Douglas Partners
Geotechnics / Environment / Groundwater

Integrated Practical Solutions

Report on
Preliminary Site Investigation for Contamination

Gosford RSL Club Redevelopment
Part of 2-22 Yallambee Ave, West Gosford

Prepared for
Gosford RSL Club

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The undersigned, on behalf of Douglas Partners Pty Ltd, confirm that this document and all attached drawings, logs and test results have been checked and reviewed for errors, omissions and inaccuracies.

	Signature	Date
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Executive Summary

This report presents the results of a preliminary site investigation for contamination (PSI) undertaken for the Gosford RSL Club Redevelopment at Part of 2-22 Yallambee Ave, West Gosford. The investigation was commissioned in an email dated 18 January 2018 received from Brendan Fisher of APP Corporation Pty Ltd on behalf of Gosford RSL Club and was undertaken in accordance with Douglas Partners Pty Ltd (DP)'s proposal CCT170145, dated 12 January 2018.

It is understood that a major extension to the northern side of the existing club is proposed, and will cover an area of 7,000 m^2 (0.7 ha). The new building is understood to comprise three storeys, with part of the ground level comprising an on-grade car park. Recent information provided to DP indicates that an area of the proposed building may also be raised, although DP is not aware of the height of the filling that would be placed (Refer to Drawing 3, Appendix A). Excavation depths are likely to be limited to that required for construction of services and pavements. Bulk excavation will not be required.

The objective of this PSI was to assess the suitability of the site for the proposed commercial development from a site contamination standpoint. A preliminary waste classification is also included, along with comments on the suitability of excavated materials to remain on-site, from a contamination perspective. The scope of work comprised a desktop site history review and a site walkover, followed by soil sampling from five boreholes.

A geotechnical investigation, including an acid sulfate soil (ASS) assessment and management plan (ASSMP) was also completed concurrently and reported separately. Both the geotechnical investigation and the PSI will be used to support the development application (DA).

Based on the findings of this PSI, it is considered that the site is suitable, from an environmental perspective, for the proposed RSL Club redevelopment, subject to the following:

- Further investigation of hazardous ground gases. These gases have the potential to be formed from the decomposition of organic material identified in the *in situ* filling and natural soils. Hazardous ground gases may impact the design and construction of the proposed development. Investigations of hazardous ground gases should be undertaken during the detailed design phase in accordance with the *Guidelines for the Assessment and Management of Sites Impacted by Hazardous Ground Gases (EPA, 2012).* If required, mitigation measures / gas protection measures should be incorporated into the final design. Gas protection measures may include passive measures to prevent or restrict gas migration or accumulation, active control measures and management / monitoring.
- Any soils to be removed off-site will be completed in accordance with the preliminary waste classification outlined in this report and will be removed off-site to a licensed waste disposal facility. Subject to the successful segregation of the filling materials from the asphalt and any acid sulfate soils, an *ex situ* excavated natural material (ENM) assessment could be completed to potential facilitate the materials beneficial reuse at an off-site location;
- Any disturbed acid sulfate soils are managed with reference to the ASSMP included in the Geotechnical Investigation Report; and
- Implementation of an Unexpected Finds Protocol (UFP) during the construction phase that would provide advice on protocols to follow if an unexpected find is encountered.

Groundwater testing was not completed, however, given that no significant soil contamination was found, groundwater is unlikely to be contaminated as a result of the known status of soil. If extraction of groundwater is planned as part of the development, further investigation will be necessary to determine its suitability for use.

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1. Introduction

This report presents the results of a preliminary site investigation for contamination (PSI) undertaken for the Gosford RSL Club Redevelopment at Part of 2-22 Yallambee Ave, West Gosford. The investigation was commissioned in an email dated 18 January 2018 received from Brendan Fisher of APP Corporation Pty Ltd on behalf of Gosford RSL Club and was undertaken in accordance with Douglas Partners Pty Ltd (DP)'s proposal CCT170145, dated 12 January 2018.

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2. Scope of Work

The scope of work comprised:

- Review of information obtained from the following sources:
  - Published data, including topographical, geological and hydrogeological maps;
  - Registered groundwater bore licence search;
  - Central Coast Council (CCC) Property Enquiry Information;
  - NSW EPA Contaminated Land and Protection of Environment Operations databases;
  - Historical aerial photographs; and
  - Anecdotal information;
- Site walkover to assess potential contamination sources and receptors;

- Drilling of five boreholes (Boreholes 1, 2, 3, 4 and 6) to depths of between 1.8 m and 3.3 m using a utility mounted push tube rig fitted with 60 mm diameter sampling tubes;
- Samples were collected from each soil stratum and upon signs of contamination;
- All samples were screened for total photoionisable compounds (TOPIC) using a photoionisation detector (PID);
- Selected primary samples and 10 % QA samples were despatched to a NATA registered laboratory for testing of potential contaminants of concern, those being heavy metals, total recoverable hydrocarbons (TRH), benzene, toluene, ethyl-benzene and xylenes (BTEX), polycyclic aromatic hydrocarbons (PAH), polychlorinated biphenyls (PCB), phenols, organochlorinated pesticides (OCP) and asbestos; and
- Preparation of this report.

3. Site Identification and Location

3.1 Site Identification and Information

The site is part of 2-22 Yallambee Avenue, West Gosford and is identified as part of Lot 22 of DP 1201808. The site is zoned B5 Business Development. The site covers an area of 7,000 m^2 (0.7 ha).

3.2 Site Location

The site location and boundaries are shown on Drawings 1 and 2, Appendix A.

The site is bounded by the Central Coast Highway to the north and commercial properties further north, public recreational space and the Narara Creek to the east, the existing Club building and car park to the south, and Yallambee Avenue and then commercial properties to the west.

The site is located within the Local Government Area of Central Coast Council, formerly Gosford City Council.

4. Geology, Topography and Hydrogeology

Geological mapping (1:100,000 Gosford-Lake Macquarie Geology Series Sheet) indicates that the site is underlain by Quaternary aged alluvial sediment which is characterised by channel and flood plain alluvium, gravel, sand, silt and clay.

Soil Landscape mapping (1:100,000 Gosford-Lake Macquarie Soils Landscape Series Sheet) indicates that the site is underlain by the Wyong Alluvial landscape group. The Wyong Alluvial soil landscape group has dominant soils described as podzolic soils, sloths with some humus podzols and lake edges.

According to a survey plan provided by the client (produced by Barry Hunt Associates and dated 2015, CAD REF:55086YALLAMBEE), the site levels range between 1.2 and 2.2 m AHD, sloping down toward the east-south-east, toward Narara Creek.

The mapping also indicates Narara Creek is approximately 50 m east of the site and Coorumbine Creek located approximately 600 m south-west of the site. Both Creeks flow into Brisbane Waters, which is located further south of the site.

According to the Gosford ASS Risk Map, the site is within an area identified as disturbed terrain with soil investigations required to assess the site for ASS. An ASS assessment was undertaken as part of the geotechnical investigation which was reported separately (Refer to Section 1). The geotechnical investigation report concluded that acid sulfate soils are present in the dark brown silt and silty sand soils underlying the filling at the site.

A search of the NSW Department of Primary Industries Office of Water database was undertaken on 30 January 2018. A total of seven registered groundwater bores were identified within approximately 600 m radius of the site. The authorised purpose for the bores were monitoring (3), testing (1), recreation (1) and domestic purposes (2). The bores were drilled to depths of between 4 m and 70 m and encountered water at depths of between 0.37 m and 8 m. Driller logs indicated the ground conditions comprised shallow filling, then sand, silt and clay soils, overlying sandstone, siltstone and shale bedrock. Bedrock was encountered at 18 m in one of the Bores (GW100174) which was located at the Gosford Race Club, located north-east of the site. A second bore located at the Race Club (GW100229) encountered sandstone bedrock from the surface.

A plan of the bore locations and copies of the available data are provided in Appendix B.

5. Site History

The desktop component of this investigation involved a review of historical information relating to potential contamination sources at the site. Relevant findings are provided below and are based on a review of:

- Aerial photographs;
- Regulatory Notices;
- Council records; and.
- Anecdotal information;

The site history documents reviewed are provided in Appendix B.

5.1 Aerial photographs

Historic aerial photographs for the years 1954, 1966, 1975 and 1984 were obtained from the DP archival database. Photographs for the years 2003 and 2007 were obtained from Google Earth and for the years 2010, 2013 and 2017 were obtained from NearMap.

These photographs were studied in order to identify the likely past uses and changes to the site and surrounding area, particularly those of a potentially contaminating nature. The findings are summarised below and the photographs are presented in Appendix B.

1954
The site and surrounding area appear relatively undeveloped. The site appears occupied by bushland. Central Coast Highway is visible along with the Racecourse to the north-east. Yallambee Avenue has not yet been constructed. The surrounding area to the north appears occupied by farmland or rural residential land use.

1966
The site area may have been cleared or filled, although it is difficult to tell due to the poor resolution of the photograph. Construction of Yallambee Avenue may have begun. The surrounding area immediately west of Yallambee Avenue and on the eastern site of Narara Creek appears to have been cleared and filled (as indicated by the reflective ground conditions). The remaining surrounding area appears similar to the 1954 photograph.

1975
The site and surrounding area appear similar to the 1966 photograph, apart from increased commercial / industrial development north and west of the site.

1984
The site and surrounding area appear similar to the 1975 photograph.

2003
The site appears in a similar condition to that noted at the time of the field work (January 2018). The site appears occupied by a ground level sealed car park. The existing RSL Club Building is located to the south and part of the existing Hotel Reception building is located in the south-east corner of the site. The surrounding area appears occupied by other commercial land uses.

2007 to 2017
The site and surrounding area appear similar to the 2003 photograph.

5.2 Regulatory Notices

The EPA publishes records of contaminated sites under Section 58 of the CLM Act on a public database, accessible via the internet. The notices relate to investigation and / or remediation of significant contaminated as defined under the CLM Act. More specifically the notices relate to the following:

- Actions taken by the EPA under Sections 15, 17, 19, 21, 23, 26 or 28 of the CLM Act;
- Actions taken by the EPA under Sections 35 or 36 of the Environmentally Hazardous Chemicals Act 1985; and
- Site audit statements provided to the EPA under section 52 of the CLM Act on sites subject to an in-force remediation order.

The search of the database on 30 January 2018 revealed that the subject site is not listed. However, one site located at 356 Manns Road, West Gosford (approximately 0.5 km north-west of the site) is listed. It is a commercial site which had two former notices issued to Metro Meat Ltd in 1989 and 1997 (138/3028) which both related to the operation of a former abattoir. Further details are provided in Appendix B.

It should be noted that the EPA record of notices for contaminated land does not provide a record of all contaminated land in NSW.

The NSW EPA also issues environmental protection licenses under Section 308 of the POEO Act. The register contains:

- Environmental protection licenses;
- Applications for new licenses and to transfer or vary or extend licenses;
- Environment protection and noise control licenses;
- Convictions and prosecutions under the POEO Act;
- The result of civil proceedings;
- License review information;
- Exemptions and provisions of the POEO Act or Regulations;
- Approvals granted under Clause 9 of the POEO (Control of Burning) Regulation; and
- Approvals granted under Clause 7a of the POEO (Clean Air) Regulation.

A search of the public register on the 30 January 2018 indicated that no licenses were listed for the site. However, one clean up notice, two penalty notices and four POEO licences and variations apply to six sites within a 2 km radius of the site as follows:

- Clean-Up Notice:
  - 38 Nells Road, dated June 2017, notice regarding stockpiles of uncovered timber waste, stockpiles of mixed soils and a stockpile of mixed demolition waste stored at the premises;
- Penalty Notices:
  - 9 Marstan Close, dated July 2016, notice regarding unlawful use of premises as a waste facility;
  - 38 Nells Road, dated June 2017, notice regarding unlawful use of premises as a waste facility;
- POEO Licences and variations:
  - Licence No. 5238 for 4 Apollo Close issued to Earburn Pty Limited for the activity of concrete works;
  - Licence No. 20648 for 30 Nells Road issued to Economy Waste Group Pty Limited for the activity of waste storage – other types of waste (recovery of general waste);
  - Licence No. 20617 for 18A Tathra Street issued to Recycled Concrete Products Pty Limited for the activity of waste storage – other types of waste; and

- Licence No. 20660 for 12 Gibbens Road issued to Suez Recycling & Recovery Pty Ltd for the activity of waste storage – other types of waste.

Further details are provided in Appendix B.

5.3 Council Records

A request to view Council Records was lodged on 25 January 2018. The following list of building and development applications (BA / DA) were provided to DP on 9 March 2018 for Lot 22 of DP 1201808.

- 1981 / BA15441 – Recreation Establishment, Application and approval to build;
- 1985 / BA6275 – Motel, Planners report and consent;
- 1985 / BA35391 – Motel, Application to build, consent, planners report;
- 1990 / DA13340 – Extension to Club, DA and consent;
- 1990 / DA61432 – Additions to RSL, BA and approval to build;
- 1996 / DA21651 – Club Addition, DA and consent;
- 1997 / DA22214 – Hotel additions, application and consent;
- 1997 / BA6651 – Club, BA and consent;
- 1999 / DA4186 – Commercial premises, application for approval, consent, DA report, inspection record;
- 1999 / DA6633 – Club alterations, application and consent;
- 2003 / DA22219 – Construction certificate for awning extension to loading dock, consent, construction certificate, DA checklist and planners report;
- 2004 / DA23553 – Boundary re-alignment, consent;
- 2005 / DA26595 – s96 Alter kitchen, shade structure, front entry, consent;
- 2005 / DA28223 – Club alterations and additions, s96 – Refurbish male and female toilets and update air con, certificate and consent;
- 2005 / DA27319 – Motel alterations and 10 additional units, construction certificate;
- 2007 / DA34289 – Alterations to existing club convert gaming room to external area, consent and construction certificate;
- 2008 – DA35332 – Alterations to façade, car parking, landscaping and lighting, consent;
- 2009 / DA37009 – Alterations and additions to existing club, consents part 1, 2 & 3 planners report;
- 2013 / DA43619 – Civil works to the car park involving the demolition of the existing retaining wall and construction of new retaining wall, consent available; and
- 2015 / DA49069 – Alterations and additions to existing Gosford RSL, consent available.

It is noted that the BA / DAs relating to the Motel / Hotel would be relevant to the subject site if the reception building in the north-eastern corner of the site formed part of the BA / DA.

5.4 Anecdotal Information

During the Site Walkover (29 January 2018), the current RSL Club Maintenance Officer indicated that the eastern half of the site was possibly filled using filling from a wreckers yard which contained car parts and other large anthropogenic materials originating from the wreckers yard.

It is noted that the aerial photography review (refer to Section 5.1 of this report) and the ground conditions encountered (refer to Section 10 of this report) does not support this anecdotal information (i.e. no anthropogenic inclusions, staining or odours potentially associated with a wreckers yard were identified).

6. Site Walkover / Description

A walkover was completed on 29 January 2018. Photographs 1 to 4 are presented in Appendix A.

The site was occupied by an open car park with the Hotel Reception building located in the south-eastern corner. Minor landscaping occupied the north and western boundaries plus a strip of landscaping north of the Hotel Reception building. The vegetation appeared to be in good health.

The majority of the surface was asphalt paved and appeared to be relatively good condition apart from some minor surficial oil staining. The site surface had a slight slope down toward the east-south-east, toward the Narara Creek.

7. Preliminary Conceptual Site Model

A conceptual site model (CSM) is a representation of site-related information regarding contamination sources, receptors and exposure pathways between those sources and receptors. The CSM provides the framework for identifying how the site became contaminated and how potential receptors may be exposed to contamination either in the present of in the future i.e. it enables an assessment of the potential source – pathway – receptor linkages (complete pathways).

7.1 Potential Contamination Sources and Contaminants of Concern

Based on the current investigation, the following potential sources of contamination and associated contaminants of concern have been identified (Table 1).

Table 1: Potential Contamination Sources and Contaminants of Concern

Potential Source	Description of Potential Contaminating Activity	Contaminants of Concern
Imported filling of unknown origin (S1) Commercial activities in surrounding area (S2)	Uncontrolled filling: Associated with disturbed terrain and possible filling to raise site levels in the local area and from the demolition of former buildings on site.	Common contaminants associated with filling include heavy metals, TRH, BTEX, PAH, PCB, OCP, OPP, phenols and asbestos Hazardous ground gases (CO_2 and methane) due to filling over organic sediments

Notes : TRH - total recoverable hydrocarbon
BTEX - benzene, toluene, ethylbenzene, xylene
PAH - polycyclic aromatic hydrocarbons
PCB - polychlorinated biphenyls
OCP - organochlorine pesticides
OPP - organophosphorous pesticides

The potential contamination sources (S) on the site are therefore filling of unknown origin (S1) and commercial activities in the surrounding area (S2).

7.2 Potential Receptors

7.2.1 Human Health Receptors

R1 Current site users (site workers and visitors);

R2 Construction and maintenance workers;

R3 Final end users (site workers and visitors); and

R4 Land users in adjacent areas (commercial).

7.2.2 Environmental Receptors

R5 Groundwater (Narara and Coorumbine Creeks, ultimately Brisbane Water);

R6 Surface water; and

R7 Terrestrial ecology.

7.2.3 Potential Pathways

Potential pathways for the identified contamination to impact on the receptors include the following:

P1 Ingestion and dermal contact;

P2 Inhalation of dust and / or vapour;

P3 Leaching of contaminants and vertical migration into groundwater;

P4 Surface water run-off;

P5 Lateral migration of groundwater; and

P6 Contact with terrestrial ecology.

7.3 Summary of Preliminary CSM

A 'source – pathway – receptor' approach has been used to assess the potential risks of harm being caused to human, water or environmental receptors from contamination sources on or in the vicinity of the site, via exposure pathways. The possible pathways between the above sources (S1 and S2) and receptors (R1 to R7) are provided in Table 2 below.

Table 2: Potential Complete Pathways

Source	Pathway	Receptor
S1 Filling of unknown origin S2 Commercial Activities in surrounding area	P1: Ingestion and dermal contact	R1: Current site users R2: Construction and maintenance workers R3: Final end users
	P2: Inhalation of dust and/or vapour	R1: Current site users R2: Construction and maintenance workers R3: Final end users R4: Land users in adjacent areas (commercial)
	P3: Leaching of contaminants and vertical migration into groundwater	R5: Groundwater
	P4: Surface water run-off P5: Lateral migration of groundwater	R6: Surface water
	P6: Contact with terrestrial ecology	R7: Terrestrial ecology

An intrusive investigation was required to assess possible contamination. Based on the desktop review, and a site walkover; it was considered that the PSI could be limited to investigation, screening and testing of the site soils. The need for additional investigation of other media (e.g. groundwater or soil gas) would be re-assessed based on the results of the PSI.

8. Fieldwork and Analysis

8.1 Data Quality Objectives and Project Quality Procedures

This PSI has been devised in general accordance with the seven step data quality objective (DQO) process which is provided in Appendix B, Schedule B2 of NEPC (2013). The DQO process is outlined as follows:

- State the problem;
- Identify the decision;
- Identify inputs into the decision;
- Define the boundary of the assessment;
- Develop a decision rule;
- Specify acceptable limits on decision errors; and
- Optimise the design for obtaining data.

