Douglas Partners
Geotechnics / Environment / Groundwater

Integrated Practical Solutions

Report on
Preliminary Site Investigation (Contamination)

Proposed Residential Subdivision
18 Gosford Road, Wyee

Prepared for
June Waldon

Project 104136.00
November 2020

Document History

Document details

Project No.	104136.00	Document No.	R.001.Rev0
Document title	Report on Preliminary Site Investigation (Contamination) Proposed Residential Subdivision		
Site address	18 Gosford Road, Wyee		
Report prepared for	June Waldon		
File name	104136.00.R.001.Rev0		

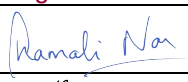
Document status and review

Status	Prepared by	Reviewed by	Date issued
Revision 0	Chamali Nagodavithane	Brent Kerry	23 November 2020

Distribution of copies

Status	Electronic	Paper	Issued to
Revision 0	1	0	Chris Oliver, Optima Developments Pty Ltd
Revision 0	1	0	June Waldon

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
Author		23 November 2020
Reviewer		23 November 2020

FS 604853

Douglas Partners Pty Ltd
ABN 75 053 980 117
www.douglaspartners.com.au
Unit 5, 3 Teamster Close
Tuggerah NSW 2259
Phone (02) 4351 1422

Douglas Partners
Geotechnics / Environment / Groundwater

Table of Contents

Page

Report on Preliminary Site Investigation (Contamination)
Proposed Residential Subdivision
18 Gosford Road, Wyee

1. Introduction

Douglas Partners Pty Ltd (DP) was engaged by Optima Developments Pty Ltd on behalf of June Waldon to undertake this preliminary site investigation for contamination (PSI) for a proposed residential subdivision at 18 Gosford Road, Wyee (the site as shown on Drawing 1, Appendix A). The investigation was undertaken with reference to DP's proposals CCT200282.P.001 dated 25 August 2020 and CCT200282.P.002 dated 9 October 2020.

The current investigation comprised a limited review of site history information, a walkover and preliminary intrusive sampling and testing for the proposed rezoning stage of the development. The objective of the PSI is to assess the potential for contamination at the site based on past and present land uses and to comment on the need for further investigation and/or management with regard to the proposed development. It is understood that the report will be used to support a development application for the proposed development. This report must be read in conjunction with all appendices including the notes provided in Appendix A.

The following key guidelines were consulted in the preparation of this report:

- NEPC *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [NEPM]* (NEPC, 2013); and
- NSW EPA *Guidelines for Consultants Reporting on Contaminated Land* (NSW EPA, 2020).

2. Proposed Development

Based on concept plans, the proposed subdivision is understood to comprise 42 residential lots with associated roads. It is understood that all existing site structures will be demolished. A copy of the proposed concept plans are included in Appendix A.

3. Scope of Works

DP carried out the following scope of works:

- Review of published geological, soil, topographic, hydrogeological and acid sulfate soil (ASS) risk maps;
- Review of key site history information including:
  - Available historical aerial photographs;
  - Recent aerial imagery obtained through Nearmap;
  - NSW EPA public registers for notices and licences issued under the Contaminated Land Management Act 1997 (CLM Act) and the Protection of the Environment Operations Act 1997 (PEOA Act); and
  - Readily accessible council records
- A site walkover to observe the current land uses and assess the potential for contaminating activities;
- Drilling of eight boreholes (Bore 1 to Bore 8) to depths of up to 3.2 m or prior refusal using a utility-mounted push tube rig;
- Collection of soil samples from regular depth intervals based on field observation;
- Screening of samples collected with a photo-ionisation detector (PID) to assess the likely presence or absence of volatile organic compounds;
- Laboratory analysis of selected soil samples for a range of commonly encountered contaminants and parameters including:
  - Metals (As, Cd, Cr, Cu, Pb, Hg, Ni, Zn);
  - Total recoverable hydrocarbons (TRH);
  - Benzene, toluene, ethylbenzene and xylene – (BTEX);
  - Polycyclic aromatic hydrocarbons (PAH);
  - Polychlorinated biphenyls (PCB);
  - Organochlorine pesticides (OCP);
  - Organophosphorus pesticides (OPP);
  - Asbestos (presence/absence); and
  - Cation exchange capacity (CEC) and pH for determination of ecological investigation levels;
- Field sampling and laboratory analysis with respect to standard environmental protocols, including a Quality Assurance / Quality Control (QA/QC) plan, appropriate Chain of Custody procedures and in-house laboratory QA/QC testing; and
- Preparation of this report detailing the findings of the investigation including recommendations for further works.

4. Site Information

The key site details are summarised in Table 1 below:

Table 1: Key site details

Site Detail	Description
Site Address	18 Gosford Road, Wyee
Legal Description	Lot 217, Deposited Plan 755242
Area	Approximately 3.1 hectares (ha)
Zoning	RU2 – Rural Landscape
Local Council Area	Lake Macquarie City Council
Current Use	Rural residential
Surrounding Uses	• North and east – Residential • South – Gosford Road and bushland beyond • West – Bushland and a rail line further west

5. Environmental Setting

5.1 Topography

The site lies at an elevation ranging from approximately 29 m to 41 m AHD, based on the survey plan (see Appendix A). Based on the site topography, the land slopes from the south east to the north west.

5.2 Site Geology

Reference to the *Gosford-Lake Macquarie 1:100 000 Geology Sheet* indicates that the site is underlain by the Tuggerah Formation of the Triassic period of the Mesozoic era, characterised by red, green and grey shale and quartz-lithic sandstone.

5.3 Soil Landscapes

Reference to the *Gosford-Lake Macquarie 1:100 000 Soil Landscape Sheet* indicates the site is underlain by the Gorokan (erosional) soil landscape, characterised by undulating low hills and rises on lithic sandstones of the Tuggerah Formation, with local relief < 30 m, slope gradients <15%, broad crests and ridges, long gently inclined slopes and broad drainage lines. The soils vary from soloths, yellow podzolic soils, grey-brown podzolic soils and gleyed podzolic soils, and typically have very high erosion hazard, localised foundation hazard, seasonal waterlogging, are strongly acid with low fertility.

5.4 Acid Sulfate Soils

Reference to ASS risk maps indicates the site and areas within 500 m of the site are not mapped within an area of ASS occurrence. Furthermore, given that the site lies at an elevation of approximately 29 m to 41 m AHD, and is underlain by an erosional soil landscape, assessment of ASS was not considered to be warranted.

5.5 Surface Water and Groundwater

A tributary of Spring Creek is mapped approximately 350 m south of the site, and Mannering Creek is mapped approximately 850 m north of the site. Based on the site topography, surface water and groundwater is anticipated to flow to the north west, and then to the north towards Mannering Creek.

A search of the publicly available registered groundwater bore database on 30 September 2020 indicated that there was one registered groundwater bore within approximately 500 m of the site. The bore, identified as GW064662 is located approximately 250 m east and is generally across gradient or upgradient of the site. Review of the records indicate that the bore is used for domestic purposes.

6. Site History

6.1 Historical Aerial Photography

Historical aerial photographs from 1954 to 2020 obtained from public databases and Nearmap were reviewed to identify possible former land uses and hence the potential for contaminating activities to have impacted the site. The aerial photographs and an approximate site boundary are presented in Appendix B. It is noted that data obtained from aerial photos was limited due to the relatively small scale and poor resolutions. A summary of the aerial photograph review is given in Table 2 below.

Table 2: Summary of Historical Aerial Photographs

Year	Site	Surrounding Land Use
1954	The aerial photograph is of a small scale and resolution. It appears that the majority of the site has been cleared and there appears to be a structure within the central portion of the site.	Gosford Road and the rail line can be seen south and west of the site, respectively. The surrounding land use appears to be predominantly bushland.
1965	The aerial photograph is of a higher resolution. The site comprises predominately cleared land with trees / shrubs along the perimeter of the site. A structure (likely rural residential house) with associated structures can be seen within the central portion of the site. An access path can be seen extending from Gosford Road to the residential house. There appears to be a minor ground disturbance (possible small farm dam) within the north western corner of the site and two minor ground disturbances (possible small farm dams), south west and south east of the house.	The surrounding land use is predominantly bushland, however it appears that a portion of the land north of the site has been cleared. West of the site, beyond the rail line, the land has been used for agricultural purposes.
1976	The structure noted in the 1965 aerial image appears to have been demolished, and there appears to be a ground disturbance / possible mounded area within the central portion of the site, in the general vicinity of the former structure.	The surrounding land use appears much the same as in 1965. It is noted that the land east of the site has been cleared.
1985	The site generally appears similar to 1976.	The land north and east of the site has been developed into residential land use.
1996	The existing residential house and associated structures have been constructed. The northern portion of the site appears to be used for farming / agricultural purposes, evident by the greenhouses present within this area. An access path can be seen from the greenhouses to the shed (near the residential house). A large farm dam exists within the western portion of the site. There appears to be a garden bed / possible vegetable patch west of the residential house. Evidence of exposed surface soils suggests that much of the northern and central portions of the site may have been subject to some regrading (e.g. minor cutting, filling or disturbance).	There has been a general increase in residential development to the north and east.

Year	Site	Surrounding Land Use
2001	The site appears much the same as in 1996, except that the ground disturbance / possible mounded area observed since 1976 is no longer visible. Trees / shrubs can be seen within this area.	The surrounding land use appears much the same as in 1996.
2010	The greenhouses are no longer present, and the access path can no longer be seen. The vegetable patch west of the residential house appears to have been cleared.	There has been an increase in residential land use to the north, east and west.
January 2018	The site appears much the same as in 2010.	The surrounding land use appears much the same as in 2010.
April 2018	The farm dam has been filled and there appears to be a stockpile of vegetable matter north of the filled dam. It is inferred that the stockpile originated from the clearing of trees / vegetation surrounding the former farm dam.	The surrounding land use appears much the same as in January 2018.

6.2 Public Registers and Planning Records

The EPA maintains a public database of contaminated sites under Section 58 of the CLM Act. The notices relate to investigation and / or remediation of site contamination considered to be significantly contaminated under the definition in the CLM Act.

A site will appear on the Contaminated Land: Record of Notices if the site has been issued a regulatory notice by the EPA. Sites appearing in the List of NSW Contaminated Sites Notified to the EPA indicate that the site is considered to be contaminated by the notifier and warrant reporting to the EPA. However, the contamination may or may not be significant enough to warrant regulation and is subject to further review by the EPA. The NSW EPA also issues environmental protection licenses under Section 308 of the POEO Act.

A summary of the EPA and Council records is presented in Table 3 below and the search results are included in Appendix B.

Table 3: Summary of EPA and Council Records

Site Detail	Description
EPA Record of Notices	No Notices relevant to the site or immediately adjacent properties; accessed 30 September 2020.
EPA Licences	No Licences relevant to the site or immediately adjacent properties; accessed 30 September 2020. It is noted a licence was previously issued for Flyash Australia Pty Ltd at the Wyee Transfer Station located along Gorokan Road, Wyee (immediately west of the rail line) for 'cement or lime handling', which had since been surrendered.
List of NSW Contaminated Sites	The site and immediately adjacent properties are not listed.
Council Records	The following building / development applications were found relating to the site: • DA-770/1992 – Rural Dwelling (approved in 1992); • ZBA – 182 / 1994 – Farm Machinery Shed (approved in 1994); • ZBA – 3339/1993 – Twelve Proposed Greenhouse Igloos (approved in 1993); • ZBA – 2899 / 1993 – In-ground Concrete Pool (approved in 1993); and • ZBA – 3585 / 1992 – Proposed Brick Veneer / Hardiplank & Tile Residence (approved in 1992).

6.3 Site History Integrity Assessment

The information used to establish the history of the site was obtained from reliable sources including the EPA and government / local government websites. It should be noted that the aerial photographs are only available for certain years / intervals, therefore some data gaps exist in the information from this source. Furthermore, the observed site features are open to different interpretations and can be affected by the time of day and/or year at which they were taken, as well as specific events, such as flooding. Care has been taken to consider different possible interpretations of aerial photographs and to consider them in conjunction with other lines of evidence.

6.4 Summary of Site History

The site history information suggests that the site has been rural residential land use since at least 1965 (likely prior to 1954). It appears that the original structure within the central portion of the site was demolished. Based on the council records and aerial photographs, it is inferred that the existing residential house was likely constructed sometime between 1992 to 1996, and the site was likely used for agricultural land use sometime between 1993 to 2010. The surrounding land uses comprised bushland / cleared land up until at least 1976, and from 1985 to present, there was an increase in residential land uses.

The search of the EPA and Council records did not identify any significant findings relating to contamination of the site.

7. Site Walkover

A site walkover was undertaken by an environmental scientist from DP on 28 September 2020. At the time of the walkover, there was a two-storey residential house with associated structures within the southern portion of the site, surrounded by extensive grassed lawn areas (Photograph 1) with some minor areas of exposed ground surface. It should be noted that the walkover was limited to the garden areas and did not include an inspection of the residential house.

The southern portion of the residential house, fronting Gosford Road comprised garden beds / landscaped areas with mature trees and shrubs and a driveway leading to the house. The northwest portion of the residential house was enclosed with a brick retaining wall (Photograph 2). The area surrounding the retaining wall was mounded. There was a large shed immediately north of the residential house, and a septic tank was observed just south of the shed (Photograph 3). Stacked bricks had been placed on the ground surface, north-west of the residential house (Photograph 4). A possible vegetable patch with a metal enclosure was located just west of the shed (Photograph 5).

The eastern and western boundary was generally tree-lined with a mix of trees, shrubs, flowering plants and tall grasses (Photograph 6). Clusters of trees were observed within the central portion of the site (Photograph 7). The vegetation appeared to generally be in good health. Given the dense grass / vegetation cover within these areas, observations of the soil surface was not possible. The northern extent of the site was bound by a colorbond fence. The vegetation along the fence line appeared to have been subject to herbicide application, evident by the dead grass (Photograph 8).

The area of the former dam was generally grass covered with some areas of exposed sandy clay fill. (Photograph 9). West of the dam, there was a large area of silty sand and sandstone at the surface (Photograph10). There was a large stockpile of tree branches, twigs and leaf matter immediately north of this area (Photograph 11). A water tank was observed north east of the dam area. The area surrounding the tank appeared filled / raised (Photograph 12).

No fragments of asbestos containing material (ACM) were observed on the ground surface during the walkover. However, it should be noted that the majority of the site was grass covered, therefore preventing adequate visual inspection of the soil surface in most areas. The general site topography was consistent with that described in Section 5.1, with the land generally sloping toward the north west (Photograph 13). The site layout appears to have remained much the same since the 2018 aerial photograph.

8. 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 or the future i.e.: it enables an assessment of the potential source – pathway – receptor linkages (complete pathways).

Potential Sources

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

- S1: Fill: Associated with site regrading, construction/demolition of former buildings, filling of the former dam(s).
  - COPC include metals, total recoverable hydrocarbons (TRH), benzene, toluene, ethylbenzene, xylene (BTEX), polycyclic aromatic hydrocarbons (PAH), polychlorinated biphenyls (PCB), organochlorine pesticides (OCP), organophosphate pesticides (OPP), and asbestos.
- S2: Agricultural land use (greenhouses).
  - COPC include primarily OCP, OPP, and metals, and also TRH, BTEX, PAH from potential fuel leaks associated with machinery sheds.
- S3: Hazardous building materials in existing structures.
  - COPC include asbestos, synthetic mineral fibres (SMF), lead (in paint) and PCB.

Based on the surrounding residential land use, the risk of contamination from off-site sources to the site is considered to be relatively low.

Potential Receptors

The following potential human receptors have been identified:

- R1: Current users [residential land use];
- R2: Construction and maintenance workers;
- R3: End users [residential land use]; and
- R4: Adjacent site users [residential land use].

The following potential environmental receptors have been identified:

- R5: Surface water [Mannering Creek];
- R6: Groundwater; and
- R7: Terrestrial ecology.

Potential Pathways

The following potential pathways have been identified:

- P1: Ingestion and dermal contact;
- P2: Inhalation of dust and/or vapours;
- P3: Surface water run-off;
- P4: Lateral migration of groundwater providing base flow to water bodies;
- P5: Leaching of contaminants and vertical migration into groundwater; and
- P6: Contact with terrestrial ecology.

Summary of Potentially Complete Exposure Pathways

A 'source–pathway–receptor' approach has been used to assess the potential risks of harm being caused to human or environmental receptors from contamination sources on or in the vicinity of the site, via exposure pathways (potential complete pathways). The possible pathways between the above sources (S1 to S3) and receptors (R1 to R7) are provided in below Table 4.

