buildings with potential basement car parking facilities, as well as ground floor commercial/retail and child care facilities.

The investigation was completed in general accordance with relevant guidelines made or approved by the NSW Environment Protection Authority (EPA).

1.2 Objectives

The objective of the investigation is to assess the potential for contamination at the site based on the historical site activities and to draw preliminary conclusions of the potential contamination status of the site.

1.3 Scope of Work

The agreed scope of work comprised:

- Review and summary of relevant published geological and hydrogeological data, including a review of licensed groundwater bore information;
- Review of available Council documentation, aerial photographs, NSW EPA records and Heritage records to identify potential areas of environmental concern (AECs) and associated contaminants of potential concern (COPCs);
- Review of previous investigation reports;
- A detailed site inspection to identify potential AECs and COPCs identified in the historical review;
- Soil sampling at 12 locations across the site;
- Groundwater sampling at two locations at the site;
- Analysis of selected soil and groundwater samples for various COPCs;
- Data assessment against relevant EPA endorsed guideline criteria; and
- Preparation of this ESA report in general accordance with guidelines made or approved by the EPA.

2. Site Condition and Surrounding Environment

2.1 Site Identification

The site details are summarised in Table 2.1 and the site layout shown in **Figure 2** and described in detail in the following sections.

Table 2.1: Summary Site Details

Item	Description
Street address	2 Figtree Drive, Sydney Olympic Park, NSW
Lot Number	Lot 22 DP 787402
Local Government Authority	Auburn Council
Current Zoning	B4 Mixed Use
Site Area	Approximately 12,700 m^2
Current land-use	Vacant Commercial Buildings and carpark
Proposed Land-use	Commercial/Residential

2.2 Site Description

A detailed site inspection was conducted by one of JBS&G's trained and experienced environmental consultants on 7 July 2014.

Observations of the current site configuration and potential AECs are shown on **Figures 2** discussed below. A photographic log can be found in **Appendix B**.

The site comprises a relatively square parcel of land on the corner of Australia Ave and Figtree Drive in Sydney Olympic Park large. The majority of the site comprised two large commercial/industrial offices and a bitumen parking area. The parking area is surrounded by a 2m high fence with an automated gate 40m south of Figtree Drive (**Photograph 1** and **12**).

Building 1 located in the north eastern corner of the site, it is an 'L' shaped two story building (**Photograph 2** and **3**). The north eastern corner of Building 1 has a third level that appears to contain the building air conditioning units. Building 1 appears to have been constructed with prefabricated concrete slabs with a metal roof. Suspected asbestos eves were observed around the outside of the entire building (Photograph 4, 5 and 13).

Building 2 located in the middle of the site is a relatively square two story building set two to three metres below building one (**Photograph 6**). There is a loading dock attached to the western side of the building (**Photograph 7** and **8**) and a large shaded car park area on the southern boundary (**Photograph 9**). There is a concrete stairwell that connects the ground level between Building 1 and Building 2 (**Photograph 13**). Building two appears to be constructed from bricks and prefabricated concrete with a metal roof. Suspected asbestos eves were observed around the outside of the entire building (**Photograph 10**).

Building 3 located to the west of the driveway is a smaller one story building that contains the transformer for the site (**Photograph 11**). It is constructed from brick and concrete with a large metal vent on the eastern side (**Photograph 12**).

There are multiple landscaped gardens across the site that contain lights and a watering system (**Photograph 18**). The landscaped garden between the western side of Building 1 and the eastern side of Building 2 has a small mulch pathway that runs through the garden bed (**Photograph 15**).

The general slope of the site is to the southern boundary. With the expectation of the flat landscaped areas between Buildings 1 and 2. It is expected that during rain periods that the

water will be either flow into the stormwater system across the site or infiltrate the landscaped areas.

A photographic log of the site inspection is provided in **Appendix A**.

2.3 Surrounding Landuse

The current landuse of adjacent properties or properties across adjacent roads is shown in **Figure 2** and summarised below.

- North – The site bound by Figtree Drive with commercial/industrial properties on the opposite side of Figtree Drive with a residential development on the opposite side of Australia Avenue to the north west;
- East – The site is bound to the east by Australia Avenue and Bennelong Park and Bicentennial Park further east and south east;
- South – The site is bound to the south by train tracks and a public walkway with Sarah Durack Avenue and sporting facilities (golf range) located further south; and
- West – The site is bound to the west by a commercial/industrial property with further commercial/industrial properties west along Figtree Drive.

2.4 Topography

Review of the regional topographic data (LPI website[1]) indicated that the site lies at approximately 15 m Australian Height Datum (AHD). The regional topography slopes to the north and north-east in the vicinity of the site. During the site inspection, the site appeared relatively flat.

2.5 Hydrology

The nearest surface water body is Lake Belvedere in Bicentennial Park approximately 300 m south east of the site. Homebush Bay and Parramatta River are located approximately 1.2 km north east of the site with Powells Creek, a tributary to Homebush Bay approximately 750 m east of the site at its closest.

During heavy or prolonged rain periods, runoff is anticipated to flow to into the stormwater system across the site or infiltrate the landscaped areas.

2.6 Geology

Review of 1:100000 'Sydney' Geological Survey of NSW Sheet 9130 (1983[2]), indicates that the site is underlain by Middle Triassic Wianamatta group consisting of black to dark-grey shale and laminate.

A review of the Sydney soil landscape map, sheet series 9130 (2002[3]), indicated that soils at the site are part of developed terrain on the boundary of Blacktown residual and Birrong fluvial landscape groups.

The residual landscape indicates the soils are shallow to moderately deep red and brown podzolic soils on crests and well drained areas with deep yellow podzolic soils and soloths on lower slopes and areas of poor drainage.

The fluvial landscape indicates the soils are deep yellow podzolic soils and yellow solodic soils on older alluvial terraces and deep solodic soils and yellow solonetz on current floodplain.

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[1] *Land and Property Information Exchange website*, www.maps.six.nsw.gov.au accessed 11 July 2014

[2] *Sydney 1:100,000 Geological Survey of NSW Sheet 9130* (1983)

[3] *Sydney 1:100 000 Soil Landscape Series Sheet 9130, NSW Department of Land and Water Conservation,* 2002

2.7 Acid Sulphate Soils

Review of the SEPP (Major Development) 2005 Sydney Olympic Park Acid Sulfate Soils Map indicated that for the site, there are no known occurrences of acid sulphate soils, however disturbed terrain and a high probability of acid sulfate soils at or near the ground surface are located with a radius of 250 m and 400 m from the site, respectively.

2.8 Hydrogeology

Registered groundwater bore information obtained from the National Resource Atlas database completed on the 1 July 2014 is included in **Appendix B**. A review of the registered bore information indicated that 33 bores are located within a 1.5 km radius of the site, with details summarised in **Table 2.2** below.

Table 2.2: Groundwater Bore Search

Groundwater Bore	Location	Use	Owner	Water Depth (m)	Geology
GW102550	320 m N east	Monitoring	NA	1.8	NA
GW102553	550 m N east	Monitoring	NA	1.83	NA
GW102554	730 m N east	Monitoring	NA	1.83	NA
GW102555	730 m N east	Monitoring	NA	1.83	NA
GW102556	680 m east	Monitoring	NA	1.83	NA
GW102557	750 m S east	Monitoring	NA	NA	NA
GW102558	630 m S east	Monitoring	NA	1.83	NA
GW102559	630 m S east	Monitoring	NA	1.83	NA
GW102560	1.2 km S east	Monitoring	NA	1.83	NA
GW102561	400 m S east	Monitoring	NA	1.83	NA
GW102562	500 m N east	Monitoring	NA	1.83	NA
GW102644	1.5 km S west	Monitoring	NA	10.00	Siltstone
GW102645	1.2 km S west	Monitoring	NA	7.30	Shale
GW102646	1.5 km S west	Monitoring	NA	6.60	Weathered Siltstone
GW102647	1.5 km S west	Monitoring	NA	5.50	Clay
GW102650	1.3 km S west	Monitoring	NA	7.60	Shale
GW102652	1.3 km S west	Monitoring	NA	2.70	Clay
GW102654	1.4 km S west	Monitoring	NA	9.50	Siltstone
GW102656	750 m S west	Monitoring	NA	1.00	Clay
GW102657	1.4 km S west	Monitoring	NA	1.00	Waste
GW102659	1.5 km S west	Monitoring	NA	1.2	Clay
GW102660	1.5 km S west	Monitoring	NA	NA	Clay/Shale
GW102670	1.5 km S east	Monitoring	NA	NA	Soil/Sandstone
GW111341	120 m west	Sydney Water Monitoring Bore	Other Govt	NA	Clay/Shale
GW111671	1.2 km S east	Energy Australia Monitoring Bore	Private	0.68	Clay
GW111672	1.2 km S east	Energy Australia Monitoring Bore	Private	1.35	Fill
GW111673	1.4 km S east	Energy Australia Monitoring Bore	Private	0.68	Clay
GW111674	1.4 km S east	Energy Australia Monitoring Bore	Private	1.35	Fill
GW113377	600 m N west	SOPA Monitoring Bore	Private	NA	NA
GW113378	600 m N west	SOPA Monitoring Bore	Private	NA	NA
GW1113379	600 m N west	SOPA Monitoring Bore	Private	NA	NA

GW1113380	650 m N west	SOPA Monitoring Bore	Private	NA	NA
GW1113381	650 m N west	SOPA Monitoring Bore	Private	NA	NA

Based on the groundwater bore information the anticipated depth of shallow groundwater at the site is approximately 0.5 to 3 m. Deep groundwater is anticipated to be present within the shale and sandstone bedrock at approximately 7-10 m or deeper. Groundwater flow direction is anticipated to be towards the east and north-east towards Homebush Bay.

3. Site History

3.1 Aerial Photographs

Copies of aerial photographs obtained from the Department of Lands are included in **Appendix C**. Relevant information from the aerial photograph review is summarised below.

- **1930:** The site appeared to be vacant with trees and roads running through the north-west and south-east boundaries of the site. The adjacent surrounding land use is generally vacant land. Commercial/industrial properties are present sporadically within a 1km radius of the site with the closest approximately 300 metres to the north-west. Vacant lots are present to the south and extend to Parramatta Road. Residential housing is present to the east on the opposite side of Powells Creek and the Badu Mangroves.
- **1943:** The site and surrounding land use appeared to be similar to the 1930 aerial.
- **1955:** The site and surrounding land use appeared to be similar to the 1943 aerial.
- **1970:** The site appeared similar to the 1955 aerial photograph. The surrounding land use appeared similar with the exception of the disturbance to the land to the south east and development of a rail line to the south running approximately 40 metres from the site. An overhead bridge is also present approximately 140 m east of the site for the rail line use. Sporadic buildings/structures are now present on some of the vacant lots to the west and north of the site.
- **1982:** The site appeared similar to the previous 1970 photograph.
- **1996:** The site and adjacent properties appeared have now been development. A building is now present in the centre of the site which appears to be the current Building 2 still present. The car park at the site is now present with the grassed areas and tree present on the remainder of the site. Figtree Drive and Australia Avenue are present with commercial building present to the west and north-west on Figtree Drive. Vacant and cleared land is present adjacent to the southern boundary. The parkland on the opposite of Australia Avenue is present.
- **2005:** The site appeared similar to the previous photograph with the exception of Building 1 located along the northern and northeastern boundaries now present. The site is similar configuration to the current site layout. The adjacent surrounding land use is similar the previous photograph however further commercial development has taken place on Figtree Drive and further north. The Sydney Olympic Park sporting facilities are present to the west, north-west and south. An overpass is present adjacent to the south-east which was previously vacant and cleared land. Bicentennial Park and Bennelong Park are development similar to the current layout.
- **2012:** The site and surrounding land appeared similar to the previous 2005 aerial photograph.

3.2 EPA Records

A search of the EPA's public register under the Protection of the Environment Operations Act 1997 was undertaken (**Appendix D**). The search identified that, for the site, there were:

- No prevention, clean-up or prohibition notices;
- No transfer, variation, suspension, surrender or revocation of an environment protection licence.

A search was also undertaken through the EPA's public contaminated land register (**Appendix D**). The search identified that there have been no notices issued under the Contaminated Land Management Act 1997 (CLM Act) for the site.

The site has not been notified to the EPA as containing significant contamination. An excerpt of the list of properties notified to the EPA is included in **Appendix D**.

Several areas within Sydney Olympic Park are maintained under a Maintenance of Remediation Area under the CLM Act including the golf driving range landfill approximately 200m to the south, Bicentennial Park landfill approximately 300 m to the east, the aquatic central landfill carpark approximately 400 m to the west and several landfills approximately 1.3 km to 1.5 km to the north.

3.3 Title Deeds

An historical title search was conducted for the site, and results are summarised below in **Table 3.1**. Copies of title documentation are included in **Appendix E**.

Table 3.1: Summary of Historical Title Search

Year	Schedule of Registered Proprietors of Lot 22 DP 787402
1910	Minister for Public Works of the State of New South Wales
1929	Metropolitan Meat Industry Board, then Metropolitan Meat Industry Commissioner, then Metropolitan Meat Industry Board
1980	Homebush Abattoir Corporation
1993	Homebush Bay Development Corporation
1995	Olympic Co-Ordination Authority
2002	Sydney Olympic Park Authority

Title deeds also indicate the presence of easement at the site for drainage of water.

3.4 Council Records

3.4.1 Section 149 Certificate

A copy of the s149 Planning Certificate for Lot 22 DP 787402 was obtained from Auburn City Council, and is included in **Appendix F**. Relevant information for the site summarised below.

- The land is excluded land under Auburn Local Environmental Plan 2010 as the land zoning and land use provisions of SEPP (Major Development) 2005 apply to the land.
- The land is zoned B4 Mixed Use under SEPP (Major Development) 2005.
- The land is not affected by the Coastal Protection code under the Coastal Protection Act 1979.
- The land does not include or comprise critical habitat.
- The land is not situated within a Heritage Conservation Area and not identified as containing an item of environmental heritage significance under SEPP (Major Development) 2005.
- The land is not situated within an Environmental Conservation Area under the provisions of SEPP (Major Development) 2005.
- The land is not affected by Section 15 of the Mine Subsidence Compensation Act 1961 proclaiming land to be a Mine Subsidence District.
- The land is not affected by any road widening or road realignment under Division 2 of Part 3 of the Roads Act 1993, any environmental planning instrument or council resolution.

- The land is not significantly contaminated (or part of the land), is not subject to a management order, an approved voluntary management proposal, ongoing maintenance order or a site audit statement within the meaning of the CLM Act 1997.

3.4.2 DA/BA Records

Copies of Development Application (DA) / Building Application (BA) records were not obtained from Auburn City Council for this ESA report due to project deadline requirements.

3.5 Australian and NSW Heritage Register

A search of the Australian Heritage Trust database and the NSW Heritage Inventory did not reveal any Heritage listed items at the site.

3.6 WorkCover Dangerous Goods Search

A WorkCover dangerous goods search was completed however due to time constraints was not available at the time of reporting.

3.7 Anecdotal Evidence

As there were no occupants of the site at the time of the investigation, no interview with onsite staff could be undertaken.