Referenced sections for the respective DQOs listed above are provided in Appendix E.

8.2 Data Quality Indicators

The performance of the assessment in achieving the DQO was assessed through the application of data quality indicators (DQI) as defined by:

Precision: A quantitative measure of the variability (reproducibility) of data;

Accuracy: A quantitative measure of the closeness of reported data to the "true" value;

Representativeness: The confidence (expressed qualitatively) that data are representative of each media present on the site;

Completeness: A measure of the useable data from a data collection activity; and

Comparability: The confidence (expressed qualitatively) that data can be considered equivalent for each sampling and analytical event.

Further comments on the DQIs are presented in Appendix E.

8.3 Soil Sampling Locations and Rationale

Table A of NSW EPA *Sampling Design Guidelines* (1995) recommends a minimum of 17 sampling points for a site of 0.7 ha for site characterisation based on the detection of circular hot spots using a systemic grid sampling pattern.

A total of five boreholes (29% of the recommended) were completed to provide preliminary information on the contamination status of the soils at the site.

Intrusive works were conducted on 29 and 30 January 2018 at the locations shown in Drawing 2, Appendix A.

8.4 Soil Sampling Procedures

Environmental sampling was performed in accordance with standard operating procedures outlined in the DP *Field Procedures Manual*. All sampling data was recorded on borehole logs presented in Appendix C and selected samples for laboratory analysis were recorded on DP chain-of-custody (COC) sheets provided in Appendix D. The general soil sampling procedure comprised:

- Use of disposable sampling equipment including nitrile gloves;
- Transfer of samples into laboratory prepared glass jars and bottles (with appropriate preservatives for analytes) and capping immediately with Teflon lined lids;
- Labelling of sampling containers with individual and unique identification, including project number, sample identification and sample depth;
- Placement of sample containers and bags into a cooled, insulated and sealed container for transport to the laboratory; and
- COC was maintained at all times and countersigned by the receiving laboratory on transfer of the samples.

Envirolab Services Pty Ltd (ELS), accredited by NATA, was employed to conduct the sample analysis. ELS is required to carry out in-house procedures.

8.5 Analytical Rationale

The analytical scheme was designed to obtain an indication of the potential presence and possible distribution of identified contaminants of concern (COC) based on information obtained in the previous investigation and the preliminary CSM. The primary contaminants of concern as identified in Section 7 are heavy metals, TRH, BTEX, PAH, PCB, OCP, OPP, phenols, asbestos and hazardous ground gases such as CO_2 and methane.

The analytical scheme was based on the identified COC in soil. The ground gases were not assessed as part of this investigation. The presence of abundant organic material in the filling indicates the presence of potential hazardous ground gases.

Soil samples were selected for analysis based on site observations (i.e. odour, staining etc.), and their location within the subsoil strata (i.e. surface, filling or natural), with an emphasis on filling and near surface samples where it would be expected that the bulk of identified COC would be present.

8.6 Field Quality Assurance and Quality Control

The field QC procedures for sampling were completed with respect to the Douglas Partners' *Field Procedure Manual*, and are outlined in Appendix E.

Field replicates were recovered and analysed for a limited suite of contaminants by means of intra-laboratory analysis. These samples were collected in accordance with standard industry practice and guidelines.

8.7 Laboratory QA / QC

The analytical laboratory, accredited by NATA, is required to conduct in-house QA/QC procedures. These are normally incorporated into every analytical run and include reagent blanks, spike recovery, surrogate recovery and duplicate samples. These results are included in the laboratory certificates in Appendix D.

The results of the DP assessment of laboratory QA/QC are shown in Appendix E, with the full laboratory certificates of analysis included in Appendix D.

9. Assessment Criteria

The assessment criteria have been sourced from the National Environment Protection Council (NEPC) *National Environment Protection Measure (Assessment of Site Contamination)* 1999, as amended 2013 (NEPC 2013).

The site assessment criteria (SAC) comprise health-based investigation levels (HILs), health screening levels (HSLs) and management limits for TRH. The laboratory Practical Quantitation Limit (PQL) has also been adopted as a screening level for some contaminants.

9.1 Health-based Investigation Levels (Non-petroleum Chemical Contaminants)

Table 3 shows the HILs that have been adopted by NEPC (2013) Schedule B1, Table 1A (1) for assessing the human health risk from a contaminant via relevant pathways of exposure, as detailed in the CSM. Table 3 only includes contaminants analysed during this assessment, not the full list provided in NEPC (2013).

Given the objective of the PSI, the proposed development (Drawing 2), and the potential receptors identified in the CSM, the adopted SAC were for a commercial / industrial land use.

Table 3: Health Investigation Levels (Non-petroleum Chemical Contaminants)

Contaminant	HIL D (mg/kg)
Metals and Inorganics	
Arsenic	3,000
Cadmium	900
Chromium (IV)	3,600
Copper	240,000
Lead	1,500
Mercury (inorganic)	730
Nickel	6,000
Zinc	400,000
PAH	
Carcinogenic PAH (as benzo(a)pyrene TEQ)	4
Total PAH	4,000
OCP	
DDT + DDD + DDE	3,600
Aldrin + Dieldrin	45
Chlordane	530
Endosulfan (total)	2,000
Endrin	100
Hepatchlor	50
HCB	80
Methoxychlor	2,500
OPP	
Chloropyrofos	2000
Other Organics	
PCB	7
Total Phenolics	240,000

9.2 Petroleum Contaminants (Health Screening Levels and Management Limits)

Health Screening Levels

Table 4 shows petroleum hydrocarbon compounds adopted from NEPC (2013) Schedule B1, Table 1A(3) and are based on the exposure to petroleum hydrocarbons through the dominant vapour inhalation exposure pathway. The screening levels are adopted given the exposure risk identified during the CSM.

The HSLs are based on overlying soil type and depth. HSLs for sand have been used as they are most conservative. Using the most conservative values, the depth range of 0 m to <1 m has been used.

Table 4: Soil Health Screening Levels for Vapour Intrusion

Contaminant	Soil Type	HSL D (mg/kg)
		Depth 0 m to <1m
Toluene	Sand	NL
Ethylbenzene		NL
Xylenes		230
Naphthalene		NL
Benzene		3
TRH C_6-C_{10} less BTEX [F1]		45
TRH >C_{10}-C_{16} less naphthalene [F2]		NL

NL – Non limiting

Direct Contact Screening Levels

Direct contact HSLs have also been considered for the future land use, considering that some parts of the site will not be occupied by buildings and may be available for direct contact such as grassed areas or in garden beds and vegetated areas. These are provided in Table 5.

Table 5: Direct Contact Health Screening Levels (mg/kg)

Contaminant	HSL D	Intrusive Maintenance Worker
Toluene	99,000	120,000
Ethylbenzene	27,000	85,000
Xylenes	81,000	130,000
Naphthalene	11,000	29,000
Benzene	430	1,100
C_6-C_{10}	26,000	82,000
>C_{10}-C_{16}	20,000	62,000
>C_{16}-C_{34}	27,000	85,000
>C_{34}-C_{40}	38,000	120,000

Management Limits (TRH Only)

NEPC (2013) Table 1B (7) provides 'management limits' for TRH fractions, which are applied after consideration of relevant HSLs. The management limits have been adopted to avoid or minimise the following potential effects of petroleum hydrocarbons:

- Formation of non-aqueous phase liquids (NAPL);
- Fire and explosive hazards; and
- Effects on buried infrastructure e.g. penetration of, or damage to, in-ground services by hydrocarbons.

The presence of TRH contamination at the site below the management limits does not imply that there is no need for administrative notification or controls in accordance with jurisdictional requirements. The adopted management limits are shown in Table 6 and have been selected based on the CSM.

Management limits for coarse material are presented in Table 6, since the coarse texture management limits are more conservative of the two management limits available.

Table 6: Management Limits for TRH Fractions in Soil

TRH Fraction	Soil Texture	Management Limit: (mg/kg)
C_6-C_9 [F1]	Coarse	700
>C_{10}-C_{16} [F2]	Coarse	1,000
>C_{16}-C_{34} [F3]	Coarse	3,500
>C_{34}-C_{40} [F4]	Coarse	10,000

9.3 Ecological Investigation Levels

Ecological Investigation Levels (EIL) have been derived for selected metals and organic compounds and are applicable for assessing risk to terrestrial ecosystems (NEPC, 2013). EIL depend on specific soil physiochemical properties and land use scenarios and generally apply to the top 2 m of soil, which corresponds to the root zone and habitation zone of many species. The EIL is determined for a contaminant based on the sum of the ambient background concentration (ABC) and an added contaminant limit (ACL). The ABC of a contaminant is the soil concentration in a specific locality that is the sum of naturally occurring background levels and the contaminants levels that have been introduced from diffuse or non-point sources (e.g. motor vehicle emissions). The ACL is the added concentration (above the ABC) of a contaminant above which further appropriate investigation and evaluation of the impact on ecological values is required.

The EIL is calculated using the following formula:

EIL = ABC + ACL,

The ABC is determined through direct measurement at an appropriate reference site (preferred) or through the use of methods defined by Olszowy et al *Trace element concentrations in soils from rural and urban areas of Australia*, Contaminated Sites monograph no. 4, South Australian Health Commission, Adelaide, Australia 1995 (Olszowy, 1995) or Hamon et al, *Geochemical indices allow estimation of heavy metal background concentrations in soils*, Global Biogeochemical Cycles, vol. 18, GB1014, (Hamon, 2004). ACL is based on the soil characteristics of pH, CEC and clay content.
EIL (and ACLs where appropriate) have been derived in NEPC (2013) for only a short list of contaminants comprising As, Cu, Cr (III), DDT, naphthalene, Ni, Pb and Zn. An *Interactive (Excel) Calculation Spreadsheet* may be used for calculating site-specific EIL for these contaminants, and has been provided in the ASC NEPM Toolbox available on the SCEW (Standing Council on Environment and Water) website (http://www.scew.gov.au/node/941).

The adopted EIL, derived from Tables 1B (1) to 1B(5), Schedule B1 of NEPC (2013) the *Interactive (Excel) Calculation Spreadsheet* are shown in the following Table 7. The following site specific data and assumptions have been used to determine the EILs:

- The EILs will apply to the top 2 m of the soil profile;

- Given the likely source of soil contaminants (i.e. historical site use / fill) the contamination is considered as “aged” (>2 years); and
- ABCs have been derived using the *Interactive (Excel) Calculation Spreadsheet* using input parameters of aged soil, average CEC of 8 and average pH of 6.8 for the State in which the site is located, and high for traffic volumes.

Table 7: Ecological Investigation Levels (EIL) in mg/kg

Analyte		EIL	Comments
Metals	Arsenic	160	Adopted pH of 6.8 and CEC of 8 $cmol_c/kg$]; assumed clay content 5%
	Copper	280	
	Nickel	290	
	Chromium III	530	
	Lead	1,800	
	Zinc	620	
PAH	Naphthalene	370	
OCP	DDT	640	

9.3.1 Ecological Screening Levels – Petroleum Hydrocarbons

Ecological Screening Levels (ESL) are used to assess the risk of selected petroleum hydrocarbon compounds, BTEX and benzo(a)pyrene to terrestrial ecosystems. ESL apply to the top 2 m of the soil profile as for EIL.

ESL have been derived in NEPC (2013) for petroleum fractions F1 to F4 as well as BTEX and Benzo(a)pyrene. Site specific data and assumptions as summarised in Table 8 have been used to determine the ESL. The adopted ESL, from Table 1B(6), Schedule B1 of NEPC (2013) are shown in Table 9.

Table 8: Inputs to the Derivation of ESL

Variable	Input	Rationale
Depth of ESL application	Top 2 m of the soil profile	The top 2 m depth below ground level corresponds to the root zone and habitation zone of many species.
Land use	Residential	Based on a more conservative approach
Soil Texture	Coarse	

Table 9: Ecological Screening Levels (ESL) in mg/kg

Analyte		ESL	Comments
TRH	C6 – C10 (less BTEX) [F1]	215*	All ESLs are low reliability apart from those marked with * which are moderate reliability
	>C10-C16 (less Naphthalene) [F2]	170*	
	>C16-C34 [F3]	1,700	
	>C34-C40 [F4]	3,300	
BTEX	Benzene	75	
	Toluene	135	
	Ethylbenzene	165	
	Xylenes	180	
PAH	Benzo(a)pyrene	1.4	

9.4 Asbestos

Presence / absence testing for asbestos in soil was carried out on eight soil samples as a screening assessment using the laboratory detection limit of 0.1 g / kg.

9.5 Contaminants with No Assessment Criteria

Where no guidance is provided in NEPC (2013) for a specific analyte, the PQL was used as the initial screening criteria.

If concentrations are recorded above the PQL, reference criteria were sourced from other national and international guidance as relevant and used to determine the significance of the detected analyte.

The referenced criteria are provided in Table D1, Appendix D.

9.6 Waste classification

A preliminary waste classification was undertaken in general accordance with the NSW EPA Waste Classification Guidelines Part 1: Classifying Waste, dated November 2014.

10. Fieldwork Observations

The borehole locations are shown in Drawing 1, Appendix A. The borehole logs are provided in Appendix C along with notes on descriptive terms and symbols. The subsurface conditions encountered in the boreholes are summarised as follows:

- Asphalt: encountered in all boreholes, except Bore 6, to depths of between 0.07 m and 0.08 m;

- Filling: grey, orange brown, red brown gravelly / sandy and clay filling, some ripped sandstone filling encountered in all bores to depths of between 0.2 m and 1.3 m;
- Filling: dark brown woodchip / sawdust organic material / possibly peat encountered in Bore 3 to a depth of 1.3 m;
- Alluvium: silt, sand, sandy silt, sandy clay / clayey sand encountered in all bores to depths of between 0.6 m and 3.3 m.

Groundwater was encountered in all boreholes at depths of between 1.1 m and 1.8 m, although it was not confirmed if this water was a perched aquifer or was representative of the regional groundwater table. It should be noted that groundwater levels are dependent on climatic conditions and soil permeability and therefore vary with time.

No obvious indications of gross contamination (e.g. staining or odours) or filling potentially sourced from a wreckers yard were observed in the boreholes, although abundant organic material (e.g. Bore 3) was observed in the bores. The buried organic material has the potential to decay over time and result in the generation of methane and carbon dioxide gases.

PID results were all less than 1 ppm which indicates an absence of detectable volatile compounds in the soil tested.

11. Analytical Results

The results of the laboratory analysis are presented in Table D1, Appendix D. The NATA laboratory reports together with the chain-of-custody and sample receipt information are presented in Appendix D.

12. Discussion of Results

The laboratory results (Table D1) indicate that all contaminant concentrations in the soil samples analysed were within the adopted SAC.

Overall the fieldwork and laboratory test results suggest a low risk to human health across the site, provided that the potential for hazardous ground gases, primarily methane and carbon dioxide are assessed and managed (if required). It is considered appropriate for these investigations to be completed as part of the detailed design phase so the mitigation measures (if required) can be planned and implemented.

Laboratory results also indicate that the filling at the site can be assigned a preliminary waste classification of General Solid Waste (non-putrescible) (GSWNP); provided no additional signs of potential contamination are identified (e.g. anthropogenic materials including asbestos containing materials) in the filling during the construction phase. It is recommended that an unexpected finds protocol be developed and implemented during the construction phase.

The underlying natural soils would be provisionally classified as GSWNP on the proviso that the soils are appropriately managed for acid sulfate conditions. Based on the proposed development, disturbance of natural soils are expected to be limited to that required for foundations and services. Therefore segregation of ASS from non-ASS is unlikely to be practicable; however, assessment has also indicated that the generally grey sands may not be ASS. Therefore the generally grey sand may not be ASS and subject to successful segregation and *ex situ* confirmation testing, may be classified as VENM.

Given that proposed excavations for services and pavements are likely to disturb the acid sulfate soils found at the site, an acid sulfate management plan (ASSMP) is required. The ASSMP is included in Section 10 of the Geotechnical Investigation Report prepared separately.

13. Recommendations and Conclusions

Based on the findings of this PSI, it is considered that the site is suitable, from an environmental perspective, for the proposed RSL Club redevelopment, subject to the following:

- Further investigation of hazardous ground gases. These gases have the potential to be formed from the decomposition of organic material identified in the *in situ* filling and natural soils. Hazardous ground gases may impact the design and construction of the proposed development. Investigations of hazardous ground gases should be undertaken during the detailed design phase in accordance with the *Guidelines for the Assessment and Management of Sites Impacted by Hazardous Ground Gases (EPA, 2012).* If required, mitigation measures / gas protection measures should be incorporated into the final design. Gas protection measures may include passive measures to prevent or restrict gas migration or accumulation, active control measures and management / monitoring.
- Any soils to be removed off-site will be completed in accordance with the preliminary waste classification outlined in this report and will be removed off-site to a licensed waste disposal facility. Subject to the successful segregation of the filling materials from the asphalt and any acid sulfate soils, an *ex situ* excavated natural material (ENM) assessment could be completed to potential facilitate the materials beneficial reuse at an off-site location;
- Any disturbed acid sulfate soils are managed with reference to the ASSMP included in the Geotechnical Investigation Report; and
- Implementation of an Unexpected Finds Protocol (UFP) during the construction phase that would provide advice on protocols to follow if an unexpected find is encountered.

Groundwater testing was not completed, however, given that no significant soil contamination was found, groundwater is unlikely to be contaminated as a result of the known status of soil. If extraction of groundwater is planned as part of the development, further investigation will be necessary to determine its suitability for use.

14. Limitations

Douglas Partners (DP) has prepared this report for the Gosford RSL Club Redevelopment at 2-22 Yallambee Avenue, West Gosford in accordance with DP's proposal CCT170145.Rev1 dated 12 January 2018 and acceptance received from Brendan Fisher from APP Corporation Pty Ltd on behalf of Gosford RSL Club dated 18 January 2018. The work was carried out under DP's Conditions of Engagement. This report is provided for the exclusive use of APP Corporation Pty Ltd and Gosford RSL Club for this project only and for the purposes as described in the report. It should not be used by or relied upon for other projects or purposes on the same or other site or by a third party. Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of DP, does so entirely at its own risk and without recourse to DP for any loss or damage. In preparing this report DP has necessarily relied upon information provided by the client and / or their agents.

The results provided in the report are indicative of the sub-surface conditions on the site only at the specific sampling and/or testing locations, and then only to the depths investigated and at the time the work was carried out. Sub-surface conditions can change abruptly due to variable geological processes and also as a result of human influences. Such changes may occur after DP's field testing has been completed.

DP's advice is based upon the conditions encountered during this investigation. The accuracy of the advice provided by DP in this report may be affected by undetected variations in ground conditions across the site between and beyond the sampling and/or testing locations. The advice may also be limited by budget constraints imposed by others or by site accessibility.

This report must be read in conjunction with all of the attached and should be kept in its entirety without separation of individual pages or sections. DP cannot be held responsible for interpretations or conclusions made by others unless they are supported by an expressed statement, interpretation, outcome or conclusion stated in this report.

