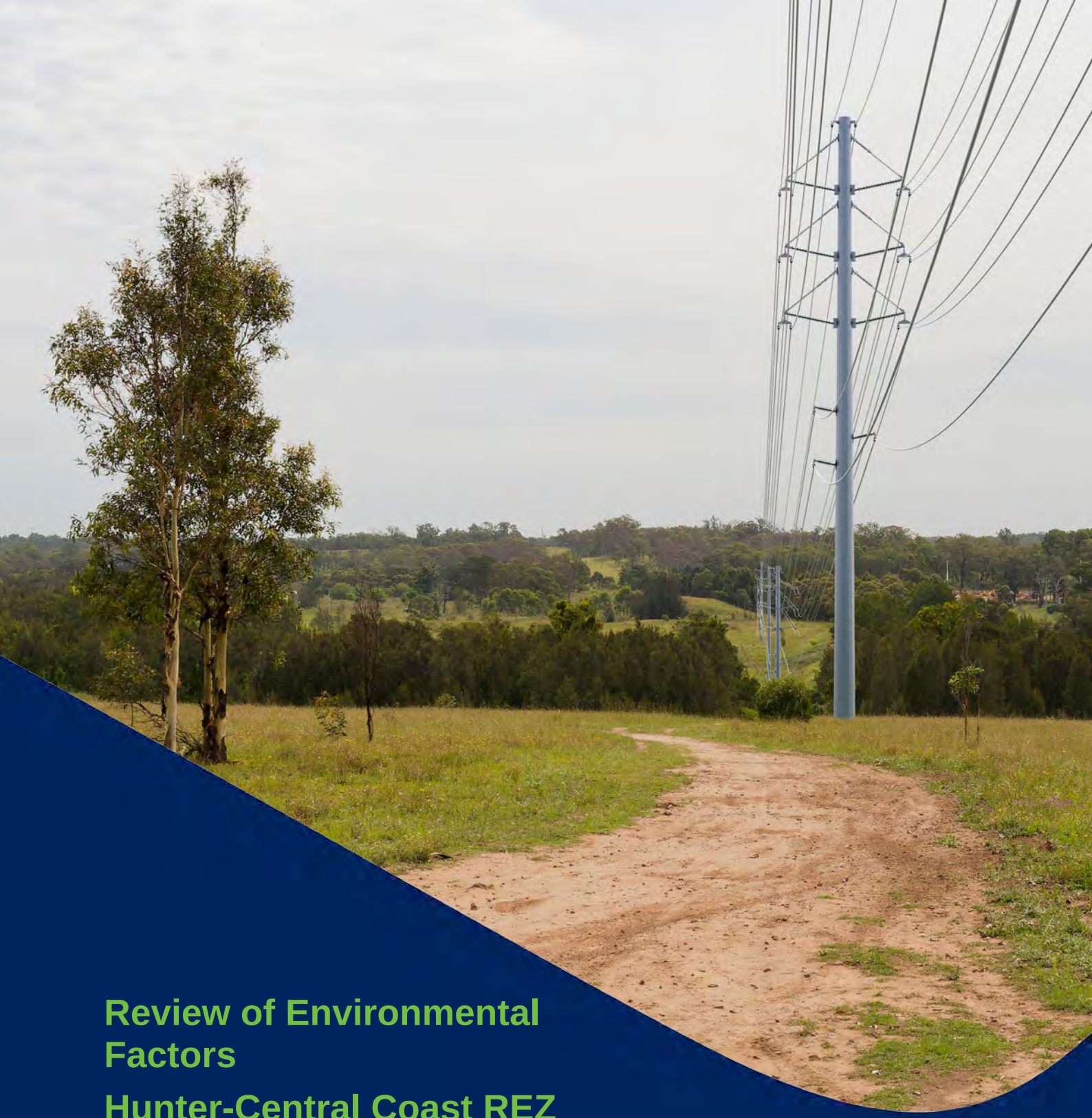

Review of Environmental Factors

Hunter-Central Coast REZ Network Infrastructure

Appendix H - Contamination Reports

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Integrated Practical Solutions

Report on
Preliminary Site Investigation (Contamination)

New Sub-Transmission Substation
Lot 9 DP250890 Hebden Road, Muswellbrook

Prepared for
Ausgrid

Project 224764.00
November 2023

Douglas Partners
Geotechnics / Environment / Groundwater

Document History

Document details

Project No.	224764.00	Document No.	R.001.Rev0
Document title	Report on Preliminary Site Investigation New Sub-Transmission Substation		
Site address	Lot 9 DP250890 Hebden Road, Muswellbrook		
Report prepared for	Ausgrid		
File name	224764.00.R.001.Rev0.contam.docx		

Document status and review

Status	Prepared by	Reviewed by	Date issued
Revision 0	Patrick Heads	Glyn Eade	27 November 2023

Distribution of copies

Status	Electronic	Paper	Issued to
Revision 0	1	0	Paul Hurst, Ausgrid

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	Patrick Heads	27 November 2023
Reviewer	Glyn Eade	27 November 2023

Douglas Partners acknowledges Australia's First Peoples as the Traditional Owners of the Land and Sea on which we operate. We pay our respects to Elders past and present and to all Aboriginal and Torres Strait Islander peoples across the many communities in which we live, visit and work. We recognise and respect their ongoing cultural and spiritual connection to Country.

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Executive Summary

Douglas Partners Pty Ltd (DP) has been engaged by Ausgrid to prepare this preliminary site investigation (contamination) (PSI) undertaken for a new sub-transmission substation for the site within Lot 9 DP250890 Hebden Road, Muswellbrook.

The objective of the PSI is to assess the potential for contamination at the site based on past and present land uses and activities and to comment on the need for further investigation and/or management with regard to the proposed development.

The scope of work for the PSI comprised a review of site history information (historical titles, historical aerial photos, Council information), a site walkover and preparation of a conceptual site model. Selected soil samples were collected from the geotechnical investigation boreholes for analysis of contaminants of concern. In addition, three groundwater monitoring wells were installed in selected boreholes as part of the geotechnical investigation. The wells were dry at the time of sampling.

The results of the PSI indicated that the site had formerly and current been used for agricultural purposes both prior to and following construction of Lake Lidell, which is located immediately south of the site. Identified contamination sources included the former agricultural site activities and the adjacent road and rail activities.

Based on the site history, site observations and the results of preliminary soil testing, the potential for gross contamination at the site is considered to be low. The site is likely to be suitable for the proposed industrial use.

Surface water testing of the adjacent Lake Lidell was conducted at the request of the client. The results of surface water testing indicated the absence of gross contamination in the water samples tested. Some slightly elevated concentrations of contaminants were identified in the surface water samples, including metals and low-level PFAS. The results of testing indicated some elevated metal concentrations, with identified contaminants commensurate with previous testing of Lake Lidell.

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Report on Preliminary Site Investigation (Contamination)
New Sub-Transmission Substation
Lot 9 DP250890 Hebden Road, Muswellbrook

1. Introduction

Douglas Partners Pty Ltd (DP) has been engaged by Ausgrid to prepare this preliminary site investigation (contamination) (PSI) conducted for a new sub-transmission substation for the site at Lot 9 DP250890 Hebden Road, Muswellbrook (hereinafter referred to as the 'site'). The site locality and layout are shown on Drawing 1, Appendix A.

The investigation was conducted with reference to DP's proposal 224764.00.P.001.Rev1 dated 18 September 2023.

The objective of the PSI is to assess the potential for contamination at the site based on past and present land uses and activities 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 (DA) for the proposed development.

This report must be read in conjunction with all appendices including the notes provided in Appendix B.

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) [the 'NEPM']* (NEPC, 2013); and
- NSW EPA *Guidelines for Consultants Reporting on Contaminated Land* (NSW EPA, 2020).

2. Proposed Development

The proposed works within the substation site will comprise an outdoor switch yard and a prefabricated single storey metal clad and steel framed building (Mobile Equipment Room or 'MER') to be installed on top of foundations. The proposed works would also include two synchronous condensers and associated foundations and buildings.

Associated electrical infrastructure works may include either a new or a modified concrete bunded transformer bay with new masonry or precast fire wall, some steelwork framed cable support structures and a number of in-ground conduit banks and possibly concrete cable jointing pits.

The approximate layout of the proposed development is shown on Drawing 1, Appendix A.

3. Scope of Works

The scope of works conducted for this PSI included:

- Review of previous investigations conducted at the site (if any) and nearby sites by DP for translatable information;
- Review of available published information on the site, including geological, topographical, acid sulfate soil and soil landscape maps and registered groundwater bores;
- Site history review, including an aerial photograph review, council and EPA record searches, and a historical titles search, to assess the potential for contamination at the site.
- Site inspection by a DP engineer, as well as discussions with the site owner, to assess current and past site conditions and identify areas of potential contamination;
- Preliminary subsurface investigation and contamination testing, conducted in conjunction with a geotechnical assessment (reported under separate cover), comprising:
    - Drilling 29 boreholes using a Hanjin 8-D track mounted drill rig equipped with a 100 mm diameter solid flight auger, drilled in conjunction with a concurrent geotechnical investigation at the site;
    - Logging of subsurface conditions and observations of contaminants, where encountered;
    - Collection of soil samples at regular intervals (0.0 to 0.1 m and 0.5 m);
    - Screening of replicate soil samples with a calibrated photo-ionisation detector (PID) to assess for the presence of volatile organic compounds (VOC);
    - Installation of three groundwater monitoring wells in drilled boreholes within the site to assess for the presence of groundwater and conduct a preliminary assessment of groundwater quality (if encountered)
    - Laboratory testing of selected soil samples for the following:
        - Eight samples for metals, total recoverable hydrocarbons (TRH), benzene, toluene, ethylene, and xylene (BTEX), polycyclic aromatic hydrocarbons (PAH), organochlorine pesticides (OCP), organophosphorus pesticides (OPP), polychlorinated biphenyls (PCB) and phenols;
        - Three samples for pH, electrical conductivity (EC), and cation exchange capacity (CEC); and
        - Six samples for aggressivity suite (pH, EC, sulfate, and chloride)
    - Collection of two surface water samples and subsequent laboratory testing of two samples for metals, TRH, PAH, OCP, PCB, nitrogen species (i.e. nitrate, nitrite, total nitrogen, TKN, ammonia), per- and polyfluorinated substances (PFAS), phosphorus (reactive and total), anions and cations, total suspended soils (TSS) and total dissolved soils (TDS), alkalinity and hardness, and pH and EC.
- Preparation of a preliminary conceptual site model (CSM) as required by NEPC (2013); and
- Preparation of this PSI report presenting the findings of the investigation.

4. Site Information

Site Address	Lot 9 DP250890 Hebden Road, Muswellbrook
Legal Description	Lot 9 Deposited Plan 250890
Approximate Area	8.9 ha
Zoning	Zone RE1 Public Recreation
Local Council Area	Muswellbrook Shire Council
Current Use	Vacant – grazing land
Surrounding Uses	North – Hebden Road and Main Northern Railway East – vacant South – Lake Lidell West – Vacant, Lake Lidell and camping area

Figure 1: Site Location (in yellow)

5. Environmental Setting

Regional Topography	The site is located at the base of Well Mountain, the peak lying approximately 2.5 km north of the site and falls towards the site from approximately relative level (RL) 400 m relative to the Australian Height Datum (AHD). Rolling hill and gully formations are present immediately north, east and west with levels between approximately RL 130 and 170.

Site Topography	The site falls from the northern boundary, generally to the south, south-east and south-west at approximately 3% from a maximum RL 138 m AHD adjacent to Hebden Road, to approximately RL 128 m AHD adjacent to Lake Lidell.
Soil Landscape	Lidell Soil Landscape. This soil landscape covers undulating low hills and undulating hills in the Liddell Power Station area. The main soils are Yellow Soloths on slopes with some Yellow Solodic Soils on concave slopes. There are Earthy and Siliceous Sands on mid to lower slopes where the parent material is more sandy. There are some Red Soloths, Red Solodic Soils and Red Podzolic Soils. The soil types generally equate to upper sandy loam/loam topsoils underlain by clay, sandy clay and some sands.
Geology	Reference to the NSW Hunter Coalfield Regional geology sheet (1:100 000) indicates that the western portion of the site is underlain by Permian aged Mulbring Siltstone, part of the Maitland Group, which comprises siltstone, claystone and minor fine-grained sandstone. The eastern portion of the site is underlain by late Permian Saltwater Creek formation of the Whittingham Coal Measures which forms part of the Singleton Supergroup and is characterised by sandstone, siltstone and minor coaly bands
Acid Sulfate Soils	The site is outside a mapped area of acid sulfate soils
Surface Water	Lake Lidell is located adjacent to the southern site boundary and is considered to be the nearest sensitive receptor. Lake Lidell has been historically used as cooling water and discharge water body for the nearby Lidell Power Station
Groundwater	A search of the publicly available registered groundwater bore database indicated that the nearest registered groundwater well (GW0205243) is located approximately 1.6 km south-east of the site and is registered as a monitoring bore. Subsurface conditions in the borehole generally comprised clay to 1.5 m below the surface, underlain by sandstone and siltstone. The well was installed to 45 m depth and the standing water level was measured at 23.6 m below ground level (bgl). The well was installed in Archerfield Sandstone & Vane Subgroup of the Whittingham Coal Measures. Based on the regional topography and the inferred flow direction of nearby water courses, the anticipated flow direction of groundwater beneath the site is to the south towards Lake Lidell, the likely receiving surface water body for the groundwater flow path.

6. Site History

6.1 Historical Aerial Photography

Several historical aerial photographs were obtained from public databases. Extracts of the aerial photographs are included in Appendix C. A summary of key features observed for the site and surrounding land is presented in Table 1.

Table 1: Summary of Historical Aerial Photographs

Year	Site	Surrounding Land Use
1958	The site was vacant and grassed and appeared to comprise grazing land	Surrounding land use appeared to comprise grazing land.
1974	The site was vacant and grassed and appeared to comprise grazing land	Lake Lidell was present immediately south of the site. A road was present on the northern boundary. A rail line was located to the north of the site. Surrounding land use appeared to comprise grazing land. Some small structures and unpaved tracks were present on the site to the west. A drainage line and surface water body were present to the east of the site, flowing from the rail corridor to Lake Lidell
1989	Similar to previous photograph	Similar to previous photograph
1993	Similar to previous photograph. Some tree growth in the far north-western corner of the site	Similar to previous photograph
1999	Similar to previous photograph. Increased tree growth in the north-western corner and northern site boundary	Similar to previous photograph. Some tree growth around the Lake Lidell shoreline, to the south of the site
2007	Similar to previous photograph. Increased tree growth in the far north-western corner of the site	Similar to previous photograph. Increased tree growth around the Lake Lidell shoreline, to the south of the site
2013	Similar to previous photograph. Increased tree growth in the far north-western corner of the site	Similar to previous photograph. Increased tree growth around the Lake Lidell shoreline, to the south of the site. Some additional structures to the west of the site. Some unpaved tracks and possible small structures were present within the rail corridor to the north of the site
2023	Similar to previous photograph. Increased tree growth in the far north-western corner of the site	Similar to previous photograph. Increased tree growth around the Lake Lidell shoreline, to the south of the site. Some additional structures are present to the west of the site.

6.2 Title Deeds

A historical title deeds search was used to obtain ownership and occupancy information including company names and the occupations of individuals. The title information can assist in the identification of previous land uses by the company names or the site owners and can, therefore, assist in establishing whether there were potentially contaminating activities occurring at the site. The results of the title deed search are provided in Appendix D. A summary of the title deeds and possible land uses (with reference to the aerial photographs and other historical searches) is presented in Table 2.

Table 2: Historical Title Deeds

Date of Acquisition and Term Held	Registered Proprietor(s) & Occupations	Inferred Land Use
19.09.1924 (1924 to 1928)	Ernest Thompson (Farmer)	Grazing/agricultural
27.06.1928 (1928 to 1939)	Chard Hilston Neve (Farmer)	Grazing/agricultural
06.01.1939 (1939 to 1946)	Enid Raby Marshall (Married Woman)	Grazing/agricultural
23.08.1946 (1946 to 1950)	John Thomas Knight (Butcher)	Grazing/agricultural
19.01.1950 (1950 to 1950)	Ian Mills Bolte (Farmer)	Grazing/agricultural
02.05.1950 (1950 to 1953)	James Craig Tanner (Grazier)	Grazing/agricultural
09.10.1953 (1953 to 1959)	J.T. & P. Investments Pty Limited	Unknown
05.03.1959 (1959 to 1960)	Thomas Arthur Hall (Engineer)	Unknown
30.06.1960 (1960 to 1966)	J.T. & P. Investments Pty Limited	Unknown
06.04.1966 (1966 to 1976)	The Electricity Commission of New South Wales	Electrical infrastructure (Lake Lidell)
30.01.1976	Declared Crown Land	Public Reserve
30th January 1976	Added to Crown Reserve No.` 87994 for Public Recreation	Public Reserve
23rd November 1990	Lake Liddel Recreation Area (Reserve 87894) Reserve Trust Muswellbrook Shire Council – Trust Manager	Public Reserve
	# The State of New South Wales	Public Reserve

Notes to Table

# Denotes current owner

6.3 Public Registers and Planning Records

EPA Notices available under Section 58 of the Contaminated Land Management Act (CLM Act) Database searched 10 October 2023	There were no records of notices for the site or adjacent sites.
Sites notified to EPA under Section 60 of the CLM Act Database searched 10 October 2023	The site and adjacent sites were not listed as a notified contaminated site.
Licences listed under Section 308 of the Protection of the Environment Operations Act 1997 (POEO Act) Database searched 10 October 2023	There were no records issued to the site or adjacent sites.
PFAS Investigation Sites listed on the EPA website	The site was not listed or located adjacent to a site listed under: • NSW EPA PFAS Investigation Program; • Defence PFAS Investigation Program; • Defence PFAS Management Program; • Airservices Australia National PFAS Management Program.
Planning Certificate(s)	Review of the Section 10.7 Parts (2) and (5) Certificate for the site indicated the following: • The site is not within a mine subsidence area; • The land is not affected by a policy adopted by Council that restricts the development of the land because of the likelihood of land slip, bushfire, tidal inundation, subsidence, acid sulfate soils or any other risk (other than flooding). • Council is unaware of any other relevant matters that may affect the land to be issued under the Section 10.7 (Part 5) certificate.
Council Records Database searched 10 October 2023	Not available at the time of the search (i.e. no access permitted to on-line records).

6.4 Summary of Previous Assessment

The client provided a report titled ‘Project Symphony, Bayswater Power Station, Stage 2 Environmental Site Assessment’, prepared by ERM Australia Pty Ltd in 2014 (ERM 2014)The report was prepared for Macquarie Generation, with the objective of the assessment being to carry out a “Stage 2 Environmental

Site Assessment" for the Bayswater Power Station site to develop a baseline assessment of environmental conditions at the site and surrounds, including soil, groundwater, surface water and sediments. The relevant sections of the report included the testing of surface water within Lake Lidell, which is adjacent to the current subject site, and the testing of groundwater in the vicinity of the subject site.

Surace water analysis was generally conducted with the western portion of Lake Lidell. Groundwater well installation and groundwater sampling was conducted at two locations in the vicinity of the subject site (well BY_MW25 (approximately 420 m north-west of site) and BY_MW26 (approximately 500 m south-east of site), and were utilised in providing background conditions for the site.

Further discussion of the results of the surface water and groundwater testing is presented in Section 12.

6.5 Site History Integrity Assessment

The information used to establish the history of the site was sourced from reputable and reliable reference documents, many of which were official records held by Government departments/agencies. The databases maintained by various Government agencies potentially can contain high quality information, but some of these do not contain any data.

In particular, aerial photographs can provide high quality information that is generally independent of memory or documentation. They are only available at intervals of several years, so some gaps exist in the information from this source. 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.

6.6 Summary of Site History

The site history information suggests that the site was used for grazing purposes from at least the 1920s prior to the construction/expansion of Lake Lidell, which was likely to have occurred in the mid-1960s when the subject site was acquired by the Electricity Commission of NSW. Following this, the site has appeared to remain as a vacant public reserve.

7. Site Walkover

7.1 Observations

A site walkover was conducted by a DP environmental engineer on 25 September 2023. The general site topography was consistent with that described in Section 5. The site layout appears to have remained unchanged from the 2023 aerial photograph. The following key site features pertinent to the PSI were observed (refer to photographs provided in Appendix E).

The site generally comprised a vacant grassed area, falling to the south to south-west and south-east towards Lake Lidell (Photograph E1).

Mature trees were observed in the north-western portion of the site (Photograph E2). Hebden Road was located immediately north of the northern site boundary (Photograph E3)

At the time of the walkover, the site was being used for cattle grazing. No structures were observed within the site area at the time of the walkover.

No obvious signs of potential contamination such as surface staining, odours, imported fill or distressed vegetation were observed during the site walkover.

8. Preliminary Conceptual Site Model

A preliminary conceptual site model (CSM) represents a theoretical 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 may become 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 (S)

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

- S1: Former agricultural use, including grazing. The site use may have been subject to the use of chemicals including pesticides, hydrocarbons and metals
  - CoPC include metals, total recoverable hydrocarbons (TRH), benzene, toluene, ethylbenzene and xylene (BTEX), polycyclic aromatic hydrocarbons (PAH), polychlorinated biphenyls (PCB), organochlorine/organophosphorus pesticides (OCP/OPP), .
- S2: Adjacent road and rail corridor and associated runoff entering the site
  - CoPC include lead, TRH, BTEX, PAH, PCB, OCP, OPP, metals.

Potential Receptors (R)

The following potential human receptors have been identified:

- R1: Current users [cattle management personnel];
- R2: Construction and maintenance workers;
- R3: End users [substation employees]; and
- R4: Adjacent site users [camping area].

The following potential environmental receptors have been identified:

- R5: Surface water [Lake Lidell, fresh water];
- R6: Groundwater; and
- R7: Terrestrial ecosystems.

Potential Pathways (P)

The following potential pathways in relation to human receptors have been identified:

- P1: Ingestion and dermal contact; and
- P2: Inhalation of dust and/or vapours.

The following potential pathways in relation to the environmental receptors have been identified:

- 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: Inhalation, ingestion and absorption.

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 (P1 to P6) between the above sources (S1 to S2) and receptors (R1 to R7) are provided in below Table 3.

Table 3: Summary of Potentially Complete Exposure Pathways

Source and CoPC	Transport Pathway	Receptor	Risk Management Action
S1: Agricultural use - TRH, BTEX, PAH, OCP/OPP and metals S2: Adjacent road and rail - TRH, BTEX, PAH, OCP/OPP and metals	P1: Ingestion and dermal contact P2: Inhalation of dust and/or vapours	R1: Current users [cattle management personnel] R2: Construction and maintenance workers R3: End users [substation employees]	A preliminary intrusive investigation is recommended to assess possible contamination including testing of the soils and surface water.
	P2: Inhalation of dust and/or vapours	R4: Adjacent site users [camping area].	
	P3: Surface water run-off P4: Lateral migration of groundwater providing base flow to water bodies	R5: Surface water	
	P5: Leaching of contaminants and vertical migration into groundwater	R6: Groundwater	
	P6: Inhalation, ingestion and absorption	R7: Terrestrial ecosystems	

9. Sampling and Analysis Quality Plan

9.1 Surface Water Sampling Rationale

At the request of the client, surface water sampling was undertaken from two locations in the vicinity of the site.

Locations LS1 and LS2 were positioned to provide background water quality of Lake Lidell.

A third location was proposed in the drainage line adjacent to the eastern site boundary to assess upslope surface water quality. There was no surface water at this location during the sampling event.

The general sampling methods are described in the field work methodology, included in Appendix F.

Surface water field monitoring was conducted at location LS1 using a calibrated water multimeter, capable of the measurement of pH, electrical conductivity, turbidity, temperature, oxidation/reduction potential (ORP) and dissolved oxygen. The results of field monitoring are presented in Section 11.3 below.

9.2 Soil Sampling Rationale

Subsurface test locations for the assessment were generally placed across the proposed area of development to target the locations of proposed structures and pavements. Contamination testing locations were based on site history information and the CSM with the rationale to support near-surface soils subject to former and current agricultural use and possible upgradient runoff areas. Borehole locations are shown on Drawing 1 provided in Appendix A.

Soil samples were collected from each borehole at depths of approximately 0.0 to 0.1 m and 0.5 m and changes in lithology or signs of contamination (if any).

The general sampling methods are described in the field work methodology, included in Appendix F.

9.3 Surface Water Sampling Rationale

At the request of the client, surface water sampling was conducted at two locations in the vicinity of the site.

Locations LS1 and LS2 were positioned to provide background water quality of Lake Lidell.

A third location was proposed in the drainage line adjacent to the eastern site boundary to assess upslope surface water quality. There was no surface water at this location during the sampling event.

The general sampling methods are described in the field work methodology, included in Appendix F.

Surface water field monitoring was conducted at location LS1 using a calibrated water multimeter, capable of measurement of pH, electrical conductivity, turbidity, temperature, oxidation/reduction potential (ORP) and dissolved oxygen. The results of field monitoring are presented in Section 11.3 below.

9.4 Groundwater Well Installation Rationale

In order to assess the presence of groundwater and current groundwater contamination status at the site and evaluate whether surrounding land uses have impacted on groundwater, three groundwater wells were installed across the site (MW5, MW23, and MW29). The well locations were selected based on the following rationale to provide substantial coverage of the site:

- MW5 is positioned towards the central to north-west portion of the site;
- MW23 is positioned towards the central south-east portion of the site; and
- MW29 is positioned towards the south-west portion of the site.

The well installation methods are described in the field work methodology, included in Appendix F.

The wells were attempted to be sampled on 20 October 2023, however, no groundwater was present at the time of sampling.

10. Site Assessment Criteria

The site assessment criteria (SAC) applied in the current investigation are informed by the CSM (Section 8) which identified human and environmental receptors to potential contamination on the site. Analytical results are assessed (as a Tier 1 assessment) against the SAC comprising primarily the investigation and screening levels of Schedule B1 of NEPC (2013).

The investigation and screening levels applied in the current investigation comprise levels adopted for a generic commercial / industrial land use scenario. The derivation of the SAC is included in Appendix G and the adopted SAC are listed on the summary analytical results tables in Appendix H.

11. Field Work Results

11.1 Subsurface Investigation Results

The borehole logs for this assessment are included in Appendix I. The logs recorded the following general sub-surface profile:

Topsoil / Clayey Silt:	Topsoil encountered in all boreholes from the surface to approximately 0.05 m below ground level (bgl). Clayey silt (brown) was also observed in Bores 2, 5, 6, 8, 9, 11, 23, 25, and 28 from 0.05 m bgl to depths ranging between 0.20 m to 0.60 m bgl.
Silty Clay / Sandy Clay:	A combination of brown to dark brown silty and sandy clays were observed in all boreholes from 0.05 m bgl to depths ranging between 0.9 m and 4.0 m bgl.

Siltstone: Extremely weathered materials (siltstone) was encountered in Bores 2-3, 5, 8, 9, 20 to22, 24, 27, and 29 (depths between 0.9 m and 6.20 m bgl). Siltstone of very low to low strength was then observed in Bores 3, 20, 21, 24, 27, and 29 (depths between 3.00 m 10.30 m bgl), low to medium strength in Bore 20 (9.90 m to 10.30 m bgl), and medium to high strength in Bores 21, 24, 27, and 27A (depths between 8.00 m and 20.74 m bgl).

No obvious visual or olfactory evidence (e.g. staining, odours or free phase product) was observed during the investigation to suggest the presence of contamination within the soils at the site.
The results of PID screening suggested the general absence of VOC in the screened samples, with all recorded values being less than 1 ppm.

No free groundwater was observed during the drilling of boreholes. It should be noted that groundwater levels are affected by factors such as climatic conditions and soil permeability and will therefore vary spatially, and with time

11.2 Groundwater Well Installation Results

Groundwater monitoring wells were installed in Bores 5, 23, and 29 on 27 September 2023, and did not contain groundwater upon groundwater sampling attempted on 20 October 2023. A summary of well installation details is included below in Table 4.

Table 4: Summary of Well Installation on 27 September 2023

Well ID	Location of Monitoring Well	Ground Level * m (AHD)	Well Length m (bgl)	SWL m (AHD)
MW5	Central north-west	137.0	4	-
MW23	Central south-east	136.5	4	-
MW29	South-west	132.4	10	-

Notes:
*Surveyed by dGPS
SWL – standing water level

Based on previous investigations conducted in 2013 for Bayswater Power Station (Project Symphony) (ERM 2014), groundwater levels in Wells BY_MW25 [approx. 420 m northwest of site] and BY_MW26 [approx. 500 m southeast of site] were recorded as 8.2 m and 3.0 m bgl, respectively. Field parameters including potentially acidic, saline groundwater conditions were recorded.

11.3 Surface Water Testing Results

Locations LS1 and LS2 were positioned to provide background water quality of Lake Lidell.

The results of field parameter testing at location LS1 are presented in Table 5 below.

Table 5: Field Surface Water Parameters, LS1, 20 October 2023

Location ID	Temp °C	pH	ORP (mV)	EC (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Dissolved Oxyegn (%)
LS1	25.8	8.1	69	2.46	90	7.5	93.2

11.4 Laboratory Analytical Results

The results of laboratory analysis are summarised in the following tables provided in Appendix H:

- Table H1: Summary of Results of Soil Analysis – TRH, BTEX, PAH, Metals;
- Table H2: Summary of Results of Surface Water Analysis.

The laboratory certificates of analysis are also presented in Appendix H. Laboratory chain of custody and sample receipt information are provided in Appendix J.

12. Discussion

12.1 Soils

The analytical results for all contaminants tested in all samples were below the adopted SAC.

All concentrations for BTEX, phenol, OCP, OPP, PCB and phenols in soil were below the laboratory practical quantitation limits (PQL). BH6/0-0.1 indicated detectable concentrations above the PQL in some heavier TRH fractions, however, all concentrations were well below the adopted SAC. Similarly, BH2/0-0.1 reported detectable concentrations above the PQL for some PAH analytes, however, these detections were also well below the adopted SAC.

12.2 Surface Water

The analytical results for the surface water samples indicated that all tested analyte concentrations were below the SAC, except for:

- Boron at 1,300 µg/L in both LS1 and LS2, which exceeded the ANZG (2018) freshwater guideline for the protection of slightly to moderately disturbed freshwater aquatic ecosystems of 940 µg/L; and
- Copper at 3 µg/L in both LS1 and LS2, which exceeded the adopted freshwater guideline (ANZG, 2018) of 1.4 µg/L.
- Selenium at 6 µg/L in both LS1 and LS2 which exceeded the adopted freshwater guideline (ANZG, 2018) of 5 µg/L
- PFOS at 0.004 µg/L in both LS1 and LS2 which exceeded the adopted ecological 99% level of protection guideline (HEPA, 2020).

Referring to previous reporting on the site (ERM 2014), these elevated metal concentration reflected previous results of elevated concentrations of boron, selenium and copper in surface water samples across the area and may reflect groundwater conditions. It was reported in (ERM 2014) that metals including boron, cadmium, copper, nickel, lead, and zinc were detected at concentrations greater than the adopted health and ecological screening values for freshwater environments in groundwater samples. The samples were collected from BY_MW25 [approximately 420 m north-west of site] and BY_MW26 [approximately 500 m south-east of site] and were utilised in providing background conditions for the site.

12.3 Data Quality Assurance and Quality Control

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

13. Revised Conceptual Site Model

The data collected for this PSI has generally confirmed that certain potential contaminant sources outlined in the CSM outlined in Section 8 pose a potentially complete pathway to the identified receptor(s) whilst others do not. No other sources of contamination have been identified as a result of the testing results and subsurface investigation. Surface water data suggests that some contaminants (i.e. boron, copper) may have migrated from surrounding land use activities (i.e. local coal-fired power stations), however, adverse impacts to the site are generally not anticipated. Consequently, the preliminary CSM described in Section 8 remains sufficient for the site.

14. Conclusions and Recommendations

The objective of this PSI was 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.

The data collected for this PSI indicated that potential contaminant sources exist (i.e. agricultural use and adjacent road and rail activities) as outlined in the CSM in Section 8.

Preliminary contamination testing of soils undertaken as part of this PSI suggest the general absence of gross contamination in soils at the locations tested.

Testing of surface water adjacent to the site suggested the absence of gross contamination in surface water as a result of previous site activities. Some slightly elevated contaminant concentrations were identified in surface water, however, the contaminants were commensurate with previous surface water testing in Lake Lidell reported in a previous assessment, (ERM, 2014) likely attributed to historical use of Lake Lidell as cooling water and waste output from the adjacent Lidell Power Station.

The results of this PSI along with preliminary contamination testing suggest that the site is likely to be suitable for the proposed industrial development from a contamination perspective.

The scope of work conducted does not constitute a Detailed Site Investigation for the assessment of contamination with reference to (NSW EPA, 2020). It is noted, however, that the potential for contamination on the subject site is considered to be low and further investigation is currently not warranted.. However, it is recommended that an Unexpected Finds Protocol (UFP) be prepared and implemented during the proposed development.

Unexpected finds would typically be able to be identified by visual or olfactory indicators and could include, inter alia:

- Waste materials in fill, including building and demolition waste;
- Fibrous cement fragments (e.g. asbestos-containing materials);
- Stained or odorous fill or soil;
- Ash and / or slag.

In the event of an unexpected find, a suitably qualified contaminated land consultant should be engaged to inspect the find and provide advice on the appropriate course of action.

15. References

ANZG. (2018). *Australian and New Zealand Guidelines for Fresh and Marine Water Quality.* Canberra, ACT: Australian and New Zealand Governments and Australian state and territory governments.

CRC CARE. (2017). *Risk-based Management and Remediation Guidance for Benzo(a)pyrene.* Technical Report no. 39: Cooperative Research Centre for Contamination Assessment and Remediation of the Environment.

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

NSW EPA. (2022). *Contaminated Sites, Sampling Design Guidelines.* NSW Environment Protection Authority.

16. Limitations

Douglas Partners (DP) has prepared this report (or services) for this project at Lot 9 DP1193430 Hebden Road, Muswellbrook in accordance with DP's proposal dated 18 September 2023 and acceptance received from Paul Hurst dated xxx. The work was carried out under DP's Conditions of Engagement (or contract No xyz, dated). This report is provided for the exclusive use of Ausgrid 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 (geotechnical / environmental / groundwater) 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.

Douglas Partners Pty Ltd

Appendix A

Drawing 1– Test Location Plan

Locality Plan

Legend

- Borehole Location
- Surface Water Sample Location
- Lot Boundary
- Access Road
- Approx Location of Proposed Switchyard
- Approx Location of Proposed SynCons

0 10 20 30 40 50 m

NOTE:
1. Drawing adapted from Metromap Image dated 12.02.2023 and plan by AECOM, Ref 265405, Sheet 01, AMD C dated 30.08,2023.
2. Test locations are approximate only and were located using dPGS.

Douglas Partners
Geotechnics | Environment | Groundwater

CLIENT: Ausgrid		
OFFICE: Newcastle	DRAWN BY: PLH	
SCALE: 1:2000@A3	DATE: 27.November.2023	

TITLE: **Test Location Plan**
Geotechnical and Contamination Services
Hebden Road, Muswellbrook, NSW

N

Project:	224764.00
DRAWING No:	1
REVISION:	0

DP.QGIS.A3LandscapeDrawingLayout.3.26.3 - P:\224764.00 - MUSWELLBROOK, Eastern Hub Sub-Station\7.0 Drawings\7.2 Out\224764.00.D.001.Mapping.qgz

Appendix B

About This Report

About this Report

November 2023

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.

continued next page

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.

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Terminology, Symbols and Abbreviations

November 2023

Introduction to Terminology, Symbols and Abbreviations

Douglas Partners' reports, investigation logs, and other correspondence may use terminology which has quantitative or qualitative connotations. To remove ambiguity or uncertainty surrounding the use of such terms, the following sets of notes pages may be attached Douglas Partners' reports, depending on the work performed and conditions encountered:

- Soil Descriptions;
- Rock Descriptions; and
- Sampling, insitu testing, and drilling methodologies

In addition to these pages, the following notes generally apply to most documents.

Abbreviation Codes

Site conditions may also be presented in a number of different formats, such as investigation logs, field mapping, or as a written summary. In some of these formats textual or symbolic terminology may be presented using textual abbreviation codes or graphic symbols, and, where commonly used, these are listed alongside the terminology definition. For ease of identification in these note pages, textual codes are presented in these notes in the following style `XW`. Code usage conforms with the following guidelines:

- Textual codes are case insensitive, although herein they are generally presented in upper case; and
- Textual codes are contextual (i.e. the same or similar combinations of characters may be used in different contexts with different meanings (for example `PL` is used for plastic limit in the context of soil moisture condition, as well as in `PL(A)` for point load test result in the testing results column)).

Data Integrity Codes

Subsurface investigation data recorded by Douglas Partners is generally managed in a highly structured database environment, where records "span" between a top and bottom depth interval. Depth interval "gaps" between records are considered to introduce ambiguity, and, where appropriate, our practice guidelines may require contiguous data sets. Recording meaningful data is not always appropriate (for example assigning a "strength" to a concrete pavement) and the following codes may be used to maintain contiguity in such circumstances.

Term	Description	Abbreviation Code
Core loss	No core recovery	`KL`
Unknown	Information was not available to allow classification of the property. For example, when auguring in loose, saturated sand auger cuttings may not be returned.	`UK`
No data	Information required to allow classification of the property was not available. For example, if drilling is commenced from the base of a hole predrilled by others	`ND`
Not Applicable	Derivation of the properties not appropriate or beyond the scope of the investigation. For example, providing a description of the strength of a concrete pavement	`NA`

Graphic Symbols

Douglas Partners' logs contain a "graphic" column which provides a pictorial representation of the basic composition of the material. The symbols used are directly representing the material name stated in the adjacent "Description of Strata" column, and as such no specific graphic symbology legend has been provided in these notes.

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Soil Descriptions

Terminology
Symbols
Abbreviations

November 2023

Introduction

All materials which are not considered to be "in-situ rock" are described in general accordance with the soil description model of AS 1726-2017 Part 6.1.3, and can be broken down into the following description structure:

The "classification" comprises a two character "group symbol" providing a general summary of dominant soil characteristics. The "name" summarises the particle sizes within the soil which most influence its behaviour. The detailed description presents more information about composition, condition, structure, and origin of the soil.

Classification, naming and description of soils require the relative proportion of particles of different sizes within the whole soil mixture to be considered.

Particle size designation and Behaviour Model

Solid particles within a soil are differentiated on the basis of size.

The engineering behaviour properties of a soil can subsequently be modelled to be either "fine grained" (also known as "cohesive" behaviour) or "coarse grained" ("non cohesive" behaviour), depending on the relative proportion of fine or coarse fractions in the soil mixture.

Particle Size Designation	Particle Size (mm)	Behaviour Model	
		Behaviour	Approximate Dry Mass
Boulder	>200	Excluded from particle behaviour model as "oversize"	
Cobble	63 - 200		
Gravel[1]	2.36 - 63	Coarse	>65%
Sand[1]	0.075 - 2.36		
Silt	0.002 - 0.075	Fine	>35%
Clay	<0.002		

[1] – refer grain size subdivision descriptions below

The behaviour model boundaries defined above are not precise, and the material behaviour should be assumed from the name given to the material (which considers the particle fraction which dominates the behaviour, refer "component proportions" below), rather than strict observance of the proportions of particle sizes. For example, if a material is named a "Sandy CLAY", this is indicative that the material exhibits fine grained behaviour, even if the dry mass of coarse grained material may exceed 65%.

Component proportions

The relative proportion of the dry mass of each particle size fraction is assessed to be a "primary", "secondary", or "minor" component of the soil mixture, depending on its influence over the soil behaviour.

Component Proportion Designation	Definition[1]	Relative Proportion	
		In Fine Grained Soil	In Coarse Grained Soil
Primary	The component (particle size designation, refer above) which dominates the engineering behaviour of the soil	The clay/silt component with the greater proportion	The sand/gravel component with the greater proportion
Secondary	Any component which is not the primary, but is significant to the engineering properties of the soil	Any component with greater than 30% proportion	Any granular component with greater than 30%; or Any fine component with greater than 12%
Minor[2]	Present in the soil, but not significant to its engineering properties	All other components	All other components

[1] As defined in AS1726-2017 6.1.4.4

[2] In the detailed material description, minor components are split into two further sub-categories. Refer "identification of minor components" below.

Composite Materials

In certain situations, a lithology description may describe more than one material, for example, collectively describing a layer of interbedded sand and clay. In such a scenario, the two materials would be described independently, with the names preceded or followed by a statement describing the arrangement by which the materials co-exist. For example, "INTERBEDDED Silty CLAY AND SAND".

Classification

The soil classification comprises a two character group symbol. The first character identifies the primary component. The second character identifies either the grading or presence of fines in a coarse grained soil, or the plasticity in a fine grained soil. Refer AS1726-2017 6.1.6 for further clarification.

Soil Name

For most soils, the name is derived with the primary component included as the noun (in upper case), preceded by any secondary components stated in an adjective form. In this way, the soil name also describes the general composition and indicates the dominant behaviour of the material.

Component [1]	Prominence in Soil Name
Primary	Noun (eg "CLAY")
Secondary	Adjective modifier (eg "Sandy")
Minor	No influence

[1] – for determination of component proportions, refer component proportions on previous page

For materials which cannot be disaggregated, or which are not comprised of rock or mineral fragments, the names "ORGANIC MATTER" or "ARTIFICIAL MATERIAL" may be used, in accordance with AS1726-2017 Table 14.

Commercial or colloquial names are not used for the soil name where a component derived name is possible (for example "Gravelly SAND" rather than "CRACKER DUST").

Materials of "fill" or "topsoil" origin are generally assigned a name derived from the primary/secondary component (where appropriate). In log descriptions this is preceded by uppercase "FILL" or "TOPSOIL". Origin uncertainty is indicated in the description by the characters (?), with the degree of uncertainty described (using the terms "probably" or "possibly" in the origin column, or at the end of the description).

Identification of minor components

Minor components are identified in the soil description immediately following the soil name. The minor component fraction is usually preceded with a term indicating the relative proportion of the component.

Minor Component Proportion Term	Relative Proportion	
	In Fine Grained Soil	In Coarse Grained Soil
With	All fractions: 15-30%	Clay/silt: 5-12% sand/gravel: 15-30%
Trace	All fractions: 0-15%	Clay/silt: 0-5% sand/gravel: 0-15%

The terms "with" and "trace" generally apply only to gravel or fine particle fractions. Where cobbles/boulders are encountered in minor proportions (generally less than about 12%) the term "occasional" may be used. This term describes the sporadic distribution of the material within the confines of the investigation excavation only, and there may be considerable variation in proportion over a wider area which is difficult to factually characterise due to the relative size of the particles and the investigation methods.

Soil Composition

Plasticity

Descriptive Term	Laboratory liquid limit range	
	Silt	Clay
Non-plastic materials	Not applicable	Not applicable
Low plasticity	≤50	≤35
Medium plasticity	Not applicable	>35 and ≤50
High plasticity	>50	>50

Note, Plasticity descriptions generally describe the plasticity behaviour of the whole of the fine grained soil, not individual fine grained fractions.

Grain Size

Type		Particle size (mm)
Gravel	Coarse	19 - 63
	Medium	6.7 - 19
	Fine	2.36 – 6.7
Sand	Coarse	0.6 - 2.36
	Medium	0.21 - 0.6
	Fine	0.075 - 0.21

Grading

Grading Term	Particle size (mm)
Well	A good representation of all particle sizes
Poorly	An excess or deficiency of particular sizes within the specified range
Uniformly	Essentially of one size
Gap	A deficiency of a particular size or size range within the total range

Note, AS1726-2017 provides terminology for additional attributes not listed here.

Soil Condition

Moisture

The moisture condition of soils is assessed relative to the plastic limit for fine grained soils, while for coarse grained soils it is assessed based on the appearance and feel of the material. The moisture condition of a material is considered to be independent of stratigraphy (although commonly these are related), and this data is presented in its own column on logs.

Applicability	Term	Tactile Assessment	Abbreviation code
Fine	Dry of plastic limit	Hard and friable or powdery	w<PL
	Near plastic limit	Can be moulded	w=PL
	Wet of plastic limit	Water residue remains on hands when handling	w>PL
	Near liquid limit	"oozes" when agitated	w=LL
	Wet of liquid limit	"oozes"	w>LL
Coarse	Dry	Non-cohesive and free running	D
	Moist	Feels cool, darkened in colour, particles may stick together	M
	Wet	Feels cool, darkened in colour, particles may stick together, free water forms when handling	W

The abbreviation code NDF, meaning "not-assessable due to drilling fluid use" may also be used.

Note, observations relating to free ground water or drilling fluids are provided independent of soil moisture condition.

Consistency/Density/Compaction/Cementation/Extremely Weathered Material

These concepts give an indication of how the material may respond to applied forces (when considered in conjunction with other attributes of the soil). This behaviour can vary independent of the composition of the material, and on logs these are described in an independent column and are generally mutually exclusive (i.e it is inappropriate to describe both consistency and compaction at the same time). The method by which the behaviour is described depends on the behaviour model and other characteristics of the soil as follows:

- In fine grained soils, the "consistency" describes the ease with which the soil can be remoulded, and is generally correlated against the materials undrained shear strength;
- In granular materials, the relative density describes how tightly packed the particles are, and is generally correlated against the density index;
- In anthropogenically modified materials, the compaction of the material is described qualitatively;
- In cemented soils (both natural and anthropogenic), the cemented "strength" is described qualitatively, relative to the difficulty with which the material is disaggregated; and
- In soils of extremely weathered material origin, the engineering behaviour may be governed by relic rock features, and expected behaviour needs to be assessed based the overall material description.

Quantitative engineering performance of these materials may be determined by laboratory testing or estimated by correlated field tests (for example penetration or shear vane testing). In some cases, performance may be assessed by tactile or other subjective methods, in which case investigation logs will show the estimated value enclosed in round brackets, for example (VS).

Consistency (fine grained soils)

Consistency Term	Tactile Assessment	Undrained Shear Strength (kPa)	Abbreviation Code
Very soft	Extrudes between fingers when squeezed	<12	VS
Soft	Mouldable with light finger pressure	>12 - ≤25	S
Firm	Mouldable with strong finger pressure	>25 - ≤50	F
Stiff	Cannot be moulded by fingers	>50 - ≤100	St
Very stiff	Indented by thumbnail	>100 - ≤200	VSt
Hard	Indented by thumbnail with difficulty	>200	H
Friable	Easily crumbled or broken into small pieces by hand	-	Fr

Relative Density (coarse grained soils)

Relative Density Term	Density Index	Abbreviation Code
Very loose	<15	VL
Loose	>15 - ≤35	L
Medium dense	>35 - ≤65	MD
Dense	>65 - ≤85	D
Very dense	>85	VD

Note, tactile assessment of relative density is difficult, and generally requires penetration testing, hence a tactile assessment guide is not provided.

Compaction (anthropogenically modified soil)

Compaction Term	Abbreviation Code
Well compacted	WC
Poorly compacted	PC
Moderately compacted	MC
Variably compacted	VC

Cementation (natural and anthropogenic)

Cementation Term	Abbreviation Code
Moderately cemented	MOD
Weakly cemented	WEK

Extremely Weathered Material

AS1726-2017 considers weathered material to be soil if the unconfined compressive strength is less than 0.6 MPa (i.e. less than very low strength rock). These materials may be identified as "extremely weathered material" in reports and by the abbreviation code XWM on log sheets. This identification is not correlated to any specific qualitative or quantitative behaviour, and the engineering properties of this material must therefore be assessed according to engineering principles with reference to any relic rock structure, fabric, or texture described in the description.

Soil Origin

Term	Description	Abbreviation Code
Residual	Derived from in-situ weathering of the underlying rock	RS
Extremely weathered material	Formed from in-situ weathering of geological formations. Has strength of less than 'very low' as per as1726 but retains the structure or fabric of the parent rock.	XWM
Alluvial	Deposited by streams and rivers	ALV
Estuarine	Deposited in coastal estuaries	EST
Marine	Deposited in a marine environment	MAR
Lacustrine	Deposited in freshwater lakes	LAC
Aeolian	Carried and deposited by wind	AEO
Colluvial	Soil and rock debris transported down slopes by gravity	COL
Slopewash	Thin layers of soil and rock debris gradually and slowly deposited by gravity and possibly water	SW
Topsoil	Mantle of surface soil, often with high levels of organic material	TOP
Fill	Any material which has been moved by man	FILL
Littoral	Deposited on the lake or seashore	LIT
Unidentifiable	Not able to be identified	UID

Cobbles and Boulders

The presence of particles considered to be "oversize" may be described using one of the following strategies:

- Oversize encountered in a minor proportion (when considered relative to the wider area) are noted in the soil description; or
- Where a significant proportion of oversize is encountered, the cobbles/boulders are described independent of the soil description, in a similar manner to composite soils (described above) but qualified with "MIXTURE OF".

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Rock Strength

Rock strength is defined by the unconfined compressive strength, and it refers to the strength of the rock substance and not the strength of the overall rock mass, which may be considerably weaker due to defects.

The Point Load Strength Index $I_{s(50)}$ is commonly used to provide an estimate of the rock strength and site specific correlations should be developed to allow UCS values to be determined. The point load strength test procedure is described by Australian Standard AS4133.4.1-2007. The terms used to describe rock strength are as follows:

Strength Term	Unconfined Compressive Strength (MPa)	Point Load Index[1] $I_{s(50)}$ MPa	Abbreviation Code
Very low	0.6 - 2	0.03 - 0.1	VL
Low	2 - 6	0.1 - 0.3	L
Medium	6 - 20	0.3 - 1.0	M
High	20 - 60	1 - 3	H
Very high	60 - 200	3 - 10	VH
Extremely high	>200	>10	EH

[1] Rock strength classification is based on UCS. The UCS to $I_{s(50)}$ ratio varies significantly for different rock types and specific ratios may be required for each site. The point load Index ranges shown above are as suggested in AS1726 and should not be relied upon without supporting evidence.

The following abbreviation codes are used for soil layers or seams of material "within rock" but for which the equivalent UCS strength is less than 0.6 MPa.

Scenario	Abbreviation Code
The material encountered has an equivalent UCS strength of less than 0.6 MPa, and therefore is considered to be soil (as per Note 1 of Table 20 of AS 1726-2017). The properties of the material encountered over this interval are described in the "Description of Strata" and soil properties columns.	SOIL
The material encountered has an equivalent UCS strength of less than 0.6 MPa, and therefore is considered to be soil (as per Note 1 of Table 20 of AS 1726-2017). The prominence of the material is such that it can be considered to be a seam (as defined in Table 22 of AS1726-2017) and the properties of the material are described in the defect column.	SEAM

Degree of Weathering

The degree of weathering of rock is classified as follows:

Weathering Term	Description	Abbreviation Code
Residual Soil[1]	Material is weathered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are no longer visible, but the soil has not been significantly transported.	RS
Extremely weathered[1]	Material is weathered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are still visible	XW
Highly weathered	The whole of the rock material is discoloured, usually by iron staining or bleaching to the extent that the colour of the original rock is not recognisable. Rock strength is significantly changed by weathering. Some primary minerals have weathered to clay minerals. Porosity may be increased by leaching or may be decreased due to deposition of weathering products in pores.	HW
Moderately weathered	The whole of the rock material is discoloured, usually by iron staining or bleaching to the extent that the colour of the original rock is not recognisable but shows little or no change of strength from fresh rock.	MW
Slightly weathered	Rock is partially discoloured with staining or bleaching along joints but shows little or no change of strength from fresh rock.	SW
Fresh	No signs of decomposition or staining.	FR
Note: If HW and MW cannot be differentiated use DW (see below)		
Distinctly weathered	Rock strength usually changed by weathering. The rock may be highly discoloured, usually by iron staining. Porosity may be increased by leaching or may be decreased due to deposition of weathered products in pores.	DW

[1] The parent rock type, of which the residual/extremely weathered material is a derivative, will be stated in the description (where discernible).

Degree of Alteration

The degree of alteration of the rock material (physical or chemical changes caused by hot gasses or liquids at depth) is classified as follows:

Term	Description	Abbreviation Code
Extremely altered	Material is altered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are still visible.	XA
Highly altered	The whole of the rock material is discoloured, usually by staining or bleaching to the extent that the colour of the original rock is not recognisable. Rock strength is changed by alteration. Some primary minerals are altered to clay minerals. Porosity may be increased by leaching or may be decreased due to precipitation of secondary materials in pores.	HA
Moderately altered	The whole of the rock material is discoloured, usually by staining or bleaching to the extent that the colour of the original rock is not recognisable but shows little or no change of strength from fresh rock.	MA
Slightly altered	Rock is slightly discoloured but shows little or no change of strength from fresh rock	SA
Note: If HA and MA cannot be differentiated use DA (see below)		
Distinctly altered	Rock strength usually changed by alteration. The rock may be highly discoloured, usually by staining or bleaching. Porosity may be increased by leaching or may be decreased due to precipitation of secondary minerals in pores.	DA

Degree of Fracturing

The following descriptive classification apply to the spacing of natural occurring fractures in the rock mass. It includes bedding plane partings, joints and other defects, but excludes drilling breaks. These terms are generally not required on investigation logs where fracture spacing is presented as a histogram, and where used are presented in an unabbreviated format.

Term	Description
Fragmented	Fragments of <20 mm
Highly Fractured	Core lengths of 20-40 mm with occasional fragments
Fractured	Core lengths of 30-100 mm with occasional shorter and longer sections
Slightly Fractured	Core lengths of 300 mm or longer with occasional sections of 100-300 mm
Unbroken	Core contains very few fractures

Rock Quality Designation

The quality of the cored rock can be measured using the Rock Quality Designation (RQD) index, defined as:

$$\text{RQD \%} = \frac{\text{cumulative length of 'sound' core sections > 100 mm long}}{\text{total drilled length of section being assessed}}$$

where 'sound' rock is assessed to be rock of low strength or stronger. The RQD applies only to natural fractures. If the core is broken by drilling or handling (i.e., drilling breaks) then the broken pieces are fitted back together and are not included in the calculation of RQD.

Stratification Spacing

These terms may be used to describe the spacing of bedding partings in sedimentary rocks. Where used, these terms are generally presented in an unabbreviated format

Term	Separation of Stratification Planes
Thinly laminated	< 6 mm
Laminated	6 mm to 20 mm
Very thinly bedded	20 mm to 60 mm
Thinly bedded	60 mm to 0.2 m
Medium bedded	0.2 m to 0.6 m
Thickly bedded	0.6 m to 2 m
Very thickly bedded	> 2 m

Defect Descriptions

Defect Type

Term	Abbreviation Code
Bedding plane	B
Infilled seam	IS
Cleavage	CV
Crushed zone	CZ
Decomposed seam	DS
Fault	F
Joint	JT
Lamination	LAM
Parting	P
Shear zone	SZ
Vein	VN
Drilling/handling break	DB , HB
Fracture	FC

Rock Defect Orientation

Term	Abbreviation Code
Horizontal	H
Vertical	V
Sub-horizontal	SH
Sub-vertical	SV

Rock Defect Coating

Term	Abbreviation Code
Clean	CN
Coating	CT
Healed	HE
Infilled	INF
Stained	SN
Tight	TI
Veneer	VNR

Rock Defect Infill

Term	Abbreviation Code
Calcite	CA
Carbonaceous	CBS
Clay	CLAY
Iron oxide	FE
Manganese	MN

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Rock Defect Shape/Planarity

Term	Abbreviation Code
Curved	CU
Irregular	IR
Planar	PR
Stepped	ST
Undulating	UN

Rock Defect Roughness

Term	Abbreviation Code
Polished	PO
Rough	RF
Slickensided	SL
Smooth	SM
Very rough	VR

Defect Orientation

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

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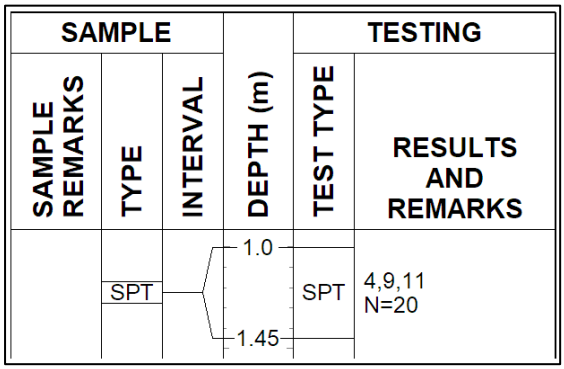
Sampling, Testing and Excavation Methodology

Terminology
Symbols
Abbreviations

November 2023

Sampling and Testing

A record of samples retained, and field testing performed is usually shown on a Douglas Partners' log with samples appearing to the left of a depth scale, and selected field and laboratory testing (including results, where relevant) appearing to the right of the scale, as illustrated below:



Sampling

The type or intended purpose for which a sample was taken is indicated by the following abbreviation codes.

Sample Type	Code
Auger sample	A
Bulk sample	B
Core sample	C
Disturbed sample	D
Sample from SPT test	SPT
Environmental sample	ES
Gas sample	G
Undisturbed tube sample	U[1]
Water sample	W
Piston sample	P
Core sample for unconfined compressive strength testing	UCS
Material Sample	MT

[1] – numeric suffixes indicate tube diameter/width in mm

The above codes only indicate that a sample was retained, and not that testing was scheduled or performed.

Field and Laboratory Testing

A record that field and laboratory testing was performed is indicated by the following abbreviation codes.

Test Type	Code
Pocket penetrometer (kPa)	PP
Photo ionisation detector (ppm)	PID
Standard Penetration Test x/y =x blows for y mm penetration HB = hammer bouncing HW = fell under weight of hammer	SPT
Shear vane (kPa)	V
Unconfined compressive strength, (MPa)	UCS

Field and laboratory testing (continued)

Test Type	Code
Point load test, (MPa), axial (A), diametric (D), irregular (I)	PLT(_)
Dynamic cone penetrometer, followed by blow count penetration increment in mm (cone tip, generally in accordance with AS1289.6.3.2)	DCP/150
Perth sand penetrometer, followed by blow count penetration increment in mm (flat tip, generally in accordance with AS1289.6.3.3)	PSP/150

Groundwater Observations

▷	seepage/inflow
▽	standing or observed water level
NFGWO	no free groundwater observed
OBS	observations obscured by drilling fluids

Drilling or Excavation Methods/Tools

The drilling/excavation methods used to perform the investigation may be shown either in a dedicated column down the left-hand edge of the log, or stated in the log footer. In some circumstances abbreviation codes may be used.

Method	Abbreviation Code
Toothed bucket	TB[1]
Mud/blade bucket	MB[1]
Ripping tyne/ripper	R
Rock breaker/hydraulic hammer	RB
Hand auger	HA[1]
NMLC series coring	NMLC
HMLC series coring	HMLC
NQ coring	NQ3
HQ coring	HQ3
PQ coring	PQ3
Push tube	PT[1]
Rock roller	RR[1]
Solid flight auger. Suffixes: /T = tungsten carbide tip, /V = v-shaped tip	AD[1]
Sonic drilling	SON[1]
Vibrocore	VC[1]
Wash bore (unspecified bit type)	WB[1]
Existing exposure	X
Hand tools (unspecified)	HAND
Predrilled	PD
Diatube	DT[1]
Hollow flight auger	HSA[1]
Vacuum excavation	VE

[1] – numeric suffixes indicate tool diameter/width in mm

Douglas PARTNERS

Appendix C

Historical Aerial Photographs

Appendix C
Historical Aerial Photos
Lot 9 DP1193430 Hebden Road, Muswellbrook

Figure C1: 1958 aerial photograph, site in red

Figure C2: 1974 aerial photograph, site in red

Figure C3: 1989 aerial photograph, site in red

Figure C4: 1993 aerial photograph, site in red

Figure C5: 1999 aerial photograph, site in red

Figure C6: 2007 aerial photograph, site in red

Figure C7: 2013 aerial photograph, site in red

Figure C8: 2023 aerial photograph, site in red

Appendix D

Historical Title Deeds

ABN: 36 092 724 251
Ph: 02 9099 7400
(Ph: 0412 199 304)

Level 14, 135 King Street, Sydney
Sydney 2000
GPO Box 4103 Sydney NSW 2001
DX 967 Sydney

Summary of Owners Report

Re: - Hebden Road, Muswellbrook

Description: - Lot 9 D.P. 250890

Date of Acquisition and term held	Registered Proprietor(s) & Occupations where available	Reference to Title at Acquisition and sale
19.09.1924 (1924 to 1928)	Ernest Thompson (Farmer)	Volume 3640 Folio 169
27.06.1928 (1928 to 1939)	Chard Hilston Neve (Farmer)	Volume 3640 Folio 169
06.01.1939 (1939 to 1946)	Enid Raby Marshall (Married Woman)	Volume 3640 Folio 169
23.08.1946 (1946 to 1950)	John Thomas Knight (Butcher)	Volume 3640 Folio 169
19.01.1950 (1950 to 1950)	Ian Mills Bolte (Farmer)	Volume 3640 Folio 169
02.05.1950 (1950 to 1953)	James Craig Tanner (Grazier)	Volume 3640 Folio 169 Now Volume 6382 Folio 138
09.10.1953 (1953 to 1959)	J.T. & P. Investments Pty Limited	Volume 6382 Folio 138
05.03.1959 (1959 to 1960)	Thomas Arthur Hall (Engineer)	Volume 6382 Folio 138
30.06.1960 (1960 to 1966)	J.T. & P. Investments Pty Limited	Volume 6382 Folio 138
06.04.1966 (1966 to 1976)	The Electricity Commission of New South Wales	Volume 6382 Folio 138
30.01.1976	Declared Crown Land	Volume 6382 Folio 138 Now Crown Land
30th January 1976	Added to Crown Reserve No.` 87994 for Public Recreation	Gazette
23rd November 1990	Lake Liddel Recreation Area (Reserve 87894) Reserve Trust Muswellbrook Shire Council – Trust Manager	
	# The State of New South Wales	9/250890

 # Denotes current registered proprietor

Leases: -

- 08.05.1926 to Thomas Reuben Payne (Farmer) – defaulted 28th June 1928.

Easements: -

- 19.12.1975 Easement for Electricity Supply.

Yours Sincerely
Mark Groll
10 July 2023

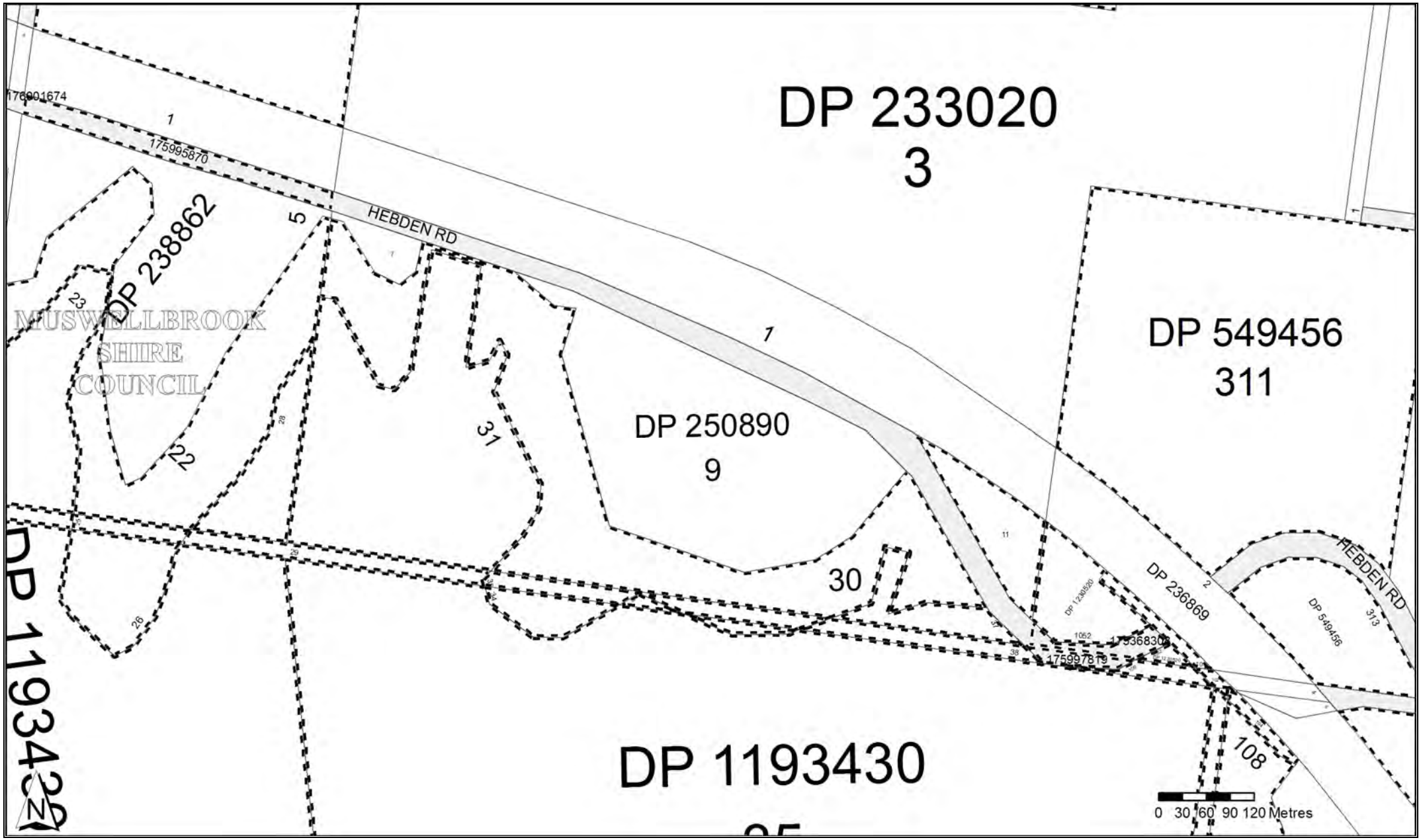
Cadastral Records Enquiry

LAND REGISTRY SERVICES

Cadastral Records Enquiry Report : Lot 9 DP 250890

Ref : DP ref 224764

Locality : MUSWELLBROOK
Parish : LIDDELL
LGA : MUSWELLBROOK
County : DURHAM



	Status	Surv/Comp	Purpose
DP231880			
Lot(s): 3			
DP265436	REGISTERED	SURVEY	EASEMENT
DP250890			
Lot(s): 11			
DP265436	REGISTERED	SURVEY	EASEMENT
DP532671			
Lot(s): 3			
DP265436	REGISTERED	SURVEY	EASEMENT
DP549456			
Lot(s): 311, 313			
DP265436	REGISTERED	SURVEY	EASEMENT
DP1193296			
Lot(s): 26			
DP238862	HISTORICAL	SURVEY	SUBDIVISION
DP1193430			
Lot(s): 24, 25, 29, 32, 33, 38, 39			
DP774680	HISTORICAL	COMPILATION	RESUMPTION OR ACQUISITION
Lot(s): 31, 37			
DP265436	REGISTERED	SURVEY	EASEMENT
Lot(s): 26, 27, 34, 35, 36			
DP255215	HISTORICAL	SURVEY	SUBDIVISION
Lot(s): 30, 31, 37			
DP250890	HISTORICAL	SURVEY	RESUMPTION OR ACQUISITION
Lot(s): 22, 23, 28			
DP238862	HISTORICAL	SURVEY	SUBDIVISION
Lot(s): 22			
NSW GAZ. 09-05-2014 Folio : 1375 ACQUIRED FOR COUNCIL PURPOSES ELECTRICITY GENERATOR ASSETS (AUTHORISED TRANSACTIONS) ACT 2012 - LOTS 10, 18 AND 21-22 DP1193430			
Lot(s): 20			
PA83221 - LOT 11 DP815320, LOT 19 DP1193296 AND LOTS 10 AND 20-21 DP1193430			
Lot(s): 25			
NSW GAZ. 12-09-2014 Folio : 3077 ADDITION TO RESERVED CROWN LAND RESERVE NO. 87894 - LOT 25 DP1193430			
Lot(s): 26			
NSW GAZ. 12-09-2014 Folio : 3077 ADDITION TO RESERVED CROWN LAND LOT 26 DP1193430			
Lot(s): 32			
NSW GAZ. 12-09-2014 Folio : 3077 ADDITION TO RESERVED CROWN LAND RESERVE NO. 87894 - LOT 32 DP1193430			
Lot(s): 30			
NSW GAZ. 12-09-2014 Folio : 3077 ADDITION TO RESERVED CROWN LAND RESERVE NO. 87894 - LOT 30 DP1193430			
Lot(s): 34, 36			
NSW GAZ. 12-09-2014 Folio : 3077 ADDITION TO RESERVED CROWN LAND RESERVE NO. 87894 - LOT 34 DP1193430			
Lot(s): 20, 25, 26, 30, 32, 34, 36			
NSW GAZ. 12-09-2014 Folio : 3077 DECLARED CROWN LAND LOTS 2, 6-7, 11, 13, 15, 19, 20, 22, 25-26, 30, 32, 34, 36 DP1193430 AND 31, 33, 34, 38-40 DP241179			
NSW GAZ. 12-09-2014 Folio : 3077 DECLARED CROWN LAND LOTS 2, 6, 7, 11, 13, 15, 19, 20, 22, 25, 26, 30, 32, 34, 36 DP1193430, 31, 33, 34, 38, 39, 40 DP241179			

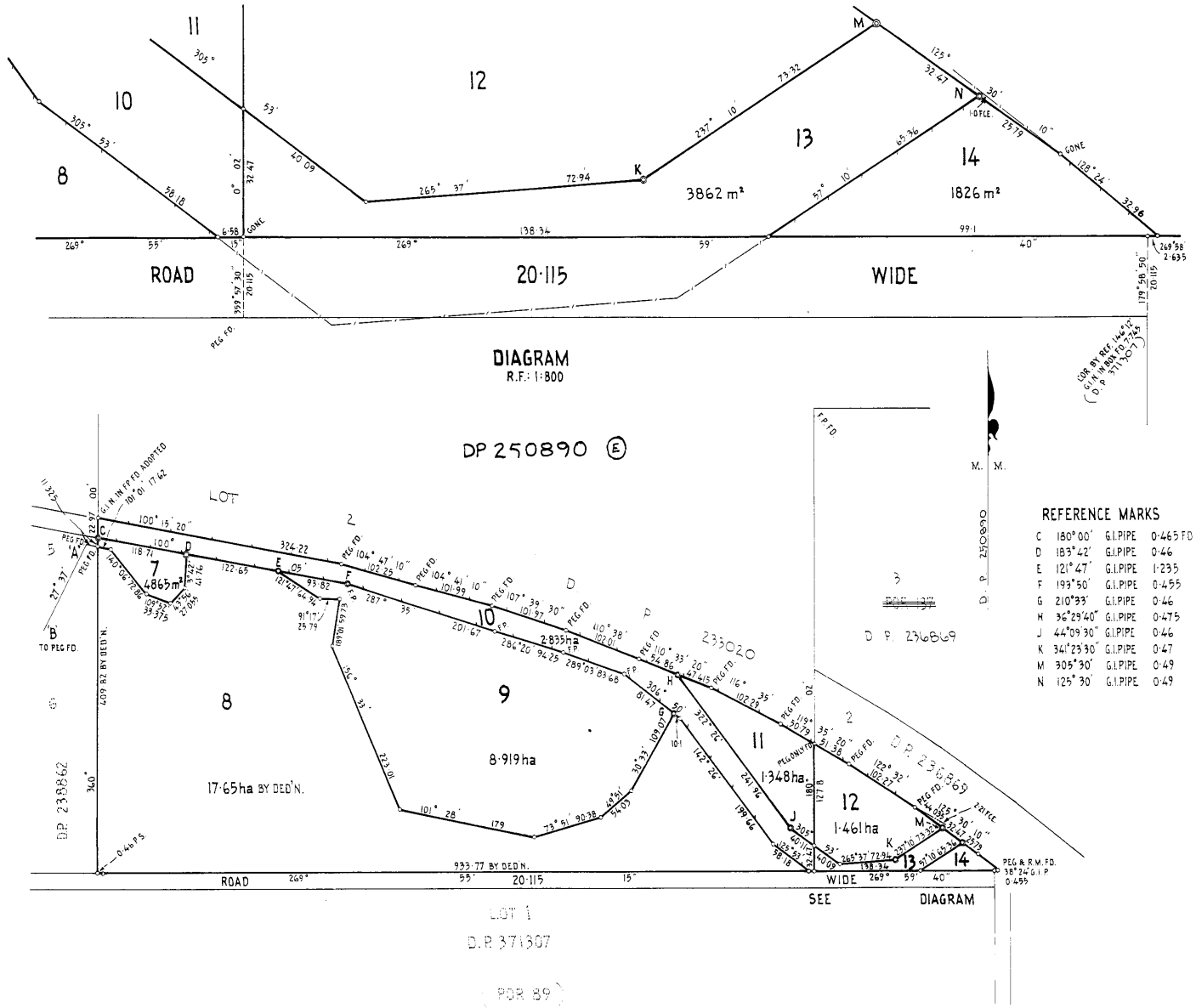
	Status	Surv/Comp	Purpose
DP1218648			
Lot(s): 102, 106			
DP774680	HISTORICAL	COMPILATION	RESUMPTION OR ACQUISITION
DP1193430	HISTORICAL	SURVEY	RESUMPTION OR ACQUISITION
Lot(s): 103, 104, 107, 108			
DP255215	HISTORICAL	SURVEY	SUBDIVISION
Lot(s): 101			
DP236869	HISTORICAL	SURVEY	RESUMPTION OR ACQUISITION
DP1230520			
Lot(s): 1051, 1052			
DP236869	HISTORICAL	SURVEY	RESUMPTION OR ACQUISITION
DP1218648	HISTORICAL	SURVEY	RESUMPTION OR ACQUISITION
Road			
Polygon Id(s): 175995870			
NSW GAZ. 18-08-2017 Folio : 4490 DEDICATED PUBLIC ROAD LOT 4 DP238862			
Polygon Id(s): 176001674			
NSW GAZ. 18-08-2017 Folio : 4490 DEDICATED PUBLIC ROAD LOT 26 DP1193296			
Polygon Id(s): 175997819			
NSW GAZ. 18-08-2017 Folio : 4490 DEDICATED PUBLIC ROAD LOT 39 DP1193430			

Plan	Surv/Comp	Purpose
DP231880	SURVEY	RESUMPTION OR ACQUISITION
DP233020	SURVEY	RESUMPTION OR ACQUISITION
DP236869	SURVEY	RESUMPTION OR ACQUISITION
DP238862	SURVEY	SUBDIVISION
DP250890	SURVEY	RESUMPTION OR ACQUISITION
DP255215	SURVEY	SUBDIVISION
DP531245	SURVEY	RESUMPTION OR ACQUISITION
DP532671	SURVEY	RESUMPTION OR ACQUISITION
DP532672	SURVEY	RESUMPTION OR ACQUISITION
DP549456	SURVEY	SUBDIVISION
DP752470	COMPILATION	CROWN ADMIN NO.
DP1128223	COMPILATION	CROWN LAND CONVERSION
DP1128333	COMPILATION	DEPARTMENTAL
DP1193430	SURVEY	RESUMPTION OR ACQUISITION
DP1218648	SURVEY	RESUMPTION OR ACQUISITION
DP1230520	SURVEY	SUBDIVISION

PLAN FORM 2

Plan Drawing only to appear in this space

Signatures and seals only.