3.8 Previous Investigations

JBS&G are not aware of any previous investigations being completed specifically at the site.

3.9 Summary Site History

A summary of the site history is provided in in **Table 3.2** below.

Table 3.2: Summary Site History

Year	Lot 32 DP 1172521	Source
1910	Minister for Public Works of the State of New South Wales	Title Records
1929	Metropolitan Meat Industry Board, Then Metropolitan Meat Industry Commissioner, then Metropolitan Meat Industry Board	Title Records
1930	Vacant Land with roads running through south-east and north-west boundaries	Aerial Photograph
1943	Vacant Land with roads running through south-east and north-west boundaries	Aerial Photograph
1955	Vacant Land with roads running through south-east and north-west boundaries	Aerial Photograph
1970	Vacant Land with roads running through south-east and north-west boundaries	Aerial Photograph
1980	Homebush Abattoir Corporation	Title Records
1982	Vacant Land with roads running through south-east and north-west boundaries	Aerial Photograph
1993	Homebush Bay Development Corporation	Title Records
1995	Olympic Co-ordination Authority	Title Records
1996	Commercial building and carpark present onsite	Aerial Photograph
2002	Sydney Olympic Park Authority	Title Records
2005	Two buildings and carpark present onsite as per current layout	Aerial Photograph
2012	Two buildings and carpark present onsite as per current layout	Aerial Photograph

3.10 Integrity Assessment

The information obtained from the historical sources reviewed has been found to be in general agreement. Information regarding the development applications and building

applications and dangerous goods search were not obtained prior to the issue of this ESA reported.

However, the lack of all DA/BA information and dangerous goods search are considered to be a minor issue due to the information provided in the other historical searches. It is therefore considered that the information provided in this historical assessment has an acceptable level of accuracy.

4. Conceptual Site Model

4.1 Potential Areas of Environmental Concern

Based on the history review and field observations from the site and from environmental assessments previously undertaken within the site, general areas of environmental concern have been categorised and are presented in (**Table 4.1**).

Table 4.1: Areas of Environmental Concern and Associated Contaminants of Potential Concern

Area of Environmental Concern (AEC)	Contaminants of Potential Concern (COPC)
Fill material of unknown origin underlying the site	Heavy metals, polycyclic aromatic hydrocarbons(PAHs), total petroleum hydrocarbons (TPH), benzene, toluene, ethylbenzene and xylenes (BTEX), organochlorine compounds (OCs), polychlorinated biphenyls (PCBs) and asbestos

4.2 Potentially Contaminated Media

Potentially contaminated media present at the site include:

- Fill material; and
- Natural soils.

The source of the fill material at the site is not known and has the potential to be contaminated. Based on the potential leachability of COPCs that may be present in the fill material, vertical migration of contamination from the fill, surface soils and other reworked natural material into the underlying undisturbed natural soils may occur or have occurred, consequently, the natural site soils are considered to be potentially contaminated media.

The potential leachability of the identified contaminants of concern and the identified historical/industrial activities on the site and surrounding area, all contribute to groundwater being nominated as a potentially contaminated media. The potential for contamination of groundwater and/or soil vapour will depend upon the actual nature, occurrence and characteristics of the contamination within the overlying fill material and potentially natural soils..

4.3 Potential for Migration

Contaminants generally migrate from site via a combination of windblown dusts, rainwater infiltration, groundwater migration and surface water runoff. The potential for contaminants to migrate is a combination of:

- The nature of the contaminants (solid/liquid and mobility characteristics);
- The extent of the contaminants (isolated or widespread);
- The location of the contaminants (surface soils or at depth); and
- The site topography, geology, hydrology and hydrogeology.

The potential contaminants identified as part of the site history review and previous investigations are generally in a solid form (e.g. heavy metals, asbestos, etc).

The surface of the site is landscaped, pavement, grassed areas and buildings. As such, there is low potential for windblown contaminants to migrate from the site.

The potential for contamination migration via surface water movement and infiltration of water and subsequent migration through the soil profile is considered a possible migration pathway.

There is potential for groundwater migration should the fill material be contaminated.

5. Sampling and Analytical Plan

5.1 Data Quality Objectives

Data quality objectives (DQOs) are statements that define the confidence required in conclusions drawn for data produced for a project, and which must be set to realistically define and measure the quality of data needed.

DQOs were developed for the investigations, as discussed in the following sections.

5.1.1 State the Problem

Mirvac have indicated they are considering acquisition of the site and requires the ESA for due diligence purposes to identify any potential contaminants on the land prior to proceeding with the acquisition. It is further understood that the site is proposed to be developed to accommodate residential buildings with potential basement car parking facilities, as well as ground floor commercial/retail and child care facilities.

5.1.2 Identify the Decision

Based on the objectives of the investigation the following decisions were made:

- Is fill present at the site?
- If present, what is the distribution of fill at the site?
- What is the waste classification of soil/fill that may require offsite disposal as part of excavation works at the site?
- What is the classification of the soils at the site?
- What are the characteristics of the groundwater present at the site?

5.1.3 Identify Inputs to the Decision

Inputs to the decisions were:

- Historical information;
- Geological data including observations, staining, odours and discolouration of the soil media;
- Soil environmental data within different fill/soil types to be collected by soil sampling and analysis;
- Soil criteria to be achieved on the site as based on a proposed future landuse as defined by assessment criteria prepared in **Section 6**;
- Groundwater environmental data collected during groundwater sampling and analysis;
- Groundwater criteria to be achieved on site as defined by assessment criteria prepared in **Section 6**; and
- Confirmation that data generated by sample analysis are of an acceptable quality to allow reliable comparison to assessment criteria by assessment of quality assurance/ quality control as per the data quality indicators established in **Section 5.1.6**.

5.1.4 Define the Study Boundaries

The site is legally identified as Lot 22 DP 787402 and occupies an area of approximately 12,700 m^2.

The vertical extent of the soil investigation was anticipated to be to a maximum depth of 2.6 m.

Due to the nature of the investigation, factors including seasonality and other temporal variables were not assessed as part of this investigation. The temporal boundaries of this investigation were limited to the period of field investigation during July 2014.

5.1.5 Develop a Decision Rule

Soil analytical data were assessed against EPA endorsed criteria including:

- National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 (No. 1) National Environment Protection Council (NEPC 2013); and
- Contaminated Sites: Guidelines for the NSW Site Auditor Scheme, 2nd edition NSW EPA, April 2006 (DEC 2006).

For asbestos, consideration will also be given to the definition of asbestos contaminated soil presented in 'How to Manage and Control Asbestos in the Workplace Code of Practice', December 2011, Safe Work Australia (SWA 2011[4]).

As for soils, where specific NSW EPA endorsed criteria are not available, the laboratory LOR will be adopted as an initial screening criterion.

The decision rules adopted to answer the decisions identified in **Section 5.1.2** are summarised in **Table 5.1**.

Table 5.1 Summary of Decision Rules

Decision Required to be Made	Decision Rule
1. Is fill present at the site?	If no fill is identified than the decision is No. Otherwise, the decision is Yes.
2. If present at the site, what is the distribution of the fill at the site?	Borehole and hand auger logs used to ascertain the distribution of the fill across the site. If no fill is identified than the decision is No. Otherwise, the decision is Yes.
3. What is the waste classification of the soil/fill that may require offsite disposal as part of excavation works at the site?	The nature and extent of soil impacts was assessed, and soil analytical data was compared against EPA endorsed waste criteria. If the criteria above is not meet, than decision is No. Otherwise, the decision is Yes.
4. What is the characterisation of the soils at the site?	The nature and extent of soil impacts was assessed, and soil analytical data was compared against EPA endorsed criteria. Statistical analyses of the data in accordance with relevant guidance documents was undertaken, if appropriate, to facilitate the decisions. The following statistical criteria was adopted with respect to soils: Either: the reported concentrations are all below the site criteria; Or: the average site concentration for each analyte must be below the adopted site criterion; no single analyte concentration exceeds 250% of the adopted site criterion; and the standard deviation of the results must be less than 50% of the site criteria. And: the 95% upper confidence limit (UCL) of the average concentration for each analyte must be below the adopted site criterion. If the statistical criteria stated above are satisfied, and an assessment of risk indicates no unacceptable risks, the decision is No. Otherwise, the decision is Yes.
5. What are the characteristics of the ground water present at the site?	Groundwater analytical data collected were compared to the adopted assessment criteria with respect to human health and/or ecological receptors as per guidance provided in ANZECC/ARMCANZ 2000 and NEPC 2013.

[4] To facilitate regulatory enforcement, SWA (2011) was subsequently re-issued under the same cover by NSW WorkCover as an approved Code of Practice under section 271 of the NSW Work Health and Safety Act, 2011. Henceforth the document is referenced in this document as SWA 2011/NSW WorkCover 2011.

Decision Required to be Made	Decision Rule
	Based on conclusions of this assessment, if there is the potential unacceptable risk from groundwater, the answer to the decision is Yes. Otherwise, the answer to the decision is No.

5.1.6 Specify Limits of Decision Error

This step is to establish the decision maker's tolerable limits on decision errors, which are used to establish performance goals for limiting uncertainty in the data. Data generated during this project must be appropriate to allow decisions to be made with confidence.

Specific limits for this project have been adopted in accordance with the appropriate guidance from the NSW EPA, NEPC (2013) appropriate indicators of data quality (DQIs used to assess quality assurance / quality control) and standard JBS&G procedures for field sampling and handling.

To assess the usability of the data prior to making decisions, the data will be assessed against pre-determined Data Quality Indicators (DQIs) established for the project as discussed below in relation to precision, accuracy, representativeness, comparability, completeness and sensitivity (PARCCS parameters). The acceptable limit on decision error is 95% compliance with DQIs.

The DQIs and data assessment criteria are summarised in **Table 5.2**.

- **Precision** - measures the reproducibility of measurements under a given set of conditions. The precision of the laboratory data and sampling techniques is assessed by calculating the Relative Percent Difference (RPD) of duplicate samples.
- **Accuracy** - measures the bias in a measurement system. The accuracy of the laboratory data that are generated during this study is a measure of the closeness of the analytical results obtained by a method to the 'true' value. Accuracy is assessed by reference to the analytical results of laboratory control samples, laboratory spikes and analyses against reference standards.
- **Representativeness** –expresses the degree which sample data accurately and precisely represent a characteristic of a population or an environmental condition. Representativeness is achieved by collecting samples on a representative basis across the site, and by using an adequate number of sample locations to characterise the site to the required accuracy.
- **Comparability** - expresses the confidence with which one data set can be compared with another. This is achieved through maintaining a level of consistency in techniques used to collect samples; ensuring analysing laboratories use consistent analysis techniques and reporting methods.
- **Completeness** – is defined as the percentage of measurements made which are judged to be valid measurements. The completeness goal is set at there being sufficient valid data generated during the study.
- **Sensitivity** - expresses the appropriateness of the chosen laboratory methods, including the limits of reporting, in producing reliable data in relation to the adopted site assessment criteria.

Table 5.2: Summary of Quality Assurance / Quality Control Program

Data Quality Indicators	Frequency	Data Quality Criteria
Precision		
Split duplicates (intra laboratory)	1 / 20 samples	<50% RPD[1]
Blind duplicates (inter laboratory)	1 / 20 samples	<50% RPD[1]
Laboratory Duplicates	1 / 20 samples	<50% RPD[1]
Accuracy		
Surrogate spikes	All organic samples	70-130%
Laboratory control samples	1 per lab batch	70-130%
Matrix spikes	1 per lab batch	70-130%
Representativeness		
Sampling appropriate for media and analytes	All samples	-
Samples extracted and analysed within holding times.	-	Soil: organics (14 days), inorganics (6 months)
Laboratory Blanks	1 per lab batch	<LOR
Trip spike	1 per lab batch	70-130% recovery
Storage blank	1 per lab batch	<LOR
Rinsate	1 per sampling date where reusable sampling equipment used	<LOR
Comparability		
Standard operating procedures for sample collection & handling	All Samples	All Samples
Standard analytical methods used for all analyses	All Samples	NATA accreditation
Consistent field conditions, sampling staff and laboratory analysis	All Samples	All samples[2]
Limits of reporting appropriate and consistent	All Samples	All samples[2]
Completeness		
Sample description and COCs completed and appropriate	All Samples	All samples
Appropriate documentation	All Samples	All samples
Satisfactory frequency and result for QC samples		95% compliance
Data from critical samples is considered valid	-	Critical samples valid
Sensitivity		
Analytical methods and limits of recovery appropriate for media and adopted site assessment criteria	All samples	LOR<= site assessment criteria

If any of the DQIs were not met, further assessment was necessary to determine whether the non-conformance significantly affected the usefulness of the data. Corrective actions might have included requesting further information from samplers and/or analytical laboratories, downgrading of the quality of the data or alternatively, re-collection of data.

5.1.7 Optimise the Design for Obtaining Data

Various strategies for developing a statistically based sampling plan are identified in EPA (1995), including judgemental, random, systematic and stratified sampling patterns. Based on known site activities, a systematic grid was identified as the preferred approach for assessing for the potential site contamination, with some locations skewed to address identified potential AECs.

For the site, with an estimated area of 1.3 Ha, the *Contaminated Sites: Sampling Design Guidelines* (EPA 1995) recommended a minimum of 22 sampling locations on a systematic sampling pattern to enable detection of contaminant 'hotspots' of between 25 m and 28 m diameter with 95% confidence. However, given the preliminary nature of the assessment (due diligence rather than submission for DA purposes), site access restrictions due to the buildings, parking areas and landscaping, the sampling strategy implemented involved collection from 12 accessible locations placed to gain as much site coverage as possible, with some locations skewed towards identified areas of environmental concern (AEC).

5.2 Soil Sampling Methodology

Soil samples were collected from test pits/solid flight augers installed by a backhoe or hand auger at a total of 12 locations to investigate shallow soil conditions, with 12 samples being chosen to be analysed. Samples were generally collected from soils at the surface (0-0.0.5 m), 0.2-0.3 m, 0.5 m and then each 0.5 m until 0.3 m into natural soils or prior refusal.

During the collection of soil samples, features such as seepage, discolouration, staining, odours and other indicators of contamination were noted on the borehole logs (**Appendix G**). Collected soil samples were immediately transferred to laboratory supplied sample jars or polyethylene ziplock bags (500 mL for asbestos as per NEPM 2013). The sample containers were labelled, sealed and transferred to an esky for sample preservation prior to and during shipment. A chain-of-custody form was completed and forwarded with the samples to the testing laboratory.

Not all soil samples collected were analysed. Samples were analysed in accordance with the analytical schedule (**Section 5.5**). All samples will remain at the primary laboratory for a period of two months if future analysis is required following the receipt of sample results, provided analytes are within holding times.

5.3 Groundwater Monitoring Methodology

Groundwater samples were collected from 50 mm diameter monitoring wells installed at the site by others as part of concurrent geotechnical investigations. Groundwater sampling was completed using a low flow Micropurge pump system with small diameter, single use tubing. Monitoring wells were purged at the highest possible flow-rate while ensuring that minimal fluctuations in depth to water occur. A flow cell was employed to monitor water quality parameters of: Electrical conductivity (EC); Redox potential (Eh); pH; Dissolved oxygen (DO); and Temperature during purging and sampling.