This report, or sections from this report, should not be used as part of a specification for a project, without review and agreement by DP. This is because this report has been written as advice and opinion rather than instructions for construction.

Asbestos has not been detected by observation or by laboratory analysis, either on the surface of the site, or in filling materials at the test locations sampled and analysed. Building demolition materials, such as wood chip material was observed in one of the boreholes. This anthropogenic material is considered to be indicative of the possible presence of hazardous building materials (HBM), including asbestos.

Although the sampling plan adopted for this investigation is considered appropriate to achieve the stated project objectives, there are necessarily parts of the site that have not been sampled and analysed. This is either due to undetected variations in ground conditions or to budget constraints (as discussed above). It is therefore considered possible that HBM, including asbestos, may be present in unobserved or untested parts of the site, between and beyond sampling locations, and hence no warranty can be given that asbestos is not present.

The contents of this report do not constitute formal design components such as are required, by the Health and Safety Legislation and Regulations, to be included in a Safety Report specifying the

hazards likely to be encountered during construction and the controls required to mitigate risk. This design process requires risk assessment to be undertaken, with such assessment being dependent upon factors relating to likelihood of occurrence and consequences of damage to property and to life. This, in turn, requires project data and analysis presently beyond the knowledge and project role respectively of DP. DP may be able, however, to assist the client in carrying out a risk assessment of potential hazards contained in the Comments section of this report, as an extension to the current scope of works, if so requested, and provided that suitable additional information is made available to DP. Any such risk assessment would, however, be necessarily restricted to the environmental components set out in this report and to their application by the project designers to project design, construction, maintenance and demolition.

Douglas Partners Pty Ltd

Appendix A

About This Report

Drawings 1 to 3

Photographs 1 to 4

About this Report

Douglas Partners

Introduction

These notes have been provided to amplify DP's report in regard to classification methods, field procedures and the comments section. Not all are necessarily relevant to all reports.

DP's reports are based on information gained from limited subsurface excavations and sampling, supplemented by knowledge of local geology and experience. For this reason, they must be regarded as interpretive rather than factual documents, limited to some extent by the scope of information on which they rely.

Copyright

Borehole and Test Pit Logs

The borehole and test pit logs presented in this report are an engineering and/or geological interpretation of the subsurface conditions, and their reliability will depend to some extent on frequency of sampling and the method of drilling or excavation. Ideally, continuous undisturbed sampling or core drilling will provide the most reliable assessment, but this is not always practicable or possible to justify on economic grounds. In any case the boreholes and test pits represent only a very small sample of the total subsurface profile.

Interpretation of the information and its application to design and construction should therefore take into account the spacing of boreholes or pits, the frequency of sampling, and the possibility of other than 'straight line' variations between the test locations.

Groundwater

Where groundwater levels are measured in boreholes there are several potential problems, namely:

- In low permeability soils groundwater may enter the hole very slowly or perhaps not at all during the time the hole is left open;
- A localised, perched water table may lead to an erroneous indication of the true water table;
- Water table levels will vary from time to time with seasons or recent weather changes. They may not be the same at the time of construction as are indicated in the report; and
- The use of water or mud as a drilling fluid will mask any groundwater inflow. Water has to be blown out of the hole and drilling mud must first be washed out of the hole if water measurements are to be made.

More reliable measurements can be made by installing standpipes which are read at intervals over several days, or perhaps weeks for low permeability soils. Piezometers, sealed in a particular stratum, may be advisable in low permeability soils or where there may be interference from a perched water table.

Reports

The report has been prepared by qualified personnel, is based on the information obtained from field and laboratory testing, and has been undertaken to current engineering standards of interpretation and analysis. Where the report has been prepared for a specific design proposal, the information and interpretation may not be relevant if the design proposal is changed. If this happens, DP will be pleased to review the report and the sufficiency of the investigation work.

Every care is taken with the report as it relates to interpretation of subsurface conditions, discussion of geotechnical and environmental aspects, and recommendations or suggestions for design and construction. However, DP cannot always anticipate or assume responsibility for:

- Unexpected variations in ground conditions. The potential for this will depend partly on borehole or pit spacing and sampling frequency;
- Changes in policy or interpretations of policy by statutory authorities; or
- The actions of contractors responding to commercial pressures.

If these occur, DP will be pleased to assist with investigations or advice to resolve the matter.

About this Report

Site Anomalies

In the event that conditions encountered on site during construction appear to vary from those which were expected from the information contained in the report, DP requests that it be immediately notified. Most problems are much more readily resolved when conditions are exposed rather than at some later stage, well after the event.

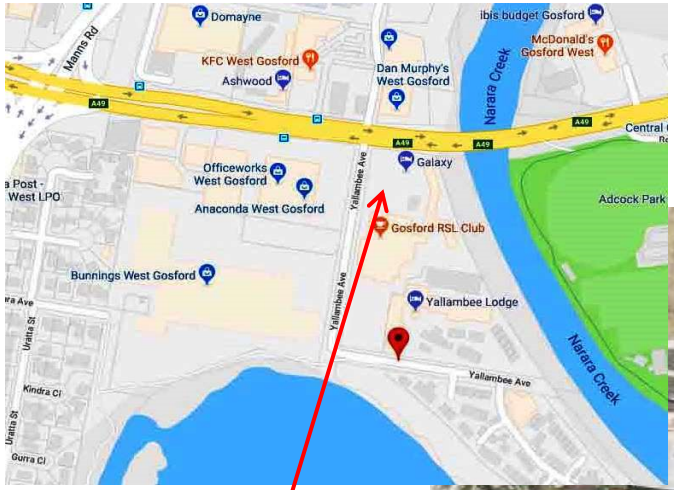
Information for Contractual Purposes

Where information obtained from this report is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document. DP would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

Site Inspection

The company will always be pleased to provide engineering inspection services for geotechnical and environmental aspects of work to which this report is related. This could range from a site visit to confirm that conditions exposed are as expected, to full time engineering presence on site.

N



Images sourced from Google Maps and SIX Maps

Site Location

Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: Gosford RSL Club	**Site Location**	PROJECT: 83326.00
	OFFICE: Central Coast	**2-22 Yallambee Avenue**	DWG No: 1
	DATE: 6 Feb 2018	**West Gosford**	REVISION: 0

Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: Gosford RSL Club	**Test Location Plan**	PROJECT: 83326.00
	OFFICE: Central Coast	**2-22 Yallambee Avenue**	DWG No: 2
	DATE: 6 Feb 2018	**West Gosford**	REVISION: 0

N

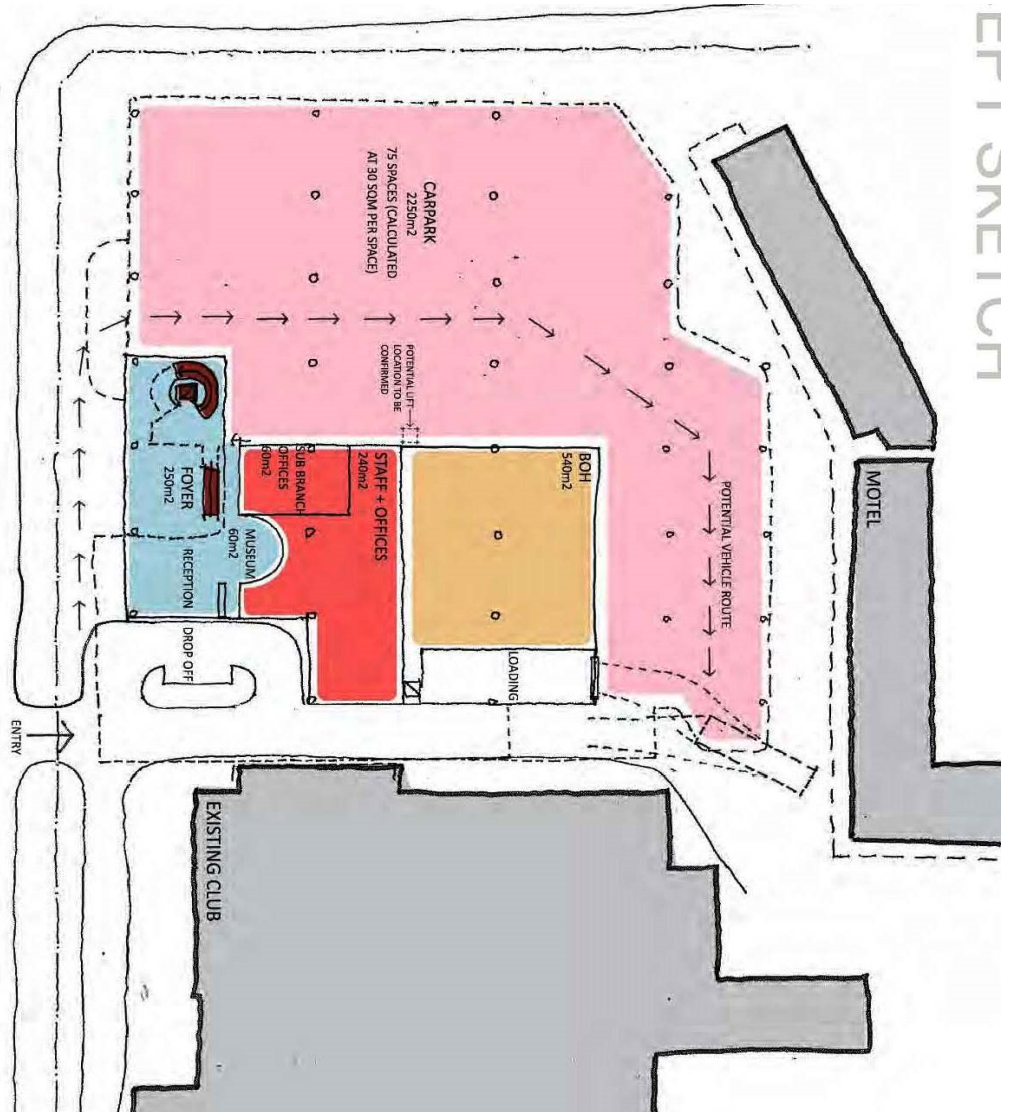


Image sourced from Concept Design WMK Floorplan

Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: Gosford RSL Club	**Proposed Development**	PROJECT: 83326.00
	OFFICE: Central Coast	**2-22 Yallambee Avenue**	DWG No: 3
	DATE: 7 Feb 2018	**West Gosford**	REVISION: 0

Photo 1 - Site, looking toward the north, minor oil staining on asphalt pavement, 29 Jan 2018.

Photo 2 - Site, looking toward the south, existing RSL Club Building at the rear, 29 Jan 2018.

Douglas Partners Geotechnics / Environment / Groundwater	**Site Photographs** **Gosford RSL Redevelopment** **Yallambee Ave, West Gosford**	PROJECT: 83326.00 PLATE No: 1 REV: 0
	CLIENT: Gosford RSL Club	DATE: 31-Jan-18

Photo 3 - Hotel Reception Building, looking toward the south-east, 29 Jan 2018.

Photo 4 - Hotel Receptioon Building, looking toward the south-west, 29 Jan 2018.

Douglas Partners Geotechnics / Environment / Groundwater	**Site Photographs** **Gosford RSL Redevelopment** **Yallambee Ave, West Gosford**	PROJECT: 83326.00 PLATE No: 2 REV: 0
	CLIENT: Gosford RSL Club	DATE: 31-Jan-18

Appendix B

Site History Information

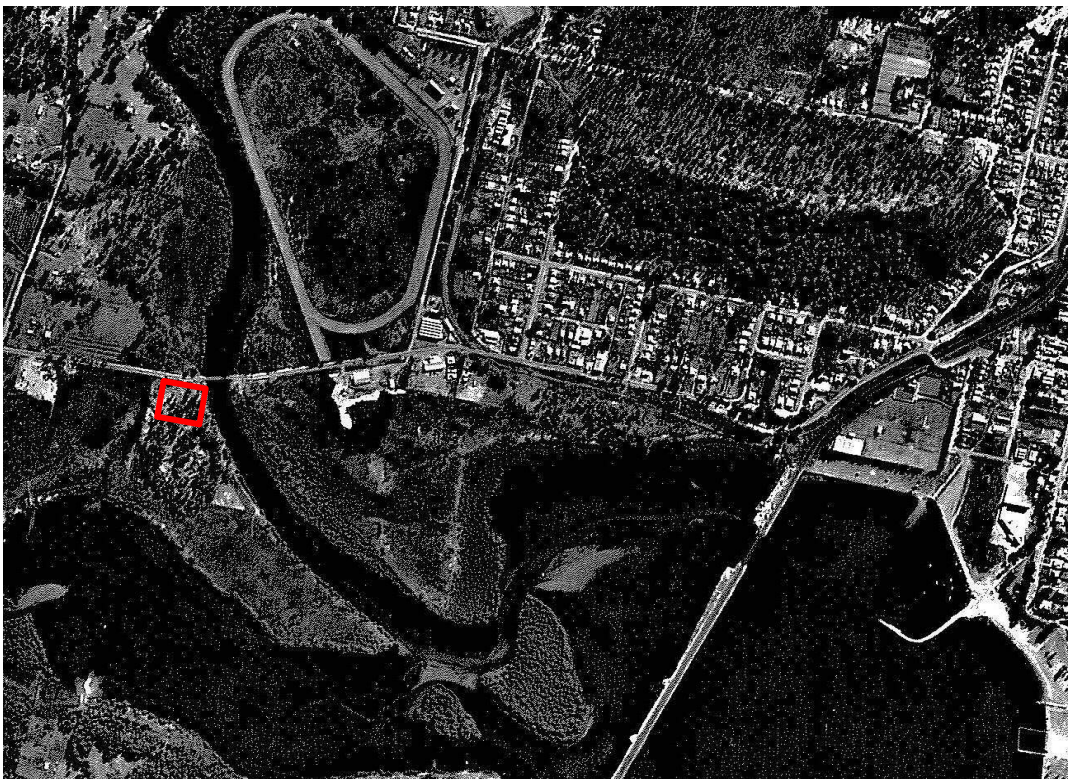


Photo 1 - 1954

Photo 2 - 1966

Douglas Partners Geotechnics / Environment / Groundwater	**Aerial Photographs** **RSL Club Redevelopment** **2-22 Yallambee Ave, W. Gosford**	PROJECT: 83326.00 PLATE No: 1 REV: 0
	CLIENT: Gosford RSL Club	DATE: 7-Feb-18

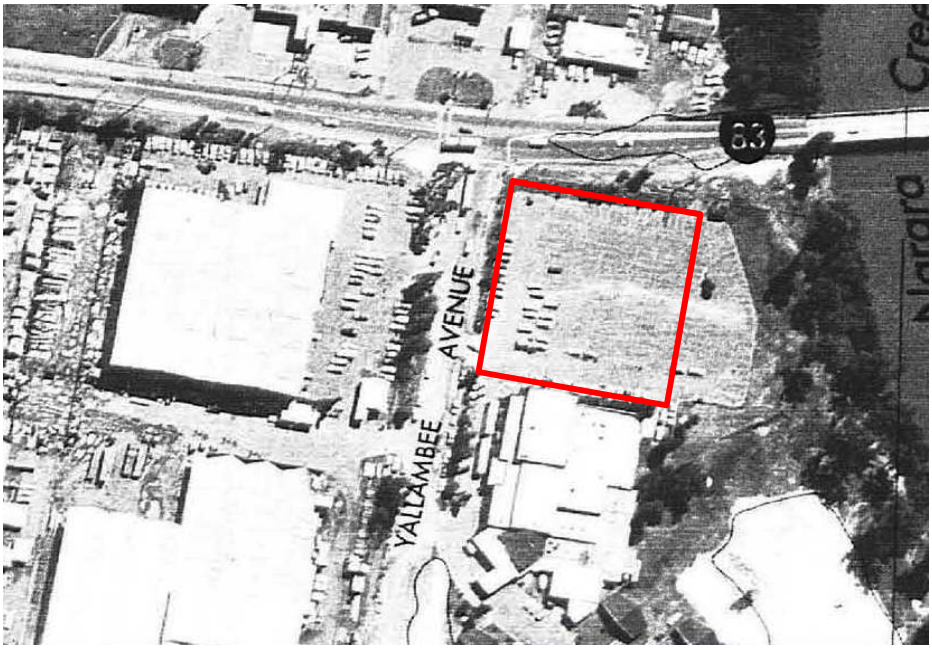


Photo 3 - 1975

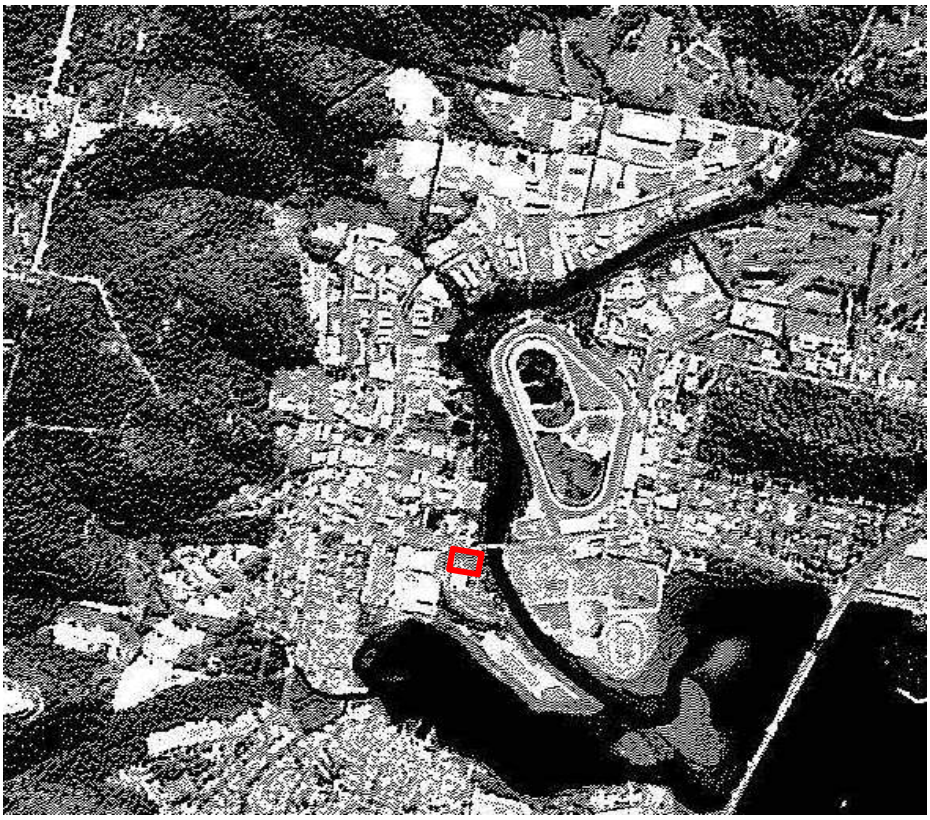


Photo 4 - 1984

Douglas Partners Geotechnics / Environment / Groundwater	**Aerial Photographs** **RSL Club Redevelopment** **2-22 Yallambee Ave, W. Gosford**	PROJECT: 83326.00 PLATE No: 2 REV: 0
	CLIENT: Gosford RSL Club	DATE: 7-Feb-18

