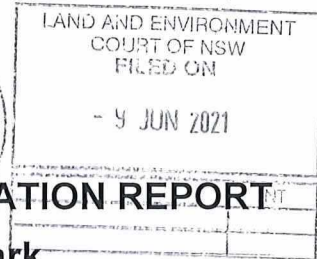


Form A (version 2)
UCPR [enter UCPR rule]



DETAILED CONTAMINATION SITE INVESTIGATION REPORT

232 Grange Avenue, Marsden Park

COURT DETAILS

Court	Land and Environment Court of New South Wales
Class	1
Case number	2019/376150

TITLE OF PROCEEDINGS

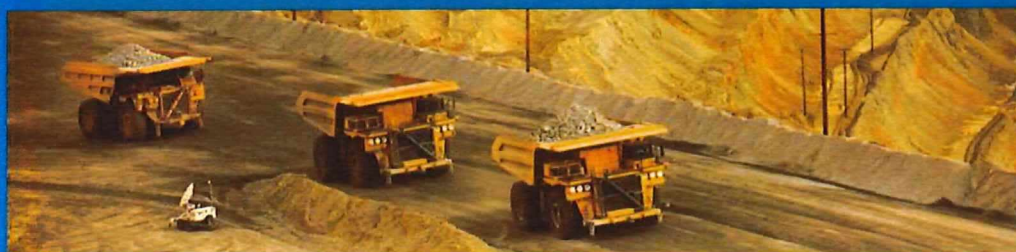
Applicant	Universal Property Group Pty Ltd
Respondent	Blacktown City Council

FILING DETAILS

Filed for	Universal Property Group Pty Ltd, Applicant
Legal representative	Emma Fleming, Swaab
Legal representative reference	EJF: 191205
Contact name and telephone	Emma Fleming, 9777 8319
Contact email	ejf@swaab.com.au



DETAILED CONTAMINATION SITE INVESTIGATION REPORT



ADDRESS: 232 Grange Ave, Marsden Park NSW

CLIENT: Bathla Group

REPORT No: NE083

DATE: 10 January 2017



GEOTESTA

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1. INTRODUCTION

The aim of this report is to investigate the contamination of the sites referred to as 232 Grange Ave, Marsden Park, NSW. This detailed site investigation was commissioned by Bathla Group.

The site currently contains a residential property, sheds and a farm dam. The site is currently used as a residential property. The preliminary site investigations performed by Martens & Associates Pty Ltd [1] have noted environmental concerns from asbestos, pesticides, heavy metals, potentially spilled or leaked contaminating chemicals and fuel, oil, lead based paints and container/drums of unknown contents.

A development application (DA) has been submitted to Blacktown City Council. It is understood that the site is proposed for development into a residential subdivision comprising of medium density residential blocks, roads and communal open spaces. Prior to the DA being approved, Council has requested that a detailed site investigation is undertaken so as to assess the potential environmental concerns.

This report is based only on the information provided at the time of this report preparation and may not be valid if changes are made to the site conditions and/or soil and groundwater.

2. OBJECTIVE AND SCOPE

The objective of this detailed study is to evaluate the site contamination with regard to the proposed development and potential contaminations presenting risk to human health and/or the environment as a result of previous and current land use.

The general objective to be adhered is recommending the suitability of the site for residential development in relation to the management of contamination.

The scope of work carried out to achieve this objective consisted of:

- Performing a desktop assessment of the available information on the site history from aerial photographs and historical titles search
- Searching records on previous notices issued by OEH and Blacktown City Council SEPP (SRGC) 2006:R3; SEPP (SRGC) 2006:SP2- Infrastructure - Local Drainage; SEPP (SRGC) 2006:SP2 - Infrastructure – Local Road
- Evaluating the preliminary site investigation, salinity and geotechnical site investigation reports
- Inspecting the site to identify apparent or suspected areas of contamination and undertaking soil samplings across the site
- Planning a range of laboratory environmental tests
- Preparing a report summarising above

3. SITE DESCRIPTION

3.1 Site Location and Topography

Investigation area is situated at 232 Grange Ave, Marsden Park NSW. The site location is shown in Figure 1. The subject site is located on the northern side of the Grange Avenue. The site is rectangular in shape, measuring about 60m along Grange Ave. The area of the site is about 1.1 ha. The site is gently sloping to south. The site is within the Blacktown City Council [1].

Site 232 Grange Ave is a rural residential with existing dwellings, sheds and paddock. The site is bound by property 234 Grange Ave to the west, property 230 Grange Ave, 1032 and 1036 Richmond Rd to the east, 1050 Richmond Rd to the north, and Grange Ave to the south.

At the time of investigation, the site was occupied by a single storey residential building, several sheds and open paddocks.

3.2 Geological and Soil Logging Settings

The Penrith 1:100,000 Geological Series (1991) indicates that the site is underlain by Bringelly Shale which comprises shale, carbonaceous claystone, claystone, laminite, fine to medium grained lithic sandstone and rare coal/tuff. The NSW Environment and Heritage eSPADE website identifies the site as having soils of the Blacktown soil landscapes consisting of shallow to moderately deep hard setting mottled texture contrast soils, red and brown podzolic soils on crests grading to yellow podzic soils on lower slopes and in drainage lines.

3.3 Site History Records

Development application and building plan records kept by Blacktown City Council show that development applications made for construction of sheds in the site started in 1978. The site history records are shown in Table 1.

3.4 Site Regional Meteorology and Hydrogeology

The following climate information from the Commonwealth Bureau of Meteorology website can be obtained [3]:

- Maximum temperature medians of 29.1°C for December to February in Richmond station
- Minimum temperature medians of 16.9°C for December to February Richmond station
- Mean annual Rainfall of 619.9mm in Willmot (Resolution Ave), weather station 67116 (approximately 3.8 km from Marsden Park)

The rainfall data for the area surrounding the site suggests that at some parts of the year, large volumes of water may flow across the site, however given the good housekeeping and drainage system this is likely to drain off the site and not infiltrate into the subsoil.

Review of NSW Department of Primary Industries - Office of Water database indicated some groundwater bores (GW104310 and GW104311) within 140m and 200m in south west of the site. Geotechnical site investigations to 4.5 m did not encounter any groundwater in Richmond site [4].

3.5 NSW OEH Records

The site or nearby surrounding areas have no notices under the Contaminated Land Management Act (1997) or the Environmentally Hazardous Chemicals Act (1985).

3.6 Historical Aerial Photograph Analysis

Historical aerial photographs taken from the site for 1947, 1955, 1965, 1977, 1986, 1998, 2007 and 2015 indicate that the site has been used for the residential and market gardens-orchards purposes since at least 1947 [1]. Additional sheds and small paddocks constructed is visible in the aerial photo 1955. The history of aerial photography is demonstrated in Table 2.

3.7 Walkover Site Inspection

Results of site walkover inspection on October 26 and 27, 2015 carried out by Martens are summarised in Table 3. The walkover inspection on 15 December 2016 confirms records of Table 3 and no change was observed.

3.8 Area of Environmental Concern

Based on available site history, aerial photograph interpretation and site walkovers, Martens [1] provided site area of Environmental Concerns (AECs) and Contaminants of Primary Concern (COPCs) in Table 4. A plan showing locations of identified AECs is presented in Figure 2. Geotesta desk study, and walkover site inspection confirms the suggestions by Martens.

4. FIELDWORK PROGRAM

Fieldwork for this investigation was carried out on the 15 December 2016 and included excavation of 9 boreholes (BH1 to BH9). All boreholes were advanced by hand auger to depths varying from 50mm to 450mm below the existing ground surface. The borehole locations are demonstrated in Figure 3. Environmental soil samples were collected from surface and at lower depths. Australian Standard (AS 4482.1—2005) procedures were used for sampling. Soil samples were collected by hand (disturbed samples) using disposable gloves which were changed between each sample. The auger was washed between each sampling to make sure no contamination is transferred. Individual samples were taken for laboratory analysis. Soil samples were placed into laboratory prepared glass jars and placed in a cooler (esky) with ice. Having collected the samples, they were transported to the laboratory within the correct holding times. A trip spike sample was stored with the samples to assess volatile loss.

5. LABORATORY PROGRAM

Selected soil samples were analysed for contamination concerns consisting of;

- Heavy metals (HM) - Arsenic (As), Cadmium (Cd), Chromium (Cr), Copper (Cu), Mercury (Hg), Lead (Pb), Nickel (Ni) and Zinc (Zn)
- Organochlorine Pesticides (OCP).
- Organophosphate pesticides (OPP)
- Total Recoverable Hydrocarbons (TRH)
- Benzene, Toluene, Ethyl Benzene and Xylene (BTEX)
- Polycyclic Aromatic Hydrocarbon (PAH)
- Polychlorinated Biphenyls (PCB)
- Asbestos

The soil analysis was performed by Eurofins MGT, a laboratory accredited by the National Association of Testing Authorities (NATA).

The above contaminants include those which are commonly encountered on agricultural/farming and rural sites. The analytical program is presented in Table 5. Laboratory results are attached to this report in Appendix B.

6. SUBSURFACE CONDITIONS

A summary of subsurface soil conditions encountered in the site is presented below:

Topsoil

Topsoil was encountered in all boreholes consisting loose to medium dense Silty Sand with some traces of gravels and organic materials. Materials were generally described as brown and red. Thickness of this profile was found to vary from 150mm to 200mm.

Natural Soil

Natural Clay (red and brown) with medium to high plasticity was encountered in all boreholes ranging in depth between 0.15m and 0.20m below existing ground surface. The natural clay was found to have gravel bands at lower depths. Based on the visual inspections, the natural clay was found to be stiff to very stiff.

Bedrock

Base on the geotechnical site investigation report [4], the Shale bedrock was not encountered in boreholes by depth 2.5m. It is suggested that the bed rock depth is about 4.0m below the existing ground surface.

Groundwater

The geotechnical site investigation report [4] demonstrates that the groundwater was not encountered (maximum investigation depth of 2.5m).

7. RESULTS OF INVESTIGATION

7.1 Assessment Criteria

Based on the information received from Bathla Group, the site is proposed to be used for medium density residential units. The most appropriate criteria are therefore those which are protective of the residential users of the site.

The results of laboratory tests for this study were compared with the published Australian contamination assessment criteria. These Criteria are presented in the Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites, 1992 [5]. The Office of Environment and Heritage (OEH) endorses the use of these guidelines for the assessment of contaminated sites.

NSW OEH and National Environmental Health Forum (NEHF) [6] is also commonly used to assess contaminant concentrations.

The National Environmental Health Forum criteria [7] are health based soil investigation levels for different exposure settings.

For this assessment, the criteria for a standard residential setting with garden/accessible soil (HIL's A) is considered appropriate and is used as the Site Criteria. Assessment of TRH and BTEX was based on the DEC Guideline for Assessing Service Station Sites [8].

Guidelines issued under the Protection of the Environment Operations Act 1997 which relate to waste classification for disposal are also considered relevant [9] for this contamination assessment.

The results of laboratory analysis of collected site samples have been directly compared with the above-mentioned criteria.

7.2 Test Results

The sample IDs, depths and laboratory requests are shown in Table 5. The results of the lab tests presented in Appendix B are summarized in the following.

Heavy Metals

A total of nine samples (BH1-9) were analysed for a range of heavy metals consisting of As, Cd, Cr, Cu, Pb, Hg, Ni and Zn.

All samples were found to have heavy metals concentrations to be within the adopted Site Criteria.

- Arsenic concentrations ranging from 4.5-17mg/kg.
- Cadmium concentrations were less than 0.4mg/kg.
- Total Chromium concentrations ranging from 14-66mg/kg.
- Copper concentrations ranging from 14-57 mg/kg.
- Lead concentrations ranging from 9.3-57 mg/kg.
- Mercury concentrations ranging from <0.1mg/kg.
- Nickel concentrations ranging from 7.5-98 mg/kg.
- Zinc concentrations ranging from 18-220 mg/kg.

Organochlorine Pesticides/ Organophosphorus Pesticides

A total of 3 samples (BH1, BH3 and BH6) were analysed for a range of organochlorine and Organophosphorus pesticides. All concentrations of OCP/OPP were found to be below the laboratory detection limit and therefore within the adopted Site Criteria.

Polycyclic Aromatic Hydrocarbons

A total of 3 samples (BH3, BH6 and BH8) were analysed for a range of PAH. All concentrations of PAH were found to be below the laboratory detection limit and therefore within the adopted Site Criteria.

Total Recoverable Hydrocarbons - 1999 NEPM Fractions

A total of 3 samples (BH3, BH6 and BH8) were analysed for TRH. All samples analysed were found to have concentrations of TRH below the laboratory detection limit.

Total Recoverable Hydrocarbons - 2013 NEPM Fractions

A total of 3 samples (BH3, BH6 and BH8) were analysed for TRH. All samples analysed were found to have concentrations of TRH below the laboratory detection limit.

Benzene, Toluene, Ethyl Benzene and Xylene

A total of 3 samples (BH3, BH6 and BH8) were analysed for BTEX. All samples analysed were found to have concentrations of BTEX below the laboratory detection limit.

Asbestos

3 samples (BH3, BH5 and BH8) were tested for Asbestos. From all the samples, no asbestos was detected. Only organic fibre was detected. No respirable fibres were detected.

7.3 Exiting Onsite Stockpiling/sheds/dwelling

During the detailed investigation, some minor stockpiling was encountered on the site. This was identified in the preliminary site investigation (refer to Figure 3). There are also several sheds and residential properties occupying a vast area of the site. The sampling of these materials will be carried out after the demolition of the buildings and sheds and removal of the stockpiling for validating the site.

8. ASSESSMENTS AND RECOMMENDATIONS

A detailed contamination site investigation of the property 232 Grange Avenue, Marsden Park, NSW, was undertaken by Geotesta in order to investigate the presence of contamination on the site. The investigations included a review of site history, a site inspection and soil sampling, laboratory testing and analysis program. Soil sampling was performed in 9 locations (BH1 to BH9). The results of site inspection and sampling indicate the site to be predominantly underlain by topsoil (silty sandy) overlying natural medium to high plasticity clay. This is underlain by shale at a depth of likely 3.5-4.5m below existing ground surface. 9 selected samples were analysed for a range of contaminants consisting of Heavy metals - Arsenic (As), Cadmium (Cd), Chromium (Cr), Copper (Cu), Mercury (Hg), Lead (Pb), Nickel (Ni) and Zinc (Zn), Organochlorine Pesticides (OCP)/ Organophosphorus Pesticides (OPP), Total recoverable Hydrocarbons (TRH), Benzene, Toluene, Ethyl Benzene and Xylene (BTEX), Polycyclic Aromatic Hydrocarbons (PAH) and Asbestos.

Based on the laboratory test results, the site was found to have concentrations of contaminants of concern to be within the adopted Site Criteria and therefore the risk of gross ground contamination is considered low.

Based on the assessment undertaken, the following conclusions and recommendations can be made:

- Based on the scope of works undertaken in this investigation, the site is considered suitable for the proposed land use for residential development.
- As described in Section 7.3, additional sampling is required for validation purpose after removal of the stockpiling materials on site and also demolition of the existing buildings and sheds.

9. REFERENCES

- [1] Martens Consulting Engineers, Preliminary Site Investigation: Lots 59 and 173 Richmond Road, 1032, 1036, 1060, 1070, 1080, 1082, 1086, 1132, 1140, 1148 and 1160 Richmond Road, and 230, 232 and 234 Grange Avenue, Marsden Park, NSW, December 2015
- [2] Clark, N.R., and Jones, D.C., (Eds) (1991) Penrith 1:100 000 Geological Sheet. New South Wales Geological Survey, Sydney
- [3] Bureau of Meteorology 2013, www.bom.gov.au
- [4] Martens Consulting Engineers, Preliminary Salinity and Geotechnical Assessment: Lots 59 and 173 Richmond Road, 1032, 1036, 1060, 1070, 1080, 1082, 1086, 1132, 1140, 1148 and 1160 Richmond Road, and 230, 232 and 234 Grange Avenue, Marsden Park, NSW, December 2015
- [5] Australian & New Zealand Guidelines for the Assessment and Management of Contaminated Sites, Australian and New Zealand Conservation Council and National Health and Medical Research Council, 1992
- [6] Health Based Soil Investigation Levels, National Environmental Health Forum Monographs Soil Series No. 1 – 1996
- [7] Assessment of Site Contamination- Measure 1999 – National Environment Protection
- [8] Guidelines for Assessment Service Station Sites – NSW EPA 1994
- [9] NSW DECCW (2009) Waste Classification Guidelines Part 1: Classifying Waste NSW EPA (1995) Contaminated Sites: Sampling Design Guidelines
- [10] NSW OEH (2011) Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites
- [11] National Environment Protection Council (Assessment of Site Contamination) Measure 1999, 2013 amendment
- [12] Australia Standard 1726 (AS, 1993) Geotechnical site investigations.

Information about this report

The report contains the results of a geotechnical investigation conducted for a specific purpose and client. The results should not be used by other parties, or for other purposes, as they may contain neither adequate nor appropriate information. In particular, the investigation does not cover contamination issues unless specifically required to do so by the client.

Test Hole Logging

The information on the test hole logs (boreholes, test pits, exposures etc.) is based on a visual and tactile assessment, except at the discrete locations where test information is available (field and/or laboratory results). The test hole logs include both factual data and inferred information.

Groundwater

Unless otherwise indicated, the water levels presented on the test hole logs are the levels of free water or seepage in the test hole recorded at the given time of measuring. The actual groundwater level may differ from this recorded level depending on material permeability (i.e. depending on response time of the measuring instrument). Further, variations of this level could occur with time due to such effects as seasonal, environmental and tidal fluctuations or construction activities. Confirmation of groundwater levels, phreatic surfaces or piezometric pressures can only be made by appropriate instrumentation techniques and monitoring programmes.

Interpretation of Results

The discussion or recommendations contained within this report normally are based on a site evaluation from discrete test hole data. Generalized, idealized or inferred subsurface conditions (including any geotechnical cross-sections) have been assumed or prepared by interpolation and/or extrapolation of these data. As such these conditions are an interpretation and must be considered as a guide only.

