Dr Upsilon Environments Pty Ltd
ABN: 91 647 732 518
Phone: 0406 201 136
Email: Jeffrey.yu@DrUpsilonGroup.com
PO Box 289, 12 Gardeners Road, Kingsford, NSW
Web: www.DrUpsilonGroup.com

Preliminary Site Investigation and Assessment Report

Prepared for	Tim Murphy LandTeam Australia Pty Ltd
Site	**292 Rosemont Road, Boxers Creek, NSW**
Prepared by	Jeffrey Yu Principal Environmental Consultant CEnvP Licenced Asbestos Assessor PhD (EnvEng), PhD (MediChem)
Date of field work	27/11/2021; 01/12/2021
Reference No.	JDRYU050_2021_PSI

14th December 2021

Dr Upsilon Environments Pty Ltd
ABN: 91 647 732 518
Phone: 0406 201 136
Email: jeffrey.yu@DrUpsilonGroup.com
PO Box 289, 12 Gardeners Road, Kingsford, NSW
Web: www.DrUpsilonGroup.com

DR UPSILON ENVIRONMENTS PTY LTD
ABN 91 647 732 518
PO Box 289, Kingsford, NSW
Phone: 0406 201 136
Email: jeffrey.yu@DrUpsilonGroup.com
Web: www.DrUpsilonGroup.com

DOCUMENT STATUS		
Version	**Author**	**Date**
1	Dr. Jeffrey Yu	14.12.2021

DOCUMENT DISTRIBUTION				
Version	**Status**	**Format**	**Issued to**	**Date**
1	Final	Electronic	Tim Murphy	14.12.2021

Dr Upsilon Environments Pty Ltd
ABN: 91 647 732 518
Phone: 0406 201 136
Email: Jeffrey.yu@DrUpsilonGroup.com
PO Box 289, 12 Gardeners Road, Kingsford, NSW
Web: www.DrUpsilonGroup.com

Contents

Dr Upsilon Environments Pty Ltd
ABN: 91 647 732 518
Phone: 0406 201 136
Email: Jeffrey.yu@DrUpsilonGroup.com
PO Box 289, 12 Gardeners Road, Kingsford, NSW
Web: www.DrUpsilonGroup.com

Tables

Figures

Dr Upsilon Environments Pty Ltd
ABN: 91 647 732 518
Phone: 0406 201 136
Email: Jeffrey.yu@DrUpsilonGroup.com
PO Box 289, 12 Gardeners Road, Kingsford, NSW
Web: www.DrUpsilonGroup.com

Abbreviations

ACM	Asbestos Containing Material
AEC	Area of Environmental Concern
AHD	Australian Height Datum
AMP	Asbestos Management Plan
ASC NEPM	National Environment Protection (Assessment of Site Contamination) Measure
ASS	Acid Sulfate Soils
BGS	Below ground surface
BTEX	Benzene, Toluene, Ethylbenzene and Xylenes
COPC	Contaminant of Potential Concern
Council	Goulburn Mulwaree Council
CSM	Conceptual Site Model
DA	Development Application
DQI	Data Quality Indicator
DQO	Data Quality Objective
DSI	Detailed Site Investigation
EIL	Ecological Investigation Level
ESL	Ecological Screening Level
EP&A	Environmental Planning and Assessment
DRYU	Dr Upsilon Environments Pty Ltd
HIL	Health Investigation Level
HSL	Health Screening Level
IL	Investigation Level
LOR	Limit of Reporting
NATA	National Association of Testing Authorities, Australia
NEPC	National Environment Protection Council
NSW EPA	Environment Protection Authority of New South Wales
NSW OEH	Office of Environment and Heritage of New South Wales
OCP	Organochlorine Pesticide
PAH	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyl
PPE	Personal Protective Equipment
QA	Quality Assurance
QC	Quality Control

Dr Upsilon Environments Pty Ltd
ABN: 91 647 732 518
Phone: 0406 201 136
Email: Jeffrey.yu@DrUpsilonGroup.com
PO Box 289, 12 Gardeners Road, Kingsford, NSW
Web: www.DrUpsilonGroup.com

RAP	Remediation Action Plan
RPD	Relative Percent Difference
SEPP	State Environmental Planning Policy
SWMS	Safe Work Method Statement
TRH	Total Recoverable Hydrocarbon
PFAS	Per- and Polyfluoroalkyl Substances
VENM	Virgin Excavated Natural Material

Dr Upsilon Environments Pty Ltd
ABN: 91 647 732 518
Phone: 0406 201 136
Email: Jeffrey.yu@DrUpsilonGroup.com
PO Box 289, 12 Gardeners Road, Kingsford, NSW
Web: www.DrUpsilonGroup.com

Executive Summary

This report presents the findings of a Preliminary Soil Characterisation and Assessment Report undertaken by Dr Upsilon Environments Pty Ltd ("**DRYU**") for the proposed development regarding subdivision (approximately 32.6 ha) at 292 Rosemont Road, Boxers Creek, NSW ("**The Site**").

Dr Upsilon Environments understands that the soils in the proposed area of the site will or likely to be disturbed, disposed off-site and/or managed on site for proposed construction of roads, transline and residential in the future.

The assessment report is required to provide a sufficient level of data for the Client to assess the potential soil contamination and quantify the required remediation work on the site (if necessary) to assist with the development application for this project only.

The objectives of the preliminary soil contamination investigation and assessment were to:

- Assess the potential for contamination to exist at the Site, as a result of historical and current Site activities;
- Assess the presence of contamination in soils at accessible areas across the Site;
- Assess the extent and nature of asbestos and other contaminants throughout the soil profile at the location of the Site;
- Identify Areas of Environmental Concern ("**AECs**") and Chemicals of Potential Concern ("**COPCs**") for the Site, and develop a preliminary Conceptual Site Model ("**CSM**") for the Site (if contamination exist);
- Assess the suitability of the Site for the proposed land use (from a contamination viewpoint); and
- Provide recommendations for further assessments, remediation and/or management, as required.

In order to meet the Client's development consent, DRYU proposes to provide the Client with the following environmental consulting services (the "**Services**") (Groundwater investigation was out of the scope of work):

- Review of planning and regulatory requirements;
- Review of the proposed development plan;
- Limited Desktop Review of historical site records, and aerial photographs (where available), publicly available data and web-based information searches, background information relevant to the study area, survey data, and topography;
- Conduct field and laboratory investigations;
- Assess NATA accredited laboratory results;
- Prepare a preliminary site contamination investigation and assessment report. This PSI report presents the results of the contamination assessment, identifies areas where contamination was found to be present and discusses the soil sample analytical results including extent and severity of contamination if exists;
- Provide recommendations for additional investigation, remediation and/or management, if required.

Dr Upsilon Environments Pty Ltd
ABN: 91 647 732 518
Phone: 0406 201 136
Email: Jeffrey.yu@DrUpsilonGroup.com
PO Box 289, 12 Gardeners Road, Kingsford, NSW
Web: www.DrUpsilonGroup.com

Based on the findings of this preliminary PSI report, DRYU concludes the following:

Limited Site History Review

- No visible ACM sheeting fragments were observed throughout the Site.
- No building rubbles were observed on soil surfaces.
- No vegetation stress was observed.
- No visible evidence of odour and staining was identified at the time of the inspection.
- No stored chemicals/drums were identified at the time of the inspection.
- Historical aerial photography indicated from 1975 to present, there were no major landscape change at the Site as a residential and farm infrastructure area.
- No residential redevelopments were identified in the close proximity in the past several years.
- A review of the NSW EPA records indicates there was **none** of properties located wither within close proximity to the Site or on the site listed as having contamination notices, orders or under management.

Conclusions and Subject accessible soils of the Site:

- Review of the analytical results for samples collected for the preliminary soil characterisation indicates concentrations of the tested potential chemicals of environmental concern including Heavy Metals – Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Nickel and Zinc (Heavy Metals), Total Recoverable Hydrocarbons (TRHs), Benzene, Toluene, Ethylbenzene, and Xylene (BTEX), Polycyclic Aromatic Hydrocarbons (PAHs), Organophosphorus Pesticides (OPPs), Organochlorine Pesticides (OCPs), Polychlorinated Biphenyl (PCBs) were either below the NEPC (2013) NEPM land use guidelines for Residential A land use (HIL-A/HSL-A) or not detected above the laboratory limit of reporting.
- Review of the analytical results for samples collected for the preliminary soil characterisation indicates concentrations of the tested potential chemicals of environmental concern were either below the NEPC (2013) NEPM land use guidelines for Residential A land use (EIL/ESL) or not detected above the laboratory limit of reporting.
- Review of the analytical results for samples collected for the preliminary soil characterisation indicates concentrations of the tested potential chemicals of environmental concern of TRHs were either below the Management Limits or not detected above the laboratory limit of reporting.

Therefore, based on the results of the preliminary investigation, DRYU is of the opinion that the subject soils are considered suitable for inclusion within the development from a contamination perspective only, subject to the proper implementation of recommendations as follows.

Recommendations

DRYU recommends that:

- NO additional investigation and assessment were considered to be warranted.
- Should unexpected finds such as asbestos containing material or any other contaminating features such as buried waste, staining or odours be encountered during disposal, relocation and/or placement of the material, further assessment will be required to re-assess the suitability for off-site disposal or on-site reuse based on further waste classification reports.

Dr Upsilon Environments Pty Ltd
ABN: 91 647 732 518
Phone: 0406 201 136
Email: Jeffrey.yu@DrUpsilonGroup.com
PO Box 289, 12 Gardeners Road, Kingsford, NSW
Web: www.DrUpsilonGroup.com

This report is based on a limited sampling and testing regime. It is possible that acid sulphate soils and differing ground conditions may be present between sampling locations, or in the remainder of the site not intrusively investigated. If more layers or horizons of soils (more than 1 m below ground surface) encountered during the deep excavation (i.e., over ~1 m below ground surface), a contingency plan for soils should be prepared to address pockets of acid sulfate soils or other contaminants of environmental concern (if exist; or if soil disturbances happen) that could potentially be encountered during site works.

Dr Upsilon Environments Pty Ltd
ABN: 91 647 732 518
Phone: 0406 201 136
Email: Jeffrey.yu@DrUpsilonGroup.com
PO Box 289, 12 Gardeners Road, Kingsford, NSW
Web: www.DrUpsilonGroup.com

1 Introduction

1.1 General

Dr Upsilon Environments Pty Ltd ("**DRYU**") was engaged by Tim Murphy from LandTeam Australia Pty Ltd ("**The Client**") to perform a preliminary soil characterisation and assessment for the proposed development subdivision (approximately 32.6 ha) at 292 Rosemont Road, Boxers Creek, NSW ("**The Site**").

The client provided DRYU with Plan of Proposed Subdivision with (i) aerial underlay, (ii) 1m contours underlay, (iii) 10m contours underlay, and (iv) location plan on 17th November, 2021.

It is understood that the Client proposes the land use is still a Residential A setting with small farms. Dr Upsilon Environments understands that the soil along areas of concern, will or likely be disturbed, disposed off-site, reuse on site and/or managed on site for Residential A and small farm land use.

The assessment report was required to provide a sufficient level of data for the Client to assess the potential soil contamination to assist with the development application for the project.

On the basis of the initial walkover and limited site information, DRYU proposes that the Site could be made suitable for the proposed development subject to preparation of a preliminary site investigation and assessment report ("**PSI**") in order to meet development condition requirements and to comply with relevant regulations.

1.2 Objectives

The objectives of the preliminary soil contamination investigation and assessment were to:

- Assess the potential for contamination to exist at the Site, as a result of historical and current Site activities;
- Assess the presence of contamination in soils at accessible areas across the Site;
- Assess the extent and nature of asbestos and other contaminants throughout the soil profile at the location of the Site;
- Identify Areas of Environmental Concern ("**AECs**") and Chemicals of Potential Concern ("**COPCs**") for the Site, and develop a preliminary Conceptual Site Model ("**CSM**") for the Site (if contamination exist);
- Assess the suitability of the Site for the proposed land use (from a contamination viewpoint); and
- Provide recommendations for further assessments, remediation and/or management, as required.

1.3 Scope of Work

In order to meet the Client's development consent, DRYU proposes to provide the Client with the following environmental consulting services (the "**Services**") (Groundwater investigation was out of the scope of work):

- Review of planning and regulatory requirements;
- Review of the proposed development plan;
- Limited Desktop Review of historical site records, and aerial photographs (where available), publicly available data and web-based information searches, background information relevant to the study area, survey data, and topography;
- Conduct field and laboratory investigations;
- Assess NATA accredited laboratory results;

Dr Upsilon Environments Pty Ltd
ABN: 91 647 732 518
Phone: 0406 201 136
Email: Jeffrey.yu@DrUpsilonGroup.com
PO Box 289, 12 Gardeners Road, Kingsford, NSW
Web: www.DrUpsilonGroup.com

- Prepare a preliminary site contamination investigation and assessment report. This PSI report presents the results of the contamination assessment, identifies areas where contamination was found to be present and discusses the soil sample analytical results including extent and severity of contamination if exists;
- Provide recommendations for additional investigation, remediation and/or management, if required.

2 Site Description

2.1 Site Location and Identification

General Site details are included below in Table 1, Figure 1 and Appendix 2 – Site Layout and Sampling Locations.

Table 1 Site Details

Item	Description
Site Address:	The Site is located at 292 Rosemont Road, Boxers Creek, NSW
Approximate Site Area:	Approximately 32.6 ha (the required investigation area of environmental concern by the Client).
Site Identification Details:	The Site locates on Lots 117 & 118, DP 126140
Zoning:	RU6: Transition
Current Land Use:	The Site is currently used as Grazing modified pastures.
Future Land Use:	The Site is going to be used as Residential A with small farms
Surrounding Land Uses:	• Rural residential without agriculture to the south • Roads to the north • Two small creeks run through the middle section of the site • Grazing modified pastures to the west and east
Site Co-ordinates:	The approximate centre of the site is located at approximately 203853.879 (E), 6146189.531 (N) (GDA 94, MGA Zone 56)

2.2 Site Features

The site is predominantly covered by lush vegetation. The Site is slightly slopes toward the middle section with two creeks.

Dr Upsilon Environments Pty Ltd
ABN: 91 647 732 518
Phone: 0406 201 136
Email: Jeffrey.yu@DrUpsilonGroup.com
PO Box 289, 12 Gardeners Road, Kingsford, NSW
Web: www.DrUpsilonGroup.com

Figure 1 The site with lush vegetation facing north-east

2.3 Site Topography and Drainage

Reference to the 1 metre resolution digital elevation model metadata from Spatial Services (https://six.nsw.gov.au/), the Site is crossed by a bipartite wadi from west to east of about 656 m Australian Height Datum ("AHD"). A tarn is situated in the north of the waterway. From the waterway, the land slightly slopes to 677 m AHD to the north, and steeply goes up to about 675 m to the south-east.

2.4 Regional Geology and Soils

Reference to the eSPADE v2.1 (https://www.environment.nsw.gov.au/eSpade2Webapp#) from Office of Environment and Heritage NSW dataset information, the Site is situated in the Bullamalita landscape.

Bullamalita soil landscape (SI5512bl) indicates the Site is composed of commonly acid to neutral yellow duplex soils, occur on lower sideslopes, footslopes and drainage lines. Red Podzolic Soils are found on upper slopes whilst Yellow Solodic Soils and Alluvial Soils occur in some drainage lines. Some sequences of the Towrang Beds and Undifferentiated Silurian sediments. Includes sediments and volcanics. Soils have formed *in situ* and from alluvial-colluvial material derived from the parent rock.