All samples for dissolved metal analysis were field filtered. All groundwater samples were placed into laboratory supplied bottles/vials with appropriate preservatives (where required). Each of the sample bottles were labelled with the project ID, date, sampler's initials and unique monitoring well ID (or QC sample name), using permanent ink marker on labels affixed to the sides of the bottles by the laboratory. In addition, the sample ID (i.e., the monitoring well ID) were replicated on the lid of the bottles/vials in the event that the labels became detached from the bottles during transport.

Bottles were placed directly into a pre-chilled ice chest, for transport to the testing laboratories under chain of custody conditions. COC documentation were completed for samples relinquished to the laboratory and included: sample ID; number of bottles/vials; media type (i.e., water); project ID; name; date of sampling and relinquishment.

At the completion of sampling at each location, single use sampling equipment were disposed of and re-useable equipment including the pump head, flow cell and interface probe decontaminated as follows:

- Pressure spray with Decon 90 detergent and potable water mix;

- Pressure spray rinse with potable water; and
- Air drying.

The completed activities were documented on groundwater monitoring and calibration/decontamination record forms included in **Appendix C**. Rinsate samples were obtained during the field decontamination procedures at a frequency of one per sampling event. The rinsate sample was obtained by rinsing the interface probe and flow cell with laboratory grade demineralised water following the decontamination procedure. The water samples were then appropriately preserved and stored with the site water samples prior to transport to the laboratory for chemical analysis.

5.4 Decontamination

Prior to the commencement of sampling activities, non-disposable sampling equipment, including sampling trowel/knife were all cleaned with a high pressure water/detergent spray, rinsed with water and then air dried. The equipment was then inspected to ensure that no soil, oil, debris or other contaminants were apparent on the equipment prior to the commencement of works. Sampling equipment was subsequently decontaminated using the above process between each sampling location.

5.5 Duplicate and Triplicate Sample Preparation

At selected sample points sufficient soil sample was collected using sampling methods described in **Section 5.2** to provide two primary, blind duplicate and split duplicate samples. The collected samples were divided into three samples to further reduce the potential for loss of volatiles and placed in three clean glass jars or sample bags as appropriate for the soil. Each sample was then labelled with primary, duplicate or triplicate sample identification before being placed in the same chilled esky for transport to the laboratory. In addition, one trip spike and storage blank were also analysed for the batches.

5.6 Laboratory Analysis

JBS&G contracted Eurofins Pty Ltd (Eurofins) as the primary laboratory for the required soil analyses and Envirolab Services Pty Ltd (Envirolab) as the primary laboratory for the groundwater analyses. The secondary laboratory for the soil works was Envirolab. All laboratories are NATA registered for the required analyses. In addition, the laboratories were required to meet JBS&G's internal QA/QC requirements. Laboratory analysis of samples was conducted as summarised in **Table 5.3**. Copies of the laboratories Certificates of Analysis are provided in **Appendix H**.

Table 5.3: Analytical Schedule

Sample Type	No. Sample Locations	Analytes and No. of Analyses (excluding QA/QC)
Soil	12 locations	8 metals – 12 samples PAH – 12 samples TPH/BTEX – 12 samples pH, CEC, % clay – 2 samples Asbestos – 12 samples OCs – 12 samples PCBs – 12 samples
Groundwater	2 locations	8 metals – 1 sample TPH – 2 samples SVOC – 2 samples VOC – 2 samples Ammonia – 2 samples

6. Assessment Criteria

6.1 Regulatory Guidelines

The investigation was undertaken with consideration to aspects of the following guidelines, as relevant:

- National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 (No. 1), National Environment Protection Council (NEPC 2013)
- Contaminated Sites: Sampling Design Guidelines, NSW EPA, 1995 (EPA 1995)
- Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites, NSW EPA, 1997 (OEH 2011)
- Contaminated Sites: Guidelines for the NSW Site Auditor Scheme, 2nd Edition, NSW EPA, 2006 (DEC 2006)
- Contaminated Sites: Guidelines on Duty to Report Contamination under the Contaminated Land Management Act 1997, NSW DECC, June 2009 (DECC 2009); and
- Waste Classification Guidelines, NSW Department of Environment, Climate Change and Water, December 2009 (DECCW 2009).

6.2 Soils Assessment Criteria

Based on the proposed development of the site for mixed high-density residential basement levels and ground floor commercial/retail and child care facilities, concentrations of contaminants in the soil have been compared against published levels as presented in **Tables 6.2** and **6.3**, sourced from the following:

- Health based Investigation Levels for Residential with garden/accessible soils including children's day care centres – NEPC 2013, HIL-A;
- Health Screening Levels (HSLs) for petroleum hydrocarbons considering potential for vapour intrusion, coarse grained soil for residential at 0.0-1.0 m depth (NEPC 2013);
- Health Screening Levels (HSLs) for petroleum hydrocarbons considering potential for vapour intrusion, sand soils for low-high residential at 0.0 to <1.0 m depth (NEPC 2013).

The most conservative NEPC (2013) investigation levels have been adopted given the potential for ground floor child care facilities to be incorporated into the development.

Where there are no NSW EPA endorsed thresholds the laboratory limit of reporting has been adopted as an initial screening value for the purposes of this assessment.

Additionally, the laboratory results will be compared against ecological screening levels (ESLs) for petroleum hydrocarbons and derived ecological investigation levels (EILs) for other COPC for commercial/industrial scenarios outlined in the NEPC (2013).

The procedure for the derivation of the EILs includes the use of added contaminant limits (ACL) as reported in NEPC (2013). The NEPC (2013) method also includes an ambient background concentration (ABC), and assumes the ecosystem is adapted to the ABC for that locality, as such it is only adding contaminants over and above this ABC which has a potentially adverse effect. The ABC at a site is considered the sum of naturally occurring background and contaminant levels introduced from diffuse or non-point sources by general anthropogenic activities such as vehicle emissions, rather than contaminant levels introduced by industrial or agricultural activities.

To derive EILs for selected inorganic COPC the pH, cation exchange capacity (CEC) and approximate percent clay content for the site must be known. Samples were collected to determine these parameters in soils at the site. Based on this information the following criteria for copper, lead and zinc were derived. NEPC (2013) provides generic EILs for arsenic, DDT and naphthalene. For the criteria for chromium the ACL was used from the NEPC, with a clay content of 10 % used.

Table 6.1: Derived EIL criteria of copper, lead and zinc (mg/kg)

pH	CEC	Component	Cu	Pb	Zn	Cr
6.7 pH units	15 meq/100 g	ABC	4	16	55	10
		ACL	210	1100	590	400
		EIL (ABC + ACL)	214	1116	645	410

[1] Ambient background concentration (ABC), calculated for this site as the average concentration of a particular metal in all soil samples analysed.

[2] Added contaminant limits (ACL), from data in Tables 1B (1) to 1B (5) in NEPC (2011) based on pH and/or CEC values and/or urban residential/public open space land use for relevant metals.

Works have been completed in accordance with the decision process for assessment of urban redevelopment sites (DEC 2006),

Table 6.2: Health Based Soil Investigation Levels (all units in mg/kg)

	Limit of Reporting	Laboratory Method	Health Investigation/ Screening Levels
			Residential Including Childcare Facilities HIL-A
Arsenic	4.0	ICP-AES (USEPA 200.7)	100
Cadmium	0.4	ICP-AES (USEPA 200.7)	20
Chromium	1.0	ICP-AES (USEPA 200.7)	100[1]
Copper	1.0	ICP-AES (USEPA 200.7)	6000
Nickel	1.0	ICP-AES (USEPA 200.7)	400
Lead	1.0	ICP-AES (USEPA 200.7)	300
Zinc	1.0	ICP-AES (USEPA 200.7)	7400
Mercury (inorganic)	0.1	Cold Vapour ASS (USEPA 7471A)	40[2]
Carcinogenic PAHs (as B(a)P TPQ)[3]	0.028	GCMS (USEPA8270)	3
Napthalene	0.1	GCMS (USEPA8270)	NL[6]
Total PAHs[4]	0.4	GCMS (USEPA8270)	300
Phenol	5	Distillation-Colorimetric (APHA 5530)	3000
Pentachlorophenol	1	Distillation-Colorimetric (APHA 5530)	100
Benzene	1.0	Purge Trap-GCMS (USEPA8260)	0.5[6]
Toluene	1.0	Purge Trap-GCMS (USEPA8260)	160[6]
Ethylbenzene	1.0	Purge Trap-GCMS (USEPA8260)	55[6]
Total Xylenes	3.0	Purge Trap-GCMS (USEPA8260)	40[6]
F1 C_6-C_{10}	10	TPH Purge Trap-GCMS (USEPA8260)	45[6]
F2 >C_{10}-C_{16}	50	TPH Purge Trap-GCMS (USEPA8260)	110[6]
F3 >C_{16}-C_{34}	100	Purge Trap-GCFID (USEPA8000)	-
F4 >C_{34}-C_{40}	100	Purge Trap-GCFID (USEPA8000)	-
DDT + DDD + DDE	0.3	GCECD (USEPA8140,8080)	240
Aldrin + Dieldrin	0.2	GCECD (USEPA8140,8080)	6
Chlordane	0.1	GCECD (USEPA8140,8080)	50
Endosulfan	0.3	GCECD (USEPA8140,8080)	270
Endrin	0.1	GCECD (USEPA8140,8080)	10
Heptachlor	0.1	GCECD (USEPA8140,8080)	6
HCB	0.1	GCECD (USEPA8140,8080)	10
Methoxychlor	0.1	GCECD (USEPA8140,8080)	300
Chloropyrifos	0.5	GCECD (USEPA8140,8080)	160
PCB	0.5	GCECD (USEPA8140,8080)	1
Bonded ACM			0.01 %
Asbestos	Presence	PLM / Dispersion Staining	No asbestos capable of being detected via the investigation, which comprises both visual identification and sample analysis by a NATA accredited laboratory [8]

Notes:

1. Guideline values presented are for Chromium (VI) in absence of total Chromium values. Where total Chromium results are elevated, samples will be analysed for Chromium (VI).

2. Guideline values are for inorganic mercury. Where elevated mercury concentrations are encountered and/or site information suggests the potential presence of elemental mercury and/or methyl mercury, consideration of applicability would be needed.

3. Carcinogenic PAHs calculated as per Benzo(a)pyrene Toxicity Equivalent Factor requirements presented in NEPC (2013)

4. Total PAHs calculated as per requirements presented in NEPC (2013).

5. Management Limits are based on coarse grained soil, with F1 and F2 concentrations inclusive of naphthalene and BTEX compounds.

6. Soil Health Screening Levels for Vapour Intrusion: Sand Soils. Values presented are those for 0 to <1 m bgs as the most conservative level. Reference should be made to results tables for further detail of levels at greater depths. NL: Non-limiting.

7. Values for F1 C6-C9 are obtained by subtracting BTEX (Sum) from laboratory result for C6-C9 TRH.

8. No EPA endorsed criteria, The LOR is proposed as a screening level in the absence of endorsed site specific criteria.

Table 6.3: Ecological Based Soil Criteria (all units in mg/kg)

	Limit of Reporting	Laboratory Method	ESLs	EILS[3]
			Urban Residential & Public Open Space	Urban Residential & Public Open Space
METALS				
Arsenic	4.0	ICP-AES (USEPA 200.7)	-	100
Cadmium	0.4	ICP-AES (USEPA 200.7)	-	-
Chromium	1.0	ICP-AES (USEPA 200.7)	-	410[3]
Chromium (VI)	1.0	Alkali leach colorimetric (APHA3500-Cr/USEAP3060A)	-	-
Copper	1.0	ICP-AES (USEPA 200.7)	-	214[2]
Nickel	1.0	ICP-AES (USEPA 200.7)	-	220
Lead	1.0	ICP-AES (USEPA 200.7)	-	1116[2]
Zinc	1.0	ICP-AES (USEPA 200.7)	-	645[2]
Mercury (inorganic)	0.1	Cold Vapour ASS (USEPA 7471A)	-	-
POLYCYCLIC AROMATIC HYDROCARBONS				
Benzo(a)pyrene[5]	0.5	GCMS (USEPA8270)	0.7	-
Naphthalene	0.1	GCMS (USEPA8270)	-	170
BTEX[5]				
Benzene	1.0	Purge Trap-GCMS (USEPA8260)	50	-
Toluene	1.0	Purge Trap-GCMS (USEPA8260)	85	-
Ethylbenzene	1.0	Purge Trap-GCMS (USEPA8260)	70	-
Total Xylenes	3.0	Purge Trap-GCMS (USEPA8260)	105	-
TOTAL RECOVERABLE HYDROCARBONS[5]				
F1 C_6-C_{10}	10	TPH Purge Trap-GCMS (USEPA8260)	180[1]	-
F2 >C_{10}-C_{16}	50	TPH Purge Trap-GCMS (USEPA8260)	120	-
F3 >C_{16}-C_{34}	100	Purge Trap-GCFID (USEPA8000)	300	-
F4 >C_{34}-C_{40}	100	Purge Trap-GCFID (USEPA8000)	2800	-
ORGANOCHLORINE PESTICIDES				
DDT	0.1	GCECD (USEPA8140,8080)	-	180

Notes:

1. Values for F1 C6-C9 are obtained by subtracting BTEX (Sum) from laboratory result for C6-C9 TRH.

2. EIL derived using site specific data as presented in Table 1B(1 to 5) using NEPC (2013) methodology.

3. Value for Chromium (III) adopted for evaluation of total Chromium in the absence of known Chromium (VI) source.

4. Table 1B(6) ESLs for TPH fractions F1-F4, BTEX and benzo (a) pyrene in soil for urban residential and public open space

6.3 Groundwater Assessment Criteria

The adopted criteria from guidelines as noted below are:

- Australian and New Zealand Guidelines for Fresh and Marine Water Quality. ANZECC/ARMCANZ (2000), based on 95% species protection in freshwater environments (based on fresh water receiving waters, rather than saline groundwater);
- Australian Drinking Water Guidelines (NHMRC/NRMMC 2004) where appropriate, although use of groundwater for drinking water is unlikely as previously noted; and
- Laboratory reporting limits or other Australian or International screening levels where no criteria are available from the above guidelines, where appropriate.