Council Clerk's Certificate

I hereby certify that –

(a) the requirements of the Local Government Act, 1919 (other than the requirements for the registration of plans), and

**(b)* the requirements of section 34B of the †Metropolitan Water, Sewerage and Drainage Act, 1924, as amended. †Hunter District Water, Sewerage, and Drainage Act, 1938, as amended

have been complied with by the applicant in relation to the proposed .....
(Insert "new road", "subdivision" or "consolidated lot") set out herein

Subdivision No. .....

Date .....

(Signature) .....
Council Clerk

**This part of certificate to be deleted where the application is only for a consolidated lot or the opening of a new road or where the land to be subdivided is wholly outside the areas of operations of the Metropolitan Water Sewerage and Drainage Board and the Hunter District Water Board.*
†Delete if inapplicable.

M.P.D.

D. P. 250890 (E)

Registered: 17-11-1975

C.A.: —

Title System: TORRENS

Purpose: ACQUISITION

Ref. Map: PARISH #

Last Plan: D.P. 233020, D.P. 236869

PLAN OF: SUBDIVISION OF LOT 2 OF D.P.233020 AND LOT 1 OF D.P.236869

Reduction Ratio 1: 4000
Lengths are in metres.

Mun./Shire ~~City~~: DENMAN

Locality: LIDDELL

Parish: LIDDELL

County: DURHAM

~~This is sheet 1 of my plan in~~ ~~sheets.~~
(Delete if inapplicable).

I, COLIN RAY MURRAY
of M.M.HYNDES, BAILEY & Co. MUSWELLBROOK
a surveyor registered under the Surveyors Act, 1929, as amended, hereby certify that the survey represented in this plan EXCEPT WITH REGARD TO LOT B
is accurate and has been made *(1) by me (2) ~~under my immediate supervision~~ in accordance with the Survey Practice Regulations, 1933, and was completed on †
30th OCTOBER, 1970.

Signature C. R. Murray.

Surveyor registered under Surveyors Act, 1929, as amended.
Datum Line of Azimuth: A - B
*Strike out either (1) or (2). †Insert date of survey.

Panel for use only for statements of intention to dedicate public roads or to create public reserves, drainage reserves, easements or restrictions as to user.

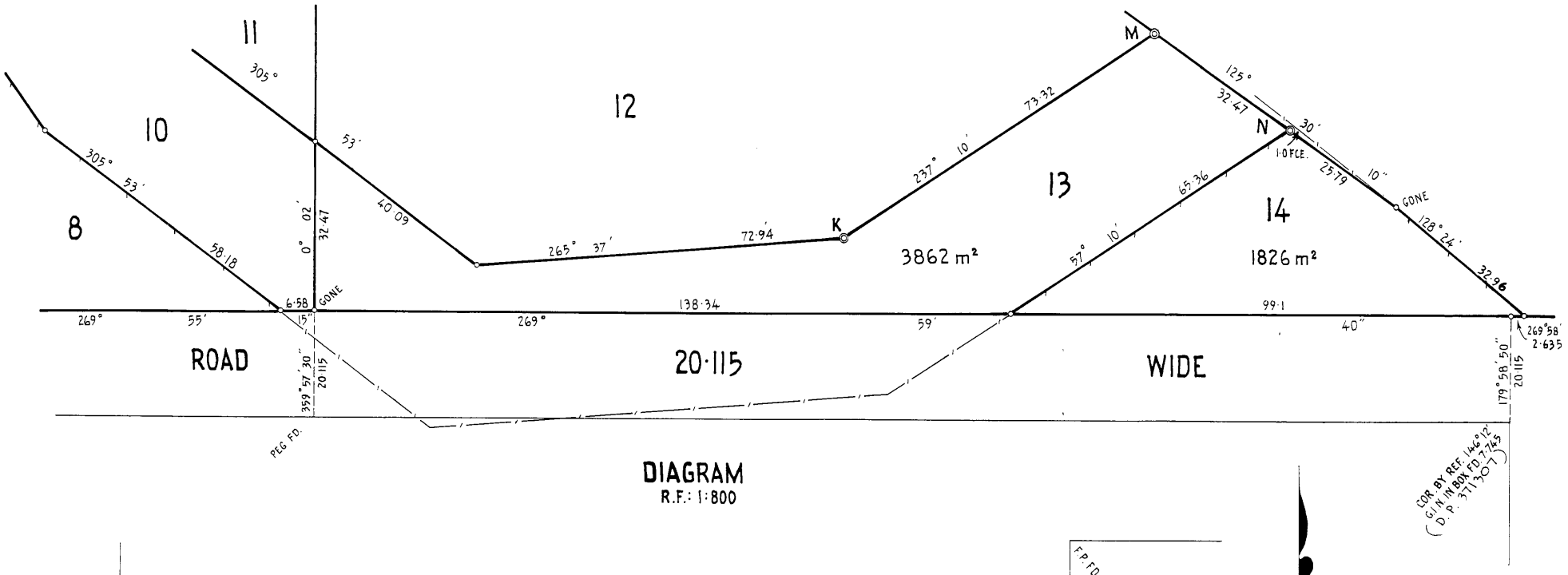
THE ELECTRICITY COMMISSION OF N.S.W.
LIDDELL POWER STATION

LOTS 7 & 9 PROPOSED TO BE ACQUIRED BY THE MINISTER FOR LANDS

Table of mm

WARNING: CREASING OR FOLDING WILL LEAD TO REJECTION

SURVEYOR'S REFERENCE: P12560



DIAGRAM
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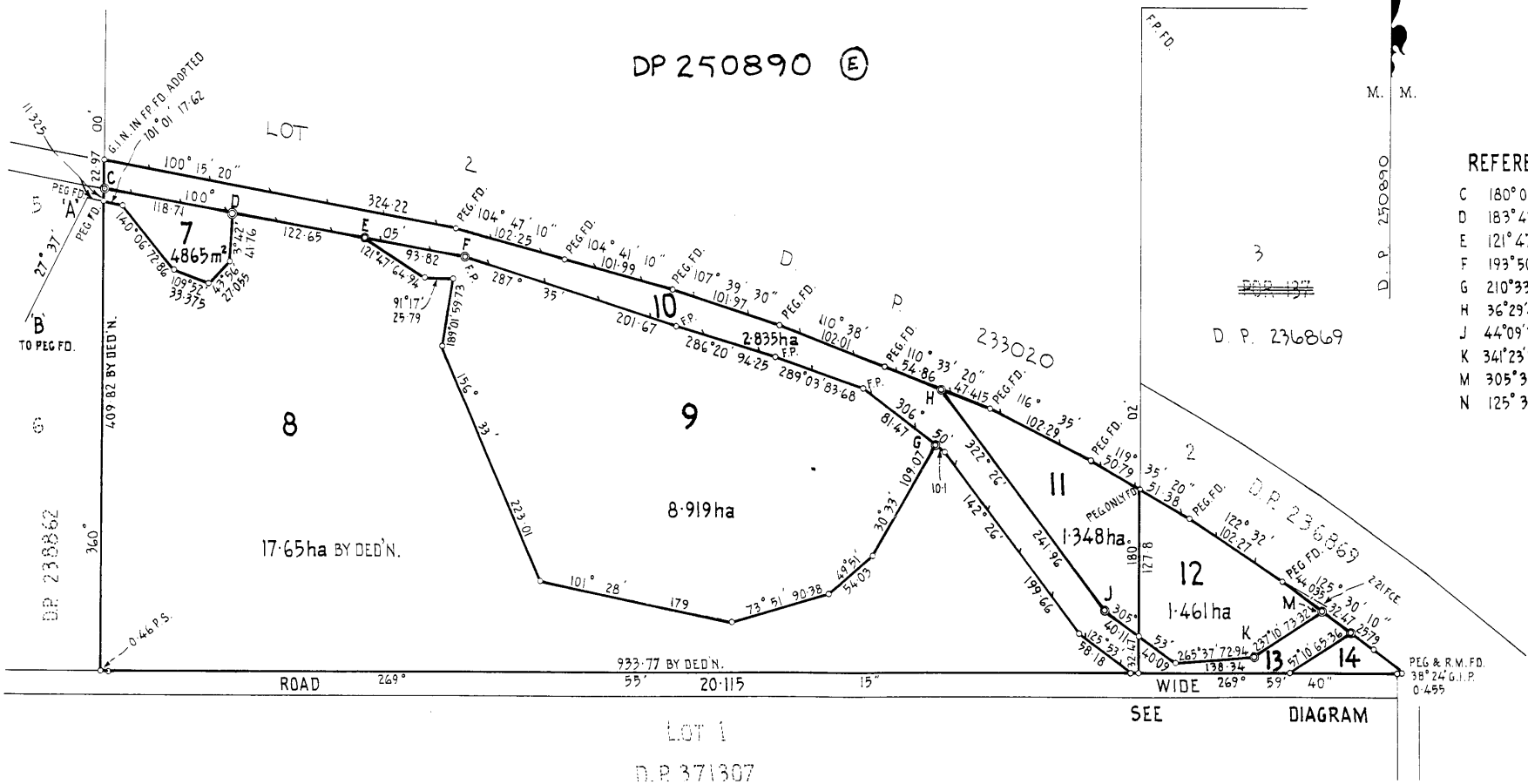
DP 250890 (E)



REFERENCE MARKS

C	180°00'	G.I.PIPE	0·465 FD.
D	183°42'	G.I.PIPE	0·46
E	121°47'	G.I.PIPE	1·235
F	193°50'	G.I.PIPE	0·455
G	210°33'	G.I.PIPE	0·46
H	36°29'40"	G.I.PIPE	0·475
J	44°09'30"	G.I.PIPE	0·46
K	341°23'30"	G.I.PIPE	0·47
M	305°30'	G.I.PIPE	0·49
N	125°30'	G.I.PIPE	0·49

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NEW SOUTH WALES LAND REGISTRY SERVICES - HISTORICAL SEARCH

SEARCH DATE
10/10/2023 6:32PM

FOLIO: 9/250890

First Title(s): THIS FOLIO
Prior Title(s): CROWN LAND

Recorded	Number	Type of Instrument	C.T. Issue
29/4/2008	CA128561	CONVERSION ACTION	FOLIO CREATED CT NOT ISSUED

*** END OF SEARCH ***

DP ref 224764 PRINTED ON 10/10/2023

NEW SOUTH WALES LAND REGISTRY SERVICES - TITLE SEARCH

FOLIO: 9/250890

SEARCH DATE	TIME	EDITION NO	DATE
10/10/2023	6:32 PM	-	-

LAND

LOT 9 IN DEPOSITED PLAN 250890
AT MULWELLBROOK
LOCAL GOVERNMENT AREA MUSWELLBROOK
PARISH OF LIDDELL COUNTY OF DURHAM
TITLE DIAGRAM DP250890

FIRST SCHEDULE

THE STATE OF NEW SOUTH WALES (CA128561)

SECOND SCHEDULE (3 NOTIFICATIONS)

* 1 THE LAND IS A RESERVE WITHIN THE MEANING OF PART 5 OF THE CROWN LANDS ACT 1989 AND THERE ARE RESTRICTIONS ON TRANSFER AND OTHER DEALINGS IN THE LAND UNDER THAT ACT, WHICH MAY REQUIRE CONSENT OF THE MINISTER.
* 2 LIMITED TITLE. LIMITATION PURSUANT TO SECTION 28T(4) OF THE REAL PROPERTY ACT, 1900. THE BOUNDARIES OF THE LAND COMPRISED HEREIN HAVE NOT BEEN INVESTIGATED BY THE REGISTRAR GENERAL.
* 3 NOTIFICATION IN GOVERNMENT GAZETTE DATED 19.12.1975 FOL. 5482 - EASEMENT FOR ELECTRICITY SUPPLY AFFECTING THE PART OF THE LAND ABOVE DESCRIBED AS MORE FULLY SET OUT THEREIN

NOTATIONS

UNREGISTERED DEALINGS: NIL

*** END OF SEARCH ***

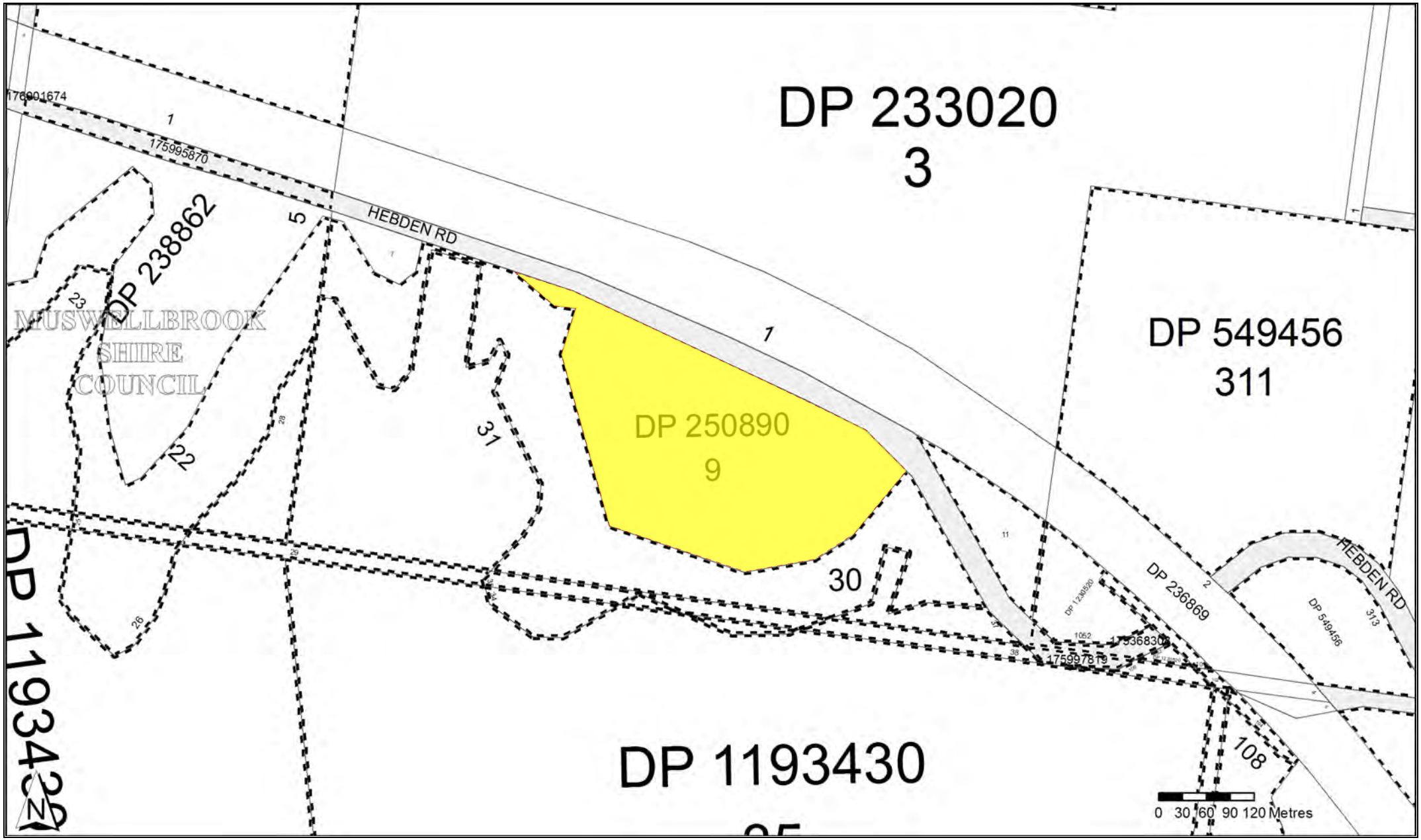
DP ref 224764 PRINTED ON 10/10/2023

* Any entries preceded by an asterisk do not appear on the current edition of the Certificate of Title. Warning: the information appearing under notations has not been formally recorded in the Register. InfoTrack an approved NSW Information Broker hereby certifies that the information contained in this document has been provided electronically by the Registrar General in accordance with Section 96B(2) of the Real Property Act 1900.

Cadastral Records Enquiry Report : Lot 9 DP 250890

Ref : DP ref 224764

Locality : MUSWELLBROOK
Parish : LIDDELL
LGA : MUSWELLBROOK
County : DURHAM

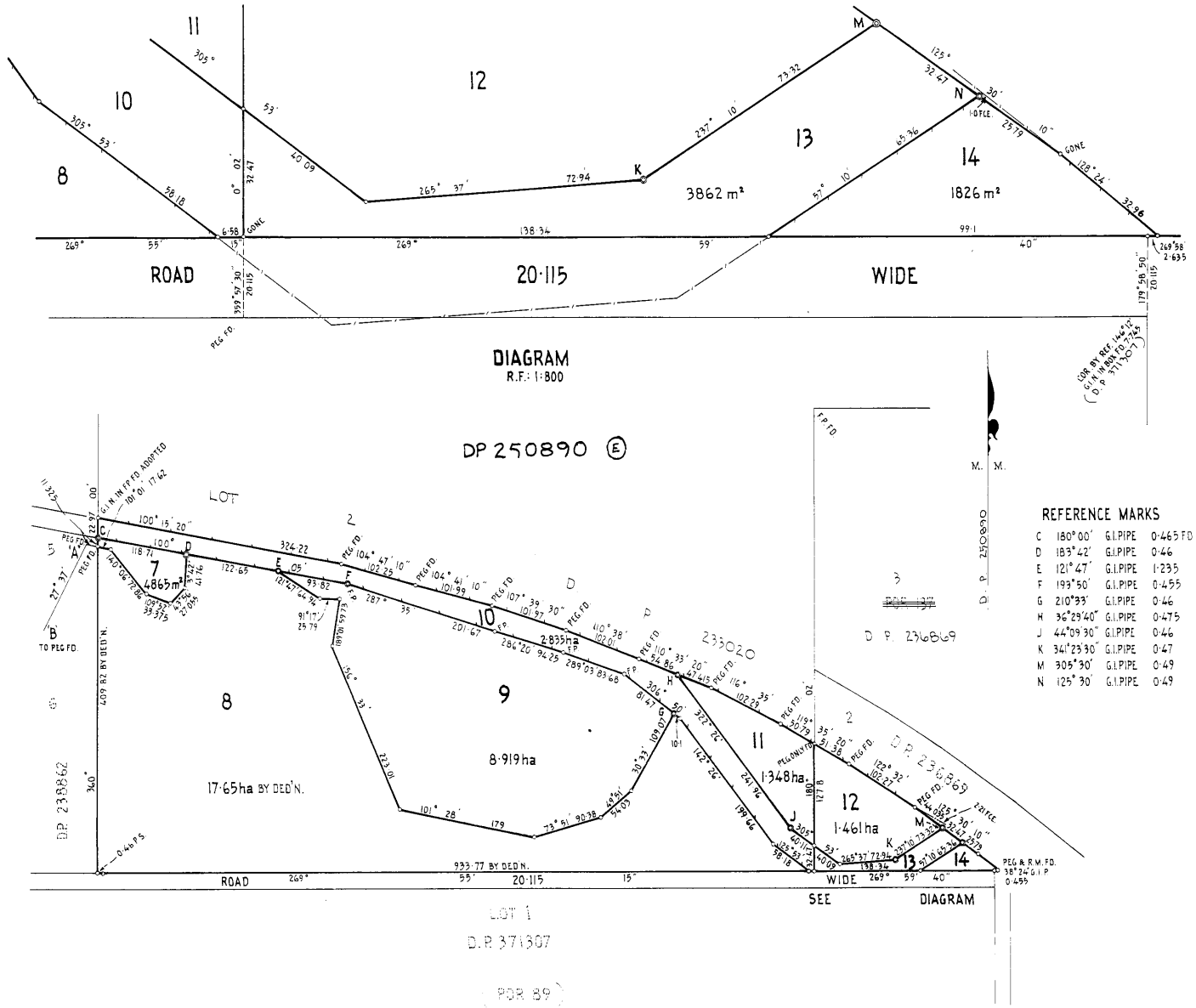


This information is provided as a searching aid only.Whilst every endeavour is made to ensure that current map, plan and titling information is accurately reflected, the Registrar General cannot guarantee the information provided. For ALL ACTIVITY PRIOR TO SEPTEMBER 2002 you must refer to the RGs Charting and Reference Maps

PLAN FORM 2

Plan Drawing only to appear in this space

Signatures and seals only.



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have been complied with by the applicant in relation to the proposed .....
(Insert "new road", "subdivision" or "consolidated lot") set out herein

Subdivision No. .....

Date .....

(Signature) .....
Council Clerk

**This part of certificate to be deleted where the application is only for a consolidated lot or the opening of a new road or where the land to be subdivided is wholly outside the areas of operations of the Metropolitan Water Sewerage and Drainage Board and the Hunter District Water Board.*
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M.P.D.

D. P. 250890 (E)

Registered: 17-11-1975

C.A.: —

Title System: TORRENS

Purpose: ACQUISITION

Ref. Map: PARISH #

Last Plan: D.P. 233020, D.P. 236869

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Reduction Ratio 1: 4000
Lengths are in metres.

Mun./Shire ~~City~~: DENMAN

Locality: LIDDELL

Parish: LIDDELL

County: DURHAM

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THE ELECTRICITY COMMISSION OF N.S.W.
LIDDELL POWER STATION

LOTS 7 & 9 PROPOSED TO BE ACQUIRED BY THE MINISTER FOR LANDS

Table of mm

WARNING: CREASING OR FOLDING WILL LEAD TO REJECTION

SURVEYOR'S REFERENCE: P12560

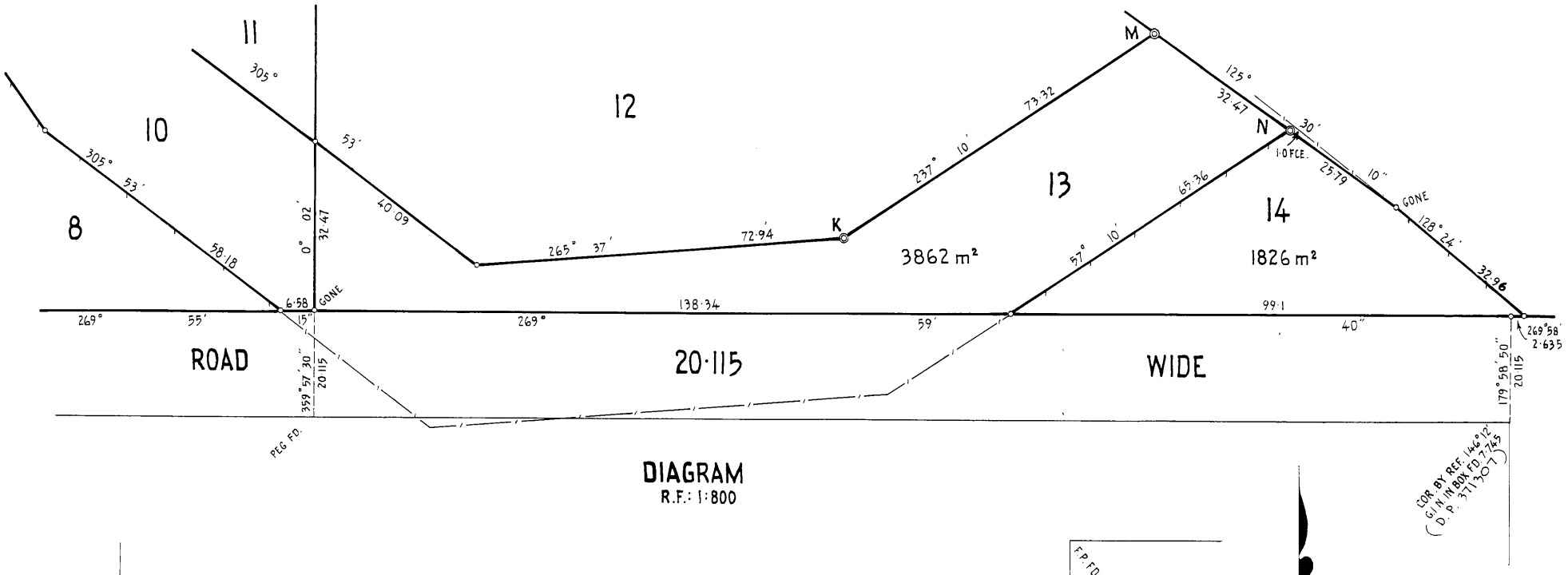
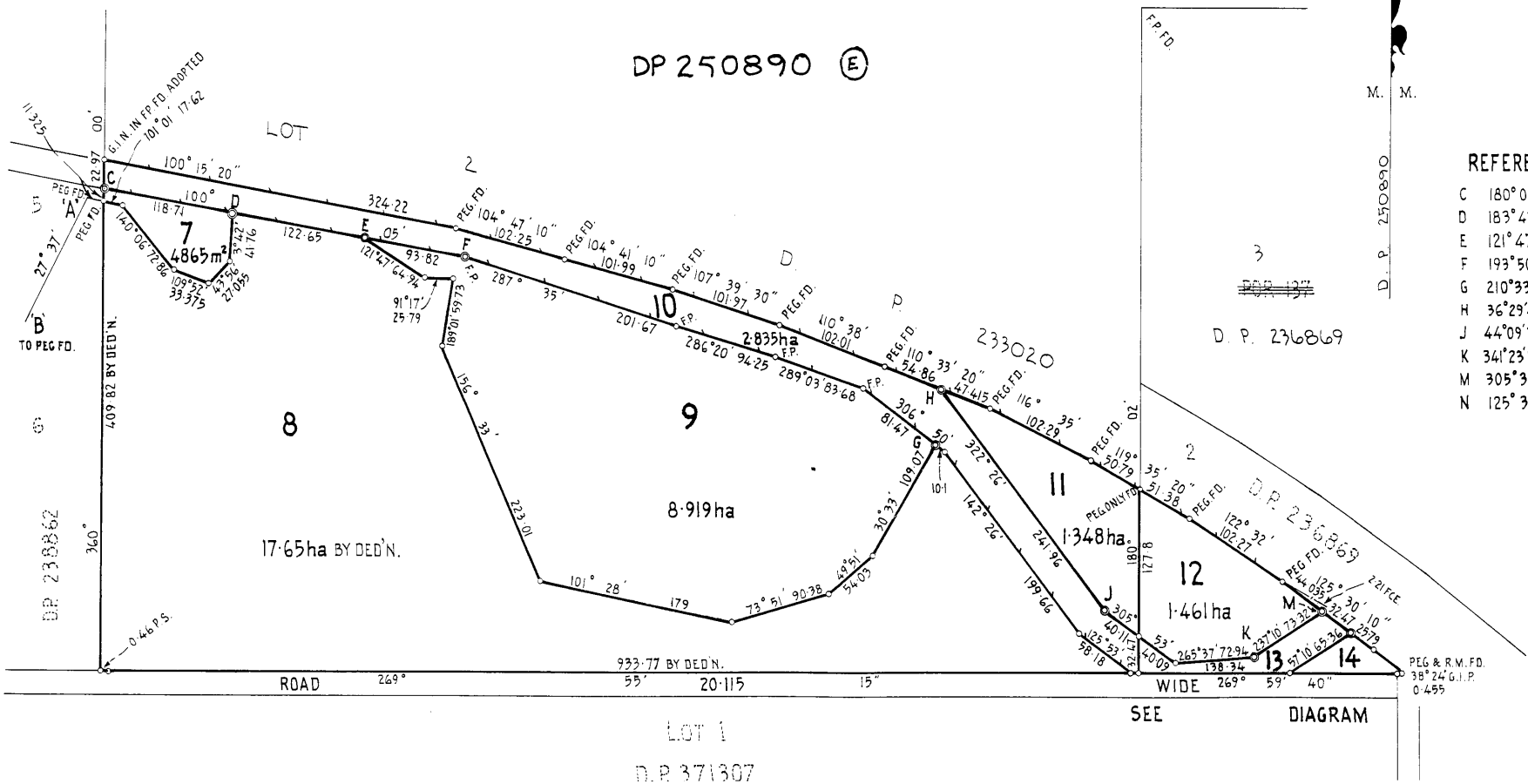


DIAGRAM
R.F.: 1:800

DP 250890 (E)



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F	193°50'	G.I.PIPE	0·455
G	210°33'	G.I.PIPE	0·46
H	36°29'40"	G.I.PIPE	0·475
J	44°09'30"	G.I.PIPE	0·46
K	341°23'30"	G.I.PIPE	0·47
M	305°30'	G.I.PIPE	0·49
N	125°30'	G.I.PIPE	0·49

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(6377) Sydney, 30th January, 1976.

DECLARATION UNDER SECTION 25A OF THE CROWN LANDS CONSOLIDATION ACT, 1913, IN RESPECT OF LAND

IN pursuance of the provisions of section 25A of the Crown Lands Consolidation Act, 1913, I declare that the lands particularized hereunder may be dealt with as if they had been acquired under the Closer Settlement Acts or as Crown land within the meaning of the Crown Lands Consolidation Act, 1913.

C. M. FISHER, Minister for Lands.

SCHEDULE

Land vested in the Electricity Commission of N.S.W.

Land District—Singleton; Shire—Denman

Parish of Liddell, County of Durham, 9.405 hectares, being lots 7 and 9, D.P. 250890, and being also part of the lands in Certificate of Title, volume 6382, folio 138. Pks 75-1181.

Land vested in The Council of the Shire of Wakool

Land District—Deniliquin; Shire—Wakool

Parish and Town Barham, County Wakool, 3.637 hectares, being portions 50, 51, 52, 53 and 54 and being the land contained in C.T., vol. 6138, fol. 213, C.G., vol. 3601, fol. 12, C.G., vol. 3420, fol. 90, and C.G., vol. 3291, fol. 64. Pks 73-650.

Land vested in the Minister for Lands

Land District—Inverell; Shire—Macintyre

Parish Clive, County Gough, 1 973 square metres, being portion 265. Pks 75-1279.

(6382) Sydney, 30th January, 1976.

LORD HOWE ISLAND BOARD

RESIGNATION

IT is hereby notified that in pursuance of the provisions of paragraph (d) of section 5 of the Lord Howe Island Act, 1953, the Governor-in-Council has approved of the acceptance of the resignation tendered by Mr John Brettell Holliday, as a member and chairman of the Lord Howe Island Board, with the last day of service 12th August, 1975. L.H. 404.

C. M. FISHER, Minister for Lands.

(6383) Sydney, 30th January, 1976.

DECLARATION OF A PUBLIC BODY AS A PUBLIC AUTHORITY FOR THE PURPOSES OF SECTION 25A, CROWN LANDS CONSOLIDATION ACT, 1913

IN pursuance of the provisions of section 25A of the Crown Lands Consolidation Act, 1913, I, by this my Order, do hereby declare The Council of the Shire of Wakool to be a public authority for the purposes of the aforesaid section 25A. Pks 73-650.

C. M. FISHER, Minister for Lands.

(6376) Sydney, 30th January, 1976.

RESERVES FROM SALE

IN pursuance of the provisions of section 28, Crown Lands Consolidation Act, 1913, I declare that the Crown lands hereunder described shall be reserved from sale for the public purposes hereinafter specified and are thereby reserved accordingly.

C. M. FISHER, Minister for Lands.

FOR BOY SCOUTS

Land District—Picton; City—Campbelltown

No. 89719, Parish Wedderburn, County Cumberland, area 6.27 hectares, being portion 63. Pks 75-429.

FOR PUBLIC RECREATION

Land District—Condobolin; Shire—Lachlan

No. 89716 from sale, Parish Murda, County Cunningham, about 6 hectares, being the part of Mount Tilga Tilga Trig. Reserve 8652, lying west of a line rectangular distant through a point on the southern boundary of the reserve 200 metres easterly of the southwestern corner of that reserve. (The included part of Trig. Reserve 8642, is hereby revoked.) Pks 75-1278.

Land District—Moruya; Shire—Eurobodalla

No. 89718, Parish Bateman, County St Vincent, area 33.19 hectares, being lot 1, D.P. 536738, and lot 221, D.P. 578305. Pks 75-797.

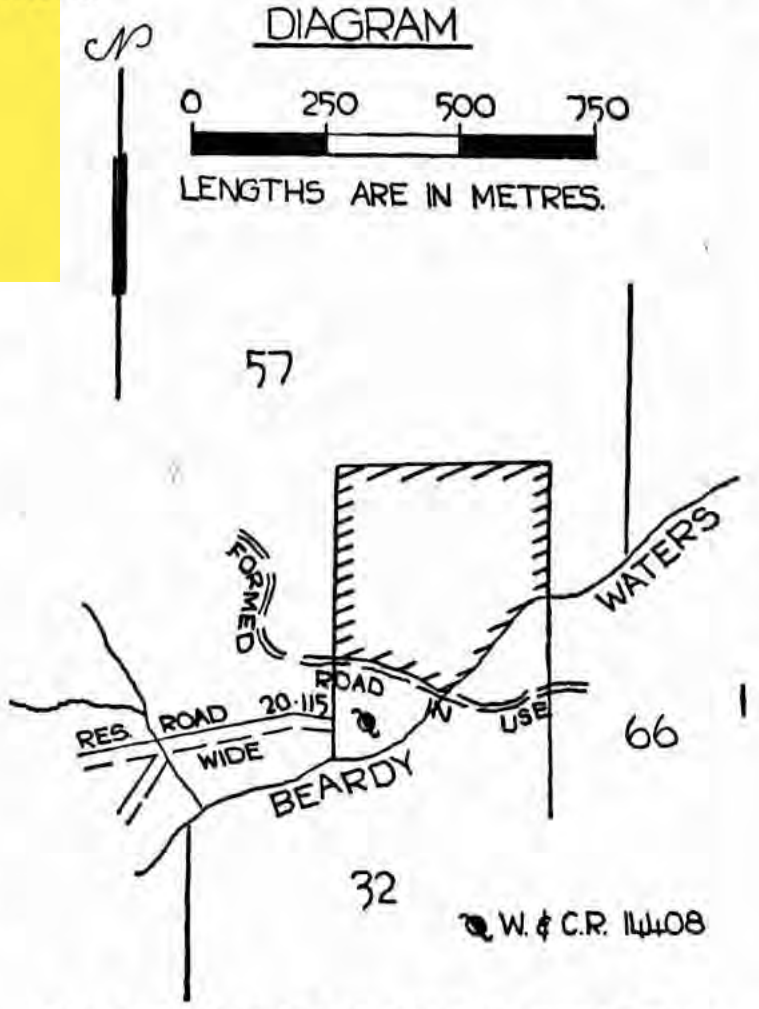
Land District—Picton; City—Campbelltown

No. 89720, Parish Wedderburn, County Cumberland, area 41.17 hectares, being portions 12 and 46. Pks 75-429.

FOR PUBLIC RECREATION AND ACCESS

Land District—Glen Innes; Shire—Severn

No. 89721, Parish Macintyre, County Gough, about 14 hectares, shown by hatched edging on diagram hereunder. Ten. 75-5446.



FOR PUBLIC RECREATION AND PUBLIC HALL

Land District—Inverell; Shire—Macintyre

No. 89717, Parish Clive, County Gough, 1 973 square metres, being portion 265. Pks 75-1279.

Board of Surveyors, Department of Lands,
Sydney, 30th January, 1976.

THE undermentioned has been removed from the Register of Surveyors under the provisions of the Surveyors Act, 1929, for the reason shown.

Nugent, Kerry Frank, 4 Ginahgulla Street, Mt Gravatt East, Brisbane—at own request.

L. N. FLETCHER, President.
(6224) J. A. COLQUHOUN, Acting Registrar.

Board of Surveyors, Department of Lands,
Sydney, 30th January, 1976.

THE undermentioned has been removed from the Register of Surveyors under the provisions of the Surveyors Act, 1929, for the reason shown.

McCouat, John Angus, 3 Birkley Road, Manly—deceased.

L. N. FLETCHER, President.
(6190) J. A. COLQUHOUN, Acting Registrar.

(6394) Board of Surveyors, Department of Lands,
Sydney, 30th January, 1976.

THE undermentioned has been registered as a Surveyor under the provisions of the Surveyors Act, 1929, from the date shown.

Franklin, Ross Charles, c.o. Jones Flint & Pike, Consulting Planners & Surveyors, P.O. Box 1074, Surfers Paradise, Queensland 4217.

L. N. FLETCHER, President.
J. A. COLQUHOUN, Acting Registrar.

Parish Tyagong, County Monteagle, Land District Grenfell, Shire Weddin

Widening of part road from Forbes to Young, D.P. 251219, R. 35382-1603. (Council's reference: R. 8/2-7/75.) Rds 75-1811.

Land resumed for road: Lot 1.

Title affected and area resumed: C.G. 5229-80 (3 540 square metres).

Parish Stewart, County Macquarie, Land District Taree, Shire Manning

Widening of part of road from Hannam Vale to Johns River, D.P. 251250, R. 35436-1603R. (Council's reference: R. 2/11.) Rds 75-1977.

Lands resumed for road: Lots 1 to 7.

Titles affected and areas resumed: C.T. 4747-248 (891 square metres); C.T. 5186-106 (445 square metres); C.T. 6845-39 (1 296 square metres); C.G. 7633-221 (1 854 square metres); C.T. 6862-206 (986 square metres); C.T. 6862-41 (8 square metres).

NOTE: Dedication is limited to the surface and a depth of 20 metres below the surface.

(6379) Sydney, 30th January, 1976.

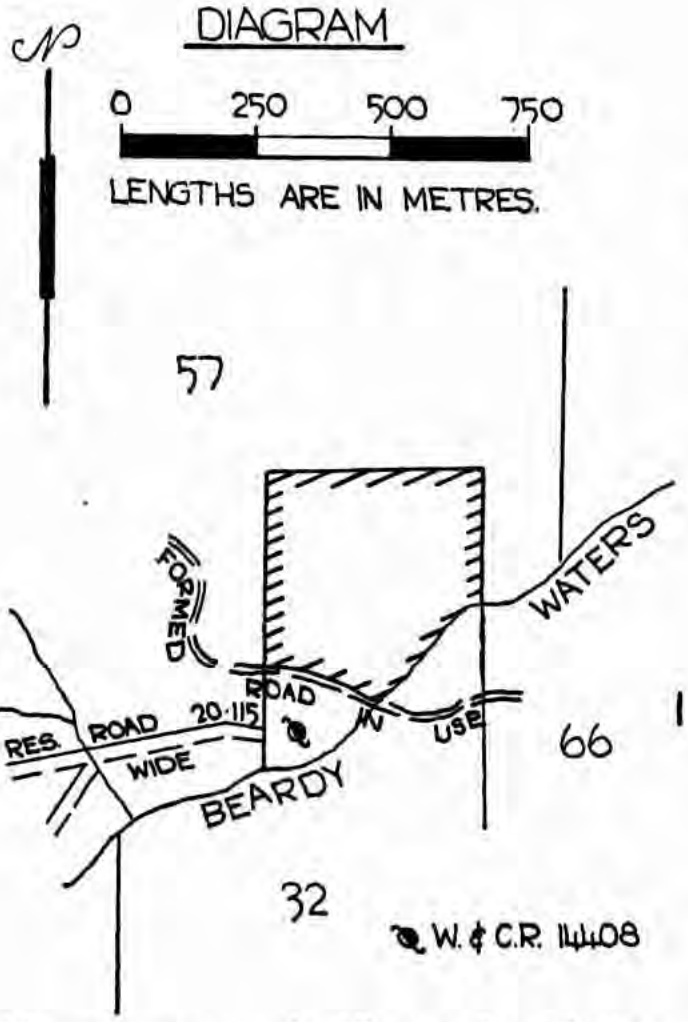
WITHDRAWAL OF LAND FROM RESERVE UNDER THE CONTROL OF PASTURES PROTECTION BOARD

IN pursuance of the provisions of section 42 (2), Pastures Protection Act, 1934, the land specified hereunder is hereby withdrawn from such reserve for the purpose stated.

C. M. FISHER, Minister for Lands.

Land Board District—Armidale; Pastures Protection District—Glen Innes

Parish Macintyre, County Gough, Reserve No. 14408 for Water Supply and Camping, notified 5th September, 1891. Part withdrawn—about 14 hectares shown by hatched edging on diagram hereunder. Ten. 75-5446.



Withdrawn for purposes of public recreation and access. (Placed under control, Gazette, 7th November, 1930.)

(6380) Sydney, 30th January, 1976.

ADDITION TO RESERVES FROM SALE

IN pursuance of the provisions of section 28, Crown Lands Consolidation Act, 1913, I declare that the Crown lands hereunder described shall be added to the lands within the reserves specified in parentheses hereunder and are thereby added accordingly.

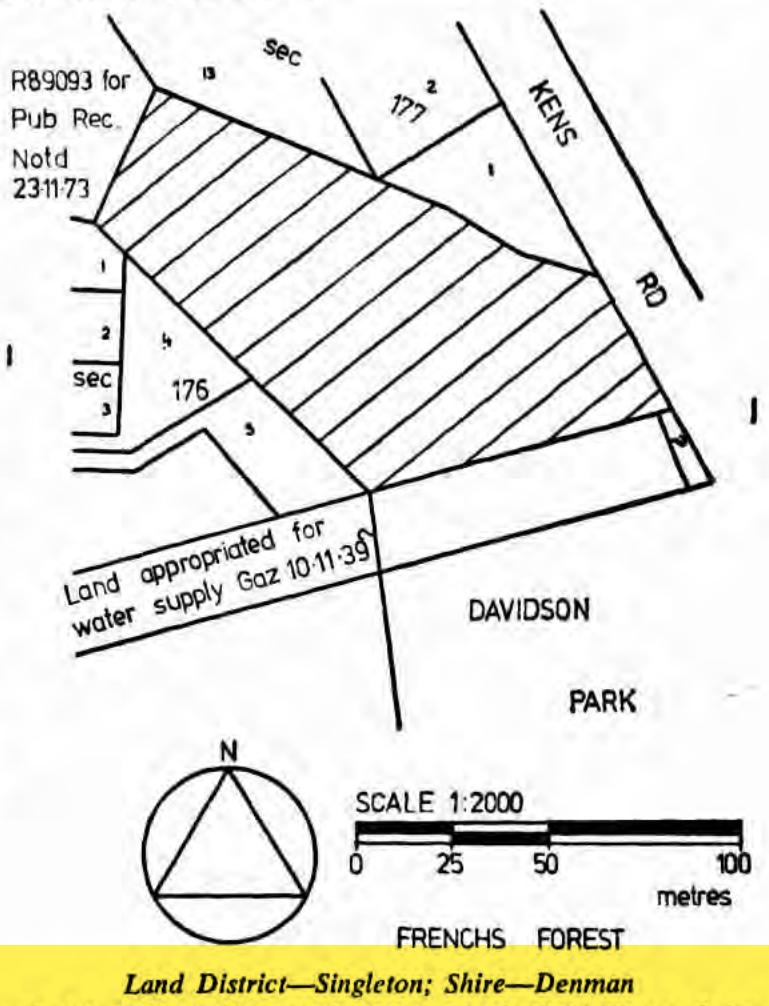
C. M. FISHER, Minister for Lands.

FOR PUBLIC RECREATION

Land District—Metropolitan; Shire—Warringah

Parish Manly Cove, County Cumberland, area about 3 hectares, being the area shown by cross-hatching on plan catalogued Ms 22786 Sydney. (R. 87733 for Public Recreation, notified 24th July, 1970). Pks 6016-S.

Parish Manly Cove, County Cumberland, area about 8 000 square metres, being the area shown by hatching on diagram below. (R. 89093 for Public Recreation, notified 23rd November, 1973). Pks 6016-S.



Land District—Singleton; Shire—Denman

Parish Liddell, County Durham, area 9.405 hectares, being lots 7 and 9, D.P. 250890. (R. 87894 for Public Recreation, notified 21st August, 1970.) Pks 75-1181.

(6381) Sydney, 30th January, 1976.

PROPOSED REVOCATION OF DEDICATION

AS I am of the opinion that the purpose of the dedication of the area described hereunder has failed, notice is hereby given, in accordance with the provisions of section 25 of the Crown Lands Consolidation Act, 1913, that it is intended to revoke such dedication with a view to dealing with the land in accordance with the provisions of that Act.

C. M. FISHER, Minister for Lands.

Land District—Armidale; Shire—Dumaresq

Parish Metz, County Sandon, Village of Hillgrove, about 3 642 square metres, the balance, being part allotment 1, section 22, dedicated for addition to public school site at Hillgrove on 24th December, 1897. Ten. 75-1149.

(6378) Sydney, 30th January, 1976.

WITHDRAWAL OF RESERVE FROM CONTROL OF PASTURES PROTECTION BOARD

IN pursuance of the provisions of section 42 (1), Pastures Protection Act, 1934, the reserve specified hereunder is hereby withdrawn from the control of the Pastures Protection Board for the Pastures Protection District.

C. M. FISHER, Minister for Lands.

Land Board District—Grafton; Pastures Protection District—Tweed-Lismore

Parish Bungawalbin, County Richmond, Reserve No. 73698 for Travelling Stock and Camping. Part withdrawn—the whole (part portion 213).

(Placed under control, Gazette, 6th April, 1951.) Pks 75-1093.

ASSIGNMENT OF CORPORATE NAMES TO RESERVE TRUSTS

Pursuant to Clause 4(3) of Schedule 8 of the Crown Lands Act, 1989 the corporate name in Column C is assigned to the reserve trust constituted for the reserve or dedication specified opposite thereto in Columns A and B.

GARRY WEST, M.P.,
MINISTER FOR TOURISM, LANDS AND FORESTS

DUBBO LANDS OFFICE

PART 1. RESERVES

COLUMN A NUMBER	COLUMN B LOCATION	COLUMN C CORPORATE NAME	COLUMN D TRUST MANAGER
11	COOLAH	QUEENSBOROUGH PARK WEST (R11) RESERVE TRUST	COOLAH SHIRE COUNCIL
1592	MENDOORAN	BRAMBIL PARK (R1592) RESERVE TRUST	COOLAH SHIRE COUNCIL
1995	GIRILAMBONE	GIRILAMBONE RECREATION (R1995) RESERVE TRUST	BOGAN SHIRE COUNCIL
2100	NEVERTIRE	NEVERTIRE PARK (R2100) RESERVE TRUST	WARREN SHIRE COUNCIL
5890	DUBBO	DUBBO RIVERBANK (R5890) RESERVE TRUST	DUBBO CITY COUNCIL
16121	WARREN	VICTORIA OVAL (R16121) RESERVE TRUST	WARREN SHIRE COUNCIL
19729	EUCHAREENA	EUCHAREENA RECREATION (R19729) RESERVE TRUST	WELLINGTON SHIRE COUNCIL
20772	WOLLAR	HARRY HARVEY MEMORIAL PARK (R20772) RESERVE TRUST	MUDGEE SHIRE COUNCIL
24311	DUBBO	DUBBO GAOL (R24311) RESERVE TRUST	DUBBO CITY COUNCIL
24511	COONAMBLE	WARRENA WEIR RECREATION (R24511) RESERVE TRUST	COONAMBLE SHIRE COUNCIL
34976	COLLARENEBRI	COLLARENEBRI CARAVAN PARK (R34976) RESERVE TRUST	WALGETT SHIRE COUNCIL
36399	BARADINE	BARADINE SPORTS OVAL (R36399) RESERVE TRUST	COONABARABRAN SHIRE COUNCIL
40891	MUDGEE	VICTORIA PARK (R40891) RESERVE TRUST	MUDGEE SHIRE COUNCIL
42238	GEURIE	TOM CULKIN OVAL (R42238) RESERVE TRUST	WELLINGTON SHIRE COUNCIL
42933	DRIPSTONE	DRIPSTONE RECREATION (R42933) RESERVE TRUST	WELLINGTON SHIRE COUNCIL
45013	QUAMBONE	QUAMBONE RACECOURSE (R45013) RESERVE TRUST	COONAMBLE SHIRE COUNCIL
46099	DUBBO	DUBBO RECREATION (R46099) RESERVE TRUST	DUBBO CITY COUNCIL
46646	COONABARABRAN	COONABARABRAN RACECOURSE (R46646) RESERVE TRUST	COONABARABRAN SHIRE COUNCIL
46722	DUNEDOO	LIONS CARAVAN PARK (R46722) RESERVE TRUST	COOLAH SHIRE COUNCIL

COLUMN A NUMBER	COLUMN B LOCATION	COLUMN C CORPORATE NAME	COLUMN D TRUST MANAGER
86605	NELSON BAY	NELSON BAY RECREATION (R86605) RESERVE TRUST	PORT STEPHENS SHIRE COUNCIL
86615	DENMAN	DENMAN RECREATION (R86615) RESERVE TRUST	MUSWELLBROOK SHIRE COUNCIL
86627	UMINA	UMINA PARKING (R86627) RESERVE TRUST	GOSFORD CITY COUNCIL
86761	FINGAL BAY	FINGAL BAY RECREATION AND PARKING (R86761) RESERVE TRUST	PORT STEPHENS SHIRE COUNCIL
86769	TOUKLEY	TOUKLEY RECREATION (R86769) RESERVE TRUST	WYONG SHIRE COUNCIL
86839	HILLSBOROUGH	HILLSBOROUGH SHOWGROUND (R86839) RESERVE TRUST	LAKE MACQUARIE CITY COUNCIL
86909	PEATS RIDGE	PEATS RIDGE RECREATION (R86909) RESERVE TRUST	GOSFORD CITY COUNCIL
87474	HAWKS NEST	HAWKS NEST GOLF COURSE (R87474) RESERVE TRUST	GREAT LAKES SHIRE COUNCIL
87512	KURRI KURRI	KURRI KURRI PRE-SCHOOL (R87512) RESERVE TRUST	KURRI KURRI & DISTRICT PRE-SCHOOL KINDERGARTEN INC
87633	KURRI KURRI	KURRI KURRI GIRL GUIDES (R87633) RESERVE TRUST	GIRL GUIDES ASSOCIATION, NSW
87813	FASSIFERN	FASSIFERN SCOUTS (R87813) RESERVE TRUST	THE SCOUT ASSOCIATION OF AUSTRALIA, NSW BRANCH
87815	KAHIBAH	KAHIBAH GIRL GUIDES (R87815) RESERVE TRUST	GIRL GUIDES ASSOCIATION, NSW
87817	KAHIBAH	KAHIBAH GIRL GUIDES (R87817) RESERVE TRUST	GIRL GUIDES ASSOCIATION, NSW
87882	HOLLOMBI	HOLLOMBI BUSH FIRE BRIGADE (R87882) RESERVE TRUST	CESSNOCK CITY COUNCIL
87894	LAKE LIDDELL	LAKE LIDDELL RECREATION AREA (R87894) RESERVE TRUST	MUSWELLBROOK SHIRE COUNCIL
88027	GOSFORD	GOSFORD CHARITABLE ORGANISATION (R88027) RESERVE TRUST	AID RETARDED PERSONS (NSW)
88028	GOSFORD	GOSFORD CHARITABLE ORGANISATION (R88028) RESERVE TRUST	ST VINCENT DE PAUL SOCIETY
88029	GOSFORD	GOSFORD SCOUTS (R88029) RESERVE TRUST	THE SCOUT ASSOCIATION OF AUSTRALIA, NSW BRANCH
88293	WILLIAMTOWN	WILLIAMTOWN SCOUTS (R88293) RESERVE TRUST	THE SCOUT ASSOCIATION OF AUSTRALIA, NSW BRANCH
88364	WOY WOY	WOY WOY SCOUTS (R88364) RESERVE TRUST	THE SCOUT ASSOCIATION OF AUSTRALIA, NSW BRANCH
88365	UMINA	UMINA SCOUTS (R88365) RESERVE TRUST	THE SCOUT ASSOCIATION OF AUSTRALIA, NSW BRANCH
88417	SINGLETON	SINGLETON RECREATION (R88417) RESERVE TRUST	SINGLETON SHIRE COUNCIL
88500	GARDEN SUBURB	GARDEN SUBURB CHARITABLE ORGANISATION (R88500) RESERVE TRUST	ABORIGINAL CHILDRENS ADVANCEMENT SOCIETY LTD

LAND REGISTRY SERVICES Historical Search

NEW SOUTH WALES LAND REGISTRY SERVICES - HISTORICAL SEARCH

SEARCH DATE
10/10/2023 6:32PM

FOLIO: 9/250890

First Title(s): THIS FOLIO
Prior Title(s): CROWN LAND

Recorded	Number	Type of Instrument	C.T. Issue
29/4/2008	CA128561	CONVERSION ACTION	FOLIO CREATED CT NOT ISSUED

*** END OF SEARCH ***

DP ref 224764 PRINTED ON 10/10/2023

NEW SOUTH WALES LAND REGISTRY SERVICES - TITLE SEARCH

FOLIO: 9/250890

SEARCH DATE	TIME	EDITION NO	DATE
10/10/2023	6:32 PM	-	-

LAND

LOT 9 IN DEPOSITED PLAN 250890
AT MULWELLBROOK
LOCAL GOVERNMENT AREA MUSWELLBROOK
PARISH OF LIDDELL COUNTY OF DURHAM
TITLE DIAGRAM DP250890

FIRST SCHEDULE

THE STATE OF NEW SOUTH WALES (CA128561)

SECOND SCHEDULE (3 NOTIFICATIONS)

---

* 1 THE LAND IS A RESERVE WITHIN THE MEANING OF PART 5 OF THE CROWN LANDS ACT 1989 AND THERE ARE RESTRICTIONS ON TRANSFER AND OTHER DEALINGS IN THE LAND UNDER THAT ACT, WHICH MAY REQUIRE CONSENT OF THE MINISTER.

* 2 LIMITED TITLE. LIMITATION PURSUANT TO SECTION 28T(4) OF THE REAL PROPERTY ACT, 1900. THE BOUNDARIES OF THE LAND COMPRISED HEREIN HAVE NOT BEEN INVESTIGATED BY THE REGISTRAR GENERAL.

* 3 NOTIFICATION IN GOVERNMENT GAZETTE DATED 19.12.1975 FOL. 5482 - EASEMENT FOR ELECTRICITY SUPPLY AFFECTING THE PART OF THE LAND ABOVE DESCRIBED AS MORE FULLY SET OUT THEREIN

NOTATIONS

UNREGISTERED DEALINGS: NIL

*** END OF SEARCH ***

DP ref 224764 PRINTED ON 10/10/2023

* Any entries preceded by an asterisk do not appear on the current edition of the Certificate of Title. Warning: the information appearing under notations has not been formally recorded in the Register. InfoTrack an approved NSW Information Broker hereby certifies that the information contained in this document has been provided electronically by the Registrar General in accordance with Section 96B(2) of the Real Property Act 1900.

Appendix E

Site Photographs

Appendix E
Site Photographs
Lot 9 DP1193430 Hebden Road, Muswellbrook

Photograph E1: Looking south-west from the central portion of the site

Photograph E2: Looking west from the central portion of the site towards mature trees to the west of the site

Photograph E3: Northern boundary and Hebden Road (behind trees) in the northern portion of the site

Douglas Partners Pty Ltd

Appendix F

Field Work Methodology

Appendix F
Field Work Methodology
Lot 9 DP1193430 Hebden Road, Muswellbrook

F1.0 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).
- HEPA *PFAS National Environmental Management Plan (NEMP)* (HEPA, 2020).

F2.0 Soil Sampling

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

- Collect soil samples directly from the SPT sample tube or solid flight auger;
- Transfer samples in laboratory-prepared glass jars with Teflon lined lids by hand, capping immediately and minimising headspace within the sample jar;
- Collect replicate samples in zip-lock bags for PID (photoionisation detector) screening;
- Wear a new disposable nitrile glove for each sample point thereby minimising potential for cross-contamination;
- Label sample containers with individual and unique identification details, including project number, sample location and sample depth (where applicable);
- Place samples into a cooled, insulated and sealed container for transport to the laboratory; and
- Use chain of custody documentation.

F2.1 Field Testing

Field testing is 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 using the PID.

F3.0 Groundwater

F3.1 Monitoring Well Installation

Monitoring wells are constructed using class 18 uPVC machine slotted screen and blank sections with screw threaded joints. The screened section of each well is backfilled with a washed sand filter pack to approximately 0.5 m above the screened interval. Each well is completed with a hydrated bentonite plug of at least 0.5 m thick to the surface, finished with a with lockable steel monument set in a concrete plinth.

F3.2 Monitoring Well Development

Groundwater monitoring wells are developed as soon as practicable following well installation. The purpose of well development is to remove sediments and/or drilling fluid introduced to the well during drilling and to facilitate connection of the monitoring well to the aquifer. The wells are developed by pumping / bailing to remove a minimum of five well volumes, or until dry.

F3.3 Groundwater Sampling

Following removal of drilling fluids, the groundwater wells were dry. Groundwater sampling was therefore not conducted.

F4.0 Surface Water Sampling

Surface water sampling is carried out in accordance with DP standard operating procedures. Sample collection is completed using a telescopic pole and decontaminated sample container. A new pair of disposable nitrile gloves are worn at each sample site to minimise potential for cross-contamination. The sampling method is described as follows:

- Where possible, select a sampling point that is a reasonable distance from the edge;
- Immerse the sample container to at least 1 m below the surface (if possible), with the opening pointing directly down to maintain a volume of air in the container, thereby avoiding the collection of any surface films;
- Once under the surface of the water, point the mouth of the sample container up stream so that gloved hands, sample container and/or sample collection device are downstream of the sample being collected;
- If the water is still, move the sample container forward away from the sampler and any equipment to collect a continuous uncontaminated sample;
- Use a sample location specific laboratory-prepared glass bottle without preservatives;
- Decant the water sample into laboratory-prepared bottles, minimising headspace within the sample bottle and cap immediately. The sample location specific laboratory-prepared glass bottle can be used as the sample container for the last sample from that location;

- Dispose of any excess water downstream of the sampling point or at a reasonable distance from sample site;
- Label sample containers with individual and unique identification details, including project number and sample location;
- Place the sample jars into a cooled, insulated and sealed container for transport to the laboratory; and
- Use chain of custody documentation.

F5.0 References

HEPA. (2020). *PFAS National Environmental Management Plan (NEMP).* Version 2.0: Heads of EPAs Australia and New Zealand and Australian Government Department of the Environment.

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 G

Site Assessment Criteria

Appendix G
Site Assessment Criteria
Lot 9 DP1193430 Hebden Road, Muswellbrook

G1.0 Introduction

G1.1 Guidelines

The following key guidelines were consulted for deriving the site assessment criteria (SAC):

- NEPC *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [the 'NEPM']* (NEPC, 2013).
- CRC CARE *Health screening levels for petroleum hydrocarbons in soil and groundwater* (CRC CARE, 2011).
- HEPA *PFAS National Environmental Management Plan (the 'NEMP')* (HEPA, 2020).
- ANZG *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZG, 2018).
- NHMRC *Guidelines for Managing Risks In Recreational Water* (NHMRC, 2008).
- NHMRC, NRMMC *Australian Drinking Water Guidelines 6 2011, Version 3.2* (NHMRC, NRMMC, 2016).
- ANZECC *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC, 2000).

G1.2 General

The SAC applied in the current investigation are informed by the CSM which identified human and environmental receptors to potential contamination at the site. Analytical results are assessed (as a Tier 1 assessment) against the SAC comprising primarily the investigation and screening levels of Schedule B1 of NEPC (2013).

The following inputs are relevant to the selection and/or derivation of the SAC:

- Land use: commercial / industrial.
    - Corresponding to land use category 'D', commercial / industrial such as shops, offices, factories and industrial sites.
- Soil type: clay.

G2.0 Soils

G2.1 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 presented in Table 1 and Table 2.

Table 1: Health Investigation Levels (mg/kg)

Contaminant	HIL-D
Metals	
Arsenic	3000
Beryllium	500
Boron	300 000
Cadmium	900
Chromium (VI)	3600
Cobalt	4000
Copper	240 000
Lead	1500
Manganese	60 000
Mercury (inorganic)	730
Methyl mercury	180
Nickel	6000
Selenium	10 000
Zinc	400 000
PAH	
B(a)P TEQ	40
Total PAH	4000
OCP	
DDT+DDE+DDD	3600
Aldrin and dieldrin	45
Chlordane	530
Endosulfan	2000
Endrin	100
Heptachlor	50
HCB	80
Methoxychlor	2500
OPP	
Chlorpyrifos	2000
PCB	
PCB	7

Table 2: Health Screening Levels (mg/kg)

Contaminant	HSL-D	HSL-D	HSL-D	HSL-D
CLAY	**0 m to <1 m**	**1 m to <2 m**	**2 m to <4 m**	**4 m+**
Benzene	4	6	9	20
Toluene	NL	NL	NL	NL
Ethylbenzene	NL	NL	NL	NL
Xylenes	NL	NL	NL	NL
Naphthalene	NL	NL	NL	NL
TRH F1	310	480	NL	NL
TRH F2	NL	NL	NL	NL

Notes: TRH F1 is TRH C_6-C_{10} minus BTEX

TRH F2 is TRH >C_{10}-C_{16} minus naphthalene

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'

The HSL for direct contact derived from CRC CARE (2011) are presented in Table 3.

Table 3: Health Screening Levels for Direct Contact (mg/kg)

Contaminant	DC HSL-D	DC HSL-IMW
Benzene	430	1100
Toluene	99 000	120 000
Ethylbenzene	27 000	85 000
Xylenes	81 000	130 000
Naphthalene	11 000	29 000
TRH F1	26 000	82 000
TRH F2	20 000	62 000
TRH F3	27 000	85 000
TRH F4	38 000	120 000

Notes: TRH F1 is TRH C_6-C_{10} minus BTEX

TRH F2 is TRH >C_{10}-C_{16} minus naphthalene

IMW intrusive maintenance worker

G2.2 Health Investigation Levels for Per- and Poly-Fluoroalkyl Substances in Soil

The laboratory analytical results for per- and poly-fluoroalkyl substances (PFAS) in soil have been assessed against HIL published in HEPA (2020). The HIL represent a nationally agreed suite that should be used to inform site investigations. The HIL are intentionally conservative, and an exceedance of these criteria may not constitute a risk if other exposure pathways are controlled. An exceedance of the HIL should trigger further investigations, such as a site-specific risk assessment. At the time of this investigation, screening values were available only for perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA) and perfluorohexane sulfonate (PFHxS).

The HIL derived from Table 2 of HEPA (2020) are presented in Table 4.

Table 4: Health Investigation Levels (mg/kg)

Contaminant	HIL-A	HIL-B	HIL-C	HIL-D
PFOS and PFHxS *	0.01	2	1	20
PFOA	0.1	20	10	50

Notes:

* Includes PFOS only, PFHxS only and the sum of the two.

G2.3 Ecological Investigation 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 6, with inputs into their derivation shown in Table 5.

Table 5: Inputs to the Derivation of the Ecological Investigation Levels

Variable	Input	Rationale
Age of contaminants	“Aged”	
pH	4.8	Lowest measured result
CEC	5 $cmol_c/kg$	Conservative assumption
Clay content	10%	Conservative assumption based on varied soil types (sand and clay)
Traffic volumes	high	
State / Territory	NSW	

Table 6: Ecological Investigation Levels (mg/kg)

Contaminant	EIL-D
Metals	
Arsenic	160
Copper	130
Nickel	60
Chromium III	670
Lead	1800
Zinc	260
PAH	
Naphthalene	370
OCP	
DDT	640

Notes:
EIL-D commercial land use

G2.4 Ecological Screening Levels

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 presented in Table 7.

Table 7: Ecological Screening Levels (mg/kg)

Contaminant	Soil Type	ESL-D
Benzene	Coarse	75
Toluene	Coarse	135
Ethylbenzene	Coarse	165
Xylenes	Coarse	180
TRH F1	Coarse/ Fine	215*
TRH F2	Coarse/ Fine	170*
TRH F3	Coarse	1700
TRH F4	Coarse	3300
B(a)P	Coarse	1.4
Benzene	Fine	95
Toluene	Fine	135
Ethylbenzene	Fine	185
Xylenes	Fine	95
TRH F1	Coarse/ Fine	215*
TRH F2	Coarse/ Fine	170*
TRH F3	Fine	2500
TRH F4	Fine	6600
B(a)P	Fine	1.4

Notes: ESL are of low reliability except where indicated by * which indicates that the ESL is of moderate reliability
TRH F1 is TRH C_6-C_{10} minus BTEX
TRH F2 is TRH >C_{10}-C_{16} including naphthalene
ESL-D commercial land use

G2.5 Ecological Soil Guideline Values - PFAS

The interim ecological soil guideline values (EGV) derived from Table3 of HEPA (2020) are presented in Table 8.

Table 8: Ecological Soil Guideline Values (mg/kg) – All Land Uses

Contaminant	Direct Exposure	Indirect Exposure
PFOS	1	0.01
PFOA	10	NC
PFHxS	NC	NC

Notes: NC no criterion

G2.6 Management Limits

In addition to appropriate consideration and application of the HSL and ESL, there are additional considerations which reflect the nature and properties of petroleum hydrocarbons, including:

- Formation of observable light non-aqueous phase liquids (LNAPL);
- Fire and explosion hazards;
- Effects on buried infrastructure eg: penetration of, or damage to, in-ground services.

The adopted management limits are presented in Table 9.

Table 9: Management Limits (mg/kg)

Contaminant	Soil Type	ML-D
TRH F1	Coarse	700
TRH F2	Coarse	1000
TRH F3	Coarse	3500
TRH F4	Coarse	10 000
TRH F1	Fine	800
TRH F2	Fine	1000
TRH F3	Fine	5000
TRH F4	Fine	10 000

Notes: TRH F1 is TRH C_6-C_{10} including BTEX
TRH F2 is TRH >C_{10}-C_{16} including naphthalene
ML-D commercial land use

G3.0 Surface Water

A lake which sustains a freshwater ecosystem is located downgradient of the site. The surface water investigation levels used for interpretation of the surface water data (as a Tier 1 assessment) have been selected based on the potential risks posed to this receptor.

The default guideline values (DGV) for the protection of aquatic ecosystems derived from ANZG (2018) are presented in Table 10 and HEPA (2020) for PFAS are presented in Table 11.

Table 10: Groundwater Investigation Levels for Protection of Aquatic Ecosystems (µg/L)

AR	Fresh Water
Metals	
Arsenic	24
Beryllium	-
Boron	940
Cadmium	0.2
Total Chromium	4.3
Cobalt	1.4
Copper	1.4
Lead	3.4
Manganese	1900
Mercury (inorganic)	0.06
Nickel	11
Selenium (Total)	5
Zinc	8
PAH	
Anthracene	0.4
Naphthalene	16
Benzo(a)pyrene (BaP)	0.1
Fluoranthene	1.4
Phenanthrene	2
OCP	
Aldrin	0.001
alpha-BHC	
alpha-chlordane	0.03
DDT	0.006
Dieldrin	0.01
Endosulfan I	0.03
Endrin	0.01
gamma-Chlordane	0.03
Heptachlor	0.01
Hexachlorobenzene	0.1
Methoxychlor	0.005
Mirex	0.04
Aldrin + Dieldrin (Calculated)	0.011
OPP	
Azinphos methyl (Guthion)	0.02
Chlorpyriphos	0.01
Diazinon	0.01
Dimethoate	0.15
Fenitrothion	0.2
Malathion	0.05
Parathion	0.004
Aroclor 1242	0.3
Aroclor 1254	0.01
BTEX	
Benzene	950
Toluene	180
Ethylbenzene	80
o-Xylene	350
m+p-Xylene	275

Notes: Where the contaminant does not have a % LOP, the 'unknown' LOP has been adopted

Table 11: Groundwater Investigation Levels for Protection of Aquatic Ecosystems (µg/L) - PFAS

Contaminant / LOP	Fresh Water DGV
PFOS 99% LOP	0.00023
PFOA 99% LOP	19
PFOS 95% LOP	0.13
PFOA 95% LOP	220

Health-based screening levels for groundwater have been used for preliminary assessment/comparison for petroleum hydrocarbons in surface water are presented in Table 12.

Table 12: Groundwater Health Screening Levels for Vapour Intrusion (µg/L)

Contaminant	HSL-D	Solubility Limit
CLAY	**2 m to <4 m**	**-**
Benzene	30 000	59 000
Toluene	NL	61 000
Ethylbenzene	NL	3900
Xylenes	NL	21 000
Naphthalene	NL	170
TRH F1	NL	9000
TRH F2	NL	3000

Notes: TRH F1 is TRH C_6-C_{10} minus BTEX

TRH F2 is TRH >C_{10}-C_{16} minus naphthalene

The solubility limit is defined as the groundwater concentration at which the water cannot dissolve any more of an individual chemical based on a petroleum mixture. The soil vapour that is in equilibrium with the groundwater will be at its maximum. If the derived groundwater HSL exceeds the water solubility limit, a soil vapour source concentration for a petroleum mixture could not exceed a level that would result 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'.

G4.0 References

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Douglas Partners Pty Ltd

Appendix H

Summary of Laboratory Testing
Laboratory Reports

Appendix H
Summary of Laboratory Testing
Lot 9 DP1193430 Hebden Road, Muswellbrook

The results of laboratory analysis are summarised in the following tables:

- Table H1: Summary of Results of Soil Analysis – TRH, BTEX, PAH, Metals;
- Table H2: Summary of Results of Surface Water Analysis.