2.5 Regional Hydrogeology and Water Course

According to the Hydrogeological landscapes map from eSPADE v2.1 (https://www.environment.nsw.gov.au/eSpade2Webapp#), the Site is mostly attributed to In the Gundary HGL, soils are generally Red Kandosol/Kurosol intergrades (Red Earth/Red Podzolic intergrades) and Leptic Tenosols (Lithosols) on exposed ridgelines, crests and some upper slopes; Red Chromosols (Red Podzolic Soils) on iron rich substrate; Red Kurosols (Red Podzolic Soils) on well drained slopes; Brown Chromosols (Soloths), Yellow/Brown Kurosols (Yellow Podzolic Soils) on long and gentle slopes; Yellow and Brown Chromosols and Kurosols (Soloths) on lower slopes and drainage lines. On the crests and ridgelines soils have minimal pedological organisation, lack strong texture contrast between A- and B-horizons and are acidic. Elsewhere soils tend to be strongly texture contrast, strongly acidic and sodic at

Dr Upsilon Environments Pty Ltd
ABN: 91 647 732 518
Phone: 0406 201 136
Email: Jeffrey.yu@DrUpsilonGroup.com
PO Box 289, 12 Gardeners Road, Kingsford, NSW
Web: www.DrUpsilonGroup.com

depth. Aquifers in this HGL are unconfined to semi-confined with flow along structures (bedding, joints, faults) in the fractured bedrock and saprolite. Flow also occurs through connected pore spaces in sandstone and conglomerate layers (dual porosity). Minor lateral flow occurs through colluvial and alluvial sediments on slopes and plains. Recharge to groundwater is moderate. Groundwater systems are local to intermediate with short to intermediate flow lengths and are loosely defined by topographic catchments. Intermediate groundwater systems may be associated with larger scale structures (folds and faults).

According to the latest groundwater site details from WaterNSW (https://realtimedata.waternsw.com.au/), groundwater level near the Site is 6 m at GW105702 (08/06/2003) and 43 m at GW112388 (11/10/2012) as shown Figure 2.

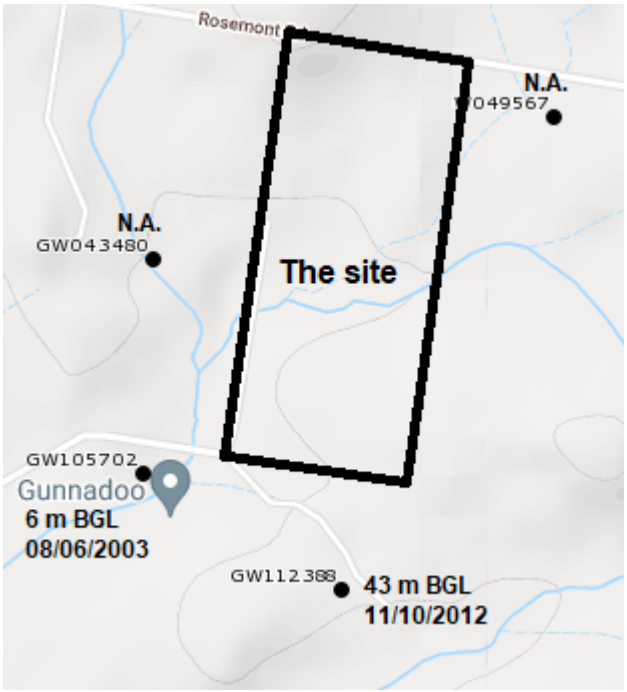


Figure 2. Groundwater map near the Site（292 Rosemont Road, Boxers Creek, NSW), some site data is not available (N.A.). BGL is short for below ground level.

The Site is crossed in the middle by a diverted stream flow (from Gundary Creek) from west to east.

2.6 Acid Sulfate Soils

A search of NSW acid sulfate soil risk map from eSPADE v2.1 (https://www.environment.nsw.gov.au/eSpade2Webapp#) indicate the Site to have no records suggesting any existing acid sulfate soil hazards.

3 Limited Desktop Review

3.1 Information Sources

A detailed review of the Site history is recommended to be carried out as part of the PSI, which should include a review of the following sources:

- A historical land titles search for the Site (through commercial provider like Advance Legal Searchers Pty Ltd);

Dr Upsilon Environments Pty Ltd
ABN: 91 647 732 518
Phone: 0406 201 136
Email: Jeffrey.yu@DrUpsilonGroup.com
PO Box 289, 12 Gardeners Road, Kingsford, NSW
Web: www.DrUpsilonGroup.com

- Aerial photography for the Site from the 1950's onwards (through commercial provider like Lotsearch Pty Ltd and the Council);
- The Section 10.7 (formerly Section 149) Planning Certificate for the Site;
- Interviews with people familiar with the Site history.

With reference to the NSW Office of Environment and Heritage and the NSW Office of Environment and Heritage's Atlas of NSW Wildlife, no ecological constraints or endangered and vulnerable species have been identified at the Site (or if in doubt, further consulting services should be pursued by the Client).

With reference to the Commonwealth of Australia, Department of Environment, RAMSAR Wetlands Data Source, no RAMSAR wetland have been identified at the Site.

Other regulatory databases were not conducted as the site investigation and remediation action plan only focus on potential chemicals of environmental concern of the Site.

3.2 Historical Aerial Photographs

With reference to high resolution Aerial Photographs (Nearmap) since October 2009, there is no evidence of major landscape change for the dwelling in over 50 years history. One little change can be observed since 1978 as described in Appendix 6 – Historical Imagery Records**.**

Historical aerial photographs were reviewed through NSW Space Services (Historical, Aerial, Satellite Imagery) from 1975 to 1997 from the government open data source (https://portal.spatial.nsw.gov.au/portal/apps/webappviewer/index.html?id=f7c215b873864d44bccddda8075238cb) and high-resolution aerial photograph from Nearmap, as shown in Appendix 6 – Historical Imagery Records.

Historical aerial photography indicates that there was no major landscape change at the site as a grazing modified pastures from 1975 to present.

3.3 NSW EPA Records

A review of the NSW Office of Environment and Heritage (OEH) Contaminated Land – Record of Notices listed by the NSW EPA under the Contaminated Land Management Act 1997 on 09th December, 2021 identified former or current notices for two sites at Goulburn within the LGA of Goulburn Mulwaree Council (https://apps.epa.nsw.gov.au/prclmapp/searchregister.aspx). The closest site is around 4.1 KM from the Site at north-western direction. As such, DRYU considers further investigation and / or analysis is not warranted.

Table 2 NSW EPA Records at Goulburn suburb

Suburb	Address	Site Name	Notices related to this site	Distance
GOULBURN	1 Blackshaw ROAD	Former Goulburn Gasworks	2 current and 10 former	about 4.6 KM radius at west-north western direction
GOULBURN	129 Lagoon STREET	Mobil Service Station	7 former	about 4.6 KM, radius north-north western direction

A review of the 'List of NSW Contaminated Sites Notified to the EPA' listed by the NSW EPA under the Contaminated Land Management Act 1997 (https://www.epa.nsw.gov.au/your-environment/contaminated-land/notified-and-regulated-contaminated-land/list-of-notified-sites) on 09th December, 2021 identified 13 notified sites within the suburb of Goulburn (Table 3). One of the sites is around 4.7 KM from the Site at north-western direction and considered by the NSW EPA as "Under assessment". The other situated within a 4.7 KM radius at north-

Dr Upsilon Environments Pty Ltd
ABN: 91 647 732 518
Phone: 0406 201 136
Email: Jeffrey.yu@DrUpsilonGroup.com
PO Box 289, 12 Gardeners Road, Kingsford, NSW
Web: www.DrUpsilonGroup.com

western direction from the Site and considered by the NSW EPA as 'Ongoing maintenance required to manage residual contamination under CLM Act'. Others notified sites are under "Regulation under CLM Act not required" or "Contamination formerly regulated under the CLM Act".

None of the notified sites or site with notice to EPA was listed on the site. All the identified sites within the suburb of Goulburn were not considered to impact the site.

Table 3 List of NSW Contaminated Sites Notified to the EPA at Goulburn suburb

Suburb	Site Name	Address	Contamination Activity Type	Management Class	Latitude	Longitude
GOULBURN	Caltex Depot	13 Sloane STREET	Other Petroleum	Regulation under CLM Act not required	-34.7742	149.7089
GOULBURN	Caltex Service Station	72-74 Clinton STREET	Service Station	Regulation under CLM Act not required	-34.7573	149.7136
GOULBURN	Caltex Service Station	68 Goldsmith STREET	Service Station	Regulation under CLM Act not required	-34.7505	149.7192
GOULBURN	Caltex Service Station	315 Auburn, corner Bradley STREET	Service Station	Regulation under CLM Act not required	-34.7494	149.7233
GOULBURN	Coles Express Service Station	90 Cowper (Corner Clinton Street) STREET	Service Station	Regulation under CLM Act not required	-34.7557	149.7108
GOULBURN	Former Goulburn Gasworks	1 Blackshaw ROAD	Gasworks	Ongoing maintenance required to manage residual contamination (CLM Act)	-34.7531	149.725
GOULBURN	Former Mobil Service Station Goulburn	422-426 Auburn STREET	Service Station	Regulation under CLM Act not required	-34.7487	149.7229
GOULBURN	Former Shell Autoport Service Station	Corner Bruce Street and Lagoon STREET	Service Station	Regulation under CLM Act not required	-34.7481	149.7266
GOULBURN	Goulburn JS Hollingworth & Wheat Siding Yards	Goulburn STREET	Other Industry	Under assessment	-35.0844	149.6379
GOULBURN	Goulburn Roundhouse	12 Braidwood ROAD	Other Industry	Under assessment	-34.7736	149.7106
GOULBURN	Goulburn Tannery	13 Gibson STREET	Other Industry	Regulation under CLM Act not required	-34.7376	149.7206

Dr Upsilon Environments Pty Ltd
ABN: 91 647 732 518
Phone: 0406 201 136
Email: Jeffrey.yu@DrUpsilonGroup.com
PO Box 289, 12 Gardeners Road, Kingsford, NSW
Web: www.DrUpsilonGroup.com

GOULBURN	Metro Goulburn Depot	23 Braidwood ROAD	Other Petroleum	Regulation under CLM Act not required	-34.7622	149.7171
GOULBURN	Mobil Service Station	129 Lagoon STREET	Service Station	Contamination formerly regulated under the CLM Act	-34.7462	149.733

3.4 Council Records

DRYU understands from review of development application records that Council does not hold any records of potentially contaminated land at the site. Further confirmation with the client and the Council is recommended.

3.5 Summary of Site History

Based on the desk study review, the Site history is summarised below:

- Aerial photography indicates since 1975, there is no evidence of major landscape change, while historical aerial images before 1975 could not be obtained through public open data sources.
- A review of the NSW EPA records indicates there was none of properties on site or within close proximity to the Site listed as having contamination notices or under management.

3.6 Gaps in the Site History

The Site history review revealed the following gaps in the Site history:

- DRYU understands none of previous investigation report(s) has been provided to DRYU at the time of investigation and PSI reporting.
- The Site walkover indicated that the site had been used for grazing for over a hundred years.

3.7 Integrity Assessment

Where available this limited site history assessment has utilised formal sources of information issued by NSW EPA, and NSW Land & Property Information (data sources from local government and SafeWork were not available for DRYU at the time of this reporting). These formal sources are supplemented by information provided by the client, landowner, and observations made by DRYU professionals during site inspections. Review of the site history summary demonstrates a relatively consistent timeline of landuse activities and layout without significant data gaps or inconsistencies to trigger further historical investigations. Hence, the sources and content of this assessment maybe should not be considered to provide a reliable and satisfactory level of accuracy to support this site history assessment and the identification of potential sources of environmental contamination. Further data sources from commercial suppliers and the client are recommended for a better understanding of the site history.

4 Data Quality Objectives

4.1 Data Quality Objectives

In order to determine the requirements for preliminary characterisation of the Site, DRYU has adopted the data quality objectives (DQOs) planning process as recommended in the National Environment Protection (Assessment of Site Contamination) Measure 2013 (ASC NEPM, 2013), required in the DEC (2006) and with consideration to technical details outlined in US EPA (2006) and AS 4482.1. A review of all available soil and groundwater data relevant to the Site was undertaken in order to develop a preliminary conceptual site model (CSM) if contamination exists. Details of the DQOs process are presented below.

Dr Upsilon Environments Pty Ltd
ABN: 91 647 732 518
Phone: 0406 201 136
Email: Jeffrey.yu@DrUpsilonGroup.com
PO Box 289, 12 Gardeners Road, Kingsford, NSW
Web: www.DrUpsilonGroup.com

4.1.1 State the Problem

The Site has historically been utilised for residential dwelling purpose over several decades. Some of the structures located in the lot and adjacent properties may have been constructed with asbestos containing materials (ACM). Building rubble and hints of soil disturbance were observed in close proximity of the site. The sources and contents of potential contamination could not be confidently identified or assumed.

4.1.2 Identify the Decision

To assess whether the historical land use of the Site has led to potential contamination of soils, at concentrations that would preclude future Residential A land use, the following decisions need to be addressed:

- Will the investigation report identify and delineate the scale and nature of contamination, if exist?
- Is there sufficient soil information (groundwater information out of the scope of work) to allow a detailed remediation plan to be developed?
- Will the PSI provide further delineation of areas around hotspots and areas adjacent to the likely disturbed soil during the proposed site development and land use?
- Will the PSI provide a data set that is suitable to assess the risk and potential future liability of material that will remain at the Site?
- Do the findings provide a higher degree of certainty of the source of identified contamination?
- Does the data set provide sufficient information to assess the potential for any off-Site migration of contaminants?
- Will the PSI recommend further site investigation based on limited sampling locations and strict testing numbers?
- Does the PSI provide adequate preliminary characterisation to enable an assessment of remedial options and remedial cost estimates?

4.1.2.1 Identify Inputs into the Decision

The inputs required to make the decision include the following:

- Geological data;
- Hydrogeological data;
- Visual observations of staining, odours and of building waste containing ACM;
- Concentrations of contaminants of potential concern (COPC) in soil and fill (groundwater investigation was out of the scope of work); and
- The vertical and lateral distribution of contaminants in the subsurface if exist.

4.1.2.2 Define the Boundaries of the Study

The spatial boundaries of the PSI with the approximate boundaries were identified in Figure 3. Inaccessible areas including, but not limited to, house footprint, handstand, garage/shed footprints, under pavements, septic tank and all underground assets/facilities were out of the scope of work.

4.1.3 Develop a Decision Rule Identify the Decision

The statistical parameters of interest are the COPC and the assessment criteria are presented in Section 5. These criteria have been used as screening levels for residential development to determine whether additional assessment is required. The following decision statements for analysis of the results were adopted with respect to the adopted criteria:

Dr Upsilon Environments Pty Ltd
ABN: 91 647 732 518
Phone: 0406 201 136
Email: Jeffrey.yu@DrUpsilonGroup.com
PO Box 289, 12 Gardeners Road, Kingsford, NSW
Web: www.DrUpsilonGroup.com

4.1.3.1 Soil Health-based Investigation levels

Where the data sets are not sufficiently populated to allow calculation of the 95% upper confidence limit (UCL_{mean}) then the individual results must be less than the adopted criteria. If all the individual results are below the adopted criteria then no additional assessment and/or management is required. Where individual results exceed that adopted criteria, then further assessment and/or management is required.

In accordance with the ASC NEPM (2013), where 95% UCL_{mean} of the average concentration for each soil analyte can be calculated, then the 95% UCL_{mean} must be below the adopted criteria; no single analyte concentration exceeds 250% of the adopted criteria; the standard deviation of the results must be less than 50% of the adopted criteria; and the normal distribution will only be used where the coefficient of variance is not greater than 1.2. Where 95% UCL mean results exceed the aforementioned criteria, then further assessment and/or management is required.

4.1.3.2 Soil Ecological Investigation levels

Only soil samples within the top 2m of the soil profile will be compared to the adopted EILs.

Comparison of the data set to the top 2 m of the soil profile will be undertaken as follows:

- Where the data sets are not sufficiently populated to allow calculation of the 95% upper confidence limit (UCL_{mean}) then the individual results must be less than the adopted criteria. If all the individual results are below the adopted criteria then no additional assessment and/or management is required. Where individual results exceed that adopted criteria, then further assessment and/or management is required.
- In accordance with the ASC NEPM (2013), where 95% UCL_{mean} of the average concentration for each soil analyte can be calculated, then the 95% UCL_{mean} must be below the adopted criteria; no single analyte concentration exceeds 250% of the adopted criteria; the standard deviation of the results must be less than 50% of the adopted criteria; and the normal distribution will only be used where the coefficient of variance is not greater than 1.2. Where 95% UCL_{mean} results exceed the aforementioned criteria, then further assessment and/or management is required.

Where exceedances are observed, the data shall be also be compared to published background levels or consideration would be given to the location of areas in the current / future proposed land use.