Table 6.4 Groundwater Assessment Criteria (units in µg/L unless noted)

	Limit of Reporting	Laboratory Method	Drinking Water Criteria[1]	Freshwater Ecosystem Criteria[2]
METALS				
Arsenic	1.0	ICP-AES (USEPA 200.8, 6020A)	10	-
Cadmium	0.1	ICP-AES (USEPA 200.8, 6020A)	2	0.2[4]
Chromium	1.0	ICP-AES (USEPA 200.8, 6020A)	50	1.4
Copper	1.0	ICP-AES (USEPA 200.8, 6020A)	2000	1.3
Lead	1.0	ICP-AES (USEPA 200.8, 6020A)	10	3.4
Mercury	0.1	ICP-AES (USEPA 200.8, 6020A)	1	0.6[4]
Nickel	1.0	ICP-AES (USEPA 200.8, 6020A)	20	11
Zinc	1.0	ICP-AES (USEPA 200.8, 6020A)	3000	8
BTEX				
Benzene	1.0	P&T GC/MS (USEPA 8020A)	1	950
Toluene	1.0	P&T GC/MS (USEPA 8020A)	800	-
Ethylbenzene	1.0	P&T GC/MS (USEPA 8020A)	300	-
o-Xylene	1.0	P&T GC/MS (USEPA 8020A)	600[8]	350[5]
m-Xylene	1.0	P&T GC/MS (USEPA 8020A)		-
p-Xylene	1.0	P&T GC/MS (USEPA 8020A)		-
PETROLEUM HYDROCARBONS				
C6 – C9 Fraction	10	P&T GC/MS (USEPA 8020A)	-	10[9]
C10 – C36 Fraction	250	GC/FID (USEPA 8000)	-	250[9]
POLYCYCLIC AROMATIC HYDROCARBONS				
Naphthalene	0.1	GCMS (USEPA8270)	-	16[4,10]
Anthracene	0.1	GCMS (USEPA8270)	-	-
Phenanthrene	0.1	GCMS (USEPA8270)	-	-
Fluoranthene	0.1	GCMS (USEPA8270)	-	-
Benzo(a)pyrene	0.1	GCMS (USEPA8270)	0.1[7]	-
SEMI VOLATILE ORGANIC COMPOUNDS				
Analine	2.0	P&T GC/MS (USEPA 8020B)	-	250
Hexachlorobudiene	4.0	P&T GC/MS (USEPA 8020B)	0.7	-
Hexachloroethane	2.0	P&T GC/MS (USEPA 8020B)	-	360
Nitrobenzene	2.0	P&T GC/MS (USEPA 8020B)	-	550
Pentachlornitrobenzene	2.0	P&T GC/MS (USEPA 8020B)	30	-
Di(2-ethylbexy)phthalate	20	P&T GC/MS (USEPA 8020B)	10	-
Dibutyl phthalate	2	P&T GC/MS (USEPA 8020B)	-	26
Diethyl phthalate	2	P&T GC/MS (USEPA 8020B)	-	1000
Dimethylphthalate	2	P&T GC/MS (USEPA 8020B)	-	3700
ORGANOCHLORINE PESTICIDES				
DDT	2	GCMS (USEPA8270)	9	0.01
Endrin	0.5	GCMS (USEPA8270)	-	0.02

	Limit of Reporting	Laboratory Method	Drinking Water Criteria[1]	Freshwater Ecosystem Criteria[2]
g-BHC (Lindane)	0.5	GCMS (USEPA8270)	10	0.2
Heptachlor	0.5	GCMS (USEPA8270)	-	0.09
Aldrin & Dieldrin	0.1	GCMS (USEPA8270)	0.3	-
Chlordane	1	GCMS (USEPA8270)	2	0.08
Heptachlor Epoxide	0.1	GCMS (USEPA8270)	0.3	-
Pentachlorophenol	10	GCMS (USEPA8270)	10	10
Toxaphene	10	GCMS (USEPA8270)	-	0.2
OTHER				
Ammonia (at pH 6)	100	Colorimetric (EPA 350.1)	-	900[12]

Notes

1. Australian Drinking Water Guidelines (NHMRC/NRMMC 2004)
2. 95% Protection Trigger Values for Fresh Water (ANZECC/ARMCANZ 2000)
3. Guidelines for Managing Risks in Recreational Waters – 10 times Drinking Water Values as a screening level (NHMRC 2008)
4. 95% Protection Level used, as recommended by ANZECC/ARMCANZ 2000
5. Low Reliability Trigger Value (ANZECC/ARMCANZ 2000)
6. Indicative Interim Working Level (ANZECC/ARMCANZ 2000)
7. Laboratory limit of reporting is greater than the available criterion, hence the laboratory LOR is adopted as the screening level.
8. Total Xylenes
9. Laboratory LOR is adopted as the criterion as a screening level in the absence of EPA endorsed assessment value.
10. Moderate Reliability Trigger value in marine waters.
11. In absence of NSW EPA endorsed values, USEPA RSLs for Tap Water adopted as screening level for assessment purposes.
12. Ammonia value for pH 7.2 as presented in ANZECC (2000) adopted based on average pH reported by the laboratory for groundwater samples.

7. Quality Assurance/ Quality Control

7.1 QA/QC Results

The QA/QC results for soil samples collected at the site are summarised in **Table 7.1** and discussed in **Section 7.2**. Detailed QA/QC results are included the laboratory reports in **Appendix H** and QA Checker included in **Appendix I**.

Table 7.1: QA/QC Results Summary

Data Quality Indicator	Results	DQI met?
Precision		
Blind duplicates (intra laboratory)	Soil 0-100% RPD The primary and duplicate samples targeting asbestos were in agreement. Duplicate samples were analysed at a rate of 1/20 primary samples. Groundwater 0-67% RPD Duplicate samples were analysed at a rate of 1/20 primary samples	Partial[2]
Blind triplicates (inter laboratory)	Soil 0-149% RPD The primary and triplicate samples targeting asbestos were in agreement. Triplicate samples were analysed at a rate of 1/20 primary samples. Groundwater 0 – 178% RPD Triplicate samples were analysed at a rate of 1/20 primary samples.	Partial[1]
Laboratory Duplicates	0 – 120% RPD	Partial[1]
Accuracy		
Surrogate spikes	78 – 132 % recovery	Partial[1]
Matrix spikes	70 - 130% recovery 1 matrix spikes - recovery was completed for each batch of samples.	Yes
Laboratory Control Samples	70 - 130%	Yes
Representativeness		
Sampling appropriate for media and analytes	All sampling conducted in accordance with JBS&G procedures	Yes
Laboratory blanks	<LOR	Yes
Samples extracted and analysed within holding times.	All samples were extracted and analysed within holding times, with the exception of three addition samples for delineation purposes	Yes
Trip spike	88-101% 1 trip spike accompanied soil samples collected	Yes
Storage blank	<LOR 1 storage blank accompanied soil samples collected 1 storage blank accompanied groundwater samples collected	Yes
Rinsate Blank	<LOR 1 rinsate blank collected and accompanied groundwater samples	Yes

Standard operating procedures used for sample collection & handling	A single field staff member used same standard operating procedures throughout works	Yes
Standard analytical methods used	Standard analytical methods used as listed in **Table 5.2**.	Yes
Consistent field conditions, sampling staff and laboratory analysis	Sampling was conducted by a single field staff member using standard operating procedures in the same conditions throughout the works. The primary lab and secondary labs remained consistent throughout the investigation.	Yes
Limits of reporting appropriate and consistent	Limits of reporting were consistent and appropriate.	Yes
Soil description, groundwater forms & COCs completed	All bore logs and COCs were completed appropriately.	Yes
Appropriate documentation	All appropriate field documentation is included in the Appendices.	Yes
Satisfactory frequency/result for QC samples	The QC results are considered adequate for the purposes of the investigation.	Yes
Data from critical samples is considered valid	Data from critical samples is considered valid.	Yes
Sensitivity		
Analytical methods and limits of recovery appropriate for media and adopted site assessment criteria	All remaining limits of reporting were less than the adopted site assessment criteria.	Yes

7.2 QA/QC Discussion

7.2.1 Precision

Blind and Split Duplicates

Soil field blind (intra-laboratory) duplicates and split (inter-laboratory) duplicates were collected at a rate of 1 per 20 primary samples analysed, meeting the 1/20 DQI frequency (for blind duplicates) and the 1/20 DQI frequency (for split duplicates).

No high RPD calculations were observed between the primary, blind duplicate and triplicate soil samples, with the exception of elevated RPD calculations for the following:

- Xylenes (m&p), >C_{10}-C_{16} TPH, >C_{16}-C_{34} TPH and >C_{10}-C_{16} less naphthalene (F2) between the primary sample BH03 (0.0-0.1 m) and blind duplicate QC01, with RPDs of 67%, 100%, 75%, 89 % and 79%, respectively; and
- Xylenes (m&p), xylene (o) and >C_{16}-C_{36} TPH between the primary sample BH03 (0.0-0.1 m) and split duplicate QC01A, with RPDs 86%, 86% and 120%, respectively.

The elevated RPD calculations for the soil blind and split duplicates may be attributed to results being at or near the laboratory limit of report which exaggerates apparent differences and RPD results.

A groundwater blind (intra-laboratory) duplicate and split (inter-laboratory) duplicate were collected at a rate of 1 per 20 primary samples analysed, meeting the 1/20 DQI frequency (for blind duplicates).

No high RPD calculations were observed between the primary, blind duplicate and triplicate groundwater samples, with the exception of elevated RPD calculations for the following:

- Ammonia, di(2-ethylhexy)phthalate, TRH > C_{10}-C_{16} and TRH >C_{16}-C_{34} between the primary sample MW01 and blind duplicate QC01, with RPDs of 122%, 123%, 178% and 167 %, respectively; and
- Chloroform, di(2-ethylhexy)phthalate, 2-methylnaphthalene, TRH > C_{10}-C_{16} and TRH >C_{16}-C_{34} between the primary sample MW01 and split duplicate QC01A, with RPDs of 135%, 123%, 163%, 178% and 167 %, respectively.

The elevated RPD calculations for the soil blind duplicates may be attributed to results being at or near the laboratory limit of report which exaggerates apparent differences and RPD result.

Laboratory Duplicates

All concentrations in the primary and duplicate samples were less than the laboratory limits of reporting, or returned RPD values were within the acceptable limits of 0 – 50% with the exception of arsenic, copper and lead with RPDs of 97 %, 120 % and 110 %. As an acceptable recovery was obtained for the laboratory controls sample, the results indicate a sample matrix interference.

7.2.2 Accuracy

Surrogate Spikes

Surrogate samples analysed reported recoveries within the acceptable range with the exception of one result for dibutylchlorendate (132 %), however, the laboratory considers recoveries of volatiles acceptable from 60 % to 140 % and so this is considered acceptable.

Matrix Spikes

Matrix spikes analysed reported recoveries within the acceptable range of 70 – 130 %.

Laboratory Control Samples

Laboratory control samples analysed reported recoveries within the acceptable range of 70 - 130%.

7.2.3 Representativeness

Sampling appropriate for media and analytes

All soil sampling works completed during the investigation were conducted in accordance with JBS&G standard operating procedures. Soil sampling was conducted with the installation of testpits with a backhoe using a solid flight augur or hand auger, which is considered appropriate for the potential site contaminants.

Laboratory Blanks

Analysis of a method blank was conducted for the laboratory batches. No target analytes were detected above the laboratory limit of reporting (LOR) within any of the laboratory blanks.

Holding Times

The extraction and analysis of selected soil samples was completed within the recommended holding times and are therefore considered adequately representative.

Trip Spike

One trip spike was submitted with the batch of soil samples collected during the assessment. The trip spike recoveries were within the limits specified in the representativeness DQIs.

Storage Blank

One storage blank was submitted with the batch of soil samples and one storage blank was submitted with the batch of groundwater samples collected during the assessment. There were no reported concentrations of TPH/BTEX or other VOC compounds above the laboratory LOR.

Rinsate Blank

One rinsate blank was submitted with the batches of soil samples collected during the assessment. There were no reported concentrations of SVOC, VOC, metals or TPH above the laboratory LOR. Ammonia was reported at 20 µg/L in the rinsate, however this is not considered to be due to cross contamination between sample locations.

7.2.4 Comparability

Experienced JBS&G personnel undertook all sampling in accordance with standard JBS&G sampling methods.

The laboratory LORs are consistent and are considered appropriate.

7.2.5 Completeness

Samples were transported under full chain of custody (COC) documentation. The COC documentation was completed correctly and the selected analyses were correctly conducted.

All field documentation was completed appropriately and were correct.

The frequency of analysis and result for all QC samples are appropriate.

7.2.6 Sensitivity

Laboratory analysis methods for all contaminants in soil and groundwater adopted during the investigation used limits of reporting significantly less than the site assessment criteria to ensure that contaminant concentrations could be confidently identified as being less than the adopted site assessment criteria.

7.3 QA/QC Assessment

The field sampling and handling procedures produced QA/QC results which indicate that the soil data are of an acceptable quality and suitable for use in site characterisation.

The NATA certified laboratory results sheets indicate that the project laboratory was generally achieving levels of performance within its recommended control limits during the period when the samples from this program were analysed.

While several recoveries and RPD's fell outside the DQI limit, the non-conformances described in **Section 7.2** are considered to be acceptable due to factors such as consistency of the remaining data, many results falling within the NATA accredited range and results significantly below the adopted site assessment criteria.

On the basis of the results of the field and laboratory QA/QC program, the soil and groundwater data are of an acceptable quality upon which to draw conclusions regarding the environmental condition of the site.

8. Soil Results

8.1 Field Observations

Field activities were completed on 7 July 2014. Field log sheets are included in **Appendix G**. Observations made during the current assessment are summarised below.

Fill material was observed to extend from 0.2 m to 2.6 m below ground surface (bgs) comprising a recovered aggregate fill comprising silty gravelly sand with brick, concrete and igneous gravels (at BH09 and BH10); and silty sand and clay fill with minor anthropogenic inclusions such as concrete and brick across the remainder of the site.

Natural soils were encountered at eight of the 12 locations during the current investigation, as silty clay or bedrock at depths ranging between 0.4 m bgs to 2.6 m bgs (the maximum depth of investigation). Refusal in fill occurred in fill at the remaining four locations.

No staining or odours were reported in any of the sample locations.

Visible friable or non-friable asbestos containing materials (ACM) were not observed during the intrusive works.

8.2 Soil Analytical Results

The soil sampling locations are shown on **Figure 4** and summarised laboratory results are presented in **Table A**. Detailed laboratory reports and chain of custody documentation are provided in **Appendix H**.

Analytical results are discussed in the following sections.

8.2.1 pH and Cation Exchange Capacity (CEC)

The pH and CEC for the site indicated that the average pH at the site was 6.7 pH units, with the CEC for the site being 15 meq/100g. These results were used to derive the EILs as per **Section 6.2**.

8.2.2 Metals

The concentrations of the heavy metals (As, Cd, Cr, Cu, Pb, Hg, Ni and Zn) in the soil samples selected for analysis were all less than the adopted health based criteria.

The concentrations of the heavy metals (As, Cd, Cr, Cu, Pb, Hg, Ni and Zn) in the soil samples selected for analysis were all less than the adopted EILs.

8.2.3 TPH

There were no reported concentrations of TPH C_6-C_{10} or TPH C_{10}-C_{40} above the laboratory limit of reporting (LOR) and /or the concentrations were below the adopted site assessment criteria.

8.2.4 BTEX

There were no reported concentrations of BTEX compounds above the laboratory LOR within any of the analysed soil samples.

8.2.5 PAHs

All total PAH concentrations were below the adopted site assessment criteria.

All B(a)P concentrations were below the adopted HSLs and ESLs within the soil samples collect and analysed from the site.

8.2.6 OCPs and OPPs

There were no OCP or OPPs reported above the laboratory LOR in any soil sample collected and analysed.