Change in Conditions

Local variations or anomalies in the generalized ground conditions do occur in the natural environment, particularly between discrete test hole locations. Additionally, certain design or construction procedures may have been assumed in assessing the soil-structure interaction behaviour of the site. Furthermore, conditions may change at the site from those encountered at the time of the geotechnical investigation through construction activities and constantly changing natural forces.

Any change in design, in construction methods, or in ground conditions as noted during construction, from those assumed or reported should be referred to GEOTESTA for appropriate assessment and comment.

Geotechnical Verification

Verification of the geotechnical assumptions and/or model is an integral part of the design process - investigation, construction verification, and performance monitoring. Variability is a feature of the natural environment and, in many instances, verification of soil or rock quality, or foundation levels, is required. There may be a requirement to extend foundation depths, to modify a foundation system or to conduct monitoring as a result of this natural variability. Allowance for verification by geotechnical personnel accordingly should be recognized and programmed during construction.

Reproduction of Reports

Where it is desired to reproduce, the information contained in our geotechnical report, or other technical information, for the inclusion in contract documents or engineering specification of the subject development, such reproductions should include at least all of the relevant test hole and test data, together with the appropriate standard description sheets and remarks made in the written report of a factual or descriptive nature. Reports are the subject of copyright and shall not be reproduced either totally or in part without the express permission of Geotesta.

Appendix A
Figures and Table



Figure 1: Site Location



Figure 2: Areas of Contamination Concerns [1]

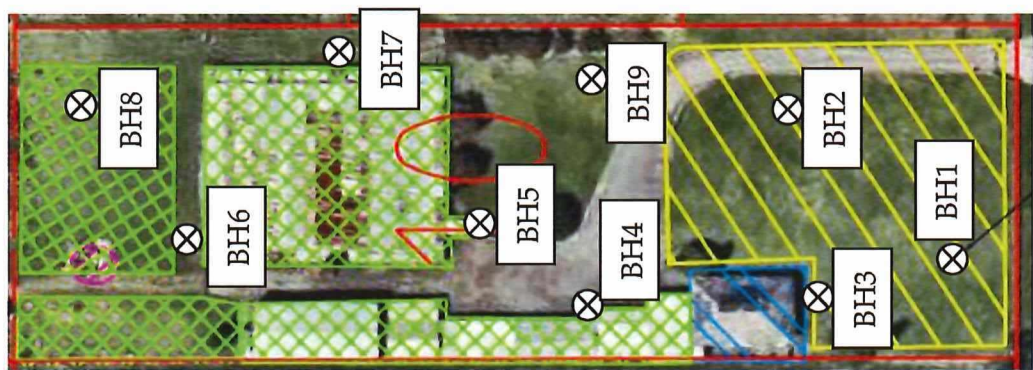


Figure 3: Borehole Locations

Table 1: Site History Information [1]

Lot ID/Address	Year	Record No.	Description
232 Grange Avenue	1978	BA-78-4970	Alterations and additions
	1979	BA-79-355	Bedrooms and bathroom

Table 2: Historic Aerial Photograph Observation from 1947-Current [1]

Year	Description	Surrounding land use
1947	Dwellings and/or sheds visible in north and west of 232 Grange Avenue. Evidence of past orchards are visible on the southern portion of 232 Grange Avenue.	Rural land uses to north east and south. Undeveloped bushland to west. Market gardens, orchards, and dams in rural lands. Local road infrastructure visible.
1955	Additional sheds and small paddocks constructed on 232 Grange Avenue. Market gardens on the southern portion of 232 Grange Avenue.	Rural land use to north east and south. Some market gardens to east no longer visible, others established. More intensive use of land immediately south of Grange Avenue.
1965	Market gardens on 232 Grange Avenue no longer visible.	Rural land use to north east and south. Additional market gardens to the east. Trotting track visible to south east. Dams constructed to east. Continued intensive use of properties to south of Grange Avenue.
1977	Market gardens no longer visible on any lots.	Continued rural land use, some dwellings/sheds removed, others constructed to north, west and east. Some sheds to south removed. Bushland cleared, and Blacktown City Council Waste Services Depot visible to south. Poultry sheds visible to west (western portion of 1148 Richmond Road). Trotting tracks visible to north and east, trotting track to south east no longer visible. Additional market gardens to east.
1986	Some sheds removed in central area and near western boundary of 232 Grange Avenue, and new shed constructed.	Continued rural land use to north, east and west, and further development of Blacktown City Council Waste Services Depot to west, including construction of dams. Removal of sheds to south and replaced with market gardens. Additional market gardens to east, south east and south.

Table 3: Summary of Site Walkover by Martens in October 2015 [1]

Address and Lot ID	Lot Infrastructure	Walkover Summary
232 Grange Road (Lot 10, DP 70287)	Brick and tile dwelling Metal sheds Metal ATSS	<p>Brick and tile dwelling in good condition near south western boundary.</p> <p>Metal sheds to north of dwelling near western boundary, unable to access sheds, but discussions with owner indicated they are used for storage of household items and vehicles.</p> <p>Large metal and timber shed with bare earth floor to north east of dwelling near eastern boundary, containing vehicles, metal, tractors, pots, timber, vehicle parts, containers of unknown content, building materials, plastics, and miscellaneous items. Discussions with owner indicated the shed was formerly used as poultry shed.</p> <p>Stockpile to west of shed, including metal, vehicle parts, plastic pipe, building materials, and equipment.</p> <p>Metal shed near western boundary, discussions with owner indicated shed was formerly used as poultry shed, unable to access shed.</p> <p>Three rusty metal silos, discussions with owner indicated they were formerly used for water and poultry feed.</p> <p>Paddock in northern portion of lot used for sheep grazing, southern portion of lot open paddock.</p>

Table 4: Areas of Environmental Concern and Contaminants of Primary Concern [1]

AEC ¹	Potential for Contamination	COPC	Contamination Likelihood
A – Dwellings and former dwellings	Pesticides and heavy metals may have been used underneath dwellings for pest control. Dwelling construction may include ACM and/or lead based paints.	HM, OCP/OPP and asbestos	Medium
B – Sheds and former sheds – unable to gain access to some	Sheds may currently (or have previously) stored fuel, oils, or containers/drums of unknown content; asbestos sheeting (PACM); pesticides and/or been treated with heavy metals and pesticides (pest control). Shed construction may include ACM and/or lead based paints.	HM, TRH, BTEX, PAH, OCP/OPP and asbestos	Medium - high
C – Portions of site, former market garden or orchard use	Application of agricultural chemicals, use of pesticides and heavy metals for pest control during site use as market gardens or orchards.	HM and OCP/OPP	Medium
E - Stockpiles	Contaminants from unknown contents of stockpiles, containers/drums of unknown content, and general refuse may have spilled or leaked onto underlying soil.	HM, TRH, BTEX, PAH, OCP/OPP and asbestos	Medium - high

Table 5: Sample Depths and Lab Requests

Sample ID (BH)	Depth (m)	HM	OCP/OPP	R17	Asbestos
BH1	0.30	×	×		
BH2	0.20	×			
BH3	0.25		×	×	×
BH4	0.10	×			
BH5	0.35	×			×
BH6	0.45		×	×	
BH7	0.15	×			
BH8	0.20			×	×
BH9	0.35	×			

HM: Heavy metal

OCP: Organochloride pesticides

OPP: Organophosphate pesticides

R17: Total Recoverable Hydrocarbons - 1999 NEPM Fractions: Volatile Organics

Total Recoverable Hydrocarbons - 2013 NEPM Fractions

Polycyclic Aromatic Hydrocarbons, Organochlorine Pesticides

Polychlorinated Biphenyls (PCB), Spectated Phenols, Total Recoverable Hydrocarbons - 2013 NEPM Fractions, Chromium (hexavalent), Cyanide (total) and Fluoride

Heavy Metals such as arsenic, copper, lead, etc., Total Recoverable Hydrocarbons - 1999 NEPM Fractions, TRH: Total recoverable hydrocarbons

PAH: Polycyclic aromatic hydrocarbons

BTEX: Benzene, toluene, ethyl benzene, xylene

Table 6: National Environmental Protection Measures Health Based Investigation Levels

Chemical	Health-based investigation levels (mg/kg)			
	Residential ¹ A	Residential ¹ B	Recreational ¹ C	Commercial/ Industrial ¹ D
Metals and Inorganics				
Arsenic ²	100	500	300	3 000
Beryllium	60	90	90	500
Boron	4500	40 000	20 000	300 000
Cadmium	20	150	90	900
Chromium (VI)	100	500	300	3600
Cobalt	100	600	300	4000
Copper	6000	30 000	17 000	240 000
Lead ³	300	1200	600	1 500
Manganese	3800	14 000	19 000	60 000
Mercury (inorganic) ⁵	40	120	80	730
Methyl mercury ⁴	10	30	13	180
Nickel	400	1200	1200	6 000
Selenium	200	1400	700	10 000
Zinc	7400	60 000	30 000	400 000
Cyanide (free)	250	300	240	1 500
Polycyclic Aromatic Hydrocarbons (PAHs)				
Carcinogenic PAHs (as BaP TEQ) ⁶	3	4	3	40
Total PAHs ⁷	300	400	300	4000
Phenols				
Phenol	3000	45 000	40 000	240 000
Pentachlorophenol	100	130	120	660
Cresols	400	4 700	4 000	25 000
Organochlorine Pesticides				
DDT+DDE+DDD	240	600	400	3600
Aldrin and dieldrin	6	10	10	45
Chlordane	50	90	70	530
Endosulfan	270	400	340	2000
Other Pesticides				
MCPB	600	900	800	5000
Mecoprop	600	900	800	5000
Picloram	4500	6600	5700	35000
Other Organics				
PCBs ⁸	1	1	1	7
PBDE Flame Retardants (Br1–Br9)	1	2	2	10

Notes:

(1) Generic land uses are described in detail in NEMP Schedule B7 Section 3

HIL A ● Residential with garden/accessible soil (home grown produce <10% fruit and vegetable intake (no poultry), also includes childcare centres, preschools and primary schools.

HIL B ● Residential with minimal opportunities for soil access; includes dwellings with fully and permanently paved yard space such as high-rise buildings and apartments.

HIL C ● Public open space such as parks, playgrounds, playing fields (e.g. ovals), secondary schools and footpaths. This does not include undeveloped public open space where the potential for exposure is lower and where a site-specific assessment may be more appropriate.

HIL D ● Commercial/industrial, includes premises such as shops, offices, factories and industrial sites.

(2) Arsenic: HIL assumes 70% oral bioavailability. Site-specific bioavailability may be important and should be considered where appropriate (refer NEPM Schedule B7).

(3) Lead: HIL is based on blood lead models (IEUBK for HILs A, B and C and adult lead model for HIL D where 50% oral bioavailability has been considered. Site-specific bioavailability may be important and should be considered where appropriate.

(4) Methyl mercury: assessment of methyl mercury should only occur where there is evidence of its potential source. It may be associated with inorganic mercury and anaerobic microorganism activity in aquatic environments. In addition, the reliability and quality of sampling/analysis should be considered.

(5) Elemental mercury: HIL does not address elemental mercury. A site-specific assessment should be considered if elemental mercury is present, or suspected to be present,

(6) Carcinogenic PAHs: HIL is based on the 8 carcinogenic PAHs and their TEFs (potency relative to B(a)P) adopted by CCME 2008 (refer Schedule B7). The B(a)P TEQ is calculated by multiplying the concentration of each carcinogenic PAH in the sample by its B(a)P TEF, given below, and summing these products.

Appendix B

Laboratory Test Results

Certificate of Analysis

Geotesta P/L
6/31-37 Howleys Rd
Notting Hill
VIC 3168



NATA Accredited
Accreditation Number 1261
Site Number 18217

Accredited for compliance with ISO/IEC 17025 – Testing
The results of the tests, calibrations and/or
measurements included in this document are traceable
to Australian/national standards.

Attention: Amir Farazmand

Report 528228-S
Project name 232 GRANGE AV
Received Date Dec 16, 2016

Client Sample ID			BH1 Soil	BH2 Soil	BH3 Soil	BH4 Soil
Sample Matrix			S16-De18271	S16-De18272	S16-De18273	S16-De18274
Eurofins mgt Sample No.			Dec 15, 2016	Dec 15, 2016	Dec 15, 2016	Dec 15, 2016
Date Sampled						
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	-	-	< 20	-
TRH C10-C14	20	mg/kg	-	-	< 20	-
TRH C15-C28	50	mg/kg	-	-	< 50	-
TRH C29-C36	50	mg/kg	-	-	< 50	-
TRH C10-36 (Total)	50	mg/kg	-	-	< 50	-
BTEX						
Benzene	0.1	mg/kg	-	-	< 0.1	-
Toluene	0.1	mg/kg	-	-	< 0.1	-
Ethylbenzene	0.1	mg/kg	-	-	< 0.1	-
m&p-Xylenes	0.2	mg/kg	-	-	< 0.2	-
o-Xylene	0.1	mg/kg	-	-	< 0.1	-
Xylenes - Total	0.3	mg/kg	-	-	< 0.3	-
4-Bromofluorobenzene (surr.)	1	%	-	-	72	-
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene ^{N02}	0.5	mg/kg	-	-	< 0.5	-
TRH >C10-C16 less Naphthalene (F2) ^{N01}	50	mg/kg	-	-	< 50	-
TRH C6-C10	20	mg/kg	-	-	< 20	-
TRH C6-C10 less BTEX (F1) ^{N04}	20	mg/kg	-	-	< 20	-
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	-	-	< 0.5	-
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	-	-	0.6	-
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	-	-	1.2	-
Acenaphthene	0.5	mg/kg	-	-	< 0.5	-
Acenaphthylene	0.5	mg/kg	-	-	< 0.5	-
Anthracene	0.5	mg/kg	-	-	< 0.5	-
Benz(a)anthracene	0.5	mg/kg	-	-	< 0.5	-
Benzo(a)pyrene	0.5	mg/kg	-	-	< 0.5	-
Benzo(b&j)fluoranthene ^{N07}	0.5	mg/kg	-	-	< 0.5	-
Benzo(g,h,i)perylene	0.5	mg/kg	-	-	< 0.5	-
Benzo(k)fluoranthene	0.5	mg/kg	-	-	< 0.5	-
Chrysene	0.5	mg/kg	-	-	< 0.5	-
Dibenz(a,h)anthracene	0.5	mg/kg	-	-	< 0.5	-
Fluoranthene	0.5	mg/kg	-	-	< 0.5	-
Fluorene	0.5	mg/kg	-	-	< 0.5	-
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	-	-	< 0.5	-
Naphthalene	0.5	mg/kg	-	-	< 0.5	-

Client Sample ID			BH1 Soil	BH2 Soil	BH3 Soil	BH4 Soil
Sample Matrix			S16-De18271	S16-De18272	S16-De18273	S16-De18274
Eurofins mgt Sample No.			Dec 15, 2016	Dec 15, 2016	Dec 15, 2016	Dec 15, 2016
Date Sampled						
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons						
Phenanthrene	0.5	mg/kg	-	-	< 0.5	-
Pyrene	0.5	mg/kg	-	-	< 0.5	-
Total PAH*	0.5	mg/kg	-	-	< 0.5	-
2-Fluorobiphenyl (surr.)	1	%	-	-	95	-
p-Terphenyl-d14 (surr.)	1	%	-	-	95	-
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	< 0.1	-	< 0.1	-
4,4'-DDD	0.05	mg/kg	< 0.05	-	< 0.05	-
4,4'-DDE	0.05	mg/kg	< 0.05	-	< 0.05	-
4,4'-DDT	0.05	mg/kg	< 0.05	-	< 0.05	-
a-BHC	0.05	mg/kg	< 0.05	-	< 0.05	-
Aldrin	0.05	mg/kg	< 0.05	-	< 0.05	-
b-BHC	0.05	mg/kg	< 0.05	-	< 0.05	-
d-BHC	0.05	mg/kg	< 0.05	-	< 0.05	-
Dieldrin	0.05	mg/kg	< 0.05	-	< 0.05	-
Endosulfan I	0.05	mg/kg	< 0.05	-	< 0.05	-
Endosulfan II	0.05	mg/kg	< 0.05	-	< 0.05	-
Endosulfan sulphate	0.05	mg/kg	< 0.05	-	< 0.05	-
Endrin	0.05	mg/kg	< 0.05	-	< 0.05	-
Endrin aldehyde	0.05	mg/kg	< 0.05	-	< 0.05	-
Endrin ketone	0.05	mg/kg	< 0.05	-	< 0.05	-
g-BHC (Lindane)	0.05	mg/kg	< 0.05	-	< 0.05	-
Heptachlor	0.05	mg/kg	< 0.05	-	< 0.05	-
Heptachlor epoxide	0.05	mg/kg	< 0.05	-	< 0.05	-
Hexachlorobenzene	0.05	mg/kg	< 0.05	-	< 0.05	-
Methoxychlor	0.2	mg/kg	< 0.2	-	< 0.2	-
Toxaphene	1	mg/kg	< 1	-	< 1	-
Dibutylchloroendate (surr.)	1	%	105	-	86	-
Tetrachloro-m-xylene (surr.)	1	%	97	-	93	-
Organophosphorus Pesticides						
Azinphos-methyl	0.2	mg/kg	< 0.2	-	< 0.2	-
Bolstar	0.2	mg/kg	< 0.2	-	< 0.2	-
Chlorfenvinphos	0.2	mg/kg	< 0.2	-	< 0.2	-
Chlorpyrifos	0.2	mg/kg	< 0.2	-	< 0.2	-
Chlorpyrifos-methyl	0.2	mg/kg	< 0.2	-	< 0.2	-
Coumaphos	2	mg/kg	< 2	-	< 2	-
Demeton-S	0.2	mg/kg	< 0.2	-	< 0.2	-
Demeton-O	0.2	mg/kg	< 0.2	-	< 0.2	-
Diazinon	0.2	mg/kg	< 0.2	-	< 0.2	-
Dichlorvos	0.2	mg/kg	< 0.2	-	< 0.2	-
Dimethoate	0.2	mg/kg	< 0.2	-	< 0.2	-
Disulfoton	0.2	mg/kg	< 0.2	-	< 0.2	-
EPN	0.2	mg/kg	< 0.2	-	< 0.2	-
Ethion	0.2	mg/kg	< 0.2	-	< 0.2	-
Ethoprop	0.2	mg/kg	< 0.2	-	< 0.2	-
Ethyl parathion	0.2	mg/kg	< 0.2	-	< 0.2	-
Fenitrothion	0.2	mg/kg	< 0.2	-	< 0.2	-
Fensulfothion	0.2	mg/kg	< 0.2	-	< 0.2	-
Fenthion	0.2	mg/kg	< 0.2	-	< 0.2	-