Table 4: Summary of Potentially Complete Exposure Pathways

Source and COPC	Transport Pathway	Receptor	Risk Management Action Recommended
S1: Fill - metals, TRH, BTEX, PAH, PCB, OCP, OPP and asbestos S2: Agricultural land-use - OCP, OPP, metals, TRH, BTEX, PAH	P1 – Ingestion and dermal contact.	R1 – Current Users R2 – Construction and maintenance workers. R3 – End users	An intrusive investigation of site soils and associated contamination sampling (with respect to the sampling density as per NSW EPA, 1995) is recommended to assess possible contamination issues.
	P2 – Inhalation of fibres/ dust and/or vapours.	R1 – Current Users R2 – Construction and maintenance workers. R3 – End users R4 – Adjacent site users	
	P3 – Surface water run-off. P4 – Lateral migration of groundwater.	R5 – Surface water	
	P5 – Leaching of contaminants and vertical migration into groundwater.	R6 – Groundwater.	
	P6 – Contact with terrestrial ecology.	R7 – Terrestrial ecology.	
S3: Hazardous building materials in existing structures	P1 – Ingestion and dermal contact.	R1 – Current Users R2 – Construction and maintenance workers. R3 – End users	A hazardous materials survey should be conducted prior to demolition Areas beneath the buildings should be assessed post-demolition.
	P2 – Inhalation of fibres/ dust and/or vapours.	R1 – Current Users R2 – Construction and maintenance workers. R3 – End users R4 – Adjacent site users	

9. Sampling and Analysis Quality Plan

9.1 Data Quality Objectives

The PSI was devised with reference to the seven-step data quality objective process which is provided in Appendix B Schedule B2, NEPC (2013). The DQO process is outlined in Appendix I.

9.2 Soil Sampling Rationale

The NSW EPA Sampling Design Guidelines (1995) recommends 40 sampling locations for a 3-ha site. However, given the proposed development is in the rezoning stage, a preliminary investigation with a significantly reduced sampling density targeting PAEC was considered to be appropriate. A summary of the sampling locations is presented in Table 5 below. Borehole locations are shown on Drawing 1, in Appendix A.

Table 5: Summary of Targeted Sampling Locations

Borehole ID	Location Target	Identified From
Bore 1 to Bore 4	Former agricultural land use (greenhouses)	1996 Aerial Photograph
Bore 5 and Bore 6	Former dam	1996 to 2018 Aerial Photographs
Bore 7	Former structure / area of potential fill	1976 to 1996 Aerial Photographs
Bore 8	Mounded area surrounding residential structure	Walkover

Soil samples were collected from each borehole at depths of approximately 0.1 m, 0.5 m, 1.0 m and every 0.5 m thereafter, and changes in lithology or signs of contamination. The general sampling methods are described in the field work methodology, included in Appendix G.

9.3 Analytical Rationale

Based on the site observations and the location of soil samples within the subsoil strata, selected samples were analysed for the primary contaminants of concern as identified in Section 8. The analytical scheme was designed to obtain an indication of the potential presence and possible distribution of identified COPC, as outlined below:

- At locations targeting the former agricultural land use (i.e. Bore 1 to Bore 4), the surface sample was analysed for metals, TRH, BTEX, PAH, OCP and OPP;
- At locations targeting the former dam (i.e. Bore 5 and Bore 6), fill from depths of 0.1 to 0.5 m were analysed for metals, TRH, BTEX, PAH, OCP, OPP, PCB and asbestos;
- At location Bore 7, the natural sample from depths of 0.4 to 0.5 m was analysed for metals, TRH, BTEX, PAH;

- At the location targeting the mounded area (i.e. Bore 8), fill from depths of 0.5 – 0.6 m (corresponding to the depth of observed anthropogenic inclusions – see Section 11 below) was analysed for metals, TRH, BTEX, PAH, OCP, OPP, PCB and asbestos. The underlying natural sample was analysed for metals, TRH, BTEX, PAH;
- Two samples, from depths ranging from 0.1 to 1.0 m were analysed for pH and CEC for derivation of the EILs.

10. Site Assessment Criteria

The Site Assessment Criteria (SAC) applied in the current investigation is informed by the CSM, which identified human and ecological receptors to potential contamination on the site, as well as consideration of the proposed development (i.e. residential subdivision). The laboratory analytical results have been assessed against the investigation and screening levels in Schedule B1 of NEPC (2013).

A summary of the adopted SAC is given below. Reference should be made to Appendix F for further details.

- Health investigation level (HIL) - HIL A;
- Health Screening Level (HSL) - HSL A & B;
- Management Limit – Residential, parkland and public open space;
- Ecological Investigation Level (EIL) / Screening Level (ESL) - Urban Residential and Public Open Space; and
- Asbestos in soil – presence / absence at a limit of reporting of 0.1 g/kg was adopted as an initial screen.

11. Field Work Observations

Details of the subsurface conditions encountered are given in the borehole logs in Appendix E, together with notes defining classification methods and descriptive terms. A summary of the ground profile encountered is given below:

FILL: Encountered in Bores 1, 5, 6 and 8 and typically comprised sand / sandy clay. Shallow fill to depths of 0.2 m was encountered in Bore 1. Clayey sand fill, with trace concrete and brick at depths of 0.6 m was encountered in Bore 8, positioned within the mounded area surrounding the house. Deeper fill to depths of up to 2.9 m was encountered in Bore 5 and Bore 6, drilled within the former dam.

SAND: Grey-brown or brown silty sand was encountered in Bore 1 to Bore 4 and Bore 7 to depths of up to 0.5 m; underlain by brown and yellow brown gravelly sand in Bore 1 and Bore 2;

Sandy CLAY/ CLAY (residual): Typically yellow brown and red-brown sandy clay was encountered in Bore 2, Bore 3, Bore 4, Bore 7 and Bore 8 to borehole termination at depths of approximately 1.1 m. Grey or red-brown clay was encountered in Bore 5 and Bore 6 underlying fill to borehole termination. Bore 6 refused on weathered sandstone at depths of approximately 2.5 m.

No free groundwater was observed during drilling. It should be noted that groundwater levels are variable and can be affected by factors such as soil permeability and recent weather conditions.

The PID readings were all < 1ppm indicating a low potential for gross contamination from volatile contaminants to be present in the soil. There were no obvious indicators of contamination (such as staining or odours) within the bores, with the exception of the trace anthropogenic inclusions noted in Bore 8.

12. Laboratory Analytical Results

The analytical results for the soil samples are summarised in Tables D1 to D2, Appendix D together with the adopted SAC. Laboratory certificates of analysis are provided in Appendix J. A summary of the results is provided below:

- The recorded concentrations of TRH, BTEX, PAH, OCP, OPP and PCB were below the PQL and the SAC in all soil samples;
- The recorded concentrations of metals were below the SAC in all soil samples; and
- No asbestos was detected in the soil samples analysed for asbestos at the reporting limit of 0.1 g/kg.

13. Discussion

The current site investigation comprised a limited review of site history information, a walkover and preliminary soil sampling targeting PAEC. Based on review of the historical aerials dating back to the 1950s, there was previously a structure located within the central portion of the site, which was later demolished. The existing residential house was constructed sometime between 1992 to 1996. Considering the age of the former / existing structures, it is considered possible that hazardous building materials (HBM), including ACM were used in the construction materials. The demolition / deterioration of the structures over time may have impacted the surrounding soil.

Review of the aerials also indicates that there was at least one dam within the site (and possibly two other smaller dams), which was later filled. The north west portion of the site was used for agricultural land use from at least 1996 to 2001 (possibly from 1993 to 2010).

The search of the EPA and Council records did not identify any significant findings relating to contamination of the site. Based on the surrounding residential land use, the risk of contamination from off-site sources to the site is considered to be relatively low.

The current investigation included preliminary intrusive works, targeting PAEC. Fill was encountered in four of the boreholes, and typically comprised sand / sandy clay fill. Trace concrete and brick was observed in one of the bores (Bore 8 at depths of 0.6 m), positioned within the mounded area surrounding the house. Deeper fill to depths of up to 2.9 m was encountered in Bore 5 and Bore 6, drilled within the former dam. The soil laboratory results indicated that concentrations of all contaminants were below the adopted SAC.

14. Conclusions and Recommendations

Based on the results of the PSI it is considered that the site is generally suitable for the proposed residential development subject to the following recommendations:

- **Existing Structures:** A pre-demolition hazardous building material survey in accordance with SafeWork NSW requirements is recommended to be conducted by an appropriately qualified occupation hygienist prior to the demolition of the existing structures. All demolition work should be undertaken by a licenced demolition contractor and a clearance certificate provided by an occupational hygienist for the ground surface post demolition;
- **Confirmatory Investigations:** Given the preliminary nature of the current PSI (completed for rezoning purposes), it is recommended that confirmatory investigation be completed as part of the subdivision development approval process. These investigations should aim to confirm the site's suitability for the proposed residential development from a site contamination standpoint; and
- **Unexpected Finds Protocol:** Development of an unexpected finds protocol (UFP) to establish a strategy / management procedure to be followed during construction works, should unexpected finds of contamination be uncovered.

15. References

NEPC. (2013). *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [NEPM].* Australian Government Publishing Services Canberra: National Environment Protection Council.

NSW EPA. (1995). *Contaminated Sites, Sampling Design Guidelines.* NSW Environment Protection Authority.

NSW EPA. (2020). *Guidelines for Consultants Reporting on Contaminated Land.* Contaminated Land Guidelines: NSW Environment Protection Authority.

16. Limitations

Douglas Partners (DP) has prepared this report for this project at 18 Gosford Road, Wyee in accordance with DP's proposals CCT200282.P.001 dated 25 August 2020 and CCT200282.P.002 dated 9 October 2020 and acceptance received from June Waldon dated 26 August 2020 and 11 October 2020. The work was carried out under DP's Conditions of Engagement. This report is provided for the exclusive use of Optima Development Pty Ltd and June Waldon 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.

The assessment of atypical safety hazards arising from this advice is restricted to the environmental components set out in this report and based on known project conditions and stated design advice and assumptions. While some recommendations for safe controls may be provided, detailed 'safety in design' assessment is outside the current scope of this report and requires additional project data and assessment.

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 concrete and brick, were, however, located in previous below-ground filling and these are considered as 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), or to parts of the site being inaccessible and not available for inspection/sampling, or to vegetation preventing visual inspection and reasonable access. 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.

Douglas Partners Pty Ltd

Appendix A

About This Report

Drawing 1

Client-Supplied Plans

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.

Drawing adapted from Nearmap, dated 5 September 2020

Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT: June Waldon		
OFFICE: Central Coast	DRAWN BY: CLN	
SCALE: As shown	DATE: 15.10.2020	

TITLE: **Site and Borehole Location Plan**
Preliminary Site Investigation (Contamination)
18 Gosford Road, Wyee

N

PROJECT No:	104136.00
DRAWING No:	1
REVISION:	0

MGA

APPROXIMATE POSITION OF RAIL LINE
GREAT NORTHERN RAIL

SYDNEY - NEWCASTLE
<- WYEE STATION

MURRAWAL ROAD
(UNFORMED)

MURRAWAL ROAD

PROPOSED ROAD 1
(16 WIDE)

PROPOSED ROAD 1
(16 WIDE)

PROPOSED ROAD 1
(16 WIDE)

OSD

LOT 155
DP 8005

LOT 156
DP 8005

GOSFORD ROAD

JABBARUP ROAD

MINIMUM APZ (BAL 29) BY TRAVERS

SITE PLAN - PROPOSED SUBDIVISION

REV	REVISION DETAILS	DATE

AUTHORISED OFFICER

THIS PLAN TO BE READ IN CONJUNCTION WITH INTRAX REPORT WITH REFERENCE: S#149418

149418_SUR_PROSUB_18 GOSFORD RD, WYEE

0 6 12 24 36 48 60

REDUCTION RATIO 1:600 @ A1 & 1:1200 @ A3

CLIENT:	J. WALDON		
REF:	S# 149418	SURVEY FILE:	149418_JC_200907_DE
SURVEYED BY:	J. CLEASBY	DATE OF SURVEY:	07.09.20
DRAWN BY:	S BRYANT	CHECKED BY:	D ARMSTRONG

LOT No.	217
SECTION	-
PLAN No.	DP 755242
SUBURB	WYEE
LGA	LAKE MACQUARIE
PARISH	MORISSET
COUNTY	NORTHUMBERLAND

CONTOUR INTERVAL: 0.5m

DATUM: AHD
AUSTRALIAN HEIGHT DATUM

ORIGIN OF LEVELS: PM 23846

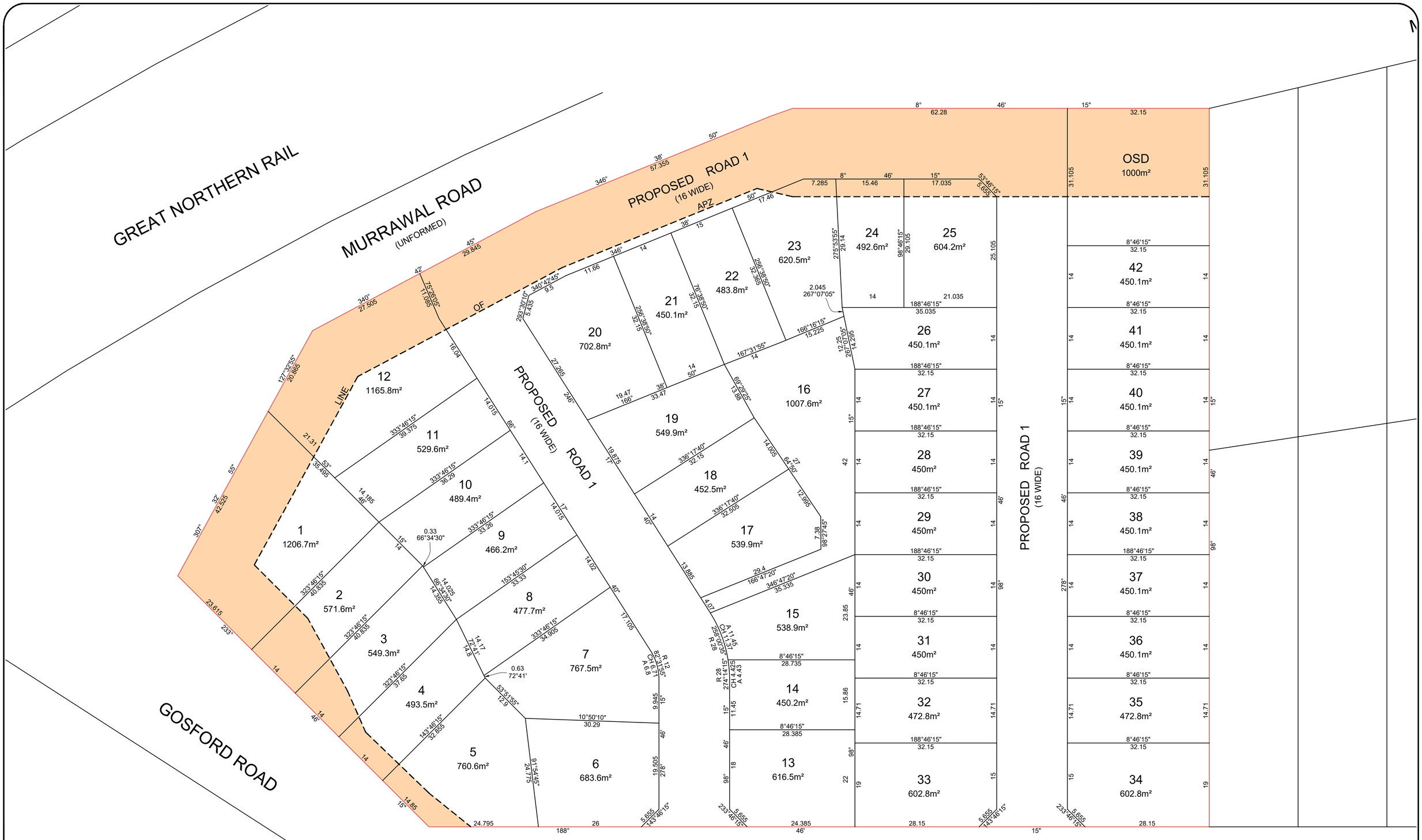
R.L.: 37.717

Intrax

www.intrax.com.au
Intrax Consulting Group
VIC | NSW | SA | QLD

PLAN SHOWING PROPOSED
SUBDIVISION OF
LOT 217 IN DP 755242
"No.18" GOSFORD ROAD
WYEE

SHEET No.	1
No. of SHEETS:	4
REFERENCE No:	S# 149418
REV:	-



MINIMUM APZ (BAL 29) BY TRAVERS

PROPOSED SUBDIVISION

REV	REVISION DETAILS	DATE

AUTHORISED OFFICER

THIS PLAN TO BE READ IN CONJUNCTION WITH INTRAX REPORT WITH REFERENCE: S#149418

149418_SUR_PROSUB_18 GOSFORD RD, WYEE

0 4 8 16 24 32 40

REDUCTION RATIO 1:400 @ A1 & 1:800 @ A3

CLIENT:	J. WALDON		
REF:	S# 149418	SURVEY FILE:	149418_JC_200907_DE
SURVEYED BY:	J. CLEASBY	DATE OF SURVEY:	07.09.20
DRAWN BY:	S BRYANT	CHECKED BY:	D ARMSTRONG