8.2.7 Asbestos

Non-friable asbestos consisting of ACM fragments was not identified in any of the soil samples collected or analysed during the ESA. ACM was not observed within any of the locations investigated during the ESA.

Asbestos fibres were detected above the laboratory LOR of 0.1 g/kg in one location (BH10 0.2-0.3 m bgs). No asbestos fibres, or respirable asbestos was detected in any of the other soil samples collected and analysed.

8.3 Preliminary Material Classification

A preliminary material classification was undertaken for the soil samples collected during the works. All analysis results were within the Contaminant Threshold 1 (CT1) criteria for General Solid Waste (GSW) (DECCW, 2009) with the exception of mercury present in fill material (BH9_0.2-0.3 m) at 4.8 mg/kg (acceptable limit is 4 mg/kg) and nickel present in the fill material (BH08_0.0-0.1 m) at 44 mg/kg (acceptable limit is 40 mg/kg GSW). Statistical analyses of the mercury and nickel data for the site was undertaken and the results were within the GSW CT1 classification. This material could be disposed of as GSW to an appropriately licensed disposal facility. Subject to agreement, material classified as GSW may be able to be removed to facilities licensed to accept waste meeting GSW CT1 conditions.

Material beneath the pathway between Buildings 1 and 2 (represented by BH10) would require classification as Special Waste (Asbestos) mixed with GSW due to the reported presence of asbestos fibres in soil.

With regards to excavated natural material (ENM) characterisation (subject to the ENM Exemption in EPA, 2012), all analysis results were within the ENM Maximum Average Concentration and Absolute Maximum Concentration acceptance criteria with the exception of mercury in BH08_0.0-0.1 m and BH9_0.2-0.3 m (acceptable limits are 0.5 and 1 mg/kg respectively), and BH10 (due to the presence of asbestos). It should be noted that foreign material was not analysed as part of the investigation which is a requirement for assessment as ENM. A site specific exemption application can be made to the EPA for the fill material (excluding asbestos impacted material) which may allow the material to be reused as ENM as engineering fill. Further assessment to meet ENM assessment sampling requirements would be needed.

9. Groundwater Results

Groundwater gauging and groundwater parameter results are summarised in **Table 7.** Groundwater laboratory results are summarised in **Table 8** and laboratory reports and chain of custody documentation are included in **Appendix H**. The locations of groundwater monitoring well are shown on **Figures 3** and **4**.

9.1 Field Observations

Groundwater levels ranged between 2.734 and 6.352 m bgs. The groundwater flow direction is anticipated to the north east. Groundwater parameters were only collected for MW02 due to low groundwater recharge in monitoring well MW01.

No phase separated hydrocarbons (PSH), hydrocarbon sheen or odour was noted in each of the two wells. Electrical conductivity was 870 µs/cm and total dissolved solids was 367 mg/L. Based on these levels, groundwater is classified as fresh. Redox potential was recorded at -268 indicating predominantly anaerobic/reducing conditions, and pH of 6.91 indicating slightly acidic to neutral conditions. Low dissolved oxygen was recorded in the one well (0.1 mg/L) indicative of reducing conditions, consistent with redox results.

9.2 Groundwater Analytical Results

The groundwater sampling locations are shown on **Figure 4**. Detailed laboratory reports and chain of custody documentation are provided in **Appendix H**.

Analytical results are discussed in the following sections.

9.2.1 Metals

One groundwater sample was analysed for a range of heavy metals and results are summarised in **Table 8**. Concentrations of metals were below the laboratory LOR and/or the adopted assessment criteria in MW02. Due to low groundwater recharge in MW01, metals analysis was not undertaken.

9.2.2 TPH

Each of the two groundwater samples were analysed for TPH and results are summarised in **Table 8**. Concentrations of TPH C_6-C_9 were below the laboratory LOR in both monitoring wells. Concentrations of TPH C_{10}-C_{36} were above the laboratory LOR and adopted criteria of 250 µg/L in MW01 (concentration of 2,510 µg/L) and MW02 (concentration of 120 µg/L).

9.2.3 SVOCs and VOCs

Each of the two groundwater samples were analysed for SVOCs and VOCs and results are summarised in **Table 8**. SVOCs and VOCs were reported below the laboratory LOR for all analytes with the exception of Bis(2-ethylhexyl)phthalate with a concentration of 42 µg/L in MW01. There is currently no endorsed site assessment criteria for Bis(2-ehtylhexyl)phthalate.

9.2.4 Ammonia

Each of the two groundwater samples were analysed for ammonia and results are summarised in **Table 8.** Ammonia was reported in monitoring wells MW01 and MW02 at concentrations of 2,200 µg/L and 530 µg/L, respectively. Concentration were above the adopted freshwater ecosystem criteria of 900 µg/L in MW01.

10. Discussion

Based on the assessment work carried out at the Site, as discussed in **Section 5**, the conclusions of the assessment are discussed below.

10.1 Is fill present at the site?

Fill is present at the site. At least two types of fill materials were identified; one a recovered aggregate fill comprising silty gravelly sand with brick, concrete and igneous gravels; and silty sand and clay fill with minor anthropogenic inclusions such as concrete and brick across the remainder of the site.

No visible ACM was observed in fill material at the locations investigated, however the laboratory reported asbestos fibres in fill material beneath the path between Buildings 1 and 2.

10.2 What is the distribution of fill at the site?

Fill is present across all of the site and ranges in depth between approximately 0.2m and 2.6 m bgs.

10.3 What is the waste classification of soil/fill that may require offsite disposal as part of excavation works at the site?

Based on the results of this investigation, the majority of fill is classified as general solid waste (GSW), which could possibly be accepted by CT1-licensed facilities. The exception is material beneath the path between Buildings 1 and 2 which is classified as Special (Asbestos) Waste mixed with GSW. It is possible that the majority of the fill (excluding asbestos impacted material) could be classified as ENM subject to additional testing, potentially requiring site-specific exemption. Natural soils can be classified as VENM.

10.4 What is the characterisation of the fill present at the site?

All COPC in fill were below adopted NEPC (2013) criteria for residential with accessible and child care land use scenarios, with the exception of asbestos fibres within fill material reported at one location beneath the pathway between Buildings 1 and 2. It is considered that bonded and friable asbestos fragments are likely to be present within fill material beneath the pathway, although no visible ACM was observed during investigations. These materials are likely to be excavated/handled during future site development activities.

10.5 What are the characteristics of the groundwater present at the site?

Groundwater at the site is anticipated to flow across the site in a generally north east direction. Measured standing groundwater levels were between approximately 2.12 m and 3.37m bgs.

Assessment of groundwater identified minor elevated concentrations of TPH, bis(2-ethylhexyl)phthalate and ammonia in two monitoring wells in the western portion of the site, which is representative of groundwater near the upgradient site boundary. The reported concentrations are not considered to be significant and are unlikely to affect development of the site provided that groundwater does not enter any future basements.

11. Conclusions

11.1 Conclusions

Based on the findings of this investigation and subject to the limitations in Section 11, the following conclusions were made:

- The site has been predominantly vacant until sometime between 1982 and 1996 when the land was developed as a commercial property;
- The historical review identified the site was owned by Metropolitan Meat Industry Board and Homebush Abattoir between 1929 and 1993, however aerial photographs over this time period indicate the site comprised vacant fenced land and roads, suggesting abattoir activities did not take place at the site.
- Suspected asbestos eves were observed around the outside of the main buildings;
- Fill is present across all of the site. At least two types of fill materials were identified: a recovered aggregate fill comprising silty gravelly sand with brick, concrete and igneous gravels; and silty sand and clay fill with minor anthropogenic inclusions such as concrete and brick across the remainder of the site. Fill depths ranged from approximately 0.2 m to 2.6 m bgs.
- Groundwater is anticipated to flow towards Homebush Bay to the north east of the site at a depth of 2- 3 m bgs;
- Concentrations of all COPCs identified for the site were reported below the adopted health based criteria for residential land use (HIL-A) with the exception of asbestos at one location;
- Concentrations of all COPCs identified for the site were reported below the ecological criteria adopted for the site; and
- Groundwater depth ranged from approximately 2 – 3.3 m from the ground surface. Groundwater does not show any evidence of being significantly impacted by the identified contaminants in the fill material. There is evidence of potential hydrocarbon and ammonia contamination migrating onto the site from up-gradient areas, however the reported concentrations are not considered to be significant and are unlikely to affect development of the site provided that groundwater does not enter any future basements.
- Based on the reported contaminant concentrations, fill at the site would be classified as Special Waste (asbestos) with GSW for material beneath the pathway between Buildings 1 and 2, and GSW (CT1) for the remainder of the fill. It is likely that the majority of the fill (excluding asbestos impacted material) could achieve a higher classification (such as ENM).

11.2 Recommendations

The fill material in the vicinity of the asbestos impacted location (beneath the pathway between the buildings) can be assessed to confirm whether it can be removed as Special Waste (Asbestos) with GSW.

The remaining fill material can be assessed to confirm whether it can be removed as ENM or GSW (CT1), separate to underlying natural clay soils and bedrock, which can be removed as VENM;

A hazardous materials survey (HMS) should be completed prior to demolition.

Any unexpected finds can be addressed during the site development if required.

12. Limitations

This report has been prepared for use by the client who commissioned the works in accordance with the project brief only, and has been based in part on information obtained from the client and other parties. The report has been prepared specifically for the client for the purposes of the commission. No warranties, express or implied, are offered to any third parties and no liability will be accepted for use or interpretation of this report by any third party.

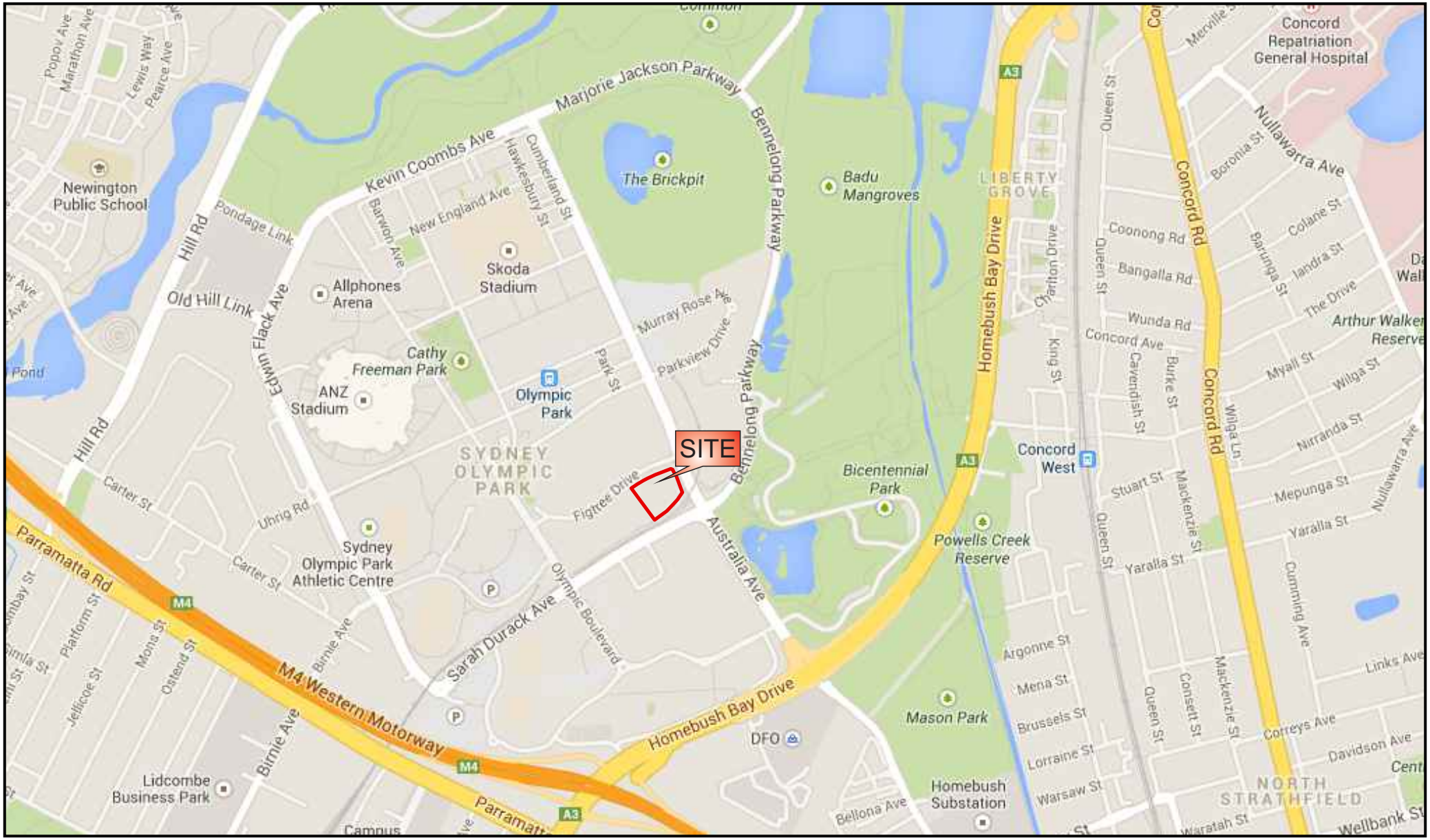
The advice herein relates only to this project and all results conclusions and recommendations made should be reviewed by a competent person with experience in environmental investigations, before being used for any other purpose. This report should not be reproduced without prior approval by the client, or amended in any way without prior approval by JBS&G (NSW & WA) Pty Ltd.

Limited sampling and laboratory analyses were undertaken as part of the investigations reviewed, as described herein. Ground conditions between sampling locations and media may vary, and this should be considered when extrapolating between sampling points. Chemical analytes are based on the information detailed in the site history. Further chemicals or categories of chemicals may exist at the site, which were not identified in the site history and which may not be expected at the site.

Changes to the subsurface conditions may occur subsequent to the investigations described herein, through natural processes or through the intentional or accidental addition of contaminants. The conclusions and recommendations reached in this report are based on the information obtained at the time of the investigations.

This report does not provide a complete assessment of the environmental status of the site, and it is limited to the scope defined herein. Should information become available regarding conditions at the site including previously unknown sources of contamination, JBS&G (NSW & WA) Pty Ltd reserves the right to review the report in the context of the additional information.