Table H1: Summary of Laboratory Results – Metals, TRH, BTEX, PAH, Phenol, OCP, OPP, PCB

			Metals							
			Arsenic	Cadmium	Total Chromium	Copper	Lead	Mercury (inorganic)	Nickel	Zinc
		PQL	4	0.4	1	1	1	0.1	1	1
Sample ID	Depth	Sample Date	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
2	0 - 0.1m	25/09/23	12	<0.4	24	16	19	<0.1	16	34
			3000 160	900 -	3600 670	240000 130	1500 1800	730 -	6000 60	400000 260
2 - [TRIPLICATE]	0 - 0.1m	25/09/23	11	<0.4	28	17	20	<0.1	20	50
			3000 160	900 -	3600 670	240000 130	1500 1800	730 -	6000 60	400000 260
5	0.5 m	25/09/23	14	<0.4	29	22	20	<0.1	19	33
			3000 160	900 -	3600 670	240000 130	1500 1800	730 -	6000 60	400000 260
6	0 - 0.1m	25/09/23	22	<0.4	15	13	18	<0.1	11	47
			3000 160	900 -	3600 670	240000 130	1500 1800	730 -	6000 60	400000 260
11	0 - 0.1m	26/09/23	30	<0.4	20	21	18	<0.1	15	35
			3000 160	900 -	3600 670	240000 130	1500 1800	730 -	6000 60	400000 260
14	0.5 m	26/09/23	21	<0.4	21	26	19	<0.1	20	48
			3000 160	900 -	3600 670	240000 130	1500 1800	730 -	6000 60	400000 260
17	0 - 0.1m	26/09/23	10	<0.4	23	42	20	<0.1	36	42
			3000 160	900 -	3600 670	240000 130	1500 1800	730 -	6000 60	400000 260
25	0.5 m	26/09/23	7	<0.4	25	35	21	<0.1	29	29
			3000 160	900 -	3600 670	240000 130	1500 1800	730 -	6000 60	400000 260
26	0 - 0.1m	27/09/23	7	<0.4	25	30	23	<0.1	27	26
			3000 160	900 -	3600 670	240000 130	1500 1800	730 -	6000 60	400000 260

			TRH										
			TRH C6 - C10	TRH >C10-C16	F1 ((C6-C10)-BTEX)	F2 (>C10-C16 less Naphthalene)	F3 (>C16-C34)	F4 (>C34-C40)	TRH C6 - C9	TRH C10 - C14	TRH C15 - C28	TRH C29 - C36	C10-C36 recoverable hydrocarbons
		PQL	25	50	25	50	100	100	25	50	100	100	50
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
2	0 - 0.1m	25/09/23	<25	<50	<25	<50	<100	<100	<25	<50	<100	<100	<50
			- -	- 170	250 215	NL -	- 2500	- 6600	- -	- -	- -	- -	- -
2 - [TRIPLICATE]	0 - 0.1m	25/09/23	-	-	-	-	-	-	-	-	-	-	-
			- -	- 170	250 215	NL -	- 2500	- 6600	- -	- -	- -	- -	- -
5	0.5 m	25/09/23	<25	<50	<25	<50	<100	<100	<25	<50	<100	<100	<50
			- -	- 170	250 215	NL -	- 2500	- 6600	- -	- -	- -	- -	- -
6	0 - 0.1m	25/09/23	<25	<50	<25	<50	220	<100	<25	<50	120	150	270
			- -	- 170	250 215	NL -	- 2500	- 6600	- -	- -	- -	- -	- -
11	0 - 0.1m	26/09/23	<25	<50	<25	<50	<100	<100	<25	<50	<100	<100	<50
			- -	- 170	250 215	NL -	- 2500	- 6600	- -	- -	- -	- -	- -
14	0.5 m	26/09/23	<25	<50	<25	<50	<100	<100	<25	<50	<100	<100	<50
			- -	- 170	310 215	NL -	- 2500	- 6600	- -	- -	- -	- -	- -
17	0 - 0.1m	26/09/23	<25	<50	<25	<50	<100	<100	<25	<50	<100	<100	<50
			- -	- 170	250 215	NL -	- 2500	- 6600	- -	- -	- -	- -	- -
25	0.5 m	26/09/23	<25	<50	<25	<50	<100	<100	<25	<50	<100	<100	<50
			- -	- 170	250 215	NL -	- 2500	- 6600	- -	- -	- -	- -	- -
26	0 - 0.1m	27/09/23	<25	<50	<25	<50	<100	<100	<25	<50	<100	<100	<50
			- -	- 170	250 215	NL -	- 2500	- 6600	- -	- -	- -	- -	- -

			BTEX				PAH				Phenol
			Benzene	Toluene	Ethylbenzene	Total Xylenes	Benzo(a)pyrene (BaP)	Benzo(a)pyrene TEQ	Naphthalene [b]	Total PAHs	Phenol
		PQL	0.2	0.5	1	1	0.05	0.5	0.1	0.05	5
Sample ID	Depth	Sample Date	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
2	0 - 0.1m	25/09/23	<0.2	<0.5	<1	<1	0.1	<0.5	<0.1	2.9	<5
			4 95	NL 135	NL 185	NL 95	- 14	40 -	NL 370	4000 -	660 -
2 - [TRIPLICATE]	0 - 0.1m	25/09/23	-	-	-	-	0.5	0.6	<0.1	5.9	-
			4 95	NL 135	NL 185	NL 95	- 14	40 -	NL 370	4000 -	660 -
5	0.5 m	25/09/23	<0.2	<0.5	<1	<1	<0.05	<0.5	<0.1	<0.05	<5
			4 95	NL 135	NL 185	NL 95	- 14	40 -	NL 370	4000 -	660 -
6	0 - 0.1m	25/09/23	<0.2	<0.5	<1	<1	<0.05	<0.5	<0.1	<0.05	<5
			4 95	NL 135	NL 185	NL 95	- 14	40 -	NL 370	4000 -	660 -
11	0 - 0.1m	26/09/23	<0.2	<0.5	<1	<1	<0.05	<0.5	<0.1	<0.05	<5
			4 95	NL 135	NL 185	NL 95	- 14	40 -	NL 370	4000 -	660 -
14	0.5 m	26/09/23	<0.2	<0.5	<1	<1	<0.05	<0.5	<0.1	<0.05	<5
			4 95	NL 135	NL 185	NL 95	- 14	40 -	NL 370	4000 -	660 -
17	0 - 0.1m	26/09/23	<0.2	<0.5	<1	<1	<0.05	<0.5	<0.1	<0.05	<5
			4 95	NL 135	NL 185	NL 95	- 14	40 -	NL 370	4000 -	660 -
25	0.5 m	26/09/23	<0.2	<0.5	<1	<1	<0.05	<0.5	<0.1	<0.05	<5
			4 95	NL 135	NL 185	NL 95	- 14	40 -	NL 370	4000 -	660 -
26	0 - 0.1m	27/09/23	<0.2	<0.5	<1	<1	<0.05	<0.5	<0.1	<0.05	<5
			4 95	NL 135	NL 185	NL 95	- 14	40 -	NL 370	4000 -	660 -

			OCP										OPP	PCB
			Aldrin & Dieldrin	Total Chlordane	DDT+DDE+DDD [c]	DDT	Endrin	Total Endosulfan	Heptachlor	Hexachlorobenzene	Methoxychlor		Chlorpyriphos	Total PCB
		PQL	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1		0.1	0.1
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
2	0 - 0.1m	25/09/23	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1
			45 -	530 -	3600 640	- 640	100 -	2000 -	50 -	80 -	2500 -		2000 -	7 -
2 - [TRIPLICATE]	0 - 0.1m	25/09/23	-	-	-	-	-	-	-	-	-		-	-
			45 -	530 -	3600 640	- 640	100 -	2000 -	50 -	80 -	2500 -		2000 -	7 -
5	0.5 m	25/09/23	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1
			45 -	530 -	3600 640	- 640	100 -	2000 -	50 -	80 -	2500 -		2000 -	7 -
6	0 - 0.1m	25/09/23	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1
			45 -	530 -	3600 640	- 640	100 -	2000 -	50 -	80 -	2500 -		2000 -	7 -
11	0 - 0.1m	26/09/23	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1
			45 -	530 -	3600 640	- 640	100 -	2000 -	50 -	80 -	2500 -		2000 -	7 -
14	0.5 m	26/09/23	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1
			45 -	530 -	3600 640	- 640	100 -	2000 -	50 -	80 -	2500 -		2000 -	7 -
17	0 - 0.1m	26/09/23	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1
			45 -	530 -	3600 640	- 640	100 -	2000 -	50 -	80 -	2500 -		2000 -	7 -
25	0.5 m	26/09/23	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1
			45 -	530 -	3600 640	- 640	100 -	2000 -	50 -	80 -	2500 -		2000 -	7 -
26	0 - 0.1m	27/09/23	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1
			45 -	530 -	3600 640	- 640	100 -	2000 -	50 -	80 -	2500 -		2000 -	7 -

Table H2: Summary of Laboratory Results for Surface Water

Water Source				NHMRC (2022) ADWG Health	NHMRC (2008) Recreational Health	ANZG (2018) 95% LOP Fresh	ANZG (2018) 95% LOP Marine	HEPA (2020) 95% LOP Fresh	HEPA (2020) 99% LOP Fresh	NEPC (2013) HSL D 2 m to <4 m Clay	Surface Water	
Sample ID											LS1	LS2
Sample Date		PQL	Units								20/11/2023	20/10/2023
Physical Parameters	EC	0.01	mS/cm								2.90	2.80
	pH	0.1	pH units								8.5	8.4
	Total Suspended Solids (TSS)	5	mg/L								24	15
	Total Dissolved Solids (TDS)	5	mg/L								1800	1800
	Hardness	3	mgCaCO3/L								790	780
	Hydroxide Alkalinity (OH-) as CaCO3	5	mg/L								<5	<5
	Bicarbonate Alkalinity as CaCO3	5	mg/L								150	140
	Carbonate Alkalinity as CaCO3	5	mg/L								20	13
	Total Alkalinity as CaCO3	5	mg/L								170	150
Nutrients	Ammonia (as N)	0.005	mg/L			0.9	0.91				0.008	0.015
	Nitrate	0.005	mg/L	0.05	50						<0.005	<0.005
	Nitrite	0.005	mg/L	0.03	3						<0.005	<0.005
	Total Nitrogen	0.1	mg/L								0.5	0.5
	TKN in water	0.1	mg/L								0.5	0.5
	Phosphate (as P)	0.005	mg/L								<0.005	>0.005
	Phosphorous - Total	0.05	mg/L								<0.05	<0.05
Metals - total	Arsenic	1	µg/L	10	7	24					6	6
	Beryllium	0.5	µg/L	60							<0.5	<0.5
	Boron	20	µg/L	4000	4000	940					1300	1300
	Cadmium	0.1	µg/L	2	2	0.2	5.5				<0.1	<0.1
	Total Chromium	1	µg/L	50	50	4.3	314				<1	<1
	Cobalt	1	µg/L			14	1				<1	<1
	Copper	1	µg/L	2000	2000	1.4	1.3				3	3
	Lead	1	µg/L	10	10	3.4	4.4				<1	<1
	Manganese	5	µg/L	500	500	1900	80				9	9
	Mercury (inorganic)	0.05	µg/L	1	1	0.06	0.4				<0.05	<0.05
	Nickel	1	µg/L	20	20	11	70				6	5
	Selenium (Total)	1	µg/L	10	10	5					6	6
	Zinc	1	µg/L			8	8				3	7
Metals - dissolved	Calcium - Dissolved	0.5	mg/L								150	150
	Potassium - Dissolved	0.5	mg/L								21	21
	Sodium - Dissolved	0.5	mg/L								390	320
	Magnesium - Dissolved	0.5	mg/L								99	99
	Sulphate, SO4	1	mg/L								830	820
	Chloride, Cl	1	mg/L								440	440
	Ionic Balance		%								0	-4.0
TRH	TRH C6 - C9	10	µg/L								<10	<10
	TRH C6 - C10	10	µg/L								<10	<10
	TRH C6 - C10 less BTEX (F1)	10	µg/L							NL	<10	<10
	TRH C10 - C14	50	µg/L								<50	<50
	TRH C15 - C28	100	µg/L								<100	<100
	TRH C29 - C36	100	µg/L								<100	<100
	Total +ve TRH (C10-C36)	50	µg/L								<50	<50
	TRH >C10 - C16	50	µg/L								<50	<50
	TRH >C10 - C16 less Naphthalene (F2)	50	µg/L							NL	<50	<50
	TRH >C16 - C34	100	µg/L								<100	<100
	TRH >C34 - C40	100	µg/L								<100	<100
	Total +ve TRH (>C10-C40)	50	µg/L								<50	<50
BTEX	Benzene	1	µg/L	1	1	950	700			30	<1	<1
	Toluene	1	µg/L	800		180	180			NL	<1	<1
	Ethylbenzene	1	µg/L	300		80	80			NL	<1	<1
	o-Xylene	1	µg/L			350				NL	<1	<1
	m+p-Xylene	2	µg/L			275	75			NL	<2	<2
PAH	Acenaphthene	0.1	µg/L								<0.1	<0.1
	Acenaphthylene	0.1	µg/L								<0.1	<0.1
	Anthracene	0.1	µg/L			0.4	0.4				<0.1	<0.1
	Benzo(a)anthracene	0.1	µg/L								<0.1	<0.1
	Naphthalene	0.2	µg/L			16	70				<0.1	<0.1
	Benzo(a)pyrene (BaP)	0.1	µg/L	0.01	0.01	0.1	0.2				<0.1	<0.1
	Benzo(a)pyrene TEQ	0.5	µg/L								<0.5	<0.5
	Benzo(b+k)fluoranthene	0.2	µg/L								<0.2	<0.2
	Benzo(g,h,i)perylene	0.1	µg/L								<0.1	<0.1
	Chrysene	0.1	µg/L								<0.1	<0.1
	Dibenzo(a,h)anthracene	0.1	µg/L								<0.1	<0.1
	Fluoranthene	0.1	µg/L			1.4	1.4				<0.1	<0.1
	Fluorene	0.1	µg/L								<0.1	<0.1
	Indeno(1,2,3-c,d)pyrene	0.1	µg/L								<0.1	<0.1
	Phenanthrene	0.1	µg/L			2	2				<0.1	<0.1
	Pyrene	0.1	µg/L								<0.1	<0.1
	Total +ve PAH's	0.1	µg/L								<0.1	<0.1
OCP	Aldrin	0.01	µg/L			0.001	0.003				<0.01	<0.01
	alpha-BHC	0.05	µg/L								<0.05	<0.05
	alpha-chlordane	0.01	µg/L	2	1	0.03					<0.01	<0.01
	beta-BHC	0.05	µg/L								<0.05	<0.05
	DDE	0.01	µg/L								<0.01	<0.01
	DDT	0.006	µg/L	9	20	0.006	0.0004				<0.006	<0.006
	delta-BHC	0.05	µg/L								<0.05	<0.05
	Dieldrin	0.01	µg/L			0.01					<0.01	<0.01
	Endosulfan I	0.02	µg/L	20	30	0.03	0.01				<0.02	<0.02
	Endosulfan II	0.02	µg/L								<0.02	<0.02
	Endosulfan Sulphate	0.02	µg/L								<0.02	<0.02
	Endrin	0.01	µg/L			0.01	0.008				<0.01	<0.01
	gamma-Chlordane	0.01	µg/L			0.03	0.001				<0.01	<0.01
	Heptachlor	0.01	µg/L	0.3	0.3	0.01	0.0004				<0.01	<0.01
	Heptachlor Epoxide	0.01	µg/L		0.3						<0.01	<0.01
	Hexachlorobenzene	0.01	µg/L			0.1	0.1				<0.01	<0.01
	gamma-BHC	0.05	µg/L								<0.05	<0.05
	Methoxychlor	0.02	µg/L	300		0.005	0.004				<0.02	<0.02
	Mirex	0.02	µg/L			0.04					<0.02	<0.02
	DDD	0.01	µg/L								<0.01	<0.01
	Aldrin + Dieldrin (Calculated)		µg/L	0.3	0.3	0.011	0.003				<0.02	<0.02
OPP	Azinphos methyl (Guthion)	0.2	µg/L			0.02					<0.2	<0.2
	Bromophos-ethyl	0.05	µg/L		10						<0.05	<0.05
	Coumaphos	0.05	µg/L								<0.05	<0.05
	Chlorpyriphos	0.009	µg/L	10	10	0.01	0.009				<0.009	<0.009
	Chlorpyriphos-methyl	0.05	µg/L								<0.05	<0.05
	Diazinon	0.01	µg/L	4	3	0.01					<0.01	<0.01
	Dichlorvos	0.05	µg/L	5	1						<0.05	<0.05
	Dimethoate	0.1	µg/L	7	50	0.15					<0.1	<0.1
	Disulfoton	0.05	µg/L	4	3						<0.05	<0.05
	Ethion	0.05	µg/L	4	3						<0.05	<0.05
	Ronnel (fenchlorphos)	0.05	µg/L		30						<0.05	<0.05
	Fenamiphos	0.05	µg/L	0.5	0.3						<0.05	<0.05
	Fenthion	0.07	µg/L	7							<0.05	<0.05
	Fenitrothion	0.05	µg/L	7	10	0.2	0.001				<0.05	<0.05
	Malathion	0.05	µg/L	70		0.05					<0.05	<0.05
	Methidathion	0.05	µg/L	6	30						<0.05	<0.05
	Mevinphos	0.05	µg/L	5	5						<0.05	<0.05
	Parathion	0.004	µg/L	20	10	0.004					<0.004	<0.004
	Parathion-methyl	0.05	µg/L	0.7	100						<0.05	<0.05
	Phorate	0.05	µg/L								<0.05	<0.05
	Phosalone	0.05	µg/L								<0.05	<0.05
PCB	Aroclor 1016	0.1	µg/L								<0.1	<0.1
	Aroclor 1221	0.1	µg/L								<0.1	<0.1
	Aroclor 1232	0.1	µg/L								<0.1	<0.1
	Aroclor 1242	0.1	µg/L			0.3					<0.1	<0.1
	Aroclor 1248	0.1	µg/L								<0.1	<0.1
	Aroclor 1254	0.1	µg/L			0.01					<0.1	<0.1
	Aroclor 1260	0.1	µg/L								<0.1	<0.1
PFAS	Perfluorobutanesulfonic acid	0.001	µg/L								<0.001	0.001
	Perfluoropentanesulfonic acid	0.001	µg/L								<0.001	<0.001
	Perfluorohexanesulfonic acid - PFHxS	0.001	µg/L								0.004	0.003
	Perfluoroheptanesulfonic acid	0.001	µg/L								<0.001	<0.001
	Perfluorooctanesulfonic acid PFOS	0.001	µg/L					0.13	0.00023		0.004	0.004
	Perfluorodecanesulfonic acid	0.002	µg/L								<0.002	<0.002
	Perfluorobutanoic acid	0.002	µg/L								0.007	0.008
	Perfluoropentanoic acid	0.002	µg/L								0.005	0.005
	Perfluorohexanoic acid	0.001	µg/L								0.004	0.004
	Perfluoroheptanoic acid	0.001	µg/L								0.003	0.004
	Perfluorooctanoic acid PFOA	0.001	µg/L	0.56				220	19		<0.001	<0.001
	Perfluorononanoic acid	0.001	µg/L								<0.001	<0.001
	Perfluorodecanoic acid	0.002	µg/L								<0.002	<0.002
	Perfluoroundecanoic acid	0.002	µg/L								<0.002	<0.002
	Perfluorododecanoic acid	0.005	µg/L								<0.005	<0.005
	Perfluorotridecanoic acid	0.01	µg/L								<0.01	<0.01
	Perfluorotetradecanoic acid	0.05	µg/L								<0.05	<0.05
	4:2 FTS	0.001	µg/L								<0.001	<0.001
	6:2 FTS	0.001	µg/L								<0.001	<0.001
	8:2 FTS	0.002	µg/L								<0.002	<0.002
	10:2 FTS	0.002	µg/L								<0.002	<0.002
	Perfluorooctane sulfonamide	0.01	µg/L								<0.01	<0.01
	N-Methyl perfluorooctane sulfonamide	0.05	µg/L								<0.05	<0.05
	N-Ethyl perfluorooctanesulfonamide	0.1	µg/L								<0.1	<0.1
	N-Me perfluorooctanesulfonamid oethanol	0.05	µg/L								<0.05	<0.05
	N-Et perfluorooctanesulfonamid oethanol	0.5	µg/L								<0.5	<0.5
	MePerfluorooctanesulf-amidoacetic acid	0.002	µg/L								<0.002	<0.002
	EtPerfluorooctanesulf-amidoacetic acid	0.002	µg/L								<0.002	<0.002
	Total Positive PFHxS & PFOS	0.001	µg/L	0.07							0.007	0.007
	Total Positive PFOA & PFOS	0.001	µg/L								0.004	0.004
	Total Positive PFAS	0.001	µg/L								0.027	0.029

Notes:

PQL — Practical quantitation limit

Shaded cells indicate exceedance of guideline value

Where one or more guideline value is exceeded, the cell is shaded to the colour of the highest guideline value exceeded

NEPC (2013) National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013), health screening level Clay 2 m to <4 m for commercial/industrial use (HSL D)

ANZG (2018) Australian and New Zealand Guidelines for Fresh and Marine Water Quality, 95% level of protection of species for Fresh aquatic ecosystems [NB: 99% level of protection adopted for bioaccumulative chemicals and where chronic toxicity is relevant. Chemical stressors for Lowland rivers from ANZECC (2000) incorporated as per ANZG (2018) recommendations]

HEPA (2020) PFAS National Environmental Management Plan, 95% and 99% level of protection for Fresh aquatic ecosystems

NHMRC (2022) Australian Drinking Water Guidelines 6 2011, drinking water aesthetic-based criteria

NHMRC (2012) Guidelines for Managing Risk in Recreational Water

ANZG (2018) Australian and New Zealand Guidelines for Fresh and Marine Water Quality, orange text is "unknown" level of protection

b — As (V) criteria as a first pass

c — Cr(VI) criteria as a first pass

d — Criteria from NHMRC (2018) Guidance on Per and Polyfluoroalkyl substances (PFAS) in Recreational Water

e — Criteria for east flowing coastal rivers was used as per ANZECC (2000)

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CERTIFICATE OF ANALYSIS 334958

Client Details

Client	Douglas Partners Newcastle
Attention	Michael Harris
Address	Box 324 Hunter Region Mail Centre, Newcastle, NSW, 2310

Sample Details

Your Reference	**224764.00 Musewllbrook**
Number of Samples	14 Soil
Date samples received	10/10/2023
Date completed instructions received	10/10/2023

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	17/10/2023
Date of Issue	17/10/2023

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Results Approved By
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Steven Luong, Senior Chemist
Tim Toll, Chemist (FAS)

Authorised By
Nancy Zhang, Laboratory Manager

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		334958-1	334958-2	334958-3	334958-4	334958-5
Your Reference	UNITS	2	5	6	11	14
Depth		0-0.1	0.5	0-0.1	0-0.1	0.5
Date Sampled		25/09/2023	25/09/2023	25/09/2023	26/09/2023	26/09/2023
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	11/10/2023	11/10/2023	11/10/2023	11/10/2023	11/10/2023
Date analysed	-	12/10/2023	12/10/2023	12/10/2023	12/10/2023	12/10/2023
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
Naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	106	107	114	111	77

vTRH(C6-C10)/BTEXN in Soil				
Our Reference		334958-6	334958-7	334958-8
Your Reference	UNITS	17	25	26
Depth		0-0.1	0.5	0-0.1
Date Sampled		26/09/2023	26/09/2023	27/09/2023
Type of sample		Soil	Soil	Soil
Date extracted	-	11/10/2023	11/10/2023	11/10/2023
Date analysed	-	12/10/2023	12/10/2023	12/10/2023
TRH C_6 - C_9	mg/kg	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1
Naphthalene	mg/kg	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	118	110	108

svTRH (C10-C40) in Soil						
Our Reference		334958-1	334958-2	334958-3	334958-4	334958-5
Your Reference	UNITS	2	5	6	11	14
Depth		0-0.1	0.5	0-0.1	0-0.1	0.5
Date Sampled		25/09/2023	25/09/2023	25/09/2023	26/09/2023	26/09/2023
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	11/10/2023	11/10/2023	11/10/2023	11/10/2023	11/10/2023
Date analysed	-	12/10/2023	12/10/2023	12/10/2023	12/10/2023	12/10/2023
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	120	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	150	<100	<100
Total +ve TRH (C10-C36)	mg/kg	<50	<50	270	<50	<50
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	220	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	220	<50	<50
Surrogate o-Terphenyl	%	67	69	72	69	71

svTRH (C10-C40) in Soil				
Our Reference		334958-6	334958-7	334958-8
Your Reference	UNITS	17	25	26
Depth		0-0.1	0.5	0-0.1
Date Sampled		26/09/2023	26/09/2023	27/09/2023
Type of sample		Soil	Soil	Soil
Date extracted	-	11/10/2023	11/10/2023	11/10/2023
Date analysed	-	12/10/2023	12/10/2023	12/10/2023
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100
Total +ve TRH (C10-C36)	mg/kg	<50	<50	<50
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50
Surrogate o-Terphenyl	%	70	72	70

PAHs in Soil						
Our Reference		334958-1	334958-2	334958-3	334958-4	334958-5
Your Reference	UNITS	2	5	6	11	14
Depth		0-0.1	0.5	0-0.1	0-0.1	0.5
Date Sampled		25/09/2023	25/09/2023	25/09/2023	26/09/2023	26/09/2023
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	11/10/2023	11/10/2023	11/10/2023	11/10/2023	11/10/2023
Date analysed	-	12/10/2023	12/10/2023	12/10/2023	12/10/2023	12/10/2023
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	0.8	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	0.3	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.6	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	0.5	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	0.2	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	0.2	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	0.3	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	0.1	<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	2.9	<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	%	94	98	94	94	98

PAHs in Soil					
Our Reference		334958-6	334958-7	334958-8	334958-15
Your Reference	UNITS	17	25	26	2 - [TRIPLICATE]
Depth		0-0.1	0.5	0-0.1	0-0.1
Date Sampled		26/09/2023	26/09/2023	27/09/2023	25/09/2023
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	11/10/2023	11/10/2023	11/10/2023	11/10/2023
Date analysed	-	12/10/2023	12/10/2023	12/10/2023	13/10/2023
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	1.2
Anthracene	mg/kg	<0.1	<0.1	<0.1	0.2
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	1.1
Pyrene	mg/kg	<0.1	<0.1	<0.1	0.9
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	0.4
Chrysene	mg/kg	<0.1	<0.1	<0.1	0.4
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	0.7
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	0.5
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	0.3
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	0.2
Total +ve PAH's	mg/kg	<0.05	<0.05	<0.05	5.9
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	0.6
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	0.7
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	0.7
Surrogate p-Terphenyl-d14	%	102	92	100	99

Organochlorine Pesticides in soil						
Our Reference		334958-1	334958-2	334958-3	334958-4	334958-5
Your Reference	UNITS	2	5	6	11	14
Depth		0-0.1	0.5	0-0.1	0-0.1	0.5
Date Sampled		25/09/2023	25/09/2023	25/09/2023	26/09/2023	26/09/2023
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	11/10/2023	11/10/2023	11/10/2023	11/10/2023	11/10/2023
Date analysed	-	12/10/2023	12/10/2023	12/10/2023	12/10/2023	12/10/2023
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
Mirex	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	96	97	97	97	98

Organochlorine Pesticides in soil				
Our Reference		334958-6	334958-7	334958-8
Your Reference	UNITS	17	25	26
Depth		0-0.1	0.5	0-0.1
Date Sampled		26/09/2023	26/09/2023	27/09/2023
Type of sample		Soil	Soil	Soil
Date extracted	-	11/10/2023	11/10/2023	11/10/2023
Date analysed	-	12/10/2023	12/10/2023	12/10/2023
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
Mirex	mg/kg	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1
Surrogate TCMX	%	100	96	99

Organophosphorus Pesticides in Soil						
Our Reference		334958-1	334958-2	334958-3	334958-4	334958-5
Your Reference	UNITS	2	5	6	11	14
Depth		0-0.1	0.5	0-0.1	0-0.1	0.5
Date Sampled		25/09/2023	25/09/2023	25/09/2023	26/09/2023	26/09/2023
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	11/10/2023	11/10/2023	11/10/2023	11/10/2023	11/10/2023
Date analysed	-	12/10/2023	12/10/2023	12/10/2023	12/10/2023	12/10/2023
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Mevinphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phorate	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
Disulfoton	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyrifos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Parathion-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
Fenthion	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
Methidathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenamiphos	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
Phosalone	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
Coumaphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	96	97	97	97	98

Organophosphorus Pesticides in Soil				
Our Reference		334958-6	334958-7	334958-8
Your Reference	UNITS	17	25	26
Depth		0-0.1	0.5	0-0.1
Date Sampled		26/09/2023	26/09/2023	27/09/2023
Type of sample		Soil	Soil	Soil
Date extracted	-	11/10/2023	11/10/2023	11/10/2023
Date analysed	-	12/10/2023	12/10/2023	12/10/2023
Dichlorvos	mg/kg	<0.1	<0.1	<0.1
Mevinphos	mg/kg	<0.1	<0.1	<0.1
Phorate	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
Disulfoton	mg/kg	<0.1	<0.1	<0.1
Chlorpyrifos-methyl	mg/kg	<0.1	<0.1	<0.1
Parathion-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
Fenthion	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
Methidathion	mg/kg	<0.1	<0.1	<0.1
Fenamiphos	mg/kg	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1
Phosalone	mg/kg	<0.1	<0.1	<0.1
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1
Coumaphos	mg/kg	<0.1	<0.1	<0.1
Surrogate TCMX	%	100	96	99

PCBs in Soil						
Our Reference		334958-1	334958-2	334958-3	334958-4	334958-5
Your Reference	UNITS	2	5	6	11	14
Depth		0-0.1	0.5	0-0.1	0-0.1	0.5
Date Sampled		25/09/2023	25/09/2023	25/09/2023	26/09/2023	26/09/2023
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	11/10/2023	11/10/2023	11/10/2023	11/10/2023	11/10/2023
Date analysed	-	12/10/2023	12/10/2023	12/10/2023	12/10/2023	12/10/2023
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	96	97	97	97	98

PCBs in Soil				
Our Reference		334958-6	334958-7	334958-8
Your Reference	UNITS	17	25	26
Depth		0-0.1	0.5	0-0.1
Date Sampled		26/09/2023	26/09/2023	27/09/2023
Type of sample		Soil	Soil	Soil
Date extracted	-	11/10/2023	11/10/2023	11/10/2023
Date analysed	-	12/10/2023	12/10/2023	12/10/2023
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1	<0.1
Surrogate TCMX	%	100	96	99

Acid Extractable metals in soil						
Our Reference		334958-1	334958-2	334958-3	334958-4	334958-5
Your Reference	UNITS	2	5	6	11	14
Depth		0-0.1	0.5	0-0.1	0-0.1	0.5
Date Sampled		25/09/2023	25/09/2023	25/09/2023	26/09/2023	26/09/2023
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	12/10/2023	12/10/2023	12/10/2023	12/10/2023	12/10/2023
Date analysed	-	12/10/2023	12/10/2023	12/10/2023	12/10/2023	12/10/2023
Arsenic	mg/kg	12	14	22	30	21
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	24	29	15	20	21
Copper	mg/kg	16	22	13	21	26
Lead	mg/kg	19	20	18	18	19
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	16	19	11	15	20
Zinc	mg/kg	34	33	47	35	48

Acid Extractable metals in soil					
Our Reference		334958-6	334958-7	334958-8	334958-15
Your Reference	UNITS	17	25	26	2 - [TRIPLICATE]
Depth		0-0.1	0.5	0-0.1	0-0.1
Date Sampled		26/09/2023	26/09/2023	27/09/2023	25/09/2023
Type of sample		Soil	Soil	Soil	Soil
Date prepared	-	12/10/2023	12/10/2023	12/10/2023	12/10/2023
Date analysed	-	12/10/2023	12/10/2023	12/10/2023	12/10/2023
Arsenic	mg/kg	10	7	7	11
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	23	25	25	28
Copper	mg/kg	42	35	30	17
Lead	mg/kg	20	21	23	20
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	36	29	27	20
Zinc	mg/kg	42	29	26	50

Misc Soil - Inorg						
Our Reference		334958-1	334958-2	334958-3	334958-4	334958-5
Your Reference	UNITS	2	5	6	11	14
Depth		0-0.1	0.5	0-0.1	0-0.1	0.5
Date Sampled		25/09/2023	25/09/2023	25/09/2023	26/09/2023	26/09/2023
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	12/10/2023	12/10/2023	12/10/2023	12/10/2023	12/10/2023
Date analysed	-	12/10/2023	12/10/2023	12/10/2023	12/10/2023	12/10/2023
Total Phenolics (as Phenol)	mg/kg	<5	<5	<5	<5	<5

Misc Soil - Inorg				
Our Reference		334958-6	334958-7	334958-8
Your Reference	UNITS	17	25	26
Depth		0-0.1	0.5	0-0.1
Date Sampled		26/09/2023	26/09/2023	27/09/2023
Type of sample		Soil	Soil	Soil
Date prepared	-	12/10/2023	12/10/2023	12/10/2023
Date analysed	-	12/10/2023	12/10/2023	12/10/2023
Total Phenolics (as Phenol)	mg/kg	<5	<5	<5

Misc Inorg - Soil						
Our Reference		334958-1	334958-5	334958-8	334958-9	334958-10
Your Reference	UNITS	2	14	26	9	10
Depth		0-0.1	0.5	0-0.1	1-1.45	1-1.35
Date Sampled		25/09/2023	26/09/2023	27/09/2023	26/09/2023	26/09/2023
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	13/10/2023	13/10/2023	13/10/2023	13/10/2023	13/10/2023
Date analysed	-	13/10/2023	13/10/2023	13/10/2023	13/10/2023	13/10/2023
pH 1:5 soil:water	pH Units	5.6	7.1	7.0	5.2	7.8
Electrical Conductivity 1:5 soil:water	µS/cm	220	88	200	980	750
Chloride, Cl 1:5 soil:water	mg/kg	[NA]	[NA]	[NA]	1,200	770
Sulphate, SO4 1:5 soil:water	mg/kg	[NA]	[NA]	[NA]	450	490

Misc Inorg - Soil					
Our Reference		334958-11	334958-12	334958-13	334958-14
Your Reference	UNITS	10	14	15	23
Depth		2.5-2.65	1-1.2	1-1.45	2.5-2.7
Date Sampled		26/09/2023	26/09/2023	26/09/2023	27/09/2023
Type of sample		Soil	Soil	Soil	Soil
Date prepared	-	13/10/2023	13/10/2023	13/10/2023	13/10/2023
Date analysed	-	13/10/2023	13/10/2023	13/10/2023	13/10/2023
pH 1:5 soil:water	pH Units	4.8	7.8	9.1	7.4
Electrical Conductivity 1:5 soil:water	µS/cm	560	76	420	780
Chloride, Cl 1:5 soil:water	mg/kg	610	23	170	1,300
Sulphate, SO4 1:5 soil:water	mg/kg	350	10	65	380

CEC				
Our Reference		334958-1	334958-5	334958-8
Your Reference	UNITS	2	14	26
Depth		0-0.1	0.5	0-0.1
Date Sampled		25/09/2023	26/09/2023	27/09/2023
Type of sample		Soil	Soil	Soil
Date prepared	-	17/10/2023	17/10/2023	17/10/2023
Date analysed	-	17/10/2023	17/10/2023	17/10/2023
Exchangeable Ca	meq/100g	6.2	16	4.8
Exchangeable K	meq/100g	1.1	0.5	0.4
Exchangeable Mg	meq/100g	4.8	10	7.7
Exchangeable Na	meq/100g	0.2	0.9	1.4
Cation Exchange Capacity	meq/100g	12	28	14

Moisture						
Our Reference		334958-1	334958-2	334958-3	334958-4	334958-5
Your Reference	UNITS	2	5	6	11	14
Depth		0-0.1	0.5	0-0.1	0-0.1	0.5
Date Sampled		25/09/2023	25/09/2023	25/09/2023	26/09/2023	26/09/2023
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	11/10/2023	11/10/2023	11/10/2023	11/10/2023	11/10/2023
Date analysed	-	12/10/2023	12/10/2023	12/10/2023	12/10/2023	12/10/2023
Moisture	%	9.1	18	11	17	19

Moisture				
Our Reference		334958-6	334958-7	334958-8
Your Reference	UNITS	17	25	26
Depth		0-0.1	0.5	0-0.1
Date Sampled		26/09/2023	26/09/2023	27/09/2023
Type of sample		Soil	Soil	Soil
Date prepared	-	11/10/2023	11/10/2023	11/10/2023
Date analysed	-	12/10/2023	12/10/2023	12/10/2023
Moisture	%	18	19	21

Method ID	Methodology Summary
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-002	Conductivity and Salinity - measured using a conductivity cell at 25°C in accordance with APHA latest edition 2510 and Rayment & Lyons.
Inorg-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
Inorg-031	Total Phenolics by segmented flow analyser (in line distillation with colourimetric finish). Solids are extracted in a caustic media prior to analysis.
Inorg-081	Anions - a range of Anions are determined by Ion Chromatography, in accordance with APHA latest edition, 4110-B. Waters samples are filtered on receipt prior to analysis. Alternatively determined by colourimetry/turbidity using Discrete Analyser.
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-OES 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-022/025	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS/GC-MSMS.

Method ID	Methodology Summary
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.
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-7	334958-2
Date extracted	-			11/10/2023	1	11/10/2023	11/10/2023		11/10/2023	11/10/2023
Date analysed	-			12/10/2023	1	12/10/2023	12/10/2023		12/10/2023	12/10/2023
TRH C_6 - C_9	mg/kg	25	Org-023	<25	1	<25	<25	0	118	115
TRH C_6 - C_{10}	mg/kg	25	Org-023	<25	1	<25	<25	0	118	115
Benzene	mg/kg	0.2	Org-023	<0.2	1	<0.2	<0.2	0	123	120
Toluene	mg/kg	0.5	Org-023	<0.5	1	<0.5	<0.5	0	119	115
Ethylbenzene	mg/kg	1	Org-023	<1	1	<1	<1	0	116	113
m+p-xylene	mg/kg	2	Org-023	<2	1	<2	<2	0	117	114
o-Xylene	mg/kg	1	Org-023	<1	1	<1	<1	0	117	114
Naphthalene	mg/kg	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-023	108	1	106	97	9	119	104

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-7	334958-2
Date extracted	-			11/10/2023	1	11/10/2023	11/10/2023		11/10/2023	11/10/2023
Date analysed	-			12/10/2023	1	12/10/2023	12/10/2023		12/10/2023	12/10/2023
TRH C_{10} - C_{14}	mg/kg	50	Org-020	<50	1	<50	<50	0	127	94
TRH C_{15} - C_{28}	mg/kg	100	Org-020	<100	1	<100	<100	0	120	95
TRH C_{29} - C_{36}	mg/kg	100	Org-020	<100	1	<100	<100	0	114	79
TRH >C_{10} -C_{16}	mg/kg	50	Org-020	<50	1	<50	<50	0	127	94
TRH >C_{16} -C_{34}	mg/kg	100	Org-020	<100	1	<100	<100	0	120	95
TRH >C_{34} -C_{40}	mg/kg	100	Org-020	<100	1	<100	<100	0	114	79
Surrogate o-Terphenyl	%		Org-020	84	1	67	67	0	95	70

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-7	334958-2
Date extracted	-			11/10/2023	1	11/10/2023	11/10/2023		11/10/2023	11/10/2023
Date analysed	-			12/10/2023	1	12/10/2023	12/10/2023		12/10/2023	12/10/2023
Naphthalene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	95	93
Acenaphthylene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	0.1	0	99	99
Fluorene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	0.2	67	90	86
Phenanthrene	mg/kg	0.1	Org-022/025	<0.1	1	0.8	2.2	93	102	96
Anthracene	mg/kg	0.1	Org-022/025	<0.1	1	0.3	0.5	50	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-022/025	<0.1	1	0.6	1.7	96	104	94
Pyrene	mg/kg	0.1	Org-022/025	<0.1	1	0.5	1.2	82	103	97
Benzo(a)anthracene	mg/kg	0.1	Org-022/025	<0.1	1	0.2	0.5	86	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-022/025	<0.1	1	0.2	0.4	67	83	81
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-022/025	<0.2	1	0.3	0.6	67	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-022/025	<0.05	1	0.1	0.3	100	96	98
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	0.2	67	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	0.2	67	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-022/025	97	1	94	93	1	93	94

QUALITY CONTROL: Organochlorine Pesticides in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-7	334958-2
Date extracted	-			11/10/2023	1	11/10/2023	11/10/2023		11/10/2023	11/10/2023
Date analysed	-			12/10/2023	1	12/10/2023	12/10/2023		12/10/2023	12/10/2023
alpha-BHC	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	102	104
HCB	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	102	100
gamma-BHC	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Heptachlor	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	95	97
delta-BHC	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	101	95
Heptachlor Epoxide	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	108	90
gamma-Chlordane	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	105	105
Dieldrin	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	110	110
Endrin	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	92	100
Endosulfan II	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
pp-DDD	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	102	98
Endrin Aldehyde	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	138	136
Methoxychlor	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Mirex	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-022/025	99	1	96	96	0	98	100

QUALITY CONTROL: Organophosphorus Pesticides in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-7	334958-2
Date extracted	-			11/10/2023	1	11/10/2023	11/10/2023		11/10/2023	11/10/2023
Date analysed	-			12/10/2023	1	12/10/2023	12/10/2023		12/10/2023	12/10/2023
Dichlorvos	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	117	115
Mevinphos	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Phorate	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Dimethoate	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Diazinon	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Disulfoton	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Chlorpyrifos-methyl	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Parathion-Methyl	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Ronnel	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	97	93
Fenitrothion	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	101	101
Malathion	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	108	106
Chlorpyriphos	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	102	104
Fenthion	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Parathion	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	103	99
Bromophos-ethyl	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Methidathion	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Fenamiphos	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Ethion	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	92	98
Phosalone	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Coumaphos	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-022/025	99	1	96	96	0	98	100

QUALITY CONTROL: PCBs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-7	334958-2
Date extracted	-			11/10/2023	1	11/10/2023	11/10/2023		11/10/2023	11/10/2023
Date analysed	-			12/10/2023	1	12/10/2023	12/10/2023		12/10/2023	12/10/2023
Aroclor 1016	mg/kg	0.1	Org-021	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-021	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-021	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-021	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-021	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-021	<0.1	1	<0.1	<0.1	0	117	120
Aroclor 1260	mg/kg	0.1	Org-021	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-021	99	1	96	96	0	98	100

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-7	334958-2
Date prepared	-			12/10/2023	1	12/10/2023	12/10/2023		12/10/2023	12/10/2023
Date analysed	-			12/10/2023	1	12/10/2023	12/10/2023		12/10/2023	12/10/2023
Arsenic	mg/kg	4	Metals-020	<4	1	12	11	9	114	103
Cadmium	mg/kg	0.4	Metals-020	<0.4	1	<0.4	<0.4	0	107	91
Chromium	mg/kg	1	Metals-020	<1	1	24	33	32	125	103
Copper	mg/kg	1	Metals-020	<1	1	16	19	17	112	114
Lead	mg/kg	1	Metals-020	<1	1	19	22	15	123	95
Mercury	mg/kg	0.1	Metals-021	<0.1	1	<0.1	<0.1	0	119	113
Nickel	mg/kg	1	Metals-020	<1	1	16	22	32	111	98
Zinc	mg/kg	1	Metals-020	<1	1	34	57	51	114	98

QUALITY CONTROL: Misc Soil - Inorg						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-7	[NT]
Date prepared	-			12/10/2023	1	12/10/2023	12/10/2023		12/10/2023	[NT]
Date analysed	-			12/10/2023	1	12/10/2023	12/10/2023		12/10/2023	[NT]
Total Phenolics (as Phenol)	mg/kg	5	Inorg-031	<5	1	<5	<5	0	102	[NT]

QUALITY CONTROL: Misc Inorg - Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-7	334958-14
Date prepared	-			13/10/2023	9	13/10/2023	13/10/2023		13/10/2023	13/10/2023
Date analysed	-			13/10/2023	9	13/10/2023	13/10/2023		13/10/2023	13/10/2023
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	9	5.2	5.2	0	98	[NT]
Electrical Conductivity 1:5 soil:water	µS/cm	1	Inorg-002	<1	9	980	900	9	105	[NT]
Chloride, Cl 1:5 soil:water	mg/kg	10	Inorg-081	<10	9	1200	1100	9	108	98
Sulphate, SO4 1:5 soil:water	mg/kg	10	Inorg-081	<10	9	450	440	2	111	116

QUALITY CONTROL: CEC						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	334958-8
Date prepared	-			17/10/2023	5	17/10/2023	17/10/2023		17/10/2023	17/10/2023
Date analysed	-			17/10/2023	5	17/10/2023	17/10/2023		17/10/2023	17/10/2023
Exchangeable Ca	meq/100g	0.1	Metals-020	<0.1	5	16	15	6	103	108
Exchangeable K	meq/100g	0.1	Metals-020	<0.1	5	0.5	0.5	0	109	103
Exchangeable Mg	meq/100g	0.1	Metals-020	<0.1	5	10	9.4	6	104	105
Exchangeable Na	meq/100g	0.1	Metals-020	<0.1	5	0.9	1	11	111	96

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.

Where matrix spike recoveries fall below the lower limit of the acceptance criteria (e.g. for non-labile or standard Organics <60%), positive result(s) in the parent sample will subsequently have a higher than typical estimated uncertainty (MU estimates supplied on request) and in these circumstances the sample result is likely biased significantly low.

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

Acid Extractable Metals in Soil: The laboratory RPD acceptance criteria has been exceeded for 334958-1 for Zn. Therefore a triplicate result has been issued as laboratory sample number 334958-15.

PAHs in Soil - The laboratory RPD acceptance criteria has been exceeded for 334958-1. Therefore a triplicate result has been issued as laboratory sample number 334958-15.

PAHs in Soil - The RPD for duplicate results is accepted due to the non homogenous nature of sample/s 334958-1.

Samples were out of the recommended holding time for this analysis pH/EC.

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CERTIFICATE OF ANALYSIS 336033

Client Details

Client	Douglas Partners Newcastle
Attention	Michael Harris
Address	Box 324 Hunter Region Mail Centre, Newcastle, NSW, 2310

Sample Details

Your Reference	**224764.00, Muswellbrook**
Number of Samples	2 Water
Date samples received	24/10/2023
Date completed instructions received	24/10/2023

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	31/10/2023
Date of Issue	31/10/2023

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Results Approved By
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Hannah Nguyen, Metals Supervisor
Liam Timmins, Organics Supervisor
Priya Samarawickrama, Senior Chemist
Sean McAlary, Chemist

Authorised By
Nancy Zhang, Laboratory Manager

vTRH(C6-C10)/BTEXN in Water			
Our Reference		336033-1	336033-2
Your Reference	UNITS	LS1	LS2
Date Sampled		20/10/2023	20/10/2023
Type of sample		Water	Water
Date extracted	-	24/10/2023	24/10/2023
Date analysed	-	25/10/2023	25/10/2023
TRH C_6 - C_9	µg/L	<10	<10
TRH C_6 - C_{10}	µg/L	<10	<10
TRH C_6 - C_{10} less BTEX (F1)	µg/L	<10	<10
Benzene	µg/L	<1	<1
Toluene	µg/L	<1	<1
Ethylbenzene	µg/L	<1	<1
m+p-xylene	µg/L	<2	<2
o-xylene	µg/L	<1	<1
Naphthalene	µg/L	<1	<1
Surrogate Dibromofluoromethane	%	94	94
Surrogate Toluene-d8	%	91	86
Surrogate 4-Bromofluorobenzene	%	119	120

svTRH (C10-C40) in Water			
Our Reference	UNITS	336033-1	336033-2
Your Reference		LS1	LS2
Date Sampled		20/10/2023	20/10/2023
Type of sample		Water	Water
Date extracted	-	25/10/2023	25/10/2023
Date analysed	-	26/10/2023	26/10/2023
TRH C_{10} - C_{14}	µg/L	<50	<50
TRH C_{15} - C_{28}	µg/L	<100	<100
TRH C_{29} - C_{36}	µg/L	<100	<100
Total +ve TRH (C10-C36)	µg/L	<50	<50
TRH >C_{10} - C_{16}	µg/L	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	µg/L	<50	<50
TRH >C_{16} - C_{34}	µg/L	<100	<100
TRH >C_{34} - C_{40}	µg/L	<100	<100
Total +ve TRH (>C10-C40)	µg/L	<50	<50
Surrogate o-Terphenyl	%	67	72

PAHs in Water			
Our Reference	UNITS	336033-1	336033-2
Your Reference		LS1	LS2
Date Sampled		20/10/2023	20/10/2023
Type of sample		Water	Water
Date extracted	-	25/10/2023	25/10/2023
Date analysed	-	30/10/2023	30/10/2023
Naphthalene	µg/L	<0.1	<0.1
Acenaphthylene	µg/L	<0.1	<0.1
Acenaphthene	µg/L	<0.1	<0.1
Fluorene	µg/L	<0.1	<0.1
Phenanthrene	µg/L	<0.1	<0.1
Anthracene	µg/L	<0.1	<0.1
Fluoranthene	µg/L	<0.1	<0.1
Pyrene	µg/L	<0.1	<0.1
Benzo(a)anthracene	µg/L	<0.1	<0.1
Chrysene	µg/L	<0.1	<0.1
Benzo(b,j+k)fluoranthene	µg/L	<0.2	<0.2
Benzo(a)pyrene	µg/L	<0.1	<0.1
Indeno(1,2,3-c,d)pyrene	µg/L	<0.1	<0.1
Dibenzo(a,h)anthracene	µg/L	<0.1	<0.1
Benzo(g,h,i)perylene	µg/L	<0.1	<0.1
Benzo(a)pyrene TEQ	µg/L	<0.5	<0.5
Total +ve PAH's	µg/L	<0.1	<0.1
Surrogate p-Terphenyl-d14	%	72	78

OCPs in Water - Low Level			
Our Reference	UNITS	336033-1	336033-2
Your Reference		LS1	LS2
Date Sampled		20/10/2023	20/10/2023
Type of sample		Water	Water
Date extracted	-	25/10/2023	25/10/2023
Date analysed	-	30/10/2023	30/10/2023
alpha-BHC	µg/L	<0.05	<0.05
HCB	µg/L	<0.01	<0.01
beta-BHC	µg/L	<0.05	<0.05
gamma-BHC	µg/L	<0.05	<0.05
Heptachlor	µg/L	<0.01	<0.01
delta-BHC	µg/L	<0.05	<0.05
Aldrin	µg/L	<0.01	<0.01
Heptachlor Epoxide	µg/L	<0.01	<0.01
gamma-Chlordane	µg/L	<0.01	<0.01
alpha-Chlordane	µg/L	<0.01	<0.01
Endosulfan I	µg/L	<0.02	<0.02
pp-DDE	µg/L	<0.01	<0.01
Dieldrin	µg/L	<0.01	<0.01
Endrin	µg/L	<0.01	<0.01
Endosulfan II	µg/L	<0.02	<0.02
pp-DDD	µg/L	<0.01	<0.01
pp-DDT	µg/L	<0.006	<0.006
Endosulfan Sulphate	µg/L	<0.02	<0.02
Methoxychlor	µg/L	<0.02	<0.02
Mirex	µg/L	<0.02	<0.02
Surrogate TCMX	%	63	67

OP in water LL ANZECCF/ADWG			
Our Reference	UNITS	336033-1	336033-2
Your Reference		LS1	LS2
Date Sampled		20/10/2023	20/10/2023
Type of sample		Water	Water
Date extracted	-	25/10/2023	25/10/2023
Date analysed	-	30/10/2023	30/10/2023
Dichlorvos	µg/L	<0.05	<0.05
Mevinphos	µg/L	<0.05	<0.05
Phorate	µg/L	<0.05	<0.05
Dimethoate	µg/L	<0.1	<0.1
Diazinon	µg/L	<0.01	<0.01
Disulfoton	µg/L	<0.05	<0.05
Chlorpyriphos-methyl	µg/L	<0.05	<0.05
Parathion-Methyl	µg/L	<0.05	<0.05
Ronnel	µg/L	<0.05	<0.05
Fenitrothion	µg/L	<0.05	<0.05
Malathion	µg/L	<0.05	<0.05
Chlorpyriphos	µg/L	<0.009	<0.009
Fenthion	µg/L	<0.05	<0.05
Parathion	µg/L	<0.004	<0.004
Bromophos ethyl	µg/L	<0.05	<0.05
Methidathion	µg/L	<0.05	<0.05
Fenamiphos	µg/L	<0.05	<0.05
Ethion	µg/L	<0.05	<0.05
Phosalone	µg/L	<0.05	<0.05
Azinphos-methyl (Guthion)	µg/L	<0.2	<0.2
Coumaphos	µg/L	<0.05	<0.05
Surrogate TCMX	%	63	67

PCBs in Water - Low Level			
Our Reference		336033-1	336033-2
Your Reference	UNITS	LS1	LS2
Date Sampled		20/10/2023	20/10/2023
Type of sample		Water	Water
Date extracted	-	25/10/2023	25/10/2023
Date analysed	-	30/10/2023	30/10/2023
Aroclor 1016	µg/L	<0.1	<0.1
Aroclor 1221	µg/L	<0.1	<0.1
Aroclor 1232	µg/L	<0.1	<0.1
Aroclor 1242	µg/L	<0.1	<0.1
Aroclor 1248	µg/L	<0.1	<0.1
Aroclor 1254	µg/L	<0.1	<0.1
Aroclor 1260	µg/L	<0.1	<0.1
Surrogate TCMX	%	63	67

PFAS in Water LOW LEVEL Extend			
Our Reference	UNITS	336033-1	336033-2
Your Reference		LS1	LS2
Date Sampled		20/10/2023	20/10/2023
Type of sample		Water	Water
Date prepared	-	26/10/2023	26/10/2023
Date analysed	-	26/10/2023	26/10/2023
Perfluorobutanesulfonic acid	µg/L	<0.001	0.001
Perfluoropentanesulfonic acid	µg/L	<0.001	<0.001
Perfluorohexanesulfonic acid - PFHxS	µg/L	0.004	0.003
Perfluoroheptanesulfonic acid	µg/L	<0.001	<0.001
Perfluorooctanesulfonic acid PFOS	µg/L	0.004	0.004
Perfluorodecanesulfonic acid	µg/L	<0.002	<0.002
Perfluorobutanoic acid	µg/L	0.007	0.008
Perfluoropentanoic acid	µg/L	0.005	0.005
Perfluorohexanoic acid	µg/L	0.004	0.004
Perfluoroheptanoic acid	µg/L	0.003	0.004
Perfluorooctanoic acid PFOA	µg/L	<0.001	<0.001
Perfluorononanoic acid	µg/L	<0.001	<0.001
Perfluorodecanoic acid	µg/L	<0.002	<0.002
Perfluoroundecanoic acid	µg/L	<0.002	<0.002
Perfluorododecanoic acid	µg/L	<0.005	<0.005
Perfluorotridecanoic acid	µg/L	<0.01	<0.01
Perfluorotetradecanoic acid	µg/L	<0.05	<0.05
4:2 FTS	µg/L	<0.001	<0.001
6:2 FTS	µg/L	<0.001	<0.001
8:2 FTS	µg/L	<0.002	<0.002
10:2 FTS	µg/L	<0.002	<0.002
Perfluorooctane sulfonamide	µg/L	<0.01	<0.01
N-Methyl perfluorooctane sulfonamide	µg/L	<0.05	<0.05
N-Ethyl perfluorooctanesulfon amide	µg/L	<0.1	<0.1
N-Me perfluorooctanesulfonamid oethanol	µg/L	<0.05	<0.05
N-Et perfluorooctanesulfonamid oethanol	µg/L	<0.5	<0.5
MePerfluorooctanesulf- amid oacetic acid	µg/L	<0.002	<0.002
EtPerfluorooctanesulf- amid oacetic acid	µg/L	<0.002	<0.002
Surrogate $^{13}C_8$ *PFOS*	%	100	100
Surrogate $^{13}C_2$ *PFOA*	%	96	91
Extracted ISTD $^{13}C_3$ *PFBS*	%	85	79
Extracted ISTD $^{18}O_2$ *PFHxS*	%	86	86
Extracted ISTD $^{13}C_4$ *PFOS*	%	90	93
Extracted ISTD $^{13}C_4$ *PFBA*	%	51	41

PFAS in Water LOW LEVEL Extend			
Our Reference	UNITS	336033-1	336033-2
Your Reference		LS1	LS2
Date Sampled		20/10/2023	20/10/2023
Type of sample		Water	Water
Extracted ISTD $^{13}C_3$ *PFPeA*	%	87	92
Extracted ISTD $^{13}C_2$ *PFHxA*	%	95	92
Extracted ISTD $^{13}C_4$ *PFHpA*	%	91	88
Extracted ISTD $^{13}C_4$ *PFOA*	%	129	135
Extracted ISTD $^{13}C_5$ *PFNA*	%	109	109
Extracted ISTD $^{13}C_2$ *PFDA*	%	126	127
Extracted ISTD $^{13}C_2$ *PFUnDA*	%	136	136
Extracted ISTD $^{13}C_2$ *PFDoDA*	%	141	139
Extracted ISTD $^{13}C_2$ *PFTeDA*	%	123	109
Extracted ISTD $^{13}C_2$ *4:2FTS*	%	195	194
Extracted ISTD $^{13}C_2$ *6:2FTS*	%	#	#
Extracted ISTD $^{13}C_2$ *8:2FTS*	%	#	#
Extracted ISTD $^{13}C_8$ *FOSA*	%	87	86
Extracted ISTD d_3 *N MeFOSA*	%	110	106
Extracted ISTD d_5 *N EtFOSA*	%	116	108
Extracted ISTD d_7 *N MeFOSE*	%	115	115
Extracted ISTD d_9 *N EtFOSE*	%	109	99
Extracted ISTD d_3 *N MeFOSAA*	%	#	#
Extracted ISTD d_5 *N EtFOSAA*	%	#	#
Total Positive PFHxS & PFOS	µg/L	0.007	0.007
Total Positive PFOA & PFOS	µg/L	0.004	0.004
Total Positive PFAS	µg/L	0.027	0.029

All metals in water - total			
Our Reference		336033-1	336033-2
Your Reference	UNITS	LS1	LS2
Date Sampled		20/10/2023	20/10/2023
Type of sample		Water	Water
Date prepared	-	25/10/2023	25/10/2023
Date analysed	-	26/10/2023	26/10/2023
Arsenic-Total	µg/L	6	6
Beryllium-Total	µg/L	<0.5	<0.5
Boron-Total	µg/L	1,300	1,300
Cadmium-Total	µg/L	<0.1	<0.1
Chromium-Total	µg/L	<1	<1
Cobalt-Total	µg/L	<1	<1
Copper-Total	µg/L	3	3
Lead-Total	µg/L	<1	<1
Manganese-Total	µg/L	9	9
Mercury-Total	µg/L	<0.05	<0.05
Nickel-Total	µg/L	6	5
Selenium-Total	µg/L	6	6
Zinc-Total	µg/L	3	7

Metals in Waters - Acid extractable			
Our Reference		336033-1	336033-2
Your Reference	UNITS	LS1	LS2
Date Sampled		20/10/2023	20/10/2023
Type of sample		Water	Water
Date prepared	-	25/10/2023	25/10/2023
Date analysed	-	25/10/2023	25/10/2023
Phosphorus - Total	mg/L	<0.05	<0.05

Miscellaneous Inorganics			
Our Reference	UNITS	336033-1	336033-2
Your Reference		LS1	LS2
Date Sampled		20/10/2023	20/10/2023
Type of sample		Water	Water
Date prepared	-	24/10/2023	24/10/2023
Date analysed	-	24/10/2023	24/10/2023
pH	pH Units	8.5	8.4
Electrical Conductivity	µS/cm	2,900	2,800
Total Suspended Solids	mg/L	24	16
Total Dissolved Solids (grav)	mg/L	1,800	1,800
Phosphate as P in water	mg/L	<0.005	<0.005

NItrogen - forms in water			
Our Reference		336033-1	336033-2
Your Reference	UNITS	LS1	LS2
Date Sampled		20/10/2023	20/10/2023
Type of sample		Water	Water
Date prepared	-	25/10/2023	25/10/2023
Date analysed	-	25/10/2023	25/10/2023
TKN in water	mg/L	0.5	0.5
Nitrate as N in water	mg/L	<0.005	<0.005
Nitrite as N in water	mg/L	<0.005	<0.005
Ammonia as N in water	mg/L	0.008	0.015
Total Nitrogen in water	mg/L	0.5	0.5

Ion Balance			
Our Reference	UNITS	336033-1	336033-2
Your Reference		LS1	LS2
Date Sampled		20/10/2023	20/10/2023
Type of sample		Water	Water
Date prepared	-	24/10/2023	24/10/2023
Date analysed	-	24/10/2023	24/10/2023
Calcium - Dissolved	mg/L	150	150
Potassium - Dissolved	mg/L	21	21
Sodium - Dissolved	mg/L	390	320
Magnesium - Dissolved	mg/L	99	99
Hardness	mgCaCO 3 /L	790	780
Hydroxide Alkalinity (OH^-) as $CaCO_3$	mg/L	<5	<5
Bicarbonate Alkalinity as $CaCO_3$	mg/L	150	140
Carbonate Alkalinity as $CaCO_3$	mg/L	20	13
Total Alkalinity as $CaCO_3$	mg/L	170	150
Sulphate, SO4	mg/L	830	820
Chloride, Cl	mg/L	440	440
Ionic Balance	%	0	-4.0

Method ID	Methodology Summary
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-002	Conductivity and Salinity - measured using a conductivity cell at 25°C in accordance with APHA latest edition 2510 and Rayment & Lyons.
Inorg-006	Alkalinity - determined titrimetrically in accordance with APHA latest edition, 2320-B.
Inorg-018	Total Dissolved Solids - determined gravimetrically. The solids are dried at 180+/-10°C. NOTE: Where the EC of the sample is <100µS/cm, the TDS will typically be below 70mg/L (as the sample is very likely to be at least drinking water quality). Therefore to ensure data quality for TDS, the TDS is typically calculated as per the equation below:- TDS = EC * 0.6
Inorg-019	Suspended Solids - determined gravimetricially by filtration of the sample. The samples are dried at 104+/-5°C.
Inorg-040	The concentrations of the major ions (mg/L) are converted to milliequivalents and summed. The ionic balance should be within +/- 15% ie total anions = total cations +/-15%.
Inorg-055	Nitrate - determined colourimetrically. Waters samples are filtered on receipt prior to analysis. Soils are analysed following a water extraction.
Inorg-055	Nitrite - determined colourimetrically based on APHA latest edition NO2- B. Waters samples are filtered on receipt prior to analysis. Soils are analysed following a water extraction.
Inorg-055/062/127	Total Nitrogen - Calculation sum of TKN and oxidised Nitrogen. Alternatively analysed by combustion and chemiluminescence.
Inorg-057	Ammonia - determined colourimetrically, based on APHA latest edition 4500-NH3 F. Waters samples are filtered on receipt prior to analysis. Soils are analysed following a KCl extraction.
Inorg-060	Phosphate determined colourimetrically based on EPA365.1 and APHA latest edition 4500 P E. Waters samples are filtered on receipt prior to analysis. Soils are analysed following a water extraction.
Inorg-062	TKN - determined colourimetrically based on APHA latest edition 4500 Norg. Alternatively, TKN can be derived from calculation (Total N - NOx).
Inorg-081	Anions - a range of Anions are determined by Ion Chromatography, in accordance with APHA latest edition, 4110-B. Waters samples are filtered on receipt prior to analysis. Alternatively determined by colourimetry/turbidity using Discrete Analyser.
Metals-020	Determination of various metals by ICP-AES.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Metals-022	Determination of various metals by ICP-MS. Please note for Bromine and Iodine, any forms of these elements that are present are included together in the one result reported for each of these two elements. Salt forms (e.g. FeO, PbO, ZnO) are determinined stoichiometrically from the base metal concentration.

Method ID	Methodology Summary
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-021/022/025	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD and/or GC-MS/GC-MSMS.
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. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013.
Org-023	Water samples are analysed directly 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-029	Soil samples are extracted with basified Methanol. Waters and soil extracts are directly injected and/or concentrated/extracted using SPE. TCLPs/ASLP leachates are centrifuged, the supernatant is then analysed (including amendment with solvent) - as per the option in AS4439.3. Analysis is undertaken with LC-MS/MS. PFAS results include the sum of branched and linear isomers where applicable. Please note that PFAS results are corrected for Extracted Internal Standards (QSM 5.4 Table B-15 terminology), which are mass labelled analytes added prior to sample preparation to assess matrix effects and verify processing of the sample. PFAS analytes without a commercially available mass labelled analogue are corrected vs a closely eluting mass labelled PFAS compound. Surrogates are also reported, in this context they are mass labelled PFAS compounds added prior to extraction but are used as monitoring compounds only (not used for result correction). Envicarb (or similar) is used discretionally to remove interfering matrix components. Please contact the laboratory if estimates of Measurement Uncertainty are required as per WA DER.

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W3	[NT]
Date extracted	-			24/10/2023	[NT]	[NT]	[NT]	[NT]	24/10/2023	[NT]
Date analysed	-			25/10/2023	[NT]	[NT]	[NT]	[NT]	25/10/2023	[NT]
TRH C_6 - C_9	µg/L	10	Org-023	<10	[NT]	[NT]	[NT]	[NT]	91	[NT]
TRH C_6 - C_{10}	µg/L	10	Org-023	<10	[NT]	[NT]	[NT]	[NT]	91	[NT]
Benzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	88	[NT]
Toluene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	89	[NT]
Ethylbenzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	92	[NT]
m+p-xylene	µg/L	2	Org-023	<2	[NT]	[NT]	[NT]	[NT]	93	[NT]
o-xylene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	92	[NT]
Naphthalene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-023	93	[NT]	[NT]	[NT]	[NT]	91	[NT]
Surrogate Toluene-d8	%		Org-023	84	[NT]	[NT]	[NT]	[NT]	94	[NT]
Surrogate 4-Bromofluorobenzene	%		Org-023	117	[NT]	[NT]	[NT]	[NT]	103	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date extracted	-			25/10/2023	[NT]	[NT]	[NT]	[NT]	25/10/2023	[NT]
Date analysed	-			26/10/2023	[NT]	[NT]	[NT]	[NT]	26/10/2023	[NT]
TRH C_{10} - C_{14}	µg/L	50	Org-020	<50	[NT]	[NT]	[NT]	[NT]	115	[NT]
TRH C_{15} - C_{28}	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	112	[NT]
TRH C_{29} - C_{36}	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	100	[NT]
TRH >C_{10} - C_{16}	µg/L	50	Org-020	<50	[NT]	[NT]	[NT]	[NT]	115	[NT]
TRH >C_{16} - C_{34}	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	112	[NT]
TRH >C_{34} - C_{40}	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	100	[NT]
Surrogate o-Terphenyl	%		Org-020	83	[NT]	[NT]	[NT]	[NT]	98	[NT]

QUALITY CONTROL: PAHs in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			25/10/2023	[NT]	[NT]	[NT]	[NT]	25/10/2023	[NT]
Date analysed	-			30/10/2023	[NT]	[NT]	[NT]	[NT]	30/10/2023	[NT]
Naphthalene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	117	[NT]
Acenaphthylene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Acenaphthene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	109	[NT]
Fluorene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	107	[NT]
Phenanthrene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	106	[NT]
Anthracene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluoranthene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	107	[NT]
Pyrene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	108	[NT]
Benzo(a)anthracene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chrysene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	112	[NT]
Benzo(b,j+k)fluoranthene	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(a)pyrene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	105	[NT]
Indeno(1,2,3-c,d)pyrene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dibenzo(a,h)anthracene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(g,h,i)perylene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-022/025	94	[NT]	[NT]	[NT]	[NT]	104	[NT]

QUALITY CONTROL: OCPs in Water - Low Level						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			25/10/2023	[NT]	[NT]	[NT]	[NT]	25/10/2023	[NT]
Date analysed	-			30/10/2023	[NT]	[NT]	[NT]	[NT]	30/10/2023	[NT]
alpha-BHC	µg/L	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	110	[NT]
HCB	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
beta-BHC	µg/L	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	108	[NT]
gamma-BHC	µg/L	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Heptachlor	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	111	[NT]
delta-BHC	µg/L	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aldrin	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	110	[NT]
Heptachlor Epoxide	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	104	[NT]
gamma-Chlordane	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
alpha-Chlordane	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endosulfan I	µg/L	0.02	Org-022/025	<0.02	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDE	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	111	[NT]
Dieldrin	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	104	[NT]
Endrin	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	112	[NT]
Endosulfan II	µg/L	0.02	Org-022/025	<0.02	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDD	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	114	[NT]
pp-DDT	µg/L	0.006	Org-022	<0.006	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endosulfan Sulphate	µg/L	0.02	Org-022/025	<0.02	[NT]	[NT]	[NT]	[NT]	118	[NT]
Methoxychlor	µg/L	0.02	Org-022/025	<0.02	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Mirex	µg/L	0.02	Org-022/025	<0.02	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate TCMX	%		Org-022/025	91	[NT]	[NT]	[NT]	[NT]	111	[NT]

QUALITY CONTROL: OP in water LL ANZECCF/ADWG						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			25/10/2023	[NT]	[NT]	[NT]	[NT]	25/10/2023	[NT]
Date analysed	-			30/10/2023	[NT]	[NT]	[NT]	[NT]	30/10/2023	[NT]
Dichlorvos	µg/L	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	120	[NT]
Mevinphos	µg/L	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Phorate	µg/L	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dimethoate	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Diazinon	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Disulfoton	µg/L	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chlorpyriphos-methyl	µg/L	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Parathion-Methyl	µg/L	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Ronnel	µg/L	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	104	[NT]
Fenitrothion	µg/L	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	118	[NT]
Malathion	µg/L	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	114	[NT]
Chlorpyriphos	µg/L	0.009	Org-022/025	<0.009	[NT]	[NT]	[NT]	[NT]	107	[NT]
Fenthion	µg/L	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Parathion	µg/L	0.004	Org-022/025	<0.004	[NT]	[NT]	[NT]	[NT]	113	[NT]
Bromophos ethyl	µg/L	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Methidathion	µg/L	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fenamiphos	µg/L	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Ethion	µg/L	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	118	[NT]
Phosalone	µg/L	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Azinphos-methyl (Guthion)	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Coumaphos	µg/L	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate TCMX	%		Org-022/025	91	[NT]	[NT]	[NT]	[NT]	111	[NT]

QUALITY CONTROL: PCBs in Water - Low Level						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			25/10/2023	[NT]	[NT]	[NT]	[NT]	25/10/2023	[NT]
Date analysed	-			30/10/2023	[NT]	[NT]	[NT]	[NT]	30/10/2023	[NT]
Aroclor 1016	µg/L	0.1	Org-021/022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1221	µg/L	0.1	Org-021/022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1232	µg/L	0.1	Org-021/022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1242	µg/L	0.1	Org-021/022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1248	µg/L	0.1	Org-021/022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1254	µg/L	0.1	Org-021/022/025	<0.1	[NT]	[NT]	[NT]	[NT]	92	[NT]
Aroclor 1260	µg/L	0.1	Org-021/022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate TCMX	%		Org-021/022/025	91	[NT]	[NT]	[NT]	[NT]	111	[NT]

QUALITY CONTROL: PFAS in Water LOW LEVEL Extend						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	336033-2
Date prepared	-			26/10/2023	1	26/10/2023	26/10/2023		26/10/2023	26/10/2023
Date analysed	-			26/10/2023	1	26/10/2023	26/10/2023		26/10/2023	26/10/2023
Perfluorobutanesulfonic acid	µg/L	0.001	Org-029	<0.001	1	<0.001	0.001	0	98	107
Perfluoropentanesulfonic acid	µg/L	0.001	Org-029	<0.001	1	<0.001	<0.001	0	102	113
Perfluorohexanesulfonic acid - PFHxS	µg/L	0.001	Org-029	<0.001	1	0.004	0.003	29	96	100
Perfluoroheptanesulfonic acid	µg/L	0.001	Org-029	<0.001	1	<0.001	<0.001	0	98	113
Perfluorooctanesulfonic acid PFOS	µg/L	0.001	Org-029	<0.001	1	0.004	0.003	29	99	98
Perfluorodecanesulfonic acid	µg/L	0.002	Org-029	<0.002	1	<0.002	<0.002	0	65	58
Perfluorobutanoic acid	µg/L	0.002	Org-029	<0.002	1	0.007	0.008	13	100	99
Perfluoropentanoic acid	µg/L	0.002	Org-029	<0.002	1	0.005	0.005	0	95	97
Perfluorohexanoic acid	µg/L	0.001	Org-029	<0.001	1	0.004	0.004	0	102	101
Perfluoroheptanoic acid	µg/L	0.001	Org-029	<0.001	1	0.003	0.003	0	108	107
Perfluorooctanoic acid PFOA	µg/L	0.001	Org-029	<0.001	1	<0.001	<0.001	0	94	87
Perfluorononanoic acid	µg/L	0.001	Org-029	<0.001	1	<0.001	<0.001	0	126	135
Perfluorodecanoic acid	µg/L	0.002	Org-029	<0.002	1	<0.002	<0.002	0	96	86
Perfluoroundecanoic acid	µg/L	0.002	Org-029	<0.002	1	<0.002	<0.002	0	102	103
Perfluorododecanoic acid	µg/L	0.005	Org-029	<0.005	1	<0.005	<0.005	0	97	88
Perfluorotridecanoic acid	µg/L	0.01	Org-029	<0.01	1	<0.01	<0.01	0	87	95
Perfluorotetradecanoic acid	µg/L	0.05	Org-029	<0.05	1	<0.05	<0.05	0	103	115
4:2 FTS	µg/L	0.001	Org-029	<0.001	1	<0.001	<0.001	0	110	110
6:2 FTS	µg/L	0.001	Org-029	<0.001	1	<0.001	<0.001	0	100	86
8:2 FTS	µg/L	0.002	Org-029	<0.002	1	<0.002	<0.002	0	97	105
10:2 FTS	µg/L	0.002	Org-029	<0.002	1	<0.002	<0.002	0	92	97
Perfluorooctane sulfonamide	µg/L	0.01	Org-029	<0.01	1	<0.01	<0.01	0	103	105
N-Methyl perfluorooctane sulfonamide	µg/L	0.05	Org-029	<0.05	1	<0.05	<0.05	0	103	101
N-Ethyl perfluorooctanesulfon amide	µg/L	0.1	Org-029	<0.1	1	<0.1	<0.1	0	105	112
N-Me perfluorooctanesulfonamid oethanol	µg/L	0.05	Org-029	<0.05	1	<0.05	<0.05	0	95	94
N-Et perfluorooctanesulfonamid oethanol	µg/L	0.5	Org-029	<0.5	1	<0.5	<0.5	0	108	102
MePerfluorooctanesulf- amid oacetic acid	µg/L	0.002	Org-029	<0.002	1	<0.002	<0.002	0	99	104
EtPerfluorooctanesulf- amid oacetic acid	µg/L	0.002	Org-029	<0.002	1	<0.002	<0.002	0	101	98
Surrogate $^{13}C_8$ *PFOS*	%		Org-029	99	1	100	102	2	103	105
Surrogate $^{13}C_2$ *PFOA*	%		Org-029	98	1	96	96	0	102	100

QUALITY CONTROL: PFAS in Water LOW LEVEL Extend						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	336033-2
Extracted ISTD $^{13}C_3$ *PFBS*	%		Org-029	50	1	85	82	4	58	81
Extracted ISTD $^{18}O_2$ *PFHxS*	%		Org-029	76	1	86	85	1	84	87
Extracted ISTD $^{13}C_4$ *PFOS*	%		Org-029	69	1	90	88	2	71	91
Extracted ISTD $^{13}C_4$ *PFBA*	%		Org-029	91	1	51	52	2	101	41
Extracted ISTD $^{13}C_3$ *PFPeA*	%		Org-029	78	1	87	91	4	82	91
Extracted ISTD $^{13}C_2$ *PFHxA*	%		Org-029	81	1	95	87	9	90	92
Extracted ISTD $^{13}C_4$ *PFHpA*	%		Org-029	85	1	91	88	3	88	92
Extracted ISTD $^{13}C_4$ *PFOA*	%		Org-029	100	1	129	128	1	105	127
Extracted ISTD $^{13}C_5$ *PFNA*	%		Org-029	86	1	109	104	5	91	108
Extracted ISTD $^{13}C_2$ *PFDA*	%		Org-029	90	1	126	121	4	97	133
Extracted ISTD $^{13}C_2$ *PFUnDA*	%		Org-029	85	1	136	132	3	93	139
Extracted ISTD $^{13}C_2$ *PFDoDA*	%		Org-029	86	1	141	137	3	95	136
Extracted ISTD $^{13}C_2$ *PFTeDA*	%		Org-029	65	1	123	115	7	72	113
Extracted ISTD $^{13}C_2$ *4:2FTS*	%		Org-029	105	1	195	176	10	119	195
Extracted ISTD $^{13}C_2$ *6:2FTS*	%		Org-029	142	1	#	#		148	#
Extracted ISTD $^{13}C_2$ *8:2FTS*	%		Org-029	183	1	#	#		#	#
Extracted ISTD $^{13}C_8$ *FOSA*	%		Org-029	72	1	87	87	0	72	83
Extracted ISTD d_3 *N MeFOSA*	%		Org-029	114	1	110	105	5	114	103
Extracted ISTD d_5 *N EtFOSA*	%		Org-029	128	1	116	118	2	114	106
Extracted ISTD d_7 *N MeFOSE*	%		Org-029	123	1	115	116	1	122	106

QUALITY CONTROL: PFAS in Water LOW LEVEL Extend						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	336033-2
Extracted ISTD d_9 *N EtFOSE*	%		Org-029	114	1	109	114	4	106	104
Extracted ISTD d_3 *N MeFOSAA*	%		Org-029	137	1	#	#		134	#
Extracted ISTD d_5 *N EtFOSAA*	%		Org-029	131	1	#	#		144	#

QUALITY CONTROL: All metals in water - total						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W5	[NT]
Date prepared	-			25/10/2023	1	25/10/2023	25/10/2023		25/10/2023	[NT]
Date analysed	-			26/10/2023	1	26/10/2023	26/10/2023		26/10/2023	[NT]
Arsenic-Total	µg/L	1	Metals-022	<1	1	6	6	0	102	[NT]
Beryllium-Total	µg/L	0.5	Metals-022	<0.5	1	<0.5	<0.5	0	107	[NT]
Boron-Total	µg/L	20	Metals-022	<20	1	1300	1300	0	109	[NT]
Cadmium-Total	µg/L	0.1	Metals-022	<0.1	1	<0.1	<0.1	0	101	[NT]
Chromium-Total	µg/L	1	Metals-022	<1	1	<1	<1	0	102	[NT]
Cobalt-Total	µg/L	1	Metals-022	<1	1	<1	<1	0	104	[NT]
Copper-Total	µg/L	1	Metals-022	<1	1	3	3	0	100	[NT]
Lead-Total	µg/L	1	Metals-022	<1	1	<1	<1	0	104	[NT]
Manganese-Total	µg/L	5	Metals-022	<5	1	9	10	11	102	[NT]
Mercury-Total	µg/L	0.05	Metals-021	<0.05	1	<0.05	[NT]		98	[NT]
Nickel-Total	µg/L	1	Metals-022	<1	1	6	5	18	105	[NT]
Selenium-Total	µg/L	1	Metals-022	<1	1	6	6	0	105	[NT]
Zinc-Total	µg/L	1	Metals-022	<1	1	3	3	0	104	[NT]

QUALITY CONTROL: Metals in Waters - Acid extractable						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date prepared	-			25/10/2023	1	25/10/2023	25/10/2023		25/10/2023	[NT]
Date analysed	-			25/10/2023	1	25/10/2023	25/10/2023		25/10/2023	[NT]
Phosphorus - Total	mg/L	0.05	Metals-020	<0.05	1	<0.05	<0.05	0	103	[NT]

QUALITY CONTROL: Miscellaneous Inorganics					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date prepared	-			24/10/2023	1	24/10/2023	24/10/2023		24/10/2023	[NT]
Date analysed	-			24/10/2023	1	24/10/2023	24/10/2023		24/10/2023	[NT]
pH	pH Units		Inorg-001	[NT]	1	8.5	[NT]		103	[NT]
Electrical Conductivity	µS/cm	1	Inorg-002	<1	1	2900	[NT]		106	[NT]
Total Suspended Solids	mg/L	5	Inorg-019	<5	1	24	[NT]		93	[NT]
Total Dissolved Solids (grav)	mg/L	5	Inorg-018	<5	1	1800	[NT]		92	[NT]
Phosphate as P in water	mg/L	0.005	Inorg-060	<0.005	1	<0.005	<0.005	0	101	[NT]

QUALITY CONTROL: Miscellaneous Inorganics					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	2	24/10/2023	24/10/2023		[NT]	[NT]
Date analysed	-			[NT]	2	24/10/2023	24/10/2023		[NT]	[NT]
pH	pH Units		Inorg-001	[NT]	2	8.4	8.4	0	[NT]	[NT]
Electrical Conductivity	µS/cm	1	Inorg-002	[NT]	2	2800	2900	4	[NT]	[NT]
Total Suspended Solids	mg/L	5	Inorg-019	[NT]	2	16	[NT]		[NT]	[NT]
Total Dissolved Solids (grav)	mg/L	5	Inorg-018	[NT]	2	1800	[NT]		[NT]	[NT]
Phosphate as P in water	mg/L	0.005	Inorg-060	[NT]	2	<0.005	[NT]		[NT]	[NT]

QUALITY CONTROL: NItrogen - forms in water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			25/10/2023	1	25/10/2023	25/10/2023		25/10/2023	[NT]
Date analysed	-			25/10/2023	1	25/10/2023	25/10/2023		25/10/2023	[NT]
TKN in water	mg/L	0.1	Inorg-062	<0.1	1	0.5	0.5	0	[NT]	[NT]
Nitrate as N in water	mg/L	0.005	Inorg-055	<0.005	1	<0.005	<0.005	0	101	[NT]
Nitrite as N in water	mg/L	0.005	Inorg-055	<0.005	1	<0.005	<0.005	0	101	[NT]
Ammonia as N in water	mg/L	0.005	Inorg-057	<0.005	1	0.008	0.009	12	98	[NT]
Total Nitrogen in water	mg/L	0.1	Inorg-055/062/127	<0.1	1	0.5	0.5	0	96	[NT]

QUALITY CONTROL: Ion Balance						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date prepared	-			24/10/2023	2	24/10/2023	24/10/2023		24/10/2023	[NT]
Date analysed	-			24/10/2023	2	24/10/2023	24/10/2023		24/10/2023	[NT]
Calcium - Dissolved	mg/L	0.5	Metals-020	<0.5	2	150	[NT]		104	[NT]
Potassium - Dissolved	mg/L	0.5	Metals-020	<0.5	2	21	[NT]		97	[NT]
Sodium - Dissolved	mg/L	0.5	Metals-020	<0.5	2	320	[NT]		104	[NT]
Magnesium - Dissolved	mg/L	0.5	Metals-020	<0.5	2	99	[NT]		105	[NT]
Hardness	mgCaCO 3 /L	3	Metals-020	[NT]	2	780	[NT]		[NT]	[NT]
Hydroxide Alkalinity (OH^-) as $CaCO_3$	mg/L	5	Inorg-006	<5	2	<5	<5	0	[NT]	[NT]
Bicarbonate Alkalinity as $CaCO_3$	mg/L	5	Inorg-006	<5	2	140	150	7	[NT]	[NT]
Carbonate Alkalinity as $CaCO_3$	mg/L	5	Inorg-006	<5	2	13	14	7	[NT]	[NT]
Total Alkalinity as $CaCO_3$	mg/L	5	Inorg-006	<5	2	150	160	6	104	[NT]
Sulphate, SO4	mg/L	1	Inorg-081	<1	2	820	[NT]		109	[NT]
Chloride, Cl	mg/L	1	Inorg-081	<1	2	440	[NT]		104	[NT]
Ionic Balance	%		Inorg-040	[NT]	2	-4.0	[NT]		[NT]	[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.