Client Sample ID			BH1 Soil	BH2 Soil	BH3 Soil	BH4 Soil
Sample Matrix			S16-De18271	S16-De18272	S16-De18273	S16-De18274
Eurofins mgt Sample No.			Dec 15, 2016	Dec 15, 2016	Dec 15, 2016	Dec 15, 2016
Date Sampled						
Test/Reference	LOR	Unit				
Organophosphorus Pesticides						
Malathion	0.2	mg/kg	< 0.2	-	< 0.2	-
Merphos	0.2	mg/kg	< 0.2	-	< 0.2	-
Methyl parathion	0.2	mg/kg	< 0.2	-	< 0.2	-
Mevinphos	0.2	mg/kg	< 0.2	-	< 0.2	-
Monocrotophos	2	mg/kg	< 2	-	< 2	-
Naled	0.2	mg/kg	< 0.2	-	< 0.2	-
Omethoate	2	mg/kg	< 2	-	< 2	-
Phorate	0.2	mg/kg	< 0.2	-	< 0.2	-
Pirimiphos-methyl	0.2	mg/kg	< 0.2	-	< 0.2	-
Pyrazophos	0.2	mg/kg	< 0.2	-	< 0.2	-
Ronnel	0.2	mg/kg	< 0.2	-	< 0.2	-
Terbufos	0.2	mg/kg	< 0.2	-	< 0.2	-
Tetrachlorvinphos	0.2	mg/kg	< 0.2	-	< 0.2	-
Tokuthion	0.2	mg/kg	< 0.2	-	< 0.2	-
Trichloronate	0.2	mg/kg	< 0.2	-	< 0.2	-
Triphenylphosphate (surr.)	1	%	57	-	87	-
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
TRH >C10-C16	50	mg/kg	-	-	< 50	-
TRH >C16-C34	100	mg/kg	-	-	< 100	-
TRH >C34-C40	100	mg/kg	-	-	< 100	-
Conductivity (1:5 aqueous extract at 25°C)	5	uS/cm	-	-	35	-
pH (1:5 Aqueous extract)	0.1	pH Units	-	-	6.7	-
% Moisture	1	%	9.2	9.5	8.6	6.7
Heavy Metals						
Arsenic	2	mg/kg	12	17	14	4.3
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	24	33	31	33
Copper	5	mg/kg	27	23	20	57
Lead	5	mg/kg	21	50	57	9.3
Mercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Nickel	5	mg/kg	18	19	7.8	98
Zinc	5	mg/kg	48	84	97	77

Client Sample ID			BH5 Soil	BH6 Soil	BH7 Soil	BH8 Soil
Sample Matrix			S16-De18275	S16-De18276	S16-De18277	S16-De18278
Eurofins mgt Sample No.			Dec 15, 2016	Dec 15, 2016	Dec 15, 2016	Dec 15, 2016
Date Sampled						
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	-	< 20	-	< 20
TRH C10-C14	20	mg/kg	-	< 20	-	< 20
TRH C15-C28	50	mg/kg	-	< 50	-	< 50
TRH C29-C36	50	mg/kg	-	< 50	-	< 50
TRH C10-36 (Total)	50	mg/kg	-	< 50	-	< 50

Client Sample ID			BH5 Soil	BH6 Soil	BH7 Soil	BH8 Soil
Sample Matrix			S16-De18275	S16-De18276	S16-De18277	S16-De18278
Eurofins mgt Sample No.			Dec 15, 2016	Dec 15, 2016	Dec 15, 2016	Dec 15, 2016
Date Sampled						
Test/Reference	LOR	Unit				
BTEX						
Benzene	0.1	mg/kg	-	< 0.1	-	< 0.1
Toluene	0.1	mg/kg	-	< 0.1	-	< 0.1
Ethylbenzene	0.1	mg/kg	-	< 0.1	-	< 0.1
m&p-Xylenes	0.2	mg/kg	-	< 0.2	-	< 0.2
o-Xylene	0.1	mg/kg	-	< 0.1	-	< 0.1
Xylenes - Total	0.3	mg/kg	-	< 0.3	-	< 0.3
4-Bromofluorobenzene (surr.)	1	%	-	70	-	71
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene ^{N02}	0.5	mg/kg	-	< 0.5	-	< 0.5
TRH >C10-C16 less Naphthalene (F2) ^{N01}	50	mg/kg	-	< 50	-	< 50
TRH C6-C10	20	mg/kg	-	< 20	-	< 20
TRH C6-C10 less BTEX (F1) ^{N04}	20	mg/kg	-	< 20	-	< 20
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	-	< 0.5	-	< 0.5
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	-	0.6	-	0.6
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	-	1.2	-	1.2
Acenaphthene	0.5	mg/kg	-	< 0.5	-	< 0.5
Acenaphthylene	0.5	mg/kg	-	< 0.5	-	< 0.5
Anthracene	0.5	mg/kg	-	< 0.5	-	< 0.5
Benz(a)anthracene	0.5	mg/kg	-	< 0.5	-	< 0.5
Benzo(a)pyrene	0.5	mg/kg	-	< 0.5	-	< 0.5
Benzo(b&j)fluoranthene ^{N07}	0.5	mg/kg	-	< 0.5	-	< 0.5
Benzo(g,h,i)perylene	0.5	mg/kg	-	< 0.5	-	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	-	< 0.5	-	< 0.5
Chrysene	0.5	mg/kg	-	< 0.5	-	< 0.5
Dibenz(a,h)anthracene	0.5	mg/kg	-	< 0.5	-	< 0.5
Fluoranthene	0.5	mg/kg	-	< 0.5	-	< 0.5
Fluorene	0.5	mg/kg	-	< 0.5	-	< 0.5
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	-	< 0.5	-	< 0.5
Naphthalene	0.5	mg/kg	-	< 0.5	-	< 0.5
Phenanthrene	0.5	mg/kg	-	< 0.5	-	< 0.5
Pyrene	0.5	mg/kg	-	< 0.5	-	< 0.5
Total PAH*	0.5	mg/kg	-	< 0.5	-	< 0.5
2-Fluorobiphenyl (surr.)	1	%	-	116	-	93
p-Terphenyl-d14 (surr.)	1	%	-	107	-	92
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	-	< 0.1	-	-
4,4'-DDD	0.05	mg/kg	-	< 0.05	-	-
4,4'-DDE	0.05	mg/kg	-	< 0.05	-	-
4,4'-DDT	0.05	mg/kg	-	< 0.05	-	-
a-BHC	0.05	mg/kg	-	< 0.05	-	-
Aldrin	0.05	mg/kg	-	< 0.05	-	-
b-BHC	0.05	mg/kg	-	< 0.05	-	-
d-BHC	0.05	mg/kg	-	< 0.05	-	-
Dieldrin	0.05	mg/kg	-	< 0.05	-	-
Endosulfan I	0.05	mg/kg	-	< 0.05	-	-
Endosulfan II	0.05	mg/kg	-	< 0.05	-	-
Endosulfan sulphate	0.05	mg/kg	-	< 0.05	-	-
Endrin	0.05	mg/kg	-	< 0.05	-	-

Client Sample ID			BH5 Soil	BH6 Soil	BH7 Soil	BH8 Soil
Sample Matrix			S16-De18275	S16-De18276	S16-De18277	S16-De18278
Eurofins mgt Sample No.			Dec 15, 2016	Dec 15, 2016	Dec 15, 2016	Dec 15, 2016
Date Sampled						
Test/Reference	LOR	Unit				
Organochlorine Pesticides						
Endrin aldehyde	0.05	mg/kg	-	< 0.05	-	-
Endrin ketone	0.05	mg/kg	-	< 0.05	-	-
g-BHC (Lindane)	0.05	mg/kg	-	< 0.05	-	-
Heptachlor	0.05	mg/kg	-	< 0.05	-	-
Heptachlor epoxide	0.05	mg/kg	-	< 0.05	-	-
Hexachlorobenzene	0.05	mg/kg	-	< 0.05	-	-
Methoxychlor	0.2	mg/kg	-	< 0.2	-	-
Toxaphene	1	mg/kg	-	< 1	-	-
Dibutylchlorodate (surr.)	1	%	-	99	-	-
Tetrachloro-m-xylene (surr.)	1	%	-	97	-	-
Organophosphorus Pesticides						
Azinphos-methyl	0.2	mg/kg	-	< 0.2	-	-
Bolstar	0.2	mg/kg	-	< 0.2	-	-
Chlorfenvinphos	0.2	mg/kg	-	< 0.2	-	-
Chlorpyrifos	0.2	mg/kg	-	< 0.2	-	-
Chlorpyrifos-methyl	0.2	mg/kg	-	< 0.2	-	-
Coumaphos	2	mg/kg	-	< 2	-	-
Demeton-S	0.2	mg/kg	-	< 0.2	-	-
Demeton-O	0.2	mg/kg	-	< 0.2	-	-
Diazinon	0.2	mg/kg	-	< 0.2	-	-
Dichlorvos	0.2	mg/kg	-	< 0.2	-	-
Dimethoate	0.2	mg/kg	-	< 0.2	-	-
Disulfoton	0.2	mg/kg	-	< 0.2	-	-
EPN	0.2	mg/kg	-	< 0.2	-	-
Ethion	0.2	mg/kg	-	< 0.2	-	-
Ethoprop	0.2	mg/kg	-	< 0.2	-	-
Ethyl parathion	0.2	mg/kg	-	< 0.2	-	-
Fenitrothion	0.2	mg/kg	-	< 0.2	-	-
Fensulfothion	0.2	mg/kg	-	< 0.2	-	-
Fenthion	0.2	mg/kg	-	< 0.2	-	-
Malathion	0.2	mg/kg	-	< 0.2	-	-
Merphos	0.2	mg/kg	-	< 0.2	-	-
Methyl parathion	0.2	mg/kg	-	< 0.2	-	-
Mevinphos	0.2	mg/kg	-	< 0.2	-	-
Monocrotophos	2	mg/kg	-	< 2	-	-
Naled	0.2	mg/kg	-	< 0.2	-	-
Omethoate	2	mg/kg	-	< 2	-	-
Phorate	0.2	mg/kg	-	< 0.2	-	-
Pirimiphos-methyl	0.2	mg/kg	-	< 0.2	-	-
Pyrazophos	0.2	mg/kg	-	< 0.2	-	-
Ronnel	0.2	mg/kg	-	< 0.2	-	-
Terbufos	0.2	mg/kg	-	< 0.2	-	-
Tetrachlorvinphos	0.2	mg/kg	-	< 0.2	-	-
Tokuthion	0.2	mg/kg	-	< 0.2	-	-
Trichloronate	0.2	mg/kg	-	< 0.2	-	-
Triphenylphosphate (surr.)	1	%	-	84	-	-
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
TRH >C10-C16	50	mg/kg	-	< 50	-	< 50
TRH >C16-C34	100	mg/kg	-	< 100	-	< 100
TRH >C34-C40	100	mg/kg	-	< 100	-	< 100

Client Sample ID			BH5 Soil	BH6 Soil	BH7 Soil	BH8 Soil
Sample Matrix			S16-De18275	S16-De18276	S16-De18277	S16-De18278
Eurofins mgt Sample No.			Dec 15, 2016	Dec 15, 2016	Dec 15, 2016	Dec 15, 2016
Date Sampled						
Test/Reference	LOR	Unit				
Conductivity (1:5 aqueous extract at 25°C)	5	uS/cm	-	110	-	1000
pH (1:5 Aqueous extract)	0.1	pH Units	-	7.0	-	6.4
% Moisture	1	%	7.0	9.2	9.3	15
Heavy Metals						
Arsenic	2	mg/kg	6.1	17	4.5	8.4
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	66	31	44	14
Copper	5	mg/kg	57	21	15	14
Lead	5	mg/kg	38	30	9.6	17
Mercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Nickel	5	mg/kg	75	11	24	7.5
Zinc	5	mg/kg	170	200	220	18

Client Sample ID			BH9 Soil
Sample Matrix			S16-De18279
Eurofins mgt Sample No.			Dec 15, 2016
Date Sampled			
Test/Reference	LOR	Unit	
% Moisture	1	%	13
Heavy Metals			
Arsenic	2	mg/kg	17
Cadmium	0.4	mg/kg	< 0.4
Chromium	5	mg/kg	41
Copper	5	mg/kg	21
Lead	5	mg/kg	33
Mercury	0.1	mg/kg	< 0.1
Nickel	5	mg/kg	13
Zinc	5	mg/kg	66

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported. A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
ENM Exemption Suite -The excavated natural material order 2014 NSW EPA(excluding Foreign Material)			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions - Method: TRH C6-C36 - LTM-ORG-2010	Sydney	Dec 20, 2016	14 Day
BTEX - Method: TRH C6-C40 - LTM-ORG-2010	Sydney	Dec 19, 2016	14 Day
Total Recoverable Hydrocarbons - 2013 NEPM Fractions - Method: TRH C6-C40 - LTM-ORG-2010	Sydney	Dec 19, 2016	14 Day
Polycyclic Aromatic Hydrocarbons - Method: E007 Polyaromatic Hydrocarbons (PAH)	Sydney	Dec 20, 2016	14 Day
Total Recoverable Hydrocarbons - 2013 NEPM Fractions - Method: TRH C6-C40 - LTM-ORG-2010	Sydney	Dec 20, 2016	14 Day
Conductivity (1:5 aqueous extract at 25°C) - Method: LTM-INO-4030	Sydney	Dec 22, 2016	7 Day
pH (1:5 Aqueous extract) - Method: LTM-GEN-7090 pH in soil by ISE	Sydney	Dec 22, 2016	7 Day
Metals M8 - Method: LTM-MET-3040_R0 TOTAL AND DISSOLVED METALS AND MERCURY IN WATERS BY ICP-MS	Sydney	Dec 19, 2016	28 Day
Eurofins mgt Suite B14			
Organochlorine Pesticides - Method: E013 Organochlorine Pesticides (OC)	Sydney	Dec 20, 2016	14 Day
Organophosphorus Pesticides - Method: LTM-ORG-2200 Organophosphorus Pesticides by GC-MS	Melbourne	Dec 20, 2016	14 Day
% Moisture - Method: LTM-GEN-7080 Moisture	Sydney	Dec 16, 2016	14 Day

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Order No.:
Report #: 528228
Phone: 03 9562 8808
Fax:

Received: Dec 16, 2016 9:22 AM
Due: Dec 23, 2016
Priority: 5 Day
Contact Name: Amir Farazmand

Eurofins | mgt Analytical Services Manager : Mary Makarios

Sample Detail

External Laboratory					Asbestos Absence /Presence	Metals M8	Eurofins mgt Suite B14	Moisture Set	ENM Exemption Suite -The excavated natural material order 2014 NSW
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID				
1	BH1	Dec 15, 2016		Soil	S16-De18271		X	X	
2	BH2	Dec 15, 2016		Soil	S16-De18272		X	X	
3	BH3	Dec 15, 2016		Soil	S16-De18273	X	X	X	X
4	BH4	Dec 15, 2016		Soil	S16-De18274		X	X	
5	BH5	Dec 15, 2016		Soil	S16-De18275	X	X	X	
6	BH6	Dec 15, 2016		Soil	S16-De18276		X	X	X
7	BH7	Dec 15, 2016		Soil	S16-De18277	X		X	
8	BH8	Dec 15, 2016		Soil	S16-De18278	X		X	X
9	BH9	Dec 15, 2016		Soil	S16-De18279		X	X	
Test Counts						3	6	3	3

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
4. Results are uncorrected for matrix spikes or surrogate recoveries.
5. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
6. Samples were analysed on an 'as received' basis. 7. This report replaces any Interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the Sample Receipt Advice.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per Kilogram	mg/l: milligrams per litre
ug/l: micrograms per litre	ppm: Parts per million
ppb: Parts per billion	%: Percentage
org/100ml: Organisms per 100 millilitres	NTU: Nephelometric Turbidity Units
MPN/100mL: Most Probable Number of organisms per 100 millilitres	

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery
CRM	Certified Reference Material - reported as percent recovery
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands. In the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
Batch Duplicate	A second piece of analysis from a sample outside of the clients batch of samples but run within the laboratory batch of analysis.
Batch SPIKE	Spike recovery reported on a sample from outside of the clients batch of samples but run within the laboratory batch of analysis.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 50-150%-Phenols & PFASs 20-130%