Figures



Source: © 2014 Google

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Scale: Approximate

Datum: MGA94 Zone 56 - AHD

Rev	Description	Drn.	Date
A4			
A	Original Issue - R01	RF	11-07-2014

Legend:

Approximate Site Boundary

JBS&G

Figure 1: Site Location

Client: Mirvac

Project: 2 Figtree Drive, Sydney Olympic Park,SOPA Site 53 ESA

Job No: 43567_01 File Name: 43567_01

Source: Base Image - © SIX Maps www.maps.six.nsw.gov.au, imagery date 01/04/2014, accessed 04/07/2014

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Scale:1:1,750

Datum: GDA 1994 MGA Zone 56 - AHD

Rev	Description	Drn.	Date:
A4			
A	Original Issue - R01	RF	11-07-2014

Legend:

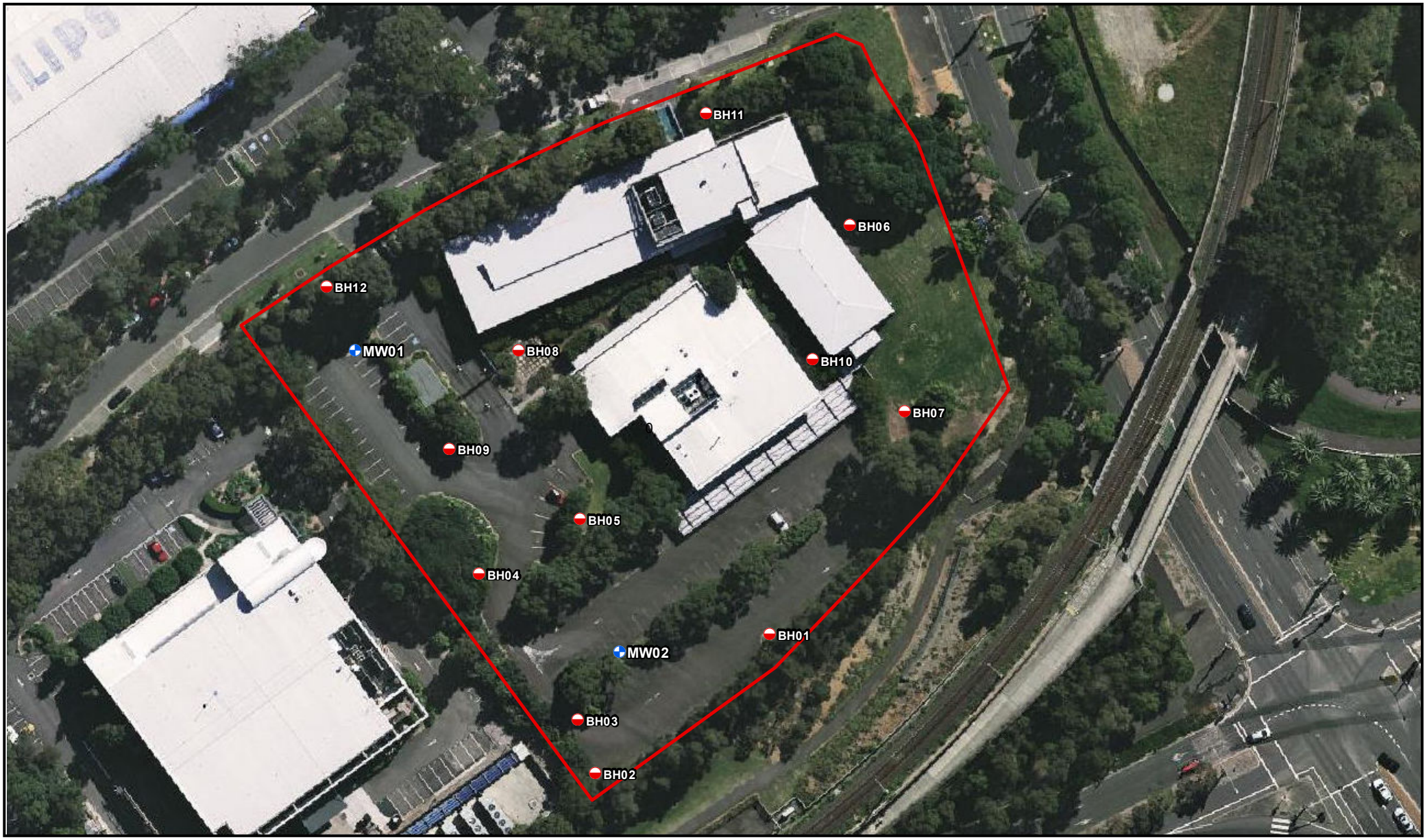
Approximate Site Boundary

JBS&G **Figure 2: Site Layout**

Client: Mirvac

Project: 2 Figtree Drive, Sydney Olympic Park, SOPA Site 53 ESA

Job No: 43567 File Name: 43567_02



Source: Base Image - © SIX Maps www.maps.six.nsw.gov.au, imagery date 01/04/2014, accessed 04/07/2014

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Datum: GDA 1994 MGA Zone 56 - AHD

Rev	Description	Drn.	Date:
A4			
A	Original Issue - R01	SE	16-07-2014

Legend:

- Approximate Site Boundary
- Monitoring Well Location
- Soil Sample Locations

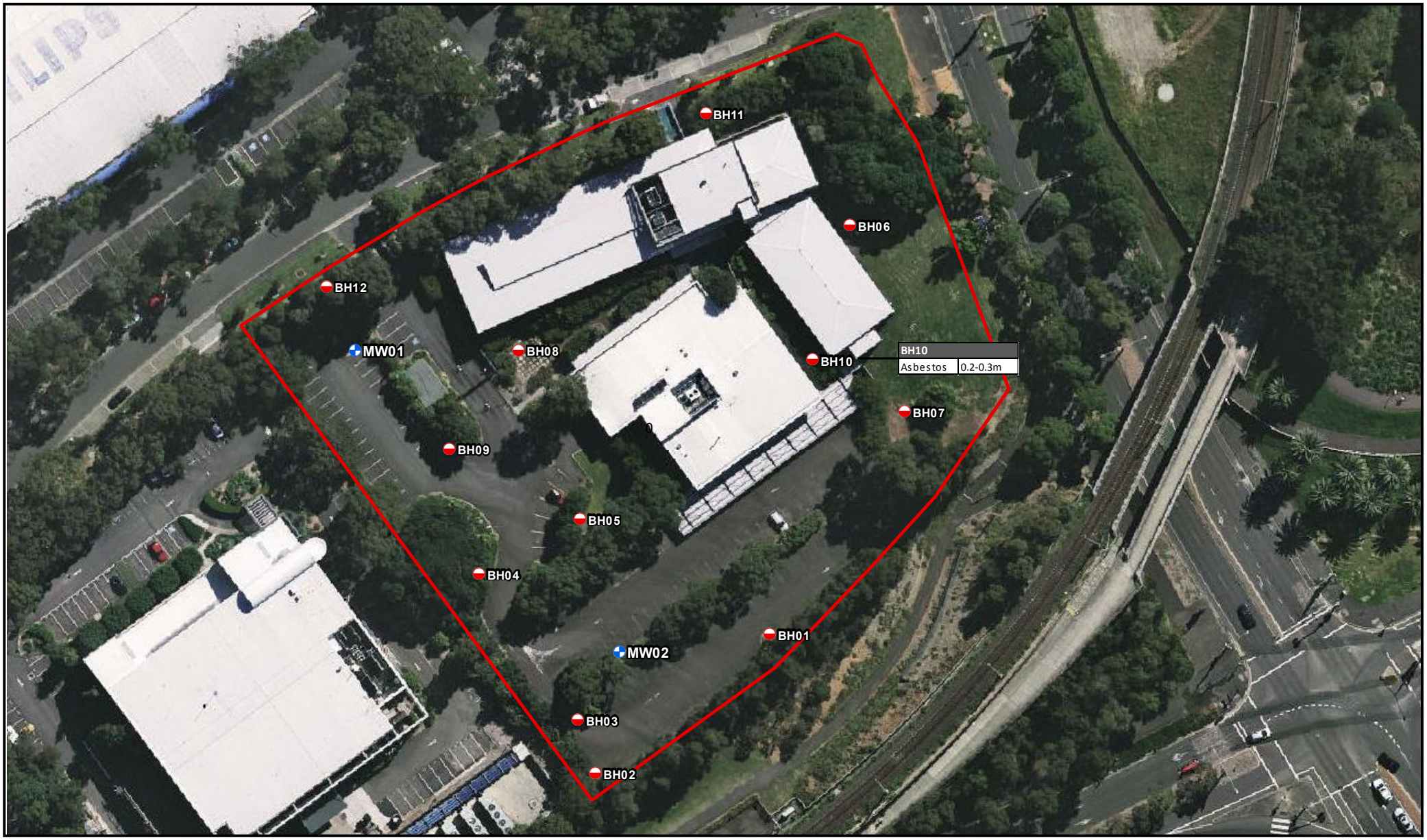
JBS&G

Figure 3: Sample Locations

Client: Mirvac

Project: 2 Figtree Drive, Sydney Olympic Park, SOPA Site 53 ESA

Job No: 43567 File Name: 43567_03



Source: Base Image - © SIX Maps www.maps.six.nsw.gov.au, imagery date 01/04/2014, accessed 04/07/2014

0 10 20 40 m

Scale: 1:1,000

Datum: GDA 1994 MGA Zone 56 - AHD

Rev	Description	Drn.	Date:
A4			
A	Original Issue - R01	SE	16-07-2014

Legend:

- Approximate Site Boundary
- Monitoring Well Location
- Soil Sample Locations

JBS&G **Figure 4: Soil Analytical Exceedances**

Client: Mirvac

Project: 2 Figtree Drive, Sydney Olympic Park, SOPA Site 53 ESA

Job No: 43567 File Name: 43567_04

Tables

Table 1: Soil Analytical Results Metals
Project Number: 43567
Project Name: SOPA Site 53 Due Dilligence

			Metals							
			Arsenic (Total)	Cadmium	Chromium (Total)	Copper	Lead	Mercury (Inorganic)	Nickel	Zinc
			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL			2	0.4	1	1	1	0.05	1	1
NEPC 2013 EIL, EILs Aged Sediment			100		410	214	1116		220	645
NEPC 2013 Soil HIL A			100	20	100	6000	300	40	400	7400
Field_ID	**Date**	**DEPTH (m)**								
BH01	7/07/2014	0.2-0.3	5	<0.4	6.7	12	14	<0.05	9.3	25
BH02	7/07/2014	0.2-0.3	5.2	<0.4	5.4	24	8.9	0.09	6.1	27
BH03	7/07/2014	0-0.1	3.2	<0.4	9.8	16	12	<0.05	8	46
BH04	7/07/2014	0-0.1	4.4	<0.4	7.7	28	21	0.18	10	150
BH05	7/07/2014	0-0.1	3.1	<0.4	11	13	11	<0.05	6	36
BH06	7/07/2014	0-0.1	4	<0.4	9.3	16	14	<0.05	7.8	36
BH07	7/07/2014	0-0.1	7.3	<0.4	13	29	24	<0.05	5	64
BH08	7/07/2014	0-0.1	<2	<0.4	9.3	31	5.4	2	44	46
BH09	7/07/2014	0.2-0.3	6.4	<0.4	9	19	22	4.8	11	53
BH10	7/07/2014	0.2-0.3	9.5	<0.4	12	16	18	<0.05	<5	24
BH11	7/07/2014	0-0.1	3.9	<0.4	13	15	16	<0.05	5.4	42
BH12	7/07/2014	0-0.1	4.9	<0.4	9.4	20	15	<0.05	5.8	62

Table 2: Soil Analytical Results - PAHs
Project Number: 43567
Project Name: SOPA Site 53 Due Dilligence

			Polycyclic Aromatic Hydrocarbons																				
			Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a)pyrene	Benzo(a)pyrene TEQ (lower bound)*	Benzo(a)pyrene TEQ (medium bound)*	Benzo(a)pyrene TEQ (upper bound)*	Benzo(b,j)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene	Carcinogenic PAHs as B(a)P TPE	PAHs (Total)	PAHs (Sum of Total)
			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL			0.1	0.1	0.1	0.1	0.05	0.5	0.5	0.5	0.5	0.1	0.5	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1		0.5	
NEPC 2013 EIL, EILs Aged Sediment																			170					
NEPC 2013 ESL Urban Residential and Public Open Space, Coarse Soil							0.7																	
NEPC 2013 Soil HIL A																						3	300	300
Field_ID	**Date**	**DEPTH (m)**																						
BH01	7/07/2014	0.2-0.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.605	<0.5	5.25
BH02	7/07/2014	0.2-0.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.605	<0.5	5.25
BH03	7/07/2014	0-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.605	<0.5	5.25
BH04	7/07/2014	0-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.605	<0.5	5.25
BH05	7/07/2014	0-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.605	<0.5	5.25
BH06	7/07/2014	0-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.605	<0.5	5.25
BH07	7/07/2014	0-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.605	<0.5	5.25
BH08	7/07/2014	0-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.605	<0.5	5.25
BH09	7/07/2014	0.2-0.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.605	<0.5	5.25
BH10	7/07/2014	0.2-0.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.605	<0.5	5.25
BH11	7/07/2014	0-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.605	<0.5	5.25
BH12	7/07/2014	0-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.605	<0.5	5.25

Table 3: Soil Analytical Results - TRH and BTEX
Project Number: 43567
Project Name: SOPA Site 53 Due Dilligence

			BTEX								TRHs (NEPC 2013)						
			Benzene	Ethylbenzene	Toluene	Xylene (m & p)	Xylene (o)	Xylene (Total)	Xylene (Sum of Total)	BTEX (Sum of Total)	C6-C10 Fraction	>C10-C16 Fraction	>C16-C34 Fraction	>C34-C40 Fraction	C6 - C10 less BTEX (F1)	>C10 - C16 less Naphthalene (F2)	>C10-C40 (Sum of Total)
			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL			0.1	0.1	0.1	0.2	0.1	0.3			20	50	100	100	20	50	
NEPC 2013 ESL Urban Residential and Public Open Space, Coarse Soil			50	70	85			105			180	120	300	2800			
Field_ID	**Date**	**DEPTH (m)**															
BH01	7/07/2014	0.2-0.3	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	0.15	0.3	<20	<50	<100	<100	<20	<50	<250
BH02	7/07/2014	0.2-0.3	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	0.15	0.3	<20	<50	<100	<100	<20	<50	<250
BH03	7/07/2014	0-0.1	<0.1	<0.1	<0.1	0.4	0.2	0.5	0.6	0.75	<20	<50	<100	<100	<20	<50	<250
BH04	7/07/2014	0-0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	0.15	0.3	<20	<50	110	140	<20	<50	<250
BH05	7/07/2014	0-0.1	<0.1	<0.1	<0.1	0.3	0.1	0.4	0.4	0.55	<20	<50	<100	<100	<20	<50	<250
BH06	7/07/2014	0-0.1	<0.1	<0.1	<0.1	0.2	<0.1	<0.3	0.25	0.4	<20	<50	<100	<100	<20	<50	<250
BH07	7/07/2014	0-0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	0.15	0.3	<20	<50	<100	<100	<20	<50	<250
BH08	7/07/2014	0-0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	0.15	0.3	<20	<50	<100	<100	<20	<50	<250
BH09	7/07/2014	0.2-0.3	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	0.15	0.3	<20	<50	<100	<100	<20	<50	<250
BH10	7/07/2014	0.2-0.3	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	0.15	0.3	<20	<50	<100	<100	<20	<50	<250
BH11	7/07/2014	0-0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	0.15	0.3	<20	<50	<100	<100	<20	<50	<250
BH12	7/07/2014	0-0.1	<0.1	<0.1	<0.1	0.2	<0.1	<0.3	0.25	0.4	<20	<50	<100	<100	<20	<50	<250

Table 4: Soil Analytical Results - PCBs
Project Number: 43567
Project Name: SOPA Site 53 Due Dilligence