Photo 5 - 2003

Photo 6 - 2007

Douglas Partners Geotechnics / Environment / Groundwater	**Aerial Photographs** **RSL Club Redevelopment** **2-22 Yallambee Ave, W. Gosford**	PROJECT: 83326.00 PLATE No: 3 REV: 0
	CLIENT: Gosford RSL Club	DATE: 7-Feb-18

Photo 7 - 2010

Photo 8 - 2013

Douglas Partners Geotechnics / Environment / Groundwater	**Aerial Photographs** **RSL Club Redevelopment** **2-22 Yallambee Ave, W. Gosford**	PROJECT: 83326.00 PLATE No: 4 REV: 0
	CLIENT: Gosford RSL Club	DATE: 7-Feb-18

Photo 9 - 2017

Douglas Partners Geotechnics / Environment / Groundwater	**Aerial Photographs** **RSL Club Redevelopment** **2-22 Yallambee Ave, W. Gosford**	PROJECT: 83326.00 PLATE No: 5 REV: 0
	CLIENT: Gosford RSL Club	DATE: 7-Feb-18

NSW OFFICE OF WATER
Work Summary

GW101286

Licence :20BL157689 — Licence Status Active

Authorised Purpose(s): MONITORING BORE — Intended Purpose(s): MONITORING BORE

Work Type :Bore
Work Status :(Unknown)
Construct. Method :Rotary
Owner Type :

Commenced Date :
Completion Date :17-Apr-1996
Final Depth : 5.00 m
Drilled Depth : 4.00 m

Contractor Name :MACQUARIE DRILLING
Driller :1712 HOWE, Steve Robert
Assistant Driller's Name :

Property : - N/A
GWMA : -
GW Zone : -

Standing Water Level :
Salinity :
Yield :

Site Details

Site Chosen By	County	Parish	Portion/Lot DP
	Form A :NORTHUMBERLAND	GOSFORD	LOT120 DP615952
	Licensed :NORTHUMBERLAND	GOSFORD	120 615952

Region :10 - SYDNEY SOUTH COAST
River Basin :
Area / District :

CMA Map :
Grid Zone :
Scale :

Elevation :
Elevation Source :

Northing :6300109
Easting :343791

Latitude (S) :33° 25' 37"
Longitude (E) :151° 19' 11"

GS Map :
MGA Zone :56
Coordinate Source :

Construction

Negative depths indicate Above Ground Level:

H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity;PL-Placement of Gravel Pack;PC-Pressure Cemented;S-Sump;CE-Centralisers

It	P	Component	Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details
1		Hole	Hole	0.00	4.00	125			Backhoe
1	1	Casing	PVC Class 18	0.00	0.50	60			Screwed; Plug
1	1	Opening	Screen	0.50	3.50	60			PVC Class 18; A: .4mm; Screwed
1		Annulus	(Unknown)	0.40	3.60				Graded; GS: 1-2mm; .03m³

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
0.37	3.80	3.43		0.37					

Drillers Log

From (m)	To (m)	Thickness(m	Drillers Description	Geological Material	Comments
0.00	0.50	0.50	Fill - roadbase & sand		
0.50	1.50	1.00	sandy clay		
1.50	3.80	2.30	clayey sand		
3.80	4.00	0.20	clay		

Remarks

Form A Remarks:
THis well has subsequently been destroyed during excavation activities.

*** End of GW101286 ***

NSW OFFICE OF WATER
Work Summary

GW101285

Licence : 20BL157689 **Licence Status** Active

Authorised Purpose(s) MONITORING BORE **Intended Purpose(s)** MONITORING BORE

Work Type : Bore
Work Status : (Unknown)
Construct. Method : Rotary
Owner Type :

Commenced Date : **Final Depth :** 5.00 m
Completion Date : 17-Apr-1996 **Drilled Depth :** 5.00 m

Contractor Name : MACQUARIE DRILLING
Driller : 1712 HOWE, Steve Robert
Assistant Driller's Name :

Property : - N/A
GWMA : -
GW Zone : -

Standing Water Level :
Salinity :
Yield :

Site Details

Site Chosen By	County	Parish	Portion/Lot DP
Other	**Form A :** NORTHUMBERLAND	GOSFORD	LOT120 DP615952
	Licensed : NORTHUMBERLAND	GOSFORD	120 615952

Region : 10 - SYDNEY SOUTH COAST **CMA Map :**
River Basin : **Grid Zone :** **Scale :**
Area / District :

Elevation : **Northing :** 6300078 **Latitude (S) :** 33° 25' 38"
Elevation Source : **Easting :** 343817 **Longitude (E) :** 151° 19' 12"

GS Map : **MGA Zone :** 56 **Coordinate Source :**

Construction

Negative depths indicate Above Ground Level:

H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity;PL-Placement of Gravel Pack;PC-Pressure Cemented;S-Sump;CE-Centralisers

H	P	Component	Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details
1		Hole	Hole	0.00	50.00	125			Backhoe
1	1	Casing	PVC Class 18	0.00	0.50	60			Screwed; Plug
1	1	Opening	Screen	0.50	4.60	60			PVC Class 18; A: .4mm; Screwed
1		Annulus	(Unknown)	0.40	4.60				Graded; GS: 1-2mm; .04m³

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
0.70	5.00	4.30		0.70					

Drillers Log

From (m)	To (m)	Thickness(m	Drillers Description	Geological Material	Comments
0.00	0.50	0.50	sandy clay (fill)		
0.50	2.00	1.50	Sandy clay		
2.00	5.00	3.00	silty to clayey sand		

Remarks

*** End of GW101285 ***

NSW OFFICE OF WATER
Work Summary

GW101287

Licence : 20BL157689
Licence Status Active
Authorised Purpose(s) MONITORING BORE
Intended Purpose(s) MONITORING BORE

Work Type : Bore
Work Status : (Unknown)
Construct. Method : Rotary
Owner Type :

Commenced Date :
Completion Date : 17-Apr-1996
Final Depth : 4.25 m
Drilled Depth : 4.20 m

Contractor Name : MACQUARIE DRILLING
Driller : 1712 HOWE, Steve Robert
Assistant Driller's Name :

Property : - N/A
GWMA : -
GW Zone : -

Standing Water Level :
Salinity :
Yield :

Site Details

Site Chosen By	County	Parish	Portion/Lot DP
Other	Form A :NORTHUMBERLAND	GOSFORD	LOT120 DP615952
	Licensed :NORTHUMBERLAND	GOSFORD	120 615952

Region : 10 - SYDNEY SOUTH COAST
River Basin :
Area / District :
CMA Map :
Grid Zone :
Scale :

Elevation :
Elevation Source :
Northing : 6300078
Easting : 343791
Latitude (S) : 33° 25' 38"
Longitude (E) : 151° 19' 11"

GS Map :
MGA Zone : 56
Coordinate Source :

Construction

Negative depths indicate Above Ground Level;

H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity;PL-Placement of Gravel Pack;PC-Pressure Cemented;S-Sump;CE-Centralisers

H	P	Component	Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details
1		Hole	Hole	0.00	4.25	125			Backhoe
1	1	Casing	PVC Class 18	0.00	0.40	60			Screwed; Plug
1	1	Opening	Screen	0.40	3.50	60			PVC Class 18; A: .4mm; Screwed
1		Annulus	(Unknown)	0.40	3.50				Graded; GS: 1-2mm; .03m³

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
0.85	3.80	2.95		0.85					

Drillers Log

From (m)	To (m)	Thickness(m	Drillers Description	Geological Material	Comments
0.00	1.00	1.00	Fill - sand with clay		
1.00	1.90	0.90	silty sand		
1.90	3.80	1.90	clayey sand		
3.80	4.20	0.40	clay		

Remarks

Form A Remarks:
Well subsequently destroyed during excavation activities.

*** End of GW101287 ***

NSW OFFICE OF WATER
Work Summary

GW100174

Licence :20BL144993 — Licence Status Abandoned

Authorised Purpose(s): TEST BORE — Intended Purpose(s)

Work Type :Bore
Work Status :(Unknown)
Construct. Method :Rotary Air
Owner Type :

Commenced Date :
Completion Date :04-Nov-1992
Final Depth : 60.00 m
Drilled Depth : 60.00 m

Contractor Name :ROSE AND HAWLEY
Driller :1550 ROSE, John
Assistant Driller's Name :

Property : - N/A
GWMA : -
GW Zone : -

Standing Water Level :
Salinity : 3,500.00 mg/L
Yield :

Site Details

Site Chosen By	County	Parish	Portion/Lot DP
Form A :	NORTHUMBERLAND	GOSFORD	4//775631
Licensed :	NORTHUMBERLAND	GOSFORD	4 775631

Region :10 - SYDNEY SOUTH COAST — CMA Map :
River Basin : — Grid Zone : — Scale :
Area / District :

Elevation :
Elevation Source :
Northing :6300559 — Latitude (S) :33° 25' 23"
Easting :344303 — Longitude (E) :151° 19' 31"

GS Map : — MGA Zone :56 — Coordinate Source :

Construction

Negative depths indicate Above Ground Level;

H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity;PL-Placement of Gravel Pack;PC-Pressure Cemented;S-Sump;CE-Centralisers

H	P	Component	Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details
1		Hole	Hole	0.00	21.00	185			Rotary Air
1		Hole	Hole	21.00	60.00	140			Rotary Air
1	1	Casing	Steel	0.00	21.00	160	155		Welded; Driven into Hole

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
3.00	4.00	1.00				0.30	5.00		680.00
8.00	9.00	1.00				0.30	10.00		720.00
21.00	22.00	1.00				1.00	25.00		1300.00
35.00	36.00	1.00				1.00	40.00		1400.00
56.00	57.00	1.00				0.50	60.00		3500.00

Drillers Log

From (m)	To (m)	Thickness(m	Drillers Description	Geological Material	Comments
0.00	1.00	1.00	SANDY BLACK LOAM		
1.00	3.00	2.00	GREY CLAY		
3.00	4.00	1.00	SILTY GREY SAND		
4.00	8.00	4.00	SANDY GREY CLAY		
8.00	9.00	1.00	WHITE SILTY SAND		
9.00	12.00	3.00	SANDY GREY CLAY		
12.00	18.00	6.00	GREY CLAY		
18.00	21.00	3.00	BROWN WEATHERED SANDSTONE		
21.00	22.00	1.00	FRACTURED GREY SANDSTONE		
22.00	35.00	13.00	GREY SANDSTONE		
35.00	36.00	1.00	FRACTURED SANDSTONE		
36.00	56.00	20.00	GREY SILTSTONE		
56.00	57.00	1.00	SOFT GREY SHALE		
57.00	60.00	3.00	GREY SANDSTONE		

Remarks

*** End of GW100174 ***

NSW OFFICE OF WATER
Work Summary

GW100229

Licence :20BL160089

Licence Status Active

Authorised Purpose(s): RECREATION (GROUNDWATER)

Intended Purpose(s): RECREATION (GROUNDWATER)

Work Type :Bore
Work Status :(Unknown)
Construct. Method :
Owner Type :

Commenced Date :
Completion Date :24-Jan-1993
Final Depth : 39.00 m
Drilled Depth : 39.00 m

Contractor Name :ROSE & HAWLEY
Driller :1550 ROSE, John
Assistant Driller's Name :

Property : - N/A
GWMA : -
GW Zone : -

Standing Water Level :
Salinity : 1,500.00 mg/L
Yield :

Site Details

Site Chosen By

	County	Parish	Portion/Lot DP
Form A :	NORTHUMBERLAND	GOSFORD	4//775631
Licensed :	NORTHUMBERLAND	GOSFORD	4 775631

Region :10 - SYDNEY SOUTH COAST
River Basin :
Area / District :

CMA Map :
Grid Zone :
Scale :

Elevation :
Elevation Source :

Northing :6300560
Easting :344314

Latitude (S) :33° 25' 23"
Longitude (E) :151° 19' 32"

GS Map :
MGA Zone :56
Coordinate Source :

Construction

Negative depths indicate Above Ground Level:

H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity;PL-Placement of Gravel Pack;PC-Pressure Cemented;S-Sump;CE-Centralisers

It	P	Component	Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details
1		Hole	Hole	0.00	39.00	165			Rotary Air

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
8.00	15.00	7.00				0.40			680.00
15.00	22.00	7.00				0.40			720.00
27.00	30.00	3.00				2.00			1300.00
33.00	39.00	6.00				2.00			1600.00

Drillers Log

From (m)	To (m)	Thickness(m	Drillers Description	Geological Material	Comments
0.00	8.00	8.00	WHITE SANDSTONE		
8.00	20.00	12.00	GREY SANDSTONE		
20.00	29.00	9.00	BROWN WEATHERED SANDSTONE		
29.00	33.00	4.00	GREY SANDSTONE		
33.00	39.00	6.00	GREY SILTSTONE		

Remarks

PREVIOUS LIC NO: 10BL152519

*** End of GW100229 ***

NSW OFFICE OF WATER
Work Summary

GW102950

Licence :10BL159586 — Licence Status Active

	Authorised Purpose(s)	Intended Purpose(s)
Work Type :Bore	DOMESTIC	DOMESTIC
Work Status :(Unknown)	STOCK	STOCK
Construct. Method :		
Owner Type :		

Commenced Date : — Final Depth : 70.00 m
Completion Date :01-Jan-1946 — Drilled Depth :

Contractor Name :
Driller :
Assistant Driller's Name :

Property : - N/A — Standing Water Level :
GWMA : - — Salinity :
GW Zone : - — Yield : 1.50 L/s

Site Details

Site Chosen By	County	Parish	Portion/Lot DP
	Form A :NORTHUMBERLAND	PATONGA	6//23871
	Licensed :CAMDEN	BONG BONG	6 23871

Region :10 - SYDNEY SOUTH COAST — CMA Map :
River Basin : — Grid Zone : — Scale :
Area / District :

Elevation : — Northing :6299224 — Latitude (S) :33° 26' 6"
Elevation Source : — Easting :343191 — Longitude (E) :151° 18' 47"

GS Map : — MGA Zone :56 — Coordinate Source :

Construction

Negative depths indicate Above Ground Level;

H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity;PL-Placement of Gravel Pack;PC-Pressure Cemented;S-Sump;CE-Centralisers

H	P	Component Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details
1		Hole Hole	0.00	70.00				
1	1	Casing Steel	0.00	0.00	152.4			

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)

(No Water Bearing Zone Details Found)

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments

Remarks

Form A Remarks:
DATA FROM AG FORM ONLY

*** End of GW102950 ***

NSW OFFICE OF WATER
Work Summary

GW073449 *Converted From HYDSYS*

Licence :
Licence Status
Authorised Purpose(s)
Intended Purpose(s)
DOMESTIC

Work Type :Spear
Work Status :(Unknown)
Construct. Method :
Owner Type :Private

Commenced Date :
Completion Date :01-Jan-1978
Final Depth : 6.00 m
Drilled Depth : 0.00

Contractor Name :
Driller :
Assistant Driller's Name :

Property :
GWMA : -
GW Zone : -
Standing Water Level :
Salinity :
Yield :

Site Details

Site Chosen By
County
Form A :NORTHUMBERLAND
Licensed :
Parish
PATONGA
Portion/Lot DP
L17 DP238829

Region :10 - SYDNEY SOUTH COAST
River Basin :212 - HAWKESBURY RIVER
Area / District :
CMA Map :
Grid Zone :
Scale :

Elevation : 0.00
Elevation Source :
Northing :6299264
Easting :343324
Latitude (S) :33° 26' 4"
Longitude (E) :151° 18' 53"

GS Map :
MGA Zone :56
Coordinate Source :GD.,ACC.GIS

Construction

Negative depths indicate Above Ground Level:

H-Hole;P-Pipe;OD-Outside Diameter;ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity;PL-Placement of Gravel Pack;PC-Pressure Cemented;S-Sump;CE-Centralisers

H	P	Component Type	From (m)	To (m)	OD (mm)	ID (mm)	Interval	Details

(No Construction Details Found)

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)

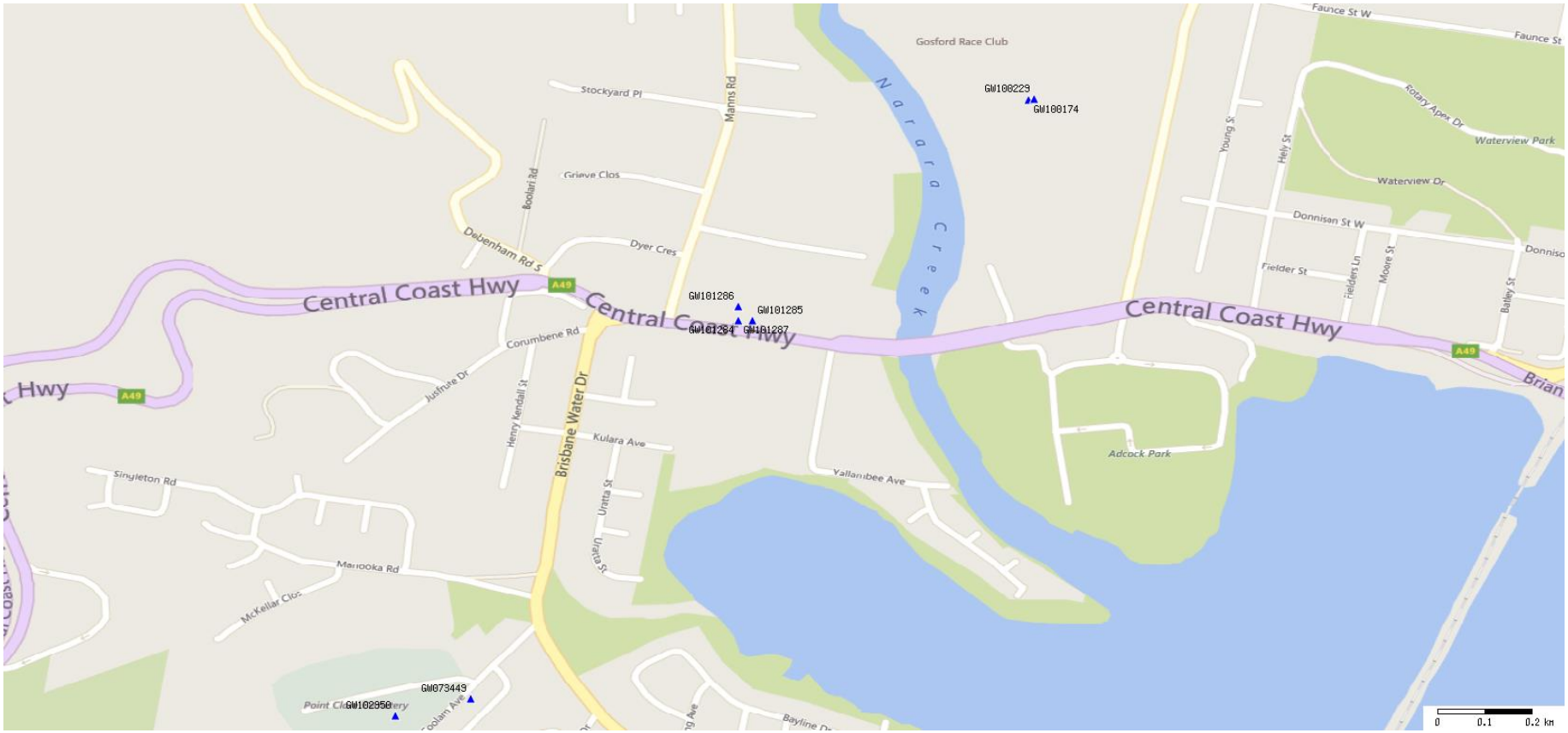
(No Water Bearing Zone Details Found)