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " - " in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	mg/kg	< 20			20	Pass	
TRH C10-C14	mg/kg	< 20			20	Pass	
TRH C15-C28	mg/kg	< 50			50	Pass	
TRH C29-C36	mg/kg	< 50			50	Pass	
Method Blank							
BTEX							
Benzene	mg/kg	< 0.1			0.1	Pass	
Toluene	mg/kg	< 0.1			0.1	Pass	
Ethylbenzene	mg/kg	< 0.1			0.1	Pass	
m&p-Xylenes	mg/kg	< 0.2			0.2	Pass	
o-Xylene	mg/kg	< 0.1			0.1	Pass	
Xylenes - Total	mg/kg	< 0.3			0.3	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	mg/kg	< 0.5			0.5	Pass	
TRH C6-C10	mg/kg	< 20			20	Pass	
Method Blank							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	mg/kg	< 0.5			0.5	Pass	
Acenaphthylene	mg/kg	< 0.5			0.5	Pass	
Anthracene	mg/kg	< 0.5			0.5	Pass	
Benz(a)anthracene	mg/kg	< 0.5			0.5	Pass	
Benzo(a)pyrene	mg/kg	< 0.5			0.5	Pass	
Benzo(b&j)fluoranthene	mg/kg	< 0.5			0.5	Pass	
Benzo(g,h,i)perylene	mg/kg	< 0.5			0.5	Pass	
Benzo(k)fluoranthene	mg/kg	< 0.5			0.5	Pass	
Chrysene	mg/kg	< 0.5			0.5	Pass	
Dibenz(a,h)anthracene	mg/kg	< 0.5			0.5	Pass	
Fluoranthene	mg/kg	< 0.5			0.5	Pass	
Fluorene	mg/kg	< 0.5			0.5	Pass	
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.5			0.5	Pass	
Naphthalene	mg/kg	< 0.5			0.5	Pass	
Phenanthrene	mg/kg	< 0.5			0.5	Pass	
Pyrene	mg/kg	< 0.5			0.5	Pass	
Method Blank							
Organochlorine Pesticides							
Chlordanes - Total	mg/kg	< 0.1			0.1	Pass	
4,4'-DDD	mg/kg	< 0.05			0.05	Pass	
4,4'-DDE	mg/kg	< 0.05			0.05	Pass	
4,4'-DDT	mg/kg	< 0.05			0.05	Pass	
a-BHC	mg/kg	< 0.05			0.05	Pass	
Aldrin	mg/kg	< 0.05			0.05	Pass	
b-BHC	mg/kg	< 0.05			0.05	Pass	
d-BHC	mg/kg	< 0.05			0.05	Pass	
Dieldrin	mg/kg	< 0.05			0.05	Pass	
Endosulfan I	mg/kg	< 0.05			0.05	Pass	
Endosulfan II	mg/kg	< 0.05			0.05	Pass	
Endosulfan sulphate	mg/kg	< 0.05			0.05	Pass	
Endrin	mg/kg	< 0.05			0.05	Pass	
Endrin aldehyde	mg/kg	< 0.05			0.05	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Endrin ketone	mg/kg	< 0.05			0.05	Pass	
g-BHC (Lindane)	mg/kg	< 0.05			0.05	Pass	
Heptachlor	mg/kg	< 0.05			0.05	Pass	
Heptachlor epoxide	mg/kg	< 0.05			0.05	Pass	
Hexachlorobenzene	mg/kg	< 0.05			0.05	Pass	
Methoxychlor	mg/kg	< 0.2			0.2	Pass	
Toxaphene	mg/kg	< 1			1	Pass	
Method Blank							
Organophosphorus Pesticides							
Azinphos-methyl	mg/kg	< 0.2			0.2	Pass	
Bolstar	mg/kg	< 0.2			0.2	Pass	
Chlorfenvinphos	mg/kg	< 0.2			0.2	Pass	
Chlorpyrifos	mg/kg	< 0.2			0.2	Pass	
Chlorpyrifos-methyl	mg/kg	< 0.2			0.2	Pass	
Coumaphos	mg/kg	< 2			2	Pass	
Demeton-S	mg/kg	< 0.2			0.2	Pass	
Demeton-O	mg/kg	< 0.2			0.2	Pass	
Diazinon	mg/kg	< 0.2			0.2	Pass	
Dichlorvos	mg/kg	< 0.2			0.2	Pass	
Dimethoate	mg/kg	< 0.2			0.2	Pass	
Disulfoton	mg/kg	< 0.2			0.2	Pass	
EPN	mg/kg	< 0.2			0.2	Pass	
Ethion	mg/kg	< 0.2			0.2	Pass	
Ethoprop	mg/kg	< 0.2			0.2	Pass	
Ethyl parathion	mg/kg	< 0.2			0.2	Pass	
Fenitrothion	mg/kg	< 0.2			0.2	Pass	
Fensulfothion	mg/kg	< 0.2			0.2	Pass	
Fenthion	mg/kg	< 0.2			0.2	Pass	
Malathion	mg/kg	< 0.2			0.2	Pass	
Merphos	mg/kg	< 0.2			0.2	Pass	
Methyl parathion	mg/kg	< 0.2			0.2	Pass	
Mevinphos	mg/kg	< 0.2			0.2	Pass	
Monocrotophos	mg/kg	< 2			2	Pass	
Naled	mg/kg	< 0.2			0.2	Pass	
Omethoate	mg/kg	< 2			2	Pass	
Phorate	mg/kg	< 0.2			0.2	Pass	
Pirimiphos-methyl	mg/kg	< 0.2			0.2	Pass	
Pyrazophos	mg/kg	< 0.2			0.2	Pass	
Ronnel	mg/kg	< 0.2			0.2	Pass	
Terbufos	mg/kg	< 0.2			0.2	Pass	
Tetrachlorvinphos	mg/kg	< 0.2			0.2	Pass	
Tokuthion	mg/kg	< 0.2			0.2	Pass	
Trichloronate	mg/kg	< 0.2			0.2	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
TRH >C10-C16	mg/kg	< 50			50	Pass	
TRH >C16-C34	mg/kg	< 100			100	Pass	
TRH >C34-C40	mg/kg	< 100			100	Pass	
Method Blank							
Conductivity (1:5 aqueous extract at 25°C)	uS/cm	< 5			5	Pass	
Method Blank							
Heavy Metals							
Arsenic	mg/kg	< 2			2	Pass	
Cadmium	mg/kg	< 0.4			0.4	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Chromium	mg/kg	< 5			5	Pass	
Copper	mg/kg	< 5			5	Pass	
Lead	mg/kg	< 5			5	Pass	
Mercury	mg/kg	< 0.1			0.1	Pass	
Nickel	mg/kg	< 5			5	Pass	
Zinc	mg/kg	< 5			5	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	%	103			70-130	Pass	
TRH C10-C14	%	97			70-130	Pass	
LCS - % Recovery							
BTEX							
Benzene	%	112			70-130	Pass	
Toluene	%	109			70-130	Pass	
Ethylbenzene	%	112			70-130	Pass	
m&p-Xylenes	%	110			70-130	Pass	
o-Xylene	%	110			70-130	Pass	
Xylenes - Total	%	110			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	%	129			70-130	Pass	
TRH C6-C10	%	93			70-130	Pass	
LCS - % Recovery							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	%	111			70-130	Pass	
Acenaphthylene	%	89			70-130	Pass	
Anthracene	%	105			70-130	Pass	
Benz(a)anthracene	%	96			70-130	Pass	
Benzo(a)pyrene	%	92			70-130	Pass	
Benzo(b&j)fluoranthene	%	100			70-130	Pass	
Benzo(g,h,i)perylene	%	97			70-130	Pass	
Benzo(k)fluoranthene	%	106			70-130	Pass	
Chrysene	%	99			70-130	Pass	
Dibenz(a,h)anthracene	%	72			70-130	Pass	
Fluoranthene	%	109			70-130	Pass	
Fluorene	%	124			70-130	Pass	
Indeno(1,2,3-cd)pyrene	%	88			70-130	Pass	
Naphthalene	%	101			70-130	Pass	
Phenanthrene	%	106			70-130	Pass	
Pyrene	%	107			70-130	Pass	
LCS - % Recovery							
Organochlorine Pesticides							
Chlordanes - Total	%	93			70-130	Pass	
4,4'-DDD	%	90			70-130	Pass	
4,4'-DDE	%	91			70-130	Pass	
4,4'-DDT	%	73			70-130	Pass	
a-BHC	%	95			70-130	Pass	
Aldrin	%	106			70-130	Pass	
b-BHC	%	114			70-130	Pass	
d-BHC	%	114			70-130	Pass	
Dieldrin	%	88			70-130	Pass	
Endosulfan I	%	106			70-130	Pass	
Endosulfan II	%	86			70-130	Pass	
Endosulfan sulphate	%	90			70-130	Pass	

Test			Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
Endrin			%	81		70-130	Pass	
Endrin aldehyde			%	76		70-130	Pass	
Endrin ketone			%	83		70-130	Pass	
g-BHC (Lindane)			%	96		70-130	Pass	
Heptachlor			%	100		70-130	Pass	
Heptachlor epoxide			%	102		70-130	Pass	
Hexachlorobenzene			%	108		70-130	Pass	
Methoxychlor			%	74		70-130	Pass	
LCS - % Recovery								
Organophosphorus Pesticides								
Diazinon			%	107		70-130	Pass	
Dimethoate			%	73		70-130	Pass	
Ethion			%	129		70-130	Pass	
Fenitrothion			%	78		70-130	Pass	
Methyl parathion			%	107		70-130	Pass	
Mevinphos			%	100		70-130	Pass	
LCS - % Recovery								
Total Recoverable Hydrocarbons - 2013 NEPM Fractions								
TRH >C10-C16			%	87		70-130	Pass	
LCS - % Recovery								
Heavy Metals								
Arsenic			%	95		70-130	Pass	
Cadmium			%	94		70-130	Pass	
Chromium			%	95		70-130	Pass	
Copper			%	96		70-130	Pass	
Lead			%	93		70-130	Pass	
Mercury			%	94		70-130	Pass	
Nickel			%	98		70-130	Pass	
Zinc			%	97		70-130	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery								
Organophosphorus Pesticides				Result 1				
Diazinon	M16-De16452	NCP	%	110		70-130	Pass	
Dimethoate	M16-De16452	NCP	%	73		70-130	Pass	
Ethion	M16-De16452	NCP	%	98		70-130	Pass	
Fenitrothion	M16-De16452	NCP	%	73		70-130	Pass	
Methyl parathion	M16-De16452	NCP	%	85		70-130	Pass	
Mevinphos	M16-De16452	NCP	%	93		70-130	Pass	
Spike - % Recovery								
Heavy Metals				Result 1				
Arsenic	S16-De15239	NCP	%	96		70-130	Pass	
Cadmium	S16-De15239	NCP	%	97		70-130	Pass	
Chromium	S16-De15239	NCP	%	93		70-130	Pass	
Copper	S16-De15239	NCP	%	95		70-130	Pass	
Lead	S16-De15239	NCP	%	91		70-130	Pass	
Mercury	S16-De15239	NCP	%	97		70-130	Pass	
Nickel	S16-De15239	NCP	%	98		70-130	Pass	
Zinc	S16-De15239	NCP	%	97		70-130	Pass	
Spike - % Recovery								
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1				
TRH C6-C9	S16-De17835	NCP	%	88		70-130	Pass	
TRH C10-C14	S16-De19233	NCP	%	94		70-130	Pass	
Spike - % Recovery								
BTEX				Result 1				

Test	Lab Sample ID	QA Source	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
Benzene	S16-De17835	NCP	%	94		70-130	Pass	
Toluene	S16-De17835	NCP	%	93		70-130	Pass	
Ethylbenzene	S16-De17835	NCP	%	93		70-130	Pass	
m&p-Xylenes	S16-De17835	NCP	%	90		70-130	Pass	
o-Xylene	S16-De17835	NCP	%	92		70-130	Pass	
Xylenes - Total	S16-De17835	NCP	%	90		70-130	Pass	
Spike - % Recovery								
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1				
Naphthalene	S16-De17835	NCP	%	105		70-130	Pass	
TRH C6-C10	S16-De17835	NCP	%	85		70-130	Pass	
Spike - % Recovery								
Polycyclic Aromatic Hydrocarbons				Result 1				
Acenaphthene	S16-De16172	NCP	%	111		70-130	Pass	
Acenaphthylene	S16-De16172	NCP	%	90		70-130	Pass	
Anthracene	S16-De16172	NCP	%	122		70-130	Pass	
Benz(a)anthracene	S16-De16172	NCP	%	105		70-130	Pass	
Benzo(a)pyrene	S16-De16172	NCP	%	97		70-130	Pass	
Benzo(b&j)fluoranthene	S16-De16172	NCP	%	113		70-130	Pass	
Benzo(g,h,i)perylene	S16-De16172	NCP	%	96		70-130	Pass	
Benzo(k)fluoranthene	S16-De16172	NCP	%	100		70-130	Pass	
Chrysene	S16-De16172	NCP	%	106		70-130	Pass	
Dibenz(a,h)anthracene	S16-De16172	NCP	%	93		70-130	Pass	
Fluoranthene	S16-De16172	NCP	%	115		70-130	Pass	
Fluorene	S16-De16172	NCP	%	121		70-130	Pass	
Indeno(1,2,3-cd)pyrene	S16-De16172	NCP	%	98		70-130	Pass	
Naphthalene	S16-De16172	NCP	%	106		70-130	Pass	
Phenanthrene	S16-De16172	NCP	%	128		70-130	Pass	
Pyrene	S16-De16172	NCP	%	121		70-130	Pass	
Spike - % Recovery								
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1				
TRH >C10-C16	S16-De19233	NCP	%	85		70-130	Pass	
Spike - % Recovery								
Organochlorine Pesticides				Result 1				
Chlordanes - Total	S16-De18276	CP	%	108		70-130	Pass	
4,4'-DDD	S16-De18276	CP	%	114		70-130	Pass	
4,4'-DDE	S16-De18276	CP	%	120		70-130	Pass	
4,4'-DDT	S16-De18276	CP	%	121		70-130	Pass	
a-BHC	S16-De18276	CP	%	95		70-130	Pass	
Aldrin	S16-De18276	CP	%	105		70-130	Pass	
b-BHC	S16-De18276	CP	%	121		70-130	Pass	
d-BHC	S16-De18276	CP	%	130		70-130	Pass	
Dieldrin	S16-De18276	CP	%	102		70-130	Pass	
Endosulfan I	S16-De18276	CP	%	114		70-130	Pass	
Endosulfan II	S16-De18276	CP	%	102		70-130	Pass	
Endosulfan sulphate	S16-De18276	CP	%	120		70-130	Pass	
Endrin	S16-De18276	CP	%	97		70-130	Pass	
Endrin aldehyde	S16-De18276	CP	%	100		70-130	Pass	
Endrin ketone	S16-De18276	CP	%	116		70-130	Pass	
g-BHC (Lindane)	S16-De18276	CP	%	98		70-130	Pass	
Heptachlor	S16-De18276	CP	%	111		70-130	Pass	
Heptachlor epoxide	S16-De18276	CP	%	120		70-130	Pass	
Methoxychlor	S16-De18276	CP	%	85		70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1	Result 2	RPD	Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Organochlorine Pesticides				Result 1	Result 2	RPD			
Chlordanes - Total	S16-De17802	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
4,4'-DDD	S16-De17802	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
4,4'-DDE	S16-De17802	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
4,4'-DDT	S16-De17802	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
a-BHC	S16-De17802	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Aldrin	S16-De17802	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
b-BHC	S16-De17802	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
d-BHC	S16-De17802	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Dieldrin	S16-De17802	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan I	S16-De17802	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan II	S16-De17802	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan sulphate	S16-De17802	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin	S16-De17802	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin aldehyde	S16-De17802	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin ketone	S16-De17802	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
g-BHC (Lindane)	S16-De17802	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Heptachlor	S16-De17802	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Heptachlor epoxide	S16-De17802	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Hexachlorobenzene	S16-De17802	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Methoxychlor	S16-De17802	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Toxaphene	S16-De17802	NCP	mg/kg	< 1	< 1	<1	30%	Pass	
Duplicate									
Organophosphorus Pesticides				Result 1	Result 2	RPD			
Azinphos-methyl	A16-De18006	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Bolstar	A16-De18006	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Chlorfenvinphos	A16-De18006	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Chlorpyrifos	A16-De18006	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Chlorpyrifos-methyl	A16-De18006	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Coumaphos	A16-De18006	NCP	mg/kg	< 2	< 2	<1	30%	Pass	
Demeton-S	A16-De18006	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Demeton-O	A16-De18006	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Diazinon	A16-De18006	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Dichlorvos	A16-De18006	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Dimethoate	A16-De18006	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Disulfoton	A16-De18006	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
EPN	A16-De18006	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ethion	A16-De18006	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ethoprop	A16-De18006	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ethyl parathion	A16-De18006	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Fenitrothion	A16-De18006	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Fensulfthion	A16-De18006	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Fenthion	A16-De18006	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Malathion	A16-De18006	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Merphos	A16-De18006	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Methyl parathion	A16-De18006	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Mevinphos	A16-De18006	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Monocrotophos	A16-De18006	NCP	mg/kg	< 2	< 2	<1	30%	Pass	
Naled	A16-De18006	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Omethoate	A16-De18006	NCP	mg/kg	< 2	< 2	<1	30%	Pass	
Phorate	A16-De18006	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Pirimiphos-methyl	A16-De18006	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Pyrazophos	A16-De18006	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	

Duplicate								
Organophosphorus Pesticides				Result 1	Result 2	RPD		
Ronnel	A16-De18006	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass
Terbufos	A16-De18006	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass
Tetrachlorvinphos	A16-De18006	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass
Tokuthion	A16-De18006	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass
Trichloronate	A16-De18006	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass
Duplicate								
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD		
TRH C6-C9	S16-De17746	NCP	mg/kg	< 20	< 20	<1	30%	Pass
TRH C10-C14	S16-De17802	NCP	mg/kg	< 20	< 20	<1	30%	Pass
TRH C15-C28	S16-De17802	NCP	mg/kg	< 50	< 50	<1	30%	Pass
TRH C29-C36	S16-De17802	NCP	mg/kg	< 50	< 50	<1	30%	Pass
Duplicate								
BTEX				Result 1	Result 2	RPD		
Benzene	S16-De17746	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
Toluene	S16-De17746	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
Ethylbenzene	S16-De17746	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
m&p-Xylenes	S16-De17746	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass
o-Xylene	S16-De17746	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
Xylenes - Total	S16-De17746	NCP	mg/kg	< 0.3	< 0.3	<1	30%	Pass
Duplicate								
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD		
Naphthalene	S16-De17746	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
TRH C6-C10	S16-De17746	NCP	mg/kg	< 20	< 20	<1	30%	Pass
Duplicate								
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD		
Acenaphthene	S16-De16171	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Acenaphthylene	S16-De16171	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Anthracene	S16-De16171	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Benz(a)anthracene	S16-De16171	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Benzo(a)pyrene	S16-De16171	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Benzo(b&j)fluoranthene	S16-De16171	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Benzo(g,h,i)perylene	S16-De16171	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Benzo(k)fluoranthene	S16-De16171	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Chrysene	S16-De16171	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Dibenz(a,h)anthracene	S16-De16171	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Fluoranthene	S16-De16171	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Fluorene	S16-De16171	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Indeno(1,2,3-cd)pyrene	S16-De16171	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Naphthalene	S16-De16171	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Phenanthrene	S16-De16171	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Pyrene	S16-De16171	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Duplicate								
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD		
TRH >C10-C16	S16-De17802	NCP	mg/kg	< 50	< 50	<1	30%	Pass
TRH >C16-C34	S16-De17802	NCP	mg/kg	< 100	< 100	<1	30%	Pass
TRH >C34-C40	S16-De17802	NCP	mg/kg	< 100	< 100	<1	30%	Pass
Duplicate								
				Result 1	Result 2	RPD		
Conductivity (1:5 aqueous extract at 25°C)	S16-De17802	NCP	uS/cm	160	160	2.0	30%	Pass
pH (1:5 Aqueous extract)	S16-De17802	NCP	pH Units	9.1	9.0	pass	30%	Pass
Duplicate								
				Result 1	Result 2	RPD		
% Moisture	S16-De18277	CP	%	9.3	9.6	3.0	30%	Pass

Duplicate								
Heavy Metals				Result 1	Result 2	RPD		
Arsenic	S16-De18279	CP	mg/kg	17	17	<1	30%	Pass
Cadmium	S16-De18279	CP	mg/kg	< 0.4	< 0.4	<1	30%	Pass
Chromium	S16-De18279	CP	mg/kg	41	41	1.0	30%	Pass
Copper	S16-De18279	CP	mg/kg	21	22	2.0	30%	Pass
Lead	S16-De18279	CP	mg/kg	33	29	12	30%	Pass
Mercury	S16-De18279	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
Nickel	S16-De18279	CP	mg/kg	13	12	4.0	30%	Pass
Zinc	S16-De18279	CP	mg/kg	66	63	4.0	30%	Pass

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	No
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.
N07	Please note:- These two PAH isomers closely co-elute using the most contemporary analytical methods and both the reported concentration (and the TEQ) apply specifically to the total of the two co-eluting PAHs

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Glenn Jackson

National Operations Manager

Final report - this Report replaces any previously Issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please [click here](#).