			Chlorinated Benzenes	Polychlorinated Biphenyls								
			Hexachlorobenzene	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	PCBs (Total)	PCBs (Sum of Total)
			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL			0.05	0.1		0.1	0.1	0.1	0.1	0.1	0.5	
NEPC 2013 Soil HIL A			10								1	1
Field_ID	**Date**	**DEPTH (m)**										
BH01	7/07/2014	0.2-0.3	<0.05	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.5
BH02	7/07/2014	0.2-0.3	<0.05	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.5
BH03	7/07/2014	0-0.1	<0.05	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.5
BH04	7/07/2014	0-0.1	<0.05	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.5
BH05	7/07/2014	0-0.1	<0.05	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.5
BH06	7/07/2014	0-0.1	<0.05	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.5
BH07	7/07/2014	0-0.1	<0.05	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.5
BH08	7/07/2014	0-0.1	<0.05	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.5
BH09	7/07/2014	0.2-0.3	<0.05	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.5
BH10	7/07/2014	0.2-0.3	<0.05	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.5
BH11	7/07/2014	0-0.1	<0.05	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.5
BH12	7/07/2014	0-0.1	<0.05	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.5

Table 5: Soil Analytical Results - OCPs
Project Number: 43567
Project Name: SOPA Site 53 Due Dilligence

			Organochlorine Pesticides																						
			Aldrin	Aldrin + Dieldrin (Sum of Total)	alpha-BHC	beta-BHC	delta-BHC	Chlordane	DDD	DDE	DDT	DDT+DDE+DDD (Sum of Total)	Dieldrin	Endosulfan alpha	Endosulfan beta	Endosulfan Sulphate	Endrin	Endrin aldehyde	Endrin ketone	Heptachlor	Heptachlor Epoxide	Lindane	Methoxychlor	Toxaphene
			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL			0.05		0.05	0.05	0.05	0.1	0.05	0.05	0.05		0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.1	1
NEPC 2013 EIL, EILs Aged Sediment											180													
NEPC 2013 Soil HIL A				6				50				240		270			10			6			300	20
Field_ID	Date	DEPTH (m)																						
BH01	7/07/2014	0.2-0.3	<0.05	0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	0.075	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<1
BH02	7/07/2014	0.2-0.3	<0.05	0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	0.075	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<1
BH03	7/07/2014	0-0.1	<0.05	0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	0.075	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<1
BH04	7/07/2014	0-0.1	<0.05	0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	0.075	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<1
BH05	7/07/2014	0-0.1	<0.05	0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	0.075	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<1
BH06	7/07/2014	0-0.1	<0.05	0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	0.075	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<1
BH07	7/07/2014	0-0.1	<0.05	0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	0.075	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<1
BH08	7/07/2014	0-0.1	<0.05	0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	0.075	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<1
BH08	7/07/2014	0.5-0.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH09	7/07/2014	0.2-0.3	<0.05	0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	0.075	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<1
BH10	7/07/2014	0.2-0.3	<0.05	0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	0.075	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<1
BH11	7/07/2014	0-0.1	<0.05	0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	0.075	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<1
BH12	7/07/2014	0-0.1	<0.05	0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	0.075	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<1

Table 6: Soil Analytical Results - Asbestos
Project number: 43567
Project Name: SOPA Site 53 Due Diligence

			Asbestos
			Asbestos Fibres
			g/kg
EQL			0.10
NEPC 2013 Soil HIL D			0.10
Field_ID	**Date**	**Depth (m)**	
BH01	7/07/2014	0.2-0.3	No asbestos detected
BH02	7/07/2014	0.2-0.3	No asbestos detected
BH03	7/07/2014	0-0.1	No asbestos detected
BH04	7/07/2014	0-0.1	No asbestos detected
BH05	7/07/2014	0-0.1	No asbestos detected
BH06	7/07/2014	0-0.1	No asbestos detected
BH07	7/07/2014	0-0.1	No asbestos detected
BH08	7/07/2014	0-0.1	No asbestos detected
BH09	7/07/2014	0.2-0.3	No asbestos detected
BH10	7/07/2014	0.2-0.3	Chrysotile asbestos fibres detected
BH11	7/07/2014	0-0.1	No asbestos detected
BH12	7/07/2014	0-0.1	No asbestos detected

Table 7 - Water Quality Parameters
Job No: 43567
SOPA Site 53 2 Due Diligence

Well ID	Date Measured	Depth to Water	Dissolved Oxygen	Electrical Conductivity	TDS*	Redox Potential	pH	Temperature	Comments
		m bgs	(mg/L)	(uS/cm)	(mg/L)	(mV)		(oC)	
Groundwater Monitoring									
MW01	10/07/2014	3.369	Well Dry - No post purge water quality parameters						No sheen or odour
MW02	10/07/2014	2.116	0.10	870	367	-268	6.91	17.9	No sheen or odour

Notes:
ID = identification
mg/L = milligrams per litre
L = litres
uS/cm = microsiemen per centimetre
mV = millivolts
^{o}C = degrees Celsius

Note that readings are post purge only.

Table 8: Groundwater Analytical Results
Project Number: 43567
Project Name: SOPA Site 53 Due Dilligence

		Hexachloropropene-1	Trans-iso-safrole	2-Chloronaphthalene	Dibenzofuran	Butylbenzylphthalate	1-Naphthylamine	4-Aminobiphenyl	4-Bromophenylphenylether	p-Dimethylaminoazobenzene	2,6-Dinitrotoluene	2-Naphthylamine	4-Chlorophenylphenylether	Acetophenone	Azobenzene	Carbazole	bis (2-Chloroethoxy) methane
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL		10	10	2	2	2	2		2	2	4	2	2	2	10	10	2
NEPC 2013 Groundwater HSL A and B for Vapour Intrusion - Clay 2 to <4m																	
NEPC 2013 Groundwater HSL A and B for Vapour Intrusion - Clay 4 to <8m																	
Field_ID	**Date**																
MW01	10/07/2014	<10	<10	<10	<10	<10	<10	-	<10	<10	<10	<10	<10	<10	<10	<10	<10
MW02	10/07/2014	<10	<10	<10	<10	<10	<10	-	<10	<10	<10	<10	<10	<10	<10	<10	<10

Table 8: Groundwater Analytical Results
Project Number: 43567
Project Name: SOPA Site 53 Due Dilligence

												Metals & Metalloids					
		Bis (2-chloroethyl) ether	bis-(2-Chloroisopropyl) ether	Diphenylamine	Methapyrilene	N-nitrosodi-n-propylamine	N-nitrosomorpholine	N-nitroso-n-butylamine	N-nitrosopiperidine	Phenacetin	5-Nitro-o-toluidine	Arsenic (Total) (Filtered)	Cadmium (Filtered)	Chromium (Total) (Filtered)	Copper (Filtered)	Lead (Filtered)	Mercury (Inorganic) (Filtered)
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL		10	2	2	10	2	10	2	2	10	10	1	0.1	1	1	1	0.05
NEPC 2013 Groundwater HSL A and B for Vapour Intrusion - Clay 2																	
NEPC 2013 Groundwater HSL A and B for Vapour Intrusion - Clay 4																	
Field_ID	**Date**																
MW01	10/07/2014	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	-	-	-	-	-	-
MW02	10/07/2014	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	3	<0.1	<1	<1	<1	<0.05

Table 8: Groundwater Analytical Results
Project Number: 43567
Project Name: SOPA Site 53 Due Dilligence

				Metallic Inorg	ganic Alcoh	Anilines										
		Nickel (Filtered)	Zinc (Filtered)	Ammonia	Benzyl Alcohol	2-Nitroaniline	3-Nitroaniline	4-Chloroaniline	4-Nitroaniline	Aniline	1,1,1,2-tetrachloroethane	1,1,1-trichloroethane	1,1,2,2-tetrachloroethane	1,1,2-trichloroethane	1,1-dichloroethane	1,2,3-trichloropropane
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL		1	1	5	10	4	10	10	10	2	1	1	1	1	1	1
NEPC 2013 Groundwater HSL A and B for Vapour Intrusion - Clay 2																
NEPC 2013 Groundwater HSL A and B for Vapour Intrusion - Clay 4																
Field_ID	**Date**															
MW01	10/07/2014	-	-	2200	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
MW02	10/07/2014	5	5	320	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10

Table 8: Groundwater Analytical Results
Project Number: 43567
Project Name: SOPA Site 53 Due Dilligence

		Chlorinated Alkanes															
		1,2-dibromo-3-chloropropane	1,2-dichloroethane	1,2-dichloropropane	1,3-dichloropropane	2,2-dichloropropane	bromodichloromethane	Carbon tetrachloride	Chloroform	Chloroethane	Chloromethane	dibromochloromethane	Dichlorodifluoromethane	Dichloromethane	Hexachloroethane	Pentachloroethane	Trichlorofluoromethane
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL		1	1	1	1	1	1	1	1	1	1	1	1		2	10	1
NEPC 2013 Groundwater HSL A and B for Vapour Intrusion - Clay 2																	
NEPC 2013 Groundwater HSL A and B for Vapour Intrusion - Clay 4																	
Field_ID	**Date**																
MW01	10/07/2014	<10	<10	<10	<10	<10	<10	<10	13	<100	<100	<10	<100	-	<10	<10	<100
MW02	10/07/2014	<10	<10	<10	<10	<10	<10	<10	<10	<100	<100	<10	<100	-	<10	<10	<100

Table 8: Groundwater Analytical Results
Project Number: 43567
Project Name: SOPA Site 53 Due Dilligence

		Chlorinated Alkenes											Miscellaneous Hydrocarb				
		1,1,2,2-tetrachloroethylene	1,1-Dichloroethene	1,1-dichloropropene	2-chlorotoluene	4-chlorotoluene	cis-1,2-dichloroethene	cis-1,3-dichloropropene	trans-1,2-dichloroethene	trans-1,3-dichloropropene	Trichloroethene	Vinyl Chloride	1,2-dibromoethane	2-Butanone (MEK)	4-Methyl-2-pentanone (MIBK)	Bromoform	Bromomethane
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL		1	1	1	1	1	1	1	1	1	1	1	1			1	1
NEPC 2013 Groundwater HSL A and B for Vapour Intrusion - Clay 2																	
NEPC 2013 Groundwater HSL A and B for Vapour Intrusion - Clay 4																	
Field_ID	**Date**																
MW01	10/07/2014	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<100	<10	-	-	<10	<100
MW02	10/07/2014	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<100	<10	-	-	<10	<100

Table 8: Groundwater Analytical Results
Project Number: 43567
Project Name: SOPA Site 53 Due Dilligence

		ons		Monocyclic Aromatic Hydrocarbons															
		Cyclohexane	Dibromomethane	1,2,4-trimethyl benzene	1,3,5-trimethyl benzene	4-isopropyl toluene	Bromobenzene	isopropylbenzene	n-butyl benzene	n-propyl benzene	sec-butyl benzene	styrene	tert-butyl benzene	2-Methylnaphthalene	3-Methylcholanthrene	7.12-Dimethylbenz(a)anthracene	Acenaphthene
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	ug/L	ug/L	ug/L	µg/L
EQL		1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	1
NEPC 2013 Groundwater HSL A and B for Vapour Intrusion - Clay 2																	
NEPC 2013 Groundwater HSL A and B for Vapour Intrusion - Clay 4																	
Field_ID	**Date**																
MW01	10/07/2014	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	10	<10	<10	<10
MW02	10/07/2014	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10

Table 8: Groundwater Analytical Results
Project Number: 43567
Project Name: SOPA Site 53 Due Dilligence

		Polycyclic Aromatic Hydrocarbons															
		Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(b,j)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Carcinogenic PAHs as B(a)P TPE	N-2-Fluorenyl Acetamide	Naphthalene
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	ug/l	ug/L	µg/L
EQL		1	1	1	1	10		1	1	1	1	1	1	1		10	1
NEPC 2013 Groundwater HSL A and B for Vapour Intrusion - Clay 2																	
NEPC 2013 Groundwater HSL A and B for Vapour Intrusion - Clay 4																	
Field_ID	**Date**																
MW01	10/07/2014	<10	<10	<10	<10	<10	-	<10	<10	<10	<10	<10	<10	<10	11.6	<10	<10
MW02	10/07/2014	<10	<10	<10	<10	<10	-	<10	<10	<10	<10	<10	<10	<10	11.6	<10	<10

Table 8: Groundwater Analytical Results
Project Number: 43567
Project Name: SOPA Site 53 Due Dilligence

					BTEX								TR		
		Phenanthrene	Pyrene	PAHs (Sum of Total)	Benzene	Ethylbenzene	BTEX (Sum of Total)	Toluene	Xylene (m & p)	Xylene (o)	Xylene (Total)	Xylene (Sum of Total)	>C10-C16 Fraction	>C16-C34 Fraction	>C34-C40 Fraction
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL		1	1		1	1		1	2	1			50	100	100
NEPC 2013 Groundwater HSL A and B for Vapour Intrusion - Clay 2					0.8										
NEPC 2013 Groundwater HSL A and B for Vapour Intrusion - Clay 4					0.8										
Field_ID	**Date**														
MW01	10/07/2014	<10	<10	80	<10	<10	30	<10	<20	<10	-	15	870	1100	<200
MW02	10/07/2014	<10	<10	80	<10	<10	30	<10	<20	<10	-	15	53	130	<100

Table 8: Groundwater Analytical Results
Project Number: 43567
Project Name: SOPA Site 53 Due Dilligence

		Hs (NEPC 2013)				Nitrobenzenes			Nitrotoluenes	Chlorinated Benzenes					
		>C10 - C16 less Naphthalene (F2)	>C10-C40 (Sum of Total)	C6-C10 Fraction	C6 - C10 less BTEX (F1)	1,3-dinitrobenzene	Nitrobenzene	pentachloronitrobenzene	2,4-dinitrotoluene	1,2,3-trichlorobenzene	1,2,4,5-tetrachlorobenzene	1,2,4-trichlorobenzene	1,2-Dichlorobenzene	1,3-dichlorobenzene	1,4-dichlorobenzene
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL				10		10	2	2		1	2	1	1	1	1
NEPC 2013 Groundwater HSL A and B for Vapour Intrusion - Clay 2		999999000			999999000										
NEPC 2013 Groundwater HSL A and B for Vapour Intrusion - Clay 4		999999000			999999000										
Field_ID	**Date**														
MW01	10/07/2014	-	2070	<100	-	<10	<10	<10	-	<10	<10	<10	<10	<10	<10
MW02	10/07/2014	-	233	<100	-	<10	<10	<10	-	<10	<10	<10	<10	<10	<10

Table 8: Groundwater Analytical Results
Project Number: 43567
Project Name: SOPA Site 53 Due Dilligence