LOT No.	217
SECTION	-
PLAN No.	DP 755242
SUBURB	WYEE
LGA	LAKE MACQUARIE
PARISH	MORISSET
COUNTY	NORTHUMBERLAND

CONTOUR INTERVAL:	0.5m
DATUM:	AHD AUSTRALIAN HEIGHT DATUM
ORIGIN OF LEVELS:	PM 23846
R.L.:	37.717

Intrax
www.intrax.com.au
Intrax Consulting Group
VIC | NSW | SA | QLD

PLAN SHOWING PROPOSED SUBDIVISION OF LOT 217 IN DP 755242 "No.18" GOSFORD ROAD WYEE

SHEET No.	2
No. of SHEETS:	4
REFERENCE No:	S# 149418
REV:	-

MGA

APPROXIMATE POSITION OF RAIL LINE
GREAT NORTHERN RAIL
SYDNEY - NEWCASTLE
<- WYEE STATION

MURRAWAL ROAD

MURRAWAL ROAD
(UNFORMED)

PROPOSED ROAD 1
(16 WIDE)

PROPOSED ROAD 1
(16 WIDE)

PROPOSED ROAD 1
(16 WIDE)

GOSFORD ROAD

JABBARUP ROAD

188°46'15"
94.43

166°38'50"
57.355

160°42'45"
57.355

307°32'55"
63.39

233°46'15"
80.465

278°46'15"
162.815

8°46'15"
176.795

OSD

HEADWALL

LOT 155
DP 8005

LOT 156
DP 8005

MINIMUM APZ (BAL 29) BY TRAVERS

CAUTION: ONLY CLEARLY VISIBLE SERVICES OR UTILITY STRUCTURES, ON OR ABOVE GROUND LEVEL, HAVE BEEN SURVEYED. **THE LOCATION OF ALL SERVICES OR UTILITY LINES/STRUCTURES SHOWN IN THIS DIAGRAM ARE APPROXIMATE ONLY.** YOU ARE ADVISED TO SEEK INFORMATION FROM THE RELEVANT SERVICE OR UTILITY AUTHORITY FOR ALL DETAILS OF DEPTH AND/OR LOCATION OF SERVICE OR UTILITY LINES/ STRUCTURES WHICH SUPPLY THE SUBJECT PROPERTY.

www.dialbeforeyoudig.com.au
DIAL 1100 BEFORE YOU DIG

THE SURVEY INFORMATION SHOWN IS FOR THE SPECIFIC PURPOSE AS INSTRUCTED BY THE CLIENT ONLY. IT SHOULD NOT BE USED FOR ANY OTHER PURPOSE WITHOUT PERMISSION OF INTRAX.

SITE PLAN - PROPOSED WORKS

REV	REVISION DETAILS	DATE

AUTHORISED OFFICER
THIS PLAN TO BE READ IN CONJUNCTION WITH INTRAX REPORT WITH REFERENCE: S#149418

149418_SUR_PROSUB_18 GOSFORD RD, WYEE

0 6 12 24 36 48 60
REDUCTION RATIO 1:600 @ A1 & 1:1200 @ A3

CLIENT:	J. WALDON		
REF:	S# 149418	SURVEY FILE:	149418_JC_200907_DE
SURVEYED BY:	J. CLEASBY	DATE OF SURVEY:	07.09.20
DRAWN BY:	S BRYANT	CHECKED BY:	D ARMSTRONG

LOT No.	217
SECTION	-
PLAN No.	DP 755242
SUBURB	WYEE
LGA	LAKE MACQUARIE
PARISH	MORISSET
COUNTY	NORTHUMBERLAND

CONTOUR INTERVAL: 0.5m
DATUM: AHD
AUSTRALIAN HEIGHT DATUM
ORIGIN OF LEVELS: PM 23846
R.L.: 37.717

Intrax
www.intrax.com.au
Intrax Consulting Group
VIC | NSW | SA | QLD

PLAN SHOWING PROPOSED SUBDIVISION OF LOT 217 IN DP 755242 "No.18" GOSFORD ROAD WYEE

SHEET No.	3
No. of SHEETS:	4
REFERENCE No:	S# 149418
REV:	-

GREAT NORTHERN RAIL

RAIL TRACKS

MURRAWAL ROAD (UNFORMED)

GOSFORD ROAD

BITUMEN

PROPOSED ROAD 1 (16 WIDE)

APZ

OF

LINE

DENSE VEGETATION
AREA NOT SURVEYED

OSD

No.13
SINGLE STOREY
BRICK DWELLING
TILE ROOF

No.17
SINGLE STOREY
BRICK DWELLING
TILE ROOF

TWO STOREY
BRICK DWELLING
TILE ROOF

METAL SHED

POOL

TANK

SEPT TANK

BRICK

METAL

FENCE

POST

& WIRE

MESHWIRE

MANPROOF

OHP

GRAVEL TRACK

BACK OF ROLL KERB

PROPOSED WORKS

MINIMUM APZ (BAL 29) BY TRAVERS

CAUTION: ONLY CLEARLY VISIBLE SERVICES OR UTILITY STRUCTURES, ON OR ABOVE GROUND LEVEL, HAVE BEEN SURVEYED. **THE LOCATION OF ALL SERVICES OR UTILITY LINES/STRUCTURES SHOWN IN THIS DIAGRAM ARE APPROXIMATE ONLY.** YOU ARE ADVISED TO SEEK INFORMATION FROM THE RELEVANT SERVICE OR UTILITY AUTHORITY FOR ALL DETAILS OF DEPTH AND/OR LOCATION OF SERVICE OR UTILITY LINES/ STRUCTURES WHICH SUPPLY THE SUBJECT PROPERTY.

www.dialbeforeyoudig.com.au
DIAL 1100 BEFORE YOU DIG

THE SURVEY INFORMATION SHOWN IS FOR THE SPECIFIC PURPOSE AS INSTRUCTED BY THE CLIENT ONLY. IT SHOULD NOT BE USED FOR ANY OTHER PURPOSE WITHOUT PERMISSION OF INTRAX.

REV	REVISION DETAILS	DATE

AUTHORISED OFFICER
THIS PLAN TO BE READ IN CONJUNCTION WITH INTRAX REPORT WITH REFERENCE: S#149418

149418_SUR_PROSUB_18 GOSFORD RD, WYEE

0 4 8 16 24 32 40

REDUCTION RATIO 1:400 @ A1 & 1:800 @ A3

CLIENT:	J. WALDON		
REF:	S# 149418	SURVEY FILE:	149418_JC_200907_DE
SURVEYED BY:	J. CLEASBY	DATE OF SURVEY:	07.09.20
DRAWN BY:	S BRYANT	CHECKED BY:	D ARMSTRONG

LOT No.	217
SECTION	-
PLAN No.	DP 755242
SUBURB	WYEE
LGA	LAKE MACQUARIE
PARISH	MORISSET
COUNTY	NORTHUMBERLAND

CONTOUR INTERVAL: 0.5m
DATUM: AHD
AUSTRALIAN HEIGHT DATUM
ORIGIN OF LEVELS: PM 23846
R.L.: 37.717

Intrax
www.intrax.com.au
Intrax Consulting Group
VIC | NSW | SA | QLD

PLAN SHOWING PROPOSED SUBDIVISION OF LOT 217 IN DP 755242 "No.18" GOSFORD ROAD WYEE

SHEET No.	4
No. of SHEETS:	4
REFERENCE No:	S# 149418
REV:	-

Appendix B

Historical Aerial Photographs

EPA Searches

Council Records

Photo 1 - 1954

Photo 2 - 1965

Douglas Partners Geotechnics / Environment / Groundwater	**Historical Aerial Photographs**	PROJECT: 104136.00
	Preliminary Site Investigation	PLATE No: 1
	18 Gosford Road, Wyee	REV: 0
	CLIENT: June Waldon	DATE: 1-Oct-20

Photo 3 - 1976

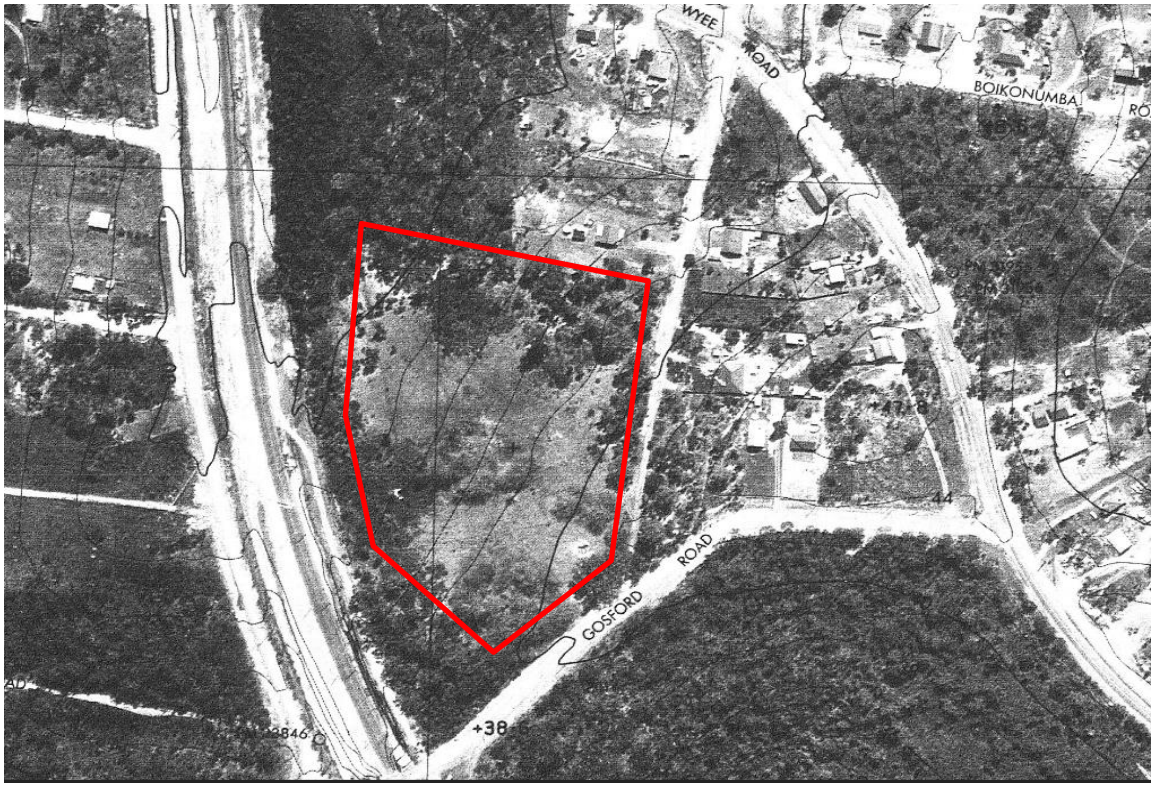


Photo 4 - 1985

Douglas Partners Geotechnics / Environment / Groundwater	**Historical Aerial Photographs**	PROJECT: 104136.00
	Preliminary Site Investigation	PLATE No: 2
	18 Gosford Road, Wyee	REV: 0
	CLIENT: June Waldon	DATE: 1-Oct-20

Photo 5 - 1996

Photo 6 - 2001

Douglas Partners Geotechnics / Environment / Groundwater	**Historical Aerial Photographs**	PROJECT: 104136.00
	Preliminary Site Investigation	PLATE No: 3
	18 Gosford Road, Wyee	REV: 0
	CLIENT: June Waldon	DATE: 1-Oct-20

Photo 7 - 2010

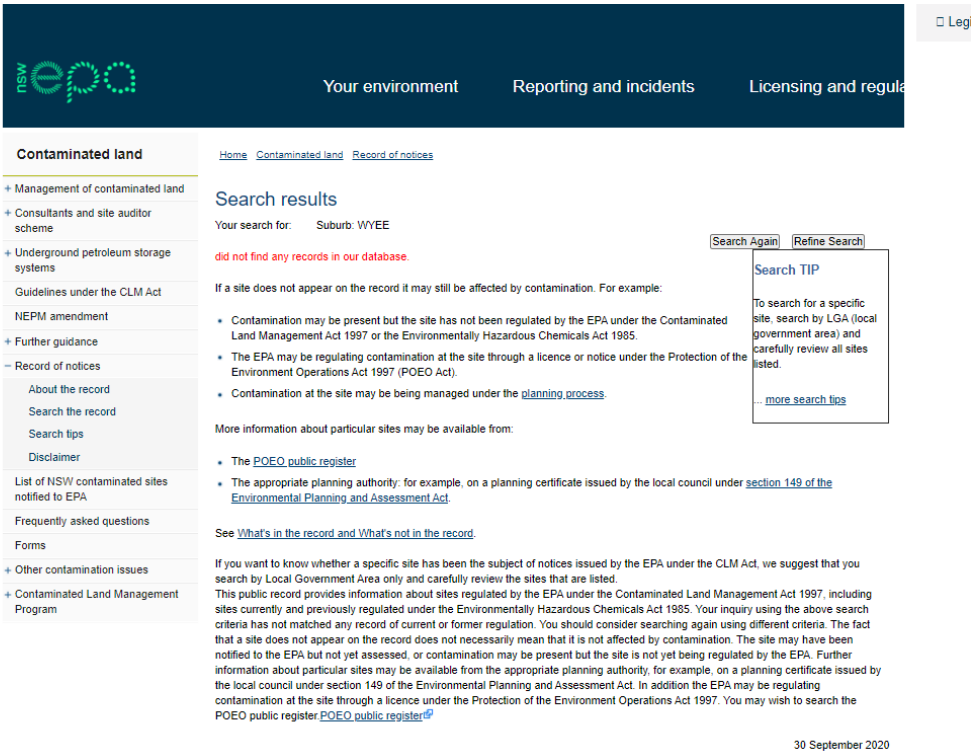
Photo 8 - January 2018

Douglas Partners Geotechnics / Environment / Groundwater	**Historical Aerial Photographs**	PROJECT: 104136.00
	Preliminary Site Investigation	PLATE No: 4
	18 Gosford Road, Wyee	REV: 0
	CLIENT: June Waldon	DATE: 1-Oct-20

Photo 9 - April 2018

Douglas Partners Geotechnics / Environment / Groundwater	**Historical Aerial Photographs**	PROJECT: 104136.00
	Preliminary Site Investigation	PLATE No: 5
	18 Gosford Road, Wyee	REV: 0
	CLIENT: June Waldon	DATE: 1-Oct-20

EPA Record of Notices



Your environment | Reporting and incidents | Licensing and regula

Contaminated land

- + Management of contaminated land
- + Consultants and site auditor scheme
- + Underground petroleum storage systems
- Guidelines under the CLM Act
- NEPM amendment
- + Further guidance
- − Record of notices
  - About the record
  - Search the record
  - Search tips
  - Disclaimer
- List of NSW contaminated sites notified to EPA
- Frequently asked questions
- Forms
- + Other contamination issues
- + Contaminated Land Management Program

Home Contaminated land Record of notices

Search results

Your search for: Suburb: WYEE

Search Again | Refine Search

did not find any records in our database.

If a site does not appear on the record it may still be affected by contamination. For example:

- Contamination may be present but the site has not been regulated by the EPA under the Contaminated Land Management Act 1997 or the Environmentally Hazardous Chemicals Act 1985.
- The EPA may be regulating contamination at the site through a licence or notice under the Protection of the Environment Operations Act 1997 (POEO Act).
- Contamination at the site may be being managed under the planning process.

Search TIP

To search for a specific site, search by LGA (local government area) and carefully review all sites listed.

... more search tips

More information about particular sites may be available from:

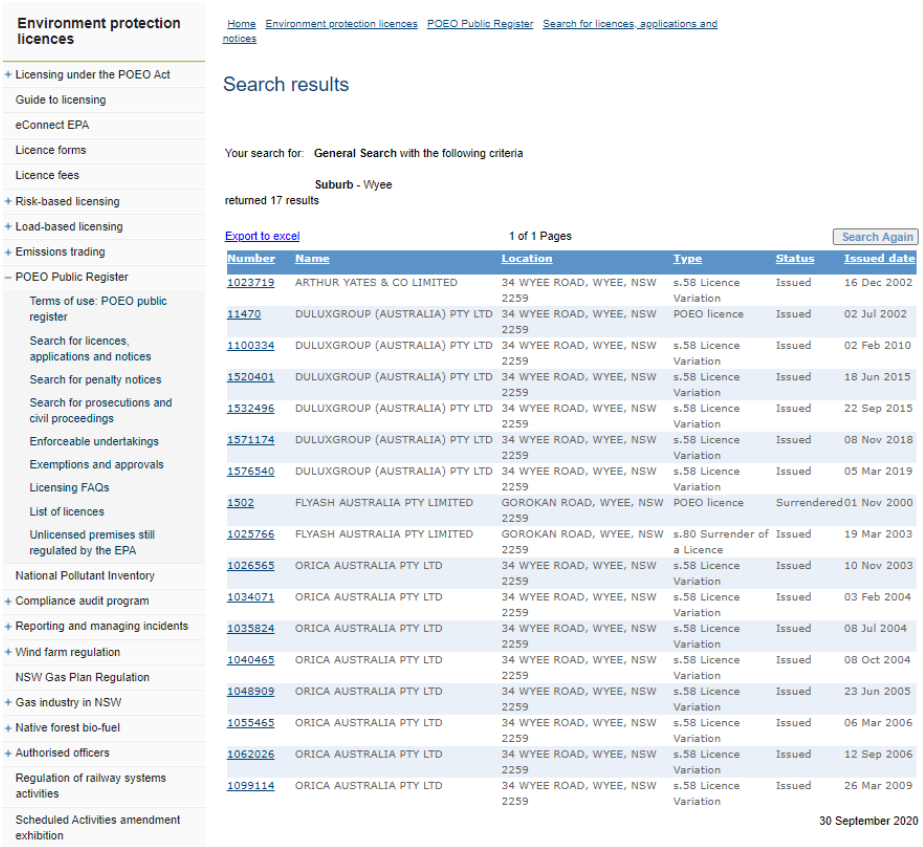
- The POEO public register
- The appropriate planning authority: for example, on a planning certificate issued by the local council under section 149 of the Environmental Planning and Assessment Act.