Where matrix spike recoveries fall below the lower limit of the acceptance criteria (e.g. for non-labile or standard Organics <60%), positive result(s) in the parent sample will subsequently have a higher than typical estimated uncertainty (MU estimates supplied on request) and in these circumstances the sample result is likely biased significantly low.

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

pH/Nutrients
Samples were out of the recommended holding time for this analysis.

Dissolved Metals: The preserved sample provided was not identified as either total or dissolved, therefore the unpreserved sample was filtered through 0.45µm filter at the lab. Note: there is a possibility some elements may be underestimated.

Total Metals: The preserved sample provided was not identified as either total or dissolved, therefore the analysis was conducted from the unpreserved sample. Note: there is a possibility some elements may be underestimated

For PFAS Extracted Internal Standards denoted with # or outside the 50-150% acceptance range, the respective target analyte results may be unaffected, in other circumstances the PQL has been raised to accommodate the outlier(s).

Appendix I

Borehole Logs

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: New Eastern Hub Sub-Transmission Substation
LOCATION: Lot 9 DP1193430 Hebden Road, Musewllbrook, NSW

SURFACE LEVEL: 137.9 AHD
COORDINATE: E:311993.3, N:6418611.2
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 1
PROJECT No: 224764.00
DATE: 06/10/23
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN[#]	CONSIS.[*]	DENSITY.[*]	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
No free groundwater observed	137	0.05 TOPSOIL Silty CLAY (CI), trace sand: brown; medium plasticity; fine to medium sand. 0.00m-0.10m: trace rootlets	TS	RS		H	w<PL	x2	B		0.10 0.60	PP	>400kPa
	1	1.04 Borehole discontinued at 1.04m depth. Limit of investigation.							U75		0.75 1 1.04	PP	>400kPa
	136										2		
	135												

NOTES: [#] Soil origin is "probable" unless otherwise stated. [*] Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hanjin 8D
METHOD: 300mm Auger
REMARKS:

OPERATOR: Total Drilling (D Tranter)
CASING: Nil

LOGGED: Chaplin

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: New Eastern Hub Sub-Transmission Substation
LOCATION: Lot 9 DP1193430 Hebden Road, Musewllbrook, NSW

SURFACE LEVEL: 136.8 AHD
COORDINATE: E:311953.6, N:6418626.5
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 2
PROJECT No: 224764.00
DATE: 25/09/23
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
	0.05	TOPSOIL	TS	RS	VSt to H	w<PL		A		0.10	PID	ppm
	0.20	Clayey SILT: brown; trace rootlets.										
		Sandy CLAY: dark brown; medium plasticity.						A		0.50	PID	ppm
								U50		0.68	PP	>400kPa
	136	From 0.70m: pale brown										
	1									1	SPT	3,6,10 N=16
											PP	>400kPa
	135											
	2	From 2.00m: pale brown mottled grey, grading to extremely weathered rock		RS	H	w<PL				2		
		2.50m: v bit refusal, grading to extremely weathered material									SPT	11,19,24 N=43
	134											
	3									3	PP	>400kPa
	133											
	4.00	Borehole discontinued at 4.00m depth. Terminated.								4		
	132											

NOTES: (#) Soil origin is "probable" unless otherwise stated. (*) Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hanjin 8D
METHOD: 100mm solid flight auger with V bit, TC bit from 2.5m
REMARKS:

OPERATOR: Total Drilling (D Tranter)
CASING: Nil

LOGGED: Gilmour

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: New Eastern Hub Sub-Transmission Substation
LOCATION: Lot 9 DP1193430 Hebden Road, Musewllbrook, NSW

SURFACE LEVEL: 135.7 AHD
COORDINATE: E:311940.9, N:6418600.6
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 3
PROJECT No: 224764.00
DATE: 29/09/23
SHEET: 1 of 3

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL ORIGIN(#)	SOIL CONSIS.(†) DENSITY.(†)	SOIL MOISTURE	ROCK WEATH.	ROCK DEPTH (m)	ROCK STRENGTH	ROCK RECOVERY (%)	ROCK RQD	ROCK FRACTURE SPACING (m)	ROCK DEFECTS & REMARKS	SAMPLE REMARKS	SAMPLE TYPE	SAMPLE INTERVAL	DEPTH (m)	TESTING TEST TYPE	TESTING RESULTS AND REMARKS
No free groundwater observed	135	0.05	TOPSOIL	TS	RS	H	w<PL									U50	0.50–0.80	0.50	PP	>400kPa
			Silty CLAY (CI): brown; medium plasticity. 0.00m-0.10m: trace rootlets															1	SPT	4,5,9 N=14
		1				VSt	w=PL to w>PL													350kPa
	134	1.70	Silty CLAY (CI): brown mottled grey and orange; medium plasticity.		XWM	H to Fr	w<PL												PP	
		2																2	SPT	17,21,25/100 Ref
	133																			>400kPa
		3																3	PP	
		3.25	SILTSTONE: brown with orange brown; iron staining					HW to XW	3.25	VL	100	0		3.25-6.20m: FC					PLT	PL(I)=0.06MPa
	132																		PLT	PL(I)=0.04MPa
		4																4		
	131																			

NOTES: (#)Soil origin is "probable" unless otherwise stated. (†)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hanjin 8D
OPERATOR: Total Drilling (D Tranter)
LOGGED: Chaplin
METHOD: Solid flight auger to 3.25, NMLC to 10.3m depth
CASING: HWT to 3.2m
REMARKS:

Refer to explanatory notes for symbol and abbreviation definitions

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: New Eastern Hub Sub-Transmission Substation
LOCATION: Lot 9 DP1193430 Hebden Road, Musewllbrook, NSW

SURFACE LEVEL: 135.7 AHD
COORDINATE: E:311940.9, N:6418600.6
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 3
PROJECT No: 224764.00
DATE: 29/09/23
SHEET: 2 of 3

CONDITIONS ENCOUNTERED																				SAMPLE				TESTING	
				SOIL				ROCK																	
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) DENSITY.(*)	MOISTURE	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
			[CONT] SILTSTONE: brown with orange brown; iron staining					HW to XW		VL	100	0								
									6.20	L	100	11							PLT	PL(I)=0.05MPa
								HW	6.25				SEAM	6.25-6.29m: CS						
								SEAM	6.29	SEAM										
										L									PLT	PL(I)=0.1MPa
								HW	6.60					6.55m: P , SH, PR, Fe, SM						
										VL									PLT	PL(A)=0.07MPa
																			PLT	PL(D)=0.06MPa
									6.96											
								SEAM		SEAM			SEAM	6.96-7.27m : CS, clay seam contains quartz						
									7.27											
								HW		VL									PLT	PL(A)=0.02MPa
									7.47										PLT	PL(D)=0.03MPa
								SEAM		SEAM			SEAM	7.47-7.58m: CS						
									7.58											
														7.83m: JT/45°, PR, TI Fe, SM						
								HW		VL to L				8.03m: P, SH, PR, Fe, SM						
														8.10m: P, S, PR, Fe, SM						
														8.17m: P, SH, PR, Fe, SM					PLT	PL(D)=0.07MPa
																			PLT	PL(A)=0.11MPa
								SEAM	8.35	SEAM			SEAM	8.35-8.41m: CS						
								HW	8.41		100	0								
								SEAM	8.48				SEAM	8.48- 8.51m : CS						
								HW	8.51											
								SEAM	8.57				SEAM	8.57-8.60m: CS						
									8.60											
														8.73m: JT/50°, PR, Fe, SM						
														8.84m: P, SH, PR, Fe, SM						
														8.92m: JT/60°, PR, Fe, SM						
														9.05m: JT/75°, PR, Fe, SM						
														9.09m: JT/45°, PR, Fe, RF						
								HW		VL				9.25m: JT/15°, PR, Fe, SM					PLT	PL(D)=0.19MPa
														9.27m: JT/15°, PR, Fe, SM					PLT	PL(A)=0.19MPa
											100	0		9.36-9.45m: FC						

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hanjin 8D
METHOD: Solid flight auger to 3.25, NMLC to 10.3m depth
REMARKS:

OPERATOR: Total Drilling (D Tranter)
CASING: HWT to 3.2m

LOGGED: Chaplin

Refer to explanatory notes for symbol and abbreviation definitions

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: New Eastern Hub Sub-Transmission Substation
LOCATION: Lot 9 DP1193430 Hebden Road, Musewllbrook, NSW

SURFACE LEVEL: 135.7 AHD
COORDINATE: E:311940.9, N:6418600.6
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 3
PROJECT No: 224764.00
DATE: 29/09/23
SHEET: 3 of 3

CONDITIONS ENCOUNTERED																	SAMPLE				TESTING	
				SOIL			ROCK															
GROUNDWATER	RL (m) DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(†) DENSITY.(†)	MOISTURE	WEATH.	DEPTH (m)	STRENGTH (VL L M H VH EH)	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
		[CONT] SILTSTONE: brown with orange brown; iron staining					HW		VL	100	0		10.10m: P, SH, PR, Fe, SM					PLT PLT	PL(D)=0.01MPa PL(A)=0.03MPa
	10.30	Borehole discontinued at 10.30m depth. Limit of Investigation.																		

NOTES: (#)Soil origin is "probable" unless otherwise stated. (†)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hanjin 8D
METHOD: Solid flight auger to 3.25, NMLC to 10.3m depth
REMARKS:

OPERATOR: Total Drilling (D Tranter)
CASING: HWT to 3.2m

LOGGED: Chaplin

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: New Eastern Hub Sub-Transmission Substation
LOCATION: Lot 9 DP1193430 Hebden Road, Musewllbrook, NSW

SURFACE LEVEL: 134.8 AHD
COORDINATE: E:311931.3, N:6418569.2
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 4
PROJECT No: 224764.00
DATE: 06/10/23
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(##)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
No free groundwater observed	134	0.05 TOPSOIL Silty CLAY (CI), trace sand: brown; medium plasticity; fine to coarse sand. 0.00m-0.10m: trace rootlets	TS	RS	H	w<PL		x2 B		0.10 0.60	PP	>400kPa
	1							U75		0.75		
	1.10	Borehole discontinued at 1.10m depth. Limit of investigation.								1.10	PP	>400kPa
	133											
	2									2		
	132											

NOTES: (#) Soil origin is "probable" unless otherwise stated. (*) Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hanjin 8D
METHOD: 300mm Auger
REMARKS:

OPERATOR: Total Drilling (D Tranter)
CASING: Nil

LOGGED: Chaplin

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: New Eastern Hub Sub-Transmission Substation
LOCATION: Lot 9 DP1193430 Hebden Road, Musewllbrook, NSW

SURFACE LEVEL:
COORDINATE:
DATUM/GRID:
DIP/AZIMUTH: 90°/---°

LOCATION ID: 5
PROJECT No: 224764.00
DATE: 27/09/23
SHEET: 1 of 1

GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	SAMPLE TYPE	SAMPLE INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
No free groundwater observed	0.05	TOPSOIL	TS							0.10			Bentonite Concrete	
		Clayey SILT, trace gravel: brown; fine gravel; rootlets.		RS	H	w<PL		B		0.50				
	0.60	Sandy CLAY, trace gravel: brown; medium plasticity; fine to medium sand; fine gravel.						A		0.60	PP	>400kPa	Gravel backfill	
	1	From 1.00m: grey mottling grading into extremely weathered sandstone		RS	H	w<PL		A/U50		1	SPT	8,12,12 N=24		
											PP	>400kPa		
	2									2				
	2.70	Borehole discontinued at 2.70m depth.									SPT	11,25/50 refusal		
		.									PP	>400kPa		
	3									3				
	4									4				

NOTES: (#) Soil origin is "probable" unless otherwise stated. (*) Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hanjin 8D
METHOD: 100mm solid flight auger with TC bit
REMARKS:

OPERATOR: Total Drilling (D Tranter)
CASING: Nil

LOGGED: Gilmour

Refer to explanatory notes for symbol and abbreviation definitions

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: New Eastern Hub Sub-Transmission Substation
LOCATION: Lot 9 DP1193430 Hebden Road, Musewllbrook, NSW

SURFACE LEVEL:
COORDINATE:
DATUM/GRID:
DIP/AZIMUTH: 90°/---°

LOCATION ID: 6
PROJECT No: 224764.00
DATE: 27/09/23
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
No free groundwater observed	0.05	TOPSOIL	TS	RS	VSt to H	w<PL		A		0.10		
	0.20	Clayey SILT: brown; trace rootlets.										
		Sandy CLAY, trace gravel: brown; medium plasticity; fine gravel.						A		0.50		
								U50		0.62	PP	>400kPa
	1	1.00m: v bit refusal								1	SPT	9,25/50 ref
											PP	>400kPa
		From 1.50m: pale brown grading to extremely weathered rock		RS	H	w<PL						
	2									2		
	2.55	Borehole discontinued at 2.55m depth. refusal.									SPT PP	25/50 ref >400kPa
	3									3		
	4									4		

NOTES: (#) Soil origin is "probable" unless otherwise stated. (*) Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hanjin 8D
METHOD: 100mm solid flight auger with v bit, TC bit from 1.2m
REMARKS:

OPERATOR: Total Drilling (D Tranter)
CASING: Nil

LOGGED: Gilmour

Refer to explanatory notes for symbol and abbreviation definitions

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: New Eastern Hub Sub-Transmission Substation
LOCATION: Lot 9 DP1193430 Hebden Road, Musewllbrook, NSW

SURFACE LEVEL:
COORDINATE:
DATUM/GRID:
DIP/AZIMUTH: 90°/---°

LOCATION ID: 7
PROJECT No: 224764.00
DATE: 06/10/23
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
No free water observed	0.05	TOPSOIL	TS							0.10	PP	>400kPa
		Silty CLAY (CI), trace sand: brown; medium plasticity; fine to coarse sand.										
		0.00m-0.10m: trace rootlets		RS	H	w<PL	x2	B		0.60		
	1.00	Borehole discontinued at 1.00m depth. Limit of investigation.						U75		0.85		
										1.00	PP	>400kPa
	2									2		

NOTES: (#) Soil origin is "probable" unless otherwise stated. (*) Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hanjin 8D
METHOD: 300mm Auger
REMARKS:

OPERATOR: Total Drilling (D Tranter)
CASING: Nil

LOGGED: Chaplin

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: New Eastern Hub Sub-Transmission Substation
LOCATION: Lot 9 DP1193430 Hebden Road, Musewllbrook, NSW

SURFACE LEVEL:
COORDINATE:
DATUM/GRID:
DIP/AZIMUTH: 90°/---°

LOCATION ID: 8
PROJECT No: 224764.00
DATE: 25/09/23
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
No free groundwater observed	0.05	TOPSOIL	TS	RS	VSt to H	w<PL		A		0.10		
	0.20	Clayey SILT: brown; low plasticity; trace rootlets.										
		Sandy CLAY: brown; medium plasticity.		RS	H	w<PL		A		0.50		
		From 0.70m: pale brown grading to weathered rock										
	1	1.00m: v bit refusal								1	SPT	12,25/50 ref
	1.10	Silty CLAY (CI): pale brown and grey; medium plasticity; grading to extremely weathered siltstone.		XWM	H	w<PL					PP	>400kPa
	2									2		
	2.60	Borehole discontinued at 2.60m depth. refusal.									SPT	25/100 ref
											PP	>400kPa
	3									3		
	4									4		

NOTES: (#) Soil origin is "probable" unless otherwise stated. (*) Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hanjin 8D
METHOD: 100mm solid flight auger with v bit, TC bit from 1.0m
REMARKS:

OPERATOR: Total Drilling (D Tranter)
CASING: Nil

LOGGED: Gilmour

Refer to explanatory notes for symbol and abbreviation definitions

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: New Eastern Hub Sub-Transmission Substation
LOCATION: Lot 9 DP1193430 Hebden Road, Musewllbrook, NSW

SURFACE LEVEL:
COORDINATE:
DATUM/GRID:
DIP/AZIMUTH: 90°/---°

LOCATION ID: 9
PROJECT No: 224764.00
DATE: 25/09/23
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN[#]	CONSIS.[*] / DENSITY.[*]	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
No free groundwater observed	0.05	TOPSOIL	TS									
		Clayey SILT, trace gravel: brown; low plasticity; fine gravel; rootlets.		RS	VSt to H	w<PL		A		0.10		
	0.30	Silty Sandy CLAY: pale brown mottled red orange; medium plasticity.						A		0.50		
	1									1	SPT	5,7,15 N=22
		1.50m: grading to extremely weathered rock		RS	H	w<PL					PP	>400kPa
	2	2.00m: v bit refusal								2		
	2.55	Borehole discontinued at 2.55m depth. refusal.									SPT PP	25/50 ref >400kPa
	3									3		
	4									4		

NOTES: [#] Soil origin is "probable" unless otherwise stated. [*] Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hanjin 8D
METHOD: 100mm solid flight auger with v bit, TC bit from 2.0m
REMARKS:

OPERATOR: Total Drilling (D Tranter)
CASING: Nil

LOGGED: Gilmour

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: New Eastern Hub Sub-Transmission Substation
LOCATION: Lot 9 DP1193430 Hebden Road, Musewllbrook, NSW

SURFACE LEVEL: 135.8 AHD
COORDINATE: E:312028.9, N:6418515.1
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 10
PROJECT No: 224764.00
DATE: 25/09/23
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN[#]	CONSIS.[*] / DENSITY.[*]	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
No free groundwater observed	135 / 0	0.05 TOPSOIL Silty CLAY, trace gravel: brown; medium plasticity; fine gravel; rootlets.	TS					A		0.10		
								A		0.40 0.50		
		From 0.60m: pale brown						U50		0.79	PP	>400kPa
	1	From 1.00m: grading to extremely weathered rock		RS	H	w<PL				1	SPT	25,14,25/50 ref
											PP	>400kPa
	134 / 2									2		
		2.65 Borehole discontinued at 2.65m depth. refusal.									SPT	25 ref
	133 / 3									3	PP	<400kPa
	132 / 4									4		
	131											

NOTES: [#] Soil origin is "probable" unless otherwise stated. [*] Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hanjin 8D
METHOD: 100mmm solid flight auger
REMARKS:

OPERATOR: Total Drilling (D Tranter)
CASING: Nil

LOGGED: Gilmour

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: New Eastern Hub Sub-Transmission Substation
LOCATION: Lot 9 DP1193430 Hebden Road, Musewllbrook, NSW

SURFACE LEVEL: 137.4 AHD
COORDINATE: E:312047.6, N:6418548.8
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 11
PROJECT No: 224764.00
DATE: 25/09/23
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE			TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN[#]	CONSIS.[*] / DENSITY.[*]	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
No free groundwater observed	137 / 0.05	TOPSOIL	TS	RS	VSt to H	w<PL		A		0.10		
	0.20	Clayey SILT, trace gravel: brown; fine gravel; rootlets.										
		Sandy CLAY, trace gravel: brown; medium plasticity; fine to medium sand; fine gravel.						A		0.40		
										0.50		
								U50				
		From 0.70m: pale brown mottled orange and grey								0.82	PP	>400kPa
	1									1		
	136			RS	H	w<PL					SPT	6,7,3 N=10
											PP	>400kPa
	2	From 2.00m: grading to extremely weathered rock								2		
	135										SPT PP	25/50 ref >400kPa
	2.55	Borehole discontinued at 2.55m depth. refusal.										
	3									3		
	134											
	4									4		
	133											

NOTES: [#] Soil origin is "probable" unless otherwise stated. [*] Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hanjin 8D
METHOD: 100mm solid flight auger, TC bit from
REMARKS:

OPERATOR: Total Drilling (D Tranter)
CASING: Nil

LOGGED: Gilmour

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: New Eastern Hub Sub-Transmission Substation
LOCATION: Lot 9 DP1193430 Hebden Road, Musewllbrook, NSW

SURFACE LEVEL: 134.9 AHD
COORDINATE: E:311918.1, N:6418609.7
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 12
PROJECT No: 224764.00
DATE: 29/09/23
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN[#]	CONSIS.[*] / DENSITY.[*]	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
No free groundwater observed	134	0.05 TOPSOIL Silty CLAY (CI): brown; medium plasticity. 0.00m-0.10m: trace rootlets	TS	RS	VSt to H	w<PL to w=PL		x2	B	0.50 0.90	PP PP	>400kPa 360kPa
	133	1.00 Borehole discontinued at 1.00m depth. Limit of investigation.								1 2		
	132											

NOTES: [#] Soil origin is "probable" unless otherwise stated. [*] Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hanjin 8D
METHOD: 300mm Auger
REMARKS:

OPERATOR: Total Drilling (D Tranter)
CASING: Nil

LOGGED: Chaplin

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: New Eastern Hub Sub-Transmission Substation
LOCATION: Lot 9 DP1193430 Hebden Road, Musewllbrook, NSW

SURFACE LEVEL: 138.8 AHD
COORDINATE: E:312101.9, N:6418614.6
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 13
PROJECT No: 224764.00
DATE: 29/09/23
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(##)	CONSIS.(*) DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
No free groundwater observed	138	0.05	TOPSOIL	TS					ES		0.10	PP	>400kPa
			Silty CLAY (CI): brown; medium plasticity.										
			0.00m-0.10m: trace rootlets		RS	H	w<PL		ES		0.40		
											0.50	PP	>400kPa
									x2 B		0.90		
		1.00	Borehole discontinued at 1.00m depth. Limit of investigation.								1		
	137	2									2		
	136												

NOTES: (##) Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hanjin 8D
METHOD: 300mm Auger
REMARKS:

OPERATOR: Total Drilling (D Tranter)
CASING: Nil

LOGGED: Chaplin

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: New Eastern Hub Sub-Transmission Substation
LOCATION: Lot 9 DP1193430 Hebden Road, Musewllbrook, NSW

SURFACE LEVEL: 136.3 AHD
COORDINATE: E:312055.8, N:6418520.6
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 14
PROJECT No: 224764.00
DATE: 26/09/23
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN[#]	CONSIS.[*] / DENSITY.[*]	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
No free groundwater observed	136	0.05 TOPSOIL Silty Sandy CLAY, trace gravel: brown; medium plasticity; fine to medium sand; fine gravel.	TS					A		0.10		
								A		0.50		
	135	1 From 1.00m: grading to extremely weathered rock		RS	H	w<PL				1	SPT PP	13,25/50 >400kPa
		2								2		
	134	2.20 Borehole discontinued at 2.20m depth. TC bit refusal.										

NOTES: [#] Soil origin is "probable" unless otherwise stated. [*] Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hanjin 8D
METHOD: 100mm solid flight auger with TC bit
REMARKS:

OPERATOR: Total Drilling (D Tranter)
CASING: Nil

LOGGED: Gilmour

Refer to explanatory notes for symbol and abbreviation definitions

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: New Eastern Hub Sub-Transmission Substation
LOCATION: Lot 9 DP1193430 Hebden Road, Musewllbrook, NSW

SURFACE LEVEL: 137.5 AHD
COORDINATE: E:312068.2, N:6418552.3
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 15
PROJECT No: 224764.00
DATE: 26/09/23
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN[#]	CONSIS.[^] / DENSITY.[^]	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
No free groundwater observed	137 / 0.05	TOPSOIL	TS					A		0.10		
		Silty Sandy CLAY, with gravel: brown-dark brown; low plasticity; fine to medium sand; fine to coarse, (natural) gravel.										
		From 0.20m: brown, trace fine to coarse gravels						A		0.50		
		From 0.70m: pale brown, grading into extremely weathered rock		RS	H	w<PL					SPT	7,13,12 N=25
	136 / 1									1	PP	>400kPa
	135 / 2									2	SPT	25 ref
	2.65	Borehole discontinued at 2.65m depth. refusal.									PP	>400kPa

NOTES: [#] Soil origin is "probable" unless otherwise stated. [^] Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hanjin 8D
METHOD: 100mm solid flight auger with TC bit
REMARKS:

OPERATOR: Total Drilling (D Tranter)
CASING: Nil

LOGGED: Gilmour

Refer to explanatory notes for symbol and abbreviation definitions

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: New Eastern Hub Sub-Transmission Substation
LOCATION: Lot 9 DP1193430 Hebden Road, Musewllbrook, NSW

SURFACE LEVEL: 138.0 AHD
COORDINATE: E:312076.1, N:6418566.1
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 16
PROJECT No: 224764.00
DATE: 26/09/23
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN[#]	CONSIS.[*] / DENSITY.[*]	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
No free groundwater observed	138	0.05	TOPSOIL	TS					A		0.10		
			Sandy CLAY, with gravel: brown; medium plasticity; fine to medium sand; fine to coarse gravel; trace rootlets.						A		0.50		
									U50		0.82	PP	>400kPa
			From 0.70m: pale brown, grading into extremely weathered rock										
	137	1	1.00m: V bit refusal								1	SPT	9,25/50 ref
					RS	H	w<PL					PP	>400kPa
	136	2									2	SPT	11,25/50 ref
		2.80	Borehole discontinued at 2.80m depth. refusal.									PP	>400kPa

NOTES: [#] Soil origin is "probable" unless otherwise stated. [*] Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hanjin 8D
METHOD: 100mm solid flight auger with V bit, TC bit from 1.0m
REMARKS:

OPERATOR: Total Drilling (D Tranter)
CASING: Nil

LOGGED: Gilmour

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: New Eastern Hub Sub-Transmission Substation
LOCATION: Lot 9 DP1193430 Hebden Road, Musewllbrook, NSW

SURFACE LEVEL: 137.0 AHD
COORDINATE: E:312100.3, N:6418552.3
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 17
PROJECT No: 224764.00
DATE: 26/09/23
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
No free groundwater observed	0.05	TOPSOIL						A		0.10		
		Silty Sandy CLAY, trace gravel: brown-dark brown; medium plasticity; fine to medium sand; fine gravel.		RS	H	w<PL		A		0.50		
	0.80	Sandy CLAY, trace gravel: brown-pale brown mottled grey-orange; medium plasticity; fine to medium sand; fine gravel.		RS	H	w<PL				1	SPT	8,12,14 N=26
	136 1										PP	>400kPa
	135 2	2.00m: grading to extremely weathered rock								2		
	2.70	Borehole discontinued at 2.70m depth. refusal.									SPT	9,25 ref
	134										PP	>>400kPa

NOTES: (#) Soil origin is "probable" unless otherwise stated. (*) Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hanjin 8D
METHOD: 100mm solid flight with TC bit
REMARKS:

OPERATOR: Total Drilling (D Tranter)
CASING: Nil

LOGGED: Gilmour

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: New Eastern Hub Sub-Transmission Substation
LOCATION: Lot 9 DP1193430 Hebden Road, Musewllbrook, NSW

SURFACE LEVEL: 135.1 AHD
COORDINATE: E:312167.8, N:6418532.5
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 18
PROJECT No: 224764.00
DATE: 06/10/23
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN[#]	CONSIS.[*] DENSITY.[*]	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
No free groundwater observed	135	0.05	TOPSOIL	TS							0.10	PP	>400kPa
			Silty CLAY (CI), trace sand: brown; medium plasticity; fine to coarse sand.										
			0.00m-0.10m: trace rootlets		RS	H	w<PL		x2 B		0.60		
											0.74		
									U75				
		1									1		
	134	1.14	Borehole discontinued at 1.14m depth. Limit of investigation.								1.14	PP	>400kPa
		2									2		
	133												

NOTES: [#] Soil origin is "probable" unless otherwise stated. [*] Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hanjin 8D
METHOD: 300mm Auger
REMARKS:

OPERATOR: Total Drilling (D Tranter)
CASING: Nil

LOGGED: Chaplin

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: New Eastern Hub Sub-Transmission Substation
LOCATION: Lot 9 DP1193430 Hebden Road, Musewllbrook, NSW

SURFACE LEVEL: 136.5 AHD
COORDINATE: E:312128.7, N:6418553.2
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 19
PROJECT No: 224764.00
DATE: 06/10/23
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE		REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
No free water observed	136	0.05 TOPSOIL Silty CLAY (CI), trace sand: brown; medium plasticity; fine to coarse sand. 0.00m-0.10m: trace rootlets	TS	RS	H	w<PL			x2 B U75		0.10 0.60 0.75 1.10	PP PP	>400kPa >400kPa
	135	1.10 Borehole discontinued at 1.10m depth. Limit of investigation.											
	134												

NOTES: (#) Soil origin is "probable" unless otherwise stated. (*) Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hanjin 8D
METHOD: 300mm Auger
REMARKS:

OPERATOR: Total Drilling (D Tranter)
CASING: Nil

LOGGED: Chaplin

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: New Eastern Hub Sub-Transmission Substation
LOCATION: Lot 9 DP1193430 Hebden Road, Musewllbrook, NSW

SURFACE LEVEL: 135.4 AHD
COORDINATE: E:312143.6, N:6418527.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 20
PROJECT No: 224764.00
DATE: 28/09/23
SHEET: 1 of 3

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL ORIGIN(#)	SOIL CONSIS.(†) DENSITY.(†)	SOIL MOISTURE	ROCK WEATH.	ROCK DEPTH (m)	ROCK STRENGTH	ROCK RECOVERY (%)	ROCK RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	SAMPLE TYPE	SAMPLE INTERVAL	DEPTH (m)	TESTING TEST TYPE	TESTING RESULTS AND REMARKS
No free groundwater observed	135	0.05	TOPSOIL	TS		H	w<PL									D		0.10		
			Silty CLAY (CI): brown; medium plasticity. 0.00m-0.30m: trace rootlets		RS											D		0.40		
																		0.50		
																U50		0.68	PP	>400kPa
	134	1				VSt to H	w=PL											1	SPT	6,9,15 N=15
																				380-400kPa
																			PP	
	133	2.00	Silty CLAY (CI): pale brown mottled orange and grey; medium plasticity.		XWM	H to Fr	w<PL											2		
																			SPT	16,17,22 N=39
																				>400kPa
		3																3	PP	
	132	3.04	SILTSTONE: brown with orange brown; iron staining					HW	3.04	VL										
								SEAM	3.13	SEAM			SEAM	3.13-3.22m: CS						
								HW	3.22	VL										
								SEAM	3.33	SEAM			SEAM	3.33-3.44m: CS						
								MW to HW	3.44	L										
								SEAM	3.52	SEAM			SEAM	3.52-3.56m: CS						
									3.56					3.68m: P, SH, PR, Fe, SM						
														3.80m: P, SH, PR, Clay, SM					PLT	PL(I)=0.16MPa
														3.87m: P, SH, PR, SM						
	131	4						MW to HW		L	100	23		3.94-4.04m: FC				4		
														4.11m: JT/60°, PR, RF					PLT	PL(I)=0.16MPa
														4.19m: P, SH, PR, Clay, SM						
														4.27m: JT/50°, PR, SM						
														4.30m: P, SH, PR, Clay, SM						
														4.44m: P, SH, PR, Fe, SM						
									4.54					4.60m: P, SH, PR, Clay, SM					PLT	PL(A)=0.05MPa
								HW		VL				4.90m: JT/50°, PR, Fe, RF						

NOTES: (#)Soil origin is "probable" unless otherwise stated. (†)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hanjin 8D
OPERATOR: Total Drilling (D Tranter)
LOGGED: Chaplin
METHOD: Solid Flight Auger to 3.04m, then NMLC to 10.3m depth
CASING: HWT to 2.5m
REMARKS:

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: New Eastern Hub Sub-Transmission Substation
LOCATION: Lot 9 DP1193430 Hebden Road, Musewllbrook, NSW

SURFACE LEVEL: 135.4 AHD
COORDINATE: E:312143.6, N:6418527.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 20
PROJECT No: 224764.00
DATE: 28/09/23
SHEET: 2 of 3

CONDITIONS ENCOUNTERED																				SAMPLE				TESTING	
				SOIL				ROCK																	
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(†) DENSITY.(†)	MOISTURE	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
	130	6	[CONT] SILTSTONE: brown with orange brown; iron staining					HW	5.10	VL	100	23		4.99m: JT/50°, PR, Fe, RF				6	PLT	PL(I)=0.03MPa
								MW to HW		L	100	32		5.21m: P, SH, PR, Fe, SM 5.23m: P, SH, PR, Fe, SM 5.31m: P, SH, PR, Fe, SM 5.33m: P, SH, PR, Fe, SM 5.41m: P, SH, PR, Fe, SM 5.48m: P, SH, PR, Fe, SM 5.67m: P, SH, PR, Fe, SM 5.75m: P 5.77m: P 5.85m: JT/10°, PR, SM 5.88m: P, SH, PR, SM 5.97m: P, SH, PR, Clay, SM					PLT	PL(I)=0.24MPa
									5.90										PLT	PL(D)=0.1MPa
								HW		L									PLT	PL(A)=0.17MPa
	129								6.30										PLT	PL(D)=0.16MPa
								SEAM	6.36	SEAM			SEAM	6.16m: P, SH, PR, SM						
								HW		VL to L				6.30-6.36m: CS 6.47m: P, SH, PR, SM, Clay/Fe						
								SEAM	6.63	SEAM			SEAM	6.58m: P, SH, PR, Fe, SM						
									6.69					6.63-6.69m: CS						
								HW		VL to L				6.74m: P, SH, PR 6.80m: JT/60°, PR, Fe, SM						
		7						SEAM	6.96	SEAM			SEAM	6.96-7.02m: CS				7		
									7.02		100	0							PLT	PL(A)=0.1MPa
								HW		VL to L				7.45m: JT/30°, PR, Fe, SM						
	128							SEAM	7.56	SEAM			SEAM	7.56-7.65m: CS						
			7.65m-7.69m: carbonate (limestone) band						7.65	H										
									7.69					7.69m: P, SH, PR, Clay, SM						
								HW		VL to L				7.74m: JT, 40-50°/35°, PR, Fe, RF 7.80m: JT/60°, PR, Fe, RF						
		8						SEAM	7.88	SEAM			SEAM	7.88-8.30m: CS, SH, PR, SM				8		
									8.30										PLT	PL(A)=0.17MPa
	127																		PLT	PL(D)=0.1MPa
								HW		L				8.55m: JT/30°, PR, Fe, SM 8.57-8.61m: CS 8.71m: P, SH, PR, SM						
														8.87m: P, SH, PR, SM 8.97m: JT/10°, PR, SM						
		9							9.04					9.05m: P, SH, PR, SM, Clay/Fe				9		
											100	32		9.18m: JT/35°, PR, SM 9.32m: P, SH, PR, Fe, SM						
	126							MW		L to M				9.46m: P, SH, PR, Fe, SM 9.54m: JT/45°, PR, Fe, SM 9.60-9.66m: FC					PLT	PL(D)=0.15MPa
														9.78-9.90m: FC					PLT	PL(A)=0.2MPa

NOTES: (#)Soil origin is "probable" unless otherwise stated. (†)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hanjin 8D
METHOD: Solid Flight Auger to 3.04m, then NMLC to 10.3m depth
REMARKS:

OPERATOR: Total Drilling (D Tranter)
CASING: HWT to 2.5m

LOGGED: Chaplin

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: New Eastern Hub Sub-Transmission Substation
LOCATION: Lot 9 DP1193430 Hebden Road, Musewllbrook, NSW

SURFACE LEVEL: 135.4 AHD
COORDINATE: E:312143.6, N:6418527.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 20
PROJECT No: 224764.00
DATE: 28/09/23
SHEET: 3 of 3

CONDITIONS ENCOUNTERED																		SAMPLE				TESTING	
				SOIL				ROCK															
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(†) / DENSITY.(†)	MOISTURE	WEATH.	DEPTH (m)	STRENGTH (VL L M H VH EH)	RECOVERY (%)	RQD	FRACTURE SPACING (m) (>0.06 0.06-0.20 0.20-0.60 0.60-2.00 >2.00)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
	10.30	[CONT] SILTSTONE: brown with orange brown; iron staining					MW		L to M	100	32		10.01m: P, SH, PR, Fe, SM 10.06-10.18m: SZ, jointed at 60 to 30 degrees 10.20m: P, SH, PR, Fe, SM 10.22m: P, SH, PR, Fe, SM 10.28m: P, S, PR, Fe, SM					PLT PLT	PL(D)=0.15MPa PL(A)=0.3MPa
		Borehole discontinued at 10.30m depth. Limit of Investigation.																	

NOTES: (#)Soil origin is "probable" unless otherwise stated. (†)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hanjin 8D
OPERATOR: Total Drilling (D Tranter)
LOGGED: Chaplin
METHOD: Solid Flight Auger to 3.04m, then NMLC to 10.3m depth
CASING: HWT to 2.5m
REMARKS:

Refer to explanatory notes for symbol and abbreviation definitions

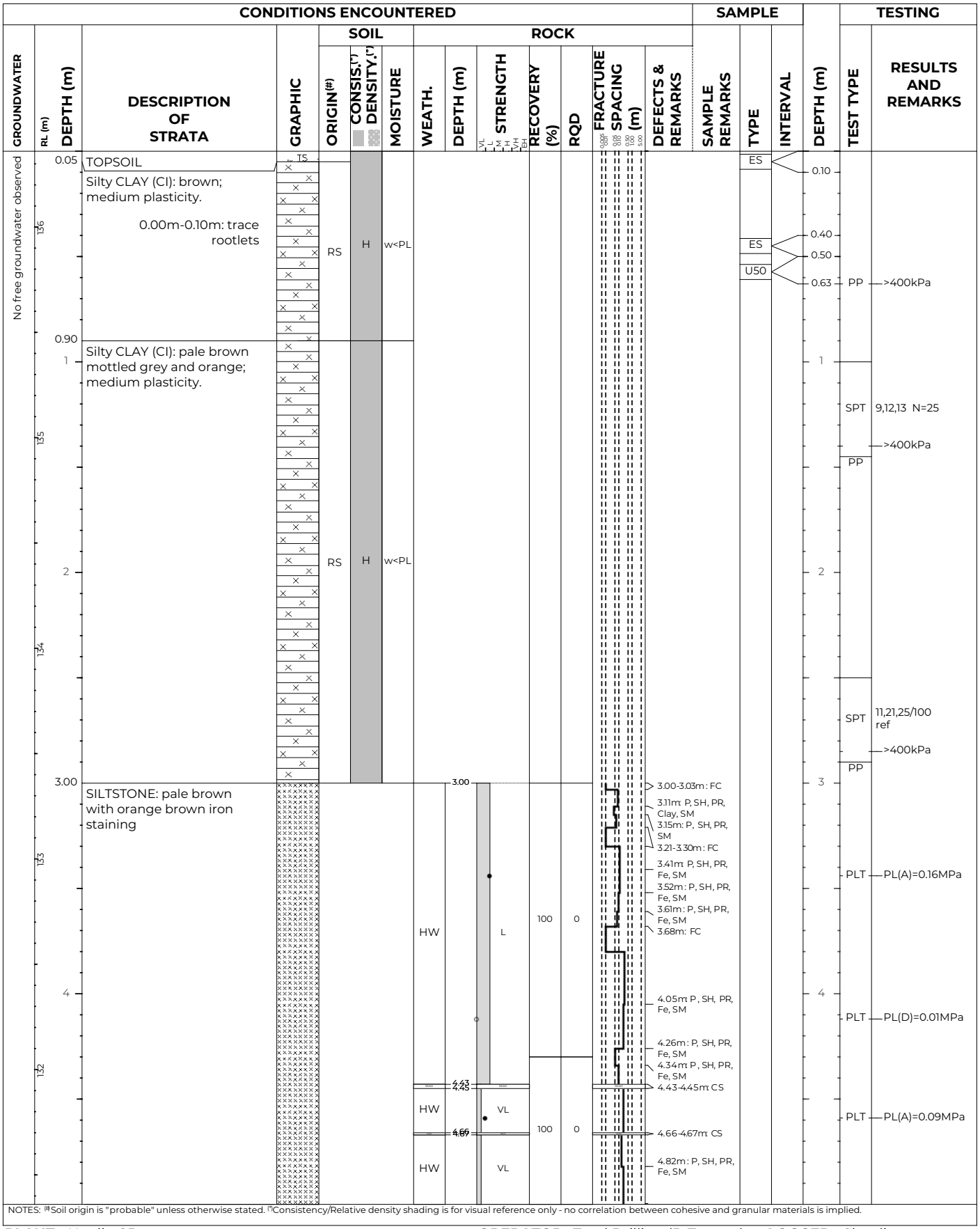
Douglas PARTNERS

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: New Eastern Hub Sub-Transmission Substation
LOCATION: Lot 9 DP1193430 Hebden Road, Musewllbrook, NSW

SURFACE LEVEL: 136.4 AHD
COORDINATE: E:312117.3, N:6418543.9
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 21
PROJECT No: 224764.00
DATE: 03/10/23
SHEET: 1 of 5



NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

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PLANT: Hanjin 8D
OPERATOR: Total Drilling (D Tranter)
LOGGED: Chaplin
METHOD: Solid flight auger to 3.0m, then NMLC to 20.74m depth
CASING: HWT to 2.5m
REMARKS:

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: New Eastern Hub Sub-Transmission Substation
LOCATION: Lot 9 DP1193430 Hebden Road, Musewllbrook, NSW

SURFACE LEVEL: 136.4 AHD
COORDINATE: E:312117.3, N:6418543.9
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 21
PROJECT No: 224764.00
DATE: 03/10/23
SHEET: 2 of 5

CONDITIONS ENCOUNTERED | **SAMPLE** | **TESTING**

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL: ORIGIN(#)	SOIL: CONSIS.(†) DENSITY.(†)	SOIL: MOISTURE	ROCK: WEATH.	ROCK: DEPTH (m)	ROCK: STRENGTH	ROCK: RECOVERY (%)	ROCK: RQD	ROCK: FRACTURE SPACING (m)	ROCK: DEFECTS & REMARKS	SAMPLE: SAMPLE REMARKS	SAMPLE: TYPE	SAMPLE: INTERVAL	DEPTH (m)	TESTING: TEST TYPE	TESTING: RESULTS AND REMARKS
	131	5	[CONT] SILTSTONE: pale brown with orange brown iron staining							VL	100	0		5.03m: P, SH, PR, Fe, SM 5.15m: P, SH, PR, SM, Fe/Clay					PLT	PL(A)=0.05MPa
														5.36m: P, SH, PR, TI Fe, SM						
			5.52m-5.33m: carbonate (limestone) band					HW	5.52 5.55	H				5.52m: P, SH, PR, Clay, SM 5.66m: P, SH, PR, Fe, SM						
										L				5.69m: P, SH, PR, Fe, SM 5.78m: P, SH, PR, SM, Fe/Clay					PLT	PL(A)=0.11MPa
	130	6	From 6.05m: becoming dark grey						6.05					5.96m: P, SH, PR, Fe, SM 5.99-6.02m: FC 6.15m: P, SH, PR, Fe, SM				6		
														6.48m: P, SH, PR, Fe, SM					PLT PLT	PL(D)=0.02MPa PL(A)=0.01MPa
														6.68m: P, SH, PR, TI Fe, SM 6.80m: P, SH, PR, TI Fe, SM 6.91m: JT, 50°, PR, Fe, SM						
	129	7									100	0		7.16m: P, SH, PR, Fe 7.27m: JT, 30°, PR, Fe, SM				7	PLT	PL(A)=0.08MPa
								MW		VL				7.50m: JT, 20°, PR, Fe, RF 7.62m: JT, 20°, PR, Fe, RF					PLT	PL(A)=0.06MPa
														7.78m: P, SH, PR, Fe, SM 7.81m: P, SH, PR, Fe, SM 7.93m: P, SH, PR, Fe, SM 7.96m: JT, 20°, PR, TI Fe, SM 8.12m: P, SH, PR, Fe, SM 8.17m: JT, 15°, PR, Fe, RF 8.22m: JT, 60°, PR, Fe, SM 8.32m: JT, 15°, PR, Fe, RF 8.41-8.55m: FC 8.55-8.62m: FC 8.69m: JT, 60°, PR, Fe, SM						
	128	8							8.74									8		
			8.84m-8.85m: quartz					SEAM	8.85	SEAM			SEAM	8.74-8.85m: CS						
								SW	8.96	VL				8.86m: P, SH, PR, Fe, SM 8.87m: P, SH, PR, Fe, SM 8.96m: P, SH, PR, Fe, RF		UCS			PLT PLT PLT	PL(D)=0.04MPa PL(A)=0.05MPa PL(D)=0.37MPa
		9							9.06									9 9.06		
	127										100	83		9.02m: P, SH, PR, SM 9.05m: P, SH, PR, SM					PLT	PL(A)=1.52MPa
								FR		H										

NOTES: (#)Soil origin is "probable" unless otherwise stated. (†)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hanjin 8D
OPERATOR: Total Drilling (D Tranter)
LOGGED: Chaplin
METHOD: Solid flight auger to 3.0m, then NMLC to 20.74m depth
CASING: HWT to 2.5m
REMARKS:

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: New Eastern Hub Sub-Transmission Substation
LOCATION: Lot 9 DP1193430 Hebden Road, Musewllbrook, NSW

SURFACE LEVEL: 136.4 AHD
COORDINATE: E:312117.3, N:6418543.9
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 21
PROJECT No: 224764.00
DATE: 03/10/23
SHEET: 3 of 5

CONDITIONS ENCOUNTERED																		SAMPLE				TESTING	
				SOIL				ROCK															
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(†) DENSITY.(†)	MOISTURE	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
	126	11	[CONT] SILTSTONE: pale brown with orange brown iron staining							VL L M H VH EH	100	83	>3.00 1.00 0.30 0.10 0.05					11	PLT	PL(A)=1.37MPa
	125	12						FR		H						UCS		12	PLT	PL(A)=1.2MPa
	124	13									100	100						12.35		
	123	14																13		
	122										100	100						14	PLT	PL(A)=1.29MPa

NOTES: (#)Soil origin is "probable" unless otherwise stated. (†)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hanjin 8D
METHOD: Solid flight auger to 3.0m, then NMLC to 20.74m depth
REMARKS:

OPERATOR: Total Drilling (D Tranter)
CASING: HWT to 2.5m

LOGGED: Chaplin

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: New Eastern Hub Sub-Transmission Substation
LOCATION: Lot 9 DP1193430 Hebden Road, Musewllbrook, NSW

SURFACE LEVEL: 136.4 AHD
COORDINATE: E:312117.3, N:6418543.9
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 21
PROJECT No: 224764.00
DATE: 03/10/23
SHEET: 4 of 5

CONDITIONS ENCOUNTERED																				SAMPLE				TESTING	
				SOIL				ROCK																	
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(†) DENSITY.(†)	MOISTURE	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
	121	16	[CONT] SILTSTONE: pale brown with orange brown iron staining								100	100						16	PLT	PL(A)=1.17MPa
	120																			
	119	17						FR		H	100	100						17	PLT	PL(A)=2.07MPa
	118	18	18.08m-18.22m: grey fine grained sandstone															18		
	117	19									100	100						19		

NOTES: (#)Soil origin is "probable" unless otherwise stated. (†)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hanjin 8D
OPERATOR: Total Drilling (D Tranter)
LOGGED: Chaplin
METHOD: Solid flight auger to 3.0m, then NMLC to 20.74m depth
CASING: HWT to 2.5m
REMARKS:

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: New Eastern Hub Sub-Transmission Substation
LOCATION: Lot 9 DP1193430 Hebden Road, Musewllbrook, NSW

SURFACE LEVEL: 136.4 AHD
COORDINATE: E:312117.3, N:6418543.9
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 21
PROJECT No: 224764.00
DATE: 03/10/23
SHEET: 5 of 5

CONDITIONS ENCOUNTERED																		SAMPLE				TESTING	
				SOIL				ROCK															
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(†) / DENSITY.(†)	MOISTURE	WEATH.	DEPTH (m)	STRENGTH (VL L M H VH EH)	RECOVERY (%)	RQD	FRACTURE SPACING (m) (>0.06 0.06-0.2 0.2-0.6 0.6-2.0 >2.00)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
	116	[CONT] SILTSTONE: pale brown with orange brown iron staining					FR		H	100	100								
	20.74	Borehole discontinued at 20.74m depth. Limit of Investigation.																	
	21																21		
	22																22		
	23																23		
	24																24		

NOTES: (#)Soil origin is "probable" unless otherwise stated. (†)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hanjin 8D
METHOD: Solid flight auger to 3.0m, then NMLC to 20.74m depth
REMARKS:

OPERATOR: Total Drilling (D Tranter)
CASING: HWT to 2.5m

LOGGED: Chaplin

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: New Eastern Hub Sub-Transmission Substation
LOCATION: Lot 9 DP1193430 Hebden Road, Musewllbrook, NSW

SURFACE LEVEL: 134.0 AHD
COORDINATE: E:311956.3, N:6418499.2
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 22
PROJECT No: 224764.00
DATE: 29/09/23
SHEET: 1 of 2

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
No free groundwater observed	0.05	TOPSOIL	TS					D/ES		0.10		
		Silty CLAY (CL): brown; low plasticity.		RS	H	w<PL					PP	>400kPa
	0.20	Silty CLAY (CI): brown; medium plasticity.								0.40		
								D/ES		0.50	PP	>400kPa
				RS	H	w<PL		U50		0.75		
	1.00	Silty CLAY (CI): brown mottled grey and orange; medium plasticity.								1		
											SPT	7,10,14 N=25
												>400kPa
											PP	
	2			XWM	H to Fr	w<PL				2		
											SPT	9,20,25/100 Ref
												>400kPa
											PP	

NOTES: (#) Soil origin is "probable" unless otherwise stated. (*) Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hanjin 8D
METHOD: Solid flight auger (TC)
REMARKS:

OPERATOR: Total Drilling (D Tranter)
CASING: Nil

LOGGED: Chaplin

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: New Eastern Hub Sub-Transmission Substation
LOCATION: Lot 9 DP1193430 Hebden Road, Musewllbrook, NSW

SURFACE LEVEL: 134.0 AHD
COORDINATE: E:311956.3, N:6418499.2
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 22
PROJECT No: 224764.00
DATE: 29/09/23
SHEET: 2 of 2

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN[#]	CONSIS.[*] / DENSITY.[*]	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
		[CONT] Silty CLAY (CI): brown mottled grey and orange; medium plasticity.		XWM	H to Fr	w<PL						
		3.50m: increased drill resistance, indicative of rock										
	3.50	Borehole discontinued at 3.50m depth. TC refusal.										
	130 4									4		
	129 5									5		

NOTES: [#] Soil origin is "probable" unless otherwise stated. [*] Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hanjin 8D
METHOD: Solid flight auger (TC)
REMARKS:

OPERATOR: Total Drilling (D Tranter)
CASING: Nil

LOGGED: Chaplin

Refer to explanatory notes for symbol and abbreviation definitions

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: New Eastern Hub Sub-Transmission Substation
LOCATION: Lot 9 DP1193430 Hebden Road, Musewllbrook, NSW

SURFACE LEVEL: 136.5 AHD
COORDINATE: E:312091.8, N:6418532.8
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 23
PROJECT No: 224764.00
DATE:
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS			
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
		0.05	TOPSOIL	TS					A		0.10			Concrete	
			Clayey SILT, trace gravel: brown; low plasticity; trace rootlets.		RS	H	w<PL							Bentonite	
		0.40	Silty Sandy CLAY, trace gravel: brown-dark brown; medium plasticity; fine to medium sand; fine gravel.						A		0.50				
	136								U50						
											0.77	PP	>400kPa		
			From 0.90m: pale brown mottled orange												
		1									1				
												SPT	5,7,7 N=14		
	135				RS	H	w<PL					PP	>400kPa	0.5 Gravel backfill	
		2									2				
	134											SPT	12,25/50		
		2.70	Borehole discontinued at 2.70m depth.									PP	>400kPa		

NOTES: (#) Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hanjin 8D
METHOD: Solid flight auger with TC bit to 2.7m
REMARKS:

OPERATOR: Total Drilling (D Tranter)
CASING: Nil

LOGGED: Gilmour

Refer to explanatory notes for symbol and abbreviation definitions

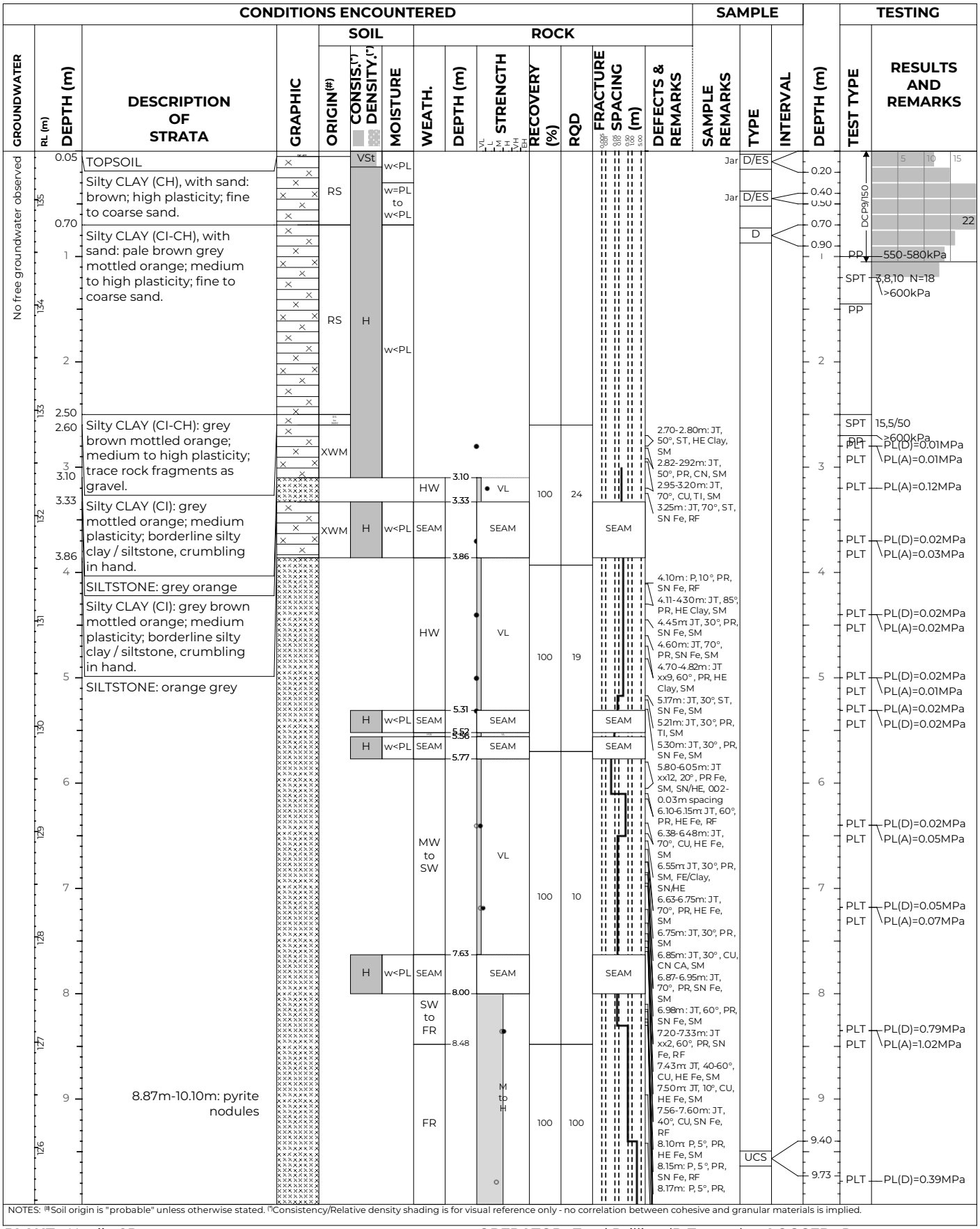
Douglas PARTNERS

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: New Eastern Hub Sub-Transmission Substation
LOCATION: Lot 9 DP1193430 Hebden Road, Musewllbrook, NSW

SURFACE LEVEL: 135.5 AHD
COORDINATE: E:312102.4, N:6418510.6
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 24
PROJECT No: 224764.00
DATE: 28/09/23
SHEET: 1 of 2



NOTES: (#)Soil origin is "probable" unless otherwise stated. (†)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hanjin 8D
OPERATOR: Total Drilling (D Tranter)
LOGGED: Runge
METHOD: Solid flight auger with TC bit to 2.6m, NMLC coring to 11.5
CASING: HWT to 2.5m
REMARKS:

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: New Eastern Hub Sub-Transmission Substation
LOCATION: Lot 9 DP1193430 Hebden Road, Musewllbrook, NSW

SURFACE LEVEL: 135.5 AHD
COORDINATE: E:312102.4, N:6418510.6
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 24
PROJECT No: 224764.00
DATE: 28/09/23
SHEET: 2 of 2

CONDITIONS ENCOUNTERED																		SAMPLE				TESTING	
				SOIL				ROCK															
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(†) DENSITY.(†)	MOISTURE	WEATH.	DEPTH (m)	STRENGTH VL L M H VH EH	RECOVERY (%)	RQD	FRACTURE SPACING (m) >0.06 0.06-0.2 0.2-0.6 0.6-2.0 >2.0	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
	125	11	[CONT] SILTSTONE: orange grey					FR		M to H	100	100		HE Fe, RF 8.24-8.27m: JT xx2, 10-20°, CU, CN, RF, HE/SN 8.30m: JT, 10°, CU, SN, PR, SN, RF 8.96m: P, 10°, CU, CN, RF 9.42m: P, 10°, CU, CN, RF				11	PLT PLT	PL(A)=1.12MPa PL(D)=0.97MPa
	4	11.53	Borehole discontinued at 11.53m depth. Limit of investigation.																		
		12																12		
		13																13		
		14																14		
		15																15		
		16																16		
		17																17		
		18																18		
		19																19		

NOTES: (#)Soil origin is "probable" unless otherwise stated. (†)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hanjin 8D
OPERATOR: Total Drilling (D Tranter)
LOGGED: Runge
METHOD: Solid flight auger with TC bit to 2.6m, NMLC coring to 11.5
CASING: HWT to 2.5m
REMARKS:

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: New Eastern Hub Sub-Transmission Substation
LOCATION: Lot 9 DP1193430 Hebden Road, Musewllbrook, NSW

SURFACE LEVEL: 134.7 AHD
COORDINATE: E:312087.5, N:6418487.1
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 25
PROJECT No: 224764.00
DATE: 26/09/23
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
No free groundwater observed		0.05	TOPSOIL	TS					A		0.10		
			Clayey SILT, trace gravel: brown; fine gravel; rootlets.		RS	H	w<PL						
									A		0.50		
		0.60	Sandy CLAY, trace gravel: brown; medium plasticity; fine to medium sand; fine to medium gravel.						U50		0.81	PP	>400kPa
	134	1									1	SPT	4,5,9 N=14
												PP	>400kPa
	133					H	w<PL						
		2									2		
	132											SPT	10,16,25/50 ref
		2.85	Borehole discontinued at 2.85m depth. refusal on siltstone.									PP	>400kPa

NOTES: (#) Soil origin is "probable" unless otherwise stated. (*) Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hanjin 8D
METHOD: 100mm solid flight auger with TC bit
REMARKS:

OPERATOR: Total Drilling (D Tranter)
CASING: Nil

LOGGED: Gilmour

Refer to explanatory notes for symbol and abbreviation definitions

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: New Eastern Hub Sub-Transmission Substation
LOCATION: Lot 9 DP1193430 Hebden Road, Musewllbrook, NSW

SURFACE LEVEL: 133.6 AHD
COORDINATE: E:312146.6, N:6418477.6
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 26
PROJECT No: 224764.00
DATE: 26/09/23
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN[#]	CONSIS.[*] / DENSITY.[*]	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
	133 / 0.05	TOPSOIL						A		0.10		
		Silty Sandy CLAY, trace gravel: dark brown; medium plasticity; fine to medium sand; fine gravel. From 0.30m: sandy clay		RS	H	w<PL		A		0.50	PP	>400kPa
	132 / 1							U50		0.85	SPT	4,7,13 N=20
										1	PP	>400kPa
	131 / 2.05	Borehole discontinued at 2.05m depth. refusal on siltstone.								2	SPT / PP	25/50 ref >400kPa
	130 / 3									3		
	129 / 4									4		
	128 / 5									5		
	127 / 6									6		
	126 / 7									7		
	125 / 8									8		
	124 / 9									9		

NOTES: [#] Soil origin is "probable" unless otherwise stated. [*] Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hanjin 8D
METHOD: 100mm solid flight auger
REMARKS:

OPERATOR: Total Drilling (D Tranter)
CASING: Nil

LOGGED: Gilmour

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: New Eastern Hub Sub-Transmission Substation
LOCATION: Lot 9 DP1193430 Hebden Road, Musewllbrook, NSW

SURFACE LEVEL: 134.8 AHD
COORDINATE: E:312132.2, N:6418502.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 27
PROJECT No: 224764.00
DATE: 05/10/23
SHEET: 1 of 4

CONDITIONS ENCOUNTERED																				SAMPLE				TESTING	
				SOIL			ROCK																		
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(†) DENSITY.(†)	MOISTURE	WEATH.	DEPTH (m)	STRENGTH VL L M H VH EH	RECOVERY (%)	RQD	FRACTURE SPACING (m) 0.06 0.08 0.10 0.60 >0.60	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
	134	0.05	TOPSOIL	TS	RS	H	w<PL									Jar	D/ES	0.20	PP	>600kPa
			Silty CLAY (CH), trace sand: brown; high plasticity; fine to coarse sand.													Jar	D/ES	0.40		
		0.90																0.50		
																		0.70		
																D		0.90		
		1	Silty CLAY (CI-CH), trace sand: pale brown mottled orange grey; medium to high plasticity; fine to medium sand.															1	PP	>600kPa
																			SPT	7,10,10 N=20 >600kPa
																			PP	
	133				RS		w<PL													
		2																2		
		2.50	Sandy CLAY (CI): grey orange; medium plasticity; fine to medium sand.																PP	>600kPa
																			SPT	15,15,18 N=33 >600kPa
	132																			
		3			XWM		w<PL											3	PP	
	131	3.90																		
		4.00	Silty Sandy CLAY (CI): grey mottled orange; medium plasticity; fine to medium sand.		XWM		w<PL		4.00									4	SPT	20/100 ref
			SILTSTONE: orange grey					MW		VL to L	100	10		4.00-4.05m: JT, 70°, PR, HE, SM 4.05-4.15m: JT x5, 40-70°, PR, Fe, SM, SN/TI 4.17m: P, 5°, PR, SN Fe, SM 4.19m: P, 5°, PR, SN Fe, SM 4.24-4.29m: JT, 10°, PR, HE Fe, SM 4.36-4.43m: JT, 50°, PR, SN Fe, RF 4.47m: P, 10°, PR, SN Fe, RF 4.59-4.65m: JT, 70°, PR, Fe, RF, SN/TI 4.71-4.75m: CS				PLT	PL(D)=0.13MPa
	130							SEAM	4.70 4.75	SEAM			SEAM						PLT	PL(A)=0.16MPa
								MW		VL to L										
								SEAM	4.88 4.97	SEAM			SEAM							

NOTES: (#)Soil origin is "probable" unless otherwise stated. (†)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hanjin 8D
METHOD:
REMARKS:

OPERATOR: Total Drilling (D Tranter)
CASING: HWT to 2.5m

LOGGED: Runge

Refer to explanatory notes for symbol and abbreviation definitions

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: New Eastern Hub Sub-Transmission Substation
LOCATION: Lot 9 DP1193430 Hebden Road, Musewllbrook, NSW

SURFACE LEVEL: 134.8 AHD
COORDINATE: E:312132.2, N:6418502.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 27
PROJECT No: 224764.00
DATE: 05/10/23
SHEET: 2 of 4