4.1.3.3 Aesthetic

The decision rule adopted for validation of aesthetic impact including removal of anthropogenic materials is as follows:

- Visual inspection including photographic record of the base and walls of the excavation in the identified burial pit areas must not identify areas containing anthropogenic materials to the extent practicable.
- Visual inspection including photographic record of the material to be backfilled must not identify areas containing anthropogenic materials to the extent practicable.

4.1.3.4 Groundwater and Surface Water

The decision rule adopted for validation of groundwater and surface water should be as follows:

- Comparison of groundwater concentrations against the adopted criteria should be undertaken by comparison to the individual total concentrations.
- Where exceedances are observed, the data should also be compared to groundwater results upgradient groundwater results (where available) to assess whether it is equal to or greater than downgradient groundwater.

Dr Upsilon Environments Pty Ltd
ABN: 91 647 732 518
Phone: 0406 201 136
Email: Jeffrey.yu@DrUpsilonGroup.com
PO Box 289, 12 Gardeners Road, Kingsford, NSW
Web: www.DrUpsilonGroup.com

Note: All the above water investigations are out of the scope of work in this report.

4.1.3.5 Specify Acceptable Limits of Decision Errors

The acceptable limits are listed as follows:

- Individual or 95% UCL_{mean} concentrations are below the adopted criteria.
- 95% of the data will satisfy the Data Quality Indicators (DQIs) which were determined for completeness, representativeness, precision and accuracy of both field and laboratory data. Therefore, the limit on the decision error will be 5% that a conclusive statement may be incorrect.
- A comprehensive Quality Assurance/Quality Control (QA/QC) program will be undertaken including representative sampling and sampling at an appropriate density for the purpose of the investigation.

The acceptable limit of error for sampling techniques and laboratory analysis is defined by the DQIs as follows:

4.1.3.6 Data Representativeness

Expresses the accuracy and precision with which sample data represents and an environmental condition. Data representativeness is achieved by the collection of samples at an appropriate pattern and density as well as consistent and repeatable sampling techniques and procedures.

4.1.3.7 Completeness

Refers to Table 4, the percentage of data that can be considered valid data. Sufficient data is required to enable an assessment of the decision rules.

4.1.3.8 Comparability

A qualitative comparison of the confidence with which one data set can be compared to another. This is achieved through consistent sampling and analytical testing and reporting techniques.

4.1.3.9 Precision

Precision is the quality of reproducibility of measurements under a given set of conditions. The relative percent difference (RPD) has been adopted to assess the precision of data between duplicate sample pairs according to the following equation.

$$RPD\% = \frac{(C_p - C_d)}{(C_p + C_p)} \times 200$$

Where:

C_p = Primary sample C_d = Duplicate Sample

An acceptance criterion of ±30% had been adopted for inorganic field duplicates and triplicates and ±50% for organic field duplicates and triplicates. However, it should be noted that exceedances of these criteria are common for heterogeneous soil or fill or for low concentrations of potential contaminant of concern.

Dr Upsilon Environments Pty Ltd
ABN: 91 647 732 518
Phone: 0406 201 136
Email: Jeffrey.yu@DrUpsilonGroup.com
PO Box 289, 12 Gardeners Road, Kingsford, NSW
Web: www.DrUpsilonGroup.com

4.1.3.10 Accuracy

Is a measure of the bias in the analytical results and can often be attributed to: field contamination; insufficient preservation or sample preparation; or inappropriate analytical techniques. Accuracy of the analytical data is assessed by consideration of laboratory control samples, laboratory spikes and analytical techniques in accordance with appropriate standards. Accuracy of the fieldwork is assessed against an assessment of field blank, field trip and rinsate results if applicable.

4.1.4 Optimise the Design for Obtaining Data

The purpose of the adopted targeted sampling strategy was to collect some limited soil to provide a preliminary characterisation of potential contamination at the Site from identified historical contaminating activities. DRYU considers that the adopted sampling program is appropriate for the purposes of the DSI and the DQOs around proposed potential/disturbed soils of the site. There is high uncertainty in all other areas of the Site as well as inaccessible areas such as handstand, under pavements, underground facilities (further investigations are recommended with consultation of the client during demolition phase).

4.2 Data Quality Indicators

The DQOs, requirements and indicators for the assessment are presented in Table 4**.**

Table 4 Data Quality Objectives, Requirements and Indicators

Data Quality Objective	Requirement	Data Quality Indicator	Conclusion
Precision			
Standard operating procedures appropriate and complied with	The sampling methods comply with industry standards and guidelines	Meet Requirement	Acceptable
Intra-laboratory Duplicates	1 per 20 samples	RPDs < 50%	NA
Inter-laboratory Duplicates	1 per 20 samples	RPDs < 50%	NA
Laboratory Duplicates	Minimum of 1 per batch per analyte	RPDs < 50%	NA
Accuracy			
Laboratory Matrix Spikes	1 per batch per volatile/semi-volatile analyte	Recoveries 50% to 150%	Acceptable
Laboratory Surrogate Spikes	1 per batch per volatile/semi-volatile analyte(as appropriate)	Recoveries 70% to 130%	Acceptable
Laboratory Control Samples	At least 1 per batch per analyte tested for	Result < Limit of reporting	Acceptable
Representativeness			
Sampling methodology - preservation	Appropriate for the sample type and analytes	Meet Requirement	Acceptable
Samples extracted and analysed within holding times	Specific to each analyte Meet Requirement	Meet Requirement	Acceptable
Field equipment calibration All field equipment calibrated and	All field equipment calibrated and calibration records provided.	Meet Requirement	Acceptable
Laboratory Method Blanks	At least 1 per batch per analyte tested for	Result < Limit of reporting	Acceptable
Trip Blanks	1 per lab batch for volatile analytes	Result < Limit of reporting	NA
Trip Spikes	1 per lab batch for volatile analytes	Recoveries 60-100%	NA
Rinsate samples	1 per each sampling day	Result < Limit of reporting	NA
Comparability			

Dr Upsilon Environments Pty Ltd
ABN: 91 647 732 518
Phone: 0406 201 136
Email: Jeffrey.yu@DrUpsilonGroup.com
PO Box 289, 12 Gardeners Road, Kingsford, NSW
Web: www.DrUpsilonGroup.com

Data Quality Objective	Requirement	Data Quality Indicator	Conclusion
Sampling approach	Consistent for each sample	Meet Requirement	Acceptable
Analysis methodology Consistent methodology for each	Consistent methodology for each sample	Meet Requirement	Acceptable

5 Site Assessment Criteria

The Site assessment criteria adopted for this project are predominantly based on the following references:

- NEPC (2013) National Environment Protection (Assessment of Site Contamination Measure) Measure 1999 (2013 amendment); and
- WA DoH (2009) Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia.

The sections below discuss the adopted assessment criteria.

5.1 Soil Investigation and Screening Levels

ASC NEPM (2013) define an 'Investigation Level' ("**IL**") as "the concentration of a contaminant above which further appropriate investigation and evaluation will be required. The investigation and evaluation is to ascertain:

- the typical and extreme concentrations of the contaminant(s) on the Site;
- the horizontal and vertical distribution of the contaminant(s) on the Site;
- the physio-chemical form(s) of the contaminant(s); and
- the bioavailability of the contaminant(s)."

Soil ILs have been used in this assessment to identify contaminant(s) that are considered to be present at concentrations that have the potential to present an unacceptable risk to future Site users and identify where further investigation may be required.

The ILs adopted for this assessment are:

- Health Investigation Levels ("HILs"): The HILs for Residential A land use are considered to be appropriate for the assessment of human health risk associated with contamination at the Site, based on the proposed future land use and current land use.
- Health Screening Levels ("HSLs"). The HSLs for Residential A land use applicable for sand soils within the top 3 m of the soil profile are considered to be appropriate for the assessment of human health risk associated with vapour intrusion, based on the proposed future land use (Industrial land use), the soil profile encountered and the anticipated depth of contamination.
- Ecological Investigation Levels ("EILs"): The EILs for Residential A and use are considered to be appropriate for the assessment of risk to vegetation growth and transitory wildlife associated with soil contamination at the Site. It is noted that **EILs only apply to the top 2 m of the soil profile**. EILs are based on Site specific data relating to soil pH, cation exchange capacity and clay content. In the absence of Site-specific data, generic values are to be established. For this project, laboratory-provided pH, cation exchange capacity and clay content data should be adopted.
- Ecological Screening Levels ("ESLs"): The ESLs for Residential A land use applicable for coarse-grained soils are considered to be appropriate for the assessment of risk to vegetation growth and transitory wildlife associated with soil contamination at the Site.

The adopted ILs are provided in Appendix 3 – Analytical Reports**.**

Dr Upsilon Environments Pty Ltd
ABN: 91 647 732 518
Phone: 0406 201 136
Email: Jeffrey.yu@DrUpsilonGroup.com
PO Box 289, 12 Gardeners Road, Kingsford, NSW
Web: www.DrUpsilonGroup.com

For the current and proposed land use: Amended NEPM (2013) Health-based Investigation levels (HILs) for Residential A land use, the Health Screening Levels (HSLs) and the CRC Care (2011) Soil Health Screening Levels for Direct Contact (SHSLs).

Environmental Criteria: Amended NEPM (2013) Ecological Screening Levels (ESLs) and Ecological Investigation Levels (EILs) for Residential A land use.

The National Environment Protection Council (NEPC) has amended the National Environment Protection (Assessment of Site Contamination) Measure 1999 on the 11 April 2013. It is understood that the amendment (Amended NEPM, 2013) took effect in each jurisdiction on 16 May 2013, the day after it was registered on the Federal Register of Legislative Instruments (FRLI).

DRYU has adopted the most recent Amended NEPM (2013) Tier 1 Guidelines over the criteria listed in NSW DEC (2006) as it is the most recent guidance available that has been approved by the NSW EPA under Section 105 of the Contaminated Land Management Act, 1997.

5.2 Management Limits

ASC NEPM (2013) provides management limits to avoid or minimise the following potential effects, relating to petroleum hydrocarbons:

- Formation of observable Light Non-Aqueous Phase Liquids (“LNAPL”);
- Fire and explosive hazards; and
- Effects on buried infrastructure.

ASC NEPM (2013) notes that application of management limits requires consideration of site specific factors such as the depths of services and basements, and the depth to groundwater. If management limits are exceeded, further site-specific assessments may be undertaken to address identified risks.

For this assessment, DRYU has adopted the management limits for Residential A land use associated with coarse-grained soils.

5.3 Asbestos in Soil Assessment Criteria

The WA DoH (2009) Guidelines and ASC NEPM 2013 provide the following definitions / groups for asbestos:

- ACM is defined as material, which is in sound condition, the asbestos is bound in a matrix, and cannot pass through a 7 mm x 7 mm sieve;
- Fibrous Asbestos (“**FA**”) encompasses friable asbestos material, such as severely weathered ACM, and loose fibrous materials such as insulation products. This material can be broken or crumbled by hand pressure; and
- Asbestos Fines (“**AF**”) includes free fibres of asbestos, small fibre bundles and ACM fragments that can pass through a 7mm x 7mm sieve.

The WA DoH (2009) Guidelines and ASC NEPM 2013 also provide Health Investigation levels (“HILs”) for the assessment of asbestos concentrations in soil, for each of the three definitions / groups listed above. The HILs have been developed for various land use scenarios including low-density residential, high-density residential (with minimal access to soils), recreational and commercial / industrial.

Table 5 Health Investigation Levels for Asbestos Contamination in Soil (NEPM 2013)

Form of asbestos	**Health Investigation Level (w/w)**

Dr Upsilon Environments Pty Ltd
ABN: 91 647 732 518
Phone: 0406 201 136
Email: Jeffrey.yu@DrUpsilonGroup.com
PO Box 289, 12 Gardeners Road, Kingsford, NSW
Web: www.DrUpsilonGroup.com

	Residential A[1]	Residential B[2]	Recreational C[3]	Commercial/ Industrial D[4]
Bonded ACM	**0.01%**	0.04%	0.02%	0.05%
FA and AF (friable asbestos)	**0.001%**			
All forms of asbestos	No visible asbestos for surface soil			

1. Recreational A with garden/accessible soil also includes children's day care centres, preschools and primary schools.
2. Residential B with minimal opportunities for soil access; includes dwellings with fully and permanently paved yard space such as high-rise buildings and apartments.
3. Recreational C includes public open space such as parks, playgrounds, playing fields (e.g. ovals), secondary schools and unpaved footpaths.
4. Commercial/industrial D includes premises such as shops, offices, factories and industrial sites.

The NEPM (2013) Schedule B (2) - Guideline on Site Characterisation provide the following management options in accordance with the WA Guidelines:
Small-scale low-risk asbestos soil contamination on single residential lots can be subject to a simplified investigation and remediation process, involving Local Government Environmental Health Officers. Application elsewhere should be discussed first with the Department of Health (DOH).
Asbestos buried deeper than 3 m is not usually regarded as contamination provided it is not likely to be disturbed.

The Guidelines provide that the percentage of soil asbestos is calculated using the following formula:

$$\%\ \text{w/w asbestos in soil} = \frac{\%\ \text{asbestos content x (ACM) kg}}{\text{Soil volume (L) x soil density (kg/L)}}$$

In the example included in enHealth (2005) it was assumed that:
% asbestos content (within bonded ACM) = 15% and soil density (for sandy soils) = 1.65 kg/L.

The Site assessment criteria applicable for asbestos in soil adopted for this project are:

- ACM = 0.01% (weight of asbestos per weight of soil) since the Site is proposed for Residential A.
- FA and AF = 0.001% (weight of asbestos per weight of soil); and
- No visible asbestos on soil surface.

The adopted asbestos in soil assessment criteria are provided in Table 5**.**

6 Methodology, Sampling and Analysis Plan

DRYU employed the following methodologies for the assessment in relation to identification of suspected asbestos contamination from any potentially disturbed ACM and other potential contaminants of concern.

6.1 Visual Inspection & Assessment

DRYU Consultants conducted the inspections, allowing inspection to be completed on a grid system walking across the hills. For each grid for areas of concern in the site, a walkover visual inspection was undertaken to identify suspected ACM in or on the surface to identify damaged and unstable ACM, fragments and debris as applicable.

Dr Upsilon Environments Pty Ltd
ABN: 91 647 732 518
Phone: 0406 201 136
Email: Jeffrey.yu@DrUpsilonGroup.com
PO Box 289, 12 Gardeners Road, Kingsford, NSW
Web: www.DrUpsilonGroup.com

The inspection process is listed below:

- DRYU personnel walked across the surface. The inspection was carried out by means of a visual observation, during a slow traverse across the materials, with the consultant inspecting on a grid pattern at 90 degrees to each walk path. The surfaces were inspected to detect evidence of suspected asbestos containing materials (ACM). Colour, size and shape are used as indicators.

If suspected ACM was identified during the inspection, it was marked as a suspected ACM sample. The remainder of the surface was inspected for any additional suspected ACM.

A qualitative assessment was made into the location of the ACM and likely exposure of occupants, workers and neighbours.

6.2 Identification of Materials to Contain Asbestos

Materials suspected to contain asbestos (if observed) could be collected and selected based on the likely pattern, morphology and appearance of the materials as well as our professional experience in the visual identification of such materials. The collected representative samples were sent to a NATA accredited laboratory for analysis in accordance with Australian Standard AS4964-2004 Method for the qualitative identification of asbestos in bulk samples.

6.3 Soil Sampling and Laboratory Analysis

6.3.1 Sampling Plan and Methodology

Table 6 Sampling Plan and Site Investigation Summary for Areas of Environmental Concern

Area of Concern	Area /ha	Minimum Sampling No.	DRYU TP No.	Contamination Depth /m BGL	Contaminants of Concern
The grassland	~32	-	3	0.1 – 1.0	Chemicals

Note 1. If any suspect materials (identified by unusual staining, odour, discolouration or inclusions such as building rubble, asbestos sheets/pieces/pipes, ash material, etc.) or any potentially contaminated area(s) and filled area(s) in or between the sampling locations, are encountered during site investigation, further sampling will be undertaken.
Note 2. In several locations around the suspected contamination, the depth of sampling could be further conducted up to 3 m or till visually clean sand, natural material layer is reached.

The NSW EPA (1995) Sampling Design Guidelines and the WA Department of Health (2009) Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia (adopted by ASC NEPM 2013) recommends that, on the Site's specific basis, the minimum sampling points required for site characterisation based on detection of circular hot spots using systematic GRID sampling pattern should be five hundred (40*10) for area with 32 ha.