See What's in the record and What's not in the record.

If you want to know whether a specific site has been the subject of notices issued by the EPA under the CLM Act, we suggest that you search by Local Government Area only and carefully review the sites that are listed.
This public record provides information about sites regulated by the EPA under the Contaminated Land Management Act 1997, including sites currently and previously regulated under the Environmentally Hazardous Chemicals Act 1985. Your inquiry using the above search criteria has not matched any record of current or former regulation. You should consider searching again using different criteria. The fact that a site does not appear on the record does not necessarily mean that it is not affected by contamination. The site may have been notified to the EPA but not yet assessed, or contamination may be present but the site is not yet being regulated by the EPA. Further information about particular sites may be available from the appropriate planning authority, for example, on a planning certificate issued by the local council under section 149 of the Environmental Planning and Assessment Act. In addition the EPA may be regulating contamination at the site through a licence under the Protection of the Environment Operations Act 1997. You may wish to search the POEO public register.POEO public register

30 September 2020

EPA Licences, Applications and Notices



Environment protection licences

- + Licensing under the POEO Act
- Guide to licensing
- eConnect EPA
- Licence forms
- Licence fees
- + Risk-based licensing
- + Load-based licensing
- + Emissions trading
- − POEO Public Register
  - Terms of use: POEO public register
  - Search for licences, applications and notices
  - Search for penalty notices
  - Search for prosecutions and civil proceedings
  - Enforceable undertakings
  - Exemptions and approvals
  - Licensing FAQs
  - List of licences
  - Unlicensed premises still regulated by the EPA
- National Pollutant Inventory
- + Compliance audit program
- + Reporting and managing incidents
- + Wind farm regulation
- NSW Gas Plan Regulation
- + Gas industry in NSW
- + Native forest bio-fuel
- + Authorised officers
- Regulation of railway systems activities
- Scheduled Activities amendment exhibition

Home Environment protection licences POEO Public Register Search for licences, applications and notices

Search results

Your search for: **General Search** with the following criteria

Suburb - Wyee

returned 17 results

Export to excel 1 of 1 Pages Search Again

Number	Name	Location	Type	Status	Issued date
1023719	ARTHUR YATES & CO LIMITED	34 WYEE ROAD, WYEE, NSW 2259	s.58 Licence Variation	Issued	16 Dec 2002
11470	DULUXGROUP (AUSTRALIA) PTY LTD	34 WYEE ROAD, WYEE, NSW 2259	POEO licence	Issued	02 Jul 2002
1100334	DULUXGROUP (AUSTRALIA) PTY LTD	34 WYEE ROAD, WYEE, NSW 2259	s.58 Licence Variation	Issued	02 Feb 2010
1520401	DULUXGROUP (AUSTRALIA) PTY LTD	34 WYEE ROAD, WYEE, NSW 2259	s.58 Licence Variation	Issued	18 Jun 2015
1532496	DULUXGROUP (AUSTRALIA) PTY LTD	34 WYEE ROAD, WYEE, NSW 2259	s.58 Licence Variation	Issued	22 Sep 2015
1571174	DULUXGROUP (AUSTRALIA) PTY LTD	34 WYEE ROAD, WYEE, NSW 2259	s.58 Licence Variation	Issued	08 Nov 2018
1576540	DULUXGROUP (AUSTRALIA) PTY LTD	34 WYEE ROAD, WYEE, NSW 2259	s.58 Licence Variation	Issued	05 Mar 2019
1502	FLYASH AUSTRALIA PTY LIMITED	GOROKAN ROAD, WYEE, NSW 2259	POEO licence	Surrendered	01 Nov 2000
1025766	FLYASH AUSTRALIA PTY LIMITED	GOROKAN ROAD, WYEE, NSW 2259	s.80 Surrender of a Licence	Issued	19 Mar 2003
1026565	ORICA AUSTRALIA PTY LTD	34 WYEE ROAD, WYEE, NSW 2259	s.58 Licence Variation	Issued	10 Nov 2003
1034071	ORICA AUSTRALIA PTY LTD	34 WYEE ROAD, WYEE, NSW 2259	s.58 Licence Variation	Issued	03 Feb 2004
1035824	ORICA AUSTRALIA PTY LTD	34 WYEE ROAD, WYEE, NSW 2259	s.58 Licence Variation	Issued	08 Jul 2004
1040465	ORICA AUSTRALIA PTY LTD	34 WYEE ROAD, WYEE, NSW 2259	s.58 Licence Variation	Issued	08 Oct 2004
1048909	ORICA AUSTRALIA PTY LTD	34 WYEE ROAD, WYEE, NSW 2259	s.58 Licence Variation	Issued	23 Jun 2005
1055465	ORICA AUSTRALIA PTY LTD	34 WYEE ROAD, WYEE, NSW 2259	s.58 Licence Variation	Issued	06 Mar 2006
1062026	ORICA AUSTRALIA PTY LTD	34 WYEE ROAD, WYEE, NSW 2259	s.58 Licence Variation	Issued	12 Sep 2006
1099114	ORICA AUSTRALIA PTY LTD	34 WYEE ROAD, WYEE, NSW 2259	s.58 Licence Variation	Issued	26 Mar 2009

30 September 2020

EPA List of Contaminated Sites Notified to EPA

1711	WOY WOY	Rogers Park	Dunban ROAD	Landfill	Regulation under CLM Act not required	-33.50009693	151.3181347
1712	WOY WOY	Austin Butler Memorial Oval	Blackwall ROAD	Landfill	Regulation under CLM Act not required	-33.48626871	151.3276042
1713	WOY WOY	James Browne Oval	Welcome STREET	Landfill	Regulation under CLM Act not required	-33.49756053	151.3234871
1714	WYALONG	Caltex Service Station	50 Neeld (Newell Highway) STREET	Service Station	Regulation under CLM Act not required	-33.92665025	147.2446546
1715	WYOMING	Caltex Service Station Wyoming	465 Pacific HIGHWAY	Service Station	Regulation under CLM Act not required	-33.40945391	151.3499812

Property details for Lot 217 DP 755242, 18 Gosford Road, Wyee

Summary generated: 2:03PM on 6/07/2020

Parcels

Lot 217 DP 755242

Status

Current

Ward

West Ward

Zones

RU2 Rural Landscape

Development applications

DA - 770 / 1992 - Rural dwelling
ZBA - 182 / 1994 - Farm Machinery Shed
ZBA - 3339 / 1993 - Twelve Proposed Greenhouse Igloos
ZBA - 2899 / 1993 - Inground Concrete Pool
ZBA - 3585 / 1992 - Proposed Brick Veneer/ Hardiplank & Tile Residence

Rates

Status: C
Local Government Code: Residential
Notice Group: General
Rates Rebate:
Valuer General Numbers: 1/07/2002 - 171430 (C)

Waste

Collection

Bulk Waste Collection Area 20
Domestic Waste Collection Area - Wednesday B
Green/Recycle Waste Collection Area - Wednesday B

State Environmental Planning Policies

SEPP (Affordable Rental Housing) 2009
SEPP (Building Sustainability Index: BASIX) 2004
SEPP (Concurrences) 2018
SEPP (Educational Est Child Care Fac) 2017
SEPP (Exempt and Complying Development Codes) 2008
SEPP (Infrastructure) 2007
SEPP (Koala Habitat Protection) 2019
SEPP (Mining, Petrol Prod, Extractive Ind) 2007
SEPP (Primary Production and Rural Dev) 2019
SEPP (State and Regional Development) 2011
SEPP (State Significant Precincts) 2005
SEPP 19 - Bushland in Urban Areas
SEPP 21 - Caravan Parks
SEPP 33 - Hazardous and Offensive Development
SEPP 50 - Canal Estates
SEPP 55 - Remediation of Land
SEPP 64 - Advertising and Signage
SEPP 65 - Design Quality Residental Apartment Dev
SEPP 70 - Affordable Housing (Revised Schemes)

Development Control Plans

Lake Macquarie DCP 2014

CODES SEPP Conditions

There are no CODES SEPP conditions against this property or land.

LEP 2014 Mapped Development Constraints

LEP14 20 ha minimum lot size
LEP14 8.5m max building height

Main Conditions

Minor Conditions

Significant Tree Register

Bush Fire Prone Land - Part Parcel - 2018
Draft Amendment No F2014/01451 to LEP 2014
LEP14 20 ha minimum lot size
LEP14 8.5m max building height
Administrative Amendment No 9 LEP 2014
Amendment No 17 to LEP 2014 Citywide
Amendment No 19 to LEP 2014 min lot size
Amendment No 21 to LEP 2014 Certain Zones
Geotechnical Zone T0
Lake Macquarie LEP 2014
Native Vegetation - 2019
Scenic Management Zone 11
Sewer is unavailable
Waste Water Treatment Device

There are no trees on this property that are recorded in Council's Significant Trees Register.

Appendix C

Site Photographs

Photo 1 – General site photograph showing residential property. Photo facing south west.

Photo 2 – Retaining wall surrounding the north west portion of house

Douglas Partners Geotechnics / Environment / Groundwater	**Site Photographs** **Preliminary Site Investigation** **18 Gosford Road, Wyee**	PROJECT: 104136.00 PLATE No: 1 REV: A
	CLIENT: June Waldon	DATE: 28 Sep 2020

Photo 3 –Shed and septic tank. Photograph facing north west

Photo 4 –Stacked bricks near residential house

Douglas Partners Geotechnics / Environment / Groundwater	**Site Photographs** **Preliminary Site Investigation** **18 Gosford Road, Wyee**	PROJECT: 104136.00 PLATE No: 2 REV: A
	CLIENT: June Waldon	DATE: 28 Sep 2020

Photo 5 – Vegetable patch

Photo 6 – Eastern boundary with trees and tall grass

Douglas Partners Geotechnics / Environment / Groundwater	**Site Photographs** **Preliminary Site Investigation** **18 Gosford Road, Wyee**	PROJECT: 104136.00 PLATE No: 3 REV: A
	CLIENT: June Waldon	DATE: 28 Sep 2020

Photo 7 – Central portion of the site

Photo 8 – Northern site boundary

Douglas Partners Geotechnics / Environment / Groundwater	**Site Photographs** **Preliminary Site Investigation** **18 Gosford Road, Wyee**	PROJECT: 104136.00 PLATE No: 4 REV: A
	CLIENT: June Waldon	DATE: 28 Sep 2020

Photo 9 – Area of former farm dam

Photo 10 – Area west of former dam

Douglas Partners Geotechnics / Environment / Groundwater	**Site Photographs** **Preliminary Site Investigation** **18 Gosford Road, Wyee**	PROJECT: 104136.00 PLATE No: 5 REV: A
	CLIENT: June Waldon	DATE: 28 Sep 2020

Photo 11 – Stockpile of tree branches and leaf litter

Photo 12 – Water tank

Douglas Partners Geotechnics / Environment / Groundwater	**Site Photographs** **Preliminary Site Investigation** **18 Gosford Road, Wyee**	PROJECT: 104136.00 PLATE No: 6 REV: A
	CLIENT: June Waldon	DATE: 28 Sep 2020

Photo 13 – General site photograph. Photo taken from north west corner, facing south east

Douglas Partners Geotechnics / Environment / Groundwater	**Site Photographs** **Preliminary Site Investigation** **18 Gosford Road, Wyee**	PROJECT: 104136.00 PLATE No: 7 REV: A
	CLIENT: June Waldon	DATE: 28 Sep 2020

Appendix D

Table D1: Summary of Laboratory Results

Table D2: Summary of Laboratory Results

Douglas Partners
Geotechnics / Environment / Groundwater

Table D1: Summary of Laboratory Results – Metals, TRH, BTEX, PAH

			Metals								TRH						BTEX				PAH			
			Arsenic	Cadmium	Total Chromium	Copper	Lead	Mercury (inorganic)	Nickel	Zinc	TRH C6 - C10	TRH >C10-C16	F1 ((C6-C10)-BTEX)	F2 (>C10-C16 less Naphthalene)	F3 (>C16-C34)	F4 (>C34-C40)	Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene [b]	Benzo(a)pyrene (BaP)	Benzo(a)pyrene TEQ	Total PAHs
		PQL	4	0.4	1	1	1	0.1	1	1	25	50	25	50	100	100	0.2	0.5	1	1	1	0.05	0.5	0.05
Sample ID[a]	Strata	Sample Date	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
1 /0-0.1	Fill	22/10/2020	<4	<0.4	2	3	3	<0.1	<1	14	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	<0.05	<0.5	<0.05
			100 100	20 NC	100 190	6000 120	300 1100	40 NC	400 40	7400 320	NC NC	NC 120	45 180	110 NC	NC 300	NC 2800	0.5 50	160 85	55 70	40 105	3 170	NC 0.7	3 NC	300 NC
2 /0-0.1	Natural	22/10/2020	<4	<0.4	4	7	6	<0.1	<1	25	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	<0.05	<0.5	<0.05
			100 100	20 NC	100 190	6000 120	300 1100	40 NC	400 40	7400 320	NC NC	NC 120	45 180	110 NC	NC 300	NC 2800	0.5 50	160 85	55 70	40 105	3 170	NC 0.7	3 NC	300 NC
3 / 0-0.1	Natural	22/10/2020	<4	<0.4	4	5	8	<0.1	<1	21	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	<0.05	<0.5	<0.05
			100 100	20 NC	100 190	6000 120	300 1100	40 NC	400 40	7400 320	NC NC	NC 120	45 180	110 NC	NC 300	NC 2800	0.5 50	160 85	55 70	40 105	3 170	NC 0.7	3 NC	300 NC
4 /0-0.1	Natural	22/10/2020	<4	<0.4	4	14	12	<0.1	1	69	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	<0.05	<0.5	<0.05
			100 100	20 NC	100 190	6000 120	300 1100	40 NC	400 40	7400 320	NC NC	NC 120	45 180	110 NC	NC 300	NC 2800	0.5 50	160 85	55 70	40 105	3 170	NC 0.7	3 NC	300 NC
5 /0.4-0.5	Fill	22/10/2020	<4	<0.4	7	<1	7	<0.1	<1	5	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	<0.05	<0.5	<0.05
			100 100	20 NC	100 190	6000 120	300 1100	40 NC	400 40	7400 320	NC NC	NC 120	45 180	110 NC	NC 300	NC 2800	0.5 50	160 85	55 70	40 105	3 170	NC 0.7	3 NC	300 NC
6 / 0-0.1	Fill	22/10/2020	<4	<0.4	5	<1	4	<0.1	<1	5	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	<0.05	<0.5	<0.05
			100 100	20 NC	100 190	6000 120	300 1100	40 NC	400 40	7400 320	NC NC	NC 120	45 180	110 NC	NC 300	NC 2800	0.5 50	160 85	55 70	40 105	3 170	NC 0.7	3 NC	300 NC
QA1	Fill	22/10/2020	5	<0.4	5	3	6	<0.1	1	19	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	<0.05	<0.5	<0.05
			100 100	20 NC	100 190	6000 120	300 1100	40 NC	400 40	7400 320	NC NC	NC 120	45 180	110 NC	NC 300	NC 2800	0.5 50	160 85	55 70	40 105	3 170	NC 0.7	3 NC	300 NC
7 /0.4-0.5	Natural	22/10/2020	<4	<0.4	21	<1	10	<0.1	<1	10	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	<0.05	<0.5	<0.05
			100 100	20 NC	100 190	6000 120	300 1100	40 NC	400 40	7400 320	NC NC	NC 120	45 180	110 NC	NC 300	NC 2800	0.5 50	160 85	55 70	40 105	3 170	NC 0.7	3 NC	300 NC
8 /0.5-0.6	Fill	22/10/2020	<4	<0.4	6	1	6	<0.1	3	110	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	<0.05	<0.5	<0.05
			100 100	20 NC	100 190	6000 120	300 1100	40 NC	400 40	7400 320	NC NC	NC 120	45 180	110 NC	NC 300	NC 2800	0.5 50	160 85	55 70	40 105	3 170	NC 0.7	3 NC	300 NC
8 /0.9-1.0	Natural	22/10/2020	<4	<0.4	2	<1	3	<0.1	<1	5	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	<0.05	<0.5	<0.05
			100 100	20 NC	100 190	6000 120	300 1100	40 NC	400 40	7400 320	NC NC	NC 120	45 180	110 NC	NC 300	NC 2800	0.5 50	160 85	55 70	40 105	3 170	NC 0.7	3 NC	300 NC