CONDITIONS ENCOUNTERED | **SAMPLE** | **TESTING**

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL: ORIGIN(#)	SOIL: CONSIS.(†) DENSITY.(†)	SOIL: MOISTURE	ROCK: WEATH.	ROCK: DEPTH (m)	ROCK: STRENGTH (VL L M H VH EH)	ROCK: RECOVERY (%)	ROCK: RQD	ROCK: FRACTURE SPACING (m) (>0.6 0.2-0.6 0.06-0.2 0.02-0.06 <0.02)	ROCK: DEFECTS & REMARKS	SAMPLE REMARKS	SAMPLE TYPE	SAMPLE INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
	129	6	[CONT] SILTSTONE: orange grey											4.75-4.87m: JT, 60°, PR, SM, Fe/Clay, SN/HE						
														4.88-4.97m: CS					PLT	PL(D)=0.06MPa
										VL to L	100	10		5.15m: P, 5°, PR, SN Fe, SM					PLT	PL(A)=0.06MPa
														5.22-5.33m: JT, 60°, PR, INF CA, SM						
														5.36m: P, t, PR, SN Fe, SM						
								SEAM	5.51	SEAM			SEAM	5.47-5.51m: JT, 30°, CU, SN Fe, SM						
			5.70m-5.76m: fragmented due to drilling					MW	5.55	VL to L				5.51-5.55m: CS						
								SEAM	5.76	SEAM			SEAM	5.56m: JT, 20°, PR, SN Fe, SM						
								MW	5.87	L				5.64m: JT, 30°, CU, HE Fe, SM						
								SEAM	6.12	SEAM			SEAM	5.69-5.70m: JT, 50°, PR, SN Fe, SM					PLT	PL(A)=0.25MPa
		6							6.19					5.70-5.76m: FG				6		
								MW		VL				5.76-5.87m: CS						
														5.94-5.95m: JT, 70°, PR, SN Fe, SM						
														6.03m: P, 5°, PR, SN Fe, RF						
								SEAM	6.53	SEAM			SEAM	6.12-6.19m: CS						
									6.56					6.19m: JT, 70°, ST, SN Fe, RF						
	128													6.29-6.34m: JT, 50-70°, CU, HE Fe, SM					PLT	PL(A)=0.16MPa
											100	17		6.40-6.46m: JT, 70°, PR, SM, Fe/Clay, SN/HE						
														6.53-6.56m: CS						
		7						MW		L				6.56-6.64m: JT, 70°, CU, Fe, SM, ST/TI				7		
			7.41m-7.43m: quartz band											6.82-6.86m: JT, 80°, PR, SN Fe, RF						
														6.82m: P, 5°, PR, SN Fe, RF						
														6.94m: P, 5°, PR, SN Fe, RF					PLT	PL(A)=0.11MPa
														6.99m: P, 5°, PR, SN Fe, RF						
														7.05-7.10m: JT xx3, 20-50°, CU, Fe, PO, SN/HE						
								SEAM	7.75	SEAM			SEAM	7.23m: P, 10°, PR, SN Fe, RF					PLT	PL(D)=0.11MPa
		7.79							7.79					7.31-7.39m: JT, 50°, PR, Fe, SM, TI/HE					PLT	PL(A)=0.31MPa
	127		CORE LOSS						7.95					7.43-7.44m: JT, 50°, PR, SN Fe, SM						
		8												7.61m: P, 10°, CU, SN Fe, SM				8		
		8.05	SILTSTONE: orange grey					MW	8.05	VL				7.67-7.75m: JT						
								SEAM	8.31	SEAM			SEAM	7.75-7.79m: CS, 70°, CU, Fe, SM, HE/SN						
									8.34					7.80m: JT, 70°, PR, Fe, SM, SN/TI					PLT	PL(A)=0.23MPa
								MW to SW		L				8.05-8.14m: FG						
									8.66					8.20-8.25m: JT, 60°, PR, HE Fe, SM						
									8.68					8.31-8.34m: CS					PLT	PL(A)=0.18MPa
	126													8.42m: JT, 20°, CU, HE Fe, SM						
		9						SW to MW		L	100	27		8.45m: P, 5°, PR, CN Fe, RF				9		
														8.52m: JT, 20°, CU, CN, SM						
														8.66-8.68m: CS						
								SEAM	9.25	SEAM			SEAM	8.68-8.76m: JT, 60°, PR, SN Fe, RF						
									9.35					8.70m: P, 5°, PR, HE Fe, RF						
								MW	9.43					8.72m: P, 5°, PR, SN Fe, RF						
														8.80m: P, 10°, PR, SN Fe, RF						
								SW to FR		M				8.83-8.89m: JT, 70°, ST, SN Fe, RF						
	125													8.94m: P, 10°, PR, SN Fe, RF					PLT	PL(A)=0.65MPa
														9.00m: JT, 20°,					PLT	PL(D)=0.69MPa

NOTES: (#)Soil origin is "probable" unless otherwise stated. (†)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hanjin 8D
METHOD:
REMARKS:

OPERATOR: Total Drilling (D Tranter)
CASING: HWT to 2.5m

LOGGED: Runge

Refer to explanatory notes for symbol and abbreviation definitions

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: New Eastern Hub Sub-Transmission Substation
LOCATION: Lot 9 DP1193430 Hebden Road, Musewllbrook, NSW

SURFACE LEVEL: 134.8 AHD
COORDINATE: E:312132.2, N:6418502.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 27
PROJECT No: 224764.00
DATE: 05/10/23
SHEET: 3 of 4

CONDITIONS ENCOUNTERED | **SAMPLE** | **TESTING**

GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL: ORIGIN(#)	SOIL: CONSIS.(†) / DENSITY.(†)	SOIL: MOISTURE	ROCK: WEATH.	ROCK: DEPTH (m)	ROCK: STRENGTH	ROCK: RECOVERY (%)	ROCK: RQD	ROCK: FRACTURE SPACING (m)	ROCK: DEFECTS & REMARKS	SAMPLE: SAMPLE REMARKS	SAMPLE: TYPE	SAMPLE: INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
	124 / 10.87	[CONT] SILTSTONE: orange grey					SW to FR	10.43	M	100	27		PR, SN Fe, RF 9.06m: P, 20°, PR, SN Fe, RF 9.07-9.17m: JT xx2, 40-60°, PR, SM, FE/CA, SN/HE 9.18m: P, 20°, PR, HE Fe, RF 9.25-9.35m: CS 9.35-9.44m: JT, 70°, ST, TI Fe, RF 9.59m: P, 20°, PR, SN Fe, RF 9.78m: P, 5°, PR, CN, RF 9.85m: JT xx2, 5°, CU, RF, CA/FE, HE/SN 10.06m: JT, 20°, CU, HE CA, RF 10.34-10.59m: JT, 60°, PR, SN Fe, RF 10.65-10.80m: JT, 70°, ST, Fe, RF, SN/HE 10.80-10.87m: CS 11.00-1117m: CS 11.09-11.33m: JT, 50°, PR, CN, RF 11.57m: P, 10°, PR, CN, RF 11.78m: P, 10°, PR, CN, RF 11.86m: P, 60°, PR, CN, RF 12.12m: P, 0°, PR, CN, RF 12.36m: JT, 30°, PR, TI, SM 13.41m: P, 20°, CU, CN, SM 13.56m: P, 10°, CU, CN, RF 13.70m: P, 10°, CU, RF 13.74m: P, 10°, PR, TI, RF 13.81m: JT, 10°, PR, HE, RF 14.22m: P, 10°, PR, CN, SM 14.67m: P, 5°, PR, CN, RF 14.76m: JT, 30°, PR, CN, RF					PLT PLT	PL(D)=0.45MPa PL(A)=0.43MPa
								10.65											
							MW to SW	10.80	VL to L										
							XW	10.87											
	10.87	CORE LOSS																	
	11.00	SILTSTONE: grey					SEAM	11.00	SEAM			SEAM							
								11.17											
	123 / 12	12.01m-13.43m: pyrite nodules							M	96	82						12	PLT PLT	PL(D)=0.68MPa PL(A)=0.62MPa
	122 / 13						FR	13.15	M to H								13	PLT PLT	PL(D)=0.92MPa PL(A)=1.06MPa
	121 / 14							14.15		100	95						14	PLT PLT	PL(D)=0.62MPa PL(A)=0.81MPa
	120	14.49m-16.20m: pyrite nodules							M										

NOTES: (#)Soil origin is "probable" unless otherwise stated. (†)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hanjin 8D
METHOD:
REMARKS:

OPERATOR: Total Drilling (D Tranter)
CASING: HWT to 2.5m

LOGGED: Runge

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: New Eastern Hub Sub-Transmission Substation
LOCATION: Lot 9 DP1193430 Hebden Road, Musewllbrook, NSW

SURFACE LEVEL: 134.8 AHD
COORDINATE: E:312132.2, N:6418502.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 27
PROJECT No: 224764.00
DATE: 05/10/23
SHEET: 4 of 4

CONDITIONS ENCOUNTERED																	SAMPLE				TESTING	
				SOIL				ROCK														
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(†) DENSITY.(†)	MOISTURE	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
	119	16	[CONT] SILTSTONE: grey					FR	15.10	M H	100	95		15.32m: JT, 20°, PR, HE CA, SM 15.54m: P, 5° , PR, TI, SM				16	PLT PLT	PL(A)=0.93MPa PL(D)=0.64MPa
		16.40	Borehole discontinued at 16.40m depth. Limit of investigation.															16	PLT	PL(A)=1.36MPa
		17																17		
		18																18		
		19																19		

NOTES: (#)Soil origin is "probable" unless otherwise stated. (†)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hanjin 8D
METHOD:
REMARKS:

OPERATOR: Total Drilling (D Tranter)
CASING: HWT to 2.5m

LOGGED: Runge

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: New Eastern Hub Sub-Transmission Substation
LOCATION: Lot 9 DP1193430 Hebden Road, Musewllbrook, NSW

SURFACE LEVEL: 134.9 AHD
COORDINATE: E:312134.5, N:6418503.1
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 27A
PROJECT No: 224764.00
DATE: 09/10/23
SHEET: 1 of 3

CONDITIONS ENCOUNTERED																SAMPLE				TESTING	
				SOIL				ROCK													
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN[#]	CONSIS.[†] / DENSITY.[†]	MOISTURE	WEATH.	DEPTH (m)	STRENGTH (VL L M H VH EH)	RECOVERY (%)	RQD	FRACTURE SPACING (m) (>0.6 0.2-0.6 0.06-0.2 0.02-0.06 <0.02)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
No free groundwater observed	134 / 0	0.00m: Refer to Bore 27 for details of upper 15.8m																			
	133 / 1																				
	132 / 2																				
	131 / 3																				
	130 / 4																				
	129 / 5																				
	128 / 6																				
	127 / 7																				
	126 / 8																				
	125 / 9																				

NOTES: [#] Soil origin is "probable" unless otherwise stated. [†] Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hanjin 8D
OPERATOR: Total Drilling (D Tranter)
LOGGED: Chaplin
METHOD: SFA with TC bit to 3.0m, PCD to 15.8m, NMLC to 20.58m
CASING: HWT to 2.6m
REMARKS:

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: New Eastern Hub Sub-Transmission Substation
LOCATION: Lot 9 DP1193430 Hebden Road, Musewllbrook, NSW

SURFACE LEVEL: 134.9 AHD
COORDINATE: E:312134.5, N:6418503.1
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 27A
PROJECT No: 224764.00
DATE: 09/10/23
SHEET: 2 of 3

CONDITIONS ENCOUNTERED																		SAMPLE				TESTING	
				SOIL				ROCK															
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(†) DENSITY.(†)	MOISTURE	WEATH.	DEPTH (m)	STRENGTH VL L M H VH EH	RECOVERY (%)	RQD	FRACTURE SPACING (m) 0.06 0.18 0.60 1.00 >1.00	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
	124	11																11		
	123	12																12		
	122	13																13		
	121	14																14		
	120	15																15		
	119	15.80 16	SILTSTONE: dark grey						15.80		100	100						16	PLT PLT	PL(A)=1.74MPa PL(D)=1MPa
	118	17												17.34m: P, SH, PR, SM				17	PLT	PL(A)=1.73MPa
	117	18	18.16m-18.27m: fine grained, grey sandstone					FR		H								18	PLT	PL(A)=1.75MPa
	116	19									100	100		18.52m: JT, 60°, PR, SM 18.72m: JT, 60°, PR, SM				19	PLT	PL(A)=1.95MPa
	115																			

NOTES: (#) Soil origin is "probable" unless otherwise stated. (†) Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hanjin 8D
OPERATOR: Total Drilling (D Tranter)
LOGGED: Chaplin
METHOD: SFA with TC bit to 3.0m, PCD to 15.8m, NMLC to 20.58m
CASING: HWT to 2.6m
REMARKS:

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: New Eastern Hub Sub-Transmission Substation
LOCATION: Lot 9 DP1193430 Hebden Road, Musewllbrook, NSW

SURFACE LEVEL: 134.9 AHD
COORDINATE: E:312134.5, N:6418503.1
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 27A
PROJECT No: 224764.00
DATE: 09/10/23
SHEET: 3 of 3

CONDITIONS ENCOUNTERED																		SAMPLE				TESTING	
				SOIL			ROCK																
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(†) / DENSITY.(†)	MOISTURE	WEATH.	DEPTH (m)	STRENGTH (VL L M H VH EH)	RECOVERY (%)	RQD	FRACTURE SPACING (m) (>0.06 0.06-0.2 0.2-0.6 0.6-2.0 >2.0)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
		[CONT] SILTSTONE: dark grey					FR		H	100	100							PLT	PL()=1.26MPa
	20.58	Borehole discontinued at 20.58m depth. Limit of investigation.																					
	21																						
	22																						
	23																						
	24																						
	25																						
	26																						
	27																						
	28																						
	29																						

NOTES: (#)Soil origin is "probable" unless otherwise stated. (†)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hanjin 8D
OPERATOR: Total Drilling (D Tranter)
LOGGED: Chaplin
METHOD: SFA with TC bit to 3.0m, PCD to 15.8m, NMLC to 20.58m
CASING: HWT to 2.6m
REMARKS:

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: New Eastern Hub Sub-Transmission Substation
LOCATION: Lot 9 DP1193430 Hebden Road, Musewllbrook, NSW

SURFACE LEVEL: 135.6 AHD
COORDINATE: E:312074.3, N:6418506.8
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 28
PROJECT No: 224764.00
DATE: 26/09/23
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
No free groundwater observed	0.05	TOPSOIL	TS					A		0.10		
		Clayey SILT, trace gravel: dark brown; fine gravel; rootlets.		RS	H	w<PL						
	135 0.60	Sandy CLAY; medium plasticity; fine to medium sand.						A		0.50		
	1	1.00m: V bit refusal								1	SPT	13,13,14 N=27
	134			RS	H	w<PL					PP	>400kPa
	2									2		
	133 2.70	Borehole discontinued at 2.70m depth. refusal.									SPT	13,25/50 ref
											PP	>400kPa

NOTES: (#) Soil origin is "probable" unless otherwise stated. (*) Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hanjin 8D
METHOD: 100mm solid flight auger with V bit, TC bit from 1.0m
REMARKS:

OPERATOR: Total Drilling (D Tranter)
CASING: Nil

LOGGED: Gilmour

Refer to explanatory notes for symbol and abbreviation definitions

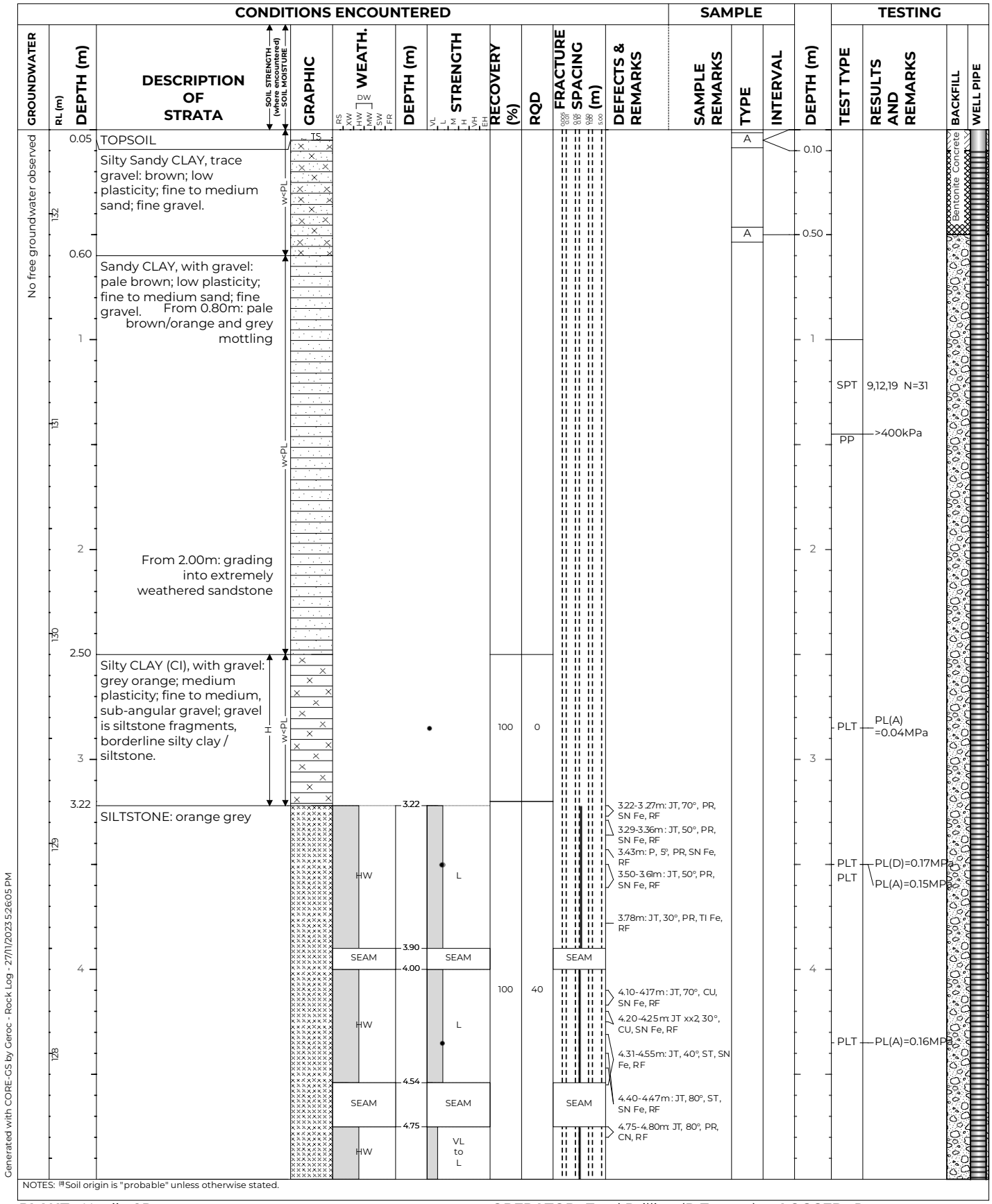
Douglas PARTNERS

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: New Eastern Hub Sub-Transmission Substation
LOCATION: Lot 9 DP1193430 Hebden Road, Musewllbrook, NSW

SURFACE LEVEL: 132.4 AHD
COORDINATE: E:311938.3, N:6418467.3
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 29
PROJECT No: 224764.00
DATE: 28/09/23
SHEET: 1 of 3



NOTES: [a] Soil origin is "probable" unless otherwise stated.

PLANT: Hanjin 8D
OPERATOR: Total Drilling (D Tranter)
LOGGED: Runge
METHOD: 100mm solid flight auger with TC bit, from 2.5m NMLC c
CASING: HWT to 2.5m
REMARKS:

Refer to explanatory notes for symbol and abbreviation definitions

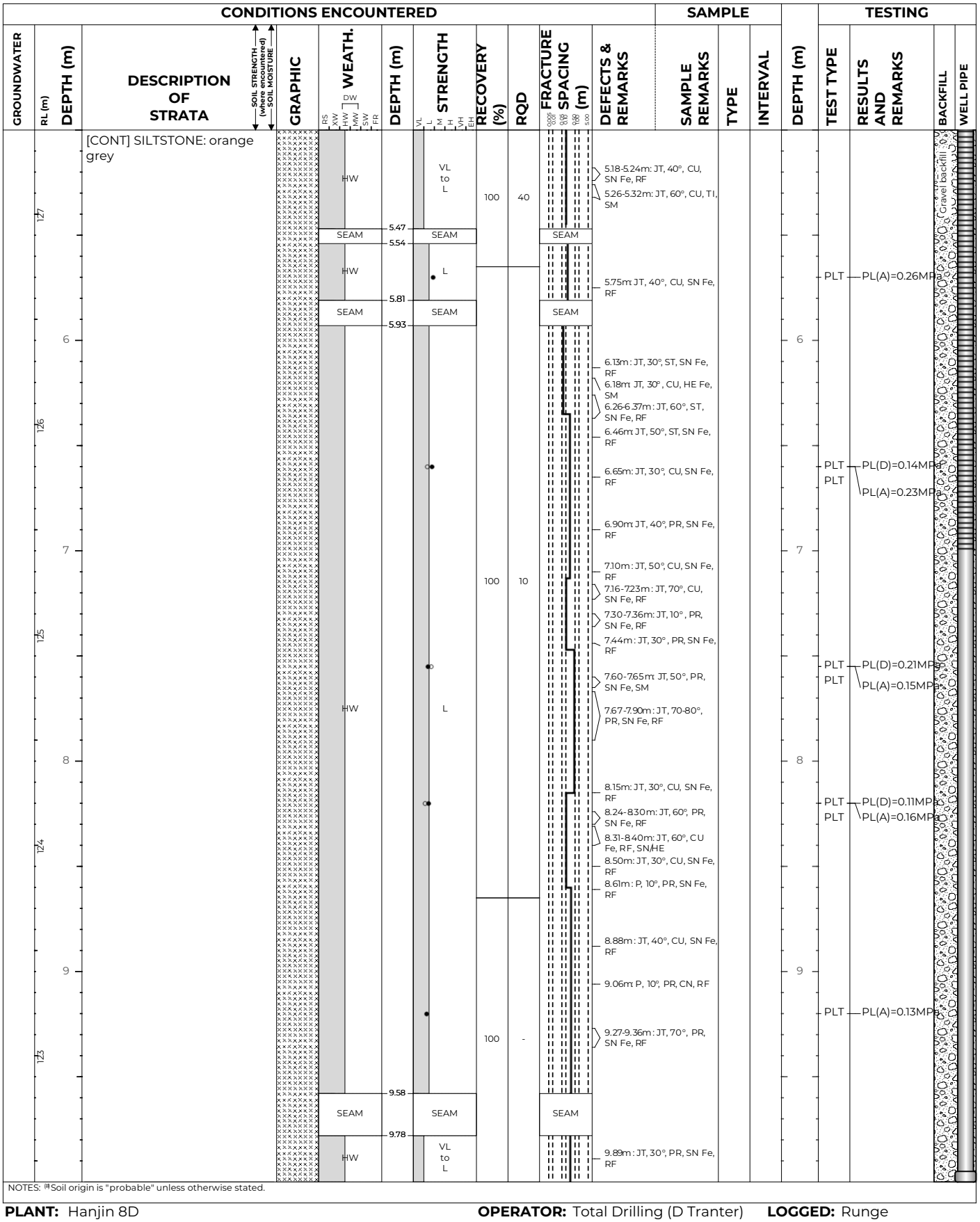
Douglas PARTNERS

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: New Eastern Hub Sub-Transmission Substation
LOCATION: Lot 9 DP1193430 Hebden Road, Musewllbrook, NSW

SURFACE LEVEL: 132.4 AHD
COORDINATE: E:311938.3, N:6418467.3
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 29
PROJECT No: 224764.00
DATE: 28/09/23
SHEET: 2 of 3



NOTES: [a] Soil origin is "probable" unless otherwise stated.

PLANT: Hanjin 8D
OPERATOR: Total Drilling (D Tranter)
LOGGED: Runge
METHOD: 100mm solid flight auger with TC bit, from 2.5m NMLC c
CASING: HWT to 2.5m
REMARKS:

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: New Eastern Hub Sub-Transmission Substation
LOCATION: Lot 9 DP1193430 Hebden Road, Musewllbrook, NSW

SURFACE LEVEL: 132.4 AHD
COORDINATE: E:311938.3, N:6418467.3
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 29
PROJECT No: 224764.00
DATE: 28/09/23
SHEET: 3 of 3

CONDITIONS ENCOUNTERED														SAMPLE				TESTING			
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA (SOIL STRENGTH (where encountered) / SOIL MOISTURE)	GRAPHIC	WEATH. (PS, XW, DW, HW, MW, SW, FR)	DEPTH (m)	STRENGTH (VL, L, M, H, VH, EH)	RECOVERY (%)	RQD	FRACTURE SPACING (m) (<0.06, 0.06-0.2, 0.2-0.6, 0.6-2, >2)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
	122	10.30	[CONT] SILTSTONE: orange grey		HW		VL to	100	-		10.16-10.23m: JT, 60°, PR, SN Fe, RF					PLT PLT	PL(D) =0.08MPa PL(A) =0.08MPa		
			Borehole discontinued at 10.30m depth. Limit of investigation.																
	121	11													11				
	120	12													12				
	119	13													13				
	118	14													14				

NOTES: [a] Soil origin is "probable" unless otherwise stated.

PLANT: Hanjin 8D
OPERATOR: Total Drilling (D Tranter)
LOGGED: Runge
METHOD: 100mm solid flight auger with TC bit, from 2.5m NMLC c
CASING: HWT to 2.5m
REMARKS:

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

Appendix J

Chain of Custody
Sample Receipt

Douglas Partners
Geotechnics | Environment | Groundwater

CHAIN OF CUSTODY DESPATCH SHEET

Project No:	224764.00	**Suburb:**	Musewllbrook	**To:**	Envirolab Services
Project Manager:	Michael Harris	**Order Number:**		**Sampler:** TLG	12 Ashley St, Chatswood NSW 2067
Email:	Michael.Harris@douglaspartners.com.au; patrick.heads@douglaspartners.com.au			**Attn:**	Sample Receipt
Turnaround time:	☑ Standard ☐ 72 hour ☐ 48 hour ☐ 24 hour ☐ Same day				(02) 9910 6200 samplereceipt@envirolab.com.au
Prior Storage:	☑ Fridge ☐ Freezer ☐ Esky ☑ Shelf	**Do samples contain 'potential' HBM?**	☑ No ☐ Yes(If YES, then handle, transport and store in accordance with FPM HAZID)		

Lab ID	Sample ID: Location / Other ID	Depth From	Depth To	Date Sampled	Sample Type: S - soil W - water M - Material	Container Type: G - glass P - plastic	Analytes: combo 8	pH	EC	CEC	aggressivity suite (pH, EC, sulfate, chloride)							Notes/ Preservation/ Additional Requirements
1	2	0	0.1	25/09/23	S	G/P	✓	✓	✓	✓								
2	5	0.5	0.5	25/09/23	S	G/P	✓											
3	6	0	0.1	25/09/23	S	G/P	✓											
4	11	0	0.1	26/09/23	S	G/P	✓											
5	14	0.5	0.5	26/09/23	S	G/P	✓	✓	✓	✓								
6	17	0	0.1	26/09/23	S	G/P	✓											
7	25	0.5	0.5	26/09/23	S	G/P	✓											
8	26	0	0.1	27/09/23	S	G/P	✓	✓	✓	✓								
9	9	1	1.45	26/09/23							✓							
10	10	1	1.35	26/09/23							✓							
11	10	2.5	2.65	26/09/23							✓							
12	14	1	1.2	26/09/23							✓							
13	15	1	1.45	26/09/23							✓							
14	23	2.5	2.7	27/09/23							✓							

ENVIROLAB
Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph: (02) 9910 6200
Job No: 334958
Date Received: 10/10/23
Time Received: 1100
Received By: KW
Temp: Cool/Ambient/Icepack 4°C
Cooling: Ice/Icepack
Security: Intact/Broken/None

Metals to analyse: As, Be, B, Cd, Cr, Co, Cu, Pb, Mn, Hg, Ni, Se, Zn

Number of samples in container: 14 **Transported to laboratory by:** FedEx

Send results to: Douglas Partners Pty Ltd

Address: 15 Callistemon Close, Warabrook NSW 23 **Phone:** (02) 4960 9600

Relinquished by: PH **Date:** 9/10/2023 **Signed:**

LAB RECEIPT

Lab Ref. No: 334958

Received by: Katy Wayne ELS SYD

Date & Time: 10/10/23 1100

Signed:

Douglas Partners
Geotechnics | Environment | Groundwater

CHAIN OF CUSTODY DESPATCH SHEET

Project No:	224764.00	**Suburb:**	Musewllbrook	**To:**	Envirolab Services
Project Manager:	Michael Harris	**Order Number:**	NC232203	**Sampler:**	PH		12 Ashley St, Chatswood NSW 2067
Email:	Michael.Harris@douglaspartners.com.au			**Attn:**	Sample Receipt
Turnaround time:	☑ Standard ☐ 72 hour ☐ 48 hour ☐ 24 hour ☐ Same day				(02) 9910 6200 samplereceipt@envirolab.com.au
Prior Storage:	☑ Fridge ☐ Freezer ☑ Esky ☐ Shelf	**Do samples contain 'potential' HBM?**	☑ No ☐ Yes	(If YES, then handle, transport and store in accordance with FPM HAZID)	

Lab ID	Sample ID: Location / Other ID	Depth From	Depth To	Date Sampled	Sample Type: S - soil W - water M - Material	Container Type: G - glass P - plastic	Analytes: Combo 6	Nitrogen species	PFAS extended low level	Phosphorus (reactive and total)	Anions and cations	TSS	TDS	alkalinity	hardness	pH	EC	Notes/ Preservation/ Additional Requirements
1	LS1			20/10/23	W	G/P	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Low level PAH, PCB, OCP, PFAS please
2	LS2			20/10/23	W	G/P	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	total metal concentrations (surface water)
																		nitrogen species - nitrate, nitrite, total nitrogen, TKN, ammonia)

Envirolab Services
12 Ashley St
Chatswood NSW 2057
Ph: (02) 9910 6200

Job No: 336033
Date Received: 24/10/23
Time Received: 1030
Received By: WW
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

Metals to analyse: - As, Be, B, Cd, Cr, Co, Cu, Pb, Mn, Hg, Ni, Se, Zn

Number of samples in container: 2

Transported to laboratory by: DP

Send results to: Douglas Partners Pty Ltd

Address: 15 Callistemon Close, Warabrook NSW 23 **Phone:** (02) 4960 9600

Relinquished by: JL **Date:** 23/10/23 **Signed:**

LAB RECEIPT

Lab Ref. No: 336033

Received by: Katy Wayne ELS SYD

Date & Time: 24/10/23 1030

Signed:

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

SAMPLE RECEIPT ADVICE

Client Details

Client	Douglas Partners Newcastle
Attention	Michael Harris

Sample Login Details

Your reference	224764.00 Musewllbrook
Envirolab Reference	334958
Date Sample Received	10/10/2023
Date Instructions Received	10/10/2023
Date Results Expected to be Reported	17/10/2023

Sample Condition

Samples received in appropriate condition for analysis	Yes
No. of Samples Provided	14 Soil
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	4
Cooling Method	Ice
Sampling Date Provided	YES

Comments

Nil

Please direct any queries to:

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

Analysis Underway, details on the following page:

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

Sample ID	vTRH(C6-C10)/BTEXN in Soil	svTRH (C10-C40) in Soil	PAHs in Soil	Organochlorine Pesticides in soil	Organophosphorus Pesticides in Soil	PCBs in Soil	Acid Extractable metalsin soil	Misc Soil - Inorg	Misc Inorg - Soil	CEC
2-0-0.1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
5-0.5	✓	✓	✓	✓	✓	✓	✓	✓		
6-0-0.1	✓	✓	✓	✓	✓	✓	✓	✓		
11-0-0.1	✓	✓	✓	✓	✓	✓	✓	✓		
14-0.5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
17-0-0.1	✓	✓	✓	✓	✓	✓	✓	✓		
25-0.5	✓	✓	✓	✓	✓	✓	✓	✓		
26-0-0.1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
9-1-1.45									✓	
10-1-1.35									✓	
10-2.5-2.65									✓	
14-1-1.2									✓	
15-1-1.45									✓	
23-2.5-2.7									✓	

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

Additional Info

Sample storage - Waters are routinely disposed of approximately 1 month and soils approximately 2 months from receipt.
Requests for longer term sample storage must be received in writing.
Please contact the laboratory immediately if observed settled sediment present in water samples is to be included in the extraction and/or analysis (exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS analysis where solids are included by default.
TAT for Micro is dependent on incubation. This varies from 3 to 6 days.

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

SAMPLE RECEIPT ADVICE

Client Details

Client	Douglas Partners Newcastle
Attention	Michael Harris

Sample Login Details

Your reference	224764.00, Muswellbrook
Envirolab Reference	336033
Date Sample Received	24/10/2023
Date Instructions Received	24/10/2023
Date Results Expected to be Reported	31/10/2023

Sample Condition

Samples received in appropriate condition for analysis	Yes
No. of Samples Provided	2 Water
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	5
Cooling Method	Ice
Sampling Date Provided	YES

Comments

#1- Did not receive 1 x 500mL Plastic bottle.

Please direct any queries to:

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

Analysis Underway, details on the following page:

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

Sample ID	vTRH(C6-C10)/BTEXN in Water	svTRH (C10-C40) in Water	PAHs in Water	OCPs in Water - Low Level	OP in water LL ANZECCF/ADWG	PCBs in Water - Low Level	PFAS in Water LOW LEVEL Extend	All metals in water - total	Metals in Waters -Acid extractable	pH	Electrical Conductivity	Total Suspended Solids	Total Dissolved Solids(grav)	Phosphate as P in water	TKN in water	Nitrate as N in water	Nitrite as N in water	Ammonia as N in water	Total Nitrogen in water	Calcium - Dissolved	Potassium - Dissolved	Sodium - Dissolved	Magnesium - Dissolved	Hardness	Hydroxide Alkalinity (OH-) as CaCO3	Bicarbonate Alkalinity as CaCO3	Carbonate Alkalinity as CaCO3	Total Alkalinity as CaCO3	Sulphate, SO4	Chloride, Cl	Ionic Balance
LS1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
LS2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

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

Additional Info

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

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

Please contact the laboratory immediately if observed settled sediment present in water samples is to be included in the extraction and/or analysis (exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS analysis where solids are included by default.

TAT for Micro is dependent on incubation. This varies from 3 to 6 days.

Douglas PARTNERS

GROUNDED EXPERTISE

Report on Preliminary Contamination Testing

Proposed Substation

20 Sandy Creek Road, Muswellbrook NSW

Prepared for Ausgrid

Project 224763.02

3 June 2024

Douglas Partners Pty Ltd
ABN 75 053 980 117
douglaspartners.com.au
15 Callistemon Close,
Warabrook, NSW 2304
(02) 4960 9600

Document History

Details

Project No.	224763.02
Document Title	Report on Preliminary Contamination Testing
Site Address	20 Sandy Creek Road, Muswellbrook NSW
Report Prepared For	Ausgrid
Filename	224763.02.R.002.Rev0

Status and Review

Status	Prepared by	Reviewed by	Date issued
Revision 0	Patrick Heads	Chris Bozinovski	3 June 2024

Distribution of Copies

Status	Issued to
Revision 0	Ausgrid

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		3 June 2024
Reviewer		3 June 2024

Executive Summary

Douglas Partners Pty Ltd (Douglas) has been engaged by Ausgrid to prepare this Preliminary Contamination Testing for a proposed substation at 20 Sandy Creek Road, Muswellbrook NSW.

The objective was to provide a preliminary assessment of contamination within the revised development footprint located to the south of the previous area investigated by Douglas in October 2023 (Douglas, 2023) .

The scope of work conducted for this assessment comprised a brief review of previous work conducted by Douglas at the site, excavation of 12 test pits, collection of soil samples under contamination sampling protocols, contamination testing of selected samples for a range of contaminants and preparation of this report.

The results of subsurface investigation indicated the following:

- The presence of fill materials (including ash) in the eastern portion of the site;
- General absence of gross contamination in soil/fill at the locations and depths tested;
- The presence of some bonded asbestos containing materials (ACM) at the site surface, likely to be associated with former structures or dumping (the extent of which is not known).

The following additional investigations are recommended to confirm contamination status and remediation requirements:

- Additional subsurface investigation to further assess the extent of the fill and site conditions in proposed areas of construction;
- Detailed surface inspection to further assess the presence of surface asbestos impacts;
- Additional assessment for waste classification to confirm requirements for off-site disposal of impacted soils, where required.

The scope of work conducted for this assessment does not constitute a Detailed Site Investigation for the assessment of contamination with reference to (NSW EPA, 2020). In addition to the above recommended additional investigations, it is recommended that an Unexpected Finds Protocol (UFP) be prepared and implemented during the proposed development.

Based on the results of the assessment, it is considered that the site can be made suitable for the proposed commercial / industrial substation development, subject to implementation of the recommendations above. Due consideration should be given to geotechnical requirements of the proposed development when formulating management/remediation options

Table of Contents

Report on Preliminary Contamination Testing
Proposed Substation – Revised Location
20 Sandy Creek Road, Muswellbrook NSW

1. Introduction

Douglas Partners Pty Ltd (Douglas) has been engaged by Ausgrid to prepare this Preliminary Contamination Testing for a proposed substation at 20 Sandy Creek Road, Muswellbrook NSW. The site is shown on Drawing 1, Appendix A.

The investigation was undertaken with reference to Douglas' proposal 224763.02.P.001.Rev0 dated 13 February 2024.

The objective was to provide a preliminary assessment of contamination within the revised development footprint located to the south of the previous area investigated by Douglas in October 2023 (Douglas, 2023) – refer to Section 6.

This report must be read in conjunction with all appendices including the notes provided in Appendix B.

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 conversations with Ausgrid it is understood that the proposed new works are to be located to the south and outside of the existing Muswellbrook substation. The proposed development is further understood to comprise:

- An outdoor switch yard;
- Modular control room and amenities building;
- Associated electrical infrastructure works may include either a new or a modified concrete slab, some steelwork, framed cable support structures and a number of in-ground conduit banks and possibly concrete cable jointing pits;
- Bulk excavation including the following:
  - Excavation in the order of 2 m to 4.5 m below existing ground surface levels along the southern boundary of the proposed substation;
  - Placement of up to about 2.5 m of fill along the northern boundary of the proposed substation;
- Retaining walls up to 2 m in height;
- Buried pipes and electrical services;

- Hardstand pavement across switch yard;
- Associated exit/entry pavement.

3. Scope of work

The scope of work for the current assessment comprised the following:

- Brief review of the previous preliminary site investigation (contamination) (Douglas, 2023) which included the revised subject site;
- Excavation of 12 test pits within the proposed development area;
- Logging and sampling of the test pits by an environmental scientist from Douglas under contamination sampling protocols;
- Analysis of selected soil samples from the test pits for a range of contaminants; and
- Preparation of this report presenting the results of the assessment and recommendations for construction.

The above scope was conducted concurrently with a geotechnical assessment at the site, comprising the drilling of six additional boreholes within the proposed development area.

4. Site information

Site address	20 Sandy Creek Road, Muswellbrook NSW
Legal description	Part Lot 12 Deposited Plan 839233
Area	3.5 ha approx.
Zoning	Zone C3 Environmental Management
	Zone SP2 Infrastructure (Classified Road)
Local Council Area	Muswellbrook Council
Current use	vacant
Surrounding uses	North – vacant, Ausgrid substation East – vacant, possible former mining South – vacant West – vacant, residential

The approximate site extent is shown on Figure 1. This site area and proposed development is presented in Drawing 1 in Appendix A.

Figure 1: Approximate site location (yellow) – subject site

5. Environmental setting

Regional topography	The area is generally characterised by undulating hills, slope and gullies with localised peaks/ridges. Elevations within the general area are between about RL 150 AHD and RL 350
Site topography	The subject site is located in the central-southern portion of the lot. The topography of the site and lot is characterised by the following: • A ridge/peak (Approx RL 212) in the south-eastern corner of the lot, falling to the north towards the subject site, which is located in the central-southern portion of the lot; • A gully/drainage formation in the south-western corner of the lot and to the south of the site, falling north-west;

	• A ridge/peak on the northern lot boundary (approx. RL 188-198), with side slopes falling to the south towards the subject site; • Gully/surface water drainage channel in the central-northern portion of the lot (Approx RL 160); • Site fall to the north to north-east; • Possible disturbed (filled?) area in the north-eastern portion of the subject site; Site topography shown in Figure 2 below
Soil landscape	Roxburgh soil landscape: Soils: yellow podzolic soils (Dy3.11, Dy2.41) occur on upper to midslopes with red solodic soils (Dr2.43) on more rounded hills. Lithosols (Um5.21) occur on crests. Brown podzolic soils (Db2.21) occur on slopes on conglomerate with associated flat pavements. Yellow soloths (Dy3.41) have been recorded in some gullies Landform: Undulating low hills and undulating hills with elevations of 80 – 370 m. Slopes are 0 – 10%, with slope lengths of 800 – 1200 m. Local relief is 60 – 120 m. Drainage lines occur at intervals of 300 – 1500 m
Geology	NSW Hunter Coalfield Regional geology 1:100000 map indicates that the site is underlain by the Branxton Formation, which is part of the Permian aged Maitland Group, comprising, conglomerate, sandstone and siltstone
Acid sulfate soils	Reference to published mapping indicates that the site outside mapped acid sulfate soil areas
Surface water	Drainage gullies and surface water bodies are adjacent to the site in both the northern and southern portions of the lot. Both systems flow west into Sandy Creek, which is located between 880 m to 1.3 km west to north-west of the site and is considered to be the nearest sensitive receptor
Groundwater	Search of the publicly available registered groundwater bore database was conducted as part of the PSI report (Douglas, 2023). In addition, groundwater monitoring bores were installed as part of previously work conducted by Douglas at the site. Based on the results of gauging of the existing groundwater wells as part of the previous assessment, it was inferred that there was no measurable groundwater to the depth of assessment.

Figure 2: Site topography (approximate extent of site in yellow)

Based on the regional topography and the inferred flow direction of nearby water courses, the anticipated flow direction of groundwater beneath the site is to the west, towards Sandy Creek, the likely receiving surface water body for the groundwater flow path.

6. Summary of previous investigations and preliminary CSM

Douglas conducted a preliminary site investigation for greater site area in October 2023 (Douglas, 2023). The scope of work comprised an assessment of site history (historical aerial photos, council and NSW EPA records, third party business search, historical titles search, discussion with personnel), site walkover, formulation of a conceptual site model (CSM), excavation of trenches in a former development area, drilling of boreholes (in conjunction with geotechnical investigation), contamination testing of selected soil samples and report preparation.

The investigation area included the northern portion of the current site area, plus an additional area to the north, which was found to be the location of a former small power station. The approximate location of the previous assessment is shown in Figure 3.

Figure 3: Approximate location of former investigation area (yellow)

The site history information suggests that the greater site area was originally use as grazing land before transfer of the land to the Muswellbrook Coal Company in 1945. The greater site area has been in ownership of the Muswellbrook Coal Company or various electricity suppliers/entities from 1945 to the present, suggesting that the greater site area has been used as part of coal mining/infrastructure and/or electricity generation/infrastructure since 1945. Information on historical aerial photographs suggest the presence of commercial use on the greater site area from at least 1958 (i.e. power station). Later aerial photos suggest that former power station buildings within the greater site area were removed/demolished after 1993 and before 1998.

The results of site history indicated the presence of a former structure in the northern portion of the previous investigation area (i.e. north of the current site area) and a possible storage/stockpile area and possible conveyor in the southern portion of the previous investigation area (i.e. within the northern portion of the current investigation area). Drawing 2 in Appendix A illustrates the approximate location of the structures and storage area in relation to the current investigation area (ie subject site).

The site walkover indicated the following, with respect to the current site area:

- The majority of the subject site area was cleared of mature vegetation;
- Likely fill placement, including possible ash and slag fill in the north-eastern portion of the site, as evidenced by surface fill observations and localised levelling of the surface in areas of natural slope;

  The presence of likely asbestos-containing materials (ACM) in the north-eastern and northern portion of the site, as confirmed during the walkover and subsequent laboratory testing for the previous site investigation (Douglas, 2023).

The preliminary conceptual site model (CSM) as presented in the previous assessment (Douglas, 2023) is reproduced in Table 1 below. It is noted that the CSM was prepared for the previous investigation area, however, is considered to also be relevant for the current investigation area.

Table 1: Preliminary CSM - summary of potentially complete exposure pathways

Source and COPC	Transport pathway	Receptor	Risk management action
S1: Fill, Metals, TRH, BTEX, PAH, OCP/OPP, PCB and asbestos S2: Former power station, metals, TRH, BTEX, PAH, PCB, PFAS, asbestos and VOC S3: Former Agricultural use, metals, OCP, OPP	P1: Ingestion and dermal contact P2: Inhalation of dust and/or vapours	R1: Current users (substation/Ausgrid employees) R2: Construction and maintenance workers R3: End users (Ausgrid employees)]	An intrusive investigation is recommended to assess possible contamination including testing of the soils and groundwater.
	P2: Inhalation of dust and/or vapours	R4: Adjacent site users (residential land use).	
	P3: Surface water run-off P4: Lateral migration of groundwater providing base flow to water bodies	R5: Surface water	
	P5: Leaching of contaminants and vertical migration into groundwater	R6: Groundwater	
	P6: Inhalation, ingestion and absorption	R1: Current users (substation/Ausgrid employees) R2: Construction and maintenance workers R3: End users (Ausgrid employees)] R7: Terrestrial ecosystems	
S4: Former buildings, asbestos, SMF, lead (in paint) and PCB S5: Coal mining (HGG), methane, carbon monoxide, carbon dioxide, hydrogen sulfide	P2: Inhalation of dust and/or vapours P6: Inhalation, ingestion and absorption	R1: Current users (substation/Ausgrid employees) R2: Construction and maintenance workers R3: End users (Ausgrid employees)] R4: Adjacent site users (residential land use).	

The results of subsurface investigation within the current site area as reported in the previous investigation (Douglas, 2023) indicated the presence of fill in the north-eastern and northern portion of the current investigation area, with fill depth in the order of 0.5 m to 1.0 m depth. The fill generally comprised silty and sandy fill with ash and coal fragments.

Limited laboratory testing was conducted within the current investigation area as part of the previous investigation (Douglas, 2023). The results of the limited testing, conducted in fill containing ash in or near to the current site area, indicated the general absence of gross contamination in the tested samples.

The previous investigation (Douglas, 2023) recommended additional investigation in the proposed area of construction, remediation of identified asbestos impacts, and additional waste classification of materials to be removed from the site. Available options for remediation included off-site disposal of impacted soils or on-site management of impacted soils with the implementation of a long-term environmental management plan, subject to regulatory approvals.

A supplementary subsurface investigation was recommended within the revised site area (i.e. within the current subject site) to further assess potential site contamination conditions.

7. Sampling plan

7.1 Data quality objectives

This supplementary contamination testing was devised with reference to the seven-step data quality objectives (DQO) process which is provided in Appendix B Schedule B2, NEPC (2013). The data quality objective process is outlined in Appendix C.

7.2 Soil sampling rationale

A targeted/judgemental sampling strategy was utilised to determine test pit locations. The test locations were generally targeted in the areas of proposed excavation, and in areas of previously observed fill (Douglas, 2023). Test pit locations for this assessment, plus relevant boreholes from the current and previous geotechnical assessments, are shown on Drawing 1, in Appendix A.

The general sampling methods are described in the field work methodology, included in Appendix D.

8. Site assessment criteria

The site assessment criteria (SAC) applied in the current investigation are informed by the CSM (Section 6) which identified human and environmental receptors to potential contamination on the site. Analytical results are assessed (as a Tier 1 assessment) against the SAC comprising primarily the investigation and screening levels of Schedule B1 of NEPC (2013).

The investigation and screening levels applied in the current investigation comprise levels adopted for a generic commercial / industrial land use scenario. The derivation of the SAC is included in Appendix E and the adopted SAC are listed on the summary analytical results tables in Appendix H.

9. Site condition

Site observations were noted by a Douglas engineer on 4 March 2024. The site was vacant and vegetated with grass and scattered mature trees. Site photographs are presented in Appendix F. Relevant site features observed included the following:

- The surface levels within the subject site generally fell to the north (Photograph F1);
- Observations of some possible ash material at the surface, generally in the eastern portion of the site (Photograph F2);
- A levelled area, appearing to be cut and filled, was present in the southern portion of the site (Photograph F3), suggesting possible former land use.

10. Results

10.1 Field work results

The borehole and test pit logs for this assessment are included in Appendix G, along with relevant logs from the previous assessment (Douglas, 2023). These should be read in conjunction with the general notes preceding them, which explain the descriptive terms and classification methods used.

The subsurface conditions encountered within the test locations have been categorised into broad geotechnical units according to their inferred geological origin. The geotechnical units have been adopted from the previous investigation to the north (Douglas, 2023) for continuity, however, some of the previously defined units were not encountered during this investigation. The subsurface units encountered during this investigation are as follows:

- Unit 1 - Fill; The fill generally comprised sandy clay/silty sand/sandy gravel fill with possible coal fines, ash and slag inclusions. Trace possible bituminous material was found in fill in Bore 12 from the previous investigation (Douglas, 2023).
- Unit 2 - Topsoil (organics and silts):
- Unit 3: Residual soils;
    - Unit 3A (Silty Clay or Sandy Clay): Typically very stiff to hard in consistency;
    - Unit 3B (Sand): Typically dense sand, likely originated from extremely weathered sandstone;
- Unit 4 Rock: Sandstone and Siltstone:
    - Unit 4A - Extremely weathered material (soil like properties);
    - Unit 4B - Very low strength;
    - Unit 4C - Low and Medium strength;

- Unit 4D – High and Very High strength.

The predominant subsurface conditions encountered within the bores and pits are summarised in Table 2 (present investigation) and Table 3 (previous investigation) below.

Table 2: Summary of subsurface conditions (present investigation)

Test Location		218	219	220	221	222	223	313	314	315	316	317	318	319	320	321	322	323	324
RL (AHD)		191.4			186.9		192.4	187	184.4	185.1	188.9	186.6	182.8	184.9	189	180.8	183.2	185	191.4
Material Description	Unit	Depth Range (m)																	
Fill	1	-	-	0.0 - 0.2	-	0.0 - 0.5	-	0.0 - 0.3	0.0 - 1.6	0.0 - 0.3	-	-	0.0 - 1.1	0.0 - 0.4	-	-	0.0 - 0.7	-	-
Topsoil (organics and silt)	2	-	-	-	0.0 - 0.1	-	-	-	-	-	0.0 - 0.4	-	-	-	-	0.0 - 0.2	-	0.0 - 0.1	-
Sandy Clay or Clay – Typically VST to H	3A	0.0 - 0.7	0.0 - 0.3	0.2 - 1.1	0.1 - 0.5	0.5 - 1.35	0.0 - 0.5	0.3 - 1.7	1.6 - 4.1	0. - 0.9	0.4 - 2.0	0.5 - 1.2	1.1 - 2.6	0.4 - 1.5	0.0 - 0.9	0.2 - 4.3	0.7 - 4.6	0.1 - 2.1	0.3 - 0.7
Clayey Sand / Sand with Clay (Typically D to VD)	3B	-	-	-	-	-	-	-	-	-	-	0.0 - 0.5	-	-	-	-	-	-	0.0 - 0.3
Sandstone (Pebbly) (Extremely Weathered Material)	4A	0.7 - 2.34	0.3 - 5.0	1.1 - 2.6	0.5 - 2.5	1.35 - 5.0	0.5 - 2.56	-	-	0.9 - 2.7	-	1.2 - 1.7	-	1.5 - 1.7	0.9 - 1.7	-	-	2.1 - 2.7	0.7 - 2.2
Sandstone (Pebbly) (typically VL to L)	4B	2.34 - 8.30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sandstone (Pebbly) (typically L to M)	4C	-	-	-	2.5 - 8.5	-	2.56 - 8.35	-	-	-	-	-	-	-	-	-	-	-	-
Sandstone (Pebbly) (typically H to VH)	4D	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Free Groundwater Observations (m)		NFGWO	NFGWO	NFGWO	NFGWO	NFGWO	NFGWO	NFGWO	NFGWO	NFGWO	NFGWO	NFGWO	NFGWO	NFGWO	NFGWO	NFGWO	NFGWO	NFGWO	NFGWO

Notes to table:

- Not encountered
- NFGWO = No free groundwater observed
- VL = Very Low strength
- L = Low strength
- M = Medium strength
- H = High strength
- VH = Very High Strength
- VST = Very stiff
- H = Hard
- D = Dense
- VD = Very dense

Table 3: Summary of relevant subsurface conditions (previous investigation)

Test Location		9	10	11	12	13	14	15
RL (AHD)		183	183.7	183.7	183.3	185.1	188.2	188.5
Material Description	Unit	Depth Range (m)						
Fill	1	-	-	-	0.0-0.55	-	-	-
Topsoil (organics and silt)	2	0.0 - 0.03	0.0 - 0.03	0.0 - 0.03	-	0.0 - 0.03	0.0 - 0.03	0.0 - 0.03
Sandy Clay – Typically VST to H	3A	0.03 - 2.3	0.03 - 1.85	0.03 - 2.16	0.55 - 3.9	0.03 - 3.5	0.03 - 2.66	0.03 - 1.0
Clayey Sand / Sand with Clay (Typically D to VD)	3B	-	-	-	-	-	-	-
Sandstone (Pebbly) (Extremely Weathered Material)	4A	2.3 - 2.4	1.85-3.42c	-	-	3.5 - 4.3	-	1.0 - 2.57
Sandstone (Pebbly) (Typically VL to L)	4B	-	3.42 - 4.8a	2.16 - 4.32	3.9 - 4.22	4.30 - 6.92a	2.66 - 3.15a	2.57 - 5.25a
Sandstone (Pebbly) (Typically L to M)	4C	-	4.8 - 10.0	4.32 - 6.35d	-	6.92 - 10.0	3.15 - 10.0d	5.25 - 10.0
Sandstone (Pebbly) (Typically H to VH)	4D	-	-	6.35 - 10.0	-	-	-	-
Free Groundwater Observations (m)		NFGWO	NFGWO	NFGWO	NFGWO	NFGWO	NFGWO	NFGWO

Notes to table:

Not encountered
NFGWO = No free groundwater observed
VL = Very Low strength
L = Low strength
M = Medium strength
H = High strength
VH = Very High Strength
VST = Very stiff
H = Hard
D = Dense
VD = Very dense

No visual or olfactory evidence (e.g. staining, odours, free phase product) was observed at the test locations during the investigations to suggest the presence of gross contamination within the soils or groundwater at the locations tested within the subject site.

Contaminant observations in the test pits and boreholes was limited to the presence of coal, ash and/or slag in fill at some test locations in the current investigation (Bores 220 and 222, Pits 314, 318, 319 and 322), and possible bituminous material in fill in one bore from the previous investigation.

The PID screening recorded values of less than 1 ppm suggesting the absence of gross volatile impacts in the soil samples tested.

Free groundwater was not observed during excavation of test pits or drilling of boreholes. It should be noted that groundwater levels are affected by climatic conditions and soil permeability and will therefore vary with time.

10.2 Laboratory analytical results

The results of laboratory analysis are summarised in the following tables in Appendix H:

- Table H1: Summary of results of soil analysis for land use – TRH, BTEX, PAH, Metals;
- Table H2: Summary of results of soil analysis for land use – PCB, OCP, OPP, PFAS, Asbestos;
- Table H3: Summary of results of soil analysis for waste classification.

The laboratory certificates of analysis are presented in Appendix H. The chain of custody and sample receipt information are provided in Appendix I.

11. Discussion

11.1 Soils

The analytical results for all contaminants tested in all samples were below the SAC with the exception of slightly elevated nickel concentrations in the sample from Pit 322/0.05 (fill containing ash/slag and coal), where concentrations exceeded the conservative EIL of 60 mg/kg.

Detectable TRH, PAH and PFAS concentrations were encountered in some fill/soil samples from the test pits, however, all concentrations were well within the adopted commercial/industrial land use criteria.

11.2 Preliminary waste classification

Contaminant concentrations in the fill and soil samples tested were all within 'General Solid Waste' criteria for total concentrations (CT1), with the exception of some slightly elevated nickel concentrations (314/0.5, 314/1.5, 318/0.1, 322/0.05) which exceeded the CT1 criteria. Trace PFAS concentrations were also encountered in one sample /322/0.05).

Subsequent leachability (toxicity characteristic leaching procedure – TCLP) testing was conducted on selected soil samples to confirm waste classification with reference to (NSW EPA, 2014). The results of TCLP testing, as presented in Table H3 in Appendix H, indicated that chemical concentrations in the soils tested were within 'General Solid Waste' criteria, based on total and leachable chemical concentrations.

It is recommended that specific waste classification assessment be conducted for soils proposed to be disposed from the site to an appropriately licensed landfill. Additional assessment is also recommended for underlying natural materials (i.e. potential virgin excavated natural materials or excavated natural materials) proposed for off-site re-use, if applicable.

Asbestos containing materials (as fibro fragments) were identified at the surface of the proposed development area. The approximate locations are shown on Drawing 1, Appendix A. It is recommended that a surface clearance be conducted by an appropriately licensed asbestos assessor/occupational hygienist prior to excavation of soils at the site. Consideration should also be given to the waste classification of asbestos-impacted soils, if encountered. It is noted that a detailed asbestos assessment has not been conducted at the site. The assessment suggested the absence of gross contamination in fill/soil at the locations tested. Fill was however observed within the proposed development area. Therefore the potential presence of contamination including asbestos, cannot be discounted due to the presence and potential variability of fill.

11.3 Data quality assurance and quality control

The data quality assurance and quality control (QA/QC) results are included in Appendix I. Based on the results of the field QA and field and laboratory QC, and evaluation against the data quality indicators (DQI) it is concluded that the field and laboratory test data obtained are reliable and useable for this assessment.

12. Conclusions and recommendations

The data collected for this preliminary contamination testing has generally confirmed that certain potential contaminant sources outlined in the CSM outlined in Section 6 pose a potentially complete pathway to the identified receptor(s) whilst others do not. No other sources of contamination have been identified as a result of the testing results. The CSM as presented in Section 6, from the previous assessment (Douglas, 2023) is considered to be suitable for continued use at this site.

Douglas has conducted limited contamination testing at the site, following completion of a preliminary site investigation for the greater lot as part of previous investigations (Douglas, 2023). The assessment has been conducted 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. The possible contamination sources identified included the presence of former power station activities on the site, demolition of former structures associated with the power station, the presence of fill and former agricultural activities.

The results of the preliminary assessment indicated the following:

- Previous site use included agricultural use and later commercial/industrial use (likely associated with mining and/or electrical generation) including a power station, and demolition of former structures;

- The proposed area of development was formerly part of the power station development, and may have included possible storage/stockpiling area and a conveyor. The majority of power station structures were generally north of the current investigation area, as indicated in the previous assessment (Douglas, 2023);
- The presence of fill materials, including ash, in the eastern portion of the site is likely to be associated with former power station activities (i.e. possible waste coal ash from power station activities);
- Subsurface investigation and contamination testing on selected samples indicated the general absence of gross contamination at the locations and depths tested;
- The presence of some bonded asbestos containing materials at the site surface, likely to be associated with former structures or dumping. It is noted that the extent of asbestos containing materials at the site is not known.

The following additional investigations are recommended to confirm contamination status and remediation requirements:

- Additional, subsurface investigation within the site to further assess the extent of the fill and site conditions in proposed areas of construction;
- Detailed surface inspection to further assess the presence of surface asbestos impacts;
- Additional assessment for waste classification to confirm requirements for off-site disposal of impacted soils, where required.

The scope of work conducted for this assessment does not constitute a Detailed Site Investigation for the assessment of contamination with reference to (NSW EPA, 2020). In addition to the above recommended additional investigations, it is recommended that an Unexpected Finds Protocol (UFP) be prepared and implemented during the proposed development.

The UFP would include measure to assist in the identification of potential impacts in soil/fill such as those presented below via visual or olfactory indicators:

- Waste materials in fill, including building and demolition waste;
- Fibrous cement fragments (e.g. asbestos-containing materials);
- Stained or odorous fill or soil;
- Ash and / or slag. Contamination testing on ash conducted as part of this investigation indicated the general absence of gross contaminant concentrations in the samples tested. It is noted, however, that contaminant levels in ash materials can be variable.

In the event of an unexpected find, a suitably qualified contaminated land consultant should be engaged to inspect the find and provide advice on the appropriate course of action.

Based on the results of the assessment it is considered that the site can be made suitable for the proposed commercial / industrial substation development subject to implementation of the recommendations above. Due consideration should be given to geotechnical requirements of the proposed development when formulating management/remediation options

13. References

CRC CARE. (2017). *Risk-based Management and Remediation Guidance for Benzo(a)pyrene.* Technical Report no. 39: Cooperative Research Centre for Contamination Assessment and Remediation of the Environment.

Douglas. (2023). *Report on Preliminary Site Investigation (Contamination), Proposed Muswellbrook Substation, 20 Sandy Creek Road, Muswellbrook, prepared for Ausgrid.* 224763.01: Douglas Partners Pty Ltd.

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. (2014). *Waste Classification Guidelines, Part 1: Classifying Waste.* NSW Environment Protection Authority.

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

NSW EPA. (2022). *Contaminated Sites, Sampling Design Guidelines.* NSW Environment Protection Authority.

14. Limitations

Douglas Partners Pty Ltd (Douglas) has prepared this report for this project at 20 Sandy Creek Road, Muswellbrook NSW with reference to Douglas' proposal dated 13 February 2024, acceptance received from Matthew Faferko dated 14 February 2024 and Ausgrid Statement of Work dated 15 February 2024. The work was carried out under Ausgrid contract No AOP000022. This report is provided for the exclusive use of Ausgrid 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 Douglas, does so entirely at its own risk and without recourse to Douglas for any loss or damage. In preparing this report Douglas 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 Douglas' field testing has been completed.

Douglas' advice is based upon the conditions encountered during this investigation. The accuracy of the advice provided by Douglas 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. Douglas 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.

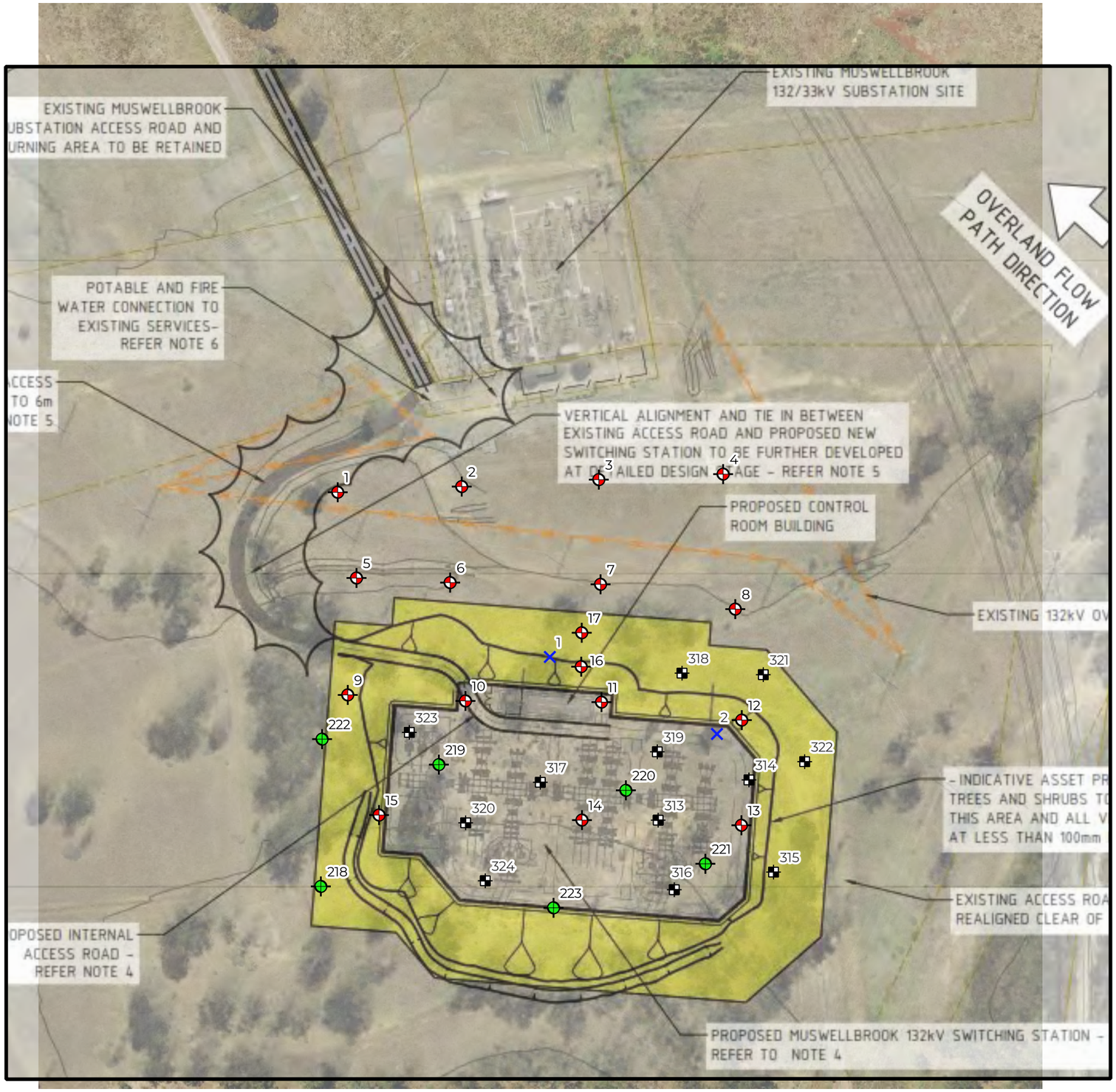
This report, or sections from this report, should not be used as part of a specification for a project, without review and agreement by Douglas. This is because this report has been written as advice and opinion rather than instructions for construction.

Asbestos has been previously detected by observation and by laboratory analysis on the surface of the site. Subsurface investigation has also indicated the presence of fill materials (potentially variable) within the greater lot and the current investigation area. 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 vegetation preventing visual inspection and reasonable access. It is therefore considered possible that additional 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 additional asbestos is not present.

Appendix A

Drawing 1 – Test Location Plan

Drawing 2 – 1974 Historical Aerial Photograph



SITE LOCATION

LEGEND

- Test Pit Location (current investigation)
- Borehole Location (current investigation)
- Approximate Location of Possible Asbestos Containing Materials
- Borehole Location - DP (2023a)

0 50 100 150 m

NOTE:
1. Drawing projection in GDA2020 / MGA zone 56, adapted from Metromap Image, Substation Layout supplied by the Client.
2. Test locations are approximate only and were located using differential GPS typically accurate to ± 0.1 m depending on satellite coverage

Douglas PARTNERS	CLIENT: Ausgrid	TITLE: **Test Location Plan, Supplementary Assessment**	PROJECT: 224763.02
	OFFICE: Newcastle / DRAWN BY: PLH	**Proposed Substation**	DRAWING No: 1
	SCALE: 1:2000 @A3 / DATE: 31.May.2024	**20 Sandy Creek Road, Muswellbrook, NSW**	REVISION: 0

DP.QGIS.A3LandscapeDrawingLayout.Rev3 - P:\224763.02 - MUSWELLBROOK, Supplementary Geo & Waste\7.0 Drawings\7.2 Out\224763.02 Test Location Plan.qgz

SITE LOCATION

LEGEND

- Test Pit Location (current investigation)
- Borehole Location (current investigation)
- Borehole Location - DP (2023a)
- Proposed Development

0 50 100 150 m

NOTE:
1. Drawing projection in GDA2020 / MGA zone 56, adapted from Metromap Image and 1974 Historical Aerial Photo.
2. Test locations are approximate only and were located using differential GPS typically accurate to ± 0.1 m depending on satellite coverage

Douglas PARTNERS

CLIENT: Ausgrid		TITLE: **1974 Historical Aerial Photo**	PROJECT: 224763.02
OFFICE: Newcastle	DRAWN BY: PLH	**Proposed Substation**	DRAWING No: 2
SCALE: 1:4000 @A3	DATE: 31.May.2024	**20 Sandy Creek Road, Muswellbrook, NSW**	REVISION: 0

N

Appendix B

About this Report

About this Report

November 2023

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.

continued next page

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.

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Appendix C

Data Quality Objectives

1. Data Quality Objectives

The DSI has been devised broadly in accordance with the seven-step data quality objectives (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).

Table 1: Data quality objectives

Step	Summary
1: State the problem	The objective of the investigation is to assess the contamination status of the site with respect to the proposed land use. The report is being undertaken as the land is to be redeveloped. A preliminary conceptual site model (CSM) has been prepared (Section 6) for the proposed development. The project team consisted of experienced environmental engineers and scientists working in the roles of Project Principal, Project Reviewer, Project Manager, 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 6). 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 E. 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 will be derived and a decision made on whether (or not) further assessment and / or remediation will be required.
3: Identify the information inputs	Inputs to the investigation will be the results of analysis of samples to measure the concentrations of CoPC identified in the CSM (Section 6) at the site using NATA accredited laboratories and methods, where possible. The SAC for each of the CoPC are detailed in Appendix E. 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.
5: Develop the analytical approach (or decision rule)	The decision rule is to compare all analytical results with SAC (Appendix E, 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, and laboratory results, RPDs should generally be below 30%; for field blanks, results should be at or less than the limits of reporting (NEPC, 2013). The field and laboratory quality assurance assessment is included in Appendix I.
6: Specify the performance or acceptance criteria	Baseline condition: Contaminants at the site exceed human health and environmental SAC and pose a potentially unacceptable risk to receptors (null hypothesis). Alternative condition: Contaminants at the site comply with human health and environmental SAC and as such, do 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 7.

2. 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.

Appendix D

Field Work Methodology

1. 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);
- HEPA *PFAS National Environmental Management Plan (NEMP)* (HEPA, 2020).

2. Soil Sampling

Soil sampling is carried out in accordance with Douglas' standard operating procedures. The general sampling and sample management procedures comprise:

- Collect soil samples directly from the excavator bucket at the nominated sample depth;
- Collect near surface samples using hand tools;
- Place samples into laboratory-prepared glass jars with Teflon lined lids, capping immediately and minimising headspace within the sample jar;
- Place samples into laboratory-prepared containers (specific for PFAS), capping immediately and minimising headspace within the sample jar;
- Collect replicate samples in zip-lock bags for photoionisation detector (PID) screening;
- Collect ~500 ml samples in zip-lock bags for fibrous asbestos and asbestos fines (FA and AF) analysis;
- Wear a new disposable nitrile glove for each sample point thereby minimising potential for cross-contamination;
- Collect 10% replicate samples for quality control (QC) purposes;
- Label sample containers with individual and unique identification details, including project number, sample location and sample depth (where applicable);
- Place samples into a cooled, insulated and sealed container for transport to the laboratory;
- Use chain of custody documentation.

Reference was made to HEPA (2020) for requirements specific to PFAS.

2.1 Field testing

Field testing is carried out in accordance with Douglas' 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 using the PID.

3. References

HEPA. (2020). *PFAS National Environmental Management Plan (NEMP).* Version 2.0: Heads of EPAs Australia and New Zealand and Australian Government Department of the Environment.

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

Appendix E

Site Assessment Criteria

1. Introduction

1.1 Guidelines

The following key guidelines were consulted for deriving the site assessment criteria (SAC):

- NEPC *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [NEPM]* (NEPC, 2013);
- CRC CARE *Health screening levels for petroleum hydrocarbons in soil and groundwater* (CRC CARE, 2011);
- HEPA *PFAS National Environmental Management Plan (NEMP)* (HEPA, 2020).

1.2 General

The SAC applied in the current investigation are informed by the CSM which identified human and environmental receptors to potential contamination at the site. Analytical results are assessed (as a Tier 1 assessment) against the SAC comprising primarily the investigation and screening levels of Schedule B1 of NEPC (2013).

The following inputs are relevant to the selection and/or derivation of the SAC:

- Land use: commercial / industrial.
  - Corresponding to land use category 'D', commercial / industrial such as factories and industrial sites.
- Soil type: sand. The natural soils are predominantly clay, however, the fill assessed at the site is generally a coarse-grained material.

2. Soils

2.1 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 in Table 1 and Table 2.

Table 1: Health investigation levels (mg/kg)

Contaminant	HIL-D
Metals	
Arsenic	3000
Cadmium	900
Chromium (VI)	3600
Copper	240 000
Lead	1500
Mercury (inorganic)	730
Nickel	6000
Zinc	400 000
PAH	
B(a)P TEQ	40
Total PAH	4000
Phenols	
Phenol	240 000
OCP	
DDT+DDE+DDD	3600
Aldrin and dieldrin	45
Chlordane	530
Endosulfan	2000
Endrin	100
Heptachlor	50
HCB	80
Methoxychlor	2500
OPP	
Chlorpyrifos	2000
PCB	
PCB	7

Table 2: Health screening levels (mg/kg)

Contaminant	HSL-D	HSL-D	HSL-D	HSL-D
SAND	**0 m to <1 m**	**1 m to <2 m**	**2 m to <4 m**	**4 m+**
Benzene	3	3	3	3
Toluene	NL	NL	NL	NL
Ethylbenzene	NL	NL	NL	NL
Xylenes	230	NL	NL	NL
Naphthalene	NL	NL	NL	NL
TRH F1	260	370	630	NL
TRH F2	NL	NL	NL	NL

Notes: TRH F1 is TRH C_6-C_{10} minus BTEX
TRH F2 is TRH >C_{10}-C_{16} minus naphthalene
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'

The HSL for direct contact derived from CRC CARE (2011) are in Table 3.