Drillers Log

From (m)	To (m)	Thickness(m)	Drillers Description	Geological Material	Comments

Remarks

*** End of GW073449 ***


Gosford Race Club
GW100229
GW100174
Stockyard Pl
Manns Rd
Narara Creek
Faunce St W
Faunce St
Young St
Hely St
Rotary Apex Dr
Waterview Park
Waterview Dr
Donnisan St W
Fielder St
Fielders Ln
Moore St
Bailey St
Grieve Clos
Boolarri Rd
Debenham Rd S
Dyer Cres
Central Coast Hwy
A49
GW101286
GW101285
GW101284
GW101287
Corrumbene Rd
Justinia Dr
Henry Kendall St
Brisbane Water Dr
Kulara Ave
Yallambee Ave
Adcock Park
Singleton Rd
Marrooka Rd
McKellar Clos
Uratta St
GW073449
GW102950
Point Clare Cemetery
Bayline Dr
0
0.1
0.2 km

The Manager
Metro Meat Limited
NSW Division
356 Manns Road
WEST GOSFORD NSW 2250 266

300030 D1
RC:KL

26 JUN 1989

ENVIRONMENTALLY HAZARDOUS CHEMICALS ACT, 1985 :
NOTICE UNDER SECTION 35

In accordance with the powers vested in the State Pollution Control Commission by the provisions of Section 35 of the Environmentally Hazardous Chemicals Act, 1985, your Company, being the occupier of premises at Lot 26, Manns Road, West Gosford :-

- used for the pond system which treated wastes from stockyards, slaughtering, rendering and fat extraction processes producing tallow and proteinaceous matter from the Metro Meat abattoir, formerley known as Gosford Meats Pty Ltd ;

- being contaminated by the prescribed activity of keeping chemical wastes, namely organic matter generated from the trade-waste; and

- deemed to be contaminated by reason of their being environmentally degraded;

is directed to take the following remedial action:-

(1) Before any work is undertaken with the intention, or having the effect of -

(a) reducing the contamination of the premises; or

(b) restoring or rehabilitating the premises; or

(c) stockpiling any materials or erecting any structure on the premises; or

(d) removing from the premises, and disposing of, any contaminated material or any soil, sand, rock, water or other solid or liquid material of whatever kind, which would result in any disturbance of tile surface of, or any structure on, the nominated premises;

the Company shall submit to the Commission, in writing, details of the proposed work, including a timetable, and shall not commence such work until it has received the written consent of the Commission setting out its requirements for the carrying out of the proposed work.

(2) So that a program of prescribed remedial action and the responsibility for carrying out such action might be agreed, the Company shall inform the Commission, in writing, of any intent to sell or otherwise transfer the ownership or responsibility for the management of the premises, at least one month prior to such sale or transfer and shall provide to the Commission, in writing, the full name and address of the proposed new occupier.

PETER STANDEN
Director

per (Signed) 26.6.1989
P B YATES
Chief-Outer Sydney, Chemicals and Wastes Division
(by Authorisation)
26 JUN 1989

Attachments : Site map showing contaminated Area.
Sect 35 of Environmentally Hazardous Chemicals Act, 1985
Sect 3 of Environmentally Hazardous Chemicals Act, 1985 for interpretation of "Chemical"

· [5W-KL, NORTH3, L-RC1] .

Map

REGISTERED MAIL

Metro Meats Ltd
2 Hurtle Square
Adelaide SA 5000

Section 35 Notice 468/UB 3028

Our Reference:

Your Reference:

ENVIRONMENTALLY HAZARDOUS CHEMICALS ACT, 1985
NOTICE UNDER SECTION 35

WHEREAS:

A. Metro Meat Ltd (ACN 006 107 857) was the occupier of premises known as Metro Meat Ltd at 356 Manns Road West Gosford which is described as Lot 26 in Deposited Plan 3944 (the premises)

B. The premises have been used for the carrying on of a prescribed activity, namely the disposing of waste material from slaughtering, rendering and fat extraction processes associated with an abattoir works;

C. The premises were deemed contaminated by reasons of their being environmentally degraded;

D. A notice pursuant to section 35 of the Environmentally Hazardous Chemicals Act 1985 was served on Metro Meats Ltd being the occupier of the premises on 26 June 1989 Notice number 138/3028 (copy attached);

E. The Environment Protection Authority (EPA) has reviewed the following reports:

- *Validation Assessment West Gosford Site* December 1993 (reference Golders Associates report number 93620101); and

- *Validation Assessment West Gosford Meatworks Site* March 1994 (reference Golders Associates report number 93620101).

F. The reports referred to in clause E indicate that the contamination within the pond system has been remediated.

TAKE NOTICE THAT:

In accordance with the powers vested in the EPA by the provisions of the Environmentally Hazardous Chemicals Act 1985, the EPA hereby revokes the Section 35 Notice dated 26 June *1989,* referred to in clause D above.

Neil Shepherd
Director-General

(signed – 30/10/1997)

Cathy Dyer
Manager Contaminated Sites
By delegation

cc. General Manager, Gosford City Council
Regional Manager Hunter
Register of Section 35 Notices

Attached: Notice number 138/3028

Number	Name	Location	Type	Status	Issued date
3085780473	ANTHONY KAMPER PTY LTD	9 Marstan Close, WEST GOSFORD, NSW 2250	Penalty Notice	Issued	4-Nov-16
5238	EARBURN PTY. LIMITED	4 APOLLO CLOSE, WEST GOSFORD, NSW 2250	POEO licence	No longer in force	27-Sep-99
1010334	EARBURN PTY. LIMITED	4 APOLLO CLOSE, WEST GOSFORD, NSW 2250	s.58 Licence Variation	Issued	30-Aug-01
1037865	EARBURN PTY. LIMITED	4 APOLLO CLOSE, WEST GOSFORD, NSW 2250	s.58 Licence Variation	Issued	8-Jul-04
1039548	EARBURN PTY. LIMITED	4 APOLLO CLOSE, WEST GOSFORD, NSW 2250	s.58 Licence Variation	Issued	11-Aug-04
1063713	EARBURN PTY. LIMITED	4 APOLLO CLOSE, WEST GOSFORD, NSW 2250	s.58 Licence Variation	Issued	22-Aug-06
20648	ECONOMY WASTE GROUP PTY LIMITED	30 NELLS ROAD, WEST GOSFORD, NSW 2250	POEO licence	Issued	13-Oct-16
20617	RECYCLED CONCRETE PRODUCTS PTY. LIMITED	18A Tathra Street, WEST GOSFORD, NSW 2250	POEO licence	Issued	26-Jul-16
1553178	SERIOUS ABOUT CIVIL PTY LTD	38 Nells Road, WEST GOSFORD, NSW 2250	s.91 Clean Up Notice	Issued	23-Jun-17
1554655	SERIOUS ABOUT CIVIL PTY LTD	38 Nells Road, WEST GOSFORD, NSW 2250	s.110 Variation of Clean Up Notice	Issued	26-Jul-17
1556503	SERIOUS ABOUT CIVIL PTY LTD	38 Nells Road, WEST GOSFORD, NSW 2250	s.110 Variation of Clean Up Notice	Issued	7-Sep-17
3173523477	SERIOUS ABOUT CIVIL PTY LTD	38 Nells Road, WEST GOSFORD, NSW 2250	Penalty Notice	Issued	3-Oct-17
20660	SUEZ RECYCLING & RECOVERY PTY LTD	12 Gibbens Road, WEST GOSFORD, NSW 2250	POEO licence	Issued	2-Feb-16

Section 91 Protection of the Environment Operations Act 1997

Clean-Up Notice

SERIOUS ABOUT CIVIL PTY LTD
ACN 155 525 401
377 Manns Road
WEST GOSFORD NSW 2250

Attention: Mr Garry Bowers

Notice Number	1553178
File Number	EF17/6718
Date	23-Jun-2017

NOTICE OF CLEAN-UP ACTION

BACKGROUND

A. The Environment Protection Authority ("EPA") administers and enforces the *Protection of the Environment Operations Act* 1997 ("the Act").

B. The registered proprietor of the premises at Lot 503 in DP 1034080 known as 38 Nells Road, West Gosford 2250 ("the Premises") is Alashan Investments Pty Ltd (ACN 123 121 791).

C. The occupant of the Premises is Serious About Civil Pty Ltd (ACN 155 525 401).

D. On 5 June 2017 and 14 June 2017, authorised officers of the EPA inspected the Premises and observed stockpiles of uncovered timber waste, stockpiles of mixed soils and a stockpile of mixed demolition waste stored at the Premises (see photographs 1,2, and 3).

E. The timber waste consists of engineered timber and timber suspected by the EPA officers to be preservative treated.

F. During the inspection by EPA officers on 14 June 2017, the EPA officers observed that the waste timber was stockpiled on or near stormwater drains. The EPA officers also observed leachate draining from the stockpiles of waste timber flowing uncontrolled into stormwater drains (see photographs 4 and 5).

G. Investigations conducted by the EPA to date indicate that stormwater discharged from the Premises flows to Narara Creek, which flows to Brisbane Water.

Clean-Up Notice

H. The Act defines water pollution or pollution of waters to include placing any matter (whether solid, liquid or gaseous) in a position where it falls or is likely to fall into any waters if the matter would, had it been placed in any waters, have polluted or have been likely to pollute those waters.

I. Section 91 of the Act provides that the appropriate regulatory authority may by notice in writing, direct a person who is reasonably suspected by the authority of causing or having caused a pollution incident, to take such clean-up action as is specified in the notice and within such period as is specified in the notice.

J. The EPA reasonably suspects that a pollution incident, being water pollution, is occurring or likely to occur at the Premises by placing liquid matter (leachate) in a position where it falls or is likely to fall into any waters designed to receive or pass rainwater.

DIRECTION TO TAKE CLEAN-UP ACTION

1. The Environment Protection Authority directs Serious About Civil Pty Ltd to take the following clean up action:
   a. **Immediately** cease, until further notice, the receipt of waste at the Premises;
   b. **Immediately** cease, until further notice, the processing of waste at the Premises;
   c. Engage or appoint a suitably qualified surveyor to carry out a volumetric survey of all material, including waste, stored at the Premises;
   d. By no later than 5.00 p.m. on Thursday 29 June 2017 cause a written copy of the volumetric survey of all material, including waste, stored at the Premises to be received by the EPA;
   e. Until the volumetric survey is provided to the EPA, do not dispose of, or remove, any waste stored at the Premises;
   f. By no later than 5.00 p.m. on Thursday 29 June 2017 install operating controls and continue to maintain the operating controls at the Premises to ensure the pollution of waters is not occurring or does not occur.

Note: Written material required to be provided to the EPA should be sent to NSW EPA, Unit Head Waste Compliance – Hunter, PO Box 488G Newcastle NSW 2300 or by email to waste.operations.nsw.gov.au.

FEE TO BE PAID

- You are required by law to pay a fee of $520 for the administrative costs of issuing this notice.
- It is an offence not to pay this fee. However you can apply for an extension of time to pay the fee or for the fee to be waived. At the end of this notice there is information about how and when to pay the fee and how to apply for an extension or a waiver of the fee.

Clean-Up Notice

.....

Steven James

Unit Head

Waste & Resource Recovery

(by Delegation)

INFORMATION ABOUT THIS CLEAN-UP NOTICE

- This notice is issued under section 91 of the *Protection of the Environment Operations Act* 1997 ("the Act")
- It is an offence against the Act not to comply with a clean-up notice unless you have a reasonable excuse.

Penalty for not complying with this notice

- The maximum penalty for a corporation is $1,000,000 and a further $120,000 for each day the offence continues. The maximum penalty for an individual is $250,000 and a further $60,000 for each day the offence continues.

Cost recovery from the person who caused the incident

- If you comply with this clean-up notice but you are not the person who caused the pollution incident to which the notice relates, you have a right to go to court to recover your costs of complying with the notice from the person who caused the incident.

Deadline for paying the fee

- The fee must be paid by **no later than 30 days after the date of this notice**, unless the EPA extends the time to pay the fee, or waives the fee.

How to pay the fee

- Possible methods of payment are listed on the last page of the attached invoice/statement.
- Please include the payment slip from the attached invoice/statement with your payment.

How to apply for an extension of time to pay/waive the fee

- Any application for and extension of time to pay the fee or for the fee to be waived should be made in writing to the EPA. The application should set out clearly why you think your application should be granted.

Clean-Up Notice

Other costs

- The Act allows the EPA to recover from you reasonable costs and expenses it incurs in monitoring action taken under this notice, ensuring the notice is complied with and associated matters. (If you are going to be required to pay these costs and expenses you will later be sent a separate notice called a "Notice Requiring Payment of Reasonable Costs and Expenses").

Continuing obligation

- Under section 319A of the Act, your obligation to comply with the requirements of this notice continues until the notice is complied with, even if the due date for compliance has passed.

Variation of this notice

- This notice may only be varied by subsequent notices issued by the EPA.

Photo 1 – Stockpile of timber waste (photo taken on 5 June 2017)

Photo 2 – Stockpiles of mixed soils (photo taken on 5 June 2017)

Photo 3 – Stockpile of mixed demolition waste (photo taken on 5 June 2017)

Photo 4 – Stormwater drain on the Premises (photo taken on 14 June 2017)

Photo 5 - Stormwater drain on the Premises (photo taken on 14 June 2017)

Appendix C

Descriptive Notes

Borehole Logs

Sampling

Sampling is carried out during drilling or test pitting to allow engineering examination (and laboratory testing where required) of the soil or rock.

Disturbed samples taken during drilling provide information on colour, type, inclusions and, depending upon the degree of disturbance, some information on strength and structure.

Undisturbed samples are taken by pushing a thin-walled sample tube into the soil and withdrawing it to obtain a sample of the soil in a relatively undisturbed state. Such samples yield information on structure and strength, and are necessary for laboratory determination of shear strength and compressibility. Undisturbed sampling is generally effective only in cohesive soils.

Test Pits

Test pits are usually excavated with a backhoe or an excavator, allowing close examination of the in-situ soil if it is safe to enter into the pit. The depth of excavation is limited to about 3 m for a backhoe and up to 6 m for a large excavator. A potential disadvantage of this investigation method is the larger area of disturbance to the site.

Large Diameter Augers

Boreholes can be drilled using a rotating plate or short spiral auger, generally 300 mm or larger in diameter commonly mounted on a standard piling rig. The cuttings are returned to the surface at intervals (generally not more than 0.5 m) and are disturbed but usually unchanged in moisture content. Identification of soil strata is generally much more reliable than with continuous spiral flight augers, and is usually supplemented by occasional undisturbed tube samples.

Continuous Spiral Flight Augers

The borehole is advanced using 90-115 mm diameter continuous spiral flight augers which are withdrawn at intervals to allow sampling or in-situ testing. This is a relatively economical means of drilling in clays and sands above the water table. Samples are returned to the surface, or may be collected after withdrawal of the auger flights, but they are disturbed and may be mixed with soils from the sides of the hole. Information from the drilling (as distinct from specific sampling by SPTs or undisturbed samples) is of relatively low reliability, due to the remoulding, possible mixing or softening of samples by groundwater.

Non-core Rotary Drilling

The borehole is advanced using a rotary bit, with water or drilling mud being pumped down the drill rods and returned up the annulus, carrying the drill cuttings. Only major changes in stratification can be determined from the cuttings, together with some information from the rate of penetration. Where drilling mud is used this can mask the cuttings and reliable identification is only possible from separate sampling such as SPTs.

Continuous Core Drilling

A continuous core sample can be obtained using a diamond tipped core barrel, usually with a 50 mm internal diameter. Provided full core recovery is achieved (which is not always possible in weak rocks and granular soils), this technique provides a very reliable method of investigation.

Standard Penetration Tests

Standard penetration tests (SPT) are used as a means of estimating the density or strength of soils and also of obtaining a relatively undisturbed sample. The test procedure is described in Australian Standard 1289, Methods of Testing Soils for Engineering Purposes - Test 6.3.1.

The test is carried out in a borehole by driving a 50 mm diameter split sample tube under the impact of a 63 kg hammer with a free fall of 760 mm. It is normal for the tube to be driven in three successive 150 mm increments and the 'N' value is taken as the number of blows for the last 300 mm. In dense sands, very hard clays or weak rock, the full 450 mm penetration may not be practicable and the test is discontinued.

The test results are reported in the following form.

- In the case where full penetration is obtained with successive blow counts for each 150 mm of, say, 4, 6 and 7 as:

  4,6,7
  N=13

- In the case where the test is discontinued before the full penetration depth, say after 15 blows for the first 150 mm and 30 blows for the next 40 mm as:

  15, 30/40 mm

The results of the SPT tests can be related empirically to the engineering properties of the soils.

Dynamic Cone Penetrometer Tests / Perth Sand Penetrometer Tests

Dynamic penetrometer tests (DCP or PSP) are carried out by driving a steel rod into the ground using a standard weight of hammer falling a specified distance. As the rod penetrates the soil the number of blows required to penetrate each successive 150 mm depth are recorded. Normally there is a depth limitation of 1.2 m, but this may be extended in certain conditions by the use of extension rods. Two types of penetrometer are commonly used.

- Perth sand penetrometer - a 16 mm diameter flat ended rod is driven using a 9 kg hammer dropping 600 mm (AS 1289, Test 6.3.3). This test was developed for testing the density of sands and is mainly used in granular soils and filling.
- Cone penetrometer - a 16 mm diameter rod with a 20 mm diameter cone end is driven using a 9 kg hammer dropping 510 mm (AS 1289, Test 6.3.2). This test was developed initially for pavement subgrade investigations, and correlations of the test results with California Bearing Ratio have been published by various road authorities.

Soil Descriptions

Douglas Partners

Description and Classification Methods

The methods of description and classification of soils and rocks used in this report are based on Australian Standard AS 1726-1993, Geotechnical Site Investigations Code. In general, the descriptions include strength or density, colour, structure, soil or rock type and inclusions.