DRYU undertook systematic grid-based sampling method where stratified sampling can be integrated for localised silty sand/fill, identified in each location around hotspots and from the site history and site observation.

Therefore, to provide a soil contamination assessment of asbestos and other potential contaminants of concern at the site, DRYU carried out judgemental sampling from three (3) locations across the potential areas of environmental concern with various depth up to 1 m or prior to refusal. Note: If any suspect materials (identified by unusual staining, odour, discolouration or inclusions such as building rubble, asbestos sheets/pieces/pipes, ash material, etc.) or any potentially contaminated area(s) and filled area(s) in or between the sampling locations, were encountered during site investigation, further sampling would be undertaken. Consultation through on-site meeting, email and or telephone with written records

Dr Upsilon Environments Pty Ltd
ABN: 91 647 732 518
Phone: 0406 201 136
Email: Jeffrey.yu@DrUpsilonGroup.com
PO Box 289, 12 Gardeners Road, Kingsford, NSW
Web: www.DrUpsilonGroup.com

shall be taken with key stakeholders as soon as practical after testing results indicate unexpected finds or excessive scale of heavy contamination.

The sampling was undertaken by a senior DRYU environmental scientist, trained in sampling contaminated land as follows:

- Collection of soil samples in an approximate grid pattern across accessible areas of the Site. The samples were collected using shovels, hand trowels, or other hand tools as appropriate.
- Soil samples collected for chemical analysis were placed into NATA accredited laboratory-supplied glass jars;
- A clean pair of disposable nitrile gloves were worn when collecting each sample.
- The sample locations were recorded with a hand-held GPS or measured relative to site features; or measured on the landscape footing marking piers.

Each sample were dispatched to a NATA-accredited laboratory and analysed for chemical quantitation in soil in accordance with the ASC NEPM (2013) guideline.

6.3.2 Quality Assurance and Quality Control

The sampling was carried out in accordance with DRYU Standard Operating Procedures ("**SOPs**"), which are based on current industry standards.

One duplicate quality control sample was taken among limited total testing numbers and sampling locations.

Field activities were conducted by an experienced Environmental Consultant. The discrete soil samples were placed in sterile glass jars with Teflon lined lids. The sterile glass jars were transferred to a cooler box which contained ice packs (or equivalent) present to maintain the samples at a temperature below approximately 4 °C.

6.3.3 Laboratory Analysis

The samples collected were dispatched to the National Association of Testing Authorities ("**NATA**") accredited laboratory. The samples were to be analysed for:

- Heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc);
- Total Recoverable Hydrocarbons ("TRH");
- Benzene, Toluene, Ethylbenzene and Xylenes ("BTEX");
- Polycyclic Aromatic Hydrocarbons ("PAH") including Naphthalene.

7 Findings

7.1 Visual Observations & Assessment of Identified ACM

Visual observation of the site noted the following, as shown in Appendix 1 – Representative Photographs.

- Lush vegetation was observed throughout.
- No building rubbles were observed.
- No building rubbles were observed on soil surfaces.
- No vegetation stress was observed.
- No visible evidence of odour and staining was identified at the time of the inspection.
- No stored chemicals/drums were identified at the time of the inspection.

Dr Upsilon Environments Pty Ltd
ABN: 91 647 732 518
Phone: 0406 201 136
Email: Jeffrey.yu@DrUpsilonGroup.com
PO Box 289, 12 Gardeners Road, Kingsford, NSW
Web: www.DrUpsilonGroup.com

7.2 Potential Contaminants of Concern in Subject Soils

The land use of the Site is Residential and farm infrastructure which will employ the Residential A criteria for assessment. As shown in Table 7, review of the analytical results for samples collected for the preliminary soil characterisation indicates concentrations of the tested potential chemicals of environmental concern including Heavy Metals – Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Nickel and Zinc (Heavy Metals), Toxicity Characteristic, Total Recoverable Hydrocarbons (TRHs), Benzene, Toluene, Ethylbenzene, and Xylene (BTEX), Polycyclic Aromatic Hydrocarbons (PAHs), Organophosphorus Pesticides (OPPs), Organochlorine Pesticides (OCPs), Polychlorinated Biphenyl (PCBs) were below either below the NEPC (2013) NEPM land use guidelines for Residential A land use (HIL-A/HSL-A) or not detected above the laboratory limit of reporting.

Review of the analytical results for samples collected for the preliminary soil characterisation indicates concentrations of the tested potential chemicals of environmental concern were below either below the NEPC (2013) NEPM land use guidelines for Residential A land use (EIL/ESL) or not detected above the laboratory limit of reporting.

Review of the analytical results for samples collected for the preliminary soil characterisation indicates concentrations of the tested potential chemicals of environmental concern of TRHs were below either below the Management Limits or not detected above the laboratory limit of reporting.

Representative contaminants of concern are summarised in Appendix 3 – Analytical Reports.

7.3 Limitations of Field Investigation

The information in this report relates only to the subject soil materials (refer to Table 6 and Figure 3). Due care should be taken to ensure no further interpolation is added to the subject site. Visual inspection was limited to the surface and upper layers of the subject soils. If there are any unexpected finds that are not consistent with this characterisation, please contact Dr Upsilon Environments immediately.

8 Conclusions and Recommendations

Based on the findings of this preliminary PSI report, DRYU concludes the following:

Limited Site History Review

- No visible ACM sheeting fragments were observed throughout the Site.
- No building rubbles were observed on soil surfaces.
- No vegetation stress was observed.
- No visible evidence of odour and staining was identified at the time of the inspection.
- No stored chemicals/drums were identified at the time of the inspection.
- Historical aerial photography indicated from 1975 to present, there were no major landscape change at the Site as a residential and farm infrastructure area.
- No residential redevelopments were identified in the close proximity in the past several years.
- A review of the NSW EPA records indicates there was **none** of properties located wither within close proximity to the Site or on the site listed as having contamination notices, orders or under management.

Dr Upsilon Environments Pty Ltd
ABN: 91 647 732 518
Phone: 0406 201 136
Email: Jeffrey.yu@DrUpsilonGroup.com
PO Box 289, 12 Gardeners Road, Kingsford, NSW
Web: www.DrUpsilonGroup.com

Conclusions and Subject accessible soils of the Site:

- Review of the analytical results for samples collected for the preliminary soil characterisation indicates concentrations of the tested potential chemicals of environmental concern including Heavy Metals – Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Nickel and Zinc (Heavy Metals), Total Recoverable Hydrocarbons (TRHs), Benzene, Toluene, Ethylbenzene, and Xylene (BTEX), Polycyclic Aromatic Hydrocarbons (PAHs), Organophosphorus Pesticides (OPPs), Organochlorine Pesticides (OCPs), Polychlorinated Biphenyl (PCBs) were either below the NEPC (2013) NEPM land use guidelines for Residential A land use (HIL-A/HSL-A) or not detected above the laboratory limit of reporting.
- Review of the analytical results for samples collected for the preliminary soil characterisation indicates concentrations of the tested potential chemicals of environmental concern were either below the NEPC (2013) NEPM land use guidelines for Residential A land use (EIL/ESL) or not detected above the laboratory limit of reporting.
- Review of the analytical results for samples collected for the preliminary soil characterisation indicates concentrations of the tested potential chemicals of environmental concern of TRHs were either below the Management Limits or not detected above the laboratory limit of reporting.

Therefore, based on the results of the preliminary investigation, DRYU is of the opinion that the subject soils are considered suitable for inclusion within the development from a contamination perspective only, subject to the proper implementation of recommendations as follows.

Recommendations

DRYU recommends that:

- NO additional investigation and assessment were considered to be warranted.
- Should unexpected finds such as asbestos containing material or any other contaminating features such as buried waste, staining or odours be encountered during disposal, relocation and/or placement of the material, further assessment will be required to re-assess the suitability for off-site disposal or on-site reuse based on further waste classification reports.

This report is based on a limited sampling and testing regime. It is possible that acid sulphate soils and differing ground conditions may be present between sampling locations, or in the remainder of the site not intrusively investigated. If more layers or horizons of soils (more than 1 m below ground surface) encountered during the deep excavation (i.e., over ~1 m below ground surface), a contingency plan for soils should be prepared to address pockets of acid sulfate soils or other contaminants of environmental concern (if exist; or if soil disturbances happen) that could potentially be encountered during site works.

Dr Upsilon Environments Pty Ltd
ABN: 91 647 732 518
Phone: 0406 201 136
Email: Jeffrey.yu@DrUpsilonGroup.com
PO Box 289, 12 Gardeners Road, Kingsford, NSW
Web: www.DrUpsilonGroup.com

9 References

- 1 metre Resolution Digital Elevation Model at Goulburn, 2 km^2, https://elevation.fsdf.org.au/.
- Soil Landscapes of Central and Eastern NSW, https://datasets.seed.nsw.gov.au/dataset/published-soil-landscapes-of-central-and-eastern-nsw37d37.
- Hydrogeological Landscapes of New South Wales and the Australian Capital Territory, https://datasets.seed.nsw.gov.au/dataset/hydrogeological-landscapes-nsw-act.
- NSW Landuse 2007, https://datasets.seed.nsw.gov.au/dataset/nsw-landuseac11c.
- National Environment Protection Council. (2013). National Environment Protection (Assessment of Site Contamination) Measure, 1999.
- New South Wales Environment Protection Authority. (1995). Contaminated Sites: Sampling Design Guidelines. Chatswood, NSW.
- New South Wales Environment Protection Authority. (2014). Waste Classification Guidelines - Part 1: Classifying Waste. Sydney, Australia.
- New South Wales Environment Protection Authority. (2017). Contaminated Land – Record of Notices. Retrieved from http://www.epa.nsw.gov.au/prclmapp/aboutregister.aspx
- New South Wales Environment Protection Authority. (2017). List of NSW contaminated sites notified to EPA. Retrieved from http://www.epa.nsw.gov.au/clm/publiclist.htm
- Protection of the Environment Operations Act 1997 (Cth.) (Austl.).
- Protection of the Environment Operations (Waste) Regulation 2014 (Cth.) (Austl.).
- Acid Sulfate Soils Manual, Acid Sulfate Soils Management Advisory Committee (ASSMAC), 1998 (ASS Manual)
- National Acid Sulfate Soils Guidance: National Acid Sulfate Soils Identification and Laboratory Methods Manual, 2018
- Guidelines for the Use of Acid Sulfate Soil Risk Maps, Acid Sulfate Soils Management Advisory Committee (ASSMAC), 1998

10 Limitations

This report has been prepared for the exclusive use of the client. Dr Upsilon Environments has used a degree of care and skill ordinarily exercised in similar investigations by reputable members of the environmental industry in Australia. No other warranty, expressed or implied, is made or intended. No one section or part of a section, of this report should be taken as giving an overall idea of this report. Each section must be read in conjunction with the whole of this report, including its appendices and attachments.

Any other party should satisfy themselves that the scope of work conducted, and report herein meets their specific needs. Dr Upsilon Environments cannot be held liable for third party reliance on this document, as Dr Upsilon Environments is not aware of the specific needs of the third party.

The subsurface environment can present substantial uncertainty due to it complex heterogeneity. The conclusions presented in this report are based on limited investigation of conditions at specific sampling locations chosen to be as representative as possible under the given circumstances. However, it is possible that this investigation may not have encountered all areas of contamination at the site due to the limited sampling and testing program undertaken.

The material subject to classification pertains only to the Site and subject stockpile outlined within the report and must be consistent with the soil description reported. If there are any unexpected finds that are not consistent with this classification, Dr Upsilon Environments must be notified immediately.

Dr Upsilon Environments professional opinions are based upon its professional judgement, experience, training and results from analytical data. In some cases, further testing and analysis may be required, thus producing different results and / or opinions. Dr Upsilon Environments has limited its investigation to the scope agreed upon with its client.

Investigations are based on inspections conducted in accordance with industry guidelines and standards, and common industry practice, having regard to the client instructions, and interpretations of conditions are based on the data from those inspections and, where relevant and conducted, testing. They will represent to the best of our knowledge, a reasonable interpretation of the condition of the site as able to be inspected. However, there can be no guarantee that conditions at specific points not able to be inspected do not vary from the interpreted conditions based on the available observations/data.

In practice, it is generally impossible to locate all asbestos in the course of an inspection due to factors including but not limited to access restrictions to certain areas including subsoil, the need to avoid damage, minimising inconvenience, operating plant, unavailability of specific information regarding the premises. The presence of asbestos and asbestos containing materials (ACM) is determined visually while the consultant will collect samples of suspected ACM and have them analysed in a laboratory. Any restrictions on the amount of sampling will reduce confidence in the inspection findings. The ACM that cannot be seen will not be found.

No warranty, undertaking, or guarantee, whether expressed or implied, will be made with respect to the data reported or to the findings, observations, conclusions and recommendations expressed in DRYU report. Furthermore, such data, findings, observations, conclusions and recommendations are based solely upon existence at the time of the investigation. The passage of time, manifestation of latent conditions or impacts of future events (e.g. changes in legislation, scientific knowledge, land uses, climatic conditions, etc) may require further investigation at the site with subsequent data analysis and re-evaluation of the findings, observations, conclusions and recommendations expressed in DRYU report.

DRYU report will be prepared on behalf of and for the exclusive use of the Client and is subject to and issued in connection with the provisions of the agreement between DRYU and the Client. DRYU accepts no liability or responsibility whatsoever and expressly disclaims any responsibility for or in respect of any use of or reliance upon DRYU report by any third party or parties. It is the responsibility of the Client to accept if the Client so chooses any recommendations contained within and implement them in an appropriate, suitable and timely manner.

All works undertaken by DRYU are subject to DRYU Terms and conditions for professional services and the statement of limitation detailed below.

Dr Upsilon Environments Pty Ltd
ABN: 91 647 732 518
Phone: 0406 201 136
Email: Jeffrey.yu@DrUpsilonGroup.com
PO Box 289, 12 Gardeners Road, Kingsford, NSW
Web: www.DrUpsilonGroup.com

Appendix 1 – Representative Photographs

Dr Upsilon Environments Pty Ltd
ABN: 91 647 732 518
Phone: 0406 201 136
Email: Jeffrey.yu@DrUpsilonGroup.com
PO Box 289, 12 Gardeners Road, Kingsford, NSW
Web: www.DrUpsilonGroup.com

Representative Site Features Photos

<table>
<tr><td> 
</td><td> 
</td></tr>
<tr><td>Image 1: Hill top in the southern section</td><td>Image 2: Adjacent to southern fence</td></tr>
<tr><td> 
</td><td> 
</td></tr>
<tr><td>Image 3: In the middle section of the site</td><td>Image 4: Northern entry section</td></tr>
</table>

Dr Upsilon Environments Pty Ltd
ABN: 91 647 732 518
Phone: 0406 201 136
Email: Jeffrey.yu@DrUpsilonGroup.com
PO Box 289, 12 Gardeners Road, Kingsford, NSW
Web: www.DrUpsilonGroup.com

Representative Sampling Photos

	
BH04_0.1-0.5; Topsoil, Clay, low to medium plasticity, brown, moist, NO ACM fragments sighted/detected. Results: Negative	BH04_0.5-1.0 Clay with gravel, stiff, moist. Results: Negative.
	
BH06_0.1-0.5; Topsoil, Clay, low to medium plasticity, brown, moist, NO ACM fragments sighted/detected. Results: Negative	BH06_0.5; Clay with gravel, stiff, moist. Results: Negative.

Dr Upsilon Environments Pty Ltd
ABN: 91 647 732 518
Phone: 0406 201 136
Email: Jeffrey.yu@DrUpsilonGroup.com
PO Box 289, 12 Gardeners Road, Kingsford, NSW
Web: www.DrUpsilonGroup.com

	
BH05_0.1-0.4; Topsoil, clay, low to medium plasticity, moist. Results: Negative.	BH05_0.4; Clay with gravel, brown, moist. Results: Negative.