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Universal Property Group Pty Ltd



Preliminary Site Investigation:

Lots 59 and 173 Richmond Road, 1032, 1036, 1060, 1070, 1080, 1082, 1086, 1132, 1140, 1148 and 1160 Richmond Road, and 230, 232 and 234 Grange Avenue, Marsden Park, NSW

ENVIRONMENTAL



WATER



WASTEWATER



GEOTECHNICAL



CIVIL



PROJECT
MANAGEMENT



P1504888JR01V01
December 2015

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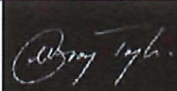
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All enquiries regarding this project are to be directed to the Project Manager.



Preliminary Site Investigation:
Lots 59 and 173 Richmond Road, 1032, 1036, 1060, 1070, 1080, 1082, 1086, 1132, 1140,
1148 and 1160 Richmond Road, and 230, 232 and 234 Grange Avenue,
Marsden Park, NSW.

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1 Overview

1.1 Introduction

Martens & Associates Pty Ltd has prepared this Preliminary Site Investigation (PSI) for Universal Property Group Pty Ltd ('the Client') to support a site redevelopment proposal comprising 16 properties in Marsden Park, NSW, being:

- o Lots 59 and 173 Richmond Road;
- o 1032, 1036, 1060, 1070, 1080, 1082, 1086, 1132, 1140, 1148 and 1160 Richmond Road; and
- o 230, 232 and 234 Grange Avenue.

Note that site investigations for 1148 Richmond Road (Lot 7 DP 235714) include only the access handle from Richmond Road to the "majority" of the allotment.

1.2 Objectives

Investigation objectives include:

- o Identification of historic and current potentially contaminating site activities.
- o Evaluation of potential areas of environmental concern (AEC) and associated contaminants of primary concern (COPC).
- o Provide comment on suitability of site for future development use and provide recommendations for a detailed site investigation (DSI) including possible intrusive soil investigations, if required.

1.3 Project Scope

Scope of works includes:

- o Walkover inspection to review current land use, potential contaminating activities and neighbouring land uses.
- o Review available Blacktown City Council (BCC) site development consents.

- Review of 8 historic aerial photographs to assess past site and surrounding land use patterns.
- Review NSW OEH (formerly NSW EPA) notices under the Contaminated Land Management Act (1997).
- Prepare a PSI report in general accordance with the relevant sections of ASC NEPM (1999, amended 2013), NSW OEH (2011) and DEC (2006).

1.4 Abbreviations

ACM – Asbestos containing material

AEC – Area of environmental concern

ASC NEPM – Assessment of Site Contamination - National Environmental Protection Measure (1999 amended 2013).

AST – Above ground storage tank

BCC – Blacktown City Council

BTEX – Benzene, toluene, ethyl benzene, xylene

COPC – Contaminants of primary concern

DEC – NSW Department of Environment and Conservation

DP – Deposited plan

DSI – Detailed site investigation

EPA – NSW Environmental Protection Authority

HM – Heavy metals

IBC – Intermediate bulk carriers

LGA – Local government area

MA – Martens & Associates Pty Ltd

mAHD – Metres, Australian Height Datum

mbgl – Metres below ground level

OCP – Organochloride pesticides

OEH – NSW Office of Environment and Heritage

OPP – Organophosphate pesticides

PACM – Potential asbestos containing material

PAH – Polycyclic aromatic hydrocarbons

PSI – Preliminary site investigation

SAC – Site acceptance criteria

SAP – Sampling and analysis plan

TRH – Total recoverable hydrocarbons

2 Site Description

2.1 Site Location and Existing Land Use

Site information is summarised in Tables 1 and 2. Site location and general surrounds are provided in Sheet A000 (Attachment A).

Table 1: Investigation address, lot information, area and zoning.

Lot	DP	Street Address	Area (ha)	Zoning
59	1196729	Lot 59 Richmond Road	0.9	SEPP (SRGC) 2006:R3; SEPP (SRGC) 2006:SP2 – Infrastructure – Local Drainage
173	1191299	Lot 173 Richmond Road	1.6	SEPP (SRGC) 2006:R2; SEPP (SRGC) 2006:SP2 – Infrastructure – Classified Road; SEPP (SRGC) 2006:SP2 – Infrastructure – Local Drainage
1	1200165	1032 Richmond Road	0.9	SEPP (SRGC) 2006:R3
7	741072	1036 Richmond Road	0.7	SEPP (SRGC) 2006:R3; SEPP (SRGC) 2006:SP2 – Infrastructure – Local Drainage
Lot 12, Sec M	193074	1060 Richmond Road	2.2	SEPP (SRGC) 2006:R3; SEPP (SRGC) 2006:SP2 – Infrastructure – Local Road
54	1196583	1070 Richmond Road	1.3	SEPP (SRGC) 2006:R3; SEPP (SRGC) 2006:SP2 – Infrastructure – Local Road
53	1196583	1080 Richmond Road	1.0	SEPP (SRGC) 2006:R3; SEPP (SRGC) 2006:SP2 – Infrastructure – Local Road
52	1196583	1082 Richmond Road	0.7	SEPP (SRGC) 2006:R3; SEPP (SRGC) 2006:SP2 – Infrastructure – Local Road
51	1196583	1086 Richmond Road	10.3	SEPP (SRGC) 2006:R3; SEPP (SRGC) 2006:RE1; SEPP (SRGC) 2006:SP2 – Infrastructure – Local Road
50	1196583	1132 Richmond Road	10.0	SEPP (SRGC) 2006:R2; SEPP (SRGC) 2006:RE3; SEPP (SRGC) 2006:SP2 – Infrastructure – Local Drainage; SEPP (SRGC) 2006:SP2 – Infrastructure – Local Road
8	235714	1140 Richmond Road	10.1	SEPP (SRGC) 2006:R2; SEPP (SRGC) 2006:R3; SEPP (SRGC) 2006:RE1; SEPP (SRGC) 2006:SP2 – Infrastructure – Classified Road; SEPP (SRGC) 2006:SP2 – Infrastructure – Local Drainage
7	235714	1148 Richmond Road ¹	1.6	SEPP (SRGC) 2006:R2; SEPP (SRGC) 2006:SP2 – Infrastructure – Classified Road; SEPP (SRGC) 2006:SP2 – Infrastructure – Local Drainage; SEPP (SRGC) 2006:SP2 – Infrastructure – Local Road
5	235714	1160 Richmond Road	10.1	SEPP (SRGC) 2006:R2; SEPP (SRGC) 2006:SP2 – Infrastructure – Classified Road; SEPP (SRGC) 2006:SP2 – Infrastructure – Local Drainage

Lot	DP	Street Address	Area (ha)	Zoning
20	1191512	230 Grange Avenue	1.1	SEPP (SRGC) 2006:R3
10	70287	232 Grange Avenue	1.1	SEPP (SRGC) 2006:R3; SEPP (SRGC) 2006:SP2 – Infrastructure – Local Drainage
Lot 11, Sec M	193074	234 Grange Avenue	2.2	SEPP (SRGC) 2006:R3; SEPP (SRGC) 2006:SP2 – Infrastructure – Local Drainage; SEPP (SRGC) 2006:SP2 – Infrastructure – Local Road

Notes

¹ Assessment of 1148 Richmond Road (Lot 7 DP 235714) limited to the access handle only, as shown on plan.

Table 2: Site background information.

Investigation area	Approximately 55.7 ha
Local Government Area (LGA)	Blacktown City Council
Site description	<p>Majority of lots are rural residential properties with existing dwellings and/or sheds. Market gardens are located on 1086 and 1160 Richmond Road, and a landscape and nursery business is located at 230 Grange Avenue. 1080 and 1082 Richmond Road are cleared and undeveloped properties, and Lot 173 and the eastern portion of 1148 Richmond Road are access roads only, with no lot infrastructure. Poultry/chicken sheds are located at 1132 Richmond Road. Dams are located on 1160, 1140, 1132, 1086, 1036, 1032 and Lot 59 Richmond Road.</p> <p>The site is bordered by rural residential and residential allotments to the north west, Richmond Road to the east, Grange Road to the south east, former Blacktown City Council Waste Services Depot to the south west and west, and rural allotments, with clearing for residential subdivision to the west and north west.</p> <p>Marsden Park Primary School is located 180 m east of 1086 Richmond Road, and a Caltex petrol station is located adjacent to the school's southern boundary, approximately 150 m from 1086 Richmond Road. Peek Farms (poultry farm), was formerly located on the western portion of 1148 Richmond Road (not included as part of our site investigations). Allotments to north and west of 1160 Richmond Road are cleared for residential subdivision development.</p> <p>The site has low to moderate grades of 0 – 15%, with the northern portion of the site ranging from 24 mAHD in the north eastern corner, to 37 mAHD near the southern boundary of 1086 Richmond Road. The southern portion of the site ranges from 33 mAHD in the south west corner to 37 mAHD near the southern boundary of 1086 Richmond Road, and the south eastern corner of the site.</p>
Current land use	Rural, rural residential, commercial and residential under construction.
Proposed land use	Residential.
Surrounding land uses	Mixture of rural residential, residential, commercial and school.

Geology and soil landscapes	<p>The Penrith 1:100,000 Geological Series Sheet 9030 (1991) indicates that the site is underlain by Bringelly Shale which comprises shale, carbonaceous claystone, claystone, laminite, fine to medium grained lithic sandstone and rare coal/tuff.</p> <p>The NSW Environment and Heritage eSPADE website identifies the site as having soils of the Blacktown soil landscapes consisting of shallow to moderately deep hardsetting mottled texture contrast soils, red and brown podzolic soils on crests grading to yellow podzic soils on lower slopes and in drainage lines.</p>
Environmental receptors	<p>Mapped watercourses and dams located in the central and eastern areas of the northern portion of the site (1086, 1132, 1140, 1148, Lot 173 and 1160 Richmond Road) drain north / north east toward an unnamed tributary of South Creek (more than 4.5 km north).</p> <p>Another mapped watercourse located in the north eastern portion of 1036 Richmond Road and the south eastern portion of Lot 59 drain to another unnamed tributary of South Creek. South Creek eventually drains into the Hawkesbury River, more than 10 km north.</p>
Human receptors	<p>Existing surrounding rural residential and residential developments. Marsden Park Public School 180 m east of northern portion of site.</p> <p>Existing and future residents and site workers / builders.</p>

2.2 Hydrogeology

Review of NSW Department of Primary Industries - Office of Water database indicated eleven groundwater bores (with limited available information) within 500 m of the site (Table 3). Groundwater bore locations are shown on Sheet A001 (Attachment B).

Table 3: Available hydrogeological information.

Groundwater Bore Identification	Direction and Distance	Depth To Groundwater (mbgl)	Intended Use	Water Bearing Zone Substrate
GW104308	West (500m)	ND ¹	Monitoring Bore	ND ¹
GW104309	South (10m)	ND ¹	Monitoring Bore	ND ¹
GW104310	South west (125m)	ND ¹	Monitoring Bore	ND ¹
GW104311	South west (290m)	ND ¹	Monitoring Bore	ND ¹
GW104312	South west (50m)	ND ¹	Monitoring Bore	ND ¹
GW104313	South (50m)	ND ¹	Monitoring Bore	ND ¹
GW104314	South (165m)	ND ¹	Monitoring Bore	ND ¹
GW113305	East (160m)	ND ¹	Monitoring Bore	ND ¹

Groundwater Bore Identification	Direction and Distance	Depth To Groundwater (mbgl)	Intended Use	Water Bearing Zone Substrate
GW113306	East (160m)	ND ¹	Monitoring Bore	ND ¹
GW113307	East (165m)	ND ¹	Monitoring Bore	ND ¹
GW113308	East (250m)	ND ¹	Monitoring Bore	ND ¹

Notes

¹ ND – No data available.

From review of the information in Table 3, groundwater wells in the vicinity are used for monitoring, however no information regarding groundwater levels was available. Further investigation would be required to characterise site hydrogeology.

On site geotechnical investigations to 4.5 mbgl did not encounter groundwater (MA, 2015).

3 Site Background Assessment

3.1 Historical Site Records Review

Development application and building plan records kept by BCC were reviewed (Table 4), and summary information provided in Attachment E. The records indicate that various development and building applications were made for construction, alterations and resiting of dwellings and sheds on various properties. A commercial dog kennel was approved in 1965 for 1032 Richmond Road, and poultry sheds were approved for 1132 Richmond Road. A place of public worship was approved in 2009 for 1036 Richmond Road, and a community centre for the Palestinian Club was approved in 1993 for 234 Grange Avenue. In 1988, a landscape supply business was approved for 230 Grange Avenue. Consent to level fill (dumped without permission) was given in 2001 to 1082 Richmond Road, and ministerial consent was given (likely around 2013) for the same property for expansion and upgrades to Richmond Road. No records of approvals were found for Lot 59, and 1080 Richmond Road.

Remediation of 1148 Richmond Road was approved in 2013 to implement a RAP (formerly a poultry farm), and a staged residential subdivision was approved in 2014 for 1148 and Lot 173 Richmond Road, with associated earthworks, road construction, dewatering of dams and other civil works. However, it is likely that identified remediation and residential subdivision construction works relate to the western portion of 1148 Richmond Road (Lot 7 DP 235714) which is not included as part of this assessment, and construction works identified on Lot 173 are likely to the benefit of surrounding properties, and not directly applicable to the site allotment under this assessment.

Table 4: BCC historical site information.

Lot ID/Address	Year	Record No.	Description
Lot 59 Richmond Road			No approvals found
	1973	BA-73-950	Dwelling
	2013	DA-13-1503	Temporary stockpiling
Lot 173 Richmond Road	2014	DA-13-2350	Installation of 3 temporary signage structures
	2014	DA-13-2351	Staged subdivision: Subdivision into 242 residential lots, 8 super lots and 5 residue lots with associated roads, drainage basins

Lot ID/Address	Year	Record No.	Description
Lot 173 Richmond Road ¹	2014	DA-13-1945	Stages 12 and 12A – Bulk earthworks and Torrens title subdivision to create 69 residential lots, 2 residue lots, 2 super lots and public roads
	2015	DA-14-2311	Earthworks – Stages 12 and 12A – Bulk earthworks and Torrens title subdivision to create 69 residential lots, 2 residue lots, 2 super lots and public roads
1032 Richmond Road	1965	DA-65-392	Commercial dog kennels
	1984	DA-83-4999	Use of dwelling as an office
	2000	DA-00-5303	Awning
1036 Richmond Road	1988	DA-88-825	Resited dwelling
	1989	BA-89-1043	Resited dwelling
	2001	DA-00-5118	Use existing house and shed for church meeting for 20 families
	2009	DA-05-3227	New place of public worship building including 1-bedroom caretakers residence and car park
1060 Richmond Road	1983	DA-83-4741	Dwelling
1070 Richmond Road	1989	DA-89-419	2-storey dwelling
	1989	BA-89-227	Dwelling
	1990	DA-89-677	Machinery shed
	1990	BA-89-4125	Shed
	1991	BA-91-3438	In-ground pool
1080 Richmond Road			No approvals found
1082 Richmond Road	2000	DA-99-6619	Detached rural 2-storey dwelling and pergola
	2001	S96-01-537 (Modification to DA-99-6619)	To level off fill (was dumped without permission) as per plans – to right hand side
	unknown	MC-13-410	Richmond Road expansion/upgrade – north of Grange Avenue to South Creek flood plain
1086 Richmond Road	1985	DA-85-5747	Dwelling and conversion of existing dwelling to rural workers dwelling

Lot ID/Address	Year	Record No.	Description
1132 Richmond Road	1984	DA-84-5455	Poultry shed
	1986	DA-86-6395	Relocation of a poultry shed and machinery shed to subject land
	1986	DA-86-2483	Resite chicken sheds
	1992	DA-92-401	Extend egg packing room, covered egg loading dock and poultry shed
	1993	BA-93-508	Poultry shed
	1996	DA-96-375	Existing house and kitchen farm on site
	1996	BA-96-2954	2-storey dwelling
	1997	BA-97-2142	Screen enclosure
1140 Richmond Road	1997	IA-97-1319	Treatment shed
1148 Richmond Road ²	1969	BA-69-2554	Dwelling and poultry shed
	2013	DA-13-1573	Demolition of structures ancillary to a poultry farm
	2013	DA-13-1635	Earthworks – Remediation of land to implement the subject RAP
	2015	DA-14-2280	Road – Torrens title subdivision in 3 stages to create 76 residential lots, construction of new roads, dewatering of dams, earthworks and associated subdivision/civil works
	2015	DA-14-2311	Earthworks – Stages 12 and 12A – Bulk earthworks and Torrens title subdivision to create 69 lots, 2 residue lots, 2 super lots and public roads
	2015	DA-14-221	Real estate advertising sign
1160 Richmond Road	2015	DA-15-815	Exhibition home – erection of dwelling with fit out for use as a sales and marketing office (on proposed lot 123 under DA-14-2280), to operate for a period of up to 5 years and temporary car park (on proposed Lot 122); access via driveway located in Frontier Avenue
	1981	DA-81-3452	Farm machinery shed (6.5 m x 12 m)
	1980	BA-80-954	Dwelling
230 Grange Avenue	1981	DA-80-4431	Dwelling

Lot ID/Address	Year	Record No.	Description
230 Grange Avenue	1988	DA-88-88	Landscape supply business and rural dwelling
	1988	BA-88-2809	Dwelling – alterations / additions
232 Grange Avenue	1978	BA-78-4970	Alterations and additions
	1979	BA-79-355	Bedrooms and bathroom
234 Grange Avenue	1989	BA-89-920	Shed
	1993	DA-92-389	Community Centre – Palestinian Club

Notes:

¹ BCC historical DA/BA/CC information includes Lot 173 Richmond Road as part of consents for residential subdivision works to west and north west of the site, where Lot 173 is only an access driveway for the development and included no physical works.