Soil Types

Soil types are described according to the predominant particle size, qualified by the grading of other particles present:

Type	Particle size (mm)
Boulder	>200
Cobble	63 - 200
Gravel	2.36 - 63
Sand	0.075 - 2.36
Silt	0.002 - 0.075
Clay	<0.002

The sand and gravel sizes can be further subdivided as follows:

Type	Particle size (mm)
Coarse gravel	20 - 63
Medium gravel	6 - 20
Fine gravel	2.36 - 6
Coarse sand	0.6 - 2.36
Medium sand	0.2 - 0.6
Fine sand	0.075 - 0.2

The proportions of secondary constituents of soils are described as:

Term	Proportion	Example
And	Specify	Clay (60%) and Sand (40%)
Adjective	20 - 35%	Sandy Clay
Slightly	12 - 20%	Slightly Sandy Clay
With some	5 - 12%	Clay with some sand
With a trace of	0 - 5%	Clay with a trace of sand

Definitions of grading terms used are:

- Well graded - a good representation of all particle sizes
- Poorly graded - an excess or deficiency of particular sizes within the specified range
- Uniformly graded - an excess of a particular particle size
- Gap graded - a deficiency of a particular particle size with the range

Cohesive Soils

Cohesive soils, such as clays, are classified on the basis of undrained shear strength. The strength may be measured by laboratory testing, or estimated by field tests or engineering examination. The strength terms are defined as follows:

Description	Abbreviation	Undrained shear strength (kPa)
Very soft	vs	<12
Soft	s	12 - 25
Firm	f	25 - 50
Stiff	st	50 - 100
Very stiff	vst	100 - 200
Hard	h	>200

Cohesionless Soils

Cohesionless soils, such as clean sands, are classified on the basis of relative density, generally from the results of standard penetration tests (SPT), cone penetration tests (CPT) or dynamic penetrometers (PSP). The relative density terms are given below:

Relative Density	Abbreviation	SPT N value	CPT qc value (MPa)
Very loose	vl	<4	<2
Loose	l	4 - 10	2 -5
Medium dense	md	10 - 30	5 - 15
Dense	d	30 - 50	15 - 25
Very dense	vd	>50	>25

Soil Descriptions

Soil Origin

It is often difficult to accurately determine the origin of a soil. Soils can generally be classified as:

- Residual soil - derived from in-situ weathering of the underlying rock;
- Transported soils - formed somewhere else and transported by nature to the site; or
- Filling - moved by man.

Transported soils may be further subdivided into:

- Alluvium - river deposits
- Lacustrine - lake deposits
- Aeolian - wind deposits
- Littoral - beach deposits
- Estuarine - tidal river deposits
- Talus - scree or coarse colluvium
- Slopewash or Colluvium - transported downslope by gravity assisted by water. Often includes angular rock fragments and boulders.

Symbols & Abbreviations

Introduction

These notes summarise abbreviations commonly used on borehole logs and test pit reports.

Drilling or Excavation Methods

C	Core drilling
R	Rotary drilling
SFA	Spiral flight augers
NMLC	Diamond core - 52 mm dia
NQ	Diamond core - 47 mm dia
HQ	Diamond core - 63 mm dia
PQ	Diamond core - 81 mm dia

Water

▷	Water seep
▽	Water level

Sampling and Testing

A	Auger sample
B	Bulk sample
D	Disturbed sample
E	Environmental sample
U_{50}	Undisturbed tube sample (50mm)
W	Water sample
pp	Pocket penetrometer (kPa)
PID	Photo ionisation detector
PL	Point load strength Is(50) MPa
S	Standard Penetration Test
V	Shear vane (kPa)

Description of Defects in Rock

The abbreviated descriptions of the defects should be in the following order: Depth, Type, Orientation, Coating, Shape, Roughness and Other. Drilling and handling breaks are not usually included on the logs.

Defect Type

B	Bedding plane
Cs	Clay seam
Cv	Cleavage
Cz	Crushed zone
Ds	Decomposed seam
F	Fault
J	Joint
Lam	Lamination
Pt	Parting
Sz	Sheared Zone
V	Vein

Orientation

The inclination of defects is always measured from the perpendicular to the core axis.

h	horizontal
v	vertical
sh	sub-horizontal
sv	sub-vertical

Coating or Infilling Term

cln	clean
co	coating
he	healed
inf	infilled
stn	stained
ti	tight
vn	veneer

Coating Descriptor

ca	calcite
cbs	carbonaceous
cly	clay
fe	iron oxide
mn	manganese
slt	silty

Shape

cu	curved
ir	irregular
pl	planar
st	stepped
un	undulating

Roughness

po	polished
ro	rough
sl	slickensided
sm	smooth
vr	very rough

Other

fg	fragmented
bnd	band
qtz	quartz

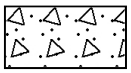
Symbols & Abbreviations

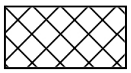
Graphic Symbols for Soil and Rock

General

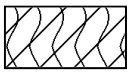

Asphalt

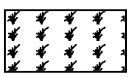

Road base

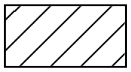

Concrete

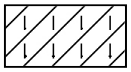

Filling

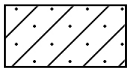
Soils


Topsoil

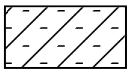

Peat

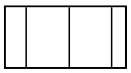

Clay

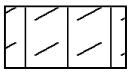

Silty clay

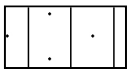

Sandy clay

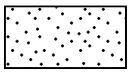

Gravelly clay

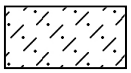

Shaly clay

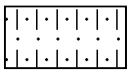

Silt


Clayey silt


Sandy silt

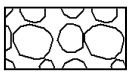

Sand

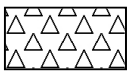

Clayey sand


Silty sand


Gravel

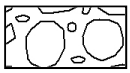

Sandy gravel


Cobbles, boulders

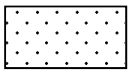

Talus

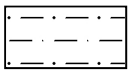
Sedimentary Rocks

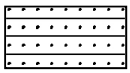

Boulder conglomerate

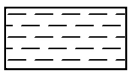

Conglomerate


Conglomeratic sandstone

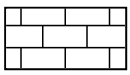

Sandstone


Siltstone

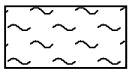

Laminite

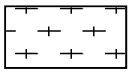

Mudstone, claystone, shale

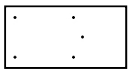

Coal


Limestone

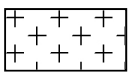
Metamorphic Rocks

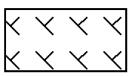

Slate, phyllite, schist

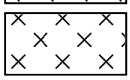

Gneiss

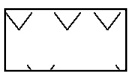

Quartzite

Igneous Rocks


Granite


Dolerite, basalt, andesite


Dacite, epidote


Tuff, breccia


Porphyry

BOREHOLE LOG

CLIENT: Gosford RSL Club
PROJECT: Gosford RSL Redevelopment
LOCATION: 2-22 Yallambee Avenue, West Gosford

SURFACE LEVEL: 1.9mAHD*
EASTING: 343980
NORTHING: 6300000
DIP/AZIMUTH: 90°/--

BORE No: 1
PROJECT No: 83326.00
DATE: 29/1/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.07	ASPHALT		D/E	0.1		PID = <1 ppm		
	0.23	FILLING: Generally comprising, orange brown gravelly sand ripped sandstone), damp			0.23				
		FILLING: Generally comprising, grey and red brown sandy clay/clayey sand with trace gravel, damp		B D/E	0.5		PID= <1 ppm		
	0.6	FILLING: Generally comprising, brown sand with trace ironstone gravel, damp			0.6				
				D/E	0.8		PID= <1 ppm		
1		- clayey sand band filling at 1.0m							1
	1.1	SILT: Firm, dark brown silt with abundant decomposed organics, moist		D/E	1.2		PID= <1 ppm		
	1.4	SAND: Loose to medium dense, grey sand with trace decomposed organics, wet		D/E	1.5		PID= <1 ppm	▼	
2									2
	2.8	Bore discontinued at 2.8m . Limit of investigation							
3									3
4									4

RIG: Toyota 4WD **DRILLER:** M Harrison **LOGGED:** M Harrison **CASING:** Nil

TYPE OF BORING: 60mm ≤ ϕ Dynamic Push Tube (continuous sample)

WATER OBSERVATIONS: Free Groundwater Observed at 1.6m

REMARKS: QA1 collected at 0.5m. Drilling completed to 2.8m however no sample recovered past 1.8m. *Levels interpolated from Barry Hunt Associates Dwg dated 2015

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Gosford RSL Club
PROJECT: Gosford RSL Redevelopment
LOCATION: 2-22 Yallambee Avenue, West Gosford

SURFACE LEVEL: 1.7mAHD*
EASTING: 344010
NORTHING: 6299999
DIP/AZIMUTH: 90°/--

BORE No: 2
PROJECT No: 83326.00
DATE: 29/1/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.07	ASPHALT							
	0.2	FILLING: Generally comprising, orange brown gravelly sand ripped sandstone), damp		D/E	0.1		PID = <1 ppm		
		FILLING: Generally comprising, orange and red brown sandy clay/clayey sand with trace gravel		D/E	0.5		PID= <1 ppm		
	0.6	FILLING: Generally comprising, brown sand with trace ironstone gravel, damp		D/E	0.7		PID= <1 ppm		
1	1.0	SILT: Firm, dark brown silt with abundant decomposed organics, moist		D/E	1.1		PID= <1 ppm		1
	1.15	SAND: Loose to medium dense, grey sand with trace decomposed organics, wet		D/E	1.2		PID= <1 ppm		
				D/E	1.5		PID= <1 ppm	▼	
2									2
	2.8	Bore discontinued at 2.8m . Limit of investigation							
3									3
4									4

RIG: Toyota 4WD **DRILLER:** M Harrison **LOGGED:** M Harrison **CASING:** Nil

TYPE OF BORING: 60mm ≤ ϕ Dynamic Push Tube (continuous sample)

WATER OBSERVATIONS: Free Groundwater Observed at 1.6m

REMARKS: Drilling completed to 2.8m however no sample recovered past 1.8m. *Levels interpolated from Barry Hunt Associates Dwg dated 2015

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Gosford RSL Club
PROJECT: Gosford RSL Redevelopment
LOCATION: 2-22 Yallambee Avenue, West Gosford

SURFACE LEVEL: 1.7mAHD*
EASTING: 343970
NORTHING: 6299961
DIP/AZIMUTH: 90°/--

BORE No: 3
PROJECT No: 83326.00
DATE: 29/1/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.08	ASPHALT		D/E	0.05		PID = <1 ppm		
		FILLING: Generally comprising, orange brown gravelly sand (ripped sandstone)		D/E	0.1				
	0.3	FILLING: Generally comprising, brown and grey gravelly sand/sandy clay, moist		D/E	0.5		PID= <1 ppm		
	1			D/E	1.0		PID= <1 ppm		1
	1.15	FILLING: Generally comprising, dark brown material. Material has consistency of dark brown sawdust							
	1.3	SAND: Loose to medium dense, grey sand with trace decomposed organics, wet		D/E	1.5		PID= <1 ppm	▼	
	1.8	Bore discontinued at 1.8m . Limit of investigation		D/E	1.8		PID= <1 ppm		
	2								2
	3								3
	4								4

RIG: Toyota 4WD **DRILLER:** M Harrison **LOGGED:** M Harrison **CASING:** Nil

TYPE OF BORING: 60mm ≤ ϕ Dynamic Push Tube (continuous sample)

WATER OBSERVATIONS: Free Groundwater Observed at 1.6m

REMARKS: *Levels interpolated from Barry Hunt Associates Dwg dated 2015

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Gosford RSL Club
PROJECT: Gosford RSL Redevelopment
LOCATION: 2-22 Yallambee Avenue, West Gosford

SURFACE LEVEL: 1.4mAHD*
EASTING: 343998
NORTHING: 6299978
DIP/AZIMUTH: 90°/--

BORE No: 4
PROJECT No: 83326.00
DATE: 30/1/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.07	ASPHALT							
		FILLING: Generally comprising, brown mottled red brown sandy gravel filling (ripped sandstone), humid/damp		DE	0.1		PID = <1 ppm		
	0.3	FILLING: Generally comprising, red brown mottled light grey sandy gravelly clay/clayey gravelly sand filling (ripped sandstone), M<Wp/damp		DE	0.4		PID= <1 ppm		
	0.55	SANDY SILT: Soft to firm, dark grey sandy silt with trace organics, M<Wp		E	0.6		pp = 60-80		
	0.63			E	0.7				
	0.74	ORGANICS		E	0.75		pp = 100-110		
	0.8	SANDY SILT: Firm, dark grey sandy silt with trace organics, M<Wp		DE	0.9		PID= <1 ppm		
1		SAND: Loose to medium dense, dark grey sand with some silt and trace organics and shell fragments, wet		D	1.25		PID= <1 ppm		1
				DE	1.5		PID= <1 ppm		
				D	1.75		PID= <1 ppm	▼	
		- saturated from 1.83m							
2				DE	2.0		PID= <1 ppm		2
	2.2	SANDY CLAY/CLAYEY SAND: Soft to firm, grey mottled light brown sandy clay/clayey sand, M>Wp/saturated		DE	2.25		PID= <1 ppm		
					2.4		pp = 50-60		
				DE	2.5		PID= <1 ppm		
	2.55	SAND: Loose to medium dense, light grey sand with some silt, saturated		DE	2.7		PID= <1 ppm		
	2.8	SANDY CLAY: Firm, light grey sandy clay with trace organics, M>Wp							
3				DE	3.0		PID= <1 ppm		3
					3.1		pp = 60-80		
				D	3.25		PID= <1 ppm		
	3.3	Bore discontinued at 3.3m . Limit of investigation							
4									4

RIG: Toyota 4WD **DRILLER:** T Warriner **LOGGED:** T Warriner **CASING:** Nil

TYPE OF BORING: 60mm ≤ ϕ Dynamic Push Tube (continuous sample)

WATER OBSERVATIONS: Free Groundwater Observed at 1.8m

REMARKS: Hole collapsing back to 2.2m. *Levels interpolated from Barry Hunt Associates Dwg dated 2015

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Gosford RSL Club
PROJECT: Gosford RSL Redevelopment
LOCATION: 2-22 Yallambee Avenue, West Gosford

SURFACE LEVEL: 1.5mAHD*
EASTING: 344020
NORTHING: 6299957
DIP/AZIMUTH: 90°/--

BORE No: 6
PROJECT No: 83326.00
DATE: 29/1/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.2	FILLING: Generally comprising, grey gravelly sand		D/E	0.1		PID = <1 ppm		
	0.3	FILLING: Orange brown gravelly sand filling (ripped sandstone)			0.3				
		FILLING: Orange brown sandy clay/clay, M<Wp		B D/E	0.4 0.5		PID= <1 ppm		
	0.5	SILTY SAND: Loose to medium dense, dark brown silty sand with some decomposed organics, moist		D/E	0.6		PID= <1 ppm		
	0.8	SAND: Loose to dense, grey sand, moist							
	1			D/E	1.0		PID= <1 ppm	▼	1
	2			D/E	2.0		PID= <1 ppm		2
		- trace shells at 2.1m							
	2.3	CLAYEY SAND: Loose to dense, grey clayey sand with trace decomposed organics, wet		D/E	2.5		PID= <1 ppm		
	2.55	SANDY CLAY: Firm, brown, sandy clay, M=Wp							
	2.8	Bore discontinued at 2.8m . Limit of investigation		D/E	2.8		PID= <1 ppm		
	3								3
	4								4

RIG: Toyota 4WD **DRILLER:** M Harrison **LOGGED:** M Harrison **CASING:** Nil

TYPE OF BORING: 60mm ≤ ϕ Dynamic Push Tube (continuous sample)

WATER OBSERVATIONS: Free Groundwater Observed at 1.1m

REMARKS: Bore conducted on elevated garden bed. *Levels interpolated from Barry Hunt Associates Dwg dated 2015

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Appendix D

Table D1

Laboratory Reports, COC and Sample Receipts

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Table D1: Summary of Laboratory Results for Soil

					Asbestos ID	Metals								TPH						
						Arsenic	Cadmium	Chromium (III+VI)	Copper	Lead	Mercury	Nickel	Zinc	C10-C16	C16-C34	C34-C40	F2-NAPHTHALENE	C6 - C9	C10 - C14	C15 - C28
					g/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Site Assessment Criteria																				
EQL					0.1	4	0.4	1	1	1	0.1	1	1	50	100	100	50	25	50	100
Site Assessment Criteria																				
CRC Care Direct Contact HSL-D														20,000	27,000	38,000	11,000			
CRC Care Direct Contact Intrusive Maintenance Worker														62,000	85,000	120,000	29,000			
CRC Care Intrusive MW Soil HSL Vapour I, Sand																				
0-2m														NL			NL			
NEPM 2013 Table 1A(1) HILs D						3000	900	3600	240,000	1500	730	6000	400,000							
NEPM 2013 Table 1B(7) Management Limits HSL D														1000	3500	10000		700		
NEPM 2013 EILs / ESL Res Aged						160		530	280	1800		290	620	170	1700	3300	170			
Waste Classification Criteria																				
Background Levels						1-53	0.7	2.5-673	0.4-412	2-81		1-517	1-263							
NSW EPA (2014) General Soild Waste (CT1)						100	20	100		100	4	40						650		10,000
NSW EPA (2014) Restricted Soild Waste (CT2)						400	80	400		400	16	160						2600		40,000
Borehole Number	**Depth (m)**	**Sampling Date**	**Filling (F) / Natural (N)**	**Sample Description**																
1	0.5	29/01/2018	F	Grey and red brown sandy clay / clayey sand filling, trace gravel	No asbestos detected	<4	<0.4	13	<1	10	<0.1	3	8	<50	<100	<100	<1	<25	<50	<100
QA1	Replicate of 1/0.5	29/01/2018	F	Grey and red brown sandy clay / clayey sand filling, trace gravel	-	<4	<0.4	13	<1	11	<0.1	2	7	<50	<100	<100	<1	<25	<50	<100
1	0.8	29/01/2018	F	Brown sand filling, trace gravel	No asbestos detected	<4	<0.4	13	<1	14	<0.1	3	5	<50	<100	<100	<1	<25	<50	<100
2	0.1	29/01/2018	F	Orange brown, gravelly sand filling (ripped sandstone)	No asbestos detected	<4	<0.4	9	<1	1	<0.1	<1	2	<50	<100	<100	<1	<25	<50	<100
2	0.7	29/01/2018	F	Brown sand filling, trace gravel	No asbestos detected	<4	<0.4	2	<1	4	<0.1	<1	3	<50	<100	<100	<1	<25	<50	<100
3	0.5	29/01/2018	F	Brown and grey gravelly sand / sandy clay filling	No asbestos detected	4	<0.4	13	<1	9	<0.1	3	3	<50	<100	<100	<1	<25	<50	<100
3	1.5	29/01/2018	N	Grey sand, trace organics	No asbestos detected	<4	<0.4	7	2	3	<0.1	<1	1	<50	<100	<100	<1	<25	<50	<100
4	0.9	30/01/2018	N	dark grey sand, some silt, trace organic and shell fragments	No asbestos detected	<4	<0.4	4	<1	2	<0.1	<1	1	<50	<100	<100	<1	<25	<50	<100
6	0.4	29/01/2018	F	Orange brown sandy clay / clay filling	No asbestos detected	<4	<0.4	24	<1	16	<0.1	1	13	<50	<100	<100	<1	<25	<50	<100