Dr Upsilon Environments Pty Ltd
ABN: 91 647 732 518
Phone: 0406 201 136
Email: Jeffrey.yu@DrUpsilonGroup.com
PO Box 289, 12 Gardeners Road, Kingsford, NSW
Web: www.DrUpsilonGroup.com

Appendix 2 – Site Layout and Sampling Locations

Dr Upsilon Environments Pty Ltd
ABN: 91 647 732 518
Phone: 0406 201 136
Email: Jeffrey.yu@DrUpsilonGroup.com
PO Box 289, 12 Gardeners Road, Kingsford, NSW
Web: www.DrUpsilonGroup.com

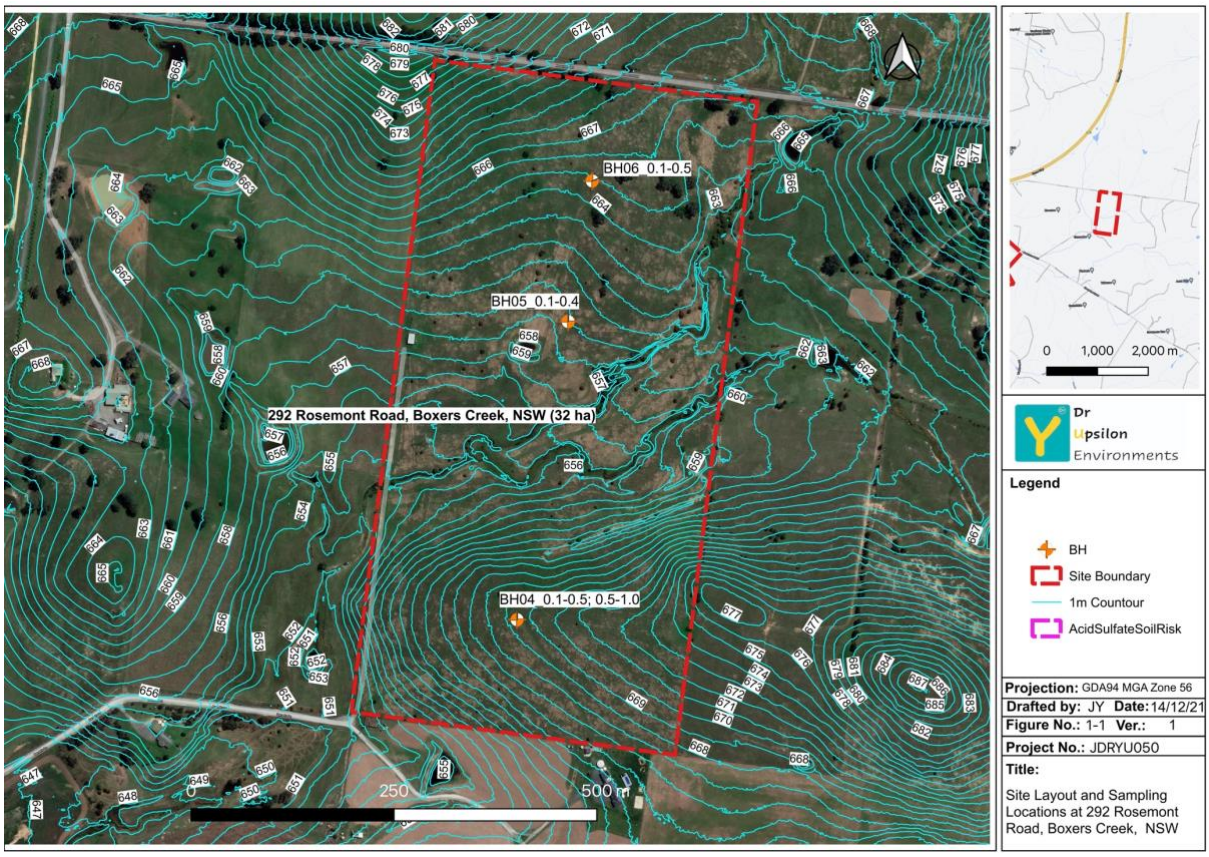


Figure 3 Site Layout and Sampling Locations for Subject Soil Materials at 292 Rosemont Road, Boxers Creek, NSW

Dr Upsilon Environments Pty Ltd
ABN: 91 647 732 518
Phone: 0406 201 136
Email: Jeffrey.yu@DrUpsilonGroup.com
PO Box 289, 12 Gardeners Road, Kingsford, NSW
Web: www.DrUpsilonGroup.com

Appendix 3 – Analytical Reports

Dr Upsilon Environments Pty Ltd
ABN: 91 647 732 518
Phone: 0406 201 136
Email: Jeffrey.yu@DrUpsilonGroup.com
PO Box 289, 12 Gardeners Road, Kingsford, NSW
Web: www.DrUpsilonGroup.com

Table 7 Summery of Representative Chemicals of Environmental Concern, Guideline Values and Analytical Results

				Job Number	SE226546	SE226546	SE226546	SE226546	SE226546	SE226546	SE226546	SE226546	SE226546	SE226546	SE226546	SE226546	SE226546	SE226546	SE226546	SE226546	SE226546
				Method Name	VOC's in Soil	VOC's in Soil	VOC's in Soil	VOC's in Soil	Volatile Petroleum Hydrocarbons in Soil	TRH (Total Recoverable Hydrocarbons) in Soil	PAH (Polynuclear Aromatic Hydrocarbons) in Soil	PAH (Polynuclear Aromatic Hydrocarbons) in Soil	OC Pesticides in Soil	OP Pesticides in Soil	PCBs in Soil	Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES	Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES	Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES	Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES	Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES	Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES	Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES	Mercury in Soil
				Analyte Name	Benzene	Toluene	Ethylbenzene	Total Xylenes	TRH C6-C10 minus BTEX (F1)	TRH C10-C36 Total	Benzo(a)pyrene	Total PAH (NEPM/WHO 16)	Total CLP OC Pesticides	Total OP Pesticides	Total PCBs (Arochlors)	Arsenic, As	Cadmium, Cd	Chromium, Cr	Copper, Cu	Lead, Pb	Nickel, Ni	Zinc, Zn	Mercury
				Units	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
Sample Name	**Description**	**Sample Date**	**Matrix**	**Reporting Limit**	0.1	0.1	0.1	0.3	25	110	0.1	0.8	1	1.7	1	1	0.3	0.5	0.5	1	0.5	2	0.05
SE226546.001	BH05_0.1-0.4	44531	Soil	Result	<0.1	<0.1	<0.1	<0.3	<25	<110	<0.1	<0.8	<1	<1.7	<1	5	<0.3	61	12	16	8.5	8.5	<0.05
SE226546.002	BH06_0.1-0.5	44531	Soil	Result	<0.1	<0.1	<0.1	<0.3	<25	<110	<0.1	<0.8	<1	<1.7	<1	2	<0.3	30	11	8	6.9	8.7	<0.05
SE226546.003	BH04_0.1-0.5	44531	Soil	Result	<0.1	<0.1	<0.1	<0.3	<25	<110	<0.1	<0.8	<1	<1.7	<1	5	<0.3	36	11	18	5.2	12	<0.05
SE226546.004	BH04_0.5-1.0	44531	Soil	Result	<0.1	<0.1	<0.1	<0.3	<25	<110	<0.1	<0.8	<1	<1.7	<1	4	<0.3	25	22	7	11	16	<0.05
				Maximum concentraion												5	0	61	22	18	11	16	0
				95% UCLmean																			

DRYU	**Benzene**	**Toluene**	**Ethylbenzene**	**Xylenes - Total***	**TRH C6-C10 less BTEX (F1)**	**TRH C10-C36 (Total)**	**Benzo(a)pyrene**	**Total PAH***	**Total CLP OC Pesticides**	**Total OP Pesticides**	**Total PCBs (Arochlors)**	**Arsenic**	**Cadmium**	**Chromium (IV)**	**Copper**	**Lead**	**Nickel**	**Zinc**	**Mercury**
HIL A/HSL A (Clay)	4/6/9/20	480/NL/NL/NL	NL/NL/NL/NL	110/310/NL/NL	50/90/150/290			300			1	100	20	100*	6000	300	400	7400	40
EIL/ESL (Area of ecological significance)	8/10	10/65	1.5/40	10/1.6	125/125		0.7/0.7					40/40				110/470			
Management Limits (A, B, C)					700/800														

Waste Classification for Off-site Disposal	**Benzene**	**Toluene**	**Ethylbenzene**	**Xylenes - Total***		**TRH C10-C36 (Total)**	**Benzo(a)pyrene**	**Total PAH***		**Total OP Pesticides**	**Total PCBs (Arochlors)**	**As**	**Cd**	**Cr**	**Cu**	**Pb**	**Ni**	**Zn**	**Hg**
General Soid Waste CT1 (mg/Kg)	10	288	600	1000		10000	0.8	200			50	100	20	100		100	40		4
General Soid Waste TCLP1 (mg/L)	0.5		30			NR		NR					1						0.2
General Soid Waste SCC1 (mg/Kg)	18		1080			10000	10	200			50	500	100	1900		1500	1050		50
Restrict Solid Waste CT2 (mg/Kg)	40	1152	2400	4000		40000	3.2	800			50	400	80	400		400	160		16
General Soid Waste TCLP2 (mg/L)	20		120			NR	0.16	NR				20	4	20		20	8		0.8
General Soid Waste SCC2 (mg/Kg)	2000		4320			40000	23	800			50	2000	400	7600		6000	4200		200

Waste Classification for VENM; ENM	**Benzene**	**Toluene**	**Ethylbenzene**	**Xylenes - Total***		**TRH C10-C36 (Total)**	**Benzo(a)pyrene**	**Total PAH***				**Arsenic**	**Cadmium**	**Chromium**	**Copper**	**Lead**	**Nickel**	**Zinc**	**Mercury**
Maximum average concentration for characterisation,(mg/kg 'dry weight' unless otherwise specified)	NA	NA	NA	NA		250	0.5	20				20	0.5	75	100	50	30	150	0.5
Absolute maximum concentration, (mg/kg 'dry weight' unless otherwise specified)	0.5	65	25	15		500	1	40				40	1	150	200	100	60	300	1

Notes to Table
NEPM, Sch B1, Table 1A Health investigation levels for soil contaminants
NEPM, Sch B7, Table 2 Health investigation levels for soil contaminants using Residential A
NEPM, Sch B1, Table 4: Soil properties to be measured for site-specific derivation of ACLs for CrIII, Cu, Ni and Zn. EIL=ABC+ACL; Table 1B(1), 1B(2), 1B(3), 1B(4). For Cu/Zn, testing CEC and pH; Ni and CrIII, additonal testing with CEC meansurements;
BTEX and F1, F2 from Sch B1, Table 1A(3) Soil HSLs for vapour intrusion (mg/kg)
Sch B1, Table 1B(6) ESLs for TPH fractions F1-F4, BTEX and benzo(a)pyrene in soil;
Sch B1, Table 1B(7) Management limits for TPH fractions F1-F4 in soil
HSLs in the Soil Depth of 0m to <1m/1m to 2m/2m to 4m/4m+
ESL data in Coarse/Fine
ML data in Coarse/Fine
EIL data in Fresh/Aged
ND – Not detected / below Practical Quantitation Limit (PQL).
NA – Not Applicable

Landuse: **Residential A**

ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS		LABORATORY DETAILS	
Contact	JEFFREY YU	Manager	Huong Crawford
Client	DR UPSILON ENVIRONMENTS PTY LTD	Laboratory	SGS Alexandria Environmental
Address	PO Box 289 Kingsford NSW 2032	Address	Unit 16, 33 Maddox St Alexandria NSW 2015
Telephone	(Not specified)	Telephone	+61 2 8594 0400
Facsimile	(Not specified)	Facsimile	+61 2 8594 0499
Email	jeffreyhuijieyu@gmail.com	Email	au.environmental.sydney@sgs.com
Project	**JDRYU 050**	SGS Reference	**SE226546 R0**
Order Number	**6334783**	Date Received	02 Dec 2021
Samples	4	Date Reported	09 Dec 2021

COMMENTS

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

SIGNATORIES

Akheeqar BENIAMEEN
Chemist

Bennet LO
Senior Chemist

Dong LIANG
Metals/Inorganics Team Leader

Ly Kim HA
Organic Section Head

Shane MCDERMOTT
Inorganic/Metals Chemist

Parameter	Units	LOR	Sample Number: SE226546.001 Sample Matrix: Soil Sample Date: 01 Dec 2021 Sample Name: BH05_0.1-0.4	SE226546.002 Soil 01 Dec 2021 BH06_0.1-0.5	SE226546.003 Soil 01 Dec 2021 BH04_0.1-0.5	SE226546.004 Soil 01 Dec 2021 BH04_0.5-1.0
VOC's in Soil Method: AN433 Tested: 5/12/2021						
Monocyclic Aromatic Hydrocarbons						
Benzene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Toluene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Ethylbenzene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
m/p-xylene	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
o-xylene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Polycyclic VOCs						
Naphthalene (VOC)	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Surrogates						
d4-1,2-dichloroethane (Surrogate)	%	-	**106**	**89**	**101**	**101**
d8-toluene (Surrogate)	%	-	**101**	**85**	**94**	**96**
Bromofluorobenzene (Surrogate)	%	-	**97**	**84**	**91**	**90**
Totals						
Total Xylenes	mg/kg	0.3	<0.3	<0.3	<0.3	<0.3
Total BTEX	mg/kg	0.6	<0.6	<0.6	<0.6	<0.6
Volatile Petroleum Hydrocarbons in Soil Method: AN433 Tested: 5/12/2021						
TRH C6-C10	mg/kg	25	<25	<25	<25	<25
TRH C6-C9	mg/kg	20	<20	<20	<20	<20
Surrogates						
d4-1,2-dichloroethane (Surrogate)	%	-	**106**	**89**	**101**	**101**
d8-toluene (Surrogate)	%	-	**101**	**85**	**94**	**96**
Bromofluorobenzene (Surrogate)	%	-	**97**	**84**	**91**	**90**
VPH F Bands						
Benzene (F0)	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	<25	<25	<25

Parameter	Units	LOR	Sample Number Sample Matrix Sample Date Sample Name	SE226546.001 Soil 01 Dec 2021 BH05_0.1-0.4	SE226546.002 Soil 01 Dec 2021 BH06_0.1-0.5	SE226546.003 Soil 01 Dec 2021 BH04_0.1-0.5	SE226546.004 Soil 01 Dec 2021 BH04_0.5-1.0
TRH (Total Recoverable Hydrocarbons) in Soil Method: AN403 Tested: 5/12/2021							
TRH C10-C14	mg/kg	20		<20	<20	<20	<20
TRH C15-C28	mg/kg	45		<45	<45	<45	<45
TRH C29-C36	mg/kg	45		<45	<45	<45	<45
TRH C37-C40	mg/kg	100		<100	<100	<100	<100
TRH C10-C36 Total	mg/kg	110		<110	<110	<110	<110
TRH >C10-C40 Total (F bands)	mg/kg	210		<210	<210	<210	<210
TRH F Bands							
TRH >C10-C16	mg/kg	25		<25	<25	<25	<25
TRH >C10-C16 - Naphthalene (F2)	mg/kg	25		<25	<25	<25	<25
TRH >C16-C34 (F3)	mg/kg	90		<90	<90	<90	<90
TRH >C34-C40 (F4)	mg/kg	120		<120	<120	<120	<120
PAH (Polynuclear Aromatic Hydrocarbons) in Soil Method: AN420 Tested: 5/12/2021							
Naphthalene	mg/kg	0.1		<0.1	<0.1	<0.1	<0.1
2-methylnaphthalene	mg/kg	0.1		<0.1	<0.1	<0.1	<0.1
1-methylnaphthalene	mg/kg	0.1		<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	0.1		<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	0.1		<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	0.1		<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	0.1		<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	0.1		<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.1		<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	0.1		<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	0.1		<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	0.1		<0.1	<0.1	<0.1	<0.1
Benzo(b&j)fluoranthene	mg/kg	0.1		<0.1	<0.1	<0.1	<0.1
Benzo(k)fluoranthene	mg/kg	0.1		<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene	mg/kg	0.1		<0.1	<0.1	<0.1	<0.1
Indeno(1,2,3-cd)pyrene	mg/kg	0.1		<0.1	<0.1	<0.1	<0.1
Dibenzo(ah)anthracene	mg/kg	0.1		<0.1	<0.1	<0.1	<0.1
Benzo(ghi)perylene	mg/kg	0.1		<0.1	<0.1	<0.1	<0.1
Carcinogenic PAHs, BaP TEQ <LOR=0	TEQ (mg/kg)	0.2		<0.2	<0.2	<0.2	<0.2
Carcinogenic PAHs, BaP TEQ <LOR=LOR	TEQ (mg/kg)	0.3		<0.3	<0.3	<0.3	<0.3
Carcinogenic PAHs, BaP TEQ <LOR=LOR/2	TEQ (mg/kg)	0.2		<0.2	<0.2	<0.2	<0.2
Total PAH (18)	mg/kg	0.8		<0.8	<0.8	<0.8	<0.8
Total PAH (NEPM/WHO 16)	mg/kg	0.8		<0.8	<0.8	<0.8	<0.8
Surrogates							
d5-nitrobenzene (Surrogate)	%	-		**83**	**85**	**83**	**82**
2-fluorobiphenyl (Surrogate)	%	-		**90**	**92**	**91**	**89**
d14-p-terphenyl (Surrogate)	%	-		**93**	**96**	**96**	**93**
OC Pesticides in Soil Method: AN420 Tested: 5/12/2021							
Hexachlorobenzene (HCB)	mg/kg	0.1		<0.1	<0.1	<0.1	<0.1
Alpha BHC	mg/kg	0.1		<0.1	<0.1	<0.1	<0.1
Lindane	mg/kg	0.1		<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	0.1		<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	0.1		<0.1	<0.1	<0.1	<0.1
Beta BHC	mg/kg	0.1		<0.1	<0.1	<0.1	<0.1
Delta BHC	mg/kg	0.1		<0.1	<0.1	<0.1	<0.1
Heptachlor epoxide	mg/kg	0.1		<0.1	<0.1	<0.1	<0.1
o,p'-DDE	mg/kg	0.1		<0.1	<0.1	<0.1	<0.1
Alpha Endosulfan	mg/kg	0.2		<0.2	<0.2	<0.2	<0.2
Gamma Chlordane	mg/kg	0.1		<0.1	<0.1	<0.1	<0.1
Alpha Chlordane	mg/kg	0.1		<0.1	<0.1	<0.1	<0.1
trans-Nonachlor	mg/kg	0.1		<0.1	<0.1	<0.1	<0.1
p,p'-DDE	mg/kg	0.1		<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	0.2		<0.2	<0.2	<0.2	<0.2
Endrin	mg/kg	0.2		<0.2	<0.2	<0.2	<0.2