² BCC historical DA/BA/CC information for 1148 Richmond Road (Lot 7 DP 235714), include works outside the current site investigations, which only addressed the access driveway to the north east.

3.2 NSW OEH Records

No notices for the site or nearby surrounding areas under the Contaminated Land Management Act (1997) or the Environmentally Hazardous Chemicals Act (1985). No site within the suburb of Marsden Park was listed on the register, or identified on the list of NSW contaminated sites notified to the EPA.

3.3 Historical Aerial Photograph Analysis

Historical aerial photographs taken of the site during 1947, 1955, 1965, 1977, 1986, 1998, 2007 and 2015 were reviewed to investigate historic site land uses (Table 5). Copies of aerial photographs are provided in Attachment D.

Photos indicate that portions of the site have been used for rural and rural residential purposes since at least 1947.

Table 5: Historic aerial photograph observations 1947 – current.

Year	Description	Surrounding Land Use
1947	Dwellings and/or sheds visible: in the south eastern corner of 1086 Richmond Road; near the southern boundary of 1082 Richmond Road; near the north eastern boundaries of 1060 Richmond Road; near the western boundary of 234 Grange Avenue; and in north and west of 232 Grange Avenue. Evidence of past orchards are visible on the western portion of 1080 Richmond Road, the eastern portion of 1070 Richmond Road, the northern and eastern portions of 234 Grange Avenue, and the southern portion of 232 Grange Avenue. Remainder of site is cleared and likely used for grazing, with sparse trees on most lots. Denser tree cover remaining on majority of 230 Grange Avenue and Lot 59 Richmond Road.	Rural land uses to north east and south. Undeveloped bushland to west. Market gardens, orchards, and dams in rural lands. Local road infrastructure visible.
1955	Additional sheds and small paddocks constructed on 1086 Richmond Road and the south western portion of Lot 59 Richmond Road, and sheds removed, others constructed on 1082 Richmond Road and 232 Grange Avenue. Dwelling and/or sheds constructed near eastern boundary of 1060 Richmond Road. Market gardens on the northern portion of 1060 Richmond Road, and the southern portion of 232 Grange Avenue. Dam visible near the central area of 1036 Richmond Road. Some clearing in eastern and western portions of 230 Grange Avenue.	Rural land use to north east and south. Some market gardens to east no longer visible, others established. More intensive use of land immediately south of Grange Avenue.
1965	Some sheds removed near the northern boundary of 1082, and the south eastern boundary of Lot 59 Richmond Road. Sheds constructed near the northern boundary of 1070 Richmond Road and in the northern and central portions of 232 Grange Avenue. Dwelling and/or sheds constructed near the northern boundary of 1032 Richmond Road and in the eastern portion of 230 Grange Avenue. Market gardens cover 1082, 1080 and 1070 Richmond Road. Possible market gardens in the south eastern portion of 1086 Richmond Road. Market gardens on 232 Grange Avenue no longer visible. Dam constructed in south western corner of 234 Grange Avenue.	Rural land use to north east and south. Additional market gardens to the east. Trotting track visible to south east. Dams constructed to east. Continued intensive use of properties to south of Grange Avenue.
1977 (BCC Online Maps) ¹	Dwellings and/or sheds constructed near eastern boundaries of 1140 and 1132 Richmond Road. Some sheds removed in the south eastern corner of 1086 Richmond Road. Dam constructed in the western portions of 1140 and 1086 Richmond Road. Access driveway on 1148 Richmond Road constructed. Market gardens no longer visible on any lots. Trotting track on 1086 Richmond Road.	Continued rural land use, some dwellings/sheds removed, others constructed to north, west and east. Some sheds to south removed. Bushland cleared, and Blacktown City Council Waste Services Depot visible to south. Poultry sheds visible to west (western portion of 1148 Richmond Road). Trotting tracks visible to north and east, trotting track to south east no longer visible. Additional market gardens to east.
1977 image of poor quality and difficult to determine infrastructure on site.		

Year	Description	Surrounding Land Use
1986	Dwelling and sheds constructed near southern boundary, dam constructed near north eastern boundary, and market gardens visible on majority of 1160 Richmond Road. Market gardens visible in the eastern portion of 1140 Richmond Road and dam constructed in the middle of the site. Sheds constructed near the southern boundary, and dam constructed near the north eastern boundary of 1132 Richmond Road. Dam additions in the southern portion of 1086 Richmond Road, and majority of lot used for market gardens. Dwellings and/or sheds removed from 1070 Richmond Road. Dwelling constructed in north eastern corner of 1060 Richmond Road. Some sheds removed in central area and near western boundary of 232 Grange Avenue, and new shed constructed. Dwelling constructed near south western boundary and market gardens visible in the northern portion of 234 Grange Avenue.	Continued rural land use to north, east and west, and further development of Blacktown City Council Waste Services Depot to west, including construction of dams. Removal of sheds to south and replaced with market gardens. Additional market gardens to east, south east and south.
1998	Some sheds near southern boundary removed, greenhouses and additional sheds constructed on 1160 Richmond Road. Access drive visible on Lot 173 Richmond Road. Alterations to existing sheds, and construction of an additional shed in south eastern corner of 1140 Richmond Road. Construction of several sheds, some likely used as poultry sheds, near southern boundary, and construction of dwelling in south eastern corner of 1132 Richmond Road. Dam constructed in north eastern portion of 1086 Richmond Road. Shed removed near northern boundary on 1082 Richmond Road. Market gardens visible on 1082, 1080, and the south western portion of 1070 Richmond Road. Dwelling and/or sheds constructed near the northern boundary and in the western portion of 1070 Richmond Road, and in the eastern portion of 1032 Richmond Road. Previous dwelling/shed on 230 Grange Avenue removed, lot cleared and dwelling and/or sheds constructed in the central area of the lot.	Surrounding rural land use, with some dwellings/sheds removed, others constructed. Poultry shed constructed to east. Additional market gardens visible to north east. Additional trotting tracks to north and south east.
2007 ¹ (Google Earth Maps)	Majority of sheds near southern boundary removed, area redeveloped as market gardens at 1132 Richmond Road. Market gardens no longer clearly visible on 1140, 1082, and 1080 Richmond Road. Some sheds constructed, others removed on 230 Grange Avenue.	Continued rural land use, with some dwellings/sheds removed, others constructed. Market gardens to south and some market gardens to east no longer visible. Some trotting tracks to north no longer as defined.
2015 (Nearmap)	Market gardens no longer visible on 1160 Richmond Road. Shed constructed near south eastern boundary of 1086 Richmond Road, and near southern boundary of 1032 Richmond Road.	Clearing to north and north west for residential subdivision development. Development of Richmond Road to east, adjoining property to south east used for stockpiles. Former Blacktown City Council Waste Services Depot to south revegetated. Some market gardens to east no longer visible. Some trotting tracks to north and east no longer visible.

Notes:

¹ 1977 and 2007 images of poor quality.

3.4 Walkover Site Inspection

Results of site walkover inspections of Lot 59 Richmond Road, 1032, 1060, 1086, 1132, 1140 and 1160 Richmond Road, and 230, 232 and 234 Grange Road on October 26 and 27, 2015 are summarised in Table 6. No site access was available for Lot 173 Richmond Road, and 1036, 1070, 1080, 1082 and 1148 (access road only) Richmond Road, site description is based on aerial photography interpretation and observations from the road and neighbouring properties.

Table 6: Summary of site walkover and aerial photography interpretation.

Address and Lot ID	Lot Infrastructure	Walkover Summary
Lot 59, Richmond Road (DP 1196729)	Metal sheds Farm dam	<p>Lot currently grazing by sheep.</p> <p>Metal shed in south west corner of lot in poor condition, formerly used to store feed for poultry farm (according to discussions with site owner), unable to access shed.</p> <p>Metal shed to north of shed, used as shelter for sheep.</p> <p>Farm dam near southern boundary of lot. Dam fill embankments likely sourced from dam construction.</p> <p>Metal shed used as pump shed for dam, to south west of dam.</p> <p>Stockpile near northern boundary including timber.</p>
Lot 173, Richmond Road (DP 1191299) ¹	No lot infrastructure	<p>Access road for western portion of 1148 Richmond Road, which is currently under development as residential subdivision.</p>
1032 Richmond Road (Lot 1 DP 1200165)	Timber and tile dwelling Metal sheds Shipping containers Farm dam	<p>Timber and tile dwelling in good condition.</p> <p>Metal and timber shed to west of dwelling, used for storage of household items.</p> <p>Metal shed to north west of dwelling used as poultry sheds and dog shelter.</p> <p>Shed to south of dwelling, containing metal, equipment and tools, tyres, poultry stock feed, plastic pipes, wire, household equipment, containers of unknown content, and general rubbish.</p> <p>Stockpiles to west of shed, including metal, timber, plastics, building materials and tiles.</p> <p>Stockpile of metal items to west of shed, including wheel rims, metal poles and pipes, wire, household items, and metal sheeting.</p> <p>Metal shed near northern boundary, unable to access shed.</p> <p>Stockpiles near northern boundary, including 2 x metal drums labelled kerosene, wire, metal, timber, plastic, containers of unknown content, corrugated iron, household items, building materials, tyres and general rubbish.</p> <p>Metal shed to south of dwelling, unable to access shed.</p> <p>Stockpile to north of shed, including timber and timber pallets, metal, and pavers.</p> <p>Two shipping containers south of shed, and two shipping containers south west of shed, unable to access shipping containers.</p> <p>Stockpile to west of shipping containers near southern boundary, including corrugated iron, concrete blocks, metal poles, wire, pavers, intermediate bulk containers (IBC) of unknown content, and building materials.</p>

Address and Lot ID	Lot Infrastructure	Walkover Summary
		<p>Boat and trailers near southern boundary.</p> <p>Children's timber playhouse near southern boundary.</p> <p>7 x IBC near southern boundary, unknown content.</p> <p>Farm dam near south western boundary, draining north through drainage depression.</p> <p>Stockpile of fill in south western corner of lot, and including plastics, household items, building materials, metal, timber, vegetation, concrete blocks, pavers, corrugated iron, and general rubbish.</p> <p>Several old vehicles near southern boundary.</p>
1036 Richmond Road (Lot 7 DP 741072) ¹	<p>Dwelling</p> <p>Sheds</p> <p>Farm dam</p>	<p>Site currently used by Universal Brotherhood Mission, Sant Nirankari Congregation Hall.</p> <p>Fibrous cement sheeting and tile dwelling.</p> <p>Metal shed to south east of dwelling used as carport.</p> <p>Sheds to west of dwelling.</p> <p>Farm dam in western portion of lot.</p>
1060 Richmond Road (Lot 12, Sec M, DP 193074)	<p>Brick and tile dwelling</p> <p>Metal sheds</p> <p>Metal shed used as a family room</p> <p>Fibrous cement clad shed formerly used as granny flat</p>	<p>Brick and tile dwelling in good condition in north eastern portion of lot.</p> <p>Metal and timber shed used as a family room to west of dwelling.</p> <p>Plastic rainwater tank to west of dwelling.</p> <p>Concrete pad to south of dwelling.</p> <p>Metal sheds to west of dwelling containing building materials, metal timber, drums and containers of unknown content, vehicle parts, plastic pipe, small stockpile of soil, wire and general rubbish.</p> <p>Stockpile near north western boundary including metal, plastic pipe, timber, wire, and rusty drum of unknown content.</p> <p>Metal shed near north western boundary, unable to access shed.</p> <p>Stockpile to east of shed near northern boundary, including wire, metal, plastic pipes, building materials, timber, household items, drums and containers of unknown content, corrugated iron, bricks, vehicle batteries and general rubbish. Brick incinerator with evidence of burning.</p> <p>Brick, fibrous cement clad and metal shed near eastern boundary, containing household items, likely formerly used as granny flats.</p> <p>Broken pieces of fibrous cement sheeting (PACM) near granny flats.</p> <p>Stockpile of metal and building materials near eastern boundary.</p> <p>Southern portion of lot used as grazing paddock for horses.</p> <p>Concrete pad in paddock near eastern boundary.</p> <p>Corrugated iron and timber shed near central area of lot containing metal and corrugated iron, household items, building materials, timber, wire, tyres, metal pipe and general rubbish. Some staining on broken concrete floor.</p> <p>Stockpile in central area of lot, including plastic pipes, household items, corrugated iron, containers of unknown content, metal, timber, plastic, small stockpile of sand, bricks, and general rubbish.</p>

Address and Lot ID	Lot Infrastructure	Walkover Summary
1070 Richmond Road (Lot 54, DP 1196583) ¹	Dwelling In ground pool Sheds	Brick and tile dwelling. In ground pool to west of dwelling. Sheds to west of dwelling, near northern boundary. Sheds to south west of dwelling. Western portion of site open paddock. Stockpiles in paddock and near southern boundary.
1080 Richmond Road (Lot 53, DP 1196583) ¹	No lot infrastructure	Lot is cleared and generally undeveloped, with no lot infrastructure.
1082 Richmond Road (Lot 52, DP 1196583) ¹	No lot infrastructure	Lot is cleared and generally undeveloped, with no lot infrastructure.
1086 Richmond Road (Lot 51, DP 1196583)	Brick and tile dwelling Metal sheds Greenhouses Farm dams Metal AST	Brick and tile dwelling in good condition in south east portion of lot. Metal shed to south of dwelling, unable to access shed. Metal shed to south of dwelling used for storage and packing vegetables, and storage of vehicles and tractors, packaging (pallets and Styrofoam boxes), tools, containers of unknown content, fertilizer and equipment. Containers of oil (approximately 13) to north east of shed. Hydrocarbon staining and odour. Stockpiles near south eastern boundary, including corrugated iron, tiles, concrete pipes, plastic, drums and containers of unknown content, wire, equipment, greenshade cloth, metal, concrete pieces, and general rubbish. Concrete block and metal shed near south eastern boundary, unable to access part of shed. Metal AST labelled diesel fuel in shed, fuel and oil odour, some staining on concrete and ground near AST. Containers of unknown content within shed. Rusty drums to west of shed, unknown content. Greenhouses near south eastern boundary. Majority of site used for market gardens. Two farm dams near south western, and one dam near north eastern boundaries. Shed used as pump house to south east of dam near north western boundary.
1132 Richmond Road (Lot 50, DP 1196583)	Brick and tile dwellings Metal, corrugated iron and timber sheds Farm dam Metal ASTs	Two brick and tile dwellings near north eastern and south eastern boundaries. Corrugated iron and timber shed near north eastern boundary, containing household items, bags of sand, containers of unknown content, and car battery. Stockpile to west of shed including metal, corrugated iron, timber, and plastic. Possible filled area, and stockpile of fill in south eastern corner of lot. Large metal shed complex near southern boundary, eastern portion of sheds used for storage of vehicles, packaging materials (egg cartons), cardboard boxes, and packaged eggs. Remainder of sheds in complex

Address and Lot ID	Lot Infrastructure	Walkover Summary
		<p>used for poultry (egg) farming.</p> <p>Metal AST to north of shed, likely fuel, some staining on ground and fuel odour.</p> <p>Stockpiles near sheds and items scattered across the working area of the site, including timber, metal, wire, tyres, containers of unknown content, plastic hose, household items, and general rubbish.</p> <p>Two rusty drums used for burning off to north of shed complex, evidence of burning.</p> <p>Farm dam near northern boundary, fill embankments likely sourced during dam construction.</p> <p>Two metal sheds used as pump houses to south of dam.</p> <p>Approximately 10 metal feed silos located near sheds.</p> <p>Constructed drainage channel to north of sheds with odorous and discoloured water/liquid. General rubbish within the drainage channel.</p> <p>Metal shed to south of dam, containing timber pallets, equipment parts, containers of unknown content, and general rubbish.</p> <p>Metal shed with bare earth floor to west of shed complex near southern boundary, containing drums and containers of unknown content, timber pallets, bags of sodium bicarbonate, feed and salt, metal pipe, engine parts, metal wire, corrugated iron, rusty old metal AST with unknown content, and general rubbish.</p> <p>Stockpile of poultry manure near central southern boundary.</p> <p>Metal shed in poor condition with bare earth floor near central southern boundary containing timber, metal, containers of unknown content, vehicle batteries, plastic, corrugated iron, and general rubbish.</p> <p>Metal shed in poor condition with bare earth floor near central southern boundary containing timber, metal, plastics, tractors, tyres, equipment, vehicle and equipment parts, and general rubbish.</p> <p>Metal shed complex near central southern boundary, egg processing and packaging area and likely formerly used for poultry (egg) farming, unable to access part of shed.</p> <p>Metal feed silo to west of shed complex.</p> <p>Remainder of lot open paddock with extensive weeds and overgrown vegetation.</p> <p>Stockpiles in paddock area near southern boundary containing concrete, plastics, timber and metal.</p>
1140 Richmond Road (Lot 8, DP 235714)	Brick and tile dwelling Metal sheds	<p>Brick and tile dwelling in good condition near eastern boundary.</p> <p>Corrugated iron shed with concrete floor to south west of dwelling, used for storage of vehicles and containing lawn mower, tools, household items, and containers of unknown content.</p> <p>Corrugated iron and timber shed with bare earth floor to west of shed, unable to access part of shed, other part of shed containing concrete blocks, metal, timber and timber pallets, metal pipes, and containers of unknown content.</p> <p>Old vehicle to west of sheds.</p> <p>Stockpile to west of sheds, including bricks, timber pallets, concrete blocks.</p>