Table 3: Health screening levels for direct contact (mg/kg)

Contaminant	DC HSL-D	DC HSL-IMW
Benzene	430	1100
Toluene	99 000	120 000
Ethylbenzene	27 000	85 000
Xylenes	81 000	130 000
Naphthalene	11 000	29 000
TRH F1	26 000	82 000
TRH F2	20 000	62 000
TRH F3	27 000	85 000
TRH F4	38 000	120 000

Notes: TRH F1 is TRH C_6-C_{10} minus BTEX
TRH F2 is TRH >C_{10}-C_{16} minus naphthalene
IMW intrusive maintenance worker

2.2 Health investigation levels for per- and poly-fluoroalkyl substances in soil

The laboratory analytical results for per- and poly-fluoroalkyl substances (PFAS) in soil have been assessed against HIL published in HEPA (2020). The HIL represent a nationally-agreed suite that should be used to inform site investigations. The HIL are intentionally conservative, and an exceedance of these criteria may not constitute a risk if other exposure pathways are controlled. An exceedance of the HIL should trigger further investigations, such as a site-specific risk assessment. At the time of this investigation, screening values were available only for perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA) and perfluorohexane sulfonate (PFHxS).

The HIL derived from Table 2 of HEPA (2020) are in Table 4.

Table 4: Health investigation levels (mg/kg)

Contaminant	HIL-D
PFOS and PFHxS *	20
PFOA	50

Notes: * Includes PFOS only, PFHxS only and the sum of the two.

2.3 Asbestos in soil

The HSL for asbestos in soil are based on likely exposure levels for different scenarios published in NEPC (2013) for the following forms of asbestos:

- Bonded asbestos containing material (ACM); and
- Fibrous asbestos and asbestos fines (FA and AF).

The HSL are in Table 5.

Table 5: Health screening levels for asbestos

Form of asbestos	HSL-D
ACM	0.05%
FA and AF	0.001%
FA and AF and ACM	No visible asbestos for surface soil *

Notes: Surface soils defined as top 10 cm.
* Based on site observations at the sampling points and the analytical results of surface samples.

2.4 Ecological investigation 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 7, with inputs into their derivation shown in Table 6.

Table 6: Inputs to the derivation of the ecological investigation levels

Variable	Input	Rationale
Age of contaminants	"Aged" (>2 years)	Existing commercial site
pH	4	Assumed, conservative value
CEC	5 $cmol_c/kg$	Assumed, conservative value
Clay content	10%	Assumed, conservative value
Traffic volumes	high	Established site
State / Territory	NSW	

Table 7: Ecological investigation levels (mg/kg)

Contaminant	EIL-D
Metals	
Arsenic	160
Copper	75
Nickel	60
Chromium III	670
Lead	1800
Zinc	190
PAH	
Naphthalene	370
OCP	
DDT	640

Notes: EIL-D commercial/industrial

2.5 Ecological screening levels

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 8.

Table 8: Ecological screening levels (mg/kg)

Contaminant	Soil Type	ESL-D
Benzene	Coarse	75
Toluene	Coarse	135
Ethylbenzene	Coarse	165
Xylenes	Coarse	180
TRH F1	Coarse/ Fine	215*
TRH F2	Coarse/ Fine	170*
TRH F3	Coarse	1700
TRH F4	Coarse	3300
B(a)P	Coarse	1.4

Notes: ESL are of low reliability except where indicated by * which indicates that the ESL is of moderate reliability
TRH F1 is TRH C_6-C_{10} minus BTEX
TRH F2 is TRH >C_{10}-C_{16} including naphthalene
ESL-D commercial/industrial

2.6 Ecological soil guideline values

The interim ecological soil guideline values (EGV) derived from Table3 of HEPA (2020) are in Table 9.

Table 9: Ecological soil guideline values (mg/kg) – all land uses

Contaminant	Direct exposure	Indirect exposure
PFOS	1	0.01
PFOA	10	NC
PFHxS	NC	NC

Notes: NC no criterion

2.7 Management limits

In addition to appropriate consideration and application of the HSL and ESL, there are additional considerations which reflect the nature and properties of petroleum hydrocarbons, including:

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

The adopted management limits are in Table 10.

Table 10: Management limits (mg/kg)

Contaminant	Soil type	ML-D
TRH F1	Coarse	700
TRH F2	Coarse	1000
TRH F3	Coarse	3500
TRH F4	Coarse	10 000
TRH F1	Fine	800
TRH F2	Fine	1000
TRH F3	Fine	5000
TRH F4	Fine	10 000

Notes: TRH F1 is TRH C_6-C_{10} including BTEX
TRH F2 is TRH >C_{10}-C_{16} including naphthalene
ML-A-B-C residential, parkland and public open space

3. References

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Appendix F

Site Photographs

Photograph F1: looking north-east from the western portion of the site, with the site falling to the north (existing substation in background)

Photograph F2: Possible ash and coal gravel at the site surface, generally in the eastern portion of the site

Photograph F3: levelled area in the southern portion of the site, looking west

Appendix G

Test Pit Logs Pits 313 to 324

Borehole Logs – Bores 9 to 17, Bores 218 to 223

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: Proposed Muswellbrook Substation
LOCATION: 20 Sandy Creek Road, Muswellbrook, NSW

SURFACE LEVEL:
COORDINATE: E:303297.3, N:6430277.4
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 218
PROJECT No: 224763.02
DATE: 07/03/24
SHEET: 1 of 2

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL ORIGIN(#)	SOIL CONSIS.(*) DENSITY.(*)	SOIL MOISTURE	ROCK WEATH.	ROCK DEPTH (m)	ROCK STRENGTH	ROCK RECOVERY (%)	ROCK RQD	ROCK FRACTURE SPACING (m)	ROCK DEFECTS & REMARKS	SAMPLE REMARKS	SAMPLE TYPE	SAMPLE INTERVAL	DEPTH (m)	TESTING TEST TYPE	TESTING RESULTS AND REMARKS
07/03/24 No free groundwater observed		0.70	Sandy CLAY (CI), trace gravel: orange brown; medium plasticity; fine to coarse sand.		RS	H	w<PL									B	0.10–0.20	0.10		
		1	Sandy CLAY (CL), trace gravel: pale brown; low plasticity; fine to medium, rounded to sub-rounded gravel; extremely weathered pebbly sandstone, friable.		XWM	H	w<PL									D U50	0.50 0.70	0.50 0.70	PP	>600kPa
		2.00	SANDSTONE: pale brown. 2.00m: driller observed increase in resistance indicative of rock		XWM	NA	NA									SPT	1.00 1.45	1.00 1.45	SPT PP	14,24,25 N=49 >600kPa
		2.34	SANDSTONE: pale brown with orange brown iron staining						2.34	VL								2	PLT	PL(D)=0.05MPa
		3	3.58m-3.66m: carbonate cemented					HW	2.80 3.58 3.66	L H L	100	73		2.80m: P , SGH, PR, Clay, RF 3.22-3.31m: FC 3.57m: JT, 45°, PR, RF 3.67m: JT, 10°, PR, RF					3	PLT PLT PLT	PL(A)=0.1MPa PL(D)=0.05MPa PL(D)=1.3MPa
		4												3.98m: P, SH, PR, Clay, RF 4.01m: JT, 50°, PR, Clay, SM 4.08m: JT, 45°, PR, Clay, SM 4.78m: JT, 60°, PR, RF					4	PLT PLT	PL(A)=0.04MPa PL(D)=0.07MPa

NOTES: (#) Soil origin is "probable" unless otherwise stated. (*) Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Comacchio GEO 405
METHOD: SFA to 2.34m, NMLC to 8.3m depth
REMARKS:

OPERATOR: Ground Test

LOGGED: Chaplin
CASING: HWT to 2.3m

Refer to explanatory notes for symbol and abbreviation definitions

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: Proposed Muswellbrook Substation
LOCATION: 20 Sandy Creek Road, Muswellbrook, NSW

SURFACE LEVEL:
COORDINATE: E:303297.3, N:6430277.4
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 218
PROJECT No: 224763.02
DATE: 07/03/24
SHEET: 2 of 2

CONDITIONS ENCOUNTERED																			SAMPLE				TESTING	
				SOIL				ROCK																
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(†) DENSITY.(†)	MOISTURE	WEATH.	DEPTH (m)	STRENGTH VL L M H VH EH	RECOVERY (%)	RQD	FRACTURE SPACING (m) 0.06 0.2 0.6 2.0 6.0	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
		6	[CONT] SANDSTONE: pale brown with orange brown iron staining					HW		L	100	73		5.45m: P , SM, PR, Clay, RF 5.70m : JT, 45°, PR, RF, DB?				6	PLT PLT	PL(D)=0.14MPa PL(A)=0.12MPa
																			PLT PLT	PL(A)=0.13MPa PL(D)=0.05MPa
									6.80		100	100								
		7	From 7.40m: colour becomes grey					MW										7	PLT PLT	PL(D)=0.06MPa PL(A)=0.16MPa
									7.40										PLT	PL(A)=0.12MPa
								FR												
		8	Borehole discontinued at 8.30m depth. Limit of investigation.															8	PLT	PL(A)=0.12MPa
		9																		

NOTES: (#)Soil origin is "probable" unless otherwise stated. (†)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Comacchio GEO 405
METHOD: SFA to 2.34m, NMLC to 8.3m depth
REMARKS:

OPERATOR: Ground Test

LOGGED: Chaplin
CASING: HWT to 2.3m

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

CORE PHOTO LOG

CLIENT: Ausgrid
PROJECT: Proposed Muswellbrook Substation
LOCATION: 20 Sandy Creek Road, Muswellbrook, NSW

SURFACE LEVEL:
COORDINATE: E:303297.3, N:6430277.4
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 218
PROJECT No: 224763.02
DATE: 07/03/24
SHEET: 1 of 1

2.34-6.00 m depth

6.00-8.30 m depth

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: Proposed Muswellbrook Substation
LOCATION: 20 Sandy Creek Road, Muswellbrook, NSW

SURFACE LEVEL:
COORDINATE: E:303288.0, N:6430246.6
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 219
PROJECT No: 224763.02
DATE: 04/03/24
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
04/03/24 No free groundwater observed	0.30	Sandy CLAY (CI), with gravel: pale orange pale brown; medium plasticity; fine to coarse sand; fine to coarse, rounded to sub-rounded gravel.		RS	VSt to H	w<PL		D		0.10 0.20		
	1	Sandy CLAY (CL-CI), with gravel: pale orange pale brown; low to medium plasticity; fine to coarse sand; fine to coarse, rounded to sub-rounded gravel; extremely weathered pebbly sandstone, friable, soil-like properties.		XWM	H	w<PL		D SPT		0.80 0.90 1.00	SPT	12,21,25 N=46
		1.80m: drilling resistance increased indicative of rock								1.45	PP	>400kPa
	1.80 2	PEBBLY SANDSTONE.								2		
	3			XWM				SPT		2.50 2.58	SPT PP	25/80 (HB) >600kPa
	4	Borehole discontinued at 5.00m depth. Limit of investigation.						SPT		3 4.00		25/0 (HB)

NOTES: (#) Soil origin is "probable" unless otherwise stated. (*) Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Comacchio GEO 405
METHOD: SFA with TC Bit to 5.0m depth
REMARKS:

OPERATOR: Ground Test

LOGGED: Chaplin
CASING: Nil

Refer to explanatory notes for symbol and abbreviation definitions

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: Proposed Muswellbrook Substation
LOCATION: 20 Sandy Creek Road, Muswellbrook, NSW

SURFACE LEVEL:
COORDINATE: E:303203.4, N:6430212.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 220
PROJECT No: 224763.02
DATE: 04/03/24
SHEET: 1 of 1

GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	SAMPLE TYPE	SAMPLE INTERVAL	DEPTH (m)	TESTING AND REMARKS: TEST TYPE	TESTING AND REMARKS: RESULTS AND REMARKS
04/03/24 No free groundwater observed	0.20	FILL / Sandy CLAY (CL), with silt, with gravel: brown; low plasticity; fine to coarse sand; fine to coarse, angular to sub-angular gravel; contains coal fragments, abundant rootlets to 0.1m.		FILL	NA	w<PL		D		0.20		
		Sandy CLAY (CI), with gravel: orange brown; medium plasticity; fine to coarse sand; fine to coarse, rounded to sub-rounded gravel.		RS	H	w<PL		D		0.50 0.60		
	1									1.00		
	1.10	Sandy CLAY (CL), with gravel: pale brown pale orange; low plasticity; fine to coarse, rounded to sub-rounded gravel; friable, extremely weathered pebbly sandstone.		XWM	H	w<PL		SPT			SPT	3,10,18 N=28 410kPa
		1.80m: driller observed increase in resistance indicative of rock								1.45	PP PP	>600kPa
	1.80	PEBBLY SANDSTONE.		XWM						2		
	2							SPT		2.50 2.55	SPT	25/50 (HB)
		Borehole discontinued at 2.60m depth. Limit of investigation.										
	3											
	4											

NOTES: (#) Soil origin is "probable" unless otherwise stated. (*) Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Comacchio GEO 405
METHOD: SFA with TC Bit to 2.60m depth
REMARKS:

OPERATOR: Ground Test

LOGGED: Chaplin
CASING: Nil

Refer to explanatory notes for symbol and abbreviation definitions

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: Proposed Muswellbrook Substation
LOCATION: 20 Sandy Creek Road, Muswellbrook, NSW

SURFACE LEVEL:
COORDINATE: E:303333.5, N:6430278.1
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 221
PROJECT No: 224763.02
DATE: 07/03/24
SHEET: 1 of 2

CONDITIONS ENCOUNTERED																				SAMPLE				TESTING	
				SOIL			ROCK																		
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(†) DENSITY.(†)	MOISTURE	WEATH.	DEPTH (m)	STRENGTH VL L M H VH EH	RECOVERY (%)	RQD	FRACTURE SPACING (m) 0.005 0.05 0.15 0.50 1.00 >1.00	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
07/03/24 No free groundwater observed		0.10	SILT (ML), with sand, with gravel: pale brown; low plasticity; fine to medium sand; fine to coarse, sub-angular to sub-rounded gravel.		COL possibly TOP RS	NA H	w<PL w<PL									D B D U50		0.10 0.20 0.30 0.50 0.67	PP	>600kPa
		0.50	CLAY (CI), with sand, trace gravel: orange brown; medium plasticity; fine to coarse sand; fine to medium, rounded to sub-rounded gravel.																	
		1	Sandy CLAY (CL), with gravel: pale brown pale orange; low plasticity; fine to coarse, rounded to sub-rounded gravel; extremely weathered pebbly sandstone, friable.		XWM	H	w<PL									SPT		1.00 1.29	SPT PP	7,25/140 >600kPa
		2	2.20m: driller observed increase in resistance															2		
		2.20	PEBBLY SANDSTONE: orange brown.		XWM	NA	NA														
		2.50	2.50m-2.70m: clast					HW	2.50	M				2.50-2.70m: FC, fractured clast						
		2.70	PEBBLY SANDSTONE: orange brown, fine to coarse grained						2.70											
			CORE LOSS: 0.3m						3.00					3.05m: JT, 15°, PR, RF				3		
		3.00	PEBBLY SANDSTONE: orange brown, fine to coarse grained					HW		M	80	40		3.25m: JT, 10°, PR, RF					PLT PLT	PL(A)=0.44MPa PL(D)=0.4MPa
									3.40	L										
								SEAM	3.65 3.72	SEAM			SEAM	3.65-3.72m: DS						
		4								L				3.80m: JT, SH, PR, Fe, RF 3.87m: JT, 10°, PR, Fe, RF 3.95m: JT, 45°, IR, Fe, RF 4.00-4.07m: FC 4.14-4.21m: FC				4		
								HW	4.40		100	53							PLT PLT	PL(A)=0.23MPa PL(D)=0.29MPa
										M	100	62		4.64m: P, SH 4.69m: P, SH 4.69-4.80m: FC, DB? 4.80-4.85m: FC, DB? 4.98m: JT, 10°, PR,						

NOTES: (#)Soil origin is "probable" unless otherwise stated. (†)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Comacchio GEO 405
METHOD: SFA to 2.5m, NMLC to 8.50m depth
REMARKS:

OPERATOR: Ground Test

LOGGED: Chaplin
CASING: HWT to 2.5m

Refer to explanatory notes for symbol and abbreviation definitions

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Douglas PARTNERS

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: Proposed Muswellbrook Substation
LOCATION: 20 Sandy Creek Road, Muswellbrook, NSW

SURFACE LEVEL:
COORDINATE: E:303333.5, N:6430278.1
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 221
PROJECT No: 224763.02
DATE: 07/03/24
SHEET: 2 of 2

CONDITIONS ENCOUNTERED																				SAMPLE				TESTING	
				SOIL				ROCK																	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(†) / DENSITY.(†)	MOISTURE	WEATH.	DEPTH (m)	STRENGTH (VL L M H VH EH)	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
	6	[CONT] PEBBLY SANDSTONE: orange brown, fine to coarse grained					SEAM HW	5.05 5.10	SEAM M	100 100 100	62 59 82	SEAM	Fe, RF 5.00m: P, SH, PR, Fe, RF 5.00-5.05m: FC 5.05-5.10m: DS 5.19m: P, SH, PR, Fe, RF 5.35m: DB 5.50-5.58m: FC 5.63m: P, SH, PR, Fe, RF 5.63-5.70m: FC 5.84m: JT, SH, IR, Fe, RF 5.88-6.00m: JT, SV, IR, Fe, RF 6.10m: P, 10°, PR, Fe, RF 6.29m: JT, 45°, PR, Fe, RF 6.36m: P, 10°, PR, Fe, RF 6.42m: P, 10°, PR, Fe, RF 6.56m: JT, 15°, IR, RF 6.74m: P, SH, PR, TI Fe, RF 7.19m: P, 10°, PR, TI Fe, RF 7.79m: P, 10°, PR, TI Fe, RF 7.99m: P, 10°, PR, TI Fe, RF 8.40m: JT, 15°, IR, Fe, RF 8.50m: JT, 30°, PR, Fe, RF				6	PLT PL(A)=0.42MPa PLT PL(D)=0.22MPa	
	7																	7	PLT PL(A)=0.36MPa PLT PL(D)=0.02MPa PLT PL(A)=0.38MPa PLT PL(D)=0.04MPa	
	8	Borehole discontinued at 8.50m depth. Limit of investigation.																8	PLT PL(D)=0.31MPa PLT PL(A)=0.36MPa	
	9																			

NOTES: (#)Soil origin is "probable" unless otherwise stated. (†)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Comacchio GEO 405
METHOD: SFA to 2.5m, NMLC to 8.50m depth
REMARKS:

OPERATOR: Ground Test

LOGGED: Chaplin
CASING: HWT to 2.5m

Refer to explanatory notes for symbol and abbreviation definitions

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Douglas PARTNERS

CORE PHOTO LOG

CLIENT: Ausgrid
PROJECT: Proposed Muswellbrook Substation
LOCATION: 20 Sandy Creek Road, Muswellbrook, NSW

SURFACE LEVEL:
COORDINATE: E:303333.5, N:6430278.1
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 221
PROJECT No: 224763.02
DATE: 07/03/24
SHEET: 1 of 1

2.50-7.00 m depth

7.00-8.56 m depth

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: Proposed Muswellbrook Substation
LOCATION: 20 Sandy Creek Road, Muswellbrook, NSW

SURFACE LEVEL:
COORDINATE: E:303353.2, N:6430241.8
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 222
PROJECT No: 224763.02
DATE: 07/03/24
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
04/03/24 No free groundwater observed	0.00	FILL / SILT (ML), with sand, trace gravel: pale brown grey; low plasticity; fine sand; fine to medium, rounded to sub-rounded gravel; possibly ash.		FILL	NA	w<PL		D		0.20 0.30		
	0.50	CLAY (CI), with sand, trace gravel: red orange; medium plasticity; fine to coarse sand; fine to medium, rounded to sub-rounded gravel.		RS	H	w<PL		U50		0.50 0.78	PP	>400kPa
	1							SPT		1.00	SPT	10,13,19 N=32 >400kPa
	1.35	Sandy CLAY (CL), with gravel: pale brown pale orange; low plasticity; fine to coarse sand; fine to coarse, rounded to sub-rounded gravel; extremely weathered pebbly sandstone.		XWM	H	w<PL				1.45	PP PP	>400kPa
	2									2		
	3.00	PEBBLY SANDSTONE.		XWM				SPT		2.50 2.64	SPT PP	25/140 >600kPa
	4							SPT		3 4.00 4.10	SPT PP	25/100 (HB) >600kPa
		Borehole discontinued at 5.00m depth. Limit of investigation.										

NOTES: (#) Soil origin is "probable" unless otherwise stated. (*) Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Comacchio GEO 405
METHOD: SFA with TC Bit to 5.0m depth
REMARKS:

OPERATOR: Ground Test

LOGGED: Chaplin
CASING: Nil

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: Proposed Muswellbrook Substation
LOCATION: 20 Sandy Creek Road, Muswellbrook, NSW

SURFACE LEVEL:
COORDINATE: E:303178.8, N:6430252.2
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 223
PROJECT No: 224763.02
DATE: 07/03/24
SHEET: 1 of 2

GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL: ORIGIN(#)	SOIL: CONSIS.(†) / DENSITY.(†)	SOIL: MOISTURE	ROCK: WEATH.	ROCK: DEPTH (m)	ROCK: STRENGTH	ROCK: RECOVERY (%)	ROCK: RQD	ROCK: FRACTURE SPACING (m)	ROCK: DEFECTS & REMARKS	SAMPLE: SAMPLE REMARKS	SAMPLE: TYPE	SAMPLE: INTERVAL	DEPTH (m)	TESTING: TEST TYPE	TESTING: RESULTS AND REMARKS
07/03/24 No groundwater observed	0.00	CLAY, with sand, trace gravel: orange brown; fine to coarse, rounded to sub-rounded gravel.		RS	H	w<PL									B		0.40 0.50		
	0.50	Sandy CLAY (CL), with gravel: pale brown; low plasticity; fine to coarse sand; fine to coarse, rounded to sub-rounded gravel; extremely weathered pebbly sandstone, friable.		XWM	H	w<PL									D U50		0.76		
	1														SPT		1.00 1.29	SPT	8,25/140
		2.00m: driller observed increase in resistance indicative of rock																	
	2.00	SANDSTONE (PEBBLY).		XWM	H	NA											2		
	2.56	PEBBLY SANDSTONE: pale brown with orange brown iron staining, fine to coarse grained					HW	2.56	M	100	67		2.69m: JT, SH, PR, Fe, RF 2.81m JT, SH, PR, Fe, RF 2.85m: JT, 45°, PR, Fe, RF		SPT		2.50 2.56	SPT	25/60
	3						SEAM	3.00 3.03	SEAM			SEAM	3.03-3.20m: DS				3	PLT PLT	PL(D)=0.05MPa PL(A)=0.37MPa
								3.20	VL				3.20-3.30m: FC					PLT PLT	PL(A)=0.37MPa PL(D)=0.09MPa
								3.45					3.43m: JT, SH, PR, TI Fe, RF 3.60m: DB						
	4						HW		M	100	95						4	PLT PLT	PL(D)=0.07MPa PL(A)=0.35MPa
																		PLT PLT	PL(D)=0.32MPa PL(A)=0.34MPa

NOTES: (#)Soil origin is "probable" unless otherwise stated. (†)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Comacchio GEO 405
METHOD: SFA to 2.56m, NMLC to 8.35m depth
REMARKS:

OPERATOR: Ground Test

LOGGED: Chaplin
CASING: HWT to 2.5m

Refer to explanatory notes for symbol and abbreviation definitions

Generated with CORE-GS by Geroc - Combined Log

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: Proposed Muswellbrook Substation
LOCATION: 20 Sandy Creek Road, Muswellbrook, NSW

SURFACE LEVEL:
COORDINATE: E:303178.8, N:6430252.2
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 223
PROJECT No: 224763.02
DATE: 07/03/24
SHEET: 2 of 2

CONDITIONS ENCOUNTERED																			SAMPLE				TESTING	
				SOIL				ROCK																
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(†) DENSITY.(†)	MOISTURE	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
		6	[CONT] PEBBLY SANDSTONE: pale brown with orange brown iron staining, fine to coarse grained								100	95		5.00m: DB 5.44m: DB 5.68m: JT, 10°, PR, Fe, RF				6	PLT PLT	PL(D)=0.24MPa PL(A)=0.73MPa
								HW		M				6.61-6.74m: FG, DB?					PLT PLT	PL(A)=0.4MPa PL(D)=0.3MPa
		7									100	90		6.83-6.90m: FG				7	PLT PLT	PL(D)=0.19MPa PL(A)=0.39MPa
		8												7.95-8.23m: JT, 75°, PR, TI Fe, RF, Qz				8	PLT PLT	PL(D)=0.52MPa PL(A)=0.39MPa
			Borehole discontinued at 8.35m depth. Limit of investigation.																	
		9																		

NOTES: (#)Soil origin is "probable" unless otherwise stated. (†)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Comacchio GEO 405
METHOD: SFA to 2.56m, NMLC to 8.35m depth
REMARKS:

OPERATOR: Ground Test

LOGGED: Chaplin
CASING: HWT to 2.5m

Refer to explanatory notes for symbol and abbreviation definitions

Generated with CORE-GS by Geroc - Combined Log

CORE PHOTO LOG

CLIENT: Ausgrid
PROJECT: Proposed Muswellbrook Substation
LOCATION: 20 Sandy Creek Road, Muswellbrook, NSW

SURFACE LEVEL:
COORDINATE: E:303178.8, N:6430252.2
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 223
PROJECT No: 224763.02
DATE: 07/03/24
SHEET: 1 of 1

2.56-6.00 m depth

6.00-8.36 m depth

TEST PIT LOG

CLIENT: Ausgrid
PROJECT: Proposed Muswellbrook Substation
LOCATION: 20 Sandy Creek Road, Muswellbrook, NSW

SURFACE LEVEL: 187.0 AHD
COORDINATE: E:303288.9, N:6430213.3
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 313
PROJECT No: 224763.02
DATE: 12/03/24
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE			TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN[#]	CONSIS.[^] / DENSITY.[^]	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
12/03/24 No free groundwater observed	187.0 / 0.00	FILL / Sandy CLAY (CL), with silt, with gravel: mottled red orange; low plasticity; fine to medium sand; fine to medium, sub-angular to sub-rounded gravel; with organics, rootlets; trace coal fines.		FILL	NA	w<PL		D/ES		0.20	PID	<1ppm
	186.7 / 0.30	Sandy CLAY (CL), with gravel: pale brown orange; low plasticity; fine to medium, sub-angular to sub-rounded gravel.		RS	H	w<PL		D/ES		0.80	PID PP	<1ppm >400kPa
	186 / 1									1		
	185.9 / 1.10	Sandy CLAY (CL), with gravel: pale brown orange; low plasticity; fine to medium sand; fine to medium, sub-angular to sub-rounded gravel; extremely weathered pebbly sandstone.		RS	H	w<PL		D/ES		1.50	PID PP	<1ppm >400kPa
	185 / 2	Test Pit discontinued at 1.70m depth. Limit of investigation. Solid rock encountered..								2		
	184 / 3									3		
	183 / 4									4		

Pit 313

Spoil from Pit 313

NOTES: [#] Soil origin is "probable" unless otherwise stated. [^] Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: 21T excavator
METHOD: 600mm Bucket
REMARKS:

OPERATOR: JE & J Robinsons

LOGGED: Krebs

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

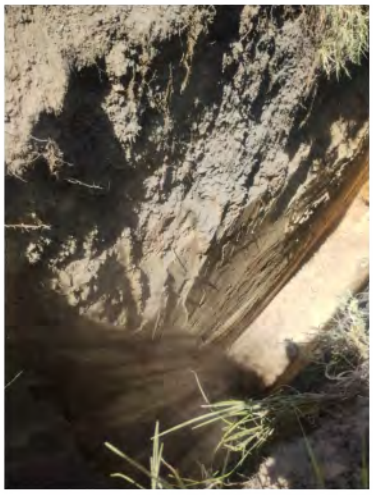
TEST PIT LOG

CLIENT: Ausgrid
PROJECT: Proposed Muswellbrook Substation
LOCATION: 20 Sandy Creek Road, Muswellbrook, NSW

SURFACE LEVEL: 184.4 AHD
COORDINATE: E:303329.0, N:6430231.1
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 314
PROJECT No: 224763.02
DATE: 12/03/24
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
12/03/24 No free groundwater observed	184	0.10 FILL / Silty SAND (SM), trace gravel: brown; fine to medium; fine to medium, sub-angular to sub-rounded gravel; trace organics, rootlets.		FILL	NA	NA		D/ES		0.05	PID	<1ppm
		FILL / Sandy GRAVEL (GP): dark brown grey; fine to medium, sub-angular to sub-rounded; fine to medium sand; with coal fines, slag, ash.		FILL	NA	NA		D/ES		0.50	PID	<1ppm
	183	0.90 FILL / Sandy CLAY (CL), with gravel: mottled grey brown; low plasticity; fine to medium sand; fine to medium, sub-angular to sub-rounded gravel; trace coal fines, slag, ash.		FILL	NA	NA		D/ES		1.50	PID	<1ppm
	182	1.60 Sandy CLAY (CL): pale orange brown; low plasticity; fine to medium sand.		RS	H	w<PL		D/ES		2.50	PID PP	<1ppm >400kPa
	181											
	180	Test Pit discontinued at 4.10m depth. Pit wall collapse, no solid rock encountered..										



Pit 314

Spoil from Pit 314

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: 21T excavator
METHOD: 600mm Bucket
REMARKS: D2/SBK @ 0.5m

OPERATOR: JE & J Robinsons

LOGGED: Krebs

Refer to explanatory notes for symbol and abbreviation definitions

TEST PIT LOG

CLIENT: Ausgrid
PROJECT: Proposed Muswellbrook Substation
LOCATION: 20 Sandy Creek Road, Muswellbrook, NSW

SURFACE LEVEL: 185.1 AHD
COORDINATE: E:303339.9, N:6430190.4
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 315
PROJECT No: 224763.02
DATE: 12/03/24
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN[#]	CONSIS.[*] / DENSITY.[*]	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
12/03/24 No free groundwater observed	185 / 0	FILL / Sandy CLAY (CL), with silt, with gravel: orange brown; low plasticity; fine to medium sand; fine to medium, sub-angular to sub-rounded gravel.		FILL possibly TOP	NA	w<PL		D/ES		0.20	PID	<1ppm
	0.30	Sandy CLAY (CL), with gravel: pale orange brown; low plasticity; fine to medium sand; fine to medium, sub-angular to sub-rounded gravel.		RS	H	w<PL		D/ES		0.50	PID PP	<1ppm >400kPa
	0.90	Sandy CLAY (CL), with gravel: pale brown orange; low plasticity; fine to medium sand; fine to medium, sub-angular to sub-rounded gravel; extremely weathered sandstone, friable.		XWM	H	w<PL		D/ES		1.00	PID PP	<1ppm >400kPa
	184 / 1											
	183 / 2							D/ES		2.00	PID PP	<1ppm >400kPa
		Test Pit discontinued at 2.70m depth. Limit of investigation. Solid rock encountered..										
	182 / 3									3		
	181 / 4									4		

Pit 315

Spoil from Pit 315

NOTES: [#] Soil origin is "probable" unless otherwise stated. [*] Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: 21T excavator
METHOD: 600mm Bucket
REMARKS:

OPERATOR: JE & J Robinsons

LOGGED: Krebs

Refer to explanatory notes for symbol and abbreviation definitions

TEST PIT LOG

CLIENT: Ausgrid
PROJECT: Proposed Muswellbrook Substation
LOCATION: 20 Sandy Creek Road, Muswellbrook, NSW

SURFACE LEVEL: 188.9 AHD
COORDINATE: E:303296.1, N:6430182.6
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 316
PROJECT No: 224763.02
DATE: 12/03/24
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN[#]	CONSIS.[*] / DENSITY.[*]	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
12/03/24 No free groundwater observed	188 / 0	TOPSOIL / Silty Sandy CLAY (CL): brown; low plasticity; fine to medium sand; with organics, rootlets.		TOP	VSt	w<PL		D/ES		0.20	PID PP	<1ppm 200kPa
	0.40											
	188 / 1	CLAY (CL), with sand, trace gravel: orange brown; low plasticity; fine to medium sand; fine to medium, sub-angular to sub-rounded gravel.		RS	H	w<PL		D/ES		0.70	PID PP	<1ppm >400kPa
	1.10											
	187 / 2	Sandy CLAY (CL), with gravel: pale brown; low plasticity; fine to medium sand; fine to medium, sub-angular to sub-rounded gravel; extremely weathered pebbly sandstone.		RS	H	w<PL		D/ES		1.20	PID PP	<1ppm >400kPa
								D/ES		1.70	PID	<1ppm
		Test Pit discontinued at 2.00m depth. Limit of investigation. Solid rock encountered..								2	PP	>400kPa
	186 / 3									3		
	185 / 4									4		
	184											

Pit 316

Spoil from Pit 316

NOTES: [#] Soil origin is "probable" unless otherwise stated. [*] Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: 21T excavator
METHOD: 600mm Bucket
REMARKS:

OPERATOR: JE & J Robinsons

LOGGED: Krebs

Refer to explanatory notes for symbol and abbreviation definitions

TEST PIT LOG

CLIENT: Ausgrid
PROJECT: Proposed Muswellbrook Substation
LOCATION: 20 Sandy Creek Road, Muswellbrook, NSW

SURFACE LEVEL: 186.8 AHD
COORDINATE: E:303236.9, N:6430230.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 317
PROJECT No: 224763.02
DATE: 12/03/24
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN[#]	CONSIS.[^] / DENSITY.[^]	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
12/03/24 No free groundwater observed	186 / 0	Clayey SAND (SC), with silt, trace gravel: brown; fine to medium, sub-angular to sub-rounded gravel; trace organics, rootlets.		RS	NA	NA		D/ES		0.10	PID	<1ppm
	0.50											
	186 / 1	Sandy CLAY, trace gravel: pale orange brown; fine to medium, sub-angular to sub-rounded gravel; extremely weathered pebbly sandstone.		RS	H	w<PL		D/ES		0.60	PID PP	<1ppm >400kPa
	1.20									1		
	185 / 2	Sandy CLAY, with gravel: pale brown; fine to medium, sub-angular to sub-rounded gravel; extremely weathered pebbly sandstone, friable.		XWM	H	w<PL		D/ES		1.50	PID PP	<1ppm >400kPa
		Test Pit discontinued at 1.70m depth. Limit of investigation. Solid rock encountered..								2		
	184 / 3									3		
	183 / 4									4		
	182											

Pit 317

Spoil from Pit 317

NOTES: [#] Soil origin is "probable" unless otherwise stated. [^] Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: 21T excavator
METHOD: 600mm Bucket
REMARKS:

OPERATOR: JE & J Robinsons

LOGGED: Krebs

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

TEST PIT LOG

CLIENT: Ausgrid
PROJECT: Proposed Muswellbrook Substation
LOCATION: 20 Sandy Creek Road, Muswellbrook, NSW

SURFACE LEVEL: 182.8 AHD
COORDINATE: E:303299.5, N:6430278.2
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 318
PROJECT No: 224763.02
DATE: 12/03/24
SHEET: 1 of 1

CONDITIONS ENCOUNTERED									SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
12/03/24 No free groundwater observed		0.20	FILL / Silty Sandy CLAY (CL), trace gravel: brown; low plasticity; fine to medium sand; fine to medium, sub-angular to sub-rounded gravel; with organics, rootlets.		FILL	NA	NA		D/ES		0.10	PID	<1ppm
	182	0.70	FILL / Clayey SAND (SC), with gravel: brown; fine to medium; fine to medium, sub-angular to sub-rounded gravel; with coal fines, ash, slag.		FILL	NA	NA		D/ES		0.50	PID	<1ppm
		1			FILL	NA	NA		D/ES		1.00	PID	<1ppm
		1.10	FILL / Clayey SAND (SC), with gravel: brown; fine to medium; fine to medium, sub-angular to sub-rounded gravel; trace coal fines, ash, slag.										
	181		CLAY (CL): mottled orange brown; low plasticity.		RS possibly XWM	H	w<PL		D/ES		1.50	PID PP	<1ppm >400kPa
		2									2		
	180	3	Test Pit discontinued at 2.60m depth. Limit of investigation. Solid rock encountered..								3		
	179	4									4		
	178												

Spoil from Pit 318

Pit 318

NOTES: (#) Soil origin is "probable" unless otherwise stated. (*) Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: 21T excavator
METHOD: 600mm Bucket
REMARKS: D3/SBK @ 0.5m

OPERATOR: JE & J Robinsons

LOGGED: Krebs

Refer to explanatory notes for symbol and abbreviation definitions

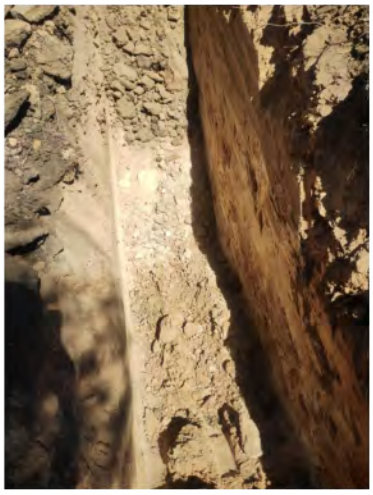
TEST PIT LOG

CLIENT: Ausgrid
PROJECT: Proposed Muswellbrook Substation
LOCATION: 20 Sandy Creek Road, Muswellbrook, NSW

SURFACE LEVEL: 184.9 AHD
COORDINATE: E:303288.6, N:6430243.5
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 319
PROJECT No: 224763.02
DATE: 12/03/24
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE			TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN[#]	CONSIS.[^] / DENSITY.[^]	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
12/03/24 No free groundwater observed	184	FILL / Gravelly SAND (SP): dark grey; fine to medium; fine to medium, sub-angular to sub-rounded gravel; with coal fines, ash, slag.		FILL	NA	NA		D/ES		0.10	PID	<1ppm
	0.20											
		FILL / Sandy CLAY, with gravel: brown; with coal fines, ash, slag.		FILL	NA	NA		D/ES		0.30	PID	<1ppm
	0.40											
		CLAY (CL): orange brown; low plasticity.		RS	H	w<PL		D/ES		0.50	PID PP	<1ppm >400kPa
	1									1		
	1.50	SANDSTONE: pale brown.		XWM	H	NA		D/ES		1.60	PID PP	<1ppm >400kPa
	183	Test Pit discontinued at 1.70m depth. Limit of investigation. Solid rock encountered..										
	2									2		
	182											
	3									3		
	181											
	4									4		
	180											



Pit 319

Spoil from Pit 319

NOTES: [#] Soil origin is "probable" unless otherwise stated. [^] Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: 21T excavator
METHOD: 600mm Bucket
REMARKS:

OPERATOR: JE & J Robinsons

LOGGED: Krebs

Refer to explanatory notes for symbol and abbreviation definitions

TEST PIT LOG

CLIENT: Ausgrid
PROJECT: Proposed Muswellbrook Substation
LOCATION: 20 Sandy Creek Road, Muswellbrook, NSW

SURFACE LEVEL: 189.0 AHD
COORDINATE: E:303203.9, N:6430212.1
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 320
PROJECT No: 224763.02
DATE: 12/03/24
SHEET: 1 of 1

CONDITIONS ENCOUNTERED									SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
12/03/24 No free groundwater observed	189	0.30	Sandy CLAY (CL), with gravel: brown; low plasticity; fine to medium sand; fine to medium, sub-angular to sub-rounded gravel; trace organics, rootlets.		RS	H	w<PL		D/ES		0.20	PID PP	<1ppm >400kPa
		0.90	Sandy CLAY (CL), with gravel: pale orange brown; low plasticity; fine to medium sand; fine to medium, sub-angular to sub-rounded gravel; gravels extremely weathered pebbly sandstone.		RS	H	w<PL		D/ES		0.70	PID PP	<1ppm >400kPa
	188	1	SANDSTONE: pale brown; extremely weathered pebbly sandstone.		XWM	H	NA		D/ES		1.50	PID PP	<1ppm >400kPa
	187	2	Test Pit discontinued at 1.70m depth. Limit of investigation. Solid rock encountered..								1		
	186	3									2		
	185	4									3		
											4		

Pit 320

Spoil from Pit 320

NOTES: (#) Soil origin is "probable" unless otherwise stated. (*) Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: 21T excavator
METHOD: 600mm Bucket
REMARKS:

OPERATOR: JE & J Robinsons

LOGGED: Krebs

Refer to explanatory notes for symbol and abbreviation definitions

TEST PIT LOG

CLIENT: Ausgrid
PROJECT: Proposed Muswellbrook Substation
LOCATION: 20 Sandy Creek Road, Muswellbrook, NSW

SURFACE LEVEL: 180.8 AHD
COORDINATE: E:303335.3, N:6430277.5
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 321
PROJECT No: 224763.02
DATE: 12/03/24
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE			TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN[#]	CONSIS.[*] / DENSITY.[*]	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
12/03/24 No free groundwater observed	180.8 / 0.00	TOPSOIL / Silty SAND (SM): brown; fine to medium; with organics, rootlets.		TOP possibly FILL	NA	NA		D/ES		0.10	PID	<1ppm
	180.3 / 0.50	Sandy CLAY (CL), trace gravel: orange brown; low plasticity; fine to medium, sub-angular to sub-rounded gravel.		RS	NA	w<PL		D/ES		0.30	PID PP	<1ppm >400kPa
	179.8 / 1.00	Sandy CLAY (CL), with gravel: orange brown; low plasticity; fine to medium, sub-angular to sub-rounded gravel; extremely weathered pebbly sandstone.		RS	H	w<PL		D/ES		1.00	PID PP	<1ppm >400kPa
	178.8 / 2.00									2.00		
	177.8 / 3.00									3.00		
	176.8 / 4.00	Test Pit discontinued at 4.30m depth. Limit of investigation. No solid rock encountered..								4.00		

Pit 321

Spoil from Pit 321

NOTES: [#] Soil origin is "probable" unless otherwise stated. [*] Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: 21T excavator
METHOD: 600mm Bucket
REMARKS:

OPERATOR: JE & J Robinsons

LOGGED: Krebs

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

TEST PIT LOG

CLIENT: Ausgrid
PROJECT: Proposed Muswellbrook Substation
LOCATION: 20 Sandy Creek Road, Muswellbrook, NSW

SURFACE LEVEL: 183.2 AHD
COORDINATE: E:303353.6, N:6430239.1
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 322
PROJECT No: 224763.02
DATE: 12/03/24
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE			TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
12/03/24 No free groundwater observed	183 / 0	FILL / Silty SAND (SM), with gravel: grey brown; fine to medium; fine to medium, sub-angular to sub-rounded gravel; with organics, rootlets; with coal fines, ash, slag.		FILL	NA	NA		D/ES		0.05	PID	<1ppm
								D/ES		0.30	PID	<1ppm
	0.10	FILL / Silty SAND (SM), with gravel: brown; fine to medium; fine to medium, sub-angular to sub-rounded gravel; with coal fines, ash, slag.		FILL	NA	NA						
	0.70	Sandy CLAY (CL), trace gravel: orange brown; low plasticity; fine to medium, sub-angular to sub-rounded gravel; extremely weathered pebbly sandstone.		RS	H	w<PL		D/ES		1.00	PID PP	<1ppm >400kPa
	182 / 1											
	1.10	Sandy CLAY (CL), with gravel: orange brown; low plasticity; fine to medium, sub-angular to sub-rounded gravel; extremely weathered pebbly sandstone, friable.						D/ES		2.00	PID PP	<1ppm >400kPa
	181 / 2											
				RS	H	w<PL						
	180 / 3									3		
	179 / 4									4		
		Test Pit discontinued at 4.60m depth. Limit of investigation. No solid rock encountered..										

Pit 322

Spoil from Pit 322

NOTES: (#) Soil origin is "probable" unless otherwise stated. (*) Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: 21T excavator
METHOD: 600mm Bucket
REMARKS:

OPERATOR: JE & J Robinsons

LOGGED: Krebs

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

TEST PIT LOG

CLIENT: Ausgrid
PROJECT: Proposed Muswellbrook Substation
LOCATION: 20 Sandy Creek Road, Muswellbrook, NSW

SURFACE LEVEL: 185.0 AHD
COORDINATE: E:303179.1, N:6430252.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 323
PROJECT No: 224763.02
DATE: 12/03/24
SHEET: 1 of 1

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	SAMPLE TYPE	SAMPLE INTERVAL	DEPTH (m)	TESTING AND REMARKS: TEST TYPE	RESULTS AND REMARKS
12/03/24 No free groundwater observed		0.10	TOPSOIL / Silty SAND (SM), with gravel: brown; fine to medium; fine to medium, sub-angular to sub-rounded gravel; with organics, rootlets.		TOP	NA	NA		D/ES		0.10	PID	<1ppm
					RS	H	w<PL		D/ES		0.30	PID	<1ppm
		0.40	Sandy CLAY (CL), with gravel: mottled red brown; low plasticity; fine to medium sand; fine to medium, sub-angular to sub-rounded gravel.									PP	>400kPa
	184	1	Sandy CLAY, with gravel: mottled orange brown; fine to medium sand; fine to medium, sub-angular to sub-rounded gravel; extremely weathered pebbly sandstone.		RS	H	w<PL		D/ES		1.00	PID	<1ppm
												PP	>400kPa
	183	2									2		
		2.10	SANDSTONE: pale orange; extremely weathered sandstone, friable.		XWM	H	NA		D/ES		2.50	PID	<1ppm
												PP	>400kPa
			Test Pit discontinued at 2.70m depth. Limit of investigation. Solid rock encountered..										
	182	3									3		
	181	4									4		

Pit 323

Spoil from Pit 323

NOTES: (#) Soil origin is "probable" unless otherwise stated. (*) Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: 21T excavator
METHOD: 600mm Bucket
REMARKS:

OPERATOR: JE & J Robinsons

LOGGED: Krebs

Refer to explanatory notes for symbol and abbreviation definitions

TEST PIT LOG

CLIENT: Ausgrid
PROJECT: Proposed Muswellbrook Substation
LOCATION: 20 Sandy Creek Road, Muswellbrook, NSW

SURFACE LEVEL: 191.4 AHD
COORDINATE: E:303212.6, N:6430186.6
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 324
PROJECT No: 224763.02
DATE: 12/03/24
SHEET: 1 of 1

CONDITIONS ENCOUNTERED									SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN[#]	CONSIS.[*] / DENSITY.[*]	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
12/03/24 No free groundwater observed	191	0.30	Clayey SAND (SC), trace gravel: pale brown; fine to medium; fine to medium, sub-angular to sub-rounded gravel; trace organics, rootlets.		RS	NA	w<PL		D/ES		0.20	PID	<1ppm
		0.70	Sandy CLAY (CL), with gravel: orange brown; low plasticity; fine to medium sand; fine to medium, sub-angular to sub-rounded gravel; extremely weathered pebbly sandstone.		RS	H	w<PL		D/ES		0.50	PID PP	<1ppm >400kPa
	190	1	Sandy CLAY (CL), with gravel: pale brown; low plasticity; fine to medium sand.		XWM	H	w<PL		D/ES		1.00	PID PP	<1ppm >400kPa
		2									2		
	189		Test Pit discontinued at 2.20m depth. Limit of investigation. Solid rock encountered..										
		3									3		
	188												
		4									4		
	187												

Pit 324

Spoil from Pit 324

NOTES: [#] Soil origin is "probable" unless otherwise stated. [*] Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: 21T excavator
METHOD: 600mm Bucket
REMARKS: D1/SBK @ 0.2m

OPERATOR: JE & J Robinsons

LOGGED: Krebs

Refer to explanatory notes for symbol and abbreviation definitions

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: Proposed Muswellbrook Substation
LOCATION: 20 Sandy Creek Road, Muswellbrook, NSW

SURFACE LEVEL:
COORDINATE: E:303139.5, N:6430182.7
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 218
PROJECT No: 224763.02
DATE: 07/03/24
SHEET: 1 of 2

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL ORIGIN(#)	SOIL CONSIS.(*) DENSITY.(*)	SOIL MOISTURE	ROCK WEATH.	ROCK DEPTH (m)	ROCK STRENGTH	ROCK RECOVERY (%)	ROCK RQD	ROCK FRACTURE SPACING (m)	ROCK DEFECTS & REMARKS	SAMPLE REMARKS	SAMPLE TYPE	SAMPLE INTERVAL	DEPTH (m)	TESTING TEST TYPE	TESTING RESULTS AND REMARKS
07/03/24 No free groundwater observed		0.70	Sandy CLAY (CI), trace gravel: orange brown; medium plasticity; fine to coarse sand.		RS	H	w<PL									B D U50		0.10 0.20 0.50 0.70	PP	>600kPa
		2.00	Sandy CLAY (CL), trace gravel: pale brown; low plasticity; fine to medium, rounded to sub-rounded gravel; extremely weathered pebbly sandstone, friable.		XWM	H	w<PL									SPT		1.00 1.45	SPT PP	14,24,25 N=49 >600kPa
		2.34	SANDSTONE: pale brown. 2.00m: driller observed increase in resistance indicative of rock		XWM	NA	NA											2		
			SANDSTONE: pale brown with orange brown iron staining						2.34	VL				2.80m: P , SGH, PR, Clay, RF					PLT	PL(D)=0.05MPa
									2.80	L				3.22-3.31m: FC				3	PLT PLT	PL(A)=0.1MPa PL(D)=0.05MPa
			3.58m-3.66m: carbonate cemented					HW	3.58 3.66	H L	100	73		3.57m: JT, 45°, PR, RF 3.67m: JT, 10°, PR, RF					PLT	PL(D)=1.3MPa
														3.98m: P, SH, PR, Clay, RF 4.01m: JT, 50°, PR, Clay, SM 4.08m: JT, 45°, PR, Clay, SM				4	PLT PLT	PL(A)=0.04MPa PL(D)=0.07MPa
														4.78m: JT, 60°, PR, RF						

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Comacchio GEO 405
METHOD: SFA to 2.34m, NMLC to 8.3m depth
REMARKS:

OPERATOR: Ground Test

LOGGED: Chaplin
CASING: HWT to 2.3m

Refer to explanatory notes for symbol and abbreviation definitions

Generated with CORE-GS by Geroc - Combined Log

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: Proposed Muswellbrook Substation
LOCATION: 20 Sandy Creek Road, Muswellbrook, NSW

SURFACE LEVEL:
COORDINATE: E:303139.5, N:6430182.7
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 218
PROJECT No: 224763.02
DATE: 07/03/24
SHEET: 2 of 2

CONDITIONS ENCOUNTERED																			SAMPLE				TESTING	
				SOIL				ROCK																
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(†) DENSITY.(†)	MOISTURE	WEATH.	DEPTH (m)	STRENGTH VL L M H VH EH	RECOVERY (%)	RQD	FRACTURE SPACING (m) 0.05 0.10 0.30 1.00 3.00	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
		6	[CONT] SANDSTONE: pale brown with orange brown iron staining					HW			100	73		5.45m: P , SM, PR, Clay, RF 5.70m: JT, 45°, PR, RF, DB?				6	PLT PLT	PL(D)=0.14MPa PL(A)=0.12MPa
																			PLT PLT	PL(A)=0.13MPa PL(D)=0.05MPa
		7	From 7.40m: colour becomes grey					MW	6.80	L	100	100						7	PLT PLT	PL(D)=0.06MPa PL(A)=0.16MPa
								FR	7.40										PLT	PL(A)=0.12MPa
		8																8	PLT	PL(A)=0.12MPa
			Borehole discontinued at 8.30m depth. Limit of investigation.																	
		9																9		

NOTES: (#)Soil origin is "probable" unless otherwise stated. (†)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Comacchio GEO 405
METHOD: SFA to 2.34m, NMLC to 8.3m depth
REMARKS:

OPERATOR: Ground Test

LOGGED: Chaplin
CASING: HWT to 2.3m

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: Proposed Muswellbrook Substation
LOCATION: 20 Sandy Creek Road, Muswellbrook, NSW

SURFACE LEVEL:
COORDINATE: E:303309.3, N:6430192.6
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 221
PROJECT No: 224763.02
DATE: 07/03/24
SHEET: 1 of 2

GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL: ORIGIN(#)	SOIL: CONSIS.(†) / DENSITY.(†)	SOIL: MOISTURE	ROCK: WEATH.	ROCK: DEPTH (m)	ROCK: STRENGTH (VL L M H VH EH)	ROCK: RECOVERY (%)	ROCK: RQD	ROCK: FRACTURE SPACING (m)	ROCK: DEFECTS & REMARKS	SAMPLE: SAMPLE REMARKS	SAMPLE: TYPE	SAMPLE: INTERVAL	DEPTH (m)	TESTING: TEST TYPE	TESTING: RESULTS AND REMARKS
07/03/24 No free groundwater observed	0.10	SILT (ML), with sand, with gravel: pale brown; low plasticity; fine to medium sand; fine to coarse, sub-angular to sub-rounded gravel.	COL possibly TOP	NA		w<PL									D		0.10		
				RS	H	w<PL											0.20		
	0.50	CLAY (CI), with sand, trace gravel: orange brown; medium plasticity; fine to coarse sand; fine to medium, rounded to sub-rounded gravel.													B		0.30		
																	0.50		
	1	Sandy CLAY (CL), with gravel: pale brown pale orange; low plasticity; fine to coarse, rounded to sub-rounded gravel; extremely weathered pebbly sandstone, friable.		XWM	H	w<PL									D U50		0.67	PP	>600kPa
																	1.00		
															SPT			SPT	7,25/140
	2	2.20m: driller observed increase in resistance															1.29	PP	>600kPa
	2.20	PEBBLY SANDSTONE: orange brown.		XWM	NA	NA											2		
	2.50	2.50m-2.70m: clast						2.50					2.50-2.70m: FC, fractured clast						
	2.70	PEBBLY SANDSTONE: orange brown, fine to coarse grained					HW	2.70	M										
		CORE LOSS: 0.3m						3.00					3.05m: JT, 15°, PR, RF						
	3.00	PEBBLY SANDSTONE: orange brown, fine to coarse grained					HW	3.40	M L	80	40		3.25m: JT, 10°, PR, RF				3	PLT PLT	PL(A)=0.44MPa PL(D)=0.4MPa
							SEAM	3.65 3.72	SEAM			SEAM	3.65-3.72m: DS						
													3.80m: JT, SH, PR, Fe, RF						
													3.87m: JT, 10°, PR, Fe, RF						
													3.95m: JT, 45°, IR, Fe, RF						
	4								L				4.00-4.07m: FC				4		
													4.14-4.21m: FC						
							HW	4.40	M	100	53							PLT PLT	PL(A)=0.23MPa PL(D)=0.29MPa
													4.64m: P, SH						
													4.69m: P, SH						
										100	62		4.69-4.80m: FC, DB?						
													4.80-4.85m: FC, DB?						
													4.98m: JT, 10°, PR,						

NOTES: (#)Soil origin is "probable" unless otherwise stated. (†)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Comacchio GEO 405
METHOD: SFA to 2.5m, NMLC to 8.50m depth
REMARKS:

OPERATOR: Ground Test

LOGGED: Chaplin
CASING: HWT to 2.5m

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: Proposed Muswellbrook Substation
LOCATION: 20 Sandy Creek Road, Muswellbrook, NSW

SURFACE LEVEL:
COORDINATE: E:303309.3, N:6430192.6
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 221
PROJECT No: 224763.02
DATE: 07/03/24
SHEET: 2 of 2

CONDITIONS ENCOUNTERED																				SAMPLE				TESTING	
				SOIL				ROCK																	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(†) / DENSITY.(†)	MOISTURE	WEATH.	DEPTH (m)	STRENGTH (VL L M H VH EH)	RECOVERY (%)	RQD	FRACTURE SPACING (m) (>0.6 0.2-0.6 0.06-0.2 <0.06)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
	6	[CONT] PEBBLY SANDSTONE: orange brown, fine to coarse grained					SEAM HW	5.05 5.10 SEAM M		100 100 100	62 59 82	SEAM	Fe, RF 5.00m: P, SH, PR, Fe, RF 5.00-5.05m: FC 5.05-5.10m: DS 5.19m: P, SH, PR, Fe, RF 5.35m: DB 5.50-5.58m: FC 5.63m: P, SH, PR, Fe, RF 5.63-5.70m: FC 5.84m: JT, SH, IR, Fe, RF 5.88-6.00m: JT, SV, IR, Fe, RF 6.10m: P, 10°, PR, Fe, RF 6.29m: JT, 45°, PR, Fe, RF 6.36m: P, 10°, PR, Fe, RF 6.42m: P, 10°, PR, Fe, RF 6.56m: JT, 15°, IR, RF 6.74m: P, SH, PR, TI Fe, RF 7.19m: P, 10°, PR, TI Fe, RF 7.79m: P, 10°, PR, TI Fe, RF 7.99m: P, 10°, PR, TI Fe, RF 8.40m: JT, 15°, IR, Fe, RF 8.50m: JT, 30°, PR, Fe, RF				6 7 8	PLT PL(A)=0.42MPa PLT PL(D)=0.22MPa PLT PL(A)=0.36MPa PLT PL(D)=0.02MPa PLT PL(A)=0.38MPa PLT PL(D)=0.04MPa PLT PL(D)=0.31MPa PLT PL(A)=0.36MPa
	9	Borehole discontinued at 8.50m depth. Limit of investigation.																9		

NOTES: (#)Soil origin is "probable" unless otherwise stated. (†)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Comacchio GEO 405
METHOD: SFA to 2.5m, NMLC to 8.50m depth
REMARKS:

OPERATOR: Ground Test

LOGGED: Chaplin
CASING: HWT to 2.5m

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: Proposed Muswellbrook Substation
LOCATION: 20 Sandy Creek Road, Muswellbrook, NSW

SURFACE LEVEL:
COORDINATE: E:303242.2, N:6430173.2
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 223
PROJECT No: 224763.02
DATE: 07/03/24
SHEET: 1 of 2

CONDITIONS ENCOUNTERED | **SAMPLE** | **TESTING**

GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL: ORIGIN(#)	SOIL: CONSIS.(†) / DENSITY.(†)	SOIL: MOISTURE	ROCK: WEATH.	ROCK: DEPTH (m)	ROCK: STRENGTH	ROCK: RECOVERY (%)	ROCK: RQD	ROCK: FRACTURE SPACING (m)	ROCK: DEFECTS & REMARKS	SAMPLE REMARKS	SAMPLE: TYPE	SAMPLE: INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
07/03/24 No groundwater observed	0.00	CLAY, with sand, trace gravel: orange brown; fine to coarse, rounded to sub-rounded gravel.		RS	H	w<PL									B	0.00–0.40	0.40		
	0.50	Sandy CLAY (CL), with gravel: pale brown; low plasticity; fine to coarse sand; fine to coarse, rounded to sub-rounded gravel; extremely weathered pebbly sandstone, friable.													D	0.40–0.76	0.50		
															U50	0.40–0.76	0.76		
	1			XWM	H	w<PL											1.00		
															SPT	1.00–1.29		SPT	8,25/140
		2.00m: driller observed increase in resistance indicative of rock															1.29		
	2.00	SANDSTONE (PEBBLY).		XWM	H	NA											2		
	2.56	PEBBLY SANDSTONE: pale brown with orange brown iron staining, fine to coarse grained						2.56	M				2.69m: JT, SH, PR, Fe, RF 2.81m JT, SH, PR, Fe, RF 2.85m: JT, 45°, PR, Fe, RF		SPT	2.50–2.56	2.50 2.56	SPT	25/60
							HW			100	67							PLT	PL(D)=0.05MPa
	3							3.00	L								3	PLT	PL(A)=0.37MPa
							SEAM	3.03	SEAM			SEAM	3.03-3.20m: DS						
								3.20					3.20-3.30m: FC						
									VL				3.43m: JT, SH, PR, TI Fe, RF					PLT	PL(A)=0.37MPa
								3.45					3.60m: DB					PLT	PL(D)=0.09MPa
	4						HW		M	100	95						4	PLT	PL(D)=0.07MPa
																		PLT	PL(A)=0.35MPa
																		PLT	PL(D)=0.32MPa
																		PLT	PL(A)=0.34MPa

NOTES: (#)Soil origin is "probable" unless otherwise stated. (†)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Comacchio GEO 405
METHOD: SFA to 2.56m, NMLC to 8.35m depth
REMARKS:

OPERATOR: Ground Test

LOGGED: Chaplin
CASING: HWT to 2.5m

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: Proposed Muswellbrook Substation
LOCATION: 20 Sandy Creek Road, Muswellbrook, NSW

SURFACE LEVEL:
COORDINATE: E:303242.2, N:6430173.2
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 223
PROJECT No: 224763.02
DATE: 07/03/24
SHEET: 2 of 2

CONDITIONS ENCOUNTERED																		SAMPLE				TESTING	
				SOIL				ROCK															
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(†) DENSITY.(†)	MOISTURE	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
		6	[CONT] PEBBLY SANDSTONE: pale brown with orange brown iron staining, fine to coarse grained							VL L M H VH EH	100	95		5.00m: DB 5.44m: DB 5.68m: JT, 10°, PR, Fe, RF				6	PLT PLT	PL(D)=0.24MPa PL(A)=0.73MPa
								HW		M				6.61-6.74m: FG, DB? 6.83-6.90m: FG					PLT PLT	PL(A)=0.4MPa PL(D)=0.3MPa
		7									100	90						7	PLT PLT	PL(D)=0.19MPa PL(A)=0.39MPa
		8												7.95-8.23m: JT, 75°, PR, Tl Fe, RF, Qz				8	PLT PLT	PL(D)=0.52MPa PL(A)=0.39MPa
			Borehole discontinued at 8.35m depth. Limit of investigation.																	
		9																9		

NOTES: (#)Soil origin is "probable" unless otherwise stated. (†)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Comacchio GEO 405
METHOD: SFA to 2.56m, NMLC to 8.35m depth
REMARKS:

OPERATOR: Ground Test

LOGGED: Chaplin
CASING: HWT to 2.5m

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: Proposed Muswellbrook Substation
LOCATION: 20 Sandy Creek Road, Muswellbrook, NSW

SURFACE LEVEL:
COORDINATE:
DATUM/GRID:
DIP/AZIMUTH: 90°/---°

LOCATION ID: 219
PROJECT No: 224763.02
DATE: 04/03/24
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
04/03/24 No free groundwater observed	0.30	Sandy CLAY (CI), with gravel: pale orange pale brown; medium plasticity; fine to coarse sand; fine to coarse, rounded to sub-rounded gravel.		RS	VSt to H	w<PL		D		0.10 0.20		
	1	Sandy CLAY (CL-CI), with gravel: pale orange pale brown; low to medium plasticity; fine to coarse sand; fine to coarse, rounded to sub-rounded gravel; extremely weathered pebbly sandstone, friable, soil-like properties.		XWM	H	w<PL		D SPT		0.80 0.90 1.00	SPT	12,21,25 N=46
		1.80m: drilling resistance increased indicative of rock								1.45	PP	>400kPa
	1.80	PEBBLY SANDSTONE.		XWM				SPT		2.50 2.58	SPT PP	25/80 (HB) >600kPa
	4							SPT		4.00		25/0 (HB)
		Borehole discontinued at 5.00m depth. Limit of investigation.										

NOTES: (#) Soil origin is "probable" unless otherwise stated. (*) Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Comacchio GEO 405
METHOD: SFA with TC Bit to 5.0m depth
REMARKS:

OPERATOR: Ground Test

LOGGED: Chaplin
CASING: Nil

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: Proposed Muswellbrook Substation
LOCATION: 20 Sandy Creek Road, Muswellbrook, NSW

SURFACE LEVEL:
COORDINATE:
DATUM/GRID:
DIP/AZIMUTH: 90°/---°

LOCATION ID: 220
PROJECT No: 224763.02
DATE: 04/03/24
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
04/03/24 No free groundwater observed	0.20	FILL / Sandy CLAY (CL), with silt, with gravel: brown; low plasticity; fine to coarse sand; fine to coarse, angular to sub-angular gravel; contains coal fragments, abundant rootlets to 0.1m.		FILL	NA	w<PL		D		0.20		
		Sandy CLAY (CI), with gravel: orange brown; medium plasticity; fine to coarse sand; fine to coarse, rounded to sub-rounded gravel.		RS	H	w<PL		D		0.50 0.60		
	1.10	Sandy CLAY (CL), with gravel: pale brown pale orange; low plasticity; fine to coarse, rounded to sub-rounded gravel; friable, extremely weathered pebbly sandstone.		XWM	H	w<PL		SPT		1.00 1.45	SPT PP PP	3,10,18 N=28 410kPa >600kPa
		1.80m: driller observed increase in resistance indicative of rock										
	1.80	PEBBLY SANDSTONE.		XWM				SPT		2.50	SPT	25/50 (HB)
		Borehole discontinued at 2.60m depth. Limit of investigation.										