Parameter	Units	LOR	Sample Number Sample Matrix Sample Date Sample Name SE226546.001 Soil 01 Dec 2021 BH05_0.1-0.4	SE226546.002 Soil 01 Dec 2021 BH06_0.1-0.5	SE226546.003 Soil 01 Dec 2021 BH04_0.1-0.5	SE226546.004 Soil 01 Dec 2021 BH04_0.5-1.0
OC Pesticides in Soil Method: AN420 Tested: 5/12/2021 (continued)						
o,p'-DDD	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
o,p'-DDT	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Beta Endosulfan	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
p,p'-DDD	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
p,p'-DDT	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan sulphate	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Endrin Ketone	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Isodrin	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Mirex	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Total CLP OC Pesticides	mg/kg	1	<1	<1	<1	<1
Total OC VIC EPA	mg/kg	1	<1	<1	<1	<1
Surrogates						
Tetrachloro-m-xylene (TCMX) (Surrogate)	%	-	**98**	**88**	**91**	**92**
OP Pesticides in Soil Method: AN420 Tested: 5/12/2021						
Dichlorvos	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5
Dimethoate	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5
Diazinon (Dimpylate)	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5
Fenitrothion	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Malathion	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Chlorpyrifos (Chlorpyrifos Ethyl)	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Parathion-ethyl (Parathion)	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Bromophos Ethyl	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Methidathion	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5
Ethion	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Azinphos-methyl (Guthion)	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Total OP Pesticides*	mg/kg	1.7	<1.7	<1.7	<1.7	<1.7
Surrogates						
2-fluorobiphenyl (Surrogate)	%	-	**90**	**92**	**91**	**89**
d14-p-terphenyl (Surrogate)	%	-	**93**	**96**	**96**	**93**
PCBs in Soil Method: AN420 Tested: 5/12/2021						
Arochlor 1016	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1221	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1232	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1242	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1248	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1254	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1260	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1262	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1268	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2
Total PCBs (Arochlors)	mg/kg	1	<1	<1	<1	<1
Surrogates						
Tetrachloro-m-xylene (TCMX) (Surrogate)	%	-	**98**	**88**	**91**	**92**

Parameter	Units	LOR	Sample Number: SE226546.001 Sample Matrix: Soil Sample Date: 01 Dec 2021 Sample Name: BH05_0.1-0.4	SE226546.002 Soil 01 Dec 2021 BH06_0.1-0.5	SE226546.003 Soil 01 Dec 2021 BH04_0.1-0.5	SE226546.004 Soil 01 Dec 2021 BH04_0.5-1.0
Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES Method: AN040/AN320 Tested: 7/12/2021						
Arsenic, As	mg/kg	1	**5**	**2**	**5**	**4**
Cadmium, Cd	mg/kg	0.3	<0.3	<0.3	<0.3	<0.3
Chromium, Cr	mg/kg	0.5	**61**	**30**	**36**	**25**
Copper, Cu	mg/kg	0.5	**12**	**11**	**11**	**22**
Nickel, Ni	mg/kg	0.5	**8.5**	**6.9**	**5.2**	**11**
Lead, Pb	mg/kg	1	**16**	**8**	**18**	**7**
Zinc, Zn	mg/kg	2	**8.5**	**8.7**	**12**	**16**
Mercury in Soil Method: AN312 Tested: 7/12/2021						
Mercury	mg/kg	0.05	<0.05	<0.05	<0.05	<0.05
Moisture Content Method: AN002 Tested: 5/12/2021						
% Moisture	%w/w	1	**15.8**	**16.4**	**18.3**	**25.5**

MB blank results are compared to the Limit of Reporting
LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.
DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage.* Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

Mercury in Soil **Method: ME-(AU)-[ENV]AN312**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Mercury	LB238673	mg/kg	0.05	<0.05	0%	110%	103%

Moisture Content **Method: ME-(AU)-[ENV]AN002**

Parameter	QC Reference	Units	LOR	DUP %RPD
% Moisture	LB238479	%w/w	1	0 - 12%

OC Pesticides in Soil **Method: ME-(AU)-[ENV]AN420**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Hexachlorobenzene (HCB)	LB238477	mg/kg	0.1	<0.1	0%	NA	NA
Alpha BHC	LB238477	mg/kg	0.1	<0.1	0%	NA	NA
Lindane	LB238477	mg/kg	0.1	<0.1	0%	NA	NA
Heptachlor	LB238477	mg/kg	0.1	<0.1	0%	99%	99%
Aldrin	LB238477	mg/kg	0.1	<0.1	0%	92%	91%
Beta BHC	LB238477	mg/kg	0.1	<0.1	0%	NA	NA
Delta BHC	LB238477	mg/kg	0.1	<0.1	0%	94%	94%
Heptachlor epoxide	LB238477	mg/kg	0.1	<0.1	0%	NA	NA
o,p'-DDE	LB238477	mg/kg	0.1	<0.1	0%	NA	NA
Alpha Endosulfan	LB238477	mg/kg	0.2	<0.2	0%	NA	NA
Gamma Chlordane	LB238477	mg/kg	0.1	<0.1	0%	NA	NA
Alpha Chlordane	LB238477	mg/kg	0.1	<0.1	0%	NA	NA
trans-Nonachlor	LB238477	mg/kg	0.1	<0.1	0%	NA	NA
p,p'-DDE	LB238477	mg/kg	0.1	<0.1	0%	NA	NA
Dieldrin	LB238477	mg/kg	0.2	<0.2	0%	93%	91%
Endrin	LB238477	mg/kg	0.2	<0.2	0%	90%	91%
o,p'-DDD	LB238477	mg/kg	0.1	<0.1	0%	NA	NA
o,p'-DDT	LB238477	mg/kg	0.1	<0.1	0%	NA	NA
Beta Endosulfan	LB238477	mg/kg	0.2	<0.2	0%	NA	NA
p,p'-DDD	LB238477	mg/kg	0.1	<0.1	0%	NA	NA
p,p'-DDT	LB238477	mg/kg	0.1	<0.1	0%	113%	99%
Endosulfan sulphate	LB238477	mg/kg	0.1	<0.1	0%	NA	NA
Endrin Aldehyde	LB238477	mg/kg	0.1	<0.1	0%	NA	NA
Methoxychlor	LB238477	mg/kg	0.1	<0.1	0%	NA	NA
Endrin Ketone	LB238477	mg/kg	0.1	<0.1	0%	NA	NA
Isodrin	LB238477	mg/kg	0.1	<0.1	0%	NA	NA
Mirex	LB238477	mg/kg	0.1	<0.1	0%	NA	NA
Total CLP OC Pesticides	LB238477	mg/kg	1	<1	0%	NA	NA
Total OC VIC EPA	LB238477	mg/kg	1	<1	0%	NA	NA

Surrogates

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Tetrachloro-m-xylene (TCMX) (Surrogate)	LB238477	%	-	102%	0 - 12%	96%	104%

MB blank results are compared to the Limit of Reporting
LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.
DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage.* Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

OP Pesticides in Soil Method: ME-(AU)-[ENV]AN420

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Dichlorvos	LB238477	mg/kg	0.5	<0.5	0%	83%	82%
Dimethoate	LB238477	mg/kg	0.5	<0.5	0%	NA	NA
Diazinon (Dimpylate)	LB238477	mg/kg	0.5	<0.5	0%	101%	100%
Fenitrothion	LB238477	mg/kg	0.2	<0.2	0%	NA	NA
Malathion	LB238477	mg/kg	0.2	<0.2	0%	NA	NA
Chlorpyrifos (Chlorpyrifos Ethyl)	LB238477	mg/kg	0.2	<0.2	0%	99%	97%
Parathion-ethyl (Parathion)	LB238477	mg/kg	0.2	<0.2	0%	NA	NA
Bromophos Ethyl	LB238477	mg/kg	0.2	<0.2	0%	NA	NA
Methidathion	LB238477	mg/kg	0.5	<0.5	0%	NA	NA
Ethion	LB238477	mg/kg	0.2	<0.2	0%	112%	116%
Azinphos-methyl (Guthion)	LB238477	mg/kg	0.2	<0.2	0%	NA	NA
Total OP Pesticides*	LB238477	mg/kg	1.7	<1.7	0%	NA	NA

Surrogates

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
2-fluorobiphenyl (Surrogate)	LB238477	%	-	92%	0 - 12%	90%	90%
d14-p-terphenyl (Surrogate)	LB238477	%	-	94%	0 - 16%	90%	90%

PAH (Polynuclear Aromatic Hydrocarbons) in Soil Method: ME-(AU)-[ENV]AN420

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Naphthalene	LB238477	mg/kg	0.1	<0.1	0 - 17%	102%	100%
2-methylnaphthalene	LB238477	mg/kg	0.1	<0.1	0%	NA	NA
1-methylnaphthalene	LB238477	mg/kg	0.1	<0.1	0%	NA	NA
Acenaphthylene	LB238477	mg/kg	0.1	<0.1	0 - 33%	100%	99%
Acenaphthene	LB238477	mg/kg	0.1	<0.1	0%	93%	91%
Fluorene	LB238477	mg/kg	0.1	<0.1	0 - 10%	NA	NA
Phenanthrene	LB238477	mg/kg	0.1	<0.1	0 - 152%	99%	95%
Anthracene	LB238477	mg/kg	0.1	<0.1	0 - 94%	92%	89%
Fluoranthene	LB238477	mg/kg	0.1	<0.1	0 - 156%	94%	90%
Pyrene	LB238477	mg/kg	0.1	<0.1	0 - 152%	100%	96%
Benzo(a)anthracene	LB238477	mg/kg	0.1	<0.1	0 - 141%	NA	NA
Chrysene	LB238477	mg/kg	0.1	<0.1	0 - 132%	NA	NA
Benzo(b&j)fluoranthene	LB238477	mg/kg	0.1	<0.1	0 - 107%	NA	NA
Benzo(k)fluoranthene	LB238477	mg/kg	0.1	<0.1	0 - 116%	NA	NA
Benzo(a)pyrene	LB238477	mg/kg	0.1	<0.1	0 - 105%	101%	96%
Indeno(1,2,3-cd)pyrene	LB238477	mg/kg	0.1	<0.1	0 - 71%	NA	NA
Dibenzo(ah)anthracene	LB238477	mg/kg	0.1	<0.1	0 - 18%	NA	NA
Benzo(ghi)perylene	LB238477	mg/kg	0.1	<0.1	0 - 54%	NA	NA
Carcinogenic PAHs, BaP TEQ <LOR=0	LB238477	TEQ (mg/kg)	0.2	<0.2	0 - 108%	NA	NA
Carcinogenic PAHs, BaP TEQ <LOR=LOR	LB238477	TEQ (mg/kg)	0.3	<0.3	0 - 97%	NA	NA
Carcinogenic PAHs, BaP TEQ <LOR=LOR/2	LB238477	TEQ (mg/kg)	0.2	<0.2	0 - 103%	NA	NA
Total PAH (18)	LB238477	mg/kg	0.8	<0.8	0 - 116%	NA	NA
Total PAH (NEPM/WHO 16)	LB238477	mg/kg	0.8	<0.8			

Surrogates

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
d5-nitrobenzene (Surrogate)	LB238477	%	-	86%	0 - 15%	88%	84%
2-fluorobiphenyl (Surrogate)	LB238477	%	-	92%	0 - 12%	90%	90%
d14-p-terphenyl (Surrogate)	LB238477	%	-	94%	0 - 16%	90%	90%

MB blank results are compared to the Limit of Reporting
LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.
DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage.* Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

PCBs in Soil Method: ME-(AU)-[ENV]AN420

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Arochlor 1016	LB238477	mg/kg	0.2	<0.2	0%	NA	NA
Arochlor 1221	LB238477	mg/kg	0.2	<0.2	0%	NA	NA
Arochlor 1232	LB238477	mg/kg	0.2	<0.2	0%	NA	NA
Arochlor 1242	LB238477	mg/kg	0.2	<0.2	0%	NA	NA
Arochlor 1248	LB238477	mg/kg	0.2	<0.2	0%	NA	NA
Arochlor 1254	LB238477	mg/kg	0.2	<0.2	0%	NA	NA
Arochlor 1260	LB238477	mg/kg	0.2	<0.2	0%	61%	78%
Arochlor 1262	LB238477	mg/kg	0.2	<0.2	0%	NA	NA
Arochlor 1268	LB238477	mg/kg	0.2	<0.2	0%	NA	NA
Total PCBs (Arochlors)	LB238477	mg/kg	1	<1	0%	NA	NA

Surrogates

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Tetrachloro-m-xylene (TCMX) (Surrogate)	LB238477	%	-	102%	0 - 12%	96%	104%

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES Method: ME-(AU)-[ENV]AN040/AN320

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Arsenic, As	LB238664	mg/kg	1	<1	13 - 41%	110%	83%
Cadmium, Cd	LB238664	mg/kg	0.3	<0.3	0 - 53%	91%	78%
Chromium, Cr	LB238664	mg/kg	0.5	<0.5	20 - 52%	109%	77%
Copper, Cu	LB238664	mg/kg	0.5	<0.5	1 - 10%	114%	101%
Nickel, Ni	LB238664	mg/kg	0.5	<0.5	12 - 23%	104%	74%
Lead, Pb	LB238664	mg/kg	1	<1	24 - 42%	104%	60%
Zinc, Zn	LB238664	mg/kg	2	<2.0	4 - 21%	106%	36%

TRH (Total Recoverable Hydrocarbons) in Soil Method: ME-(AU)-[ENV]AN403

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
TRH C10-C14	LB238477	mg/kg	20	<20	0%	128%	85%
TRH C15-C28	LB238477	mg/kg	45	<45	0 - 9%	115%	75%
TRH C29-C36	LB238477	mg/kg	45	<45	0 - 16%	90%	123%
TRH C37-C40	LB238477	mg/kg	100	<100	0%	NA	NA
TRH C10-C36 Total	LB238477	mg/kg	110	<110	0%	NA	NA
TRH >C10-C40 Total (F bands)	LB238477	mg/kg	210	<210	0%	NA	NA

TRH F Bands

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
TRH >C10-C16	LB238477	mg/kg	25	<25	0%	120%	85%
TRH >C10-C16 - Naphthalene (F2)	LB238477	mg/kg	25	<25	0%	NA	NA
TRH >C16-C34 (F3)	LB238477	mg/kg	90	<90	0%	98%	60%
TRH >C34-C40 (F4)	LB238477	mg/kg	120	<120	0%	105%	NA