				Phenols													
		Hexachlorobenzene	Pentachlorobenzene	2,3,4,6-tetrachlorophenol	2,4,5-trichlorophenol	2,4,6-trichlorophenol	2,4-dichlorophenol	2,4-dimethylphenol	2,4-dinitrophenol	2,6-dichlorophenol	2-chlorophenol	2-Methylphenol	2-nitrophenol	3- & 4-Methylphenol	4-Chloro-3-Methylphenol	4-nitrophenol	Phenol
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL		2	2	2	2	2	2	2	100	2	2	2	2	4		2	2
NEPC 2013 Groundwater HSL A and B for Vapour Intrusion - Clay 2																	
NEPC 2013 Groundwater HSL A and B for Vapour Intrusion - Clay 4																	
Field_ID	**Date**																
MW01	10/07/2014	<10	<10	<10	<10	<10	<10	<10	<100	<10	<10	<10	<10	<20	-	<100	<10
MW02	10/07/2014	<10	<10	<10	<10	<10	<10	<10	<100	<10	<10	<10	<10	<20	-	<100	<10

Table 8: Groundwater Analytical Results
Project Number: 43567
Project Name: SOPA Site 53 Due Dilligence

		Organic Sulfur Compounds	Phthalates					laneous Industrial Che					
		Carbon disulfide	Di(2-ethylhexy) phthalate	Dibutyl phthalate	Diethyl phthalate	Dimethyl phthalate	di-n-octylphthalate	Hexachlorobutadiene	Hexachlorocyclopentadiene	Isophorone	Aldrin	Aldrin + Dieldrin (Sum of Total)	alpha-BHC
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL			10	2	2	2	2	1	4	10	2		2
NEPC 2013 Groundwater HSL A and B for Vapour Intrusion - Clay 2													
NEPC 2013 Groundwater HSL A and B for Vapour Intrusion - Clay 4													
Field_ID	**Date**												
MW01	10/07/2014	-	42	<10	<10	<10	<10	<10	<10	<10	<10	10	<10
MW02	10/07/2014	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	10	<10

Table 8: Groundwater Analytical Results
Project Number: 43567
Project Name: SOPA Site 53 Due Dilligence

		Organochlorine Pesticides															
		alpha-Chlordane	beta-BHC	delta-BHC	DDD	DDE	gamma-Chlordane	DDT	DDT+DDE+DDD (Sum of Total)	Dieldrin	Endosulfan alpha	Endosulfan beta	Endosulfan Sulphate	Endrin	Endrin aldehyde	Endrin ketone	Heptachlor
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL		10	2	2	2	2	10	4		2	2	2	2	2	2		2
NEPC 2013 Groundwater HSL A and B for Vapour Intrusion - Clay 2																	
NEPC 2013 Groundwater HSL A and B for Vapour Intrusion - Clay 4																	
Field_ID	**Date**																
MW01	10/07/2014	<10	<10	<10	<10	<10	<10	<10	15	<10	<10	<10	<10	<10	<10	-	<10
MW02	10/07/2014	<10	<10	<10	<10	<10	<10	<10	15	<10	<10	<10	<10	<10	<10	-	<10

Table 8: Groundwater Analytical Results
Project Number: 43567
Project Name: SOPA Site 53 Due Dilligence

						Organophosphorus Pesticides		Herbicides & Fungicides	
		Heptachlor Epoxide	Lindane	Methoxychlor	Pentachlorophenol	Ethylmethanesulfonate	Safrole	Dinitro-o-cresol	Dinoseb
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL		2	2		10	10	10	100	10
NEPC 2013 Groundwater HSL A and B for Vapour Intrusion - Clay 2									
NEPC 2013 Groundwater HSL A and B for Vapour Intrusion - Clay 4									
Field_ID	**Date**								
MW01	10/07/2014	<10	<10	-	<100	<10	<10	<100	<10
MW02	10/07/2014	<10	<10	-	<100	<10	<10	<100	<10

Appendix A - Site Photograph Log

Photograph 1: Fence along the northern side of the car park area.

Photograph 2: Northern side of Building one with suspected asbestos eaves

Photograph 3: Southern side of Building one with suspected asbestos eaves and third level containing the air-conditioning units.

Photograph 4: Suspected asbestos eaves on the western side of Building one

Photograph 5: Suspected asbestos eaves on the southern side of Building one

Photograph 6: Northern side of Building two showing height difference between Building one and two.

Source:
Site inspection completed 7.07.2014

0	Original Issue -	R01	7.07.2014
Rev	Description	Drn.	Date

JBS&G

Appendix: Photograph Log

Client: Mirvac Developments

Project: Due Diligence SOPA Site 53

Job No: 43567 File Name: Photographic Log

Photograph 7: Western side of Building two showing the loading dock

Photograph 8: Roof of the loading dock on the western side of Building one

Photograph 9: Car park cover on the southern side of Building two

Photograph 10: Suspected asbestos sheeting on the northern side of Building two

Photograph 11: Northern side of Building three, housing the transformer for the site

Photograph 12: Southern side of Building three and automatic gate.

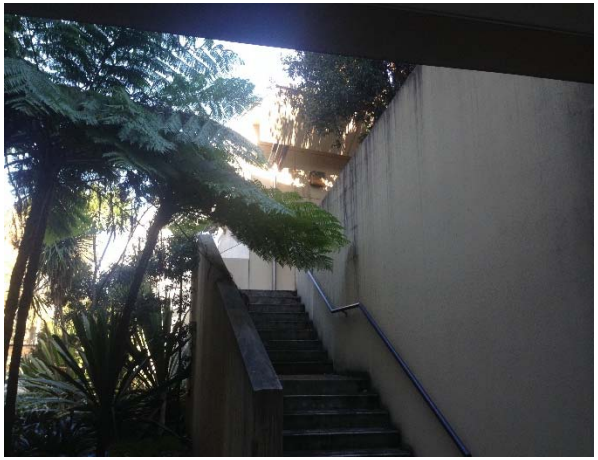
Source: Site inspection completed 7.07.2014			
0	Original Issue -	R01	7.07.2014
Rev	Description	Drn.	Date

JBS&G **Appendix: Photograph Log**

Client: Mirvac Developments

Project: Due Diligence SOPA Site 53

Job No: 43567 File Name: Photographic Log



Photograph 13: Concrete stairs connecting the upper Building on level and the lower Building two level

Photograph 14: Western side of Building one with suspected asbestos sheeting

Photograph 15: Garden area between southern portion of Building one and two showing location of BH10

Photograph 16: North western boundary facing south and showing the location of BH12

Photograph 17: Location of BH02 in the south western corner

Photograph 18: Location of BH03 in the garden bed in the south western portion of the car park

Source:
Site inspection completed 7.07.2014

0	Original Issue -	R01	7.07.2014
Rev	Description	Drn.	Date

JBS&G

Appendix: Photograph Log

Client: Mirvac Developments

Project: Due Diligence SOPA Site 53

Job No: 43567 File Name: Photographic Log

Photograph 19: Location of BH08 within the landscaped area between Building one and two

Photograph 20: Location of BH11 within the garden beds on the northern side of Building one

Photograph 21: Three shipping containers along the southern boundary of the site

Source:
Site inspection completed 7.07.2014

0	Original Issue -	R01	7.07.2014
Rev	Description	Drn.	Date

Appendix: Photograph Log

Client: Mirvac Developments

Project: Due Diligence SOPA Site 53

Job No: 43567 File Name: Photographic Log

Appendix B - Groundwater Bore Records

Groundwater Works Summary

For information on the meaning of fields please see Glossary
Document Generated on Tuesday, July 1, 2014

Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW102550

Works Details (top)

GROUNDWATER NUMBER	GW102550
LIC-NUM	10BL157703
AUTHORISED-PURPOSES	MONITORING BORE
INTENDED-PURPOSES	MONITORING BORE
WORK-TYPE	Bore
WORK-STATUS	(Unknown)
CONSTRUCTION-METHOD	
OWNER-TYPE	
COMMENCE-DATE	
COMPLETION-DATE	1996-01-01
FINAL-DEPTH (metres)	4.00
DRILLED-DEPTH (metres)	
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	N/A
GWMA	-
GW-ZONE	-
STANDING-WATER-LEVEL	1.80
SALINITY	
YIELD	

Site Details (top)

REGION	10 - SYDNEY SOUTH COAST
RIVER-BASIN	
AREA-DISTRICT	
CMA-MAP	
GRID-ZONE	
SCALE	
ELEVATION	
ELEVATION-SOURCE	
NORTHING	6253109.00
EASTING	322033.00
LATITUDE	33 50' 50"
LONGITUDE	151 4' 35"
GS-MAP	

AMG-ZONE	56
COORD-SOURCE	
REMARK	

Form-A (top)

no details

Licensed (top)

COUNTY	CUMBERLAND
PARISH	CONCORD
PORTION-LOT-DP	LOTS 2,6&7 DP740600

Construction (top)

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;
ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1		Hole	Hole	0.00	4.00				
1	1	Casing	P.V.C.	0.00	0.00	50			

Water Bearing Zones (top)

no details

Drillers Log (top)

no details

Groundwater Works Summary

For information on the meaning of fields please see Glossary
Document Generated on Tuesday, July 1, 2014

Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW102553

Works Details (top)

GROUNDWATER NUMBER	GW102553
LIC-NUM	10BL157703
AUTHORISED-PURPOSES	MONITORING BORE
INTENDED-PURPOSES	MONITORING BORE
WORK-TYPE	Bore
WORK-STATUS	(Unknown)
CONSTRUCTION-METHOD	
OWNER-TYPE	
COMMENCE-DATE	
COMPLETION-DATE	1996-01-01
FINAL-DEPTH (metres)	4.00
DRILLED-DEPTH (metres)	
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	N/A
GWMA	-
GW-ZONE	-
STANDING-WATER-LEVEL	1.83
SALINITY	
YIELD	

Site Details (top)

REGION	10 - SYDNEY SOUTH COAST
RIVER-BASIN	
AREA-DISTRICT	
CMA-MAP	
GRID-ZONE	
SCALE	
ELEVATION	
ELEVATION-SOURCE	
NORTHING	6253267.00
EASTING	322210.00
LATITUDE	33 50' 45"
LONGITUDE	151 4' 42"
GS-MAP	

AMG-ZONE	56
COORD-SOURCE	
REMARK	

Form-A (top)

no details

Licensed (top)

COUNTY	CUMBERLAND
PARISH	CONCORD
PORTION-LOT-DP	LOTS 2,6&7 DP740600

Construction (top)

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;
ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1		Hole	Hole	0.00	4.00				
1	1	Casing	P.V.C.	0.00	0.00	50			

Water Bearing Zones (top)

no details

Drillers Log (top)

no details

Groundwater Works Summary

For information on the meaning of fields please see Glossary
Document Generated on Tuesday, July 1, 2014

Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW102554

Works Details (top)

GROUNDWATER NUMBER	GW102554
LIC-NUM	10BL157703
AUTHORISED-PURPOSES	MONITORING BORE
INTENDED-PURPOSES	MONITORING BORE
WORK-TYPE	Bore
WORK-STATUS	(Unknown)
CONSTRUCTION-METHOD	
OWNER-TYPE	
COMMENCE-DATE	
COMPLETION-DATE	1996-01-01
FINAL-DEPTH (metres)	4.00
DRILLED-DEPTH (metres)	
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	N/A
GWMA	-
GW-ZONE	-
STANDING-WATER-LEVEL	1.83
SALINITY	
YIELD	

Site Details (top)

REGION	10 - SYDNEY SOUTH COAST
RIVER-BASIN	
AREA-DISTRICT	
CMA-MAP	
GRID-ZONE	
SCALE	
ELEVATION	
ELEVATION-SOURCE	
NORTHING	6253239.00
EASTING	322365.00
LATITUDE	33 50' 46"
LONGITUDE	151 4' 48"
GS-MAP	

AMG-ZONE	56
COORD-SOURCE	
REMARK	

Form-A (top)

no details

Licensed (top)

COUNTY	CUMBERLAND
PARISH	CONCORD
PORTION-LOT-DP	LOTS 2,6&7 DP740600

Construction (top)

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;
ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1		Hole	Hole	0.00	4.00				
1	1	Casing	P.V.C.	0.00	0.00	50			

Water Bearing Zones (top)

no details

Drillers Log (top)

no details

Groundwater Works Summary

For information on the meaning of fields please see Glossary
Document Generated on Tuesday, July 1, 2014

Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW102555

Works Details (top)

GROUNDWATER NUMBER	GW102555
LIC-NUM	10BL157703
AUTHORISED-PURPOSES	MONITORING BORE
INTENDED-PURPOSES	MONITORING BORE
WORK-TYPE	Bore
WORK-STATUS	(Unknown)
CONSTRUCTION-METHOD	
OWNER-TYPE	
COMMENCE-DATE	
COMPLETION-DATE	1996-01-01
FINAL-DEPTH (metres)	4.00
DRILLED-DEPTH (metres)	
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	N/A
GWMA	-
GW-ZONE	-
STANDING-WATER-LEVEL	1.83
SALINITY	
YIELD	

Site Details (top)

REGION	10 - SYDNEY SOUTH COAST
RIVER-BASIN	
AREA-DISTRICT	
CMA-MAP	
GRID-ZONE	
SCALE	
ELEVATION	
ELEVATION-SOURCE	
NORTHING	6253143.00
EASTING	322187.00
LATITUDE	33 50' 49"
LONGITUDE	151 4' 41"
GS-MAP	

AMG-ZONE	56
COORD-SOURCE	
REMARK	

Form-A (top)

no details

Licensed (top)

COUNTY	CUMBERLAND
PARISH	CONCORD
PORTION-LOT-DP	LOTS 2,6&7 DP740600

Construction (top)

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;
ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1		Hole	Hole	0.00	4.00				
1	1	Casing	P.V.C.	0.00	0.00	50			

Water Bearing Zones (top)

no details

Drillers Log (top)

no details

Groundwater Works Summary

For information on the meaning of fields please see Glossary
Document Generated on Tuesday, July 1, 2014

Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW102556

Works Details (top)

GROUNDWATER NUMBER	GW102556
LIC-NUM	10BL157703
AUTHORISED-PURPOSES	MONITORING BORE
INTENDED-PURPOSES	MONITORING BORE
WORK-TYPE	Bore
WORK-STATUS	(Unknown)
CONSTRUCTION-METHOD	
OWNER-TYPE	
COMMENCE-DATE	
COMPLETION-DATE	1996-01-01
FINAL-DEPTH (metres)	4.00
DRILLED-DEPTH (metres)	
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	N/A
GWMA	-
GW-ZONE	-
STANDING-WATER-LEVEL	1.83
SALINITY	
YIELD	

Site Details (top)

REGION	10 - SYDNEY SOUTH COAST
RIVER-BASIN	
AREA-DISTRICT	
CMA-MAP	
GRID-ZONE	
SCALE	
ELEVATION	
ELEVATION-SOURCE	
NORTHING	6252900.00
EASTING	322371.00
LATITUDE	33 50' 57"
LONGITUDE	151 4' 48"
GS-MAP	

AMG-ZONE	56
COORD-SOURCE	
REMARK	

Form-A (top)

no details

Licensed (top)

COUNTY	CUMBERLAND
PARISH	CONCORD
PORTION-LOT-DP	LOTS 2,6&7 DP740600

Construction (top)

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;
ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1		Hole	Hole	0.00	4.00				
1	1	Casing	P.V.C.	0.00	0.00	50			

Water Bearing Zones (top)

no details

Drillers Log (top)

no details