NOTES: (#) Soil origin is "probable" unless otherwise stated. (*) Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Comacchio GEO 405
METHOD: SFA with TC Bit to 2.60m depth
REMARKS:

OPERATOR: Ground Test

LOGGED: Chaplin
CASING: Nil

Refer to explanatory notes for symbol and abbreviation definitions

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: Proposed Muswellbrook Substation
LOCATION: 20 Sandy Creek Road, Muswellbrook, NSW

SURFACE LEVEL:
COORDINATE:
DATUM/GRID:
DIP/AZIMUTH: 90°/---°

LOCATION ID: 222
PROJECT No: 224763.02
DATE: 07/03/24
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
04/03/24 No free groundwater observed	0.50	FILL / SILT (ML), with sand, trace gravel: pale brown grey; low plasticity; fine sand; fine to medium, rounded to sub-rounded gravel; possibly ash.		FILL	NA	w<PL		D		0.20 0.30		
	1	CLAY (CI), with sand, trace gravel: red orange; medium plasticity; fine to coarse sand; fine to medium, rounded to sub-rounded gravel.		RS	H	w<PL		U50 SPT		0.50 0.78 1.00	PP SPT	>400kPa 10,13,19 N=32 >400kPa
	1.35 2	Sandy CLAY (CL), with gravel: pale brown pale orange; low plasticity; fine to coarse sand; fine to coarse, rounded to sub-rounded gravel; extremely weathered pebbly sandstone.		XWM	H	w<PL				1.45 2	PP PP	>400kPa
	3.00 4	PEBBLY SANDSTONE. Borehole discontinued at 5.00m depth. Limit of investigation.		XWM				SPT SPT		2.50 2.64 3 4.00 4.10	SPT PP SPT PP	25/140 >600kPa 25/100 (HB) >600kPa

NOTES: (#) Soil origin is "probable" unless otherwise stated. (*) Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Comacchio GEO 405
METHOD: SFA with TC Bit to 5.0m depth
REMARKS:

OPERATOR: Ground Test

LOGGED: Chaplin
CASING: Nil

Refer to explanatory notes for symbol and abbreviation definitions

Generated with CORE-GS by Geroc - Soil Log

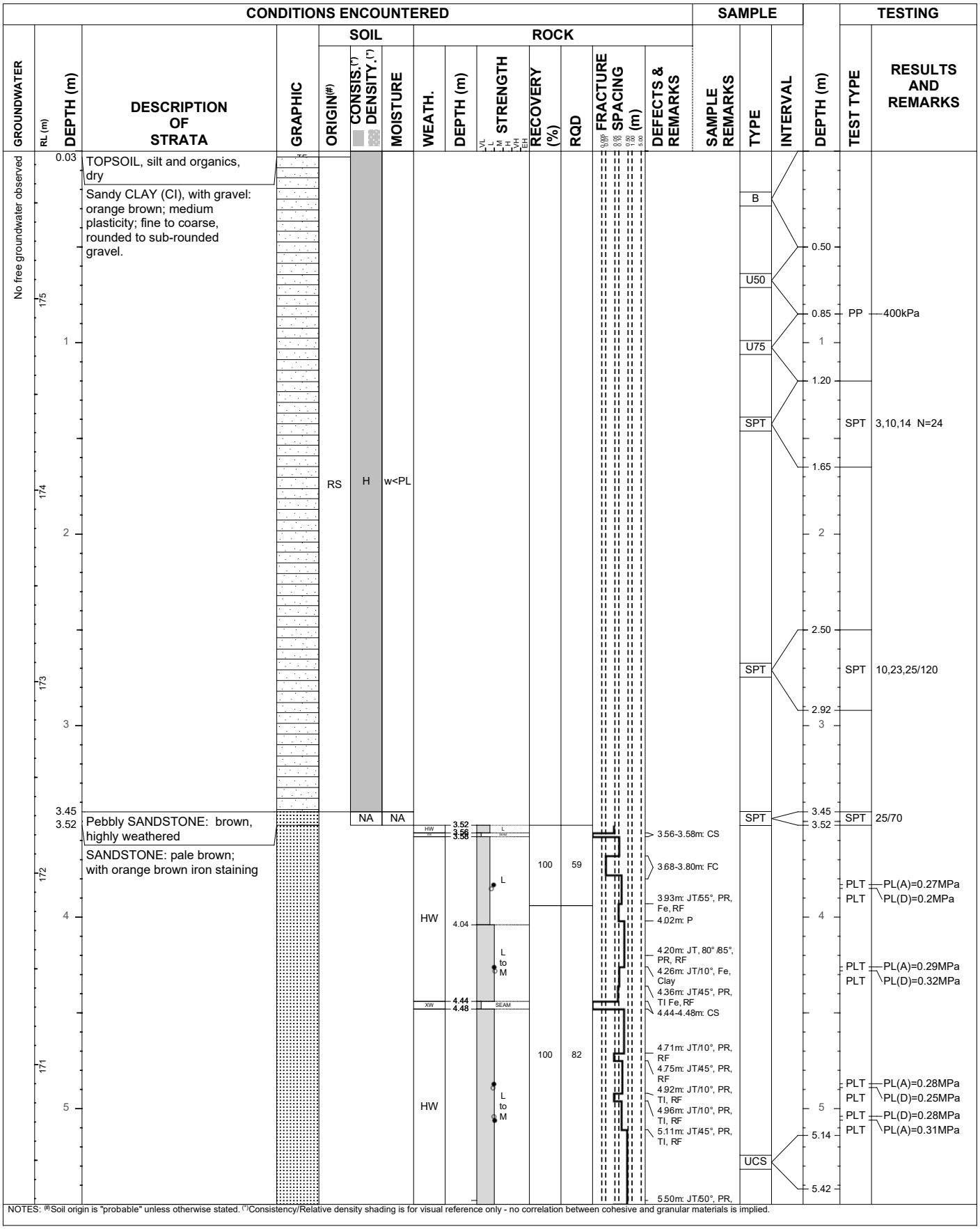
Douglas PARTNERS

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: Proposed Muswellbrook Substation
LOCATION: 20 Sandy Point Road, Muswellbrook, NSW

SURFACE LEVEL: 175.8 AHD
COORDINATE: E:303147.5, N:6430358.0
DATUM/GRID: MGA2020 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 1
PROJECT No: 224763.00
DATE: 18/09/23
SHEET: 1 of 2



NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Truck Mounted Drill Rig
OPERATOR: Ground Test
LOGGED: Chaplin

METHOD: Solid flight auger to 3.45m, then NMLC coring to 10m depth
CASING: HQ to 3.5m

REMARKS:

Refer to explanatory notes for symbol and abbreviation definitions

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: Proposed Muswellbrook Substation
LOCATION: 20 Sandy Point Road, Muswellbrook, NSW

SURFACE LEVEL: 175.8 AHD
COORDINATE: E:303147.5, N:6430358.0
DATUM/GRID: MGA2020 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 1
PROJECT No: 224763.00
DATE: 18/09/23
SHEET: 2 of 2

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL: ORIGIN(#)	SOIL: CONSIS.(*) DENSITY.(*)	SOIL: MOISTURE	ROCK: WEATH.	ROCK: DEPTH (m)	ROCK: STRENGTH	ROCK: RECOVERY (%)	ROCK: RQD	ROCK: FRACTURE SPACING (m)	ROCK: DEFECTS & REMARKS	SAMPLE: SAMPLE REMARKS	SAMPLE: TYPE	SAMPLE: INTERVAL	DEPTH (m)	TESTING: TEST TYPE	TESTING: RESULTS AND REMARKS
	170	6	[CONT] SANDSTONE: pale brown; with orange brown iron staining					HW		VL to L	100	82		Clay, RF 5.54m: JT/50°, PR, Clay, RF				6	PLT	PL(D)=0.16MPa
								XW	5.76	SEAM				5.76-5.82m: CS					PLT	PL(A)=0.19MPa
									5.82											
														5.95-6.15m: FC						
	169	7						HW		L to M	100	28		6.31m: JT, 50° /55°, PR, Fe, RF 6.33m: JT, 50° /55°, PR, Fe, RF 6.37m: P, SH, PR, Clay, RF 6.40m: P, SH, PR, Fe, RF 6.54m: JT/10°, UN, Fe, RF 6.60m: JT, 70° /75°, UN, Fe, RF 6.67m: JT/45°, PR, Fe, RF				7	PLT	PL(A)=0.39MPa
																			PLT	PL(D)=0.33MPa
									7.00					6.74-7.00m: FC						
										VL				7.07m: P, SH, PR, RF 7.20m: JT/45°, PR, Clay, RF 7.28m: JT/45°, PR, RF					PLT	PL(A)=0.16MPa
								XW	7.37	SEAM				7.32m: JT/30°, PR, RF					PLT	PL(D)=0.11MPa
									7.43					7.37-7.43m: CS						
	168	8						HW		VL	100	41		7.48m: JT/50°, PR, RF 7.49m: JT/50°, PR, RF				8	PLT	PL(D)=0.32MPa
								XW	7.62	SEAM				7.62-7.74m: CS					PLT	PL(A)=0.32MPa
									7.74											
								MW		M				8.00m: JT/10°					PLT	PL(A)=0.47MPa
									8.10					8.12m: P, SH, PR, RF					PLT	PL(D)=0.26MPa
								SW	8.25											
									8.31									8.68		
	167															UCS		8.91		
		9						FR		H	100	100						9	PLT	PL(D)=1.4MPa
																			PLT	PL(A)=1.6MPa
	166	10.00	Borehole discontinued at 10.00m depth. Limit of investigation.															10		

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Truck Mounted Drill Rig
METHOD: Solid flight auger to 3.45m, then NMLC coring to 10m depth
REMARKS:

OPERATOR: Ground Test
CASING: HQ to 3.5m

LOGGED: Chaplin

Refer to explanatory notes for symbol and abbreviation definitions

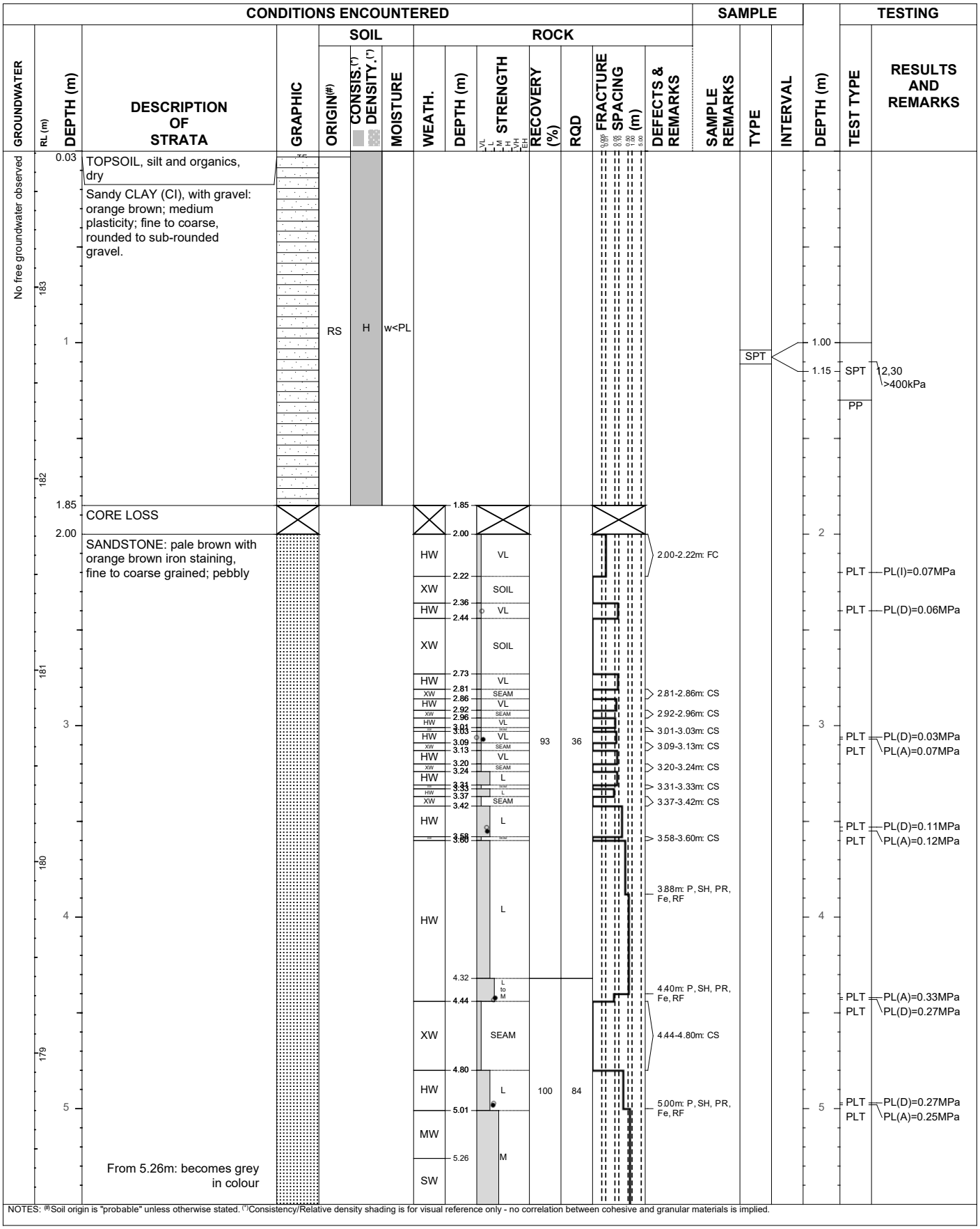
Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: Proposed Muswellbrook Substation
LOCATION: 20 Sandy Point Road, Muswellbrook, NSW

SURFACE LEVEL: 183.7 AHD
COORDINATE: E:303203.9, N:6430265.9
DATUM/GRID: MGA2020 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 10
PROJECT No: 224763.00
DATE: 22/09/23
SHEET: 1 of 2



NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Truck Mounted Drill Rig
METHOD: Solid flight auger to 1.85m, then NMLC to 10m depth
REMARKS:

OPERATOR: Ground Test
CASING: HQ to 1.85m

LOGGED: Chaplin

Refer to explanatory notes for symbol and abbreviation definitions

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: Proposed Muswellbrook Substation
LOCATION: 20 Sandy Point Road, Muswellbrook, NSW

SURFACE LEVEL: 183.7 AHD
COORDINATE: E:303203.9, N:6430265.9
DATUM/GRID: MGA2020 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 10
PROJECT No: 224763.00
DATE: 22/09/23
SHEET: 2 of 2

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL ORIGIN(#)	SOIL CONSIS.(†) DENSITY.(†)	SOIL MOISTURE	ROCK WEATH.	ROCK DEPTH (m)	ROCK STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	SAMPLE TYPE	SAMPLE INTERVAL	DEPTH (m)	TESTING TEST TYPE	TESTING RESULTS AND REMARKS
	178	6	[CONT] SANDSTONE: pale brown with orange brown iron staining, fine to coarse grained; pebbly					SW	5.68					5.64m: JT, 15° /20°, UN, Fe, RF				6	PLT	PL(D)=0.47MPa
								MW						6.02m: P, SH, UN, Fe, RF					PLT	PL(A)=0.43MPa
									6.28		100	84								
	177	7						FR						7.17m: JT, 10° /15°, PR, RF				7	PLT	PL(D)=0.36MPa
																			PLT	PL(A)=0.58MPa
										M									PLT	PL(A)=0.43MPa
	176								7.85										PLT	PL(D)=0.27MPa
		8						MW						7.95m: JT/10°, UN, Fe, RF				8		
									8.10					8.02m: P, SH, PR, Fe, RF						
	175										100	96							PLT	PL(A)=0.58MPa
		9						FR										9	PLT	PL(D)=0.28MPa
	174																			
		10.00	Borehole discontinued at 10.00m depth. Limit of investigation.															10	PLT	PL(A)=0.66MPa
																			PLT	PL(D)=0.7MPa

NOTES: (#)Soil origin is "probable" unless otherwise stated. (†)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Truck Mounted Drill Rig
METHOD: Solid flight auger to 1.85m, then NMLC to 10m depth
REMARKS:

OPERATOR: Ground Test
CASING: HQ to 1.85m

LOGGED: Chaplin

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: Proposed Muswellbrook Substation
LOCATION: 20 Sandy Point Road, Muswellbrook, NSW

SURFACE LEVEL: 183.7 AHD
COORDINATE: E:303263.9, N:6430265.4
DATUM/GRID: MGA2020 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 11
PROJECT No: 224763.00
DATE: 25/09/23
SHEET: 1 of 2

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL ORIGIN(#)	SOIL CONSIS.(*) DENSITY.(*)	SOIL MOISTURE	ROCK WEATH.	ROCK DEPTH (m)	ROCK STRENGTH	ROCK RECOVERY (%)	ROCK RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	SAMPLE TYPE	SAMPLE INTERVAL	DEPTH (m)	TESTING TEST TYPE	TESTING RESULTS AND REMARKS
No free groundwater observed	183	0.03	TOPSOIL, silt and organics, dry																	
			Sandy CLAY (CI), with gravel: orange brown; medium plasticity; fine to coarse sand; fine to coarse, rounded to sub-rounded gravel.		RS	H	w<PL									SPT		1.00	SPT	25/140
		1																1.14	PP	>400kPa
	182																			
		2	2.10m: increase in drilling resistance indicative of rock															2		
		2.16	SANDSTONE: pale brown with orange brown iron staining, fine to coarse grained; pebbly					HW	2.16	VL										
								XW	2.39					2.39-2.42m: CS						
								HW	2.42	VL									PLT	PL(A)=0.04MPa
	181							XW	2.61					2.61-2.77m: CS						
								HW to MW	2.77	L									PLT	PL(A)=0.13MPa
									2.98	VL									PLT	PL(D)=0.05MPa
		3						XW	3.05					3.05-3.13m: CS				3		
									3.13											
								MW		L	100	55								
								XW	3.51					3.51-3.55m: CS					PLT	PL(D)=0.17MPa
									3.55										PLT	PL(A)=0.27MPa
	180									L										
		4												3.95m: JT/45°, PR, Fe, RF				4	PLT	PL(A)=0.22MPa
									4.18	VL									PLT	PL(D)=0.21MPa
									4.32											
								HW						4.41m: P, SH, PR, RF						
	179																			
		5								M	100	100						5	PLT	PL(A)=0.4MPa
																			PLT	PL(D)=0.45MPa
														5.24m: JT/45°, CU, Fe, RF						
														5.41m: JT/80°, PR, TI Fe, RF						

NOTES: (#) Soil origin is "probable" unless otherwise stated. (*) Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Truck Mounted Drill Rig
METHOD:
REMARKS:

OPERATOR: Ground Test
CASING: HQ to 2m

LOGGED: Chaplin

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: Proposed Muswellbrook Substation
LOCATION: 20 Sandy Point Road, Muswellbrook, NSW

SURFACE LEVEL: 183.7 AHD
COORDINATE: E:303263.9, N:6430265.4
DATUM/GRID: MGA2020 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 11
PROJECT No: 224763.00
DATE: 25/09/23
SHEET: 2 of 2

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL: ORIGIN(#)	SOIL: CONSIS.(*) DENSITY.(*)	SOIL: MOISTURE	ROCK: WEATH.	ROCK: DEPTH (m)	ROCK: STRENGTH	ROCK: RECOVERY (%)	ROCK: RQD	ROCK: FRACTURE SPACING (m)	ROCK: DEFECTS & REMARKS	SAMPLE: SAMPLE REMARKS	SAMPLE: TYPE	SAMPLE: INTERVAL	DEPTH (m)	TESTING: TEST TYPE	TESTING: RESULTS AND REMARKS
	178	6	[CONT] SANDSTONE: pale brown with orange brown iron staining, fine to coarse grained; pebbly					HW	5.91	H				5.64m: JT/85°, PR, TI Fe, RF				6	PLT	PL(D)=1.9MPa
																			PLT	PL(A)=1.6MPa
														5.91m: JT/15°, PR, Fe, RF						
										M										
									6.35		100	100		6.37m: P, SH, PR, Fe, RF					PLT	PL(D)=0.72MPa
																			PLT	PL(A)=0.54MPa
	177	7																7	PLT	PL(A)=2.2MPa
																			PLT	PL(D)=1MPa
										H									PLT	PL(D)=1.8MPa
																			PLT	PL(A)=1.4MPa
	176	8						HW to MW			100	100						8	PLT	PL(A)=1.7MPa
																			PLT	PL(D)=1MPa
									8.23	VH									PLT	PL(D)=5.5MPa
									8.39											
	175	9								H	100	100		9.52m: JT/45°, PR, TI Fe, RF				9		
	174	10.00	Borehole discontinued at 10.00m depth. Limit of invesitgation.															10	PLT	PL(D)=1.2MPa

NOTES: (#) Soil origin is "probable" unless otherwise stated. (*) Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Truck Mounted Drill Rig
METHOD:
REMARKS:

OPERATOR: Ground Test
CASING: HQ to 2m

LOGGED: Chaplin

Refer to explanatory notes for symbol and abbreviation definitions

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: Proposed Muswellbrook Substation
LOCATION: 20 Sandy Point Road, Muswellbrook, NSW

SURFACE LEVEL: 183.3 AHD
COORDINATE: E:303325.8, N:6430257.4
DATUM/GRID: MGA2020 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 12
PROJECT No: 224763.00
DATE: 19/09/23
SHEET: 1 of 1

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*)	DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
No free groundwater observed	183	0.15	FILL / Gravelly SILT (ML), with clay: brown; low plasticity; fine to coarse, angular to sub-angular gravel; trace ash.		FILL	NA		w<PL						
			FILL / Clayey GRAVEL (GC), with silt: black; fine to medium, angular to sub-angular; possibly contains trace bituminous material.		FILL	NA		D						
		0.55	Sandy CLAY (CI), with gravel: orange brown; medium plasticity; fine to coarse sand; fine to coarse, rounded to sub-rounded gravel.							B		0.55		
	182	1							U75 /	U50		1.00 1.05		
												1.26	PP	>400kPa
										SPT			SPT	4,14,20 N=34
														>400kPa
												1.71	PP	
		2			RS	H		w<PL				2		
	181													
												2.50		
										SPT			SPT	7,12,17 N=29
														>400kPa
		3										2.95	PP	
	180		3.90m: increase in drill resistance indicative of rock									3		
		3.90	SANDSTONE, highly weathered pebbly			VL		NA						
		4								SPT		4.00	SPT	4,25/70
	179	4.22	Borehole discontinued at 4.22m depth. TC bit refusal.									4.22		

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Truck Mounted Drill Rig
METHOD: Solid flight auger with TC bit to 4.22m
REMARKS:

OPERATOR: Ground Test
CASING: Nil

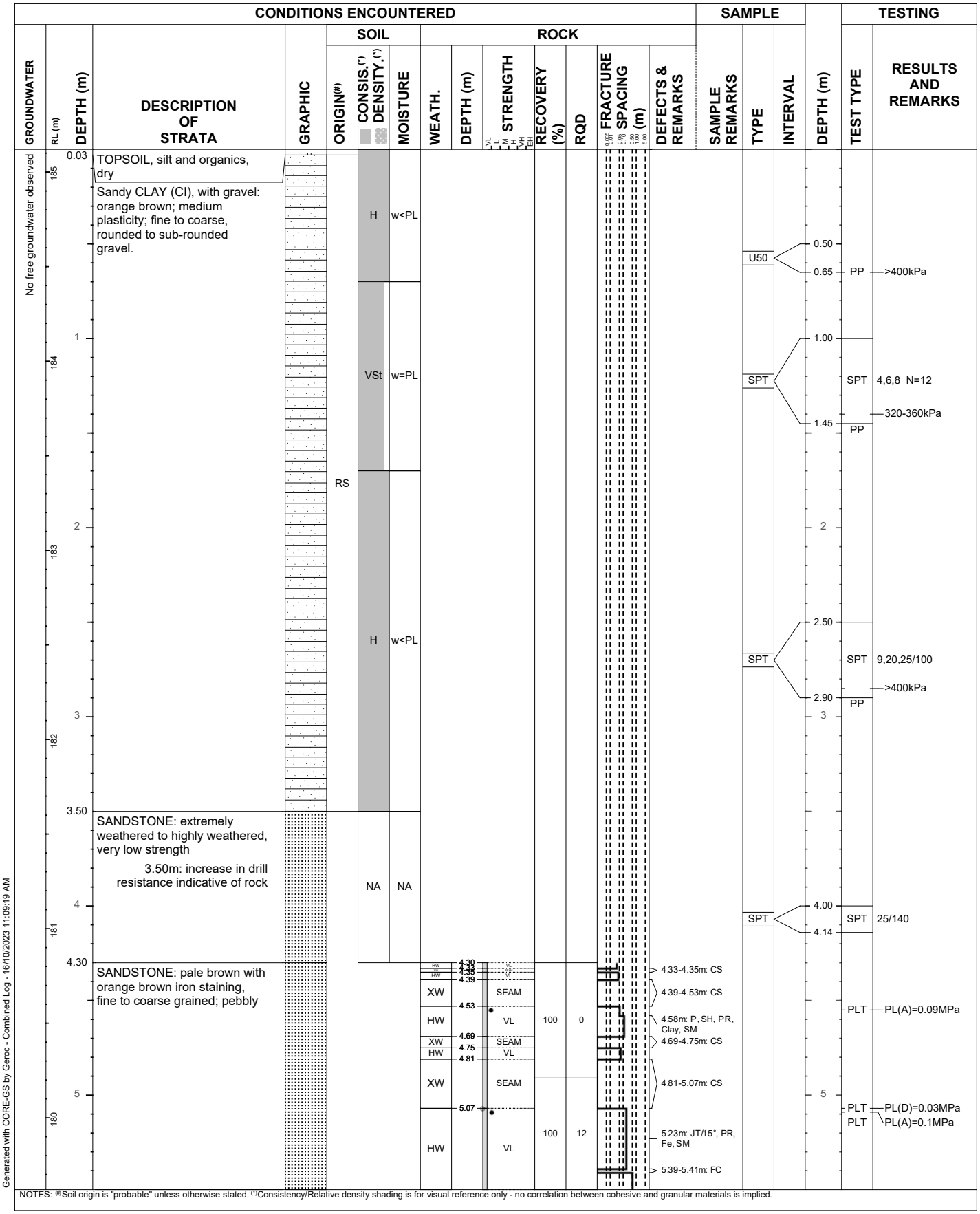
LOGGED: Chaplin

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: Proposed Muswellbrook Substation
LOCATION: 20 Sandy Point Road, Muswellbrook, NSW

SURFACE LEVEL: 185.1 AHD
COORDINATE: E:303325.7, N:6430211.1
DATUM/GRID: MGA2020 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 13
PROJECT No: 224763.00
DATE: 26/09/23
SHEET: 1 of 2



NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Truck Mounted Drill Rig
METHOD:
REMARKS:

OPERATOR: Ground Test
CASING: HQ to 4.1m

LOGGED: Chaplin

Refer to explanatory notes for symbol and abbreviation definitions

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: Proposed Muswellbrook Substation
LOCATION: 20 Sandy Point Road, Muswellbrook, NSW

SURFACE LEVEL: 185.1 AHD
COORDINATE: E:303325.7, N:6430211.1
DATUM/GRID: MGA2020 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 13
PROJECT No: 224763.00
DATE: 26/09/23
SHEET: 2 of 2

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL: ORIGIN(#)	SOIL: CONSIS.(*) DENSITY.(*)	SOIL: MOISTURE	ROCK: WEATH.	ROCK: DEPTH (m)	ROCK: STRENGTH (VL L M H VH EH)	ROCK: RECOVERY (%)	ROCK: RQD	ROCK: FRACTURE SPACING (m) (0.05 0.06 0.18 0.60 2.00 >2.00)	ROCK: DEFECTS & REMARKS	SAMPLE: SAMPLE REMARKS	SAMPLE: TYPE	SAMPLE: INTERVAL	DEPTH (m)	TESTING: TEST TYPE	TESTING: RESULTS AND REMARKS
			[CONT] SANDSTONE: pale brown with orange brown iron staining, fine to coarse grained; pebbly											5.88m: P, SH, PR, Fe, RF					PLT	PL(D)=0.19MPa
																			PLT	PL(A)=0.09MPa
	179	6								VL				6.23-6.25m: FC				6	PLT	PL(A)=0.27MPa
																			PLT	PL(D)=0.08MPa
											100	12								
																			PLT	PL(D)=0.07MPa
														6.83m: P, SH, PR, Fe, RF						
									6.92											
	178	7												7.08m: P, SH, PR, Fe, RF				7	PLT	PL(D)=0.1MPa
														7.13m: P, SH, PR, Fe, RF					PLT	PL(A)=0.23MPa
														7.22m: JT, 55°/60°, PR, Fe, RF						
														7.36m: JT/80°, PR, TI Fe, RF						
														7.42m: P, SH, PR, RF						
														7.46m: P, SH, PR, RF					PLT	PL(D)=0.35MPa
								HW						7.60-7.65m: FC, Fe					PLT	PL(A)=0.21MPa
	177	8												7.98m: JT/60°, PR, TI Clay, SM				8		
														8.04m: JT/10°, PR, Fe, RF						
										L									PLT	PL(A)=0.15MPa
											100	91		8.70m: JT/80°, PR, TI, RF, HE					PLT	PL(D)=0.14MPa
	176	9												9.21m: P, SH, PR Fe, RF				9	PLT	PL(A)=0.19MPa
														9.29m: JT, 50°/55°, PR, TI Fe, SM, HE					PLT	PL(D)=0.14MPa
														9.45m: P, SH, PR, Fe, RF						
														9.86m: P, SH, PR, Fe, RF						
		10.00	Borehole discontinued at 10.00m depth. Limit of investigation.															10		

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Truck Mounted Drill Rig
METHOD:
REMARKS:

OPERATOR: Ground Test
CASING: HQ to 4.1m

LOGGED: Chaplin

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: Proposed Muswellbrook Substation
LOCATION: 20 Sandy Point Road, Muswellbrook, NSW

SURFACE LEVEL: 188.2 AHD
COORDINATE: E:303255.3, N:6430213.3
DATUM/GRID: MGA2020 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 14
PROJECT No: 224763.00
DATE: 26/09/23
SHEET: 1 of 2

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL ORIGIN(#)	SOIL CONSIS.(*) DENSITY.(*)	SOIL MOISTURE	ROCK WEATH.	ROCK DEPTH (m)	ROCK STRENGTH	ROCK RECOVERY (%)	ROCK RQD	ROCK FRACTURE SPACING (m)	ROCK DEFECTS & REMARKS	SAMPLE REMARKS	SAMPLE TYPE	SAMPLE INTERVAL	DEPTH (m)	TESTING TEST TYPE	TESTING RESULTS AND REMARKS
No free groundwater observed	188	0.03	TOPSOIL, silt and organics, dry															0.50		
			Sandy CLAY (CI), with gravel: orange brown; medium plasticity; fine to coarse, rounded to sub-rounded gravel.													U50		0.81	PP	>400kPa
	187	1			RS	H	w<PL									SPT		1.00	SPT	12,19,17 N=36
																		1.45	PP	>400kPa
	186	2																2.50		
		2.66	SANDSTONE: pale brown with orange brown iron staining, fine to coarse grained					HW	2.66	VL				2.69m: P, SH, PR, Fe, RF 2.72-2.74m: FC		SPT		2.66	SPT	24,25/10 (HB)
								XW	2.86	SEAM	100	0		2.86-2.96m: CS						
		3						HW	2.96	VL								3		
		3.07	CORE LOSS						3.07									3.40		
	185	3.15	SANDSTONE: pale brown with orange brown iron staining, fine to coarse grained						3.15							UCS		3.61	PLT PLT	PL(A)=0.36MPa PL(D)=0.32MPa
														3.70m: JT/10°, PR, Fe, RF						
		4																4	PLT PLT	PL(D)=0.31MPa PL(A)=0.38MPa
	184							HW		M	97	92								
														4.82m: JT/10°, PR, Fe, RF 4.90m: JT/10°, PR, Fe, RF 4.94m: P, SH, PR, Fe, RF					PLT PLT	PL(D)=0.31MPa PL(A)=0.5MPa
	183	5	5.19m-5.27m: clast															5		

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Truck Mounted Drill Rig
METHOD: Solid flight auger to 2.66m, then NMLC coring to 10m depth
REMARKS:

OPERATOR: Ground Test
CASING: HQ to 2.66m

LOGGED: Chaplin

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: Proposed Muswellbrook Substation
LOCATION: 20 Sandy Point Road, Muswellbrook, NSW

SURFACE LEVEL: 188.2 AHD
COORDINATE: E:303255.3, N:6430213.3
DATUM/GRID: MGA2020 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 14
PROJECT No: 224763.00
DATE: 26/09/23
SHEET: 2 of 2

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL: ORIGIN(#)	SOIL: CONSIS.(*) DENSITY.(*)	SOIL: MOISTURE	ROCK: WEATH.	ROCK: DEPTH (m)	ROCK: STRENGTH (VL L M H VH EH)	ROCK: RECOVERY (%)	ROCK: RQD	ROCK: FRACTURE SPACING (m)	ROCK: DEFECTS & REMARKS	SAMPLE: SAMPLE REMARKS	SAMPLE: TYPE	SAMPLE: INTERVAL	DEPTH (m)	TESTING: TEST TYPE	TESTING: RESULTS AND REMARKS
	182	6	[CONT] SANDSTONE: pale brown with orange brown iron staining, fine to coarse grained								97	92		5.75m: JT/60°, PR, Fe, RF 5.81-5.86m: FC				6	PLT PLT	PL(D)=0.95MPa PL(A)=0.92MPa
																			PLT PLT	PL(A)=0.97MPa PL(D)=0.94MPa
										M				6.30m: P, SH, PR, Fe, RF						
														6.78m: JT/80°, PR, TI Fe, RF, HE						
	181	7									100	96						7	PLT	PL(D)=0.9MPa
														7.41m: P, SH, PR, Fe, RF						
								HW	7.69	H to VH								7.65		
																UCS				
		8							8.05									7.96	PLT PLT	PL(D)=3.1MPa PL(A)=2.7MPa
	180		8.81m-9.00m: clast																	
														8.81m: JT/30°, PR, Fe, RF					PLT PLT	PL(D)=0.42MPa PL(A)=0.37MPa
		9								M								9		
	179										100	100		9.23m: JT/45°, PR, Fe, RF						
														9.72m: JT/10°, PR, Fe, RF						
		10.00	Borehole discontinued at 10.00m depth. Limit of investigation.															10		

NOTES: (#) Soil origin is "probable" unless otherwise stated. (*) Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Truck Mounted Drill Rig
METHOD: Solid flight auger to 2.66m, then NMLC coring to 10m depth
REMARKS:

OPERATOR: Ground Test
CASING: HQ to 2.66m

LOGGED: Chaplin

Refer to explanatory notes for symbol and abbreviation definitions

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: Proposed Muswellbrook Substation
LOCATION: 20 Sandy Point Road, Muswellbrook, NSW

SURFACE LEVEL: 188.5 AHD
COORDINATE: E:303165.7, N:6430215.6
DATUM/GRID: MGA2020 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 15
PROJECT No: 224763.00
DATE: 02/09/23
SHEET: 1 of 2

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL ORIGIN(#)	SOIL CONSIS.(*) DENSITY.(*)	SOIL MOISTURE	ROCK WEATH.	ROCK DEPTH (m)	ROCK STRENGTH	ROCK RECOVERY (%)	ROCK RQD	ROCK FRACTURE SPACING (m)	ROCK DEFECTS & REMARKS	SAMPLE REMARKS	SAMPLE TYPE	SAMPLE INTERVAL	DEPTH (m)	TESTING TEST TYPE	TESTING RESULTS AND REMARKS
No free groundwater observed	188	0.03	TOPSOIL, silt and organics, dry																	
			Sandy CLAY (CI), with gravel: orange brown; medium plasticity; fine to coarse sand; fine to coarse, rounded to sub-rounded gravel.		RS	VSt to H	w<PL									D		0.50		
		1.00	Sandy CLAY, with gravel: orange brown; medium plasticity; fine to coarse sand; fine to coarse, rounded to sub-rounded gravel.		XWM	H to Fr	w<PL									SPT		1.00	SPT	15,25/140
	187																	1.29	PP	>400kPa
		2																2		
	186	2.57	SANDSTONE: pale brown with orange brown iron staining, fine to coarse grained; pebbly					HW	2.57	VL				2.63-2.74m: FC		SPT		2.50	SPT	25/70
																		2.57	PP	>400kPa
		3						XW	2.95	SEAM				2.95-3.07m: CS				3		
	185							HW	3.07	VL	100	22		3.56-3.63m: FC 3.85m: JT x2, SV, UN, TI Clay, RF, extends from 3.63m to 4.03m					PLT	PL(A)=0.03MPa
																			PLT	PL(D)=0.04MPa
		4						XW	4.03	SEAM				4.03-4.31m: CS				4		
	184							HW	4.31	L									PLT	PL(A)=0.22MPa
																			PLT	PL(D)=0.25MPa
		4.80	CORE LOSS						4.80		62	62								
		5																5		
		5.25	SANDSTONE: pale brown with orange brown iron staining, fine to coarse					HW	5.25	M								5.40		

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Truck Mounted Drill Rig
METHOD:
REMARKS:

OPERATOR: Ground Test
CASING: HQ to 2.5m

LOGGED: Chaplin

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BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: Proposed Muswellbrook Substation
LOCATION: 20 Sandy Point Road, Muswellbrook, NSW

SURFACE LEVEL: 188.5 AHD
COORDINATE: E:303165.7, N:6430215.6
DATUM/GRID: MGA2020 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 15
PROJECT No: 224763.00
DATE: 02/09/23
SHEET: 2 of 2

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL ORIGIN(#)	SOIL CONSIS.(*) DENSITY.(*)	SOIL MOISTURE	ROCK WEATH.	ROCK DEPTH (m)	ROCK STRENGTH	ROCK RECOVERY (%)	ROCK RQD	ROCK FRACTURE SPACING (m)	ROCK DEFECTS & REMARKS	SAMPLE REMARKS	SAMPLE TYPE	SAMPLE INTERVAL	DEPTH (m)	TESTING TEST TYPE	TESTING RESULTS AND REMARKS
			grained; pebbly					HW		M	62	62				UCS		5.75	PLT PLT	PL(A)=0.34MPa PL(D)=0.45MPa
									5.81											
								MW										6	PLT	PL(D)=0.36MPa
		6.03							6.03											
		6.12	CORE LOSS						6.12											
			SANDSTONE: pale brown with orange brown iron staining, fine to coarse grained; pebbly					MW	6.21		75	0		6.19-6.26m: FC						
	182		6.50m: colour becomes grey											6.30m: JT, SV, UN, RF, extends from 6.26m to 6.35m 6.35m: P, SH, PR, RF						
																			PLT PLT	PL(A)=0.55MPa PL(D)=0.42MPa
		7																7	PLT PLT	PL(A)=0.31MPa PL(D)=0.4MPa
	181										100	100								
		8						FR		M								8	PLT PLT	PL(D)=0.56MPa PL(A)=0.53MPa
																			PLT PLT	PL(D)=0.56MPa PL(A)=0.31MPa
	180																			
		9									100	100						9	PLT PLT	PL(A)=0.4MPa PL(D)=0.34MPa
	179													9.87m: JT/70°, PR, Fe, RF					PLT PLT PLT	PL(D)=0.55MPa PL(A)=0.51MPa PL(D)=0.5MPa
		10.00	Borehole discontinued at 10.00m depth. Limit of investigation.															10		

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Truck Mounted Drill Rig
METHOD:
REMARKS:

OPERATOR: Ground Test
CASING: HQ to 2.5m

LOGGED: Chaplin

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: Proposed Muswellbrook Substation
LOCATION: 20 Sandy Point Road, Muswellbrook, NSW

SURFACE LEVEL: 183.0 AHD
COORDINATE: E:303255.0, N:6430281.0
DATUM/GRID: MGA2020 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 16
PROJECT No: 224763.00
DATE: 27/09/23
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
No free groundwater observed	183	0	FILL / SILT (ML), with sand, trace gravel: dark brown; low plasticity; interbedded pale brown ash.		FILL	NA	w<PL		D		0.30		
			0.00m-0.05m: with coal fragments scattered								0.50		
	182	1							D		1.00		
		1.10	Sandy CLAY (CI), with gravel: orange brown; medium plasticity; fine to coarse sand; fine to coarse, rounded to sub-rounded gravel.		RS	H to Fr	w<PL		SPT		1.10	SPT	7,10,15 N=25
													>400kPa
											1.45	PP	
									D		1.50		
									U50		1.73		
	181	2									2		
											2.50		
									SPT			SPT	9,25/130
													>400kPa
		2.78	Borehole discontinued at 2.78m depth. Limit of investigation.								2.78	PP	

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Truck Mounted Drill Rig
METHOD: Solid flight auger with TC bit to 2.78m
REMARKS:

OPERATOR: Ground Test
CASING: Nil

LOGGED: Chaplin

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BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: Proposed Muswellbrook Substation
LOCATION: 20 Sandy Point Road, Muswellbrook, NSW

SURFACE LEVEL: 181.7 AHD
COORDINATE: E:303255.2, N:6430296.0
DATUM/GRID: MGA2020 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 17
PROJECT No: 224763.00
DATE: 27/09/23
SHEET: 1 of 1

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*)	DENSITY.(*)	MOISTURE	REMARKS	SAMPLE TYPE	SAMPLE INTERVAL	DEPTH (m)	TESTING AND REMARKS: TEST TYPE	TESTING AND REMARKS: RESULTS AND REMARKS
No free groundwater observed	181		FILL / SILT (ML), with sand, with gravel: dark brown; low plasticity; fine to coarse sand; fine to coarse, sub-angular to sub-rounded gravel; contains coal fragments.		FILL		NA	w<PL		D		0.30		
										U50		0.50		
												0.66	PP	>400kPa
		1.00	Sandy CLAY (CI), with gravel: orange brown; medium plasticity; fine to coarse, rounded to sub-rounded gravel.									1.00		
	180				RS		H	w<PL		SPT			SPT	10,14,17 N=31
														>400kPa
												1.45	PP	
		2										2		
										SPT		2.50	SPT	25/140
	179	2.64	Borehole discontinued at 2.64m depth. Limit of investigation.									2.64		>400kPa
													PP	

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Truck Mounted Drill Rig
METHOD: Solid flight auger with TC bit to 2.64m
REMARKS:

OPERATOR: Ground Test
CASING: Nil

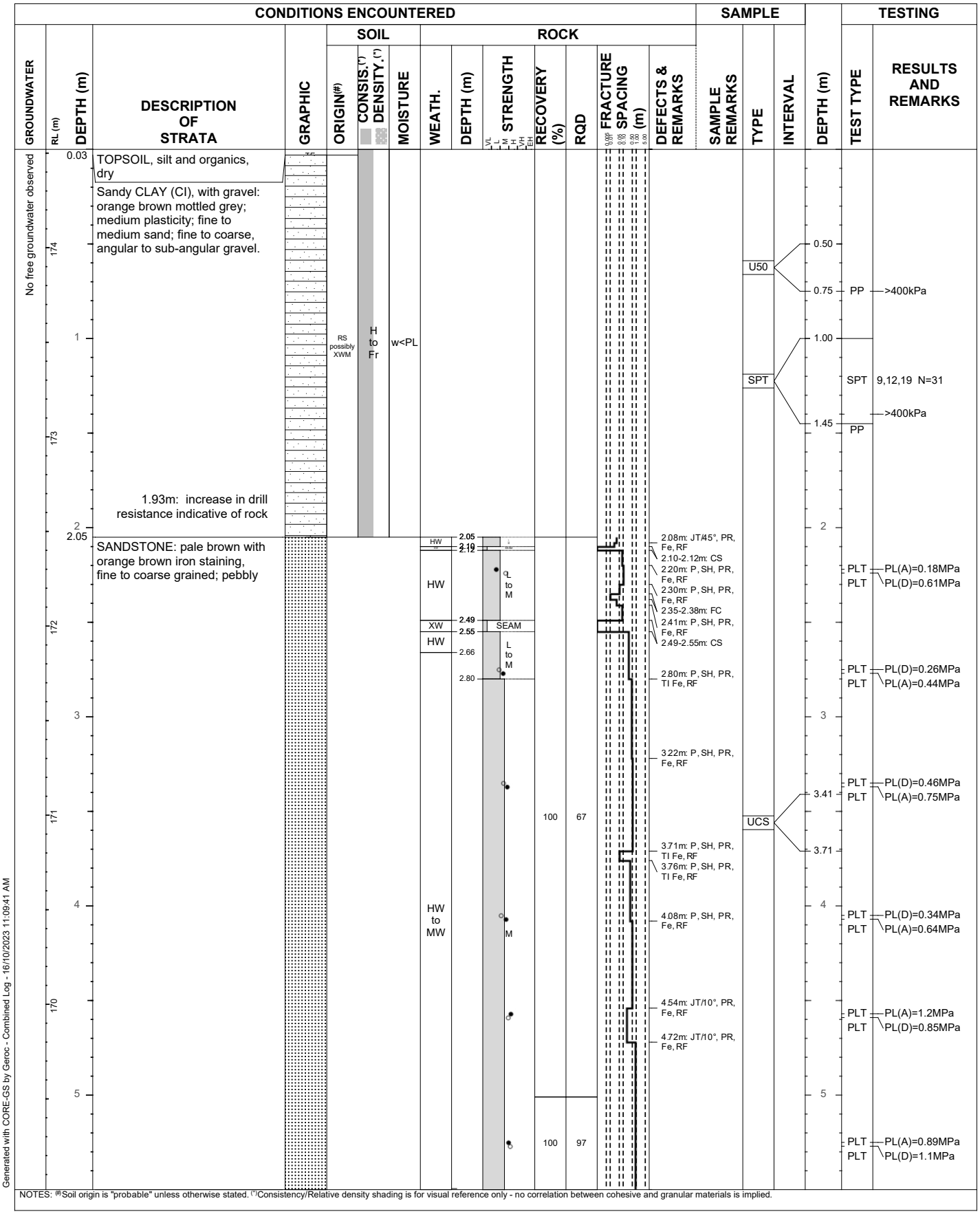
LOGGED: Chaplin

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: Proposed Muswellbrook Substation
LOCATION: 20 Sandy Point Road, Muswellbrook, NSW

SURFACE LEVEL: 174.5 AHD
COORDINATE: E:303202.2, N:6430360.5
DATUM/GRID: MGA2020 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 2
PROJECT No: 224763.00
DATE: 21/09/23
SHEET: 1 of 2



NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Truck Mounted Drill Rig
METHOD: Solid flight auger to 2.05m, then NMLC coring to 10m depth
REMARKS:

OPERATOR: Ground Test
CASING: HQ to 2m

LOGGED: Chaplin

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: Proposed Muswellbrook Substation
LOCATION: 20 Sandy Point Road, Muswellbrook, NSW

SURFACE LEVEL: 174.5 AHD
COORDINATE: E:303202.2, N:6430360.5
DATUM/GRID: MGA2020 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 2
PROJECT No: 224763.00
DATE: 21/09/23
SHEET: 2 of 2

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL ORIGIN(#)	SOIL CONSIS.(*) DENSITY.(*)	SOIL MOISTURE	ROCK WEATH.	ROCK DEPTH (m)	ROCK STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	SAMPLE TYPE	SAMPLE INTERVAL	DEPTH (m)	TESTING TEST TYPE	TESTING RESULTS AND REMARKS
	169		[CONT] SANDSTONE: pale brown with orange brown iron staining, fine to coarse grained; pebbly					HW	5.53 5.55	L				5.54m: P/10°, PR, RF						
									5.67					5.67-5.76m: CS						
								XW	5.76	L				5.86m: P, SH, PR, Fe, RF						
								HW	5.81 5.83											
								MW						6.00m: P, SH, PR, RF						
		6							6.09									6		
			From 6.09m: becomes grey in colour					SW						6.29m: P, SH, PR, RF					PLT	PL(D)=0.84MPa
	168								6.29										PLT	PL(A)=0.94MPa
											100	97		6.71m: P, SH, PR, RF						
		7								M				7.01m: JT/15°, PR, RF						
	167													7.53m: JT/35°, PR, RF				7.52	PLT	PL(D)=0.47MPa
																UCS			PLT	PL(A)=0.93MPa
		8						FR										7.87		
																			PLT	PL(D)=0.29MPa
	166								8.55					8.61m: P, SH, PR, RF					PLT	PL(A)=0.87MPa
														8.91m: JT/20°, PR, SM						
		9								H	100	100						9		
	165																		PLT	PL(D)=1.3MPa
																			PLT	PL(A)=1.4MPa
		10.00	Borehole discontinued at 10.00m depth. Limit of investigation.															10		

NOTES: (#) Soil origin is "probable" unless otherwise stated. (*) Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Truck Mounted Drill Rig
METHOD: Solid flight auger to 2.05m, then NMLC coring to 10m depth
REMARKS:

OPERATOR: Ground Test
CASING: HQ to 2m

LOGGED: Chaplin

Refer to explanatory notes for symbol and abbreviation definitions

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: Proposed Muswellbrook Substation
LOCATION: 20 Sandy Point Road, Muswellbrook, NSW

SURFACE LEVEL: 175.0 AHD
COORDINATE: E:303262.7, N:6430363.5
DATUM/GRID: MGA2020 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 3
PROJECT No: 224763.00
DATE: 21/09/23
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
No free groundwater observed	175	FILL / Sandy CLAY (CI), with gravel: orange brown; medium plasticity; fine to coarse, angular to sub-angular gravel.		FILL	NA	w<PL		U50		0.50 – 0.72		
	0.75 / 174	FILL / Silty GRAVEL (GM): dark grey; fine to coarse, sub-angular to sub-rounded.		FILL	NA	D		D		0.75 – 0.85		
	1							SPT		1.00 – 1.10	SPT	25/100
	1.10 / 1.12	CONCRETE: grey.			NA	NA						
		Borehole discontinued at 1.12m depth. TC bit refusal, likely concrete.										
	173											
	2									2		
	172											

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Truck Mounted Drill Rig
METHOD: Solid flight auger with TC bit to 1.12m
REMARKS:

OPERATOR: Ground Test
CASING: Nil

LOGGED: Chaplin

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: Proposed Muswellbrook Substation
LOCATION: 20 Sandy Point Road, Muswellbrook, NSW

SURFACE LEVEL: 176.5 AHD
COORDINATE: E:303317.6, N:6430366.0
DATUM/GRID: MGA2020 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 4
PROJECT No: 224763.00
DATE: 21/09/23
SHEET: 1 of 2

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL ORIGIN(#)	SOIL CONSIS.(*) DENSITY.(*)	SOIL MOISTURE	ROCK WEATH.	ROCK DEPTH (m)	ROCK STRENGTH	ROCK RECOVERY (%)	ROCK RQD	ROCK FRACTURE SPACING (m)	ROCK DEFECTS & REMARKS	SAMPLE REMARKS	SAMPLE TYPE	SAMPLE INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
No free groundwater observed		0.03	TOPSOIL, silt and organics, dry															0.50		
	176		Sandy CLAY (CI), trace gravel: orange brown; medium plasticity; fine to coarse sand; fine to coarse, rounded to sub-rounded gravel.													U50		0.68	PP	>400kPa
		1																1.00		
																SPT			SPT	16,23,23 N=46
	175																	1.45	PP	>400kPa
		2			RS	H	w<PL											2		
	174																	2.50		
																SPT			SPT	16,23,24 N=47
		3																2.95	PP	>400kPa
	173																			
		4																4.00		
																SPT			SPT	15,25/140
	172		4.60m: increase in drill resistance indicative of rock															4.29	PP	>400kPa
		4.66	SANDSTONE: brown with orange brown iron staining, fine to coarse grained; pebbly					HW	4.66	VH	100	34		4.70-4.75m: FC 4.81-4.88m: FC 4.94-5.00m: FC						
		5																5.00	PLT	PL(D)=3.5MPa
		5.27	CORE LOSS						5.27		0	0		5.21m: JT/15°, PR, Fe, RF		UCS		5.22		

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Truck Mounted Drill Rig
OPERATOR: Ground Test
LOGGED: Chaplin
METHOD: Solid flight auger to 4.66m, then NMLC coring to 10m depth
CASING: HQ to 4.5m
REMARKS:

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: Proposed Muswellbrook Substation
LOCATION: 20 Sandy Point Road, Muswellbrook, NSW

SURFACE LEVEL: 176.5 AHD
COORDINATE: E:303317.6, N:6430366.0
DATUM/GRID: MGA2020 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 4
PROJECT No: 224763.00
DATE: 21/09/23
SHEET: 2 of 2

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL: ORIGIN(#)	SOIL: CONSIS.(*) DENSITY.(*)	SOIL: MOISTURE	ROCK: WEATH.	ROCK: DEPTH (m)	ROCK: STRENGTH	ROCK: RECOVERY (%)	ROCK: RQD	ROCK: FRACTURE SPACING (m)	ROCK: DEFECTS & REMARKS	SAMPLE: SAMPLE REMARKS	SAMPLE: TYPE	SAMPLE: INTERVAL	DEPTH (m)	TESTING: TEST TYPE	TESTING: RESULTS AND REMARKS
	171		[CONT] CORE LOSS								0	0								
		5.96						MW to HW	5.96	H	100	0								
		6.05	SANDSTONE: brown with orange brown iron staining, fine to coarse grained; pebbly						6.05											
		6.18	CORE LOSS						6.18											
			SANDSTONE: brown with orange brown iron staining, fine to coarse grained; pebbly											6.41m: P, SH, PR, Fe, RF					PLT	PL(D)=2.9MPa
																			PLT	PL(A)=2.3MPa
	170													6.69m: P, SH, PR, TI Fe, RF						
		7								H								7	PLT	PL(D)=1.3MPa
								MW											PLT	PL(A)=1.6MPa
											94	94							PLT	PL(D)=1.8MPa
	169													7.48m: JT/10°, PR, Fe, RF					PLT	PL(A)=1.6MPa
									7.55											
										M										
		8							7.99									8	PLT	PL(D)=0.73MPa
			From 8.12m: colour becomes grey						8.12	VH									PLT	PL(A)=0.83MPa
								FR	8.29										PLT	PL(D)=3.6MPa
								SW to FR	8.48	M									PLT	PL(D)=7.1MPa
	168																			
		8.64	CORE LOSS						8.64		20	0							PLT	PL(D)=0.4MPa
		8.83	SANDSTONE: brown with orange brown iron staining, fine to coarse grained; pebbly						8.83										PLT	PL(A)=0.89MPa
		9												8.97m: P, SH, PR, RF				9		
								MW to SW												
									9.40	M	100	91							PLT	PL(A)=0.76MPa
	167																	9.49	PLT	PL(D)=0.61MPa
								SW to FR								UCS		9.71		
		10.00	Borehole discontinued at 10.00m depth. Limit of investigation.															10		

NOTES: (#) Soil origin is "probable" unless otherwise stated. (*) Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Truck Mounted Drill Rig
METHOD: Solid flight auger to 4.66m, then NMLC coring to 10m depth
REMARKS:

OPERATOR: Ground Test
CASING: HQ to 4.5m

LOGGED: Chaplin

Refer to explanatory notes for symbol and abbreviation definitions

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: Proposed Muswellbrook Substation
LOCATION: 20 Sandy Point Road, Muswellbrook, NSW

SURFACE LEVEL: 178.7 AHD
COORDINATE: E:303155.7, N:6430320.1
DATUM/GRID: MGA2020 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 5
PROJECT No: 224763.00
DATE: 19/09/23
SHEET: 1 of 1

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*)	DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
No free groundwater observed	178	0	FILL / Sandy CLAY (CI), with gravel: orange brown; medium plasticity; fine to coarse sand; fine to coarse, rounded to sub-rounded gravel.		FILL	H		w<PL		B		0.05		
										U50		0.50		
												0.86	PP	>400kPa
		1								U75		0.90 1		
												1.10	PP	>400kPa
										SPT			SPT	13,16,17 N=33
														>400kPa
												1.55	PP	
	177	2										2		
		2.05	Pebbly SANDSTONE, brown, highly weathered 2.05m: increase in drill resistance indicative of rock			NA	NA	NA						
										SPT		2.50	SPT	25/70
	176	2.72	Borehole discontinued at 2.72m depth. TC bit refusal.									2.72		

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Truck Mounted Drill Rig
METHOD: Solid flight auger with TC bit to 2.72m
REMARKS:

OPERATOR: Ground Test
CASING: Nil

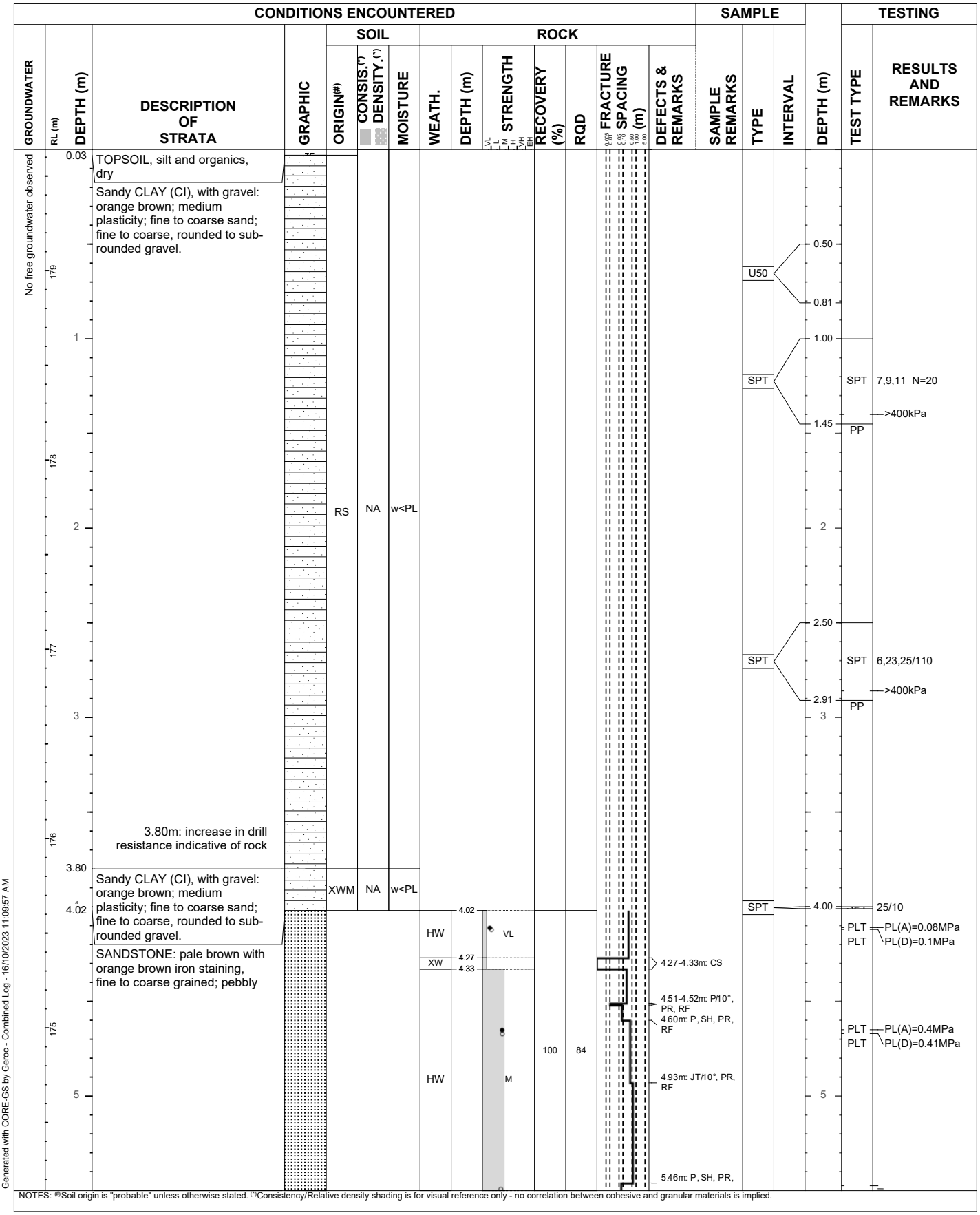
LOGGED: Chaplin

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: Proposed Muswellbrook Substation
LOCATION: 20 Sandy Point Road, Muswellbrook, NSW

SURFACE LEVEL: 179.6 AHD
COORDINATE: E:303197.1, N:6430318.1
DATUM/GRID: MGA2020 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 6
PROJECT No: 224763.00
DATE: 20/09/23
SHEET: 1 of 2



NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Truck Mounted Drill Rig
METHOD:
REMARKS:

OPERATOR: Ground Test
CASING: HQ to 4m

LOGGED: Chaplin

Refer to explanatory notes for symbol and abbreviation definitions

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: Proposed Muswellbrook Substation
LOCATION: 20 Sandy Point Road, Muswellbrook, NSW

SURFACE LEVEL: 179.6 AHD
COORDINATE: E:303197.1, N:6430318.1
DATUM/GRID: MGA2020 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 6
PROJECT No: 224763.00
DATE: 20/09/23
SHEET: 2 of 2

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL: ORIGIN(#)	SOIL: CONSIS.(*) DENSITY.(*)	SOIL: MOISTURE	ROCK: WEATH.	ROCK: DEPTH (m)	ROCK: STRENGTH	ROCK: RECOVERY (%)	ROCK: RQD	ROCK: FRACTURE SPACING (m)	ROCK: DEFECTS & REMARKS	SAMPLE: SAMPLE REMARKS	SAMPLE: TYPE	SAMPLE: INTERVAL	DEPTH (m)	TESTING: TEST TYPE	TESTING: RESULTS AND REMARKS
	174	6	[CONT] SANDSTONE: pale brown with orange brown iron staining, fine to coarse grained; pebbly					HW		M	100	84		RF 5.53m: JT/10°, PR, RF 5.73m: JT/10°, PR, RF 5.89m: JT/10°, PR, RF		UCS		6.00	PLT PLT	PL(D)=0.34MPa PL(A)=0.4MPa
	173							XW	6.42					6.42-6.76m: CS				6.28	PLT PLT	PL(D)=0.46MPa PL(A)=0.43MPa
		7	7.09m-10.00m: grey in colour					MW	6.76					7.00m: JT/10°, PR, Fe, RF				7	PLT PLT	PL(A)=0.76MPa PL(D)=0.57MPa
	172							SW	7.09		100	84								
								MW	7.68										PLT PLT	PL(A)=0.88MPa PL(D)=0.98MPa
		8							8.18	M								8	PLT PLT	PL(A)=0.89MPa PL(D)=0.8MPa
	171																		PLT PLT	PL(A)=0.41MPa PL(D)=0.76MPa
		9						FR			100	100		8.90m: P, SH, PR, RF 9.17m: JT/55°, PR, RF 9.48m: P, SH, PR, RF				9		
	170	10.00	Borehole discontinued at 10.00m depth. Limit of investigation.															10	PLT PLT	PL(A)=0.66MPa PL(D)=0.66MPa

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Truck Mounted Drill Rig
METHOD:
REMARKS:

OPERATOR: Ground Test
CASING: HQ to 4m

LOGGED: Chaplin

Generated with CORE-GS by Geroc - Combined Log - 16/10/2023 11:09:57 AM

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: Proposed Muswellbrook Substation
LOCATION: 20 Sandy Point Road, Muswellbrook, NSW

SURFACE LEVEL: 178.0 AHD
COORDINATE: E:303263.5, N:6430317.4
DATUM/GRID: MGA2020 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 7
PROJECT No: 224763.00
DATE: 20/09/23
SHEET: 1 of 1

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	SAMPLE TYPE	SAMPLE INTERVAL	DEPTH (m)	TESTING AND REMARKS: TEST TYPE	RESULTS AND REMARKS
No free groundwater observed											0.05		
			FILL / Sandy CLAY (CI), with gravel: orange brown; medium plasticity; fine to coarse sand; fine to coarse, sub-angular to sub-rounded gravel.		FILL	NA	w<PL		U50				
		0.50									0.73	PP	>400kPa
			FILL / Clayey Gravelly SILT (ML), with sand: dark brown; low plasticity; fine to coarse, angular to sub-angular gravel; fine to coarse sand; trace coal fragments, trace possible ash.		FILL	NA	w<PL		D		0.80		
	177	1									1.00		
									SPT			SPT	24,25/110
		1.20									1.26		>400kPa
			FILL / Silty GRAVEL (GM): dark grey; trace coal fragments, trace possible ash.		FILL	NA	D					PP	
									D		1.50		
	176	2.00									2		
			FILL / Clayey Gravelly SILT (ML), with sand: dark brown; low plasticity; fine to coarse, angular to sub-angular gravel; fine to coarse sand; trace coal fragments, trace possible ash.		FILL	NA	w<PL						
											2.50		
									SPT			SPT	16,18,18 N=32
	175	3									2.95		
											3		
		3.20	Sandy CLAY (CI), with gravel: orange brown; medium plasticity; fine to coarse, rounded to sub-rounded gravel.		XWM	H	w<PL						
		3.45	PEBBLY SANDSTONE: orange brown 3.45m: increase in drill resistance indicative of rock			VL	NA						
	174	4.01							SPT		4.00		25/10
			Borehole discontinued at 4.01m depth. TC bit refusal.										
	173												

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Truck Mounted Drill Rig
METHOD: Solid flight auger with TC bit to 4.01m
REMARKS:

OPERATOR: Ground Test
CASING: Nil

LOGGED: Chaplin

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: Proposed Muswellbrook Substation
LOCATION: 20 Sandy Point Road, Muswellbrook, NSW

SURFACE LEVEL: 179.5 AHD
COORDINATE: E:303323.0, N:6430306.4
DATUM/GRID: MGA2020 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 8
PROJECT No: 224763.00
DATE: 19/09/23
SHEET: 1 of 1

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) DENSITY.(*)	MOISTURE	REMARKS	SAMPLE TYPE	SAMPLE INTERVAL	DEPTH (m)	TESTING AND REMARKS: TEST TYPE	TESTING AND REMARKS: RESULTS AND REMARKS
No free groundwater observed	179	0.50	FILL / Clayey SILT (ML), with sand, with gravel: brown grey; low plasticity; contains ash and coal fragments.		FILL	NA	w<PL		D	0.25	0.25		
			Sandy CLAY (CI), with gravel: orange brown; medium plasticity; fine to coarse sand; fine to coarse, rounded to sub-rounded gravel.						U50	0.50	0.50		
										0.65		PP	>400kPa
									B				
		1									1.00		
									U75				
										1.24		PP	>400kPa
	178								SPT			SPT	10,12,20 N=32
											1.69		
		2			RS	H to Fr	w<PL				2		
	177										2.50		
									SPT			SPT	10,25/120
													>400kPa
										2.77		PP	
		3	3.35m: increase in drill resistance indicative of rock								3		
		3.35	Pebby SANDSTONE, brown, highly weathered			VL	NA						
	176	3.50	Borehole discontinued at 3.50m depth. TC bit refusal.										
		4									4		
	175												

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Truck Mounted Drill Rig
METHOD: Solid flight auger with TC bit to 3.50m
REMARKS:

OPERATOR: Ground Test
CASING: Nil

LOGGED: Chaplin

BOREHOLE LOG

CLIENT: Ausgrid
PROJECT: Proposed Muswellbrook Substation
LOCATION: 20 Sandy Point Road, Muswellbrook, NSW

SURFACE LEVEL: 183.0 AHD
COORDINATE: E:303151.9, N:6430268.6
DATUM/GRID: MGA2020 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: 9
PROJECT No: 224763.00
DATE: 19/09/23
SHEET: 1 of 1

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*)	DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
No free groundwater observed		0.03	TOPSOIL, silt and organics, dry	TS										
			Sandy CLAY (CI), with gravel: orange brown; medium plasticity; fine to coarse sand; fine to medium, rounded to sub-rounded gravel.							B		0.50		
	182	1			RS possibly XWM	H to Fr		w<PL		U75		1.00		
												1.21	PP	>400kPa
										SPT			SPT	9,21,25 N=46
												1.66	PP	>400kPa
	181	2	2.30m: increase in drill resistance indicative of rock									2		
		2.40	Borehole discontinued at 2.40m depth. TC bit refusal at 2.4m, on sandstone.											

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Truck Mounted Drill Rig
METHOD: Solid flight auger with TC bit to 2.4m
REMARKS:

OPERATOR: Ground Test
CASING: Nil

LOGGED: Chaplin

Appendix H

Laboratory Testing Reports

Laboratory Summary Tables:

Table H1: Summary of soil analysis for land use – TRH, BTEX, PAH, Metals

Table H2: Summary of soil analysis for land use – PCB, OCP, OPP, PFAS, Asbestos

Table H3: Summary of Soil Analysis for Wate Classification

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 346557

Client Details

Client	Douglas Partners Newcastle
Attention	Michael Gawn
Address	Box 324 Hunter Region Mail Centre, Newcastle, NSW, 2310

Sample Details

Your Reference	**224763.02, Muswellbrook**
Number of Samples	21 Soil
Date samples received	15/03/2024
Date completed instructions received	15/03/2024

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	22/03/2024
Date of Issue	22/03/2024

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

Results Approved By
Diego Bigolin, Inorganics Supervisor
Hannah Nguyen, Metals Supervisor
Lucy Zhu, Asbestos Supervisor
Timothy Toll, Senior Chemist

Authorised By
Nancy Zhang, Laboratory Manager

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		346557-1	346557-2	346557-3	346557-4	346557-5
Your Reference	UNITS	313	313	314	314	314
Depth		0.2	0.8	0.05	0.5	1.5
Date Sampled		12/03/2024	12/03/2024	12/03/2024	12/03/2024	12/03/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	18/03/2024	18/03/2024	18/03/2024	18/03/2024	18/03/2024
Date analysed	-	21/03/2024	21/03/2024	21/03/2024	21/03/2024	21/03/2024
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTRH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
Naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	111	107	94	106	97

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		346557-6	346557-7	346557-8	346557-9	346557-10
Your Reference	UNITS	315	315	318	318	318
Depth		0.2	0.5	0.1	1.0	1.5
Date Sampled		12/03/2024	12/03/2024	12/03/2024	12/03/2024	12/03/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	18/03/2024	18/03/2024	18/03/2024	18/03/2024	18/03/2024
Date analysed	-	21/03/2024	21/03/2024	21/03/2024	21/03/2024	21/03/2024
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTRH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
Naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	93	103	101	106	110

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		346557-11	346557-12	346557-13	346557-14	346557-15
Your Reference	UNITS	319	319	320	321	321
Depth		0.3	0.5	0.2	0.1	0.3
Date Sampled		12/03/2024	12/03/2024	12/03/2024	12/03/2024	12/03/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	18/03/2024	18/03/2024	18/03/2024	18/03/2024	18/03/2024
Date analysed	-	21/03/2024	21/03/2024	21/03/2024	21/03/2024	21/03/2024
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTRH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
Naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	110	92	114	106	81

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		346557-16	346557-17	346557-18	346557-19	346557-20
Your Reference	UNITS	322	322	322	326	324
Depth		0.05	0.3	1.0	0.1	0.5
Date Sampled		12/03/2024	12/03/2024	12/03/2024	12/03/2024	12/03/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	18/03/2024	18/03/2024	18/03/2024	18/03/2024	18/03/2024
Date analysed	-	21/03/2024	21/03/2024	21/03/2024	21/03/2024	21/03/2024
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTRH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
Naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	113	106	106	112	111

vTRH(C6-C10)/BTEXN in Soil		
Our Reference		346557-21
Your Reference	UNITS	D2/SBK
Depth		-
Date Sampled		13/03/2024
Type of sample		Soil
Date extracted	-	18/03/2024
Date analysed	-	21/03/2024
TRH C_6 - C_9	mg/kg	<25
TRH C_6 - C_{10}	mg/kg	<25
vTRH C_6 - C_{10} less BTEX (F1)	mg/kg	<25
Benzene	mg/kg	<0.2
Toluene	mg/kg	<0.5
Ethylbenzene	mg/kg	<1
m+p-xylene	mg/kg	<2
o-Xylene	mg/kg	<1
Naphthalene	mg/kg	<1
Total +ve Xylenes	mg/kg	<1
Surrogate aaa-Trifluorotoluene	%	97

svTRH (C10-C40) in Soil						
Our Reference		346557-1	346557-2	346557-3	346557-4	346557-5
Your Reference	UNITS	313	313	314	314	314
Depth		0.2	0.8	0.05	0.5	1.5
Date Sampled		12/03/2024	12/03/2024	12/03/2024	12/03/2024	12/03/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	18/03/2024	18/03/2024	18/03/2024	18/03/2024	18/03/2024
Date analysed	-	19/03/2024	19/03/2024	19/03/2024	19/03/2024	19/03/2024
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	190	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	140	<100
Total +ve TRH (C10-C36)	mg/kg	<50	<50	<50	330	<50
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	280	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	280	<50
Surrogate o-Terphenyl	%	85	87	87	100	86

svTRH (C10-C40) in Soil						
Our Reference		346557-6	346557-7	346557-8	346557-9	346557-10
Your Reference	UNITS	315	315	318	318	318
Depth		0.2	0.5	0.1	1.0	1.5
Date Sampled		12/03/2024	12/03/2024	12/03/2024	12/03/2024	12/03/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	18/03/2024	18/03/2024	18/03/2024	18/03/2024	18/03/2024
Date analysed	-	19/03/2024	19/03/2024	19/03/2024	19/03/2024	19/03/2024
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
Total +ve TRH (C10-C36)	mg/kg	<50	<50	<50	<50	<50
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	%	90	84	82	85	81

svTRH (C10-C40) in Soil						
Our Reference		346557-11	346557-12	346557-13	346557-14	346557-15
Your Reference	UNITS	319	319	320	321	321
Depth		0.3	0.5	0.2	0.1	0.3
Date Sampled		12/03/2024	12/03/2024	12/03/2024	12/03/2024	12/03/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	18/03/2024	18/03/2024	18/03/2024	18/03/2024	18/03/2024
Date analysed	-	19/03/2024	20/03/2024	20/03/2024	20/03/2024	20/03/2024
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
Total +ve TRH (C10-C36)	mg/kg	<50	<50	<50	<50	<50
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	100	<50
Surrogate o-Terphenyl	%	83	83	79	85	81

svTRH (C10-C40) in Soil						
Our Reference		346557-16	346557-17	346557-18	346557-19	346557-20
Your Reference	UNITS	322	322	322	326	324
Depth		0.05	0.3	1.0	0.1	0.5
Date Sampled		12/03/2024	12/03/2024	12/03/2024	12/03/2024	12/03/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	18/03/2024	18/03/2024	18/03/2024	18/03/2024	18/03/2024
Date analysed	-	20/03/2024	20/03/2024	20/03/2024	20/03/2024	20/03/2024
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	86	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	660	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	340	<100
Total +ve TRH (C10-C36)	mg/kg	<50	<50	<50	1,100	<50
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50	130	<50
TRH >C_{10} -C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	130	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100	<100	870	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	120	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	1,100	<50
Surrogate o-Terphenyl	%	81	80	79	92	81

svTRH (C10-C40) in Soil		
Our Reference		346557-21
Your Reference	UNITS	D2/SBK
Depth		-
Date Sampled		13/03/2024
Type of sample		Soil
Date extracted	-	18/03/2024
Date analysed	-	20/03/2024
TRH C_{10} - C_{14}	mg/kg	<50
TRH C_{15} - C_{28}	mg/kg	200
TRH C_{29} - C_{36}	mg/kg	150
Total +ve TRH (C10-C36)	mg/kg	350
TRH >C_{10} -C_{16}	mg/kg	<50
TRH >C_{10} -C_{16} less Naphthalene (F2)	mg/kg	<50
TRH >C_{16} -C_{34}	mg/kg	290
TRH >C_{34} -C_{40}	mg/kg	<100
Total +ve TRH (>C10-C40)	mg/kg	290
Surrogate o-Terphenyl	%	67

PAHs in Soil						
Our Reference		346557-1	346557-2	346557-3	346557-4	346557-5
Your Reference	UNITS	313	313	314	314	314
Depth		0.2	0.8	0.05	0.5	1.5
Date Sampled		12/03/2024	12/03/2024	12/03/2024	12/03/2024	12/03/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	18/03/2024	18/03/2024	18/03/2024	18/03/2024	18/03/2024
Date analysed	-	20/03/2024	20/03/2024	20/03/2024	20/03/2024	20/03/2024
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	1.8	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	1	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1	0.6	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	0.4	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	0.3	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	0.5	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	0.06	<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	4.6	<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	%	86	83	84	84	83

PAHs in Soil						
Our Reference		346557-6	346557-7	346557-8	346557-9	346557-10
Your Reference	UNITS	315	315	318	318	318
Depth		0.2	0.5	0.1	1.0	1.5
Date Sampled		12/03/2024	12/03/2024	12/03/2024	12/03/2024	12/03/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	18/03/2024	18/03/2024	18/03/2024	18/03/2024	18/03/2024
Date analysed	-	20/03/2024	20/03/2024	20/03/2024	20/03/2024	20/03/2024
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	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	0.6	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	0.3	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	0.2	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	0.2	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	0.4	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	0.06	<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	2.9	<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	%	89	88	88	89	89

PAHs in Soil						
Our Reference		346557-11	346557-12	346557-13	346557-14	346557-15
Your Reference	UNITS	319	319	320	321	321
Depth		0.3	0.5	0.2	0.1	0.3
Date Sampled		12/03/2024	12/03/2024	12/03/2024	12/03/2024	12/03/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	18/03/2024	18/03/2024	18/03/2024	18/03/2024	18/03/2024
Date analysed	-	20/03/2024	20/03/2024	20/03/2024	20/03/2024	20/03/2024
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	0.2	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	0.2	<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	0.99	<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	93	88	97	96

PAHs in Soil						
Our Reference		346557-16	346557-17	346557-18	346557-19	346557-20
Your Reference	UNITS	322	322	322	326	324
Depth		0.05	0.3	1.0	0.1	0.5
Date Sampled		12/03/2024	12/03/2024	12/03/2024	12/03/2024	12/03/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	18/03/2024	18/03/2024	18/03/2024	18/03/2024	18/03/2024
Date analysed	-	20/03/2024	20/03/2024	20/03/2024	20/03/2024	20/03/2024
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	2.7	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	1.2	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1	0.8	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	0.6	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	0.4	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	0.8	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	0.08	<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	0.1	<0.05	<0.05	6.9	<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	%	71	90	83	85	85

PAHs in Soil		
Our Reference		346557-21
Your Reference	UNITS	D2/SBK
Depth		-
Date Sampled		13/03/2024
Type of sample		Soil
Date extracted	-	18/03/2024
Date analysed	-	20/03/2024
Naphthalene	mg/kg	<0.1
Acenaphthylene	mg/kg	<0.1
Acenaphthene	mg/kg	<0.1
Fluorene	mg/kg	<0.1
Phenanthrene	mg/kg	1.3
Anthracene	mg/kg	<0.1
Fluoranthene	mg/kg	0.7
Pyrene	mg/kg	0.4
Benzo(a)anthracene	mg/kg	0.2
Chrysene	mg/kg	0.2
Benzo(b,j+k)fluoranthene	mg/kg	0.3
Benzo(a)pyrene	mg/kg	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1
Total +ve PAH's	mg/kg	3.3
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5
Surrogate p-Terphenyl-d14	%	72

Organochlorine Pesticides in soil						
Our Reference		346557-1	346557-3	346557-4	346557-5	346557-6
Your Reference	UNITS	313	314	314	314	315
Depth		0.2	0.05	0.5	1.5	0.2
Date Sampled		12/03/2024	12/03/2024	12/03/2024	12/03/2024	12/03/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	18/03/2024	18/03/2024	18/03/2024	18/03/2024	18/03/2024
Date analysed	-	20/03/2024	20/03/2024	20/03/2024	20/03/2024	20/03/2024
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
Mirex	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 4-Chloro-3-NBTF	%	87	88	90	89	91

Organochlorine Pesticides in soil						
Our Reference		346557-8	346557-9	346557-11	346557-14	346557-16
Your Reference	UNITS	318	318	319	321	322
Depth		0.1	1.0	0.3	0.1	0.05
Date Sampled		12/03/2024	12/03/2024	12/03/2024	12/03/2024	12/03/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	18/03/2024	18/03/2024	18/03/2024	18/03/2024	18/03/2024
Date analysed	-	20/03/2024	20/03/2024	20/03/2024	20/03/2024	20/03/2024
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
Mirex	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 4-Chloro-3-NBTF	%	89	93	88	96	93

Organochlorine Pesticides in soil			
Our Reference		346557-17	346557-21
Your Reference	UNITS	322	D2/SBK
Depth		0.3	-
Date Sampled		12/03/2024	13/03/2024
Type of sample		Soil	Soil
Date extracted	-	18/03/2024	18/03/2024
Date analysed	-	20/03/2024	20/03/2024
alpha-BHC	mg/kg	<0.1	<0.1
HCB	mg/kg	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1
Mirex	mg/kg	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1
Surrogate 4-Chloro-3-NBTF	%	90	87

Organophosphorus Pesticides in Soil						
Our Reference		346557-1	346557-3	346557-4	346557-5	346557-6
Your Reference	UNITS	313	314	314	314	315
Depth		0.2	0.05	0.5	1.5	0.2
Date Sampled		12/03/2024	12/03/2024	12/03/2024	12/03/2024	12/03/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	18/03/2024	18/03/2024	18/03/2024	18/03/2024	18/03/2024
Date analysed	-	20/03/2024	20/03/2024	20/03/2024	20/03/2024	20/03/2024
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Mevinphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phorate	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
Disulfoton	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyrifos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Parathion-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
Fenthion	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
Methidathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenamiphos	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
Phosalone	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
Coumaphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate 4-Chloro-3-NBTF	%	87	88	90	89	91