Lab result
HIL/HSL value EIL/ESL value

HIL/HSL exceedance EIL/ESL exceedance HIL/HSL and EIL/ESL exceedance ML exceedance ML and HIL/HSL or EIL/ESL exceedance

Indicates that asbestos has been detected by the lab below the PQL, refer to the lab report **Blue** = DC exceedance

Bold = Lab detections NT = Not tested NL = Non limiting NC = No criteria NA = Not applicable NAD = No asbestos detected at the reporting limit

Notes:

HIL/HSL/DC	NEPC, Schedule B1 - HIL A (Residential with garden / accessible soil), HSL A/B (Low – high density residential), DC HSL A (Residential - low density)
EIL/ESL	NEPC, Schedule B1 - EIL UR/POS (Urban Residential / Public Open Space), ESL UR/POS (Urban Residential / Public Open Space)
ML	NEPC, Schedule B1 - ML R/P/POS (Residential / Parkland / Public Open Space)
a	QA/QC replicate of sample listed directly below the primary sample
b	reported naphthalene laboratory result obtained from BTEXN suite

Douglas Partners
Geotechnics / Environment / Groundwater

Table D2: Summary of Laboratory Results – OCP, OPP, PCB, Asbestos

			OCP												OPP	PCB	Asbestos
			DDT+DDE+DDD [c]	DDD	DDE	DDT	Aldrin & Dieldrin	Total Chlordane	Total Endosulfan	Endrin	Heptachlor	Hexachlorobenzene	Methoxychlor		Chlorpyriphos	Total PCB	Asbestos Summary
		PQL	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	-
Sample ID[a]	Depth	Sample Date	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	-
1 /0-0.1	Fill	22/10/2020	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	NT	NT
			240 180	NC NC	NC NC	NC 180	6 NC	50 NC	270 NC	10 NC	6 NC	10 NC	300 NC		160 NC	1 NC	
2 /0-0.1	Natural	22/10/2020	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	NT	NT
			240 180	NC NC	NC NC	NC 180	6 NC	50 NC	270 NC	10 NC	6 NC	10 NC	300 NC		160 NC	1 NC	
3 / 0-0.1	Natural	22/10/2020	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	NT	NT
			240 180	NC NC	NC NC	NC 180	6 NC	50 NC	270 NC	10 NC	6 NC	10 NC	300 NC		160 NC	1 NC	
4 /0-0.1	Natural	22/10/2020	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	NT	NT
			240 180	NC NC	NC NC	NC 180	6 NC	50 NC	270 NC	10 NC	6 NC	10 NC	300 NC		160 NC	1 NC	
5 /0.4-0.5	Fill	22/10/2020	<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	NAD
			240 180	NC NC	NC NC	NC 180	6 NC	50 NC	270 NC	10 NC	6 NC	10 NC	300 NC		160 NC	1 NC	
6 / 0-0.1	Fill	22/10/2020	<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	NAD
			240 180	NC NC	NC NC	NC 180	6 NC	50 NC	270 NC	10 NC	6 NC	10 NC	300 NC		160 NC	1 NC	
QA1	Fill	22/10/2020	<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	NT
			240 180	NC NC	NC NC	NC 180	6 NC	50 NC	270 NC	10 NC	6 NC	10 NC	300 NC		160 NC	1 NC	
7 /0.4-0.5	Natural	22/10/2020	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT		NT	NT	NT
			240 180	NC NC	NC NC	NC 180	6 NC	50 NC	270 NC	10 NC	6 NC	10 NC	300 NC		160 NC	1 NC	
8 /0.5-0.6	Fill	22/10/2020	<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	NAD
			240 180	NC NC	NC NC	NC 180	6 NC	50 NC	270 NC	10 NC	6 NC	10 NC	300 NC		160 NC	1 NC	
8 /0.9-1.0	Natural	22/10/2020	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT		NT	NT	NT
			240 180	NC NC	NC NC	NC 180	6 NC	50 NC	270 NC	10 NC	6 NC	10 NC	300 NC		160 NC	1 NC	

Lab result

HIL/HSL value EIL/ESL value

HIL/HSL exceedance EIL/ESL exceedance HIL/HSL and EIL/ESL exceedance ML exceedance ML and HIL/HSL or EIL/ESL exceedance

Indicates that asbestos has been detected by the lab below the PQL, refer to the lab report **Blue** = DC exceedance

Bold = Lab detections NT = Not tested NL = Non limiting NC = No criteria NA = Not applicable NAD = No asbestos detected at the reporting limit

HIL/HSL/DC	NEPC, Schedule B1 - HIL A (Residential with garden / accessible soil), HSL A/B (Low – high density residential), DC HSL A (Residential - low density)
EIL/ESL	NEPC, Schedule B1 - EIL UR/POS (Urban Residential / Public Open Space), ESL UR/POS (Urban Residential / Public Open Space)
ML	NEPC, Schedule B1 - ML R/P/POS (Residential / Parkland / Public Open Space)
a	QA/QC replicate of sample listed directly below the primary sample
c	criteria applies to DDT only

Appendix E

Borehole Logs

Sampling Methods

Soil Descriptions

Symbols and Abbreviations

BOREHOLE LOG

CLIENT: June Waldon
PROJECT: Proposed Residential Subdivision
LOCATION: 18 Gosford Road, Wyee

SURFACE LEVEL: 29.88 AHD
EASTING: 359085.9
NORTHING: 6327132.4
DIP/AZIMUTH: 90°/--

BORE No: 1
PROJECT No: 104136.00
DATE: 22/10/2020
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
29	0.0	FILL/SAND: medium grained, pale grey, trace rootlets, moist, fill		D/E	0.0		PID<1ppm		
					0.1				
	0.2	Silty SAND SM: medium grained, grey-brown, trace clay (approximately 2% to 3%), moist			0.3				
				D/E			PID<1ppm		
	0.5	Gravelly SAND GP: poorly graded, brown and yellow-brown, subrounded ironstone ridge gravels, moist, residual			0.4				
					0.7				
				D/E			PID<1ppm		
					0.8				
		- From 0.9m: with clay (5% to 10%)							
	1.0	Bore discontinued at 1.0m- limit of investigation							
28	1								1
	2								2
27	3								3

RIG: TOYOTA 4WD **DRILLER:** MJH **LOGGED:** MJH **CASING:**
TYPE OF BORING: 60mm Ø Dynamic Continous Push Tube Sampling
WATER OBSERVATIONS: No free groundwater observed
REMARKS: Location coordinates are in MGA94 Zone 56 H.

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: June Waldon
PROJECT: Proposed Residential Subdivision
LOCATION: 18 Gosford Road, Wyee

SURFACE LEVEL: 32.70 AHD
EASTING: 359126
NORTHING: 6327122.52
DIP/AZIMUTH: 90°/--

BORE No: 2
PROJECT No: 104136.00
DATE: 22/10/2020
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
32	0.0	Silty SAND SM: medium grained, brown, trace rootlets, trace clay (2% to 3%), moist		D	0.0				
					0.1				
	0.2	Gravelly SAND GP: poorly graded, brown and yellow-brown, subrounded ironstone ridge gravels, with clay (5% to 10%), moist, residual		D/E	0.2		PID<1ppm		
	0.35	Sandy CLAY CL: low plasticity, yellow-brown and red-brown, trace ironstone gravels, w<PL, residual			0.3				
					0.5		PID<1ppm		
31	1.0	Bore discontinued at 1.0m- limit of investigation		D/E	0.6				
	1								1
	2								2
30	3								3

RIG: TOYOTA 4WD **DRILLER:** MJH **LOGGED:** MJH **CASING:**
TYPE OF BORING: 60mm Ø Dynamic Continous Push Tube Sampling
WATER OBSERVATIONS: No free groundwater observed
REMARKS: Location coordinates are in MGA94 Zone 56 H.

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: June Waldon
PROJECT: Proposed Residential Subdivision
LOCATION: 18 Gosford Road, Wyee

SURFACE LEVEL: 31.52 AHD
EASTING: 359090.1
NORTHING: 6327093.06
DIP/AZIMUTH: 90°/--

BORE No: 3
PROJECT No: 104136.00
DATE: 22/10/2020
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
31	0.0	Silty SAND SM: medium grained, brown, trace rootlets, trace clay (2% to 3%), moist		D/E	0.0 – 0.1		PID<1ppm		
	0.45	Sandy CLAY CL: low plasticity, yellow-brown and red-brown, with subrounded ironstone ridge gravels, w<PL, residual		D/E	0.5 – 0.6		PID<1ppm		
	1.0	Bore discontinued at 1.0m- limit of investigation							
30	1								1
	2								2
29	3								3

RIG: TOYOTA 4WD **DRILLER:** MJH **LOGGED:** MJH **CASING:**
TYPE OF BORING: 60mm Ø Dynamic Continous Push Tube Sampling
WATER OBSERVATIONS: No free groundwater observed
REMARKS: Location coordinates are in MGA94 Zone 56 H.

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: June Waldon
PROJECT: Proposed Residential Subdivision
LOCATION: 18 Gosford Road, Wyee

SURFACE LEVEL: 33.68 AHD
EASTING: 359120.98
NORTHING: 6327089.57
DIP/AZIMUTH: 90°/--

BORE No: 4
PROJECT No: 104136.00
DATE: 22/10/2020
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
33	0.0	Silty SAND SM: medium grained, brown, trace rootlets, trace clay (2% to 3%), moist		D/E	0.0 - 0.1		PID<1ppm		
	0.3	Sandy CLAY CL: low plasticity, yellow-brown and red-brown, with subrounded ironstone ridge gravels, w<PL, residual		D/E	0.4 - 0.5		PID<1ppm		
32	1.0	Bore discontinued at 1.0m- limit of investigation							
31	2								
	3								

RIG: TOYOTA 4WD **DRILLER:** MJH **LOGGED:** MJH **CASING:**
TYPE OF BORING: 60mm Ø Dynamic Continous Push Tube Sampling
WATER OBSERVATIONS: No free groundwater observed
REMARKS: Location coordinates are in MGA94 Zone 56 H.

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: June Waldon
PROJECT: Proposed Residential Subdivision
LOCATION: 18 Gosford Road, Wyee

SURFACE LEVEL: 32.76 AHD
EASTING: 359087.54
NORTHING: 6327037
DIP/AZIMUTH: 90°/--

BORE No: 5
PROJECT No: 104136.00
DATE: 22/10/2020
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
32	0.0	FILL/Sandy CLAY: low plasticity, yellow-brown and grey, trace sandstone gravels, w<PL, fill		D/E	0.0–0.1		PID<1ppm		
	0.4	FILL/Sandy CLAY: high plasticity, grey and yellow-brown, trace sandstone and ironstone gravels, trace organics, w>PL (wet), fill		D/E	0.4–0.5		PID<1ppm		
	1			D/E	1.0–1.1		PID<1ppm		1
31				D/E	1.5–1.6		PID<1ppm		
	2			D/E	2.0–2.1		PID<1ppm		2
				D/E	2.5–2.6		PID<1ppm		
30	2.9			D/E	2.9–3.0		PID<1ppm		3
	3	CLAY CH: high plasticity, grey, trace sand, w>PL (wet), residual							
	3.2	Bore discontinued at 3.2m- limit of investigation							

RIG: TOYOTA 4WD **DRILLER:** MJH **LOGGED:** MJH **CASING:**
TYPE OF BORING: 60mm Ø Dynamic Continous Push Tube Sampling
WATER OBSERVATIONS: No free groundwater observed
REMARKS: Location coordinates are in MGA94 Zone 56 H.

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: June Waldon
PROJECT: Proposed Residential Subdivision
LOCATION: 18 Gosford Road, Wyee

SURFACE LEVEL: 33.02 AHD
EASTING: 359083.69
NORTHING: 6327017.54
DIP/AZIMUTH: 90°/--

BORE No: 6
PROJECT No: 104136.00
DATE: 22/10/2020
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
33	0.0	FILL/Sandy CLAY: low plasticity, yellow-brown and grey, trace sandstone gravels, w<PL, fill		D/E	0.0 - 0.1		PID<1ppm		
	0.45	FILL/Sandy CLAY: high plasticity, grey and yellow-brown, trace sandstone and ironstone gravels, trace organics, w>PL (wet), fill		D/E	0.5 - 0.6		PID<1ppm		
32	1			D/E	1.0 - 1.1		PID<1ppm		1
				D/E	1.5 - 1.6		PID<1ppm		
31	2			D/E	2.0 - 2.1		PID<1ppm		2
	2.4	CLAY CL: medium plasticity, red-brown, trace sand, w<PL (wet), residual		D/E	2.4 - 2.5		PID<1ppm		
	2.55	- From 2.5m: weathered sandstone with soil like properties Bore discontinued at 2.55m- refusal on weathered sandstone							
30	3								3

RIG: TOYOTA 4WD **DRILLER:** MJH **LOGGED:** MJH **CASING:**
TYPE OF BORING: 60mm Ø Dynamic Continous Push Tube Sampling
WATER OBSERVATIONS: No free groundwater observed
REMARKS: Location coordinates are in MGA94 Zone 56 H.

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: June Waldon
PROJECT: Proposed Residential Subdivision
LOCATION: 18 Gosford Road, Wyee

SURFACE LEVEL: 34.77 AHD
EASTING: 359114.96
NORTHING: 6327033.75
DIP/AZIMUTH: 90°/--

BORE No: 7
PROJECT No: 104136.00
DATE: 22/10/2020
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
34	0.0	Silty SAND SM: medium grained, brown, trace rootlets, trace clay (2% to 3%), moist		D/E	0.0 - 0.1		PID<1ppm		
	0.35	Sandy CLAY CL: low plasticity, yellow-brown and red-brown, trace ironstone gravels, w<PL, residual		D/E	0.4 - 0.5		PID<1ppm		
33	1.0	Bore discontinued at 1.0m- limit of investigation							
32									

RIG: TOYOTA 4WD **DRILLER:** MJH **LOGGED:** MJH **CASING:**
TYPE OF BORING: 60mm Ø Dynamic Continous Push Tube Sampling
WATER OBSERVATIONS: No free groundwater observed
REMARKS: Location coordinates are in MGA94 Zone 56 H.

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: June Waldon
PROJECT: Proposed Residential Subdivision
LOCATION: 18 Gosford Road, Wyee

SURFACE LEVEL: 39.08 AHD
EASTING: 359146.36
NORTHING: 6326981.34
DIP/AZIMUTH: 90°/--

BORE No: 8
PROJECT No: 104136.00
DATE: 22/10/2020
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
39	0.0	FILL/Clayey SAND: medium grained, brown, trace sandstone gravels, trace organics, dry, fill		D/E	0.0 - 0.1		PID<1ppm		
	0.5			D/E	0.5 - 0.6		PID<1ppm		
	0.7	- At 0.6m: trace concrete (2 pieces <10mm), trace brick (1 piece)							
		Sandy CLAY CL: low plasticity, yellow-brown and red-brown, trace ironstone gravels, w<PL, residual							
	0.9			D/E	0.9 - 1.0		PID<1ppm		
38	1.1	Bore discontinued at 1.1m- limit of investigation							
37									
36									

RIG: TOYOTA 4WD **DRILLER:** MJH **LOGGED:** MJH **CASING:**
TYPE OF BORING: 60mm Ø Dynamic Continous Push Tube Sampling
WATER OBSERVATIONS: No free groundwater observed
REMARKS: Location coordinates are in MGA94 Zone 56 H.

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

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.

Description and Classification Methods

The methods of description and classification of soils and rocks used in this report are generally based on Australian Standard AS1726:2017, Geotechnical Site Investigations. 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	19 - 63
Medium gravel	6.7 - 19
Fine gravel	2.36 – 6.7
Coarse sand	0.6 - 2.36
Medium sand	0.21 - 0.6
Fine sand	0.075 - 0.21

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

The proportions of secondary constituents of soils are described as follows:

In fine grained soils (>35% fines)

Term	Proportion of sand or gravel	Example
And	Specify	Clay (60%) and Sand (40%)
Adjective	>30%	Sandy Clay
With	15 – 30%	Clay with sand
Trace	0 - 15%	Clay with trace sand

In coarse grained soils (>65% coarse)
- with clays or silts

Term	Proportion of fines	Example
And	Specify	Sand (70%) and Clay (30%)
Adjective	>12%	Clayey Sand
With	5 - 12%	Sand with clay
Trace	0 - 5%	Sand with trace clay

In coarse grained soils (>65% coarse)
- with coarser fraction

Term	Proportion of coarser fraction	Example
And	Specify	Sand (60%) and Gravel (40%)
Adjective	>30%	Gravelly Sand
With	15 - 30%	Sand with gravel
Trace	0 - 15%	Sand with trace gravel

The presence of cobbles and boulders shall be specifically noted by beginning the description with ‘Mix of Soil and Cobbles/Boulders’ with the word order indicating the dominant first and the proportion of cobbles and boulders described together.