MB blank results are compared to the Limit of Reporting
LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.
DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage.* Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

VOC's in Soil Method: ME-(AU)-[ENV]AN433

Monocyclic Aromatic Hydrocarbons

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Benzene	LB238478	mg/kg	0.1	<0.1	0%	90%	78%
Toluene	LB238478	mg/kg	0.1	<0.1	0%	96%	83%
Ethylbenzene	LB238478	mg/kg	0.1	<0.1	0%	91%	80%
m/p-xylene	LB238478	mg/kg	0.2	<0.2	0%	88%	79%
o-xylene	LB238478	mg/kg	0.1	<0.1	0%	98%	89%

Polycyclic VOCs

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Naphthalene (VOC)	LB238478	mg/kg	0.1	<0.1	0%	NA	NA

Surrogates

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
d4-1,2-dichloroethane (Surrogate)	LB238478	%	-	89%	2 - 10%	102%	88%
d8-toluene (Surrogate)	LB238478	%	-	98%	2 - 9%	106%	86%
Bromofluorobenzene (Surrogate)	LB238478	%	-	101%	4 - 7%	97%	85%

Totals

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Total Xylenes	LB238478	mg/kg	0.3	<0.3	0%	NA	NA
Total BTEX	LB238478	mg/kg	0.6	<0.3	0%	NA	NA

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

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
TRH C6-C10	LB238478	mg/kg	25	<25	0%	84%	82%
TRH C6-C9	LB238478	mg/kg	20	<20	0%	87%	85%

Surrogates

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
d4-1,2-dichloroethane (Surrogate)	LB238478	%	-	89%	2 - 10%	102%	88%
d8-toluene (Surrogate)	LB238478	%	-	98%	2 - 9%	106%	86%
Bromofluorobenzene (Surrogate)	LB238478	%	-	101%	4 - 7%	97%	85%

VPH F Bands

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Benzene (F0)	LB238478	mg/kg	0.1	<0.1	0%	NA	NA
TRH C6-C10 minus BTEX (F1)	LB238478	mg/kg	25	<25	0%	81%	82%

METHOD	METHODOLOGY SUMMARY
AN002	The test is carried out by drying (at either 40°C or 105°C) a known mass of sample in a weighed evaporating basin. After fully dry the sample is re-weighed. Samples such as sludge and sediment having high percentages of moisture will take some time in a drying oven for complete removal of water.
AN040	A portion of sample is digested with Nitric acid to decompose organic matter and Hydrochloric acid to complete the digestion of metals and then filtered for analysis by ASS or ICP as per USEPA Method 200.8.
AN040/AN320	A portion of sample is digested with nitric acid to decompose organic matter and hydrochloric acid to complete the digestion of metals. The digest is then analysed by ICP OES with metals results reported on the dried sample basis. Based on USEPA method 200.8 and 6010C.
AN312	Mercury by Cold Vapour AAS in Soils: After digestion with nitric acid, hydrogen peroxide and hydrochloric acid, mercury ions are reduced by stannous chloride reagent in acidic solution to elemental mercury. This mercury vapour is purged by nitrogen into a cold cell in an atomic absorption spectrometer or mercury analyser. Quantification is made by comparing absorbances to those of the calibration standards. Reference APHA 3112/3500
AN403	Total Recoverable Hydrocarbons: Determination of Hydrocarbons by gas chromatography after a solvent extraction. Detection is by flame ionisation detector (FID) that produces an electronic signal in proportion to the combustible matter passing through it. Total Recoverable Hydrocarbons (TRH) are routinely reported as four alkane groupings based on the carbon chain length of the compounds: C6-C9, C10-C14, C15-C28 and C29-C36 and in recognition of the NEPM 1999 (2013), >C10-C16 (F2), >C16-C34 (F3) and >C34-C40 (F4). F2 is reported directly and also corrected by subtracting Naphthalene (from VOC method AN433) where available.
AN403	Additionally, the volatile C6-C9 fraction may be determined by a purge and trap technique and GC/MS because of the potential for volatiles loss. Total Recoverable Hydrocarbons - Silica (TRH-Si) follows the same method of analysis after silica gel cleanup of the solvent extract. Aliphatic/Aromatic Speciation follows the same method of analysis after fractionation of the solvent extract over silica with differential polarity of the eluent solvents .
AN403	The GC/FID method is not well suited to the analysis of refined high boiling point materials (ie lubricating oils or greases) but is particularly suited for measuring diesel, kerosene and petrol if care to control volatility is taken. This method will detect naturally occurring hydrocarbons, lipids, animal fats, phenols and PAHs if they are present at sufficient levels, dependent on the use of specific cleanup/fractionation techniques. Reference USEPA 3510B, 8015B.
AN420	(SVOCs) including OC, OP, PCB, Herbicides, PAH, Phthalates and Speciated Phenols (etc) in soils, sediments and waters are determined by GCMS/ECD technique following appropriate solvent extraction process (Based on USEPA 3500C and 8270D).
AN420	SVOC Compounds: Semi-Volatile Organic Compounds (SVOCs) including OC, OP, PCB, Herbicides, PAH, Phthalates and Speciated Phenols in soils, sediments and waters are determined by GCMS/ECD technique following appropriate solvent extraction process (Based on USEPA 3500C and 8270D).
AN433	VOCs and C6-C9 Hydrocarbons by GC-MS P&T: VOC`s are volatile organic compounds. The sample is presented to a gas chromatograph via a purge and trap (P&T) concentrator and autosampler and is detected with a Mass Spectrometer (MSD). Solid samples are initially extracted with methanol whilst liquid samples are processed directly. References: USEPA 5030B, 8020A, 8260.

FOOTNOTES

IS	Insufficient sample for analysis.	LOR	Limit of Reporting
LNR	Sample listed, but not received.	↑↓	Raised or Lowered Limit of Reporting
*	NATA accreditation does not cover the performance of this service.	QFH	QC result is above the upper tolerance
		QFL	QC result is below the lower tolerance
**	Indicative data, theoretical holding time exceeded.	-	The sample was not analysed for this analyte
***	Indicates that both * and ** apply.	NVL	Not Validated

Unless it is reported that sampling has been performed by SGS, the samples have been analysed as received.
Solid samples expressed on a dry weight basis.

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

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

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

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

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

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

The QC and MU criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here: www.sgs.com.au/en-gb/environment-health-and-safety.

source: Sydney.pdf page: 3 SGS Ref: SE226546_COC

CHAIN OF CUSTODY & ANALYSIS REQUEST

Page 1 of 1

SGS Environmental Services Sydney
Unit 16, 33 Maddox Street
Alexandria NSW 2015
Telephone No: (02) 85940400
Facsimile No: (02) 85940499
Email: au.samplereceipt.sydney@sgs.com

Lab ID Number: *(please quote on correspondence)*

Company Name:	Dr Upsilon Environments	Project Name/No:	JDRYU050
Address:	292 Rosemont Road, Bossers Creek NSW	Purchase Order No:	6334783
		Results Required Date:	9/12/21
		Telephone:	0406201136 Fax:
Contact Name:	Jeffray YU	Email Results to:	admin @ DrUpsilonGroup.com @
Quotation No:			

SGS ID	Client Sample ID	Sampling Date/ Time	Matrix (Tick as appropriate) Soil Sample	Water Sample	Other	NO. OF CONTAINERS	ANALYSIS REQUESTED: CL17
1	BH05_0.1-0.4	1/12/21	1			1	1
2	BH06_0.1-0.5	1/12/21	1			1	1
3	BH04_0.1-0.5	1/12/21	1			1	1
4	BH04_0.5-1.0	1/12/21	1			1	1

Additional Report Formats

- [x] NEPM
- [x] CSV
- [ ] ESDAT
- [x] DQO
- [ ] GO, Guidelines ---------
- [ ] Others _____

Notes/Guidelines/LOR/ Special instructions

SGS EHS Sydney COC
SE226546

Relinquished By: Jeffray YU	Date/Time: 2/12/21	Received By: George Zhi	Date/Time: 2/12/21 @ 11:50am
Relinquished By: Jeffray YU	Date/Time: 2/12/21	Received By:	Date/Time:
Samples Intact: (Yes) / No	Temperature: 11 °C	Sample Security Sealed: *Yes / No*	Hazards: *e.g. may contain Asbestos*

Comments / Subcontracting details:

Dr Upsilon Environments Pty Ltd
ABN: 91 647 732 518
Phone: 0406 201 136
Email: Jeffrey.yu@DrUpsilonGroup.com
PO Box 289, 12 Gardeners Road, Kingsford, NSW
Web: www.DrUpsilonGroup.com

Appendix 4 – Borehole Log

Dr Upsilon Environments

ENVIRONMENTAL BOREHOLE BH04

PROJECT NUMBER JDRYU050
PROJECT NAME PSI
CLIENT TL
ADDRESS 292 Rosemont Road, Boxers Creek, NSW

DRILLING DATE 01/12/2021
DRILLING COMPANY DRYU
DRILLER JY
DRILLING METHOD Hand Auger
TOTAL DEPTH 1

COORDINATES 203800.491, 6145911.768
COORD SYS GDA94, MAG Zone 56
SURFACE ELEVATION 670 m
LOGGED BY JY

COMMENTS

Depth (m)	Samples	Is Analysed?	Graphic Log	USCS	Material Description	Additional Observations
0.05	BH04_0.0-0.1	N		Peat	TOPSOIL: Clay or loamy clay, with lush vegetation	Topsoil, lush vegetation
0.1	BH04_0.1-0.5	Y			Clay: low to medium plasticity, brown, moist.	Clay: Visual natural material; Refusal to 1 m due to abundant gravels
0.5	BH04_0.5-1.0	N			Clay with Gravel, low to medium plasticity, yellow, moist.	
1					Termination Depth at: 1 m	Termination Depth at: 1 m

Dr Upsilon Environments

ENVIRONMENTAL BOREHOLE BH05

PROJECT NUMBER JDRYU050
PROJECT NAME PSI
CLIENT TL
ADDRESS 292 Rosemont Road, Boxers Creek, NSW

DRILLING DATE 01/12/2021
DRILLING COMPANY DRYU
DRILLER JY
DRILLING METHOD Hand Auger
TOTAL DEPTH 0.4

COORDINATES 203862.353,6146273.041
COORD SYS GDA94, MAG Zone 56
SURFACE ELEVATION 658 m
LOGGED BY JY

COMMENTS

Depth (m)	Samples	Is Analysed?	Graphic Log	USCS	Material Description	Additional Observations
0.02	BH05_0.0-0.1	N		Peat	TOPSOIL: Clay or loamy clay, with lush vegetation	Topsoil, lush vegetation
0.04						
0.06						
0.08						
0.1	BH05_0.1-0.4	Y			Clay: low to medium plasticity, brown, moist.	Clay: Visual natural material; Refusal to 0.4 m due to abundant gravels
0.12						
0.14						
0.16						
0.18						
0.2						
0.22						
0.24						
0.26						
0.28						
0.3						
0.32						
0.34						
0.36						
0.38						
0.4					Termination Depth at: 0.4 m	Termination Depth at: 0.4 m

Dr Upsilon Environments

ENVIRONMENTAL BOREHOLE BH06

PROJECT NUMBER JDRYU050
PROJECT NAME PSI
CLIENT TL
ADDRESS 292 Rosemont Road, Boxers Creek, NSW

DRILLING DATE 01/12/2021
DRILLING COMPANY DRYU
DRILLER JY
DRILLING METHOD Hand Auger
TOTAL DEPTH 0.5

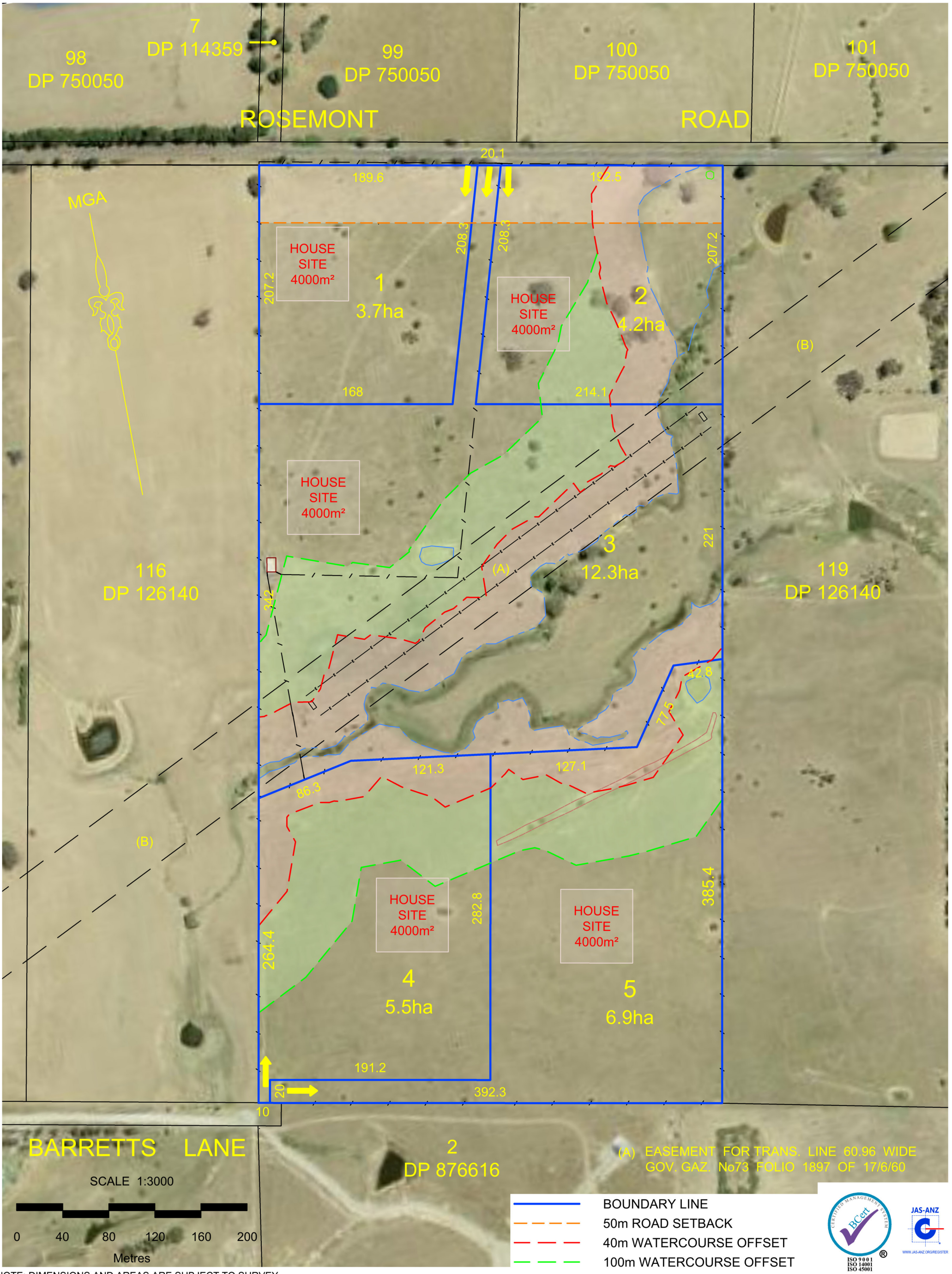
COORDINATES 203862.353, 6146273.041
COORD SYS GDA94, MAG Zone 56
SURFACE ELEVATION 667 m
LOGGED BY JY

COMMENTS

Depth (m)	Samples	Is Analysed?	Graphic Log	USCS	Material Description	Additional Observations
0.02	BH06_0.0-0.1	N		Peat	TOPSOIL: Clay or loamy clay, with lush vegetation	Topsoil, lush vegetation
0.1	BH06_0.1-0.5	Y			Clay: low to medium plasticity, brown, moist.	Clay: Visual natural material; Refusal to 0.5 m due to abundant gravels
0.5					Termination Depth at: 0.5 m	Termination Depth at: 0.5 m

Dr Upsilon Environments Pty Ltd
ABN: 91 647 732 518
Phone: 0406 201 136
Email: Jeffrey.yu@DrUpsilonGroup.com
PO Box 289, 12 Gardeners Road, Kingsford, NSW
Web: www.DrUpsilonGroup.com