Address and Lot ID	Lot Infrastructure	Walkover Summary
		<p>Fill embankment to west of sheds.</p> <p>Remainder of lot used as grazing paddock, for goats and horses.</p> <p>Stockpile near northern boundary including bricks, timber and wire.</p>
1148 Richmond Road (Lot 7, DP 235714) – access driveway only ¹	Driveway	Unsealed access drive for western portion of 1148 Richmond Road, which is currently under development as residential subdivision. No lot infrastructure.
1160 Richmond Road (Lot 5, DP 235714)	Brick and tile dwelling Metal sheds	<p>Brick and tile dwelling in good condition in eastern corner of lot.</p> <p>Corrugated iron shed to south of dwelling, unable to access shed.</p> <p>Majority of site is open paddock. Owner mentioned that the paddock area was formerly used for market gardens.</p> <p>Farm dam in paddock near north eastern boundary.</p> <p>Stockpile (formerly corrugated iron shed, dilapidated) to south of dam.</p> <p>Concrete slab near south eastern boundary.</p> <p>Corrugated iron shed in poor condition near central southern boundary containing tractors, equipment, tools, Styrofoam boxes, containers of unknown content, tyres, building materials and general rubbish. Unable to access part of the shed.</p> <p>Stockpile to north west of shed including bricks, metal, equipment, tyres, tiles, timber and general rubbish.</p> <p>Metal shed in poor condition near central southern boundary, unable to access shed.</p> <p>Stockpile to west of shed including tyres, containers of unknown content, plastics, metal, timber, household items, wire, paper, vehicle batteries, tiles, building materials, and general rubbish.</p>
230 Grange Road (Lot 20, DP 1191512)	Metal and timber sheds Greenhouses and former greenhouses Shipping container Metal AST Retail nursery	<p>Lot currently used as a plant nursey, Parklea Plants and Pots / Marsden Park Pots and Plants.</p> <p>Metal and timber shed used as an office and retail sales area.</p> <p>Open paved and gravel retail nursery area in eastern portion of lot for plants and other garden and landscaping products.</p> <p>Concrete and tiled in ground pool near southern boundary.</p> <p>Greenhouse constructed of corrugated iron, metal and shade cloth in north eastern portion of lot with bare earth and gravel floor, with concrete paths, and containing plants.</p> <p>Metal and plastic greenhouse structure to west of greenhouse, currently dismantling structure.</p> <p>Metal shed to north west of office/shed with concrete floor in good condition, containing vehicles, motorbike, tractors, pots, wheels, tyres, containers of unknown content, pumps, containers labelled paint, tools and other miscellaneous items.</p> <p>Shipping container to west of office/shed, unable to access shipping container.</p> <p>Metal AST, rusty and in poor condition on broken concrete bunding to north of shipping container.</p>

Address and Lot ID	Lot Infrastructure	Walkover Summary
		<p>Stockpiles near southern boundary, including plastic pots, plants, timber pallets, metal trailers for use in the nursery, corrugated iron, timber, plastic pipe, metal pipes, drums and containers of unknown content, and general rubbish.</p> <p>Burnt area near western boundary.</p> <p>Significant site filling observed in western portion of lot, covered in grass, trees and other vegetation. Concrete blocks forming a retaining wall observed near the western edge of filled area.</p> <p>Watercourse in western portion of lot, draining north to farm dam on neighbouring property.</p> <p>Filled area observed to west of watercourse.</p>
232 Grange Road (Lot 10, DP 70287)	<p>Brick and tile dwelling</p> <p>Metal sheds</p> <p>Metal ATs</p>	<p>Brick and tile dwelling in good condition near south western boundary.</p> <p>Metal sheds to north of dwelling near western boundary, unable to access sheds, but discussions with owner indicated they are used for storage of household items and vehicles.</p> <p>Large metal and timber shed with bare earth floor to north east of dwelling near eastern boundary, containing vehicles, metal, tractors, pots, timber, vehicle parts, containers of unknown content, building materials, plastics, and miscellaneous items. Discussions with owner indicated the shed was formerly used as poultry shed.</p> <p>Stockpile to west of shed, including metal, vehicle parts, plastic pipe, building materials, and equipment.</p> <p>Metal shed near western boundary, discussions with owner indicated shed was formerly used as poultry shed, unable to access shed.</p> <p>Three rusty metal silos, discussions with owner indicated they were formerly used for water and poultry feed.</p> <p>Paddock in northern portion of lot used for sheep grazing, southern portion of lot open paddock.</p>
234 Grange Road (Lot 11, Sec M, DP 193074)	<p>Brick and tile dwelling</p> <p>Metal sheds</p>	<p>Brick and tile dwelling in good condition near western boundary.</p> <p>Stockpile of bricks and metal to north west of dwelling, near western boundary.</p> <p>Metal shed to north of dwelling, used for storage of furniture and miscellaneous items.</p> <p>Stockpile to north of shed, including timber and timber pallets, containers of unknown content, corrugated iron, tyres, plastic pipe and wire.</p> <p>Metal shed near central western boundary with timber floor, containing tractors and lawn mower, containers labelled oil and other containers of unknown content, wire and metal.</p> <p>Stockpile to north of shed, including corrugated iron, plastic drum of unknown content, timber, plastic pipe and metal.</p> <p>Stockpile to south of shed, including equipment, trampoline, timber, and corrugated iron.</p> <p>Northern and eastern portions of lot open paddock.</p>

Notes

¹ No site access available for walkover on site – description from aerial photography interpretation and inspection undertaken from road and neighbouring properties.

4 Areas of Environmental Concern/Contaminants of Primary Concern

Our assessment of site AECs and COPCs (Table 7) is made on the basis of available site history, aerial photograph interpretation and site walkovers. Maps showing locations of identified AECs is provided in Sheets A018 to A022 (Attachment C).

Table 7: Areas of environmental concern and contaminants of primary concern.

AEC ¹	Potential for Contamination	COPC	Contamination Likelihood
A – Dwellings and former dwellings	Pesticides and heavy metals may have been used underneath dwellings for pest control. Dwelling construction may include ACM and/or lead based paints.	HM, OCP/OPP and asbestos	Medium
B – Sheds and former sheds – unable to gain access to some	Sheds may currently (or have previously) stored fuel, oils, or containers/drums of unknown content; asbestos sheeting (PACM); pesticides and/or been treated with heavy metals and pesticides (pest control). Shed construction may include ACM and/or lead based paints.	HM, TRH, BTEX, PAH, OCP/OPP and asbestos	Medium - high
C – Portions of site, former market garden or orchard use	Application of agricultural chemicals, use of pesticides and heavy metals for pest control during site use as market gardens or orchards.	HM and OCP/OPP	Medium
D - Site filling	Fill material of unknown origin and quality.	HM, TRH, BTEX, PAH, OCP/OPP and asbestos	Medium
E - Stockpiles	Contaminants from unknown contents of stockpiles, containers/drums of unknown content, and general refuse may have spilled or leaked onto underlying soil.	HM, TRH, BTEX, PAH, OCP/OPP and asbestos	Medium - high
F - Dams	Contaminants resulting from agricultural/ market garden land uses may have washed into and accumulated in dams.	HM and OCP/OPP	Low - medium
G - Broken fibrous cement sheeting (PACM)	Potential ACM material observed.	Asbestos	Medium - high
H - Old vehicles and batteries	Fuel, oil or battery acid containing lead from old vehicles may have contaminated soil.	HM, TRH, PAH and BTEX	Low
I – AST	Potentially used for hydrocarbon storage which may have spilled or leaked onto underlying soil.	TRH, BTEX, PAH	Medium - high

AEC ¹	Potential for Contamination	COPC	Contamination Likelihood
J – Chicken sheds on 1132 Richmond Road	Sheds potentially built on top of ACM layer or resulting contamination from agricultural or chemical use or asbestos during construction.	Asbestos, HM, OCP/OPP	Medium
K – Drainage channel on 1132 Richmond Road	Contaminants may have washed into and accumulated in drainage channel, as odour and discolouration observed.	HM, TRH, BTEX, PAH and OCP/OPP	Medium - high
L – Greenhouses	Application of agricultural chemicals, use of pesticides and heavy metals for pest control during site use as greenhouses.	HM and OCP/OPP	Medium
M – Nursery	Application of agricultural chemicals, use of pesticides and heavy metals for pest control during site use as nursery.	HM and OCP/OPP	Medium

Notes

¹ Locations identified on AEC maps in Attachment C.

5 Conclusions and Recommendations

5.1 Conclusions

The results of the site history and walkover inspection indicates that portions of the site have been used for rural and rural residential purposes since at least 1947 and have the following potential contamination sources:

- o Past dwelling construction and maintenance have the potential to have introduced contaminants in the form of asbestos (as a construction material), pesticides (pest control) and heavy metals (paints, pest control).
- o Sheds and former sheds may currently or previously have stored fuel, oils or containers/drums of unknown content, leading to hydrocarbon, heavy metal or OCP/OPP contamination. Lead based paints or PACM (fibrous cement sheeting containing asbestos) may have been used during construction. The sheds may have been treated with pesticides and heavy metals for pest control.
- o Former market garden and/or orchard use (on 1060, 1070, 1080, 1082, 1086, 1140, and 1160 Richmond Road, and 234 Grange Avenue) may have introduced heavy metals or pesticides into the soil.
- o Fill (placed without permission, then regraded under 2001 consent) was identified on 1082 Richmond Road in BCC historical records, it is unclear as to the exact location of fill on the lot. Localised fill importation to other lots may have occurred during dam construction, and stockpiles of fill were observed at various locations across the site potentially introducing heavy metals, hydrocarbons and asbestos.
- o Stockpiles and containers/drums of unknown content may have introduced heavy metals, hydrocarbons, OCP/OPP and asbestos to the site soils.
- o Farm dams may have accumulated agricultural land use driven contaminants.
- o Several broken pieces of fibrous cement sheeting were observed onsite (1060 Richmond Road) and could contain asbestos.

- o Fuel, oil or battery acid from old vehicles may have introduced contaminants to the soil such as heavy metals and hydrocarbons.
- o ASTs were observed on 1086 and 1132 Richmond Road, and 230 Grange Avenue, some with hydrocarbon odour and staining nearby (1086 and 1132 Richmond Road) and may have contained fuel or oils, introducing hydrocarbons to the soil.
- o Chicken sheds on 1132 Richmond Road may have potentially been built on top of an asbestos layer, sometimes used to retain heat within the sheds, or been contaminated by agricultural land use.
- o Drainage channel on 1132 Richmond Road to north of shed complex with odorous and discoloured water/liquid observed, may have introduced site contaminants to the soil.
- o Greenhouses and former greenhouses on 1086 and 1160 Richmond Road, and 230 Grange Avenue may have introduced heavy metals or pesticides into the soil.
- o Use of 230 Grange Avenue as a retail nursery may have resulted in heavy metals or pesticides contamination.

5.2 Recommendations

It is recommended that walkover site inspections are completed on all lots previously unavailable for site access at time of walkover site inspections, to confirm AECs already identified or further identify potential COPC (Lot 173 and 1036, 1070, 1080, 1082 and 1148 Richmond Road).

To address potential AECs, a detailed site investigation (DSI) including intrusive soil sampling is recommended. Testing is recommended to address all AECs. Testing under all dwelling and shed footprints (plus 1 m curtilage) is recommended following their demolition to determine any residual impacts from previous use. A walkover inspection of remaining site should be conducted following removal of refuse to assess any potential residual impacts.

The sampling and analysis plan (SAP) for the DSI is to be developed in accordance with NSW EPA (1995) *Sampling Design Guidelines* and a risk based assessment. Assessment shall address each of the identified AECs and assess COPC identified for each AEC (Table 7). Results of the site testing shall be assessed against site acceptance criteria (SAC) developed with reference to ASC NEPM (1999, amended 2013).

Preliminary Site Investigation:

Lots 59 and 173 Richmond Road, 1032, 1036, 1060, 1070, 1080, 1082, 1086, 1132, 1140, 1148 and 1160 Richmond Road, and 230, 232 and 234 Grange Avenue, Marsden Park, NSW.

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6 Limitations Statement

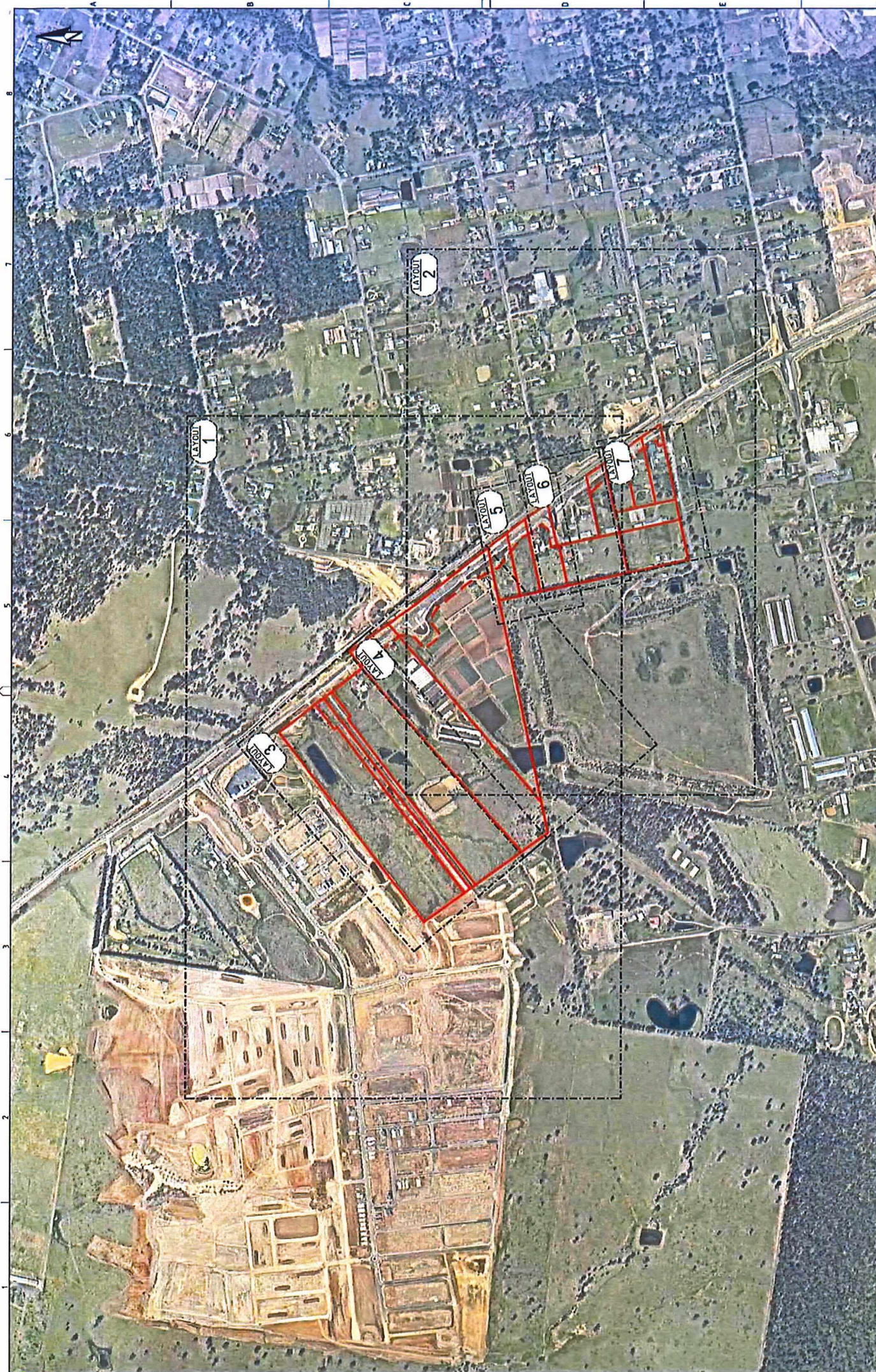
The preliminary site investigation was undertaken in line with current industry standards.

It is important, however, to note that no land contamination study can be considered to be a complete and exhaustive characterisation of a site nor can it be guaranteed that any assessment shall identify and characterise all areas of potential contamination or all past potentially contaminating land-uses. This is particularly the case on sites where full access is not possible due to the presence of structures (dwellings and sheds), a long history of rural or rural residential land use, and where additional assessment work is identified as being required. Therefore, this report should not be read as a guarantee that no contamination shall be found on the site. Should material be exposed in future which appears to be contaminated or inconsistent with natural site soils, additional testing may be required to determine the implications for the site.

Martens & Associates Pty Ltd has undertaken this assessment for the purposes of the current development proposal. No reliance on this report should be made for any other investigation or proposal. Martens & Associates accepts no responsibility, and provides no guarantee regarding the characteristics of areas of the site not specifically studied in this investigation.

- Blacktown City Council – DA/BA/CC records (2015).
- Blacktown City Council – Online Maps (1977).
- Department of Lands – Map sales. Aerial photographs (1947, 1955, 1965, 1986, 1998).
- Google Maps (2007).
- Martens & Associates (2015) *Preliminary Salinity and Geotechnical assessment: Lots 59 and 173 Richmond Road, 1032, 1036, 1060, 1070, 1080, 1082, 1086, 1132, 1140, 1148 and 1160 Richmond Road, and 230, 232 and 234 Grange Avenue, Marsden Park, NSW. (P1504888JR05V01)*
- Nearmap (2015).
- NEPC (1999, amended 2013) *National Environmental Protection (Assessment of Site Contamination) Measure (ASC NEPM, 1999 amended 2013).*
- NSW DEC (2006) *2nd Ed. Contaminated Sites: Guidelines for the NSW Site Auditor Scheme.*
- NSW Department of Environment & Heritage (eSPADE, NSW soil and land information), www.environment.nsw.gov.au.
- NSW Department of Mineral Resources, (1991) *Penrith 1:100,000 Geological Sheet 9030.*
- NSW Department of Primary Industries - Office of Water, groundwater database, accessed October 6, 2015.
<http://allwaterdata.water.nsw.gov.au/water.stm>
- NSW EPA (1995) *Sampling Design Guidelines.*
- NSW OEH (2011) *Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites, 2nd Edition.*
- SIX Viewer, LPI (2015).