Soil Descriptions

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
Friable	Fr	-

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	Density Index (%)
Very loose	VL	<15
Loose	L	15-35
Medium dense	MD	35-65
Dense	D	65-85
Very dense	VD	>85

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;
- Extremely weathered material – formed from in-situ weathering of geological formations. Has soil strength but retains the structure or fabric of the parent rock;
- Alluvial soil – deposited by streams and rivers;
- Estuarine soil – deposited in coastal estuaries;
- Marine soil – deposited in a marine environment;
- Lacustrine soil – deposited in freshwater lakes;
- Aeolian soil – carried and deposited by wind;
- Colluvial soil – soil and rock debris transported down slopes by gravity;
- Topsoil – mantle of surface soil, often with high levels of organic material.
- Fill – any material which has been moved by man.

Moisture Condition – Coarse Grained Soils

For coarse grained soils the moisture condition should be described by appearance and feel using the following terms:

- Dry (D) Non-cohesive and free-running.
- Moist (M) Soil feels cool, darkened in colour.
  Soil tends to stick together.
  Sand forms weak ball but breaks easily.
- Wet (W) Soil feels cool, darkened in colour.
  Soil tends to stick together, free water forms when handling.

Moisture Condition – Fine Grained Soils

For fine grained soils the assessment of moisture content is relative to their plastic limit or liquid limit, as follows:

- ‘Moist, dry of plastic limit’ or ‘w <PL’ (i.e. hard and friable or powdery).
- ‘Moist, near plastic limit’ or ‘w ≈ PL (i.e. soil can be moulded at moisture content approximately equal to the plastic limit).
- ‘Moist, wet of plastic limit’ or ‘w >PL’ (i.e. soils usually weakened and free water forms on the hands when handling).
- ‘Wet’ or ‘w ≈LL’ (i.e. near the liquid limit).
- ‘Wet’ or ‘w >LL’ (i.e. wet of the liquid limit).

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

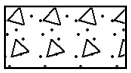
Symbols & Abbreviations

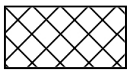
Graphic Symbols for Soil and Rock

General

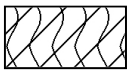

Asphalt

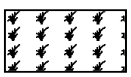

Road base

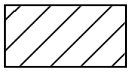

Concrete

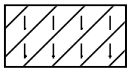

Filling

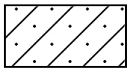
Soils


Topsoil

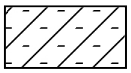

Peat

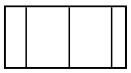

Clay

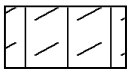

Silty clay

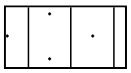

Sandy clay

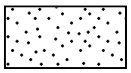

Gravelly clay

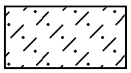

Shaly clay

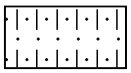

Silt


Clayey silt


Sandy silt

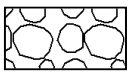

Sand

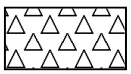

Clayey sand


Silty sand


Gravel

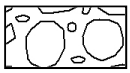

Sandy gravel


Cobbles, boulders

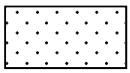

Talus

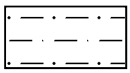
Sedimentary Rocks

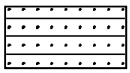

Boulder conglomerate

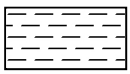

Conglomerate


Conglomeratic sandstone

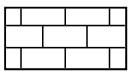

Sandstone


Siltstone

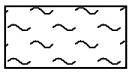

Laminite

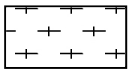

Mudstone, claystone, shale

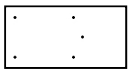

Coal


Limestone

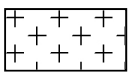
Metamorphic Rocks

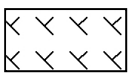

Slate, phyllite, schist

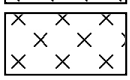

Gneiss

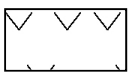

Quartzite

Igneous Rocks


Granite


Dolerite, basalt, andesite


Dacite, epidote


Tuff, breccia


Porphyry

Appendix F

Site Assessment Criteria

Appendix F
Site Assessment Criteria

F1.0 Introduction

The Site Assessment Criteria (SAC) applied in the current investigation are informed by the CSM, which identified human and environmental receptors to potential contamination on the site as well as consideration of the proposed development.

The laboratory analytical results have been assessed against the investigation and screening levels in Schedule B1 of NEPC (2013). These guidelines are endorsed by the NSW EPA under the CLM Act 1997.

Schedule B1, NEPC (2013) provides investigation and screening levels for commonly encountered contaminants which are applicable to generic land uses, and where relevant, also include consideration of soil type and the depth of contamination. It should be highlighted that the investigation and screening levels are not intended to be used as clean up levels, and any contaminants which have concentrations that exceed the investigation/screening levels should be further assessed using a Tier 2 risk assessment.

F2.0 Soils

F2.1 Health Investigation and Screening Levels

The generic health investigation levels (HIL) and health screening levels (HSL) are considered to be appropriate for the assessment of human health risk via all relevant pathways of exposure associated with contamination at the site. The adopted soil HIL and HSL for the contaminants of concern are shown in Table F2 and the inputs into the derivation are shown in Table F1.

Given the proposed development is a residential subdivision, the following investigation / screening levels have been applied, as follows:

- HIL A (Residential with garden / accessible soil);
- HSL A & HSL B (Low – high density residential - for vapour intrusion); and
- HSL A (Low density residential - for direct contact).

It is noted that HSL for intrusive maintenance workers (direct contact) are listed in CRC CARE (2011) however, these have not been used as SAC for the current investigation as the screening levels are generally higher than HSL-A and therefore are considered unlikely to be risk drivers for further assessment.

Table F1: Inputs to the derivation of HSL

Variable	Input	Rationale
Potential exposure pathway	Inhalation of vapours / direct contact	Potential exposure pathways identified in the CSM
Soil Type	Sand	Based on dominant soil type encountered (see logs). Sand is also the most conservative soil type for HSL application.
Depth to contamination	0 m to <1 m	Potential contamination sources likely to impact surface soils. This depth range is also the most conservative.

Table F2: Soil Health Investigation and Screening Levels

Contaminants		HIL A / HSL A Direct Contact	HSL A-B [3]
			0 m to <1 m(sand)
Metals	Arsenic	100	-
	Cadmium	20	-
	Chromium (VI)	100	-
	Copper	6000	-
	Lead	300	-
	Mercury (inorganic)	40	-
	Nickel	400	-
	Zinc	7400	-
PAH	Benzo(a)pyrene TEQ[1]	3	-
	Total PAH	300	-
	Naphthalene	1400*	3
TRH	TRH [F1]	4400*	45
	TRH [F2]	3300*	110
	TRH [F3]	4500*	-
	TRH [F4]	6300*	-
BTEX	Benzene	100*	0.5
	Toluene	14000*	160
	Ethylbenzene	4500*	55
	Xylenes	12000*	40
OCP	DDT+DDE+DDD	240	-
	Aldrin and dieldrin	6	-
	Chlordane	50	-
	Endosulfan	270	-
	Endrin	10	-
	Heptachlor	6	-
	HCB	10	-
	Methoxychlor	300	-
OPP	Chlorpyriphos	160	-
PCB[2]	PCB	1	-

Notes to Table F2:
1 sum of carcinogenic PAH
2 non dioxin-like PCB only
3 The soil saturation concentration (Csat) is defined as the soil concentration at which the porewater phase cannot dissolve any more of an individual chemical. The soil vapour that is in equilibrium with the porewater will be at its maximum. If the derived soil HSL exceeds Csat, a soil vapour source concentration for a petroleum mixture could not exceed a level that would results in the maximum allowable vapour risk for the given scenario. For these scenarios, no HSL is presented for these chemicals and the HSL is shown as 'not limiting' or 'NL'.
* Direct contact HSL.

F2.2 Ecological Investigation and Screening Levels

Ecological investigation levels (EIL) and added contaminant limits (ACL), where appropriate, have been derived in NEPC (2013) for arsenic, copper, chromium (III), nickel, lead, zinc, DDT and naphthalene . The adopted EIL, derived using the interactive (excel) calculation spreadsheet on the NEPM toolbox website are shown in Table F4, with inputs into their derivation shown in Table F3.

Table F3: Inputs to the Derivation of EIL

Variable	Input	Rationale
Depth of EIL 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.
Contamination type	Aged	Given the likely source of soil contaminants (i.e. historical site use/fill), the contamination is considered as "aged" (>2 years)
Input Parameters	state = NSW traffic volume = low	The site is in NSW, in an area of low traffic volume
Land Use	Urban residential and Public Open Space	This land use is broadly equivalent to the HIL-A land use scenario A protection level of 80% for urban residential areas and public open space has been adopted

Table F4: Ecological Investigation Levels (EIL) in mg/kg

Analyte		EIL Residential Open Space	Comments
Metals	Arsenic	100	Generic value
	Chromium III	190[a]	Adopted values: pH = 7.2 (average of two samples) CEC = 5.3 $cmol_c/kg$ (average of two samples) Clay content:1 % (consistent with a 'sand' soil type)
	Copper	120[b]	
	Lead	1100	Generic value
	Nickel	40[c]	Adopted values: pH = 7.2 (average of two samples) CEC = 5.3 $cmol_c/kg$ (average of two samples) Clay content:1 % (consistent with a 'sand' soil type)
	Zinc	320[b]	
OCP	DDT	180	Generic value
PAH	Naphthalene	170	Generic value

Notes to Table F4:

[a] – EIL value based on clay content

[b] – EIL value based on pH and CEC

[c] – EIL value based on CEC

Ecological screening levels (ESL) are used to assess the risk of selected petroleum hydrocarbon compounds, BTEX and benzo(a)pyrene to terrestrial ecosystems. The adopted ESL are shown in Table F6 and the inputs into the derivation are shown in Table F5.

Table F5: 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.
Soil Texture	Sand (coarse)	Consistent with a 'sand' soil type (see Logs).
Land use	Urban residential and Public Open Space	This land use is broadly equivalent to the HIL-A land use scenario.

Table F6: Ecological Screening Levels in mg/kg

Analyte		ESL (coarse)	Comments
TRH	TRH [F1]	180*	ESLs are of low reliability except where indicated by an asterisk (*) which are of moderate reliability
	TRH [F2]	120*	
	TRH [F3]	300	
	TRH [F4]	2800	
BTEX	Benzene	50	
	Toluene	85	
	Ethylbenzene	70	
	Xylenes	105	
PAH	Benzo(a)pyrene	0.7	

F2.3 Management Limits

In addition to the application of HSL and ESL, a further screening measure is applicable to petroleum hydrocarbons, which takes into account policy considerations and reflect the nature and properties of petroleum hydrocarbons, including:

- Formation of observable light non-aqueous phase liquid (LNAPL);
- Fire and explosive hazards; and
- Effects on buried infrastructure e.g. penetration of, or damage to, in-ground services.

The adopted management limits are in Table F8 and the inputs into the derivation are shown in Table F7.

Table F7: Inputs into the Derivation of Management Limits

Variable	Input	Rationale
Depth of Management Limit application	Any depth within the soil profile	'Management limits' apply to any depth within the soil profile
Soil Texture	Coarse	Consistent with a 'sand' soil type (see Logs).
Land use	Residential, parkland and public open space	Based on proposed development

Table F8: Management Limits

Analyte		Management Limit (coarse)
TRH	$C_6 - C_{10}$ (F1)	700
	$>C_{10}-C_{16}$ (F2)	1000
	$>C_{16}-C_{34}$ (F3)	2500
	$>C_{34}-C_{40}$ (F4)	10000

F2.4 Asbestos in Soil

Based on the CSM and/or current site access limitations, a detailed asbestos assessment was not considered to be warranted at this stage. However, due to the history of widespread use of ACM products across Australia, ACM can be encountered unexpectedly and sporadically at a site. Therefore, the presence or absence of asbestos at a limit of reporting of 0.1 g/kg (AS:4964) has been adopted for this investigation / assessment as an initial screen.

Appendix G

Field Work Methodology

Appendix G
Field Work Methodology

1.0 Guidelines

The following key guidelines were consulted for the field work methodology:

- NEPC *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [NEPM]* (NEPC, 2013).

2.0 Field Work

Field work was conducted on 22 October 2020 by a DP engineering geologist. The field work comprised the drilling of eight boreholes (Bore 1 to Bore 8) using a Toyota 4WD mounted push tube rig to a maximum depth of 3.2 m bgl.

2.1 Soil Sampling

Soil sampling was carried out in accordance with DP standard operating procedures. The general sampling and sample management procedures comprised:

- Collection of soil samples directly from the push-tube sampling tube at the nominated sample depth;
- Collect of 10% replicate samples for QC purposes;
- Disposable nitrile gloves were worn when collecting all samples. Gloves were replaced prior to the collection of each sample in order to prevent cross-contamination;
- Samples collected for laboratory analysis were transferred into a new laboratory prepared glass jar, with minimal headspace, and sealed with a Teflon lined lid. Each jar was individually sealed to reduce the potential for cross contamination during transportation to the laboratory;
- Sample containers were labelled with individual and unique identification including project number, sample ID, depth and date of sampling;
- Placement of sample containers and bags into a cooled, insulated and sealed container for transport to the laboratory; and
- Use of chain of custody documentation so that sample tracking and custody could be cross-checked at any point in the transfer of samples from the field to the laboratory. Copies of completed chain of custody forms are included in Appendix J.

2.2 Field Testing

Field testing was carried out in accordance with DP standard operating procedures. The general sampling and sample management procedures comprise:

PID Field Test

- Calibrate the PID with isobutylene gas at 100 ppm and with fresh air prior to commencement of each successive day's field work;
- Allow the headspace in the PID zip-lock bag samples to equilibrate; and
- Screen samples using the PID.

Douglas Partners Pty Ltd

Appendix H

Quality Assurance / Quality Control

Appendix H
Quality Assurance / Quality Control

H1.0 Field and Laboratory Data Quality Assurance and Quality Control

The field and laboratory data quality assurance and quality control (QA/QC) procedures and results are summarised in the following Table H1. Reference should be made to the field work methodology and the laboratory results / certificates of analysis for further details. The relative percentage difference (RPD) results, along with the other filed QC samples are included at the end of this appendix.

Table H1: Field and Laboratory Quality Control

Item	Evaluation / Acceptance Criteria	Compliance
Analytical laboratories used	NATA accreditation	C
Holding times	Various based on type of analysis	C
Intra-laboratory replicates	5% of primary samples; <30% RPD	PC
Trip Spikes	1 per sampling event; 60-140% recovery	C (see Table H5)
Trip Blanks	1 per sampling event; <PQL	C (see Table H6)
Laboratory / Reagent Blanks	1 per batch; <PQL	C
Matrix Spikes	1 per lab batch; 70-130% recovery (inorganics); 60-140% recovery (organics)	C
Surrogate Spikes	All organics analysis; 70-130% recovery (inorganics); 60-140% recovery (organics)	C
Control Samples	1 per lab batch; 70-130% recovery (inorganics); 60-140% recovery (organics)	C
Standard Operating Procedures (SOP)	Adopting SOP for all aspects of the sampling field work	C

Notes:
C = compliance; PC = partial compliance; NC = non-compliance

The RPD results were all within the acceptable range, with the exception of those indicated in bold in Table H3. The exceedances are not, however, considered to be of concern given that:

- The typically low actual differences in the concentrations of the replicate pairs where some RPD exceedances occurred;
- The number of replicate pairs being collected from fill soils which by its nature is heterogeneous;
- Replicates, rather than homogenised duplicates, were used to minimise risk of volatile loss, hence greater variability can be expected;
- Most of the recorded concentrations being relatively close to the PQL;
- The majority of RPDs within a replicate pair being within the acceptable limits; and
- All other QA/QC parameters met the DQIs.

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

H2.0 Data Quality Indicators

The reliability of field procedures and analytical results was assessed against the following data quality indicators (DQIs) as outlined in NEPC *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [NEPM]* (NEPC, 2013):

- 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.

Table H2: Data Quality Indicators

Data Quality Indicator	Method(s) of Achievement
Completeness	Target locations sampled.
	Preparation of borehole logs, sample location plan and chain of custody 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 chain of custody (COC) documentation.
	NATA accredited laboratory results certificates provided by the laboratory.
	Satisfactory frequency and results for field and laboratory quality control (QC) samples as discussed in Section 1.
Comparability	Using appropriate techniques for sample recovery, storage and transportation, which were the same for the duration of the project.
	Experienced sampler used.
	Use of NATA registered laboratory
	Satisfactory results for field and laboratory QC samples.
Representativeness	Target media sampled.
	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 COC.
Precision	Field staff followed standard operating procedures.
	Acceptable RPD between original samples and replicates.
	Satisfactory results for all other field and laboratory QC samples.
Accuracy	Field staff followed standard operating procedures.
	Satisfactory results for all field and laboratory QC samples.