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Table D1: Summary of Laboratory Results for Soil

									BTEX						PAH				Polychlorinated Biphenyls									
				C29-C36	C10 - C40 (Sum of total)	C6-C10 less BTEX (F1)	C6-C10	Total Phenolics	Benzene	Ethylbenzene	Toluene	Xylene (m & p)	Xylene (o)	Xylene Total	Benzo(a) pyrene	Naphthalene	Carcinogenic PAH (as Benzo(a)pyrene TEQ)	Total PAH	Arochlor 1016	Arochlor 1221	Arochlor 1232	Arochlor 1242	Arochlor 1248	Arochlor 1254	Arochlor 1260	PCBs (Sum of total)	4,4-DDE	a-BHC
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Site Assessment Criteria																												
EQL				100	50	25	25	5	0.2	1	0.5	2	1	1	0.05	0.1	0.05	0.05	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Site Assessment Criteria																												
CRC Care Direct Contact HSL-D							26,000		430	27,000	99,000	81,000	81,000	81,000		11,000												
CRC Care Direct Contact Intrusive Maintenance Worker							82,000		1100	85,000	120,000	130,000	130,000	130,000		29,000												
CRC Care Intrusive MW Soil HSL Vapour I, Sand																												
0-2m						260	260		3	NL	NL	230	230	230		NL												
NEPM 2013 Table 1A(1) HILs D								240,000									40	4000							7			
NEPM 2013 Table 1B(7) Management Limits HSL D																3												
NEPM 2013 EILs / ESL Res Aged							215		75	165	135			180	1.4	170												
Waste Classification Criteria																												
Background Levels								0.03-0.5	0.05-1		0.1-1							0.95-5								50		
NSW EPA (2014) General Soild Waste (CT1)								288	10	600	288		1000		0.8			200										
NSW EPA (2014) Restricted Soild Waste (CT2)								1152	40	2400	1152		4000		3.2			800										
Borehole Number	**Depth (m)**	**Sampling Date**	**Filling (F) / Natural (N)**																									
1	0.5	29/01/2018	F	<100	<50	<25	<25	<5	<0.2	<1	<0.5	<2	<1	<1	<0.05	<1	<0.5	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
QA1	Replicate of 1/0.5	29/01/2018	F	<100	<50	<25	<25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1	0.8	29/01/2018	F	<100	<50	<25	<25	<5	<0.2	<1	<0.5	<2	<1	<1	<0.05	<1	<0.5	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2	0.1	29/01/2018	F	<100	<50	<25	<25	<5	<0.2	<1	<0.5	<2	<1	<1	<0.05	<1	<0.5	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2	0.7	29/01/2018	F	<100	<50	<25	<25	<5	<0.2	<1	<0.5	<2	<1	<1	<0.05	<1	<0.5	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
3	0.5	29/01/2018	F	<100	<50	<25	<25	<5	<0.2	<1	<0.5	<2	<1	<1	<0.05	<1	<0.5	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
3	1.5	29/01/2018	N	<100	<50	<25	<25	-	<0.2	<1	<0.5	<2	<1	<1	<0.05	<1	<0.5	<0.05	-	-	-	-	-	-	-	-	-	-
4	0.9	30/01/2018	N	<100	<50	<25	<25	-	<0.2	<1	<0.5	<2	<1	<1	<0.05	<1	<0.5	<0.05	-	-	-	-	-	-	-	-	-	-
6	0.4	29/01/2018	F	<100	<50	<25	<25	<5	<0.2	<1	<0.5	<2	<1	<1	<0.05	<1	<0.5	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

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Table D1: Summary of Laboratory Results for Soil

				OCP / OPP																																	
				Aldrin	b-BHC	Chlordane (cis)	Chlordane (trans)	d-BHC	DDD	DDT	DDT+DDE+DDD	Dieldrin	Endosulfan I	Endosulfan II	Endosulfan sulphate	Endrin	Endrin aldehyde	g-BHC (Lindane)	Heptachlor	Heptachlor epoxide	Methoxychlor	Azinophos methyl	Bromophos-ethyl	Chlorpyrifos	Chlorpyrifos-methyl	Diazinon	Dichlorvos	Dimethoate	Ethion	Fenitrothion	Malathion	Ronnel
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Site Assessment Criteria																																					
EQL				0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Site Assessment Criteria																																					
CRC Care Direct Contact HSL-D																																					
CRC Care Direct Contact Intrusive Maintenance Worker																																					
CRC Care Intrusive MW Soil HSL Vapour I, Sand																																					
0-2m																																					
NEPM 2013 Table 1A(1) HILs D				45 (Aldrin+Dieldrin)	80	530		80			3600	45 (Aldrin+Dieldrin)	2000			100			50		2500			2000													
NEPM 2013 Table 1B(7) Management Limits HSL D																																					
NEPM 2013 EILs / ESL Res Aged										640																											
Waste Classification Criteria																																					
Background Levels				50 / 250																																	
NSW EPA (2014) General Soild Waste (CT1)																																					
NSW EPA (2014) Restricted Soild Waste (CT2)																																					
Borehole Number	**Depth (m)**	**Sampling Date**	**Filling (F) / Natural (N)**																																		
1	0.5	29/01/2018	F	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
QA1	Replicate of 1/0.5	29/01/2018	F	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1	0.8	29/01/2018	F	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2	0.1	29/01/2018	F	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2	0.7	29/01/2018	F	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
3	0.5	29/01/2018	F	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
3	1.5	29/01/2018	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	0.9	30/01/2018	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	0.4	29/01/2018	F	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

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Table D1: Summary of Laboratory Results for Soil				
				Parathion
				mg/kg
Site Assessment Criteria				
EQL				0.1
Site Assessment Criteria				
CRC Care Direct Contact HSL-D				
CRC Care Direct Contact Intrusive Maintenance Worker				
CRC Care Intrusive MW Soil HSL Vapour I, Sand				
0-2m				
NEPM 2013 Table 1A(1) HILs D				
NEPM 2013 Table 1B(7) Management Limits HSL D				
NEPM 2013 EILs / ESL Res Aged				
Waste Classification Criteria				
Background Levels				
NSW EPA (2014) General Soild Waste (CT1)				
NSW EPA (2014) Restricted Soild Waste (CT2)				
Borehole Number	**Depth (m)**	**Sampling Date**	**Filling (F) / Natural (N)**	
1	0.5	29/01/2018	F	<0.1
QA1	Replicate of 1/0.5	29/01/2018	F	-
1	0.8	29/01/2018	F	<0.1
2	0.1	29/01/2018	F	<0.1
2	0.7	29/01/2018	F	<0.1
3	0.5	29/01/2018	F	<0.1
3	1.5	29/01/2018	N	-
4	0.9	30/01/2018	N	-
6	0.4	29/01/2018	F	<0.1

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CERTIFICATE OF ANALYSIS 184286

Client Details

Client	Douglas Partners Tuggerah
Attention	Jessica Paulsen
Address	Unit 5, 3 Teamster Close, Tuggerah, NSW, 2259

Sample Details

Your Reference	**83326, Gosford RSL Club**
Number of Samples	9 Soil
Date samples received	01/02/2018
Date completed instructions received	01/02/2018

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.

Samples were analysed as received from the client. Results relate specifically to the samples as received.

Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Please refer to the last page of this report for any comments relating to the results.

Report Details

Date results requested by	08/02/2018
Date of Issue	07/02/2018

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David Springer, General Manager

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		184286-1	184286-2	184286-3	184286-4	184286-5
Your Reference	UNITS	1	1	2	2	3
Depth		0.5	0.8	0.1	0.7	0.5
Date Sampled		29/01/2018	29/01/2018	29/01/2018	29/01/2018	29/01/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	02/02/2018	02/02/2018	02/02/2018	02/02/2018	02/02/2018
Date analysed	-	02/02/2018	02/02/2018	02/02/2018	02/02/2018	02/02/2018
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	86	99	97	89	91

vTRH(C6-C10)/BTEXN in Soil					
Our Reference		184286-6	184286-7	184286-8	184286-9
Your Reference	UNITS	3	4	6	QA1
Depth		1.5	0.9	0.4	-
Date Sampled		29/01/2018	30/01/2018	29/01/2018	29/01/2018
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	02/02/2018	02/02/2018	02/02/2018	02/02/2018
Date analysed	-	02/02/2018	02/02/2018	02/02/2018	02/02/2018
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	[NA]
Toluene	mg/kg	<0.5	<0.5	<0.5	[NA]
Ethylbenzene	mg/kg	<1	<1	<1	[NA]
m+p-xylene	mg/kg	<2	<2	<2	[NA]
o-Xylene	mg/kg	<1	<1	<1	[NA]
naphthalene	mg/kg	<1	<1	<1	[NA]
Total +ve Xylenes	mg/kg	<1	<1	<1	[NA]
Surrogate aaa-Trifluorotoluene	%	88	90	90	94

svTRH (C10-C40) in Soil						
Our Reference		184286-1	184286-2	184286-3	184286-4	184286-5
Your Reference	UNITS	1	1	2	2	3
Depth		0.5	0.8	0.1	0.7	0.5
Date Sampled		29/01/2018	29/01/2018	29/01/2018	29/01/2018	29/01/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	02/02/2018	02/02/2018	02/02/2018	02/02/2018	02/02/2018
Date analysed	-	03/02/2018	03/02/2018	03/02/2018	03/02/2018	03/02/2018
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	<50
Surrogate o-Terphenyl	%	82	84	87	83	83

svTRH (C10-C40) in Soil					
Our Reference		184286-6	184286-7	184286-8	184286-9
Your Reference	UNITS	3	4	6	QA1
Depth		1.5	0.9	0.4	-
Date Sampled		29/01/2018	30/01/2018	29/01/2018	29/01/2018
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	02/02/2018	02/02/2018	02/02/2018	02/02/2018
Date analysed	-	03/02/2018	03/02/2018	03/02/2018	03/02/2018
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50
Surrogate o-Terphenyl	%	83	81	83	80

PAHs in Soil						
Our Reference		184286-1	184286-2	184286-3	184286-4	184286-5
Your Reference	UNITS	1	1	2	2	3
Depth		0.5	0.8	0.1	0.7	0.5
Date Sampled		29/01/2018	29/01/2018	29/01/2018	29/01/2018	29/01/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	02/02/2018	02/02/2018	02/02/2018	02/02/2018	02/02/2018
Date analysed	-	02/02/2018	02/02/2018	02/02/2018	02/02/2018	02/02/2018
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PAH's	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	99	98	101	98	99

PAHs in Soil				
Our Reference		184286-6	184286-7	184286-8
Your Reference	UNITS	3	4	6
Depth		1.5	0.9	0.4
Date Sampled		29/01/2018	30/01/2018	29/01/2018
Type of sample		Soil	Soil	Soil
Date extracted	-	02/02/2018	02/02/2018	02/02/2018
Date analysed	-	02/02/2018	02/02/2018	02/02/2018
Naphthalene	mg/kg	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1
Total +ve PAH's	mg/kg	<0.05	<0.05	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	97	96	100

Organochlorine Pesticides in soil						
Our Reference		184286-1	184286-2	184286-3	184286-4	184286-5
Your Reference	UNITS	1	1	2	2	3
Depth		0.5	0.8	0.1	0.7	0.5
Date Sampled		29/01/2018	29/01/2018	29/01/2018	29/01/2018	29/01/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	02/02/2018	02/02/2018	02/02/2018	02/02/2018	02/02/2018
Date analysed	-	02/02/2018	02/02/2018	02/02/2018	02/02/2018	02/02/2018
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	96	102	102	97	94

Organochlorine Pesticides in soil		
Our Reference		184286-8
Your Reference	UNITS	6
Depth		0.4
Date Sampled		29/01/2018
Type of sample		Soil
Date extracted	-	02/02/2018
Date analysed	-	02/02/2018
HCB	mg/kg	<0.1
alpha-BHC	mg/kg	<0.1
gamma-BHC	mg/kg	<0.1
beta-BHC	mg/kg	<0.1
Heptachlor	mg/kg	<0.1
delta-BHC	mg/kg	<0.1
Aldrin	mg/kg	<0.1
Heptachlor Epoxide	mg/kg	<0.1
gamma-Chlordane	mg/kg	<0.1
alpha-chlordane	mg/kg	<0.1
Endosulfan I	mg/kg	<0.1
pp-DDE	mg/kg	<0.1
Dieldrin	mg/kg	<0.1
Endrin	mg/kg	<0.1
pp-DDD	mg/kg	<0.1
Endosulfan II	mg/kg	<0.1
pp-DDT	mg/kg	<0.1
Endrin Aldehyde	mg/kg	<0.1
Endosulfan Sulphate	mg/kg	<0.1
Methoxychlor	mg/kg	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1
Surrogate TCMX	%	103

PCBs in Soil						
Our Reference		184286-1	184286-2	184286-3	184286-4	184286-5
Your Reference	UNITS	1	1	2	2	3
Depth		0.5	0.8	0.1	0.7	0.5
Date Sampled		29/01/2018	29/01/2018	29/01/2018	29/01/2018	29/01/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	02/02/2018	02/02/2018	02/02/2018	02/02/2018	02/02/2018
Date analysed	-	02/02/2018	02/02/2018	02/02/2018	02/02/2018	02/02/2018
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	96	102	102	97	94

PCBs in Soil		
Our Reference		184286-8
Your Reference	UNITS	6
Depth		0.4
Date Sampled		29/01/2018
Type of sample		Soil
Date extracted	-	02/02/2018
Date analysed	-	02/02/2018
Aroclor 1016	mg/kg	<0.1
Aroclor 1221	mg/kg	<0.1
Aroclor 1232	mg/kg	<0.1
Aroclor 1242	mg/kg	<0.1
Aroclor 1248	mg/kg	<0.1
Aroclor 1254	mg/kg	<0.1
Aroclor 1260	mg/kg	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1
Surrogate TCLMX	%	103

Acid Extractable metals in soil						
Our Reference		184286-1	184286-2	184286-3	184286-4	184286-5
Your Reference	UNITS	1	1	2	2	3
Depth		0.5	0.8	0.1	0.7	0.5
Date Sampled		29/01/2018	29/01/2018	29/01/2018	29/01/2018	29/01/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	02/02/2018	02/02/2018	02/02/2018	02/02/2018	02/02/2018
Date analysed	-	02/02/2018	02/02/2018	02/02/2018	02/02/2018	02/02/2018
Arsenic	mg/kg	<4	<4	<4	<4	4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	13	13	9	2	13
Copper	mg/kg	<1	<1	<1	<1	<1
Lead	mg/kg	10	14	1	4	9
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	3	3	<1	<1	3
Zinc	mg/kg	8	5	2	3	3

Acid Extractable metals in soil					
Our Reference		184286-6	184286-7	184286-8	184286-9
Your Reference	UNITS	3	4	6	QA1
Depth		1.5	0.9	0.4	-
Date Sampled		29/01/2018	30/01/2018	29/01/2018	29/01/2018
Type of sample		Soil	Soil	Soil	Soil
Date prepared	-	02/02/2018	02/02/2018	02/02/2018	02/02/2018
Date analysed	-	02/02/2018	02/02/2018	02/02/2018	02/02/2018
Arsenic	mg/kg	<4	<4	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	7	4	24	13
Copper	mg/kg	2	<1	<1	<1
Lead	mg/kg	3	2	16	11
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	<1	<1	1	2
Zinc	mg/kg	1	1	13	7

Misc Soil - Inorg						
Our Reference		184286-1	184286-2	184286-3	184286-4	184286-5
Your Reference	UNITS	1	1	2	2	3
Depth		0.5	0.8	0.1	0.7	0.5
Date Sampled		29/01/2018	29/01/2018	29/01/2018	29/01/2018	29/01/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	02/02/2018	02/02/2018	02/02/2018	02/02/2018	02/02/2018
Date analysed	-	02/02/2018	02/02/2018	02/02/2018	02/02/2018	02/02/2018
Total Phenolics (as Phenol)	mg/kg	<5	<5	<5	<5	<5

Misc Soil - Inorg		
Our Reference		184286-8
Your Reference	UNITS	6
Depth		0.4
Date Sampled		29/01/2018
Type of sample		Soil
Date prepared	-	02/02/2018
Date analysed	-	02/02/2018
Total Phenolics (as Phenol)	mg/kg	<5

Moisture						
Our Reference		184286-1	184286-2	184286-3	184286-4	184286-5
Your Reference	UNITS	1	1	2	2	3
Depth		0.5	0.8	0.1	0.7	0.5
Date Sampled		29/01/2018	29/01/2018	29/01/2018	29/01/2018	29/01/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	02/02/2018	02/02/2018	02/02/2018	02/02/2018	02/02/2018
Date analysed	-	05/02/2018	05/02/2018	05/02/2018	05/02/2018	05/02/2018
Moisture	%	17	9.9	7.1	9.8	15

Moisture					
Our Reference		184286-6	184286-7	184286-8	184286-9
Your Reference	UNITS	3	4	6	QA1
Depth		1.5	0.9	0.4	-
Date Sampled		29/01/2018	30/01/2018	29/01/2018	29/01/2018
Type of sample		Soil	Soil	Soil	Soil
Date prepared	-	02/02/2018	02/02/2018	02/02/2018	02/02/2018
Date analysed	-	05/02/2018	05/02/2018	05/02/2018	05/02/2018
Moisture	%	17	17	20	8.3

Asbestos ID - soils						
Our Reference		184286-1	184286-2	184286-3	184286-4	184286-5
Your Reference	UNITS	1	1	2	2	3
Depth		0.5	0.8	0.1	0.7	0.5
Date Sampled		29/01/2018	29/01/2018	29/01/2018	29/01/2018	29/01/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	06/02/2018	06/02/2018	06/02/2018	06/02/2018	06/02/2018
Sample mass tested	g	Approx. 40g	Approx. 35g	<5g	Approx. 35g	Approx. 35g
Sample Description	-	Brown sandy soil	Brown sandy soil	Brown sandy soil	Brown sandy soil	Brown sandy soil
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibre detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibre detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibre detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibre detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibre detected
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected

Asbestos ID - soils				
Our Reference		184286-6	184286-7	184286-8
Your Reference	UNITS	3	4	6
Depth		1.5	0.9	0.4
Date Sampled		29/01/2018	30/01/2018	29/01/2018
Type of sample		Soil	Soil	Soil
Date analysed	-	06/02/2018	06/02/2018	06/02/2018
Sample mass tested	g	Approx. 35g	Approx. 40g	Approx. 30g
Sample Description	-	Brown sandy soil	Brown sandy soil	Brown sandy soil
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibre detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibre detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibre detected
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected

Method ID	Methodology Summary
ASB-001	Asbestos ID - Qualitative identification of asbestos in bulk samples using Polarised Light Microscopy and Dispersion Staining Techniques including Synthetic Mineral Fibre and Organic Fibre as per Australian Standard 4964-2004.
Inorg-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
Inorg-031	Total Phenolics by segmented flow analyser (in line distillation with colourimetric finish). Solids are extracted in a caustic media prior to analysis.
Metals-020	Determination of various metals by ICP-AES.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis. Note, the Total +ve TRH PQL is reflective of the lowest individual PQL and is therefore "Total +ve TRH" is simply a sum of the positive individual TRH fractions (>C10-C40).
Org-005	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
Org-005	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's. Note, the Total +ve reported DDD+DDE+DDT PQL is reflective of the lowest individual PQL and is therefore simply a sum of the positive individually report DDD+DDE+DDT.
Org-006	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD.
Org-006	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD. Note, the Total +ve PCBs PQL is reflective of the lowest individual PQL and is therefore" Total +ve PCBs" is simply a sum of the positive individual PCBs.