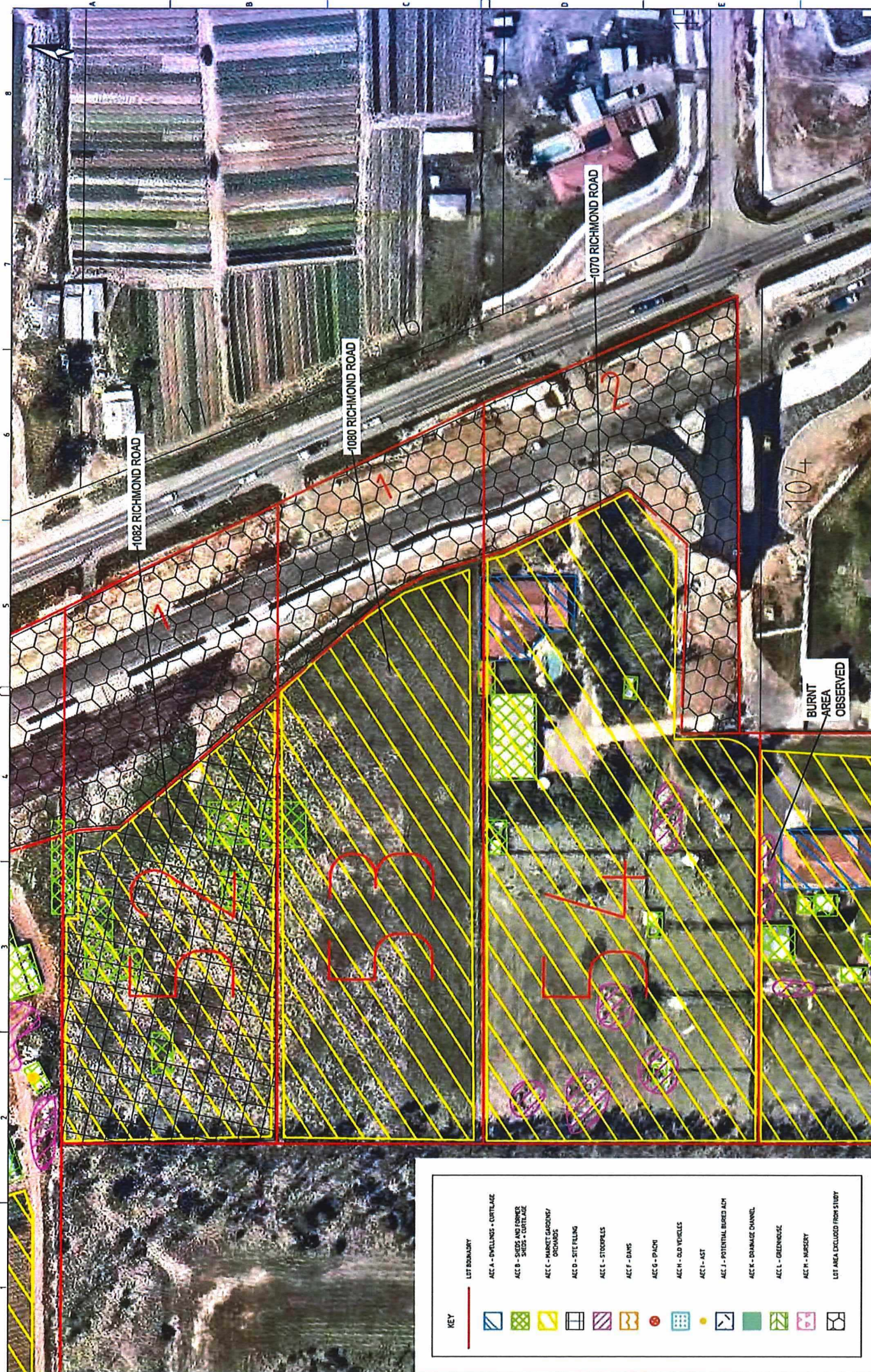
8 Attachment A – Site Plan

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9 **Attachment B - Groundwater Bore Locations**

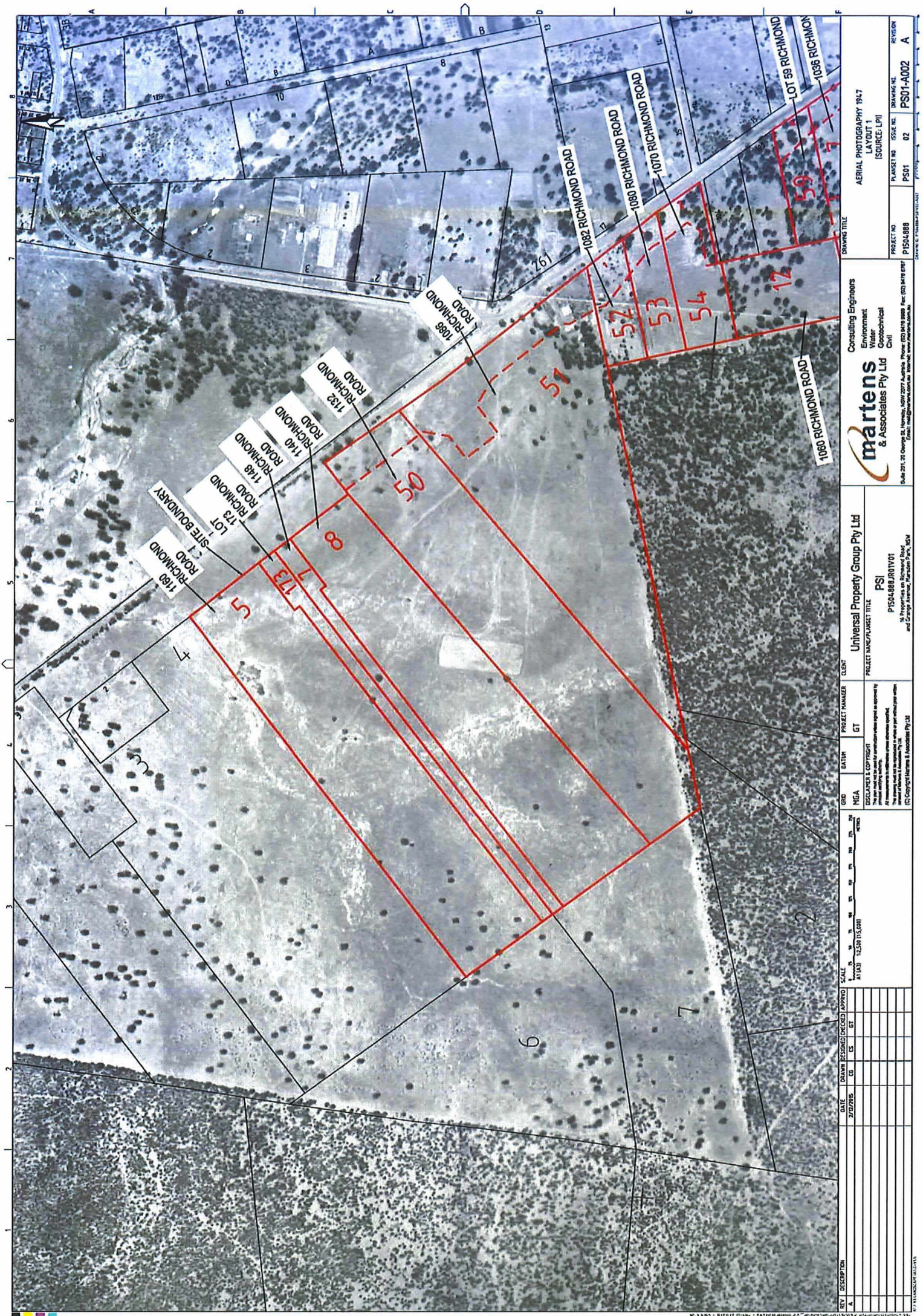
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10 Attachment C – AEC Locations



KEY		LOT BOUNDARY	
	ACC A - DWELLINGS - CORTLAGE		ACC E - MARKET GARDENS/ ORCHARDS
	ACC B - SHEEP AND COWS/ SHEEDS - CORTLAGE		ACC D - SITE FILLING
	ACC C - MARKET GARDENS/ ORCHARDS		ACC F - STOCKPILES
	ACC D - SITE FILLING		ACC G - DAMS
	ACC E - MARKET GARDENS/ ORCHARDS		ACC H - OLD VEHICLES
	ACC F - STOCKPILES		ACC I - AST
	ACC G - DAMS		ACC J - POTENTIAL BURIED ALN
	ACC H - OLD VEHICLES		ACC K - DRAINAGE CHANNEL
	ACC I - AST		ACC L - GREENHOUSE
	ACC J - POTENTIAL BURIED ALN		ACC M - MANSERY
	ACC K - DRAINAGE CHANNEL		
	ACC L - GREENHOUSE		
	ACC M - MANSERY		
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11 Attachment D – Historical Aerial Photographs




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PSI										PSI										Water									
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and Strategic Services, Melbourne, Victoria 3000, Australia										PS01A009										PS01A009									
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**12 Attachment E – Blacktown City Council DA/BA/CC
Correspondence**

Carolyn Stanley

From: Prem Siwan <Prem.Siwan@blacktown.nsw.gov.au>
Sent: Tuesday, 29 September 2015 4:20 PM
To: Carolyn Stanley
Subject: Marsden Park sites
Attachments: Marsden Park sites.docx

Hi Carolyn

Attached please find details of approvals for the 19 properties, where available.

Council Ref: GIPA 15/1431

Kind Regards

PREM SIWAN (MRS)
SENIOR GOVERNANCE INFORMATION OFFICER
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Marsden Park sites

Lot	DP	Street Address	Superseded	Approval	Approval Date	Details
5	235714	1 160 Richmond Rd		DA-81-3452	21 Jan 1981	Farm Machinery Shed (6.5 x 12m)
				BA-80-954	25 Apr 1980	Dwelling
8	235714	1140 Richmond Rd		IA-97-1319	3 Apr 1997	Treatment Shed
50	1196583	1132 Richmond Rd	Lot 9 DP 235714	DA-84-5455	9 Nov 1984	Poultry Shed
				DA-86-6395	6 Aug 1986	Relocation of a poultry shed & machinery shed to subject land
				BA-86-2483	Not known	Resite chicken sheds
				DA-92-401	4 Feb 1993	Extend egg packing room, covered egg loading dock and poultry shed
				BA-93-508	4 Mar 1993	Poultry Shed
				DA-96-375	15 Oct 1996	Existing house and kitchen farm on site
				BA-96-2954	8 Nov 1996	2 Storey dwelling
				BA-97-2142	8 May 1997	Screen enclosure
51	1196583	1086 Richmond Rd	Lot 10 DP 235714	DA-85-5747	7 Jun 1985	Dwelling & conversion of existing dwelling to rural workers dwelling
52	1196583	1082 Richmond Road	Lot 1 Sec M DP 193074	DA-99-6619	21 Jan 2000	Detached Rural 2 Storey dwelling & Pergola
				S96-01-537 Modification to DA-99-6619	5 Apr 2001	To level off fill (was dumped without permission) as per plans - to right hand side
				MC-13-410 (Ministerial)	Not known	Richmond Rd expansion/upgrade - north of Grange Ave to South Creek flood plain

53	1196583	1080 Richmond Road					No approvals found	
54	1196583	1070 Richmond Road	Lot 2 DP 799814	DA-89-419	18 Oct 1989	2 Storey dwelling		
				DA-89-677	16 Jan 1990	Machinery Shed		
				BA-89-227	25 Oct 1989	Dwelling		
				BA-89-4125	18 Jan 1990	Shed		
				BA-91-3438	16 Oct 1991	In-ground Pool		
Lot 12 Sec M	193074	1060 Richmond Road		DA-83-4741	31 Aug 1983	Dwelling		
Lot 11 L Sec M	199074 193074	234 Grange Avenue		BA-89-920	10 May 1989	Shed		
				DA-92-389	16 Feb 1993	Community Centre – Palestinian Club		
10	70287	232 Grange Avenue	Lot 10 Sec M DP 193074	BA-78-4970	15 Dec 1978	Alterations & Additions		
				BA-79-355	6 Feb 1979	Bedrooms & Bathroom		
20	1191512	230 Grange Avenue	Lot 2 DP 781151	DA-80-4431	4 Mar 1981	Dwelling		
				DA-88-88	11 May 1988	Landscape supply business & rural dwelling		
				BA-88-2809	15 Jul 1988	Dwelling- Alts/Addis		
1	1200165	1032 Richmond Road	Lot 8 Sec M DP 193074	DA-83-4999	4 Jan 1984	Use of dwelling as an office		
				DA-00-5303	13 Nov 2000	Awning		
				DA-65-392	8 Jun 1965	Commercial Dog Kennels		

7	741072	1036 Richmond Road		DA-88-825	19 Dec 1988	Re-sited dwelling	
				BA-89-1043	10 May 1989	Re-sited dwelling	
				DA-00-5118	10 Aug 2001	Use existing house & shed for church meeting for 20 families	
				DA-05-3227	26 May 2009	New place of public worship building including 1 bedroom caretakers residence & car park	
13	734813	24 Vine Street West		DA-86-6423	17 Jul 1986	Dwelling house	
				BA-86-911		Dwelling house	
12, Sec K	193074	32 Vine Street West		DA-81-644	4 Mar 1981	Rear Awning	
				BA-89-1307	21 Apr 1989	Garage	
				DA-99-1237	7 Apr 1999	In-ground Pool	
				DA-99-4980	16 Sep 1999	Enclosed BBQ/Entertainment Area	
				DA-03-4643	2 Jun 2004	2 -Storey Dual occupancy dwelling attached to existing rural dwelling	
				DA-08-1961	17 Oct 2008	Additions to existing rural dwelling	
11 Sec K	193074	40 Vine Street West		DA-83-4965		Swimming Pool - archives	
				BA-78-535	28 Feb 1978	Brick Veneer Extensions	
4	802880	78 Vine Street West		DA-00-294	16 Feb 2000	Rural Dwelling	
				DA-01-3938	20 Sep 2001	Awning	
				DA-01-4667	17 Oct 2001	Front Fence	
				DA-02-516	25 Mar 2002	In-ground Pool	
				DA-02-1799	26 Jun 2002	Rural Shed - storage of show cars, tractor, tools & other vehicles/implements	

Carolyn Stanley

From: Prem Siwan <Prem.Siwan@blacktown.nsw.gov.au>
Sent: Thursday, 15 October 2015 3:33 PM
To: Gray Taylor
Cc: Carolyn Stanley
Subject: Lot 7 DP 1196729 Richmond Road, Marsden Park

Hi guys

Search results for subject property:

Lot	DP	Street Address	Superseded Lot/ DP	Approval Number	Approval Date	Details
7	235714	Richmond Rd, Marsden Park		BA-69-2254	1969	Dwelling & Poultry Shed
				DA-13-1573	18 Sept 2013	DEMOLITION OF STRUCTURES ANCILLARY TO A POULTRY FARM
				DA-13-1635	28 Oct 2013	Earthworks - Remediation of land to implement the subject RAP
				DA-14-2280	27 Aug 2015	Road - Torrens title subdivision in 3 stages to create 76 residential lots, construction of new roads, dewatering of dams, earthworks and associated subdivision/civil works
				DA-14-2311	15 Sep 2015	Earthworks - Stages 12 and 12A - Bulk earthworks and Torrens title subdivision to create 69 residential lots, 2 residue lots, 2 super lots and public roads.
				DA-14-221	2 Mar 2015	Real Estate Advertising Sign
				DA-15-815	15 Jun 2015	Exhibition Home - Erection of dwelling with fit out for use as a sales and marketing office (on proposed Lot 123 under DA-14-

Council Ref: 122735, GIPA 15/1709

Kind Regards

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Carolyn Stanley

From: Prem Siwan <Prem.Siwan@blacktown.nsw.gov.au>
Sent: Thursday, 15 October 2015 3:24 PM
To: Gray Taylor
Cc: Carolyn Stanley
Subject: Lot 173 DP 1191299 Richmond Road

Hi guys

Search results for the subject property:

Lot	DP	Street Address	Superseded Lot/ DP	Approval Number	Approval Date	Details
173	1191299	Richmond road		DA-14-2311	15 Sep 2015	Earthworks - Stages 12 and 12A - Bulk earthworks and Torrens title subdivision to create 69 residential lots, 2 residue lots, 2 super lots and public roads.
			Lot 6/DP	DA-13-	22 Nov	Temporary
				DA-13-1945	21 Mar 2014	Stages 12 and 12A - Bulk earthworks and Torrens
				DA-13-2051	28 May 2014	Staged subdivision: Subdivision into 242 residential lots, 8 super lots & 5 residue lots with associated roads, drainage basins
				DA-13-2350	31 Jan 2014	Installation of 3 temporary signage structures
				BA-73-950	1973	Dwelling

Council Ref: 369246, GIPA 15/1709

Kind Regards

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Carolyn Stanley

From: Prem Siwan <Prem.Siwan@blacktown.nsw.gov.au>
Sent: Tuesday, 20 October 2015 4:29 PM
To: Carolyn Stanley
Subject: RE: Rest of the searches

Hi Carolyn

Please see details in red below:

From: Carolyn Stanley [mailto:cstanley@martens.com.au]
Sent: Tuesday, 20 October 2015 12:37 PM
To: Joanne Muscat; Prem Siwan
Subject: FW: Rest of the searches

OK, I've just had another check of where we are at with regard to the searches, and they are nearly done!

We are waiting for information for the following lots:

Lot 59 DP 1196729 (Richmond Road, no street number) – no approvals found
Lot 15, Sec K, DP 193074 (Richmond Road, no street number) – Under Superseded Lots 14/15, Section K, DP 193074 – DA-312 (1964) – Poultry Sheds
Lot 16, Sec K, DP 193074 (1029 Richmond Road) – Under Superseded Lots 16, Section K, DP 193074 - BA-65-1111 – Country Dwelling

You have both done remarkably well! Thank you!

Kind regards,

Carolyn Stanley
Environmental Scientist
B.Sc., B.Sc., B.A.



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From: Carolyn Stanley
Sent: Tuesday, 20 October 2015 12:24 PM
To: 'Joanne Muscat' <Joanne.Muscat@blacktown.nsw.gov.au>