Based on the above, it is considered that the DQIs have been generally complied with.

H3.0 Conclusion

Based on the results of the field QA and field and laboratory QC, and evaluation against the DQIs it is concluded that the field and laboratory test data obtained are reliable and useable for this assessment.

H4.0 References

NEPC. (2013). *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [NEPM].* Australian Government Publishing Services Canberra: National Environment Protection Council.

Douglas Partners Pty Ltd

Table H3: Relative Percentage Difference – Intra-laboratory Replicates for Soils (Metals, TRH, BTEX, PAH)

			Metals								TRH						BTEX				PAH			
			Arsenic	Cadmium	Total Chromium	Copper	Lead	Mercury (inorganic)	Nickel	Zinc	TRH C6 - C10	TRH >C10-C16	F1 ((C6-C10)-BTEX)	F2 (>C10-C16 less Naphthalene)	F3 (>C16-C34)	F4 (>C34-C40)	Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene [b]	Benzo(a)pyrene (BaP)	Benzo(a)pyrene TEQ	Total PAHs
Sample ID	Depth	Sample Date	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
QA1	0 - 0.1 m	22/10/2020	5	<0.4	5	3	6	<0.1	1	19	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	<0.05	<0.5	<0.05
6	0 - 0.1 m	22/10/2020	<4	<0.4	5	<1	4	<0.1	<1	5	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	<0.05	<0.5	<0.05
		Difference	1	0	0	2	2	0	0	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		RPD	22%	0%	0%	**100%**	**40%**	0%	0%	**117%**	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Table H4: Relative Percentage Difference – Intra-laboratory Replicates for Soils (OCP, OPP, PCB)

			OCP											OPP	PCB
			DDT+DDE+DDD [c]	DDD	DDE	DDT	Aldrin & Dieldrin	Total Chlordane	Total Endosulfan	Endrin	Heptachlor	Hexachlorobenzene	Methoxychlor	Chlorpyriphos	Total PCB
Sample ID	Depth	Sample Date	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
QA1	0 - 0.1 m	22/10/2020	<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
6	0 - 0.1 m	22/10/2020	<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
		Difference	0	0	0	0	0	0	0	0	0	0	0	0	0
		RPD	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Table H5: Trip Spike Results – Soil (mg/kg)

Sample ID	Benzene	Toluene	Ethylbenzene	m+p-Xylene	o-Xylene
TS	73	73	75	72	70

Table H6: Trip Blank Results – Soil (mg/kg)

Sample ID	Benzene	Toluene	Ethylbenzene	m+p-Xylene	o-Xylene
TB	<0.2	<0.5	<1	<2	<1

Appendix I

Data Quality Objectives

Appendix I
Data Quality Objectives

I1.0 Data Quality Objectives

The DSI has been devised broadly in accordance with the seven-step data quality objective (DQO) process which is provided in Appendix B, Schedule B2 of NEPC *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [NEPM]* (NEPC, 2013).

Step	Summary
1: State the problem	The objective of the investigation is to confirm the contamination status of the site with respect to the proposed land use. The investigation is being undertaken as the land is to be subdivided. A preliminary conceptual site model (CSM) has been prepared (Section 8) for the proposed development. The project team consisted of experienced environmental engineers and scientists working in the roles of Project Reviewer, Project Manager and Field staff.
2: Identify the decisions / goal of the study	The site history has identified possible contaminating previous uses which are identified in the CSM (Section 8). The CSM identifies the associated contaminants of potential concern (COPC) and the likely impacted media. The site assessment criteria (SAC) for each of the COPC are detailed in Appendix F. The decision is to establish whether or not the results fall below the SAC. On this basis, an assessment of the site's suitability from a contamination perspective and whether (or not) further assessment and / or remediation will be derived.
3: Identify the information inputs	Inputs to the investigation will be the results of analysis of samples to measure the concentration of COPC identified in the CSM (Section 8) at the site using NATA accredited laboratories and methods, where possible. The SAC for each of the COPC are detailed in Appendix F. A photoionisation detector (PID) will be used on-site to screen soils for VOC. PID readings will be used to inform sample selection for laboratory analysis.
4: Define the study boundaries	The lateral boundaries of the investigation area are shown on Drawing 1, Appendix A. The vertical boundaries are to the extent of contamination impact as determined from the site history assessment and site observations. The assessment is limited to the timeframe over which the field investigation was undertaken. Constraints to the assessment are identified and discussed in the conclusions of the report, Section 14.
5: Develop the analytical approach (or decision rule)	The decision rule is to compare all analytical results with the SAC (Appendix F) based on NEPC (2013)). Where guideline values are absent, other sources of guideline values accepted by NEPC (2013) shall be adopted where possible.

Step	Summary
	Where a sample result exceeds the adopted criterion, a further site-specific assessment will be made as to the risk posed by the presence of that contaminant(s). Initial comparisons will be with individual results then, where required, summary statistics (including mean, standard deviation and 95% upper confidence limit (UCL) of the arithmetic mean (95% UCL) to assess potential risks posed by the site contamination. Quality control results are to be assessed according to their relative percent difference (RPD) values. For field duplicates, triplicates and laboratory results, RPDs should generally be below 30%; for field blanks and rinsates, results should be at or less than the limits of reporting (NEPC, 2013). The field and laboratory quality assurance assessment is included in Appendix H.
6: Specify the performance or acceptance criteria	Baseline condition: Contaminants at the site exceed human health and environmental SAC and poses a potentially unacceptable risk to receptors (null hypothesis). Alternative condition: Contaminants at the site complies with human health and environmental SAC and as such, does not pose a potentially unacceptable risk to receptors (alternative hypothesis). Unless conclusive information from the collected data is sufficient to reject the null hypothesis, it is assumed that the baseline condition is true.
7: Optimise the design for obtaining data	As the purpose of the sampling program is to assess for potential contamination across the site, the sampling program is reliant on professional judgement to identify and sample the potentially affected areas. Further details regarding the proposed sampling plan are presented in Section 9.

I2.0 References

NEPC. (2013). *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [NEPM].* Australian Government Publishing Services Canberra: National Environment Protection Council.

Douglas Partners Pty Ltd

Appendix J

Laboratory Certificates of Analysis and Chain-of-Custody Documentation

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

CERTIFICATE OF ANALYSIS 254343

Client Details

Client	Douglas Partners Pty Ltd
Attention	Chamali Nagodavithane
Address	96 Hermitage Rd, West Ryde, NSW, 2114

Sample Details

Your Reference	**104136.00. Wyee**
Number of Samples	12 soil
Date samples received	27/10/2020
Date completed instructions received	27/10/2020

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	03/11/2020
Date of Issue	02/11/2020

NATA Accreditation Number 2901. This document shall not be reproduced except in full.

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

Asbestos Approved By
Analysed by Asbestos Approved Identifier: Lucy Zhu
Authorised by Asbestos Approved Signatory: Lucy Zhu

Results Approved By
Dragana Tomas, Senior Chemist
Hannah Nguyen, Senior Chemist
Josh Williams, Senior Chemist
Lucy Zhu, Asbestos Supervisor
Manju Dewendrage, Chemist
Priya Samarawickrama, Senior Chemist

Authorised By

Nancy Zhang, Laboratory Manager

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		254343-1	254343-2	254343-3	254343-4	254343-5
Your Reference	UNITS	1	2	3	4	5
Depth		0-0.1	0-0.12	0-0.1	0-0.1	0.4-0.5
Date Sampled		22/10/2020	22/10/2020	22/10/2020	22/10/2020	22/10/2020
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	28/10/2020	28/10/2020	28/10/2020	28/10/2020	28/10/2020
Date analysed	-	29/10/2020	29/10/2020	29/10/2020	29/10/2020	29/10/2020
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	<3	<3	<3	<3	<3
Surrogate aaa-Trifluorotoluene	%	115	98	131	121	129

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		254343-6	254343-7	254343-8	254343-9	254343-10
Your Reference	UNITS	6	7	8	QA1	TB
Depth		0-0.1	0.4-0.5	0.5-0.6	-	-
Date Sampled		22/10/2020	22/10/2020	22/10/2020	22/10/2020	22/10/2020
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	28/10/2020	28/10/2020	28/10/2020	28/10/2020	28/10/2020
Date analysed	-	29/10/2020	29/10/2020	29/10/2020	29/10/2020	29/10/2020
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	<3	<3	<3	<3	<3
Surrogate aaa-Trifluorotoluene	%	125	120	108	125	129

vTRH(C6-C10)/BTEXN in Soil			
Our Reference		254343-11	254343-12
Your Reference	UNITS	TS	8
Depth		-	0.9-1.0
Date Sampled		22/10/2020	22/10/2020
Type of sample		soil	soil
Date extracted	-	28/10/2020	28/10/2020
Date analysed	-	29/10/2020	29/10/2020
TRH C_6 - C_9	mg/kg	[NA]	<25
TRH C_6 - C_{10}	mg/kg	[NA]	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	[NA]	<25
Benzene	mg/kg	73%	<0.2
Toluene	mg/kg	73%	<0.5
Ethylbenzene	mg/kg	75%	<1
m+p-xylene	mg/kg	72%	<2
o-Xylene	mg/kg	70%	<1
naphthalene	mg/kg	[NA]	<1
Total +ve Xylenes	mg/kg	[NA]	<3
Surrogate aaa-Trifluorotoluene	%	117	125

svTRH (C10-C40) in Soil						
Our Reference		254343-1	254343-2	254343-3	254343-4	254343-5
Your Reference	UNITS	1	2	3	4	5
Depth		0-0.1	0-0.12	0-0.1	0-0.1	0.4-0.5
Date Sampled		22/10/2020	22/10/2020	22/10/2020	22/10/2020	22/10/2020
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	28/10/2020	28/10/2020	28/10/2020	28/10/2020	28/10/2020
Date analysed	-	29/10/2020	29/10/2020	29/10/2020	29/10/2020	29/10/2020
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	%	76	79	79	76	75

svTRH (C10-C40) in Soil						
Our Reference		254343-6	254343-7	254343-8	254343-9	254343-12
Your Reference	UNITS	6	7	8	QA1	8
Depth		0-0.1	0.4-0.5	0.5-0.6	-	0.9-1.0
Date Sampled		22/10/2020	22/10/2020	22/10/2020	22/10/2020	22/10/2020
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	28/10/2020	28/10/2020	28/10/2020	28/10/2020	28/10/2020
Date analysed	-	29/10/2020	29/10/2020	29/10/2020	29/10/2020	29/10/2020
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	%	77	74	72	70	76

PAHs in Soil						
Our Reference		254343-1	254343-2	254343-3	254343-4	254343-5
Your Reference	UNITS	1	2	3	4	5
Depth		0-0.1	0-0.12	0-0.1	0-0.1	0.4-0.5
Date Sampled		22/10/2020	22/10/2020	22/10/2020	22/10/2020	22/10/2020
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	28/10/2020	28/10/2020	28/10/2020	28/10/2020	28/10/2020
Date analysed	-	28/10/2020	28/10/2020	28/10/2020	28/10/2020	28/10/2020
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	%	90	88	86	89	88

PAHs in Soil						
Our Reference		254343-6	254343-7	254343-8	254343-9	254343-12
Your Reference	UNITS	6	7	8	QA1	8
Depth		0-0.1	0.4-0.5	0.5-0.6	-	0.9-1.0
Date Sampled		22/10/2020	22/10/2020	22/10/2020	22/10/2020	22/10/2020
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	28/10/2020	28/10/2020	28/10/2020	28/10/2020	28/10/2020
Date analysed	-	28/10/2020	28/10/2020	28/10/2020	28/10/2020	28/10/2020
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	%	87	88	92	92	92

Organochlorine Pesticides in soil						
Our Reference		254343-1	254343-2	254343-3	254343-4	254343-5
Your Reference	UNITS	1	2	3	4	5
Depth		0-0.1	0-0.12	0-0.1	0-0.1	0.4-0.5
Date Sampled		22/10/2020	22/10/2020	22/10/2020	22/10/2020	22/10/2020
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	28/10/2020	28/10/2020	28/10/2020	28/10/2020	28/10/2020
Date analysed	-	28/10/2020	28/10/2020	28/10/2020	28/10/2020	28/10/2020
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
HCB	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
gamma-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
Endosulfan II	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
Endrin Aldehyde	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
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	%	89	88	90	87	89

Organochlorine Pesticides in soil				
Our Reference		254343-6	254343-8	254343-9
Your Reference	UNITS	6	8	QA1
Depth		0-0.1	0.5-0.6	-
Date Sampled		22/10/2020	22/10/2020	22/10/2020
Type of sample		soil	soil	soil
Date extracted	-	28/10/2020	28/10/2020	28/10/2020
Date analysed	-	28/10/2020	28/10/2020	28/10/2020
alpha-BHC	mg/kg	<0.1	<0.1	<0.1
HCB	mg/kg	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1
Surrogate TCMX	%	88	93	91

Organophosphorus Pesticides in Soil						
Our Reference		254343-1	254343-2	254343-3	254343-4	254343-5
Your Reference	UNITS	1	2	3	4	5
Depth		0-0.1	0-0.12	0-0.1	0-0.1	0.4-0.5
Date Sampled		22/10/2020	22/10/2020	22/10/2020	22/10/2020	22/10/2020
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	28/10/2020	28/10/2020	28/10/2020	28/10/2020	28/10/2020
Date analysed	-	28/10/2020	28/10/2020	28/10/2020	28/10/2020	28/10/2020
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	89	88	90	87	89

Organophosphorus Pesticides in Soil				
Our Reference		254343-6	254343-8	254343-9
Your Reference	UNITS	6	8	QA1
Depth		0-0.1	0.5-0.6	-
Date Sampled		22/10/2020	22/10/2020	22/10/2020
Type of sample		soil	soil	soil
Date extracted	-	28/10/2020	28/10/2020	28/10/2020
Date analysed	-	28/10/2020	28/10/2020	28/10/2020
Dichlorvos	mg/kg	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1
Surrogate TCMX	%	88	93	91

PCBs in Soil					
Our Reference		254343-5	254343-6	254343-8	254343-9
Your Reference	UNITS	5	6	8	QA1
Depth		0.4-0.5	0-0.1	0.5-0.6	-
Date Sampled		22/10/2020	22/10/2020	22/10/2020	22/10/2020
Type of sample		soil	soil	soil	soil
Date extracted	-	28/10/2020	28/10/2020	28/10/2020	28/10/2020
Date analysed	-	28/10/2020	28/10/2020	28/10/2020	28/10/2020
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	89	88	93	91

Acid Extractable metals in soil						
Our Reference		254343-1	254343-2	254343-3	254343-4	254343-5
Your Reference	UNITS	1	2	3	4	5
Depth		0-0.1	0-0.12	0-0.1	0-0.1	0.4-0.5
Date Sampled		22/10/2020	22/10/2020	22/10/2020	22/10/2020	22/10/2020
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	28/10/2020	28/10/2020	28/10/2020	28/10/2020	28/10/2020
Date analysed	-	28/10/2020	28/10/2020	28/10/2020	28/10/2020	28/10/2020
Arsenic	mg/kg	<4	<4	<4	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	2	4	4	4	7
Copper	mg/kg	3	7	5	14	<1
Lead	mg/kg	3	6	8	12	7
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	<1	<1	<1	1	<1
Zinc	mg/kg	14	25	21	69	5

Acid Extractable metals in soil						
Our Reference		254343-6	254343-7	254343-8	254343-9	254343-12
Your Reference	UNITS	6	7	8	QA1	8
Depth		0-0.1	0.4-0.5	0.5-0.6	-	0.9-1.0
Date Sampled		22/10/2020	22/10/2020	22/10/2020	22/10/2020	22/10/2020
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	28/10/2020	28/10/2020	28/10/2020	28/10/2020	28/10/2020
Date analysed	-	28/10/2020	28/10/2020	28/10/2020	28/10/2020	28/10/2020
Arsenic	mg/kg	<4	<4	<4	5	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	5	21	6	5	2
Copper	mg/kg	<1	<1	1	3	<1
Lead	mg/kg	4	10	6	6	3
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	<1	<1	3	1	<1
Zinc	mg/kg	5	10	110	19	5

Moisture						
Our Reference		254343-1	254343-2	254343-3	254343-4	254343-5
Your Reference	UNITS	1	2	3	4	5
Depth		0-0.1	0-0.12	0-0.1	0-0.1	0.4-0.5
Date Sampled		22/10/2020	22/10/2020	22/10/2020	22/10/2020	22/10/2020
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	28/10/2020	28/10/2020	28/10/2020	28/10/2020	28/10/2020
Date analysed	-	29/10/2020	29/10/2020	29/10/2020	29/10/2020	29/10/2020
Moisture	%	9.2	14	8.8	18	24