Appendix 5 – Architectural Plan and Survey Plan



NOTE: DIMENSIONS AND AREAS ARE SUBJECT TO SURVEY

File Name: J:\Surveyors\Jobs\214480 Taylor\4. Planning\DWG\Rosemont Road-Barretts Lane\214480-DA01- D Subdivsion (Rosemont Road).dwg

ISSUE	AMENDMENT	DATE
A	INITIAL ISSUE	02/03/2021
B	BOUNDARY ADJUSTMENT	10/03/2021
C	BOUNDARY ADJUSTMENT	23/08/2021
D	REMOVAL OF ROC	30/08/2021

LandTeam Australia Pty Ltd
ABN 35 300 283 592
Goulburn Office
36 Montague Street
Postal: PO Box 1040
GOULBURN NSW 2580
p: (02) 4821 1033
e: goulburn@landteam.com.au
www.landteam.com.au

LandTeam

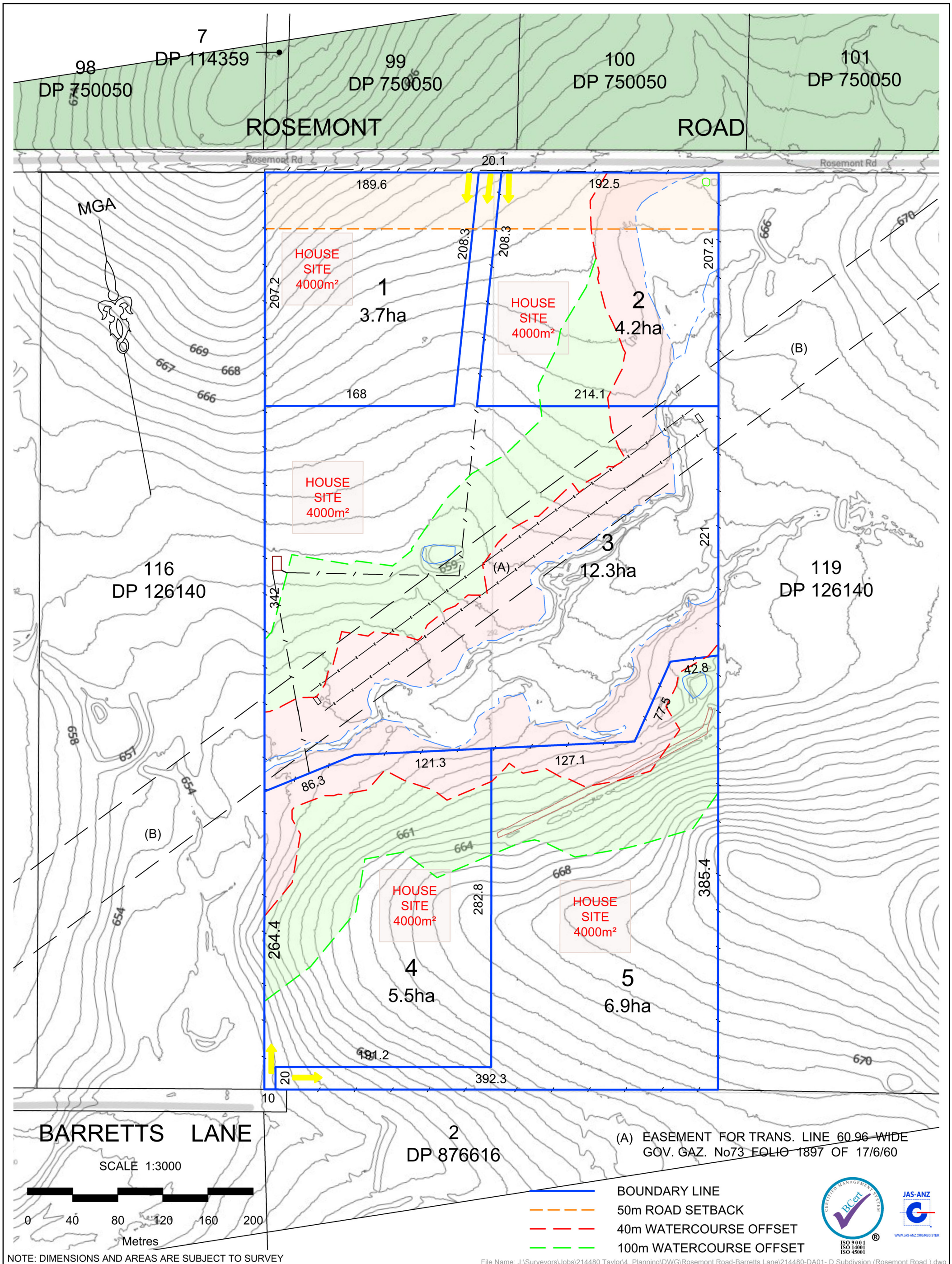
A3 SHEET

M.TAYLOR

PLAN OF PROPOSED SUBDIVSION
AERIAL UNDERLAY
LOTS 117 & 118 DP 126140,
292 ROSEMONT ROAD, BOXERS CREEK.

SCALE 1:3000 | DATUM N/A | CONTOUR INTERVAL N/A

DATE: 02/03/2021
SURVEYED: N/A
DRAWN: SH
CHECKED: JK
ISSUE D
DRAWING No. 214480 B-DA01-01



NOTE: DIMENSIONS AND AREAS ARE SUBJECT TO SURVEY

File Name: J:\Surveyors\Jobs\214480 Taylor\4. Planning\DWG\Rosemont Road-Barretts Lane\214480-DA01- D Subdivsion (Rosemont Road).dwg

ISSUE	AMENDMENT	DATE
A	INITIAL ISSUE	02/03/2021
B	BOUNDARY ADJUSTMENT	10/03/2021
C	BOUNDARY ADJUSTMENT	23/08/2021
D	REMOVAL OF ROC	30/08/2021

LandTeam Australia Pty Ltd
ABN 35 300 283 592
Goulburn Office
36 Montague Street
Postal: PO Box 1040
GOULBURN NSW 2580
p: (02) 4821 1033
e: goulburn@landteam.com.au
www.landteam.com.au

LandTeam

A3 SHEET

M.TAYLOR

PLAN OF PROPOSED SUBDIVSION
1m CONTOURS UNDERLAY
LOTS 117 & 118 DP 126140,
292 ROSEMONT ROAD, BOXERS CREEK.

SCALE	1:3000	DATUM	N/A	CONTOUR INTERVAL	N/A

DATE: 02/03/2021
SURVEYED: N/A
DRAWN: SH
CHECKED: JK
ISSUE D
DRAWING No.
214480 B-DA01-02

98
DP 750050

7
DP 114359

99
DP 750050

100
DP 750050

101
DP 750050

ROSEMONT ROAD

MGA

20.1

189.6

192.5

HOUSE SITE 4000m²

1
3.7ha

208.3

208.3

207.2

207.2

HOUSE SITE 4000m²

2
4.2ha

(B)

168

214.1

HOUSE SITE 4000m²

3
12.3ha

(A)

221

116
DP 126140

119
DP 126140

342

42.8

77.5

121.3

127.1

86.3

(B)

HOUSE SITE 4000m²

HOUSE SITE 4000m²

282.8

385.4

264.4

4
5.5ha

5
6.9ha

191.2

20

392.3

10

BARRETTS LANE

2
DP 876616

(A) EASEMENT FOR TRANS. LINE 60.96 WIDE
GOV. GAZ. No73 FOLIO 1897 OF 17/6/60

SCALE 1:3000

0 40 80 120 160 200

Metres

BOUNDARY LINE
50m ROAD SETBACK
40m WATERCOURSE OFFSET
100m WATERCOURSE OFFSET

ISO 9001
ISO 14001
ISO 45001

NOTE: DIMENSIONS AND AREAS ARE SUBJECT TO SURVEY

File Name: J:\Surveyors\Jobs\214480 Taylor\4. Planning\DWG\Rosemont Road-Barretts Lane\214480-DA01- D Subdivsion (Rosemont Road).dwg

ISSUE	AMENDMENT	DATE
A	INITIAL ISSUE	02/03/2021
B	BOUNDARY ADJUSTMENT	10/03/2021
C	BOUNDARY ADJUSTMENT	23/08/2021
D	REMOVAL OF ROC	30/08/2021

LandTeam Australia Pty Ltd
ABN 35 300 283 592
Goulburn Office
36 Montague Street
Postal: PO Box 1040
GOULBURN NSW 2580
p: (02) 4821 1033
e: goulburn@landteam.com.au
www.landteam.com.au

LandTeam

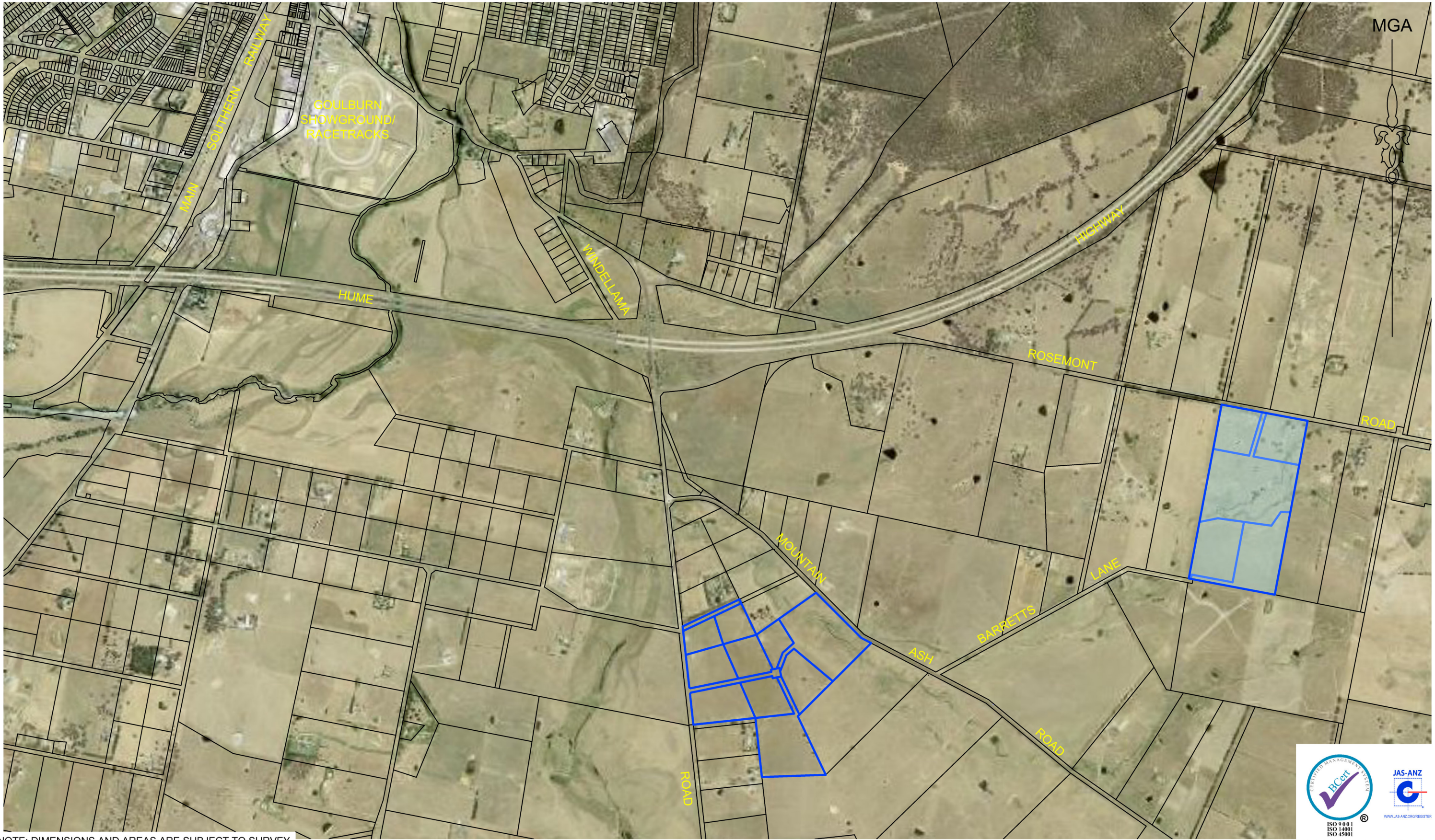
A3 SHEET

M.TAYLOR

PLAN OF PROPOSED SUBDIVSION
10m CONTOURS UNDERLAY
LOTS 117 & 118 DP 126140,
292 ROSEMONT ROAD, BOXERS CREEK.

SCALE	1:3000	DATUM	N/A	CONTOUR INTERVAL	N/A

DATE: 02/03/2021
SURVEYED: N/A
DRAWN: SH
CHECKED: JK
ISSUE D
DRAWING No.
214480 B-DA01-03



NOTE: DIMENSIONS AND AREAS ARE SUBJECT TO SURVEY

File Name: J:\Surveyors\Jobs\214480 Taylor\4. Planning\DWG\Rosemont Road-Barretts Lane\214480-DA01- D Subdivsion (Rosemont Road).dwg

ISSUE	AMENDMENT	DATE
A	INITIAL ISSUE	02/03/2021
B	BOUNDARY ADJUSTMENTS	10/03/2021
C	BOUNDARY ADJUSTMENTS	25/08/2021
D	REMOVAL OF ROC	30/08/2021

0 200 400 600 800 1000
Metres

LandTeam Australia Pty Ltd
ABN 35 300 283 592
Goulburn Office
36 Montague Street
Postal: PO Box 1040
GOULBURN NSW 2580
p: (02) 4821 1033
e: goulburn@landteam.com.au
www.landteam.com.au

LandTeam

A3 SHEET

M. TAYLOR

GOULBURN MULWAREE COUNCIL

PLAN OF PROPOSED SUBDIVSION
LOCATION PLAN
LOTS 117 & 118 DP 126140,
292 ROSEMONT ROAD, BOXERS CREEK.

DATUM N/A CONTOUR INTERVAL N/A

DATE: 02/02/2021
SURVEYED: N/A
DRAWN: SH
CHECKED: JK
ISSUE D

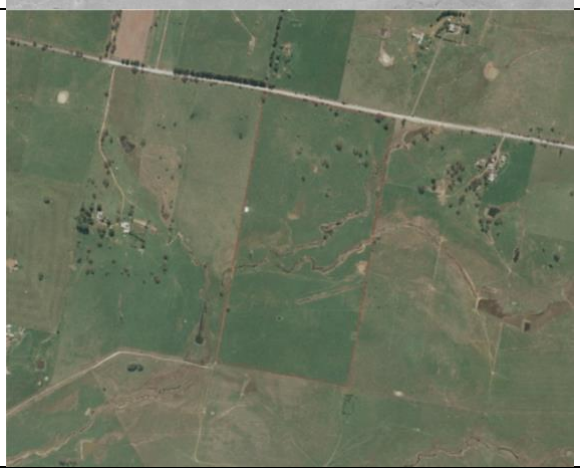
DRAWING No.
214480 A-DA01-04

Appendix 6 – Historical Imagery Records

How to Contact Us

DR UPSILON ENVIRONMENTS PTY LTD
ABN: 91 647 732 518
PO Box 289, 12 Gardeners Road, Kingsford, NSW
Phone: 0406 201 136
Email: Jeffrey.yu@DrUpsilonGroup.com
Web: www.DrUpsilonGroup.com

Table 7 Historical aerial photography at 292 Rosemont Road, Boxers Creek, NSW

Year	Historical aerial photography	Site features	Surroundings features
1975		The site is situated on similar 32.6 ha land parcels with distinct property boundaries. There were some trees decorated most in the northeast portion. The Site is crossed in the middle by a diverted stream flow from west to east.	The Site is to the north by Rosemont Road, to the west and east by grazing modified pastures, to the south by residential and farm infrastructure.
1978		There was no apparently significant landscape change.	There was no apparently significant landscape change.
1987		There appeared to be little change to the site since 1978. The shed near the middle west boundary of the site may have been constructed.	There was no apparently significant landscape change.
1991		There was no apparently significant landscape change.	There was no apparently significant landscape change.

Year	Historical aerial photography	Site features	Surroundings features
1997		There was no apparently significant landscape change.	There was no apparently significant landscape change.
2021		There was no apparently significant landscape change.	There was no apparently significant landscape change.