Method ID	Methodology Summary
Org-012	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013. For soil results:- 1. 'EQ PQL'values are assuming all contributing PAHs reported as <PQL are actually at the PQL. This is the most conservative approach and can give false positive TEQs given that PAHs that contribute to the TEQ calculation may not be present. 2. 'EQ zero'values are assuming all contributing PAHs reported as <PQL are zero. This is the least conservative approach and is more susceptible to false negative TEQs when PAHs that contribute to the TEQ calculation are present but below PQL. 3. 'EQ half PQL'values are assuming all contributing PAHs reported as <PQL are half the stipulated PQL. Hence a mid-point between the most and least conservative approaches above. Note, the Total +ve PAHs PQL is reflective of the lowest individual PQL and is therefore "Total +ve PAHs" is simply a sum of the positive individual PAHs.
Org-014	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS.
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater. Note, the Total +ve Xylene PQL is reflective of the lowest individual PQL and is therefore "Total +ve Xylenes" is simply a sum of the positive individual Xylenes.

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	[NT]
Date extracted	-			02/02/2018	1	02/02/2018	02/02/2018		02/02/2018	[NT]
Date analysed	-			02/02/2018	1	02/02/2018	02/02/2018		02/02/2018	[NT]
TRH C_6 - C_9	mg/kg	25	Org-016	<25	1	<25	<25	0	115	[NT]
TRH C_6 - C_{10}	mg/kg	25	Org-016	<25	1	<25	<25	0	115	[NT]
Benzene	mg/kg	0.2	Org-016	<0.2	1	<0.2	<0.2	0	91	[NT]
Toluene	mg/kg	0.5	Org-016	<0.5	1	<0.5	<0.5	0	112	[NT]
Ethylbenzene	mg/kg	1	Org-016	<1	1	<1	<1	0	122	[NT]
m+p-xylene	mg/kg	2	Org-016	<2	1	<2	<2	0	124	[NT]
o-Xylene	mg/kg	1	Org-016	<1	1	<1	<1	0	126	[NT]
naphthalene	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	105	1	86	94	9	116	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	[NT]
Date extracted	-			02/02/2018	1	02/02/2018	02/02/2018		02/02/2018	[NT]
Date analysed	-			03/02/2018	1	03/02/2018	03/02/2018		03/02/2018	[NT]
TRH C_{10} - C_{14}	mg/kg	50	Org-003	<50	1	<50	<50	0	111	[NT]
TRH C_{15} - C_{28}	mg/kg	100	Org-003	<100	1	<100	<100	0	104	[NT]
TRH C_{29} - C_{36}	mg/kg	100	Org-003	<100	1	<100	<100	0	108	[NT]
TRH >C_{10} -C_{16}	mg/kg	50	Org-003	<50	1	<50	<50	0	111	[NT]
TRH >C_{16} -C_{34}	mg/kg	100	Org-003	<100	1	<100	<100	0	104	[NT]
TRH >C_{34} -C_{40}	mg/kg	100	Org-003	<100	1	<100	<100	0	108	[NT]
Surrogate o-Terphenyl	%		Org-003	85	1	82	81	1	89	[NT]

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	[NT]
Date extracted	-			02/02/2018	1	02/02/2018	02/02/2018		02/02/2018	[NT]
Date analysed	-			02/02/2018	1	02/02/2018	02/02/2018		02/02/2018	[NT]
Naphthalene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	84	[NT]
Acenaphthylene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	104	[NT]
Phenanthrene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	90	[NT]
Anthracene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	84	[NT]
Pyrene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	104	[NT]
Benzo(a)anthracene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	90	[NT]
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-012	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012	<0.05	1	<0.05	<0.05	0	96	[NT]
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	100	1	99	99	0	122	[NT]

QUALITY CONTROL: Organochlorine Pesticides in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	[NT]
Date extracted	-			02/02/2018	1	02/02/2018	02/02/2018		02/02/2018	[NT]
Date analysed	-			02/02/2018	1	02/02/2018	02/02/2018		02/02/2018	[NT]
HCB	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
alpha-BHC	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	91	[NT]
gamma-BHC	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	105	[NT]
Heptachlor	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	103	[NT]
delta-BHC	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	108	[NT]
Heptachlor Epoxide	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	113	[NT]
gamma-Chlordane	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	106	[NT]
Dieldrin	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	114	[NT]
Endrin	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	103	[NT]
pp-DDD	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	109	[NT]
Endosulfan II	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Endrin Aldehyde	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	118	[NT]
Methoxychlor	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-005	102	1	96	99	3	123	[NT]

QUALITY CONTROL: PCBs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	[NT]
Date extracted	-			02/02/2018	1	02/02/2018	02/02/2018		02/02/2018	[NT]
Date analysed	-			02/02/2018	1	02/02/2018	02/02/2018		02/02/2018	[NT]
Aroclor 1016	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	100	[NT]
Aroclor 1260	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCLMX	%		Org-006	102	1	96	99	3	97	[NT]

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	[NT]
Date prepared	-			02/02/2018	1	02/02/2018	02/02/2018		02/02/2018	[NT]
Date analysed	-			02/02/2018	1	02/02/2018	02/02/2018		02/02/2018	[NT]
Arsenic	mg/kg	4	Metals-020	<4	1	<4	<4	0	105	[NT]
Cadmium	mg/kg	0.4	Metals-020	<0.4	1	<0.4	<0.4	0	93	[NT]
Chromium	mg/kg	1	Metals-020	<1	1	13	13	0	101	[NT]
Copper	mg/kg	1	Metals-020	<1	1	<1	<1	0	107	[NT]
Lead	mg/kg	1	Metals-020	<1	1	10	10	0	92	[NT]
Mercury	mg/kg	0.1	Metals-021	<0.1	1	<0.1	<0.1	0	106	[NT]
Nickel	mg/kg	1	Metals-020	<1	1	3	3	0	103	[NT]
Zinc	mg/kg	1	Metals-020	<1	1	8	7	13	98	[NT]

QUALITY CONTROL: Misc Soil - Inorg						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	[NT]
Date prepared	-			02/02/2018	1	02/02/2018	02/02/2018		02/02/2018	[NT]
Date analysed	-			02/02/2018	1	02/02/2018	02/02/2018		02/02/2018	[NT]
Total Phenolics (as Phenol)	mg/kg	5	Inorg-031	<5	1	<5	<5	0	102	[NT]

Result Definitions

NT	Not tested
NA	Test not required
INS	Insufficient sample for this test
PQL	Practical Quantitation Limit
<	Less than
>	Greater than
RPD	Relative Percent Difference
LCS	Laboratory Control Sample
NS	Not specified
NEPM	National Environmental Protection Measure
NR	Not Reported

Quality Control Definitions

Blank	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample)	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.

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

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

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

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

Report Comments

Asbestos: A portion of the supplied sample was sub-sampled for asbestos analysis according to Envirolab procedures.
We cannot guarantee that this sub-sample is indicative of the entire sample. Envirolab recommends supplying 40-50g of sample in its own container.
Note: Samples 184286-1 to 8 were sub-sampled from jars provided by the client.

CHAIN OF CUSTODY

Douglas Partners
Geotechnics | Environment | Groundwater

Client: Douglas Partners	**Project Number** 83326	**To:**	Envirolab Services
Contact Person: Jessica Paulsen	**Project Name:** Gosford RSL Club	**Contact Person:**	Aileen Hie
Project Mgr: Jessica Paulsen	**PO No.:** Nil	**Address:**	12 Ashley Street
	lab Quote No. : 2016-2017 List		Chatswood NSW 2068
Address: 5/3 Teanster Cl	**Date results required:** STANDARD	**Phone:**	02 9910 6200
Tuggerah NSW 2259		**Fax:**	02 9910 6201
	Note: Inform lab in advance if urgent turnaround is required - surcharges apply	**Email:**	ahie@envirolab.com.au
Phone: 4351 1422 **Mob:**	**Report format:** Esdat/PDF / Excel	**Laboratory Report No:**	
Email: jessica.paulsen@douglaspartners.com.au	**Comments:**	**Lab Comments:**	

Sample information						Tests Required										Comments
Lab Sample ID	Field Sample ID	Depth	Date sampled	Container Type	Type of sample	Asbestos ID	COMBO 3	PCB, Phenols & OCP	QA/QC - Metals & TRH						Combo	Provide as much information about the sample as you can
1	1	0.5	29/01/2018	G	S	1	1	1								
2	1	0.8	29/01/2018	G	S	1	1	1								
3	2	0.1	29/01/2018	G	S	1	1	1								
4	2	0.7	29/01/2018	G	S	1	1	1								
5	3	0.5	29/01/2018	G	S	1	1	1								
6	3	1.5	29/01/2018	G	S	1	1									
7	4	0.9	30/01/2018	G	S	1	1									
8	6	0.4	29/01/2018	G	S	1	1	1								
9	QA1	-	29/01/2018	G	S				1							

ENVIROLAB

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

~~Job No:~~ 184286
~~Date Received:~~ 1/2/2018
~~Time Received:~~ 10.30
~~Received by:~~ PR
~~Temp: Cool/Ambient~~ 14.2
~~Cooling: Ice/Icepack~~
~~Security: Intact/Broken/None~~

Relinquished by: Douglas Partners	Jessica Paulsen	**Sample Receipt**	
Courier (by whom)		**Received by (Company):** EVS	
Condition of Sample at dispatch Cool or Ambient (circle)	ice	**Print Name:** P. Kay	
Temperature (if Applicable):		**Date & Time:** 1/2/2018	10.30
Print Name:	Jessica Paulsen	**Signature:**	
Date & Time:	31/1/18		
Signature:			

Lab use only:
Samples Received: Cool or Ambient (circle one)
Temperature Received at: (if applicable)
Transported by: Hand delivered / courier

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

SAMPLE RECEIPT ADVICE

Client Details

Client	Douglas Partners Tuggerah
Attention	Jessica Paulsen

Sample Login Details

Your reference	83326, Gosford RSL Club
Envirolab Reference	184286
Date Sample Received	01/02/2018
Date Instructions Received	01/02/2018
Date Results Expected to be Reported	08/02/2018

Sample Condition

Samples received in appropriate condition for analysis	YES
No. of Samples Provided	9 Soil
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	14.2
Cooling Method	Ice Pack
Sampling Date Provided	YES

Comments

Nil

Please direct any queries to:

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

Analysis Underway, details on the following page:

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

Sample ID	vTRH(C6-C10)/BTEXN in Soil	svTRH (C10-C40) in Soil	PAHs in Soil	Organochlorine Pesticidesin soil	PCBsin Soil	Acid Extractable metalsin soil	Total Phenolics (as Phenol)	Asbestos ID - soils
1-0.5	✓	✓	✓	✓	✓	✓	✓	✓
1-0.8	✓	✓	✓	✓	✓	✓	✓	✓
2-0.1	✓	✓	✓	✓	✓	✓	✓	✓
2-0.7	✓	✓	✓	✓	✓	✓	✓	✓
3-0.5	✓	✓	✓	✓	✓	✓	✓	✓
3-1.5	✓	✓	✓			✓		✓
4-0.9	✓	✓	✓			✓		✓
6-0.4	✓	✓	✓	✓	✓	✓	✓	✓
QA1	✓	✓				✓		

The '✓' indicates the testing you have requested. **THIS IS NOT A REPORT OF THE RESULTS.**

Additional Info

Sample storage - Waters are routinely disposed of approximately 1 month and soils approximately 2 months from receipt.

Requests for longer term sample storage must be received in writing.

Appendix E

Data Quality Assessment

DATA QUALITY ASSESSMENT

Q1. Data Quality Objectives

The contamination assessment was prepared with reference to the seven step data quality objective (DQO) process which is provided in Appendix B, Schedule B2 of the *National Environment Protection (Assessment of Site Contamination) Measure* 1999 as amended 2013 (NEPC, 2013). The DQO process is outlined as follows:

- Stating the Problem;
- Identifying the Decision;
- Identifying Inputs to the Decision;
- Defining the Boundary of the Assessment;
- Developing a Decision Rule;
- Specifying Acceptable Limits on Decision Errors; and
- Optimising the Design for Obtaining Data.

The DQOs have been addressed within the report as shown in Table Q1.

Table Q1: Data Quality Objectives

Data Quality Objective	Report Section where Addressed
State the Problem	S1 Introduction
Identify the Decision	S1 Introduction (objective) S12 & S13 Discussion, Recommendations & Conclusions
Identify Inputs to the Decision	S1 Introduction S3 Site Information S2 Scope of Works S9 Assessment Criteria S10 & S11 Results of Investigation
Define the Boundary of the Assessment	S3 & S6 Site Identification and Description Site Drawing – Appendix A
Develop a Decision Rule	S9 Site Assessment Criteria
Specify Acceptable Limits on Decision Errors	S8 Fieldwork and Analysis S9 Site Assessment Criteria QA/QC Procedures and Results – Sections Q2, Q3
Optimise the Design for Obtaining Data	S2 Scope of Works S8.3 Sampling Locations and Rationale QA/QC Procedures and Results – Sections Q2, Q3

Q2. FIELD AND LABORATORY QUALITY CONTROL

The field and laboratory quality control (QC) procedures and results are summarised in Tables Q2 and Q3. Reference should be made to the fieldwork and analysis procedures in Section 8 and the laboratory results certificates in Appendix D for further details.

Table Q2: Field QC

Item	Frequency	Acceptance Criteria	Achievement
Intra-laboratory replicates	5% primary samples	RPD <30% inorganics), <50% (organics)	yes[1]

NOTES: 1 qualitative assessment of RPD results overall; refer Section Q2.1

Table Q3: Laboratory QC

Item	Frequency	Acceptance Criteria	Achievement
Analytical laboratories used		NATA accreditation	yes
Holding times		In accordance with NEPC (2013) which references various Australian and international standards	yes
Laboratory / Reagent Blanks	1 per lab batch	<PQL	yes
Laboratory duplicates	10% primary samples	Laboratory specific [1]	yes
Matrix Spikes	1 per lab batch	70-130% recovery (inorganics); 60-140% (organics); 10-140% (SVOC, speciated phenols)	yes
Surrogate Spikes	organics by GC	70-130% recovery (inorganics); 60-140% (organics); 10-140% (SVOC, speciated phenols)	yes
Control Samples	1 per lab batch	70-130% recovery (inorganics); 60-140% (organics); 10-140% (SVOC, speciated phenols)	yes

NOTES: 1 ELS: <5xPQL – any RPD; >5xPQL – 0-50%RPD

In summary, the QC data is considered to be of sufficient quality to be acceptable for the assessment.

Q2.1 Intra-Laboratory Replicates

One intra-laboratory replicate was analysed as an internal check of the reproducibility within the primary laboratory ELS and as a measure of consistency of sampling techniques. The comparative results of analysis between original and intra-laboratory replicate samples are summarised in Table Q4.

Note that, where both samples are below LOR/PQL the difference and RPD has been given as zero. Where one sample is reported below LOR/PQL, but a concentration is reported for the other, the LOR/PQL value has been used for calculation of the RPD for the less than LOR/PQL sample.

Table Q4: Relative Percentage Difference Results – Intra-laboratory Replicate

Lab	Sample ID	Date Sampled	Media	Units	Metals										PAH				TRH				BTEX			
					As	Cd	Cr	Cu	Pb	Hg	Ni	Zn	Fe	Mn	Total	BaP TEQ	BaP	Naphthalene	C6-C10	>C10-C16	>C16-C34	>C34-C40	Benzene	Toluene	Ethylbenzene	xylene
ELS	1/0.5	29/1/2018	filling	mg/kg	<4	<0.4	13	<1	10	<0.1	3	8	-	-	<0.05	<0.5	<0.05	<1	<25	<50	<100	<100	<0.2	<0.5	<1	<1
ELS	QA1	29/1/2018	filling	mg/kg	<4	<0.4	13	<1	11	<0.1	2	7	-	-	-	-	-	-	<25	<50	<100	<100	-	-	-	-
Difference				mg/kg	0	0	0	0	1	0	1	1	-	-	-	-	-	-	0	0	0	0	-	-	-	-
RPD				%	0	0	0	0	10	0	40	13	-	-	-	-	-	-	0	0	0	0	-	-	-	-

Notes: - not applicable, not tested

The calculated RPD values were within the acceptable range of +/-30% for inorganic analytes and +/-50% for organics with the exception of the Nickel values (40%). This is considered to be insignificant and attributable to differences between two small numbers and the heterogeneous nature of the filling.

Overall, the intra-laboratory replicate comparisons indicate that the sampling techniques were generally consistent and repeatable.

Q3. Data Quality Indicators

The reliability of field procedures and analytical results was assessed against the following data quality indicators (DQIs):

- Completeness – a measure of the amount of usable data from a data collection activity;
- Comparability – the confidence (qualitative) that data may be considered to be equivalent for each sampling and analytical event;
- Representativeness – the confidence (qualitative) of data representativeness of media present on-site;
- Precision – a measure of variability or reproducibility of data; and
- Accuracy – a measure of closeness of the data to the 'true' value.

The DQIs were assessed as outlined in the following Table Q5.

Table Q5: Data Quality Indicators

Data Quality Indicator	Method(s) of Achievement
Completeness	Planned systematic and selected target locations sampled; Preparation of field logs, sample location plan and chain of custody (COC) records; Laboratory sample receipt information received confirming receipt of samples intact and appropriateness of the chain of custody; Samples analysed for contaminants of potential concern (COPC) identified in the Conceptual Site Model (CSM); Completion of COC documentation; NATA endorsed laboratory certificates provided by the laboratory; Satisfactory frequency and results for field and laboratory QC samples as discussed in Section Q2.
Comparability	Using appropriate techniques for sample recovery, storage and transportation, which were the same for the duration of the project; Works undertaken by appropriately experienced and trained DP environmental scientist / engineer / geologist; Use of a NATA registered laboratory,

Data Quality Indicator	Method(s) of Achievement
	Satisfactory results for field and laboratory QC samples.
Representativeness	Target media sampled; Spatial and temporal distribution of sample locations; Sample numbers recovered and analysed are considered to be representative of the target media and complying with DQOs; Samples were extracted and analysed within holding times; Samples were analysed in accordance with the analysis request.
Precision	Acceptable RPD between the original sample and the replicate; Satisfactory results for all other field and laboratory QC samples.
Accuracy	Satisfactory results for all field and laboratory QC samples.

Based on the above, it is considered that the DQIs have been complied with. As such, it is concluded that the field and laboratory test data obtained are reliable and useable for this assessment.