Moisture						
Our Reference		254343-6	254343-7	254343-8	254343-9	254343-12
Your Reference	UNITS	6	7	8	QA1	8
Depth		0-0.1	0.4-0.5	0.5-0.6	-	0.9-1.0
Date Sampled		22/10/2020	22/10/2020	22/10/2020	22/10/2020	22/10/2020
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	28/10/2020	28/10/2020	28/10/2020	28/10/2020	28/10/2020
Date analysed	-	29/10/2020	29/10/2020	29/10/2020	29/10/2020	29/10/2020
Moisture	%	24	22	7.1	20	6.8

Asbestos ID - soils				
Our Reference		254343-5	254343-6	254343-8
Your Reference	UNITS	5	6	8
Depth		0.4-0.5	0-0.1	0.5-0.6
Date Sampled		22/10/2020	22/10/2020	22/10/2020
Type of sample		soil	soil	soil
Date analysed	-	30/10/2020	30/10/2020	30/10/2020
Sample mass tested	g	Approx. 15g	Approx. 30g	Approx. 15g
Sample Description	-	Grey coarse-grained soil & rocks	Grey coarse-grained soil & rocks	Brown coarse-grained soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Asbestos comments	-	NO	NO	NO
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected

Misc Inorg - Soil			
Our Reference		254343-4	254343-12
Your Reference	UNITS	4	8
Depth		0-0.1	0.9-1.0
Date Sampled		22/10/2020	22/10/2020
Type of sample		soil	soil
Date prepared	-	29/10/2020	29/10/2020
Date analysed	-	29/10/2020	29/10/2020
pH 1:5 soil:water	pH Units	6.4	7.9

CEC			
Our Reference		254343-4	254343-12
Your Reference	UNITS	4	8
Depth		0-0.1	0.9-1.0
Date Sampled		22/10/2020	22/10/2020
Type of sample		soil	soil
Date prepared	-	30/10/2020	30/10/2020
Date analysed	-	30/10/2020	30/10/2020
Exchangeable Ca	meq/100g	6.9	1.4
Exchangeable K	meq/100g	0.3	<0.1
Exchangeable Mg	meq/100g	1.9	<0.1
Exchangeable Na	meq/100g	<0.1	<0.1
Cation Exchange Capacity	meq/100g	9.1	1.5

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-001	pH - Measured using pH meter and electrode in accordance with APHA latest edition, 4500-H+. Please note that the results for water analyses are indicative only, as analysis outside of the APHA storage times.
Inorg-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
Metals-020	Determination of various metals by ICP-AES.
Metals-020	Determination of exchangeable cations and cation exchange capacity in soils using 1M Ammonium Chloride exchange and ICP-AES analytical finish.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Org-020	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-020	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-021	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD.
Org-021	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.
Org-022	Determination of VOCs sampled onto coconut shell charcoal sorbent tubes, that can be desorbed using carbon disulphide, and analysed by GC-MS.
Org-022/025	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS/GC-MSMS.
Org-022/025	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-MS/GC-MSMS. 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.

Method ID	Methodology Summary
Org-022/025	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS and/or GC-MS/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-023	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS.
Org-023	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-023	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-6	254343-6
Date extracted	-			28/10/2020	5	28/10/2020	28/10/2020		28/10/2020	28/10/2020
Date analysed	-			29/10/2020	5	29/10/2020	29/10/2020		29/10/2020	29/10/2020
TRH C_6 - C_9	mg/kg	25	Org-023	<25	5	<25	<25	0	119	112
TRH C_6 - C_{10}	mg/kg	25	Org-023	<25	5	<25	<25	0	119	112
Benzene	mg/kg	0.2	Org-023	<0.2	5	<0.2	<0.2	0	126	114
Toluene	mg/kg	0.5	Org-023	<0.5	5	<0.5	<0.5	0	121	112
Ethylbenzene	mg/kg	1	Org-023	<1	5	<1	<1	0	129	110
m+p-xylene	mg/kg	2	Org-023	<2	5	<2	<2	0	109	113
o-Xylene	mg/kg	1	Org-023	<1	5	<1	<1	0	108	112
naphthalene	mg/kg	1	Org-023	<1	5	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-023	130	5	129	107	19	127	128

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-5	254343-6
Date extracted	-			28/10/2020	5	28/10/2020	28/10/2020		28/10/2020	28/10/2020
Date analysed	-			28/10/2020	5	29/10/2020	29/10/2020		28/10/2020	28/10/2020
TRH C_{10} - C_{14}	mg/kg	50	Org-020	<50	5	<50	<50	0	114	99
TRH C_{15} - C_{28}	mg/kg	100	Org-020	<100	5	<100	<100	0	96	81
TRH C_{29} - C_{36}	mg/kg	100	Org-020	<100	5	<100	<100	0	77	99
TRH >C_{10} -C_{16}	mg/kg	50	Org-020	<50	5	<50	<50	0	114	99
TRH >C_{16} -C_{34}	mg/kg	100	Org-020	<100	5	<100	<100	0	96	81
TRH >C_{34} -C_{40}	mg/kg	100	Org-020	<100	5	<100	<100	0	77	99
Surrogate o-Terphenyl	%		Org-020	72	5	75	78	4	81	90

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-6	254343-6
Date extracted	-			28/10/2020	5	28/10/2020	28/10/2020		28/10/2020	28/10/2020
Date analysed	-			28/10/2020	5	28/10/2020	28/10/2020		28/10/2020	28/10/2020
Naphthalene	mg/kg	0.1	Org-022/025	<0.1	5	<0.1	<0.1	0	97	95
Acenaphthylene	mg/kg	0.1	Org-022/025	<0.1	5	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-022/025	<0.1	5	<0.1	<0.1	0	104	103
Fluorene	mg/kg	0.1	Org-022/025	<0.1	5	<0.1	<0.1	0	100	95
Phenanthrene	mg/kg	0.1	Org-022/025	<0.1	5	<0.1	<0.1	0	111	111
Anthracene	mg/kg	0.1	Org-022/025	<0.1	5	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-022/025	<0.1	5	<0.1	<0.1	0	107	109
Pyrene	mg/kg	0.1	Org-022/025	<0.1	5	<0.1	<0.1	0	109	113
Benzo(a)anthracene	mg/kg	0.1	Org-022/025	<0.1	5	<0.1	<0.1	0	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-022/025	<0.1	5	<0.1	<0.1	0	116	112
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-022/025	<0.2	5	<0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-022/025	<0.05	5	<0.05	<0.05	0	90	93
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-022/025	<0.1	5	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-022/025	<0.1	5	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-022/025	<0.1	5	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-022/025	85	5	88	91	3	82	83

QUALITY CONTROL: Organochlorine Pesticides in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-6	254343-6
Date extracted	-			28/10/2020	5	28/10/2020	28/10/2020		28/10/2020	28/10/2020
Date analysed	-			28/10/2020	5	28/10/2020	28/10/2020		28/10/2020	28/10/2020
alpha-BHC	mg/kg	0.1	Org-022/025	<0.1	5	<0.1	<0.1	0	94	94
HCB	mg/kg	0.1	Org-022/025	<0.1	5	<0.1	<0.1	0	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-022/025	<0.1	5	<0.1	<0.1	0	100	92
gamma-BHC	mg/kg	0.1	Org-022/025	<0.1	5	<0.1	<0.1	0	[NT]	[NT]
Heptachlor	mg/kg	0.1	Org-022/025	<0.1	5	<0.1	<0.1	0	113	99
delta-BHC	mg/kg	0.1	Org-022/025	<0.1	5	<0.1	<0.1	0	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-022/025	<0.1	5	<0.1	<0.1	0	103	110
Heptachlor Epoxide	mg/kg	0.1	Org-022/025	<0.1	5	<0.1	<0.1	0	101	107
gamma-Chlordane	mg/kg	0.1	Org-022/025	<0.1	5	<0.1	<0.1	0	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-022/025	<0.1	5	<0.1	<0.1	0	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-022/025	<0.1	5	<0.1	<0.1	0	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-022/025	<0.1	5	<0.1	<0.1	0	101	104
Dieldrin	mg/kg	0.1	Org-022/025	<0.1	5	<0.1	<0.1	0	97	103
Endrin	mg/kg	0.1	Org-022/025	<0.1	5	<0.1	<0.1	0	77	111
Endosulfan II	mg/kg	0.1	Org-022/025	<0.1	5	<0.1	<0.1	0	[NT]	[NT]
pp-DDD	mg/kg	0.1	Org-022/025	<0.1	5	<0.1	<0.1	0	79	83
Endrin Aldehyde	mg/kg	0.1	Org-022/025	<0.1	5	<0.1	<0.1	0	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-022/025	<0.1	5	<0.1	<0.1	0	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-022/025	<0.1	5	<0.1	<0.1	0	84	86
Methoxychlor	mg/kg	0.1	Org-022/025	<0.1	5	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-022/025	92	5	89	90	1	86	83

QUALITY CONTROL: Organophosphorus Pesticides in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-6	254343-6
Date extracted	-			28/10/2020	5	28/10/2020	28/10/2020		28/10/2020	28/10/2020
Date analysed	-			28/10/2020	5	28/10/2020	28/10/2020		28/10/2020	28/10/2020
Dichlorvos	mg/kg	0.1	Org-022/025	<0.1	5	<0.1	<0.1	0	78	104
Dimethoate	mg/kg	0.1	Org-022/025	<0.1	5	<0.1	<0.1	0	[NT]	[NT]
Diazinon	mg/kg	0.1	Org-022/025	<0.1	5	<0.1	<0.1	0	[NT]	[NT]
Chlorpyriphos-methyl	mg/kg	0.1	Org-022/025	<0.1	5	<0.1	<0.1	0	[NT]	[NT]
Ronnel	mg/kg	0.1	Org-022/025	<0.1	5	<0.1	<0.1	0	96	98
Fenitrothion	mg/kg	0.1	Org-022/025	<0.1	5	<0.1	<0.1	0	81	83
Malathion	mg/kg	0.1	Org-022/025	<0.1	5	<0.1	<0.1	0	80	100
Chlorpyriphos	mg/kg	0.1	Org-022/025	<0.1	5	<0.1	<0.1	0	93	99
Parathion	mg/kg	0.1	Org-022/025	<0.1	5	<0.1	<0.1	0	82	90
Bromophos-ethyl	mg/kg	0.1	Org-022	<0.1	5	<0.1	<0.1	0	[NT]	[NT]
Ethion	mg/kg	0.1	Org-022/025	<0.1	5	<0.1	<0.1	0	89	101
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-022/025	<0.1	5	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-022/025	92	5	89	90	1	86	83

QUALITY CONTROL: PCBs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-6	254343-6
Date extracted	-			28/10/2020	5	28/10/2020	28/10/2020		28/10/2020	28/10/2020
Date analysed	-			28/10/2020	5	28/10/2020	28/10/2020		28/10/2020	28/10/2020
Aroclor 1016	mg/kg	0.1	Org-021	<0.1	5	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-021	<0.1	5	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-021	<0.1	5	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-021	<0.1	5	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-021	<0.1	5	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-021	<0.1	5	<0.1	<0.1	0	100	100
Aroclor 1260	mg/kg	0.1	Org-021	<0.1	5	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-021	92	5	89	90	1	86	83

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-6	254343-6
Date prepared	-			28/10/2020	5	28/10/2020	28/10/2020		28/10/2020	28/10/2020
Date analysed	-			28/10/2020	5	28/10/2020	28/10/2020		28/10/2020	28/10/2020
Arsenic	mg/kg	4	Metals-020	<4	5	<4	<4	0	104	78
Cadmium	mg/kg	0.4	Metals-020	<0.4	5	<0.4	<0.4	0	108	84
Chromium	mg/kg	1	Metals-020	<1	5	7	6	15	99	83
Copper	mg/kg	1	Metals-020	<1	5	<1	<1	0	115	85
Lead	mg/kg	1	Metals-020	<1	5	7	5	33	111	80
Mercury	mg/kg	0.1	Metals-021	<0.1	5	<0.1	<0.1	0	90	78
Nickel	mg/kg	1	Metals-020	<1	5	<1	<1	0	98	75
Zinc	mg/kg	1	Metals-020	<1	5	5	5	0	108	81

QUALITY CONTROL: Misc Inorg - Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-6	[NT]
Date prepared	-			29/10/2020	[NT]	[NT]	[NT]	[NT]	29/10/2020	[NT]
Date analysed	-			29/10/2020	[NT]	[NT]	[NT]	[NT]	29/10/2020	[NT]
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	[NT]	[NT]	[NT]	[NT]	101	[NT]

QUALITY CONTROL: CEC						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			30/10/2020	[NT]	[NT]	[NT]	[NT]	30/10/2020	[NT]
Date analysed	-			30/10/2020	[NT]	[NT]	[NT]	[NT]	30/10/2020	[NT]
Exchangeable Ca	meq/100g	0.1	Metals-020	<0.1	[NT]	[NT]	[NT]	[NT]	109	[NT]
Exchangeable K	meq/100g	0.1	Metals-020	<0.1	[NT]	[NT]	[NT]	[NT]	110	[NT]
Exchangeable Mg	meq/100g	0.1	Metals-020	<0.1	[NT]	[NT]	[NT]	[NT]	111	[NT]
Exchangeable Na	meq/100g	0.1	Metals-020	<0.1	[NT]	[NT]	[NT]	[NT]	108	[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.

The recommended maximums for analytes in urine are taken from “2018 TLVs and BEIs”, as published by ACGIH (where available). Limit provided for Nickel is a precautionary guideline as per Position Paper prepared by AIOH Exposure Standards Committee, 2016.

Guideline limits for Rinse Water Quality reported as per analytical requirements and specifications of AS 4187, Amdt 2 2019, Table 7.2

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: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals (not SPOCAS); 60-140% for organics/SPOCAS (+/-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.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC and/or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, total recoverable metals and PFAS where solids are included by default.

Samples for Microbiological analysis (not Amoeba forms) received outside of the 2-8°C temperature range do not meet the ideal cooling conditions as stated in AS2031-2012.

Report Comments

Asbestos: A portion of the supplied samples were sub-sampled for asbestos analysis according to Envirolab procedures.
We cannot guarantee that these sub-samples are indicative of the entire sample.
Envirolab recommends supplying 40-50g of sample in its own container.
Note: Samples 254343-5,6,8 were sub-sampled from jars provided by the client.

Douglas Partners
Geotechnics / Environment / Groundwater

CHAIN OF CUSTODY DESPATCH SHEET

Project No:	104136.00	**Suburb:**	Wyee	**To:**	Envirolab Services Sydney
Project Name:	Wyee	**Order Number**			
Project Manager:	Chamali	**Sampler:**	CLN	**Attn:**	Aileen Hie
Emails:	chamali.n@douglaspartners.com.au			**Phone:**	
Date Required:	Same day ☐ 24 hours ☐ 48 hours ☐ 72 hours ☐ Standard ☒			**Email:**	ahie@envirolab.com.au
Prior Storage:	☐ Esky ☒ Fridge ☐ Shelved	Do samples contain 'potential' HBM?	Yes ☐ No ☐ (If YES, then handle, transport and store in accordance with FPM HAZID)		

Sample ID	Lab ID	Date Sampled	Sample Type (S - soil, W - water)	Container Type (G - glass, P - plastic)	Analytes: Combo 6a	Combo 5b	TRH and BTEXN	pH and CEC	Combo 6	BTEX	Combo 3			Notes/preservation
1/0-0.1	1	22/10/20	S	G		x								
2/0~~0.1~~ 0.2	0-0.1 2	22/10/20	S	G		x								
3/ 0-0.1	3	22/10/20	S	G		x								
4 / 0-0.1	4	22/10/20	S	G		x		x						
5 / 0.4- 0.5	5	22/10/20	S	G	x									
6 / 0 - 0.1	6	22/10/20	S	G	x									
7/ 0.4 - 0.5	7	22/10/20	S	G							x			
8 / 0.5 - 0.6	8	22/10/20	S	G	x									
QA1	9	22/10/20	S	G					x					
TB	10		S	G			x							
TS	11		S	G						x				
8 / 0.9 -1.0	12	22/10/20	S	G				x			x			
PQL (S) mg/kg														**ANZECC PQLs req'd for all water analytes** ☐

Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph: (02) 9910 6200
Job No: 254343
Date Received: 27/10/2020
Time Received: 10:45
Received By: MT
Temp: Cool/Ambient 12-3
Cooling: Ice/Icepack
Security: Intact/Broken/None

PQL = practical quantitation limit. If none given, default to Laboratory Method Detection Limit

Metals to Analyse: 8HM unless specified here:

Lab Report/Reference No: 254343

Total number of samples in container:

Relinquished by:

Transported to laboratory by:

Send Results to: Douglas Partners Pty Ltd

Address

Phone: **Fax:**

Signed: Chamali N

Received by: Ming Yan Zo

Date & Time: 27/10/2020 10:45

12-3°C.