Organophosphorus Pesticides in Soil						
Our Reference		346557-8	346557-9	346557-11	346557-14	346557-16
Your Reference	UNITS	318	318	319	321	322
Depth		0.1	1.0	0.3	0.1	0.05
Date Sampled		12/03/2024	12/03/2024	12/03/2024	12/03/2024	12/03/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	18/03/2024	18/03/2024	18/03/2024	18/03/2024	18/03/2024
Date analysed	-	20/03/2024	20/03/2024	20/03/2024	20/03/2024	20/03/2024
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Mevinphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phorate	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
Disulfoton	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyrifos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Parathion-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
Fenthion	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
Methidathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenamiphos	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
Phosalone	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
Coumaphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate 4-Chloro-3-NBTF	%	89	93	88	96	93

Organophosphorus Pesticides in Soil			
Our Reference		346557-17	346557-21
Your Reference	UNITS	322	D2/SBK
Depth		0.3	-
Date Sampled		12/03/2024	13/03/2024
Type of sample		Soil	Soil
Date extracted	-	18/03/2024	18/03/2024
Date analysed	-	20/03/2024	20/03/2024
Dichlorvos	mg/kg	<0.1	<0.1
Mevinphos	mg/kg	<0.1	<0.1
Phorate	mg/kg	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1
Disulfoton	mg/kg	<0.1	<0.1
Chlorpyrifos-methyl	mg/kg	<0.1	<0.1
Parathion-Methyl	mg/kg	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1
Fenthion	mg/kg	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1
Methidathion	mg/kg	<0.1	<0.1
Fenamiphos	mg/kg	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1
Phosalone	mg/kg	<0.1	<0.1
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1
Coumaphos	mg/kg	<0.1	<0.1
Surrogate 4-Chloro-3-NBTF	%	90	87

PCBs in Soil						
Our Reference		346557-1	346557-3	346557-4	346557-5	346557-6
Your Reference	UNITS	313	314	314	314	315
Depth		0.2	0.05	0.5	1.5	0.2
Date Sampled		12/03/2024	12/03/2024	12/03/2024	12/03/2024	12/03/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	18/03/2024	18/03/2024	18/03/2024	18/03/2024	18/03/2024
Date analysed	-	20/03/2024	20/03/2024	20/03/2024	20/03/2024	20/03/2024
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate 2-Fluorobiphenyl	%	92	90	92	90	97

PCBs in Soil						
Our Reference		346557-8	346557-9	346557-11	346557-14	346557-16
Your Reference	UNITS	318	318	319	321	322
Depth		0.1	1.0	0.3	0.1	0.05
Date Sampled		12/03/2024	12/03/2024	12/03/2024	12/03/2024	12/03/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	18/03/2024	18/03/2024	18/03/2024	18/03/2024	18/03/2024
Date analysed	-	20/03/2024	20/03/2024	20/03/2024	20/03/2024	20/03/2024
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate 2-Fluorobiphenyl	%	91	96	92	102	97

PCBs in Soil			
Our Reference		346557-17	346557-21
Your Reference	UNITS	322	D2/SBK
Depth		0.3	-
Date Sampled		12/03/2024	13/03/2024
Type of sample		Soil	Soil
Date extracted	-	18/03/2024	18/03/2024
Date analysed	-	20/03/2024	20/03/2024
Aroclor 1016	mg/kg	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1
Surrogate 2-Fluorobiphenyl	%	96	84

Acid Extractable metals in soil						
Our Reference		346557-1	346557-2	346557-3	346557-4	346557-5
Your Reference	UNITS	313	313	314	314	314
Depth		0.2	0.8	0.05	0.5	1.5
Date Sampled		12/03/2024	12/03/2024	12/03/2024	12/03/2024	12/03/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	19/03/2024	19/03/2024	19/03/2024	19/03/2024	19/03/2024
Date analysed	-	21/03/2024	21/03/2024	21/03/2024	21/03/2024	21/03/2024
Arsenic	mg/kg	15	<4	16	<4	8
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	14	15	5	7	22
Copper	mg/kg	7	16	5	18	7
Lead	mg/kg	12	11	8	3	12
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	24	10	5	46	42
Zinc	mg/kg	32	44	7	7	14

Acid Extractable metals in soil						
Our Reference		346557-6	346557-7	346557-8	346557-9	346557-10
Your Reference	UNITS	315	315	318	318	318
Depth		0.2	0.5	0.1	1.0	1.5
Date Sampled		12/03/2024	12/03/2024	12/03/2024	12/03/2024	12/03/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	19/03/2024	19/03/2024	19/03/2024	19/03/2024	19/03/2024
Date analysed	-	21/03/2024	21/03/2024	21/03/2024	21/03/2024	21/03/2024
Arsenic	mg/kg	5	10	5	14	10
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	22	31	9	12	8
Copper	mg/kg	8	7	18	18	7
Lead	mg/kg	7	15	8	10	8
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	15	21	51	39	10
Zinc	mg/kg	17	19	19	34	29

Acid Extractable metals in soil						
Our Reference		346557-11	346557-12	346557-13	346557-14	346557-15
Your Reference	UNITS	319	319	320	321	321
Depth		0.3	0.5	0.2	0.1	0.3
Date Sampled		12/03/2024	12/03/2024	12/03/2024	12/03/2024	12/03/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	19/03/2024	19/03/2024	19/03/2024	19/03/2024	19/03/2024
Date analysed	-	21/03/2024	21/03/2024	21/03/2024	21/03/2024	21/03/2024
Arsenic	mg/kg	5	<4	8	6	4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	16	16	18	12	12
Copper	mg/kg	9	5	6	9	4
Lead	mg/kg	13	10	11	10	7
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	11	13	16	15	5
Zinc	mg/kg	21	24	21	27	9

Acid Extractable metals in soil						
Our Reference		346557-16	346557-17	346557-18	346557-19	346557-20
Your Reference	UNITS	322	322	322	326	324
Depth		0.05	0.3	1.0	0.1	0.5
Date Sampled		12/03/2024	12/03/2024	12/03/2024	12/03/2024	12/03/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	19/03/2024	19/03/2024	19/03/2024	19/03/2024	19/03/2024
Date analysed	-	21/03/2024	21/03/2024	21/03/2024	21/03/2024	21/03/2024
Arsenic	mg/kg	4	5	5	<4	7
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	9	17	22	9	11
Copper	mg/kg	21	5	6	10	15
Lead	mg/kg	5	9	7	7	11
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	77	10	10	18	11
Zinc	mg/kg	11	8	15	32	53

Acid Extractable metals in soil				
Our Reference		346557-21	346557-22	346557-23
Your Reference	UNITS	D2/SBK	319 - [TRIPLICATE]	322 - [TRIPLICATE]
Depth		-	0.3	0.3
Date Sampled		13/03/2024	12/03/2024	12/03/2024
Type of sample		Soil	Soil	Soil
Date prepared	-	19/03/2024	19/03/2024	19/03/2024
Date analysed	-	21/03/2024	21/03/2024	21/03/2024
Arsenic	mg/kg	<4	<4	5
Cadmium	mg/kg	<0.4	<0.4	<0.4
Chromium	mg/kg	6	12	17
Copper	mg/kg	17	5	4
Lead	mg/kg	4	10	8
Mercury	mg/kg	<0.1	<0.1	<0.1
Nickel	mg/kg	43	8	7
Zinc	mg/kg	9	19	7

Misc Soil - Inorg						
Our Reference		346557-1	346557-3	346557-4	346557-5	346557-6
Your Reference	UNITS	313	314	314	314	315
Depth		0.2	0.05	0.5	1.5	0.2
Date Sampled		12/03/2024	12/03/2024	12/03/2024	12/03/2024	12/03/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	19/03/2024	19/03/2024	19/03/2024	19/03/2024	19/03/2024
Date analysed	-	19/03/2024	19/03/2024	19/03/2024	19/03/2024	19/03/2024
Total Phenolics (as Phenol)	mg/kg	<5	<5	<5	<5	<5

Misc Soil - Inorg						
Our Reference		346557-8	346557-9	346557-11	346557-14	346557-16
Your Reference	UNITS	318	318	319	321	322
Depth		0.1	1.0	0.3	0.1	0.05
Date Sampled		12/03/2024	12/03/2024	12/03/2024	12/03/2024	12/03/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	19/03/2024	19/03/2024	19/03/2024	19/03/2024	19/03/2024
Date analysed	-	19/03/2024	19/03/2024	19/03/2024	19/03/2024	19/03/2024
Total Phenolics (as Phenol)	mg/kg	<5	<5	<5	<5	<5

Misc Soil - Inorg			
Our Reference		346557-17	346557-21
Your Reference	UNITS	322	D2/SBK
Depth		0.3	-
Date Sampled		12/03/2024	13/03/2024
Type of sample		Soil	Soil
Date prepared	-	19/03/2024	19/03/2024
Date analysed	-	19/03/2024	19/03/2024
Total Phenolics (as Phenol)	mg/kg	<5	<5

Moisture						
Our Reference		346557-1	346557-2	346557-3	346557-4	346557-5
Your Reference	UNITS	313	313	314	314	314
Depth		0.2	0.8	0.05	0.5	1.5
Date Sampled		12/03/2024	12/03/2024	12/03/2024	12/03/2024	12/03/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	18/03/2024	18/03/2024	18/03/2024	18/03/2024	18/03/2024
Date analysed	-	19/03/2024	19/03/2024	19/03/2024	19/03/2024	19/03/2024
Moisture	%	9.6	4.5	8.4	6.2	18

Moisture						
Our Reference		346557-6	346557-7	346557-8	346557-9	346557-10
Your Reference	UNITS	315	315	318	318	318
Depth		0.2	0.5	0.1	1.0	1.5
Date Sampled		12/03/2024	12/03/2024	12/03/2024	12/03/2024	12/03/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	18/03/2024	18/03/2024	18/03/2024	18/03/2024	18/03/2024
Date analysed	-	19/03/2024	19/03/2024	19/03/2024	19/03/2024	19/03/2024
Moisture	%	2.8	8.2	11	6.1	9.3

Moisture						
Our Reference		346557-11	346557-12	346557-13	346557-14	346557-15
Your Reference	UNITS	319	319	320	321	321
Depth		0.3	0.5	0.2	0.1	0.3
Date Sampled		12/03/2024	12/03/2024	12/03/2024	12/03/2024	12/03/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	18/03/2024	18/03/2024	18/03/2024	18/03/2024	18/03/2024
Date analysed	-	19/03/2024	19/03/2024	19/03/2024	19/03/2024	19/03/2024
Moisture	%	9.6	11	8.0	8.1	4.6

Moisture						
Our Reference		346557-16	346557-17	346557-18	346557-19	346557-20
Your Reference	UNITS	322	322	322	326	324
Depth		0.05	0.3	1.0	0.1	0.5
Date Sampled		12/03/2024	12/03/2024	12/03/2024	12/03/2024	12/03/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	18/03/2024	18/03/2024	18/03/2024	18/03/2024	18/03/2024
Date analysed	-	19/03/2024	19/03/2024	19/03/2024	19/03/2024	19/03/2024
Moisture	%	6.9	11	11	4.4	1.5

Moisture		
Our Reference		346557-21
Your Reference	UNITS	D2/SBK
Depth		-
Date Sampled		13/03/2024
Type of sample		Soil
Date prepared	-	18/03/2024
Date analysed	-	19/03/2024
Moisture	%	3.6

Asbestos ID - soils NEPM					
Our Reference		346557-1	346557-9	346557-11	346557-17
Your Reference	UNITS	313	318	319	322
Depth		0.2	1.0	0.3	0.3
Date Sampled		12/03/2024	12/03/2024	12/03/2024	12/03/2024
Type of sample		Soil	Soil	Soil	Soil
Date analysed	-	20/03/2024	20/03/2024	20/03/2024	20/03/2024
Sample mass tested	g	889.07	985.37	834.86	766.93
Sample Description	-	Red clayey soil & rocks	Grey coarse-grained soil & rocks	Brown clayey soil & rocks	Grey fine-grained soil & rocks
Asbestos ID in soil (AS4964) >0.1g/kg	-	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	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected
Total Asbestos[#1]	g/kg	<0.1	<0.1	<0.1	<0.1
Asbestos ID in soil <0.1g/kg*	-	No visible asbestos detected	No visible asbestos detected	No visible asbestos detected	No visible asbestos detected
ACM >7mm Estimation*	g	–	–	–	–
FA and AF Estimation*	g	–	–	–	–
FA and AF Estimation*#2	%(w/w)	<0.001	<0.001	<0.001	<0.001

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.
ASB-001	Asbestos ID - Identification of asbestos in soil samples using Polarised Light Microscopy and Dispersion Staining Techniques. Minimum 500mL soil sample was analysed as recommended by "National Environment Protection (Assessment of site contamination) Measure, Schedule B1 and "The Guidelines from the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia - May 2009" with a reporting limit of 0.1g/kg (0.01% w/w) as per Australian Standard AS4964-2004. Results reported denoted with * are outside our scope of NATA accreditation. NOTE#1 Total Asbestos g/kg was analysed and reported as per Australian Standard AS4964 (This is the sum of ACM >7mm, <7mm and FA/AF relative to the sample mass tested) NOTE#2 The screening level of 0.001% w/w asbestos in soil for FA and AF only applies where the FA and AF are able to be quantified by gravimetric procedures. This screening level is not applicable to free fibres. Estimation = Estimated asbestos weight Results reported with "--" is equivalent to no visible asbestos identified using Polarised Light microscopy and Dispersion Staining Techniques.
Inorg-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
Inorg-031	Total Phenolics by segmented flow analyser (in line distillation with colourimetric finish). Solids are extracted in a caustic media prior to analysis.
Metals-020	Determination of various metals by ICP-AES.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Org-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.

Method ID	Methodology Summary
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-021/022/025	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD and/or GC-MS/GC-MSMS. 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-022/025	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.
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-12	346557-3
Date extracted	-			18/03/2024	1	18/03/2024	18/03/2024		18/03/2024	18/03/2024
Date analysed	-			21/03/2024	1	21/03/2024	21/03/2024		21/03/2024	21/03/2024
TRH C_6 - C_9	mg/kg	25	Org-023	<25	1	<25	<25	0	94	119
TRH C_6 - C_{10}	mg/kg	25	Org-023	<25	1	<25	<25	0	94	119
Benzene	mg/kg	0.2	Org-023	<0.2	1	<0.2	<0.2	0	83	124
Toluene	mg/kg	0.5	Org-023	<0.5	1	<0.5	<0.5	0	90	110
Ethylbenzene	mg/kg	1	Org-023	<1	1	<1	<1	0	94	116
m+p-xylene	mg/kg	2	Org-023	<2	1	<2	<2	0	102	123
o-Xylene	mg/kg	1	Org-023	<1	1	<1	<1	0	112	127
Naphthalene	mg/kg	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-023	107	1	111	106	5	103	117

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	346557-21
Date extracted	-			[NT]	11	18/03/2024	18/03/2024		[NT]	18/03/2024
Date analysed	-			[NT]	11	21/03/2024	21/03/2024		[NT]	21/03/2024
TRH C_6 - C_9	mg/kg	25	Org-023	[NT]	11	<25	<25	0	[NT]	103
TRH C_6 - C_{10}	mg/kg	25	Org-023	[NT]	11	<25	<25	0	[NT]	103
Benzene	mg/kg	0.2	Org-023	[NT]	11	<0.2	<0.2	0	[NT]	91
Toluene	mg/kg	0.5	Org-023	[NT]	11	<0.5	<0.5	0	[NT]	99
Ethylbenzene	mg/kg	1	Org-023	[NT]	11	<1	<1	0	[NT]	104
m+p-xylene	mg/kg	2	Org-023	[NT]	11	<2	<2	0	[NT]	111
o-Xylene	mg/kg	1	Org-023	[NT]	11	<1	<1	0	[NT]	113
Naphthalene	mg/kg	1	Org-023	[NT]	11	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-023	[NT]	11	110	112	2	[NT]	115

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	17	18/03/2024	18/03/2024		[NT]	[NT]
Date analysed	-			[NT]	17	21/03/2024	21/03/2024		[NT]	[NT]
TRH C_6 - C_9	mg/kg	25	Org-023	[NT]	17	<25	<25	0	[NT]	[NT]
TRH C_6 - C_{10}	mg/kg	25	Org-023	[NT]	17	<25	<25	0	[NT]	[NT]
Benzene	mg/kg	0.2	Org-023	[NT]	17	<0.2	<0.2	0	[NT]	[NT]
Toluene	mg/kg	0.5	Org-023	[NT]	17	<0.5	<0.5	0	[NT]	[NT]
Ethylbenzene	mg/kg	1	Org-023	[NT]	17	<1	<1	0	[NT]	[NT]
m+p-xylene	mg/kg	2	Org-023	[NT]	17	<2	<2	0	[NT]	[NT]
o-Xylene	mg/kg	1	Org-023	[NT]	17	<1	<1	0	[NT]	[NT]
Naphthalene	mg/kg	1	Org-023	[NT]	17	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-023	[NT]	17	106	105	1	[NT]	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-12	346557-3
Date extracted	-			18/03/2024	1	18/03/2024	18/03/2024		18/03/2024	18/03/2024
Date analysed	-			19/03/2024	1	19/03/2024	19/03/2024		19/03/2024	19/03/2024
TRH C_{10} - C_{14}	mg/kg	50	Org-020	<50	1	<50	<50	0	70	86
TRH C_{15} - C_{28}	mg/kg	100	Org-020	<100	1	<100	<100	0	72	101
TRH C_{29} - C_{36}	mg/kg	100	Org-020	<100	1	<100	<100	0	129	104
TRH >C_{10} -C_{16}	mg/kg	50	Org-020	<50	1	<50	<50	0	70	86
TRH >C_{16} -C_{34}	mg/kg	100	Org-020	<100	1	<100	<100	0	72	101
TRH >C_{34} -C_{40}	mg/kg	100	Org-020	<100	1	<100	<100	0	129	104
Surrogate o-Terphenyl	%		Org-020	86	1	85	84	1	105	87

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	346557-21
Date extracted	-			[NT]	11	18/03/2024	18/03/2024		[NT]	18/03/2024
Date analysed	-			[NT]	11	19/03/2024	20/03/2024		[NT]	20/03/2024
TRH C_{10} - C_{14}	mg/kg	50	Org-020	[NT]	11	<50	<50	0	[NT]	77
TRH C_{15} - C_{28}	mg/kg	100	Org-020	[NT]	11	<100	<100	0	[NT]	115
TRH C_{29} - C_{36}	mg/kg	100	Org-020	[NT]	11	<100	<100	0	[NT]	#
TRH >C_{10} -C_{16}	mg/kg	50	Org-020	[NT]	11	<50	<50	0	[NT]	77
TRH >C_{16} -C_{34}	mg/kg	100	Org-020	[NT]	11	<100	<100	0	[NT]	115
TRH >C_{34} -C_{40}	mg/kg	100	Org-020	[NT]	11	<100	<100	0	[NT]	#
Surrogate o-Terphenyl	%		Org-020	[NT]	11	83	81	2	[NT]	67

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	17	18/03/2024	18/03/2024		[NT]	[NT]
Date analysed	-			[NT]	17	20/03/2024	20/03/2024		[NT]	[NT]
TRH C_{10} - C_{14}	mg/kg	50	Org-020	[NT]	17	<50	<50	0	[NT]	[NT]
TRH C_{15} - C_{28}	mg/kg	100	Org-020	[NT]	17	<100	<100	0	[NT]	[NT]
TRH C_{29} - C_{36}	mg/kg	100	Org-020	[NT]	17	<100	<100	0	[NT]	[NT]
TRH >C_{10} -C_{16}	mg/kg	50	Org-020	[NT]	17	<50	<50	0	[NT]	[NT]
TRH >C_{16} -C_{34}	mg/kg	100	Org-020	[NT]	17	<100	<100	0	[NT]	[NT]
TRH >C_{34} -C_{40}	mg/kg	100	Org-020	[NT]	17	<100	<100	0	[NT]	[NT]
Surrogate o-Terphenyl	%		Org-020	[NT]	17	80	75	6	[NT]	[NT]

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-12	346557-3
Date extracted	-			18/03/2024	1	18/03/2024	18/03/2024		18/03/2024	18/03/2024
Date analysed	-			20/03/2024	1	20/03/2024	20/03/2024		20/03/2024	20/03/2024
Naphthalene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	66	82
Acenaphthylene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	72	88
Fluorene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	68	82
Phenanthrene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	86	102
Anthracene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	84	108
Pyrene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	76	102
Benzo(a)anthracene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	66	70
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-022/025	<0.05	1	<0.05	<0.05	0	62	80
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-022/025	79	1	86	79	8	91	88

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	346557-21
Date extracted	-			[NT]	11	18/03/2024	18/03/2024		[NT]	18/03/2024
Date analysed	-			[NT]	11	20/03/2024	20/03/2024		[NT]	20/03/2024
Naphthalene	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	70
Acenaphthylene	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	76
Fluorene	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	72
Phenanthrene	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	84
Anthracene	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	#
Pyrene	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	#
Benzo(a)anthracene	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	#
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-022/025	[NT]	11	<0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-022/025	[NT]	11	<0.05	<0.05	0	[NT]	#
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-022/025	[NT]	11	87	93	7	[NT]	75

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	17	18/03/2024	18/03/2024		[NT]	[NT]
Date analysed	-			[NT]	17	20/03/2024	20/03/2024		[NT]	[NT]
Naphthalene	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Acenaphthylene	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Phenanthrene	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Anthracene	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Pyrene	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Benzo(a)anthracene	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-022/025	[NT]	17	<0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-022/025	[NT]	17	<0.05	<0.05	0	[NT]	[NT]
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-022/025	[NT]	17	90	87	3	[NT]	[NT]

QUALITY CONTROL: Organochlorine Pesticides in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-12	346557-3
Date extracted	-			18/03/2024	1	18/03/2024	18/03/2024		18/03/2024	18/03/2024
Date analysed	-			20/03/2024	1	20/03/2024	20/03/2024		20/03/2024	20/03/2024
alpha-BHC	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	86	106
HCB	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	92	114
gamma-BHC	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Heptachlor	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	100	106
delta-BHC	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	92	94
Heptachlor Epoxide	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	108	108
gamma-Chlordane	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	110	108
Dieldrin	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	122	124
Endrin	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	86	100
Endosulfan II	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
pp-DDD	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	84	92
Endrin Aldehyde	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	80	106
Methoxychlor	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Mirex	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate 4-Chloro-3-NBTF	%		Org-022/025	84	1	87	82	6	75	88

QUALITY CONTROL: Organochlorine Pesticides in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	346557-21
Date extracted	-			[NT]	11	18/03/2024	18/03/2024		[NT]	18/03/2024
Date analysed	-			[NT]	11	20/03/2024	20/03/2024		[NT]	20/03/2024
alpha-BHC	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	88
HCB	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	104
gamma-BHC	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Heptachlor	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	100
delta-BHC	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	86
Heptachlor Epoxide	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	108
gamma-Chlordane	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	108
Dieldrin	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	111
Endrin	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	112
Endosulfan II	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
pp-DDD	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	88
Endrin Aldehyde	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	122
Methoxychlor	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Mirex	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Surrogate 4-Chloro-3-NBTF	%		Org-022/025	[NT]	11	88	95	8	[NT]	87

QUALITY CONTROL: Organochlorine Pesticides in soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	17	18/03/2024	18/03/2024		[NT]	[NT]
Date analysed	-			[NT]	17	20/03/2024	20/03/2024		[NT]	[NT]
alpha-BHC	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
HCB	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
gamma-BHC	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Heptachlor	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
delta-BHC	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Heptachlor Epoxide	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
gamma-Chlordane	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Dieldrin	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Endrin	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Endosulfan II	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
pp-DDD	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Endrin Aldehyde	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Methoxychlor	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Mirex	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Surrogate 4-Chloro-3-NBTF	%		Org-022/025	[NT]	17	90	88	2	[NT]	[NT]

QUALITY CONTROL: Organophosphorus Pesticides in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-12	346557-3
Date extracted	-			18/03/2024	1	18/03/2024	18/03/2024		18/03/2024	18/03/2024
Date analysed	-			20/03/2024	1	20/03/2024	20/03/2024		20/03/2024	20/03/2024
Dichlorvos	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	80	104
Mevinphos	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Phorate	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Dimethoate	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Diazinon	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Disulfoton	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Chlorpyrifos-methyl	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Parathion-Methyl	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Ronnel	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	76	78
Fenitrothion	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	64	70
Malathion	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	64	76
Chlorpyriphos	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	74	82
Fenthion	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Parathion	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	60	72
Bromophos-ethyl	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Methidathion	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Fenamiphos	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Ethion	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	62	82
Phosalone	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Coumaphos	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate 4-Chloro-3-NBTF	%		Org-022/025	84	1	87	82	6	75	88

QUALITY CONTROL: Organophosphorus Pesticides in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	346557-21
Date extracted	-			[NT]	11	18/03/2024	18/03/2024		[NT]	18/03/2024
Date analysed	-			[NT]	11	20/03/2024	20/03/2024		[NT]	20/03/2024
Dichlorvos	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	106
Mevinphos	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Phorate	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Dimethoate	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Diazinon	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Disulfoton	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Chlorpyrifos-methyl	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Parathion-Methyl	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Ronnel	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	76
Fenitrothion	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	90
Malathion	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	90
Chlorpyriphos	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	86
Fenthion	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Parathion	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	80
Bromophos-ethyl	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Methidathion	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Fenamiphos	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Ethion	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	116
Phosalone	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Coumaphos	mg/kg	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Surrogate 4-Chloro-3-NBTF	%		Org-022/025	[NT]	11	88	95	8	[NT]	87

QUALITY CONTROL: Organophosphorus Pesticides in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	17	18/03/2024	18/03/2024		[NT]	[NT]
Date analysed	-			[NT]	17	20/03/2024	20/03/2024		[NT]	[NT]
Dichlorvos	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Mevinphos	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Phorate	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Dimethoate	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Diazinon	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Disulfoton	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Chlorpyrifos-methyl	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Parathion-Methyl	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Ronnel	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Fenitrothion	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Malathion	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Chlorpyriphos	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Fenthion	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Parathion	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Bromophos-ethyl	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Methidathion	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Fenamiphos	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Ethion	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Phosalone	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Coumaphos	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Surrogate 4-Chloro-3-NBTF	%		Org-022/025	[NT]	17	90	88	2	[NT]	[NT]

QUALITY CONTROL: PCBs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-12	346557-3
Date extracted	-			18/03/2024	1	18/03/2024	18/03/2024		18/03/2024	18/03/2024
Date analysed	-			20/03/2024	1	20/03/2024	20/03/2024		20/03/2024	20/03/2024
Aroclor 1016	mg/kg	0.1	Org-021/022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-021/022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-021/022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-021/022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-021/022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-021/022/025	<0.1	1	<0.1	<0.1	0	78	80
Aroclor 1260	mg/kg	0.1	Org-021/022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate 2-Fluorobiphenyl	%		Org-021/022/025	87	1	92	87	6	77	92

QUALITY CONTROL: PCBs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	346557-21
Date extracted	-			[NT]	11	18/03/2024	18/03/2024		[NT]	18/03/2024
Date analysed	-			[NT]	11	20/03/2024	20/03/2024		[NT]	20/03/2024
Aroclor 1016	mg/kg	0.1	Org-021/022/025	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-021/022/025	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-021/022/025	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-021/022/025	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-021/022/025	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-021/022/025	[NT]	11	<0.1	<0.1	0	[NT]	60
Aroclor 1260	mg/kg	0.1	Org-021/022/025	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Surrogate 2-Fluorobiphenyl	%		Org-021/022/025	[NT]	11	92	99	7	[NT]	84

QUALITY CONTROL: PCBs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	17	18/03/2024	18/03/2024		[NT]	[NT]
Date analysed	-			[NT]	17	20/03/2024	20/03/2024		[NT]	[NT]
Aroclor 1016	mg/kg	0.1	Org-021/022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-021/022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-021/022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-021/022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-021/022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-021/022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1260	mg/kg	0.1	Org-021/022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Surrogate 2-Fluorobiphenyl	%		Org-021/022/025	[NT]	17	96	93	3	[NT]	[NT]

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-12	346557-3
Date prepared	-			19/03/2024	1	19/03/2024	19/03/2024		19/03/2024	19/03/2024
Date analysed	-			21/03/2024	1	21/03/2024	21/03/2024		21/03/2024	21/03/2024
Arsenic	mg/kg	4	Metals-020	<4	1	15	16	6	117	114
Cadmium	mg/kg	0.4	Metals-020	<0.4	1	<0.4	<0.4	0	110	98
Chromium	mg/kg	1	Metals-020	<1	1	14	20	35	112	105
Copper	mg/kg	1	Metals-020	<1	1	7	7	0	111	108
Lead	mg/kg	1	Metals-020	<1	1	12	15	22	114	104
Mercury	mg/kg	0.1	Metals-021	<0.1	1	<0.1	<0.1	0	97	88
Nickel	mg/kg	1	Metals-020	<1	1	24	30	22	111	104
Zinc	mg/kg	1	Metals-020	<1	1	32	40	22	112	104

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-13	346557-21
Date prepared	-			[NT]	11	19/03/2024	19/03/2024		19/03/2024	19/03/2024
Date analysed	-			[NT]	11	21/03/2024	21/03/2024		21/03/2024	21/03/2024
Arsenic	mg/kg	4	Metals-020	[NT]	11	5	6	18	110	101
Cadmium	mg/kg	0.4	Metals-020	[NT]	11	<0.4	<0.4	0	102	90
Chromium	mg/kg	1	Metals-020	[NT]	11	16	16	0	104	95
Copper	mg/kg	1	Metals-020	[NT]	11	9	9	0	104	97
Lead	mg/kg	1	Metals-020	[NT]	11	13	13	0	106	94
Mercury	mg/kg	0.1	Metals-021	[NT]	11	<0.1	<0.1	0	94	85
Nickel	mg/kg	1	Metals-020	[NT]	11	11	11	0	103	95
Zinc	mg/kg	1	Metals-020	[NT]	11	21	32	42	104	92

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	17	19/03/2024	19/03/2024		[NT]	[NT]
Date analysed	-			[NT]	17	21/03/2024	21/03/2024		[NT]	[NT]
Arsenic	mg/kg	4	Metals-020	[NT]	17	5	<4	22	[NT]	[NT]
Cadmium	mg/kg	0.4	Metals-020	[NT]	17	<0.4	<0.4	0	[NT]	[NT]
Chromium	mg/kg	1	Metals-020	[NT]	17	17	13	27	[NT]	[NT]
Copper	mg/kg	1	Metals-020	[NT]	17	5	3	50	[NT]	[NT]
Lead	mg/kg	1	Metals-020	[NT]	17	9	5	57	[NT]	[NT]
Mercury	mg/kg	0.1	Metals-021	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Nickel	mg/kg	1	Metals-020	[NT]	17	10	6	50	[NT]	[NT]
Zinc	mg/kg	1	Metals-020	[NT]	17	8	6	29	[NT]	[NT]

QUALITY CONTROL: Misc Soil - Inorg						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-12	346557-3
Date prepared	-			19/03/2024	1	19/03/2024	19/03/2024		19/03/2024	19/03/2024
Date analysed	-			19/03/2024	1	19/03/2024	19/03/2024		19/03/2024	19/03/2024
Total Phenolics (as Phenol)	mg/kg	5	Inorg-031	<5	1	<5	<5	0	101	102

QUALITY CONTROL: Misc Soil - Inorg						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	11	19/03/2024	19/03/2024		[NT]	[NT]
Date analysed	-			[NT]	11	19/03/2024	19/03/2024		[NT]	[NT]
Total Phenolics (as Phenol)	mg/kg	5	Inorg-031	[NT]	11	<5	<5	0	[NT]	[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.

Where matrix spike recoveries fall below the lower limit of the acceptance criteria (e.g. for non-labile or standard Organics <60%), positive result(s) in the parent sample will subsequently have a higher than typical estimated uncertainty (MU estimates supplied on request) and in these circumstances the sample result is likely biased significantly low.

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-ID in soil: NEPM
This report is consistent with the reporting recommendations in the National Environment Protection (Assessment of Site Contamination) Measure, Schedule B1, May 2013. This is reported outside our scope of NATA accreditation.

Acid Extractable Metals in Soil:
- The laboratory RPD acceptance criteria has been exceeded for 346557-11 for Zn. Therefore a triplicate result has been issued as laboratory sample number 346557-22.
- The laboratory RPD acceptance criteria has been exceeded for 346557-17 for Ni and Pb. Therefore a triplicate result has been issued as laboratory sample number 346557-23.

TRH Soil C10-C40 NEPM - # Percent recovery for the matrix spike is not possible to report as the high concentration of analytes in sample 346557-21ms have caused interference.

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CERTIFICATE OF ANALYSIS 346557-A

Client Details

Client	Douglas Partners Newcastle
Attention	Patrick Heads
Address	Box 324 Hunter Region Mail Centre, Newcastle, NSW, 2310

Sample Details

Your Reference	**224763.02, Muswellbrook**
Number of Samples	additional testing
Date samples received	15/03/2024
Date completed instructions received	02/04/2024

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	05/04/2024
Date of Issue	05/04/2024

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 ***

Results Approved By
Amanda Chui, LC/Air Toxics Supervisor
Loren Bardwell, Development Chemist
Sean McAlary, Chemist (FAS)

Authorised By
Nancy Zhang, Laboratory Manager

PFAS in Soils Short					
Our Reference		346557-A-4	346557-A-5	346557-A-8	346557-A-16
Your Reference	UNITS	314	314	318	322
Depth		0.5	1.5	0.1	0.05
Date Sampled		12/03/2024	12/03/2024	12/03/2024	12/03/2024
Type of sample		Soil	Soil	Soil	Soil
Date prepared	-	03/04/2024	03/04/2024	03/04/2024	03/04/2024
Date analysed	-	03/04/2024	03/04/2024	03/04/2024	03/04/2024
Perfluorohexanesulfonic acid - PFHxS	µg/kg	<0.1	<0.1	<0.1	<0.1
Perfluorooctanesulfonic acid PFOS	µg/kg	<0.1	<0.1	0.1	0.2
Perfluorooctanoic acid PFOA	µg/kg	<0.1	<0.1	<0.1	<0.1
6:2 FTS	µg/kg	<0.1	<0.1	<0.1	<0.1
8:2 FTS	µg/kg	<0.2	<0.2	<0.2	<0.2
Surrogate $^{13}C_8$ *PFOS*	%	101	98	93	97
Surrogate $^{13}C_2$ *PFOA*	%	99	102	99	99
Extracted ISTD $^{18}O_2$ *PFHxS*	%	104	89	101	96
Extracted ISTD $^{13}C_4$ *PFOS*	%	101	91	103	101
Extracted ISTD $^{13}C_4$ *PFOA*	%	117	89	107	106
Extracted ISTD $^{13}C_2$ *6:2FTS*	%	144	95	115	117
Extracted ISTD $^{13}C_2$ *8:2FTS*	%	157	95	120	116
Total Positive PFHxS & PFOS	µg/kg	<0.1	<0.1	0.1	0.2
Total Positive PFOS & PFOA	µg/kg	<0.1	<0.1	0.1	0.2
Total Positive PFAS	µg/kg	<0.1	<0.1	0.1	0.2

Metals from Leaching Fluid pH 2.9 or 5					
Our Reference		346557-A-4	346557-A-5	346557-A-8	346557-A-16
Your Reference	UNITS	314	314	318	322
Depth		0.5	1.5	0.1	0.05
Date Sampled		12/03/2024	12/03/2024	12/03/2024	12/03/2024
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	05/04/2024	05/04/2024	05/04/2024	05/04/2024
Date analysed	-	05/04/2024	05/04/2024	05/04/2024	05/04/2024
pH of soil for fluid# determ.	pH units	6.5	6.2	6.8	6.8
pH of soil TCLP (after HCl)	pH units	1.5	1.6	1.6	1.6
Extraction fluid used		1	1	1	1
pH of final Leachate	pH units	5.0	5.0	5.0	5.0
Nickel	mg/L	0.07	<0.02	0.04	0.09

PFAS in TCLP Short					
Our Reference		346557-A-4	346557-A-5	346557-A-8	346557-A-16
Your Reference	UNITS	314	314	318	322
Depth		0.5	1.5	0.1	0.05
Date Sampled		12/03/2024	12/03/2024	12/03/2024	12/03/2024
Type of sample		Soil	Soil	Soil	Soil
Date prepared	-	04/04/2024	04/04/2024	04/04/2024	04/04/2024
Date analysed	-	04/04/2024	04/04/2024	04/04/2024	04/04/2024
Perfluorohexanesulfonic acid - PFHxS	µg/L	<0.01	<0.01	<0.01	<0.01
Perfluorooctanesulfonic acid PFOS	µg/L	<0.01	<0.01	<0.01	<0.01
Perfluorooctanoic acid PFOA	µg/L	<0.01	<0.01	<0.01	<0.01
6:2 FTS	µg/L	<0.01	<0.01	<0.01	<0.01
8:2 FTS	µg/L	<0.02	<0.02	<0.02	<0.02
Surrogate $^{13}C_8$ *PFOS*	%	99	98	96	101
Surrogate $^{13}C_2$ *PFOA*	%	94	116	105	95
Extracted ISTD $^{18}O_2$ *PFHxS*	%	109	103	111	112
Extracted ISTD $^{13}C_4$ *PFOS*	%	106	106	105	103
Extracted ISTD $^{13}C_4$ *PFOA*	%	102	91	91	99
Extracted ISTD $^{13}C_2$ *6:2FTS*	%	92	92	89	91
Extracted ISTD $^{13}C_2$ *8:2FTS*	%	124	118	134	130
Total Positive PFHxS & PFOS	µg/L	<0.01	<0.01	<0.01	<0.01
Total Positive PFOS & PFOA	µg/L	<0.01	<0.01	<0.01	<0.01
Total Positive PFAS	µg/L	<0.01	<0.01	<0.01	<0.01

Method ID	Methodology Summary
Inorg-004	Toxicity Characteristic Leaching Procedure (TCLP) using AS 4439. Please note that the mass used may be scaled down from default based on sample mass available. Samples are stored at 2-6oC before and after leachate preparation.
Metals-020	Determination of various metals by ICP-AES following buffer determination as per USEPA 1311 and hence AS 4439.3. Extraction Fluid 1 refers to the pH 5.0 buffer and Extraction Fluid 2 is the pH 2.9 buffer.
Org-029	Soil samples are extracted with basified Methanol. Waters and soil extracts are directly injected and/or concentrated/extracted using SPE. TCLPs/ASLP leachates are centrifuged, the supernatant is then analysed (including amendment with solvent) - as per the option in AS4439.3. Analysis is undertaken with LC-MS/MS. PFAS results include the sum of branched and linear isomers where applicable. Please note that PFAS results are corrected for Extracted Internal Standards (QSM 5.4 Table B-15 terminology), which are mass labelled analytes added prior to sample preparation to assess matrix effects and verify processing of the sample. PFAS analytes without a commercially available mass labelled analogue are corrected vs a closely eluting mass labelled PFAS compound. Surrogates are also reported, in this context they are mass labelled PFAS compounds added prior to extraction but are used as monitoring compounds only (not used for result correction). Envicarb (or similar) is used discretionally to remove interfering matrix components. Please contact the laboratory if estimates of Measurement Uncertainty are required as per WA DER.

QUALITY CONTROL: PFAS in Soils Short						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	346557-A-5
Date prepared	-			03/04/2024	4	03/04/2024	03/04/2024		03/04/2024	03/04/2024
Date analysed	-			03/04/2024	4	03/04/2024	03/04/2024		03/04/2024	03/04/2024
Perfluorohexanesulfonic acid - PFHxS	µg/kg	0.1	Org-029	<0.1	4	<0.1	<0.1	0	96	92
Perfluorooctanesulfonic acid PFOS	µg/kg	0.1	Org-029	<0.1	4	<0.1	<0.1	0	96	86
Perfluorooctanoic acid PFOA	µg/kg	0.1	Org-029	<0.1	4	<0.1	<0.1	0	95	92
6:2 FTS	µg/kg	0.1	Org-029	<0.1	4	<0.1	<0.1	0	87	87
8:2 FTS	µg/kg	0.2	Org-029	<0.2	4	<0.2	<0.2	0	95	96
Surrogate $^{13}C_8$ *PFOS*	%		Org-029	102	4	101	102	1	100	93
Surrogate $^{13}C_2$ *PFOA*	%		Org-029	97	4	99	100	1	104	102
Extracted ISTD $^{18}O_2$ *PFHxS*	%		Org-029	102	4	104	102	2	101	94
Extracted ISTD $^{13}C_4$ *PFOS*	%		Org-029	100	4	101	97	4	97	95
Extracted ISTD $^{13}C_4$ *PFOA*	%		Org-029	107	4	117	118	1	102	92
Extracted ISTD $^{13}C_2$ *6:2FTS*	%		Org-029	117	4	144	154	7	112	96
Extracted ISTD $^{13}C_2$ *8:2FTS*	%		Org-029	111	4	157	158	1	118	96

QUALITY CONTROL: Metals from Leaching Fluid pH 2.9 or 5					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	346557-A-5
Date extracted	-			05/04/2024	4	05/04/2024	05/04/2024		05/04/2024	05/04/2024
Date analysed	-			05/04/2024	4	05/04/2024	05/04/2024		05/04/2024	05/04/2024
Nickel	mg/L	0.02	Metals-020	<0.02	4	0.07	0.08	13	104	110

QUALITY CONTROL: PFAS in TCLP Short						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	346557-A-5
Date prepared	-			04/04/2024	4	04/04/2024	04/04/2024		04/04/2024	04/04/2024
Date analysed	-			04/04/2024	4	04/04/2024	04/04/2024		04/04/2024	04/04/2024
Perfluorohexanesulfonic acid - PFHxS	µg/L	0.01	Org-029	<0.01	4	<0.01	<0.01	0	94	88
Perfluorooctanesulfonic acid PFOS	µg/L	0.01	Org-029	<0.01	4	<0.01	<0.01	0	92	98
Perfluorooctanoic acid PFOA	µg/L	0.01	Org-029	<0.01	4	<0.01	<0.01	0	104	100
6:2 FTS	µg/L	0.01	Org-029	<0.01	4	<0.01	<0.01	0	91	102
8:2 FTS	µg/L	0.02	Org-029	<0.02	4	<0.02	<0.02	0	79	86
Surrogate $^{13}C_8$ *PFOS*	%		Org-029	100	4	99	103	4	100	100
Surrogate $^{13}C_2$ *PFOA*	%		Org-029	102	4	94	98	4	108	110
Extracted ISTD $^{18}O_2$ *PFHxS*	%		Org-029	103	4	109	110	1	102	112
Extracted ISTD $^{13}C_4$ *PFOS*	%		Org-029	106	4	106	105	1	104	103
Extracted ISTD $^{13}C_4$ *PFOA*	%		Org-029	96	4	102	94	8	92	90
Extracted ISTD $^{13}C_2$ *6:2FTS*	%		Org-029	90	4	92	86	7	86	84
Extracted ISTD $^{13}C_2$ *8:2FTS*	%		Org-029	100	4	124	123	1	119	126

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.
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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.

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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.

Where matrix spike recoveries fall below the lower limit of the acceptance criteria (e.g. for non-labile or standard Organics <60%), positive result(s) in the parent sample will subsequently have a higher than typical estimated uncertainty (MU estimates supplied on request) and in these circumstances the sample result is likely biased significantly low.

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

For PFAS Extracted Internal Standards denoted with # or outside the 50-150% acceptance range, the respective target analyte results may be unaffected, in other circumstances the PQL has been raised to accommodate the outlier(s).

Table H1: Summary of Laboratory Results of Soil Analysis for Land Use – Priority metals, Priority PAH, Priority TRH, BTEX

			Priority metals								Priority PAH				Priority TRH						BTEX			
			Total Arsenic	Cadmium	Total Chromium	Copper	Lead	Mercury (inorganic)	Nickel	Zinc	Naphthalene [b]	Benzo(a)pyrene (B(a)P)	Benzo(a)pyrene TEQ (B(a)P TEQ)	Total PAH	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
		PQL	4	0.4	1	1	1	0.1	1	1	1	0.05	0.5	0.05	25	50	25	50	100	100	0.2	0.5	1	1
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
313	0.2 m	12/03/24	**15**	<0.4	**14**	**7**	**12**	<0.1	**24**	**32**	<1	<0.05	<0.5	<0.05	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1
			3,000 160	900 -	3,600 670	240,00(75	1,500 1,800	730 -	6,000 60	400,00(190	NL 370	- 1.4	40 -	4,000 -	- -	- 170	260 215	NL -	- 1,700	- 3,300	3 75	NL 135	NL 165	230 180
313	0.8 m	12/03/24	<4	<0.4	**15**	**16**	**11**	<0.1	**10**	**44**	<1	<0.05	<0.5	<0.05	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1
			3,000 160	900 -	3,600 670	240,00(75	1,500 1,800	730 -	6,000 60	400,00(190	NL 370	- 1.4	40 -	4,000 -	- -	- 170	260 215	NL -	- 1,700	- 3,300	3 75	NL 135	NL 165	230 180
314	0.05 m	12/03/24	**16**	<0.4	**5**	**5**	**8**	<0.1	**5**	**7**	<1	<0.05	<0.5	<0.05	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1
			3,000 160	900 -	3,600 670	240,00(75	1,500 1,800	730 -	6,000 60	400,00(190	NL 370	- 1.4	40 -	4,000 -	- -	- 170	260 215	NL -	- 1,700	- 3,300	3 75	NL 135	NL 165	230 180
314	0.5 m	12/03/24	<4	<0.4	**7**	**18**	**3**	<0.1	**46**	**7**	<1	**0.06**	<0.5	**4.6**	<25	<50	<25	<50	**280**	<100	<0.2	<0.5	<1	<1
			3,000 160	900 -	3,600 670	240,00(75	1,500 1,800	730 -	6,000 60	400,00(190	NL 370	- 1.4	40 -	4,000 -	- -	- 170	260 215	NL -	- 1,700	- 3,300	3 75	NL 135	NL 165	230 180
D2/SBK	0 m	13/03/24	<4	<0.4	**6**	**17**	**4**	<0.1	**43**	**9**	<1	<0.05	<0.5	**3.3**	<25	<50	<25	<50	**290**	<100	<0.2	<0.5	<1	<1
			3,000 160	900 -	3,600 670	240,00(75	1,500 1,800	730 -	6,000 60	400,00(190	NL 370	- 1.4	40 -	4,000 -	- -	- 170	260 215	NL -	- 1,700	- 3,300	3 75	NL 135	NL 165	230 180
314	1.5 m	12/03/24	**8**	<0.4	**22**	**7**	**12**	<0.1	**42**	**14**	<1	<0.05	<0.5	<0.05	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1
			3,000 160	900 -	3,600 670	240,00(75	1,500 1,800	730 -	6,000 60	400,00(190	NL 370	- 1.4	40 -	4,000 -	- -	- 170	370 215	NL -	- 1,700	- 3,300	3 75	NL 135	NL 165	NL 180
315	0.2 m	12/03/24	**5**	<0.4	**22**	**8**	**7**	<0.1	**15**	**17**	<1	<0.05	<0.5	<0.05	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1
			3,000 160	900 -	3,600 670	240,00(75	1,500 1,800	730 -	6,000 60	400,00(190	NL 370	- 1.4	40 -	4,000 -	- -	- 170	260 215	NL -	- 1,700	- 3,300	3 75	NL 135	NL 165	230 180
315	0.5 m	12/03/24	**10**	<0.4	**31**	**7**	**15**	<0.1	**21**	**19**	<1	<0.05	<0.5	<0.05	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1
			3,000 160	900 -	3,600 670	240,00(75	1,500 1,800	730 -	6,000 60	400,00(190	NL 370	- 1.4	40 -	4,000 -	- -	- 170	260 215	NL -	- 1,700	- 3,300	3 75	NL 135	NL 165	230 180
318	0.1 m	12/03/24	**5**	<0.4	**9**	**18**	**8**	<0.1	**51**	**19**	<1	**0.06**	<0.5	**2.9**	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1
			3,000 160	900 -	3,600 670	240,00(75	1,500 1,800	730 -	6,000 60	400,00(190	NL 370	- 1.4	40 -	4,000 -	- -	- 170	260 215	NL -	- 1,700	- 3,300	3 75	NL 135	NL 165	230 180
318	1 m	12/03/24	**14**	<0.4	**12**	**18**	**10**	<0.1	**39**	**34**	<1	<0.05	<0.5	<0.05	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1
			3,000 160	900 -	3,600 670	240,00(75	1,500 1,800	730 -	6,000 60	400,00(190	NL 370	- 1.4	40 -	4,000 -	- -	- 170	370 215	NL -	- 1,700	- 3,300	3 75	NL 135	NL 165	NL 180
318	1.5 m	12/03/24	**10**	<0.4	**8**	**7**	**8**	<0.1	**10**	**29**	<1	<0.05	<0.5	<0.05	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1
			3,000 160	900 -	3,600 670	240,00(75	1,500 1,800	730 -	6,000 60	400,00(190	NL 370	- 1.4	40 -	4,000 -	- -	- 170	370 215	NL -	- 1,700	- 3,300	3 75	NL 135	NL 165	NL 180
319	0.3 m	12/03/24	**5**	<0.4	**16**	**9**	**13**	<0.1	**11**	**21**	<1	<0.05	<0.5	<0.05	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1
			3,000 160	900 -	3,600 670	240,00(75	1,500 1,800	730 -	6,000 60	400,00(190	NL 370	- 1.4	40 -	4,000 -	- -	- 170	260 215	NL -	- 1,700	- 3,300	3 75	NL 135	NL 165	230 180
319	0.5 m	12/03/24	<4	<0.4	**16**	**5**	**10**	<0.1	**13**	**24**	<1	<0.05	<0.5	<0.05	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1
			3,000 160	900 -	3,600 670	240,00(75	1,500 1,800	730 -	6,000 60	400,00(190	NL 370	- 1.4	40 -	4,000 -	- -	- 170	260 215	NL -	- 1,700	- 3,300	3 75	NL 135	NL 165	230 180
320	0.2 m	12/03/24	**8**	<0.4	**18**	**6**	**11**	<0.1	**16**	**21**	<1	<0.05	<0.5	<0.05	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1
			3,000 160	900 -	3,600 670	240,00(75	1,500 1,800	730 -	6,000 60	400,00(190	NL 370	- 1.4	40 -	4,000 -	- -	- 170	260 215	NL -	- 1,700	- 3,300	3 75	NL 135	NL 165	230 180
321	0.1 m	12/03/24	**6**	<0.4	**12**	**9**	**10**	<0.1	**15**	**27**	<1	<0.05	<0.5	**0.99**	<25	<50	<25	<50	**100**	<100	<0.2	<0.5	<1	<1
			3,000 160	900 -	3,600 670	240,00(75	1,500 1,800	730 -	6,000 60	400,00(190	NL 370	- 1.4	40 -	4,000 -	- -	- 170	260 215	NL -	- 1,700	- 3,300	3 75	NL 135	NL 165	230 180
321	0.3 m	12/03/24	**4**	<0.4	**12**	**4**	**7**	<0.1	**5**	**9**	<1	<0.05	<0.5	<0.05	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1
			3,000 160	900 -	3,600 670	240,00(75	1,500 1,800	730 -	6,000 60	400,00(190	NL 370	- 1.4	40 -	4,000 -	- -	- 170	260 215	NL -	- 1,700	- 3,300	3 75	NL 135	NL 165	230 180
322	0.05 m	12/03/24	**4**	<0.4	**9**	**21**	**5**	<0.1	**77**	**11**	<1	<0.05	<0.5	**0.1**	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1
			3,000 160	900 -	3,600 670	240,00(75	1,500 1,800	730 -	6,000 60	400,00(190	NL 370	- 1.4	40 -	4,000 -	- -	- 170	260 215	NL -	- 1,700	- 3,300	3 75	NL 135	NL 165	230 180
322	0.3 m	12/03/24	**5**	<0.4	**17**	**5**	**9**	<0.1	**10**	**8**	<1	<0.05	<0.5	<0.05	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1
			3,000 160	900 -	3,600 670	240,00(75	1,500 1,800	730 -	6,000 60	400,00(190	NL 370	- 1.4	40 -	4,000 -	- -	- 170	260 215	NL -	- 1,700	- 3,300	3 75	NL 135	NL 165	230 180
322	1 m	12/03/24	**5**	<0.4	**22**	**6**	**7**	<0.1	**10**	**15**	<1	<0.05	<0.5	<0.05	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1
			3,000 160	900 -	3,600 670	240,00(75	1,500 1,800	730 -	6,000 60	400,00(190	NL 370	- 1.4	40 -	4,000 -	- -	- 170	370 215	NL -	- 1,700	- 3,300	3 75	NL 135	NL 165	NL 180
326	0.1 m	12/03/24	<4	<0.4	**9**	**10**	**7**	<0.1	**18**	**32**	<1	**0.08**	<0.5	**6.9**	<25	**130**	<25	**130**	**870**	**120**	<0.2	<0.5	<1	<1
			3,000 160	900 -	3,600 670	240,00(75	1,500 1,800	730 -	6,000 60	400,00(190	NL 370	- 1.4	40 -	4,000 -	- -	- 170	260 215	NL -	- 1,700	- 3,300	3 75	NL 135	NL 165	230 180
324	0.5 m	12/03/24	**7**	<0.4	**11**	**15**	**11**	<0.1	**11**	**53**	<1	<0.05	<0.5	<0.05	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1
			3,000 160	900 -	3,600 670	240,00(75	1,500 1,800	730 -	6,000 60	400,00(190	NL 370	- 1.4	40 -	4,000 -	- -	- 170	260 215	NL -	- 1,700	- 3,300	3 75	NL 135	NL 165	230 180
319 - [TRIPLICATE]	0.3 m	12/03/24	<4	<0.4	**12**	**5**	**10**	<0.1	**8**	**19**	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			3,000 160	900 -	3,600 670	240,00(75	1,500 1,800	730 -	6,000 60	400,00(190	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
322 - [TRIPLICATE]	0.3 m	12/03/24	**5**	<0.4	**17**	**4**	**8**	<0.1	**7**	**7**	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			3,000 160	900 -	3,600 670	240,00(75	1,500 1,800	730 -	6,000 60	400,00(190	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -

Lab result

HIL/HSL value EIL/ESL/EGV 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, refer to the lab report **Blue** = DC exceedance **Red** = EGV-indirect exceedance HSL 0-<1 Exceedance

Bold = Lab detections - = Not tested or No HIL/HSL/EIL/ESL (as applicable) or Not applicable NL = Not limiting NAD = No Asbestos detected

HIL = Health investigation level HSL = Health screening level (excluding DC) EIL = Ecological investigation level ESL = Ecological screening level EGV = Environmental Guideline Value ML = Management Limit DC = Direct Contact HSL

Notes:

a QA/QC replicate of sample listed directly below the primary sample

b Naphthalene reported as highest detection from the BTEXN or PAH suite, or if both results <PQL as lowest PQL

c EIL criteria applies to DDT only

Site Assessment Criteria (SAC):

SAC based on generic land use thresholds for Commercial/ industrial D

Refer to the SAC section of report for information of SAC sources and rationale. Summary information as follows:

HIL	HIL-D (NEPC, 2013 or HEPA, 2020 (PFAS only))	EGV	EGV, all land uses, direct exposure (HEPA, 2020)
HSL (vapour intrusion)	HSL-D (NEPC, 2013)	ESL	Commercial and Industrial (NEPC, 2013)
DC	Direct contact HSL D Commercial/Industrial (CRC CARE, 2011)	ML	Commercial and Industrial (NEPC, 2013)
		EGV-Indir	EGV, all land uses, Indirect exposure (HEPA, 2020)

Table H2: Summary of Laboratory Results of Soil Analysis for Land Use – Priority OCP, Priority OPP, PCB, Priority PFAS, Asbestos

			Priority OCP									Priority OPP	PCB	Priority PFAS					Asbestos (FA/AF)				Asbestos, Other				
			DDT+DDE+DDDc	Aldrin + Dieldrin	Total Chlordane	Total Endosulfan	Endrin	Heptachlor	Hexachlorobenzene	Methoxychlor	Mirex	Chlorpyriphos	Total PCB	Total Positive PFAS	PFOA	PFOS + PFHxS	PFOS	PFHxS	Asb_Sample_mass	ACM >7mm Estimation	FA and AF Estimation	FA and AF Estimation	Asbestos ID in soil >0.1g/kg	Asbestos ID in soil <0.1g/kg	Trace Analysis (NEPC)	Total Asbestos#1	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	0.0001	0.0001	0.0001	0.0001	0.0001				0.001				0.1	0.1
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	g	g	g	%(w/w)	-	-	-	g/kg	
313	0.2 m	12/03/24	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	**889.07**	-	-	<0.001	NAD	NAD	NAD	<0.1	-
			3,600 640	45 -	530 -	2,000 -	100 -	50 -	80 -	2,500 -	100 -	2,000 -	7 -	- -	- -	- -	- -	- -	- -	- -	- -	0.001 -					
313	0.8 m	12/03/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -					
314	0.05 m	12/03/24	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			3,600 640	45 -	530 -	2,000 -	100 -	50 -	80 -	2,500 -	100 -	2,000 -	7 -	- -	- -	- -	- -	- -	- -	- -	- -	- -					
314	0.5 m	12/03/24	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	-	-	-	-	-	-	-	-
			3,600 640	45 -	530 -	2,000 -	100 -	50 -	80 -	2,500 -	100 -	2,000 -	7 -	- -	50 10	20 -	20 1	20 -	- -	- -	- -	- -					
D2/SBK	0 m	13/03/24	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			3,600 640	45 -	530 -	2,000 -	100 -	50 -	80 -	2,500 -	100 -	2,000 -	7 -	- -	- -	- -	- -	- -	- -	- -	- -	- -					
314	1.5 m	12/03/24	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	-	-	-	-	-	-	-	-
			3,600 640	45 -	530 -	2,000 -	100 -	50 -	80 -	2,500 -	100 -	2,000 -	7 -	- -	50 10	20 -	20 1	20 -	- -	- -	- -	- -					
315	0.2 m	12/03/24	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			3,600 640	45 -	530 -	2,000 -	100 -	50 -	80 -	2,500 -	100 -	2,000 -	7 -	- -	- -	- -	- -	- -	- -	- -	- -	- -					
315	0.5 m	12/03/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -					
318	0.1 m	12/03/24	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**0.0001**	<0.0001	**0.0001**	**0.0001**	<0.0001	-	-	-	-	-	-	-	-	-
			3,600 640	45 -	530 -	2,000 -	100 -	50 -	80 -	2,500 -	100 -	2,000 -	7 -	- -	50 10	20 -	20 1	20 -	- -	- -	- -	- -					
318	1 m	12/03/24	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	**985.37**	-	-	<0.001	NAD	NAD	NAD	<0.1	-
			3,600 640	45 -	530 -	2,000 -	100 -	50 -	80 -	2,500 -	100 -	2,000 -	7 -	- -	- -	- -	- -	- -	- -	- -	- -	0.001 -					
318	1.5 m	12/03/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -					
319	0.3 m	12/03/24	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	**834.86**	-	-	<0.001	NAD	NAD	NAD	<0.1	-
			3,600 640	45 -	530 -	2,000 -	100 -	50 -	80 -	2,500 -	100 -	2,000 -	7 -	- -	- -	- -	- -	- -	- -	- -	- -	0.001 -					
319	0.5 m	12/03/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -					
320	0.2 m	12/03/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -					
321	0.1 m	12/03/24	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			3,600 640	45 -	530 -	2,000 -	100 -	50 -	80 -	2,500 -	100 -	2,000 -	7 -	- -	- -	- -	- -	- -	- -	- -	- -	- -					
321	0.3 m	12/03/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -					
322	0.05 m	12/03/24	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**0.0002**	<0.0001	**0.0002**	**0.0002**	<0.0001	-	-	-	-	-	-	-	-	-
			3,600 640	45 -	530 -	2,000 -	100 -	50 -	80 -	2,500 -	100 -	2,000 -	7 -	- -	50 10	20 -	20 1	20 -	- -	- -	- -	- -					
322	0.3 m	12/03/24	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	**766.93**	-	-	<0.001	NAD	NAD	NAD	<0.1	-
			3,600 640	45 -	530 -	2,000 -	100 -	50 -	80 -	2,500 -	100 -	2,000 -	7 -	- -	- -	- -	- -	- -	- -	- -	- -	0.001 -					
322	1 m	12/03/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -					
326	0.1 m	12/03/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -					
324	0.5 m	12/03/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -					
319 - [TRIPLICATE]	0.3 m	12/03/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -					
322 - [TRIPLICATE]	0.3 m	12/03/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -					

Lab result

HIL/HSL value EIL/ESL/EGV 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, refer to the lab report **Blue** = DC exceedance **Red** = EGV-indirect exceedance HSL 0-<1 Exceedance

Bold = Lab detections - = Not tested or No HIL/HSL/EIL/ESL (as applicable) or Not applicable NL = Not limiting NAD = No Asbestos detected

HIL = Health investigation level HSL = Health screening level (excluding DC) EIL = Ecological investigation level ESL = Ecological screening level EGV = Environmental Guideline Value ML = Management Limit DC = Direct Contact HSL

Notes:

a QA/QC replicate of sample listed directly below the primary sample

b Naphthalene reported as highest detection from the BTEXN or PAH suite, or if both results <PQL as lowest PQL

c EIL criteria applies to DDT only

Site Assessment Criteria (SAC):

SAC based on generic land use thresholds for Commercial/ industrial D

Refer to the SAC section of report for information of SAC sources and rationale. Summary information as follows:

HIL	HIL-D (NEPC, 2013 or HEPA, 2020 (PFAS only))	EGV	EGV, all land uses, direct exposure (HEPA, 2020)
HSL (vapour intrusion)	HSL-D (NEPC, 2013)	ESL	Commercial and Industrial (NEPC, 2013)
DC	Direct contact HSL D Commercial/Industrial (CRC CARE, 2011)	ML	Commercial and Industrial (NEPC, 2013)
		EGV-Indir	EGV, all land uses, Indirect exposure (HEPA, 2020)

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Table H3: Summary of Laboratory Results of Soil Analysis for Waste Classification – Metals, TRH, BTEX, PAH, Phenols, OCP, OPP, PCB, PFAS, Asbestos

			Metals							TRH		BTEX				PAH		Phenols	OCP				OPP	PCB	PFAS				Asbestos							
			Total Arsenic	Cadmium	Total Chromium	Lead	Mercury (inorganic)	Nickel	TCLP Nickel	TRH C6 - C9	TRH C10-C36	Benzene	Toluene	Ethylbenzene	Total Xylenes	Benzo(a)pyrene (BaP)	Total PAH	Total Phenolics	Scheduled Chemical Waste (standard)	Total Endosulfan	Total Analysed OCP	Mirex	Total Analysed OPP	Total PCB	PFOA	TCLP PFOA	PFOS + PFHxS	TCLP PFOS + PFHxS	Asbestos ID in soil >0.1g/kg	Asbestos ID in soil <0.1g/kg	Trace Analysis (NEPC)	ACM >7mm Estimation	FA and AF Estimation	FA and AF Estimation	Total Asbestos[f]	Asbestos Summary
		PQL	4	0.4	1	1	0.1	1	0.02	25	50	0.2	0.5	1	1	0.05	0.05	5	0.1	0.1	0.1	0.1	0.1	0.1	0.0001	0.00001	0.0001	0.00001						0.001	0.1	0.001
Sample ID	Depth	Sample Date	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/L	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/L	mg/kg	mg/L	-	-	-	g	g	%(w/w)	g/kg	
313	0.2 m	12/03/24	**15**	<0.4	**14**	**12**	<0.1	**24**	-	<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	NAD	NAD	NAD	–	–	<0.001	<0.1	-
313	0.8 m	12/03/24	<4	<0.4	**15**	**11**	<0.1	**10**	-	<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
314	0.05 m	12/03/24	**16**	<0.4	**5**	**8**	<0.1	**5**	-	<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-
314	0.5 m	12/03/24	<4	<0.4	**7**	**3**	<0.1	**46**	**0.07**	<25	**330**	<0.2	<0.5	<1	<1	**0.06**	**4.6**	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.0001	<0.00001	<0.0001	<0.00001	-	-	-	-	-	-	-	-
D2/SBK	0 m	13/03/24	<4	<0.4	**6**	**4**	<0.1	**43**	-	<25	**350**	<0.2	<0.5	<1	<1	<0.05	**3.3**	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-
314	1.5 m	12/03/24	**8**	<0.4	**22**	**12**	<0.1	**42**	<0.02	<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.0001	<0.00001	<0.0001	<0.00001	-	-	-	-	-	-	-	-
315	0.2 m	12/03/24	**5**	<0.4	**22**	**7**	<0.1	**15**	-	<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-
315	0.5 m	12/03/24	**10**	<0.4	**31**	**15**	<0.1	**21**	-	<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
318	0.1 m	12/03/24	**5**	<0.4	**9**	**8**	<0.1	**51**	**0.04**	<25	<50	<0.2	<0.5	<1	<1	**0.06**	**2.9**	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.0001	<0.00001	**0.0001**	<0.00001	-	-	-	-	-	-	-	-
318	1 m	12/03/24	**14**	<0.4	**12**	**10**	<0.1	**39**	-	<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	NAD	NAD	NAD	–	–	<0.001	<0.1	-
318	1.5 m	12/03/24	**10**	<0.4	**8**	**8**	<0.1	**10**	-	<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
319	0.3 m	12/03/24	**5**	<0.4	**16**	**13**	<0.1	**11**	-	<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	NAD	NAD	NAD	–	–	<0.001	<0.1	-
319	0.5 m	12/03/24	<4	<0.4	**16**	**10**	<0.1	**13**	-	<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
320	0.2 m	12/03/24	**8**	<0.4	**18**	**11**	<0.1	**16**	-	<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
321	0.1 m	12/03/24	**6**	<0.4	**12**	**10**	<0.1	**15**	-	<25	<50	<0.2	<0.5	<1	<1	<0.05	**0.99**	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-
321	0.3 m	12/03/24	**4**	<0.4	**12**	**7**	<0.1	**5**	-	<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
322	0.05 m	12/03/24	**4**	<0.4	**9**	**5**	<0.1	**77**	**0.09**	<25	<50	<0.2	<0.5	<1	<1	<0.05	**0.1**	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.0001	<0.00001	**0.0002**	<0.00001	-	-	-	-	-	-	-	-
322	0.3 m	12/03/24	**5**	<0.4	**17**	**9**	<0.1	**10**	-	<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	NAD	NAD	NAD	–	–	<0.001	<0.1	-
322	1 m	12/03/24	**5**	<0.4	**22**	**7**	<0.1	**10**	-	<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
326	0.1 m	12/03/24	<4	<0.4	**9**	**7**	<0.1	**18**	-	<25	**1,100**	<0.2	<0.5	<1	<1	**0.08**	**6.9**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
324	0.5 m	12/03/24	**7**	<0.4	**11**	**11**	<0.1	**11**	-	<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
319 - [TRIPLICATE]	0.3 m	12/03/24	<4	<0.4	**12**	**10**	<0.1	**8**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
322 - [TRIPLICATE]	0.3 m	12/03/24	**5**	<0.4	**17**	**8**	<0.1	**7**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Summary Statistics																																				
Min			4	0.4	5	3	0.1	5	0.02	25	50	0.2	0.5	1	1	0.05	0.05	5	0.1	0.1	0.1	0.1	0.1	0.1	0.0001	0.00001	0.0001	0.00001	-	-	-	-	-	-	-	-
Max			16	0.4	31	15	0.1	77	0.09	25	1,100	0.2	0.5	1	1	0.08	6.9	5	0.1	0.1	0.1	0.1	0.1	0.1	0.0001	0.00001	0.0002	0.00001	-	-	-	-	-	-	-	-
Mean			7	0.4	14	9	0.1	22	0.06	25	128	0.2	0.5	1	1	0.05	0.93	5	0.1	0.1	0.1	0.1	0.1	0.1	0.0001	0.00001	0.0001	0.00001	-	-	-	-	-	-	-	-
Waste Classification Criteria[f]																																				
CT1			100	20	100	100	4	40	-	650	10,000	10	288	600	1000	0.8	200	288	<50	60	-	-	4	<50	-	-	-	-	-	-	-	-	-	-	-	-
SCC1			500	100	1,900	1,500	50	1,050	-	650	10,000	18	518	1,080	1,800	10	200	518	<50	108	-	-	7.5	<50	18	-	1.8	-	-	-	-	-	-	-	-	-
TCLP1			-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.5	-	0.05	-	-	-	-	-	-	-	-
CT2			400	80	400	400	16	160	-	2,600	40,000	40	1,152	2,400	4,000	3.2	800	1,152	<50	240	-	-	16	<50	-	-	-	-	-	-	-	-	-	-	-	-
SCC2			2,000	400	7,600	6,000	200	4,200	-	2,600	40,000	72	2,073	4,320	7,200	23	800	2,073	<50	432	-	-	30	<50	72	-	7.2	-	-	-	-	-	-	-	-	-
TCLP2			-	-	-	-	-	-	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	0.2	-	-	-	-	-	-	-	-

CT1 exceedance TCLP1 and/or SCC1 exceedance CT2 exceedance TCLP2 and/or SCC2 exceedance Asbestos detection

- = Not tested, no criteria or not applicable NAD = no asbestos detected

Notes:

a	QA/QC replicate of sample listed directly below the primary sample
b	Total chromium used as initial screen for chromium(VI).
c	Total recoverable hydrocarbons (TRH) used as an initial screen for total petroleum hydrocarbons (TPH)
d	Criteria for scheduled chemicals used as an initial screen
e	Criteria for Chlorpyrifos used as initial screen
f	NSW EPA, 2014, Waste Classification Guidelines Part 1; Classifying Waste
PQL	Practical quantitation limit
CT1	Maximum values of specific contaminant concentration (SCC) for classification without TCLP: General solid waste
SCC1	Maximum values for leachable concentration (TCLP) and specific contaminant concentration (SCC) when used together: General solid waste
TCLP1	Maximum values for leachable concentration (TCLP) and specific contaminant concentration (SCC) when used together: General solid waste
CT2	Maximum values of specific contaminant concentration (SCC) for classification without TCLP: Restricted solid waste
SCC2	Maximum values for leachable concentration (TCLP) and specific contaminant concentration (SCC) when used together: Restricted solid waste
TCLP2	Maximum values for leachable concentration (TCLP) and specific contaminant concentration (SCC) when used together: Restricted solid waste

Appendix I

Data Quality Assurance and Quality Control Report

Chain of Custody

Sample Receipt

1. 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 1. 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 field QC samples are included in at the end of this appendix.

Table 1: 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	10% of primary samples; <30% RPD	PC
Laboratory / Reagent Blanks	1 per batch; <PQL	C
Laboratory Duplicate	1 per lab batch; As laboratory certificate	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 Table QA1 (results in bold). The exceedances are not, however, considered to be of concern given that:

- The actual differences in the concentrations of the replicate pairs where RPD exceedances occurred were typically low;
- The replicate pairs were collected from fill soils which by its nature are heterogeneous;
- Replicates, rather than homogenised duplicates, were used to minimise risk of volatile loss, hence greater analytical variability between replicate pairs can be expected;
- Most of the recorded concentrations were relatively close to the PQL;
- The majority of RPD results from a replicate pair were within the acceptable limits; and

- All other QA/QC parameters met the data quality indicators.

Ina addition to the above, the following was noted in the laboratory testing report 346557:

- The laboratory RPD acceptance criteria has been exceeded for 346557-11 (319/0.3) for Zn. Therefore a triplicate result has been issued as laboratory sample number 346557-22;
- The laboratory RPD acceptance criteria has been exceeded for 346557-17 (322/0.3) for Ni and Pb. Therefore a triplicate result has been issued as laboratory sample number 346557-23;
- TRH Soil C10-C40 NEPM - # Percent recovery for the matrix spike is not possible to report as the high concentration of analytes in sample 346557-21 may have caused interference.

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

2. Data Quality Indicators

The reliability of field procedures and analytical results was assessed against the following data quality indicators (DQI) 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 2: Data quality indicators

Data quality indicator	Method(s) of achievement
Completeness	Systematic and selected 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(s) used.
	Use of NATA registered laboratories, with test methods the same or similar between laboratories.
	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 DQO.
	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 DQI have been generally complied with.

3. Conclusion

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

4. 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.

Table QA1: Relative Percentage Difference Results – Soil Sampling

Lab Report No	Sample ID	Depth	Sample Date	Sample Type	Units	Priority metals							Priority PAH				PAH											Priority TRH						TRH	
						Total Arsenic	Cadmium	Total Chromium	Copper	Lead	Mercury (inorganic)	Nickel	Zinc	Naphthalene [b]	Benzo(a)pyrene (BaP)	Benzo(a)pyrene TEQ (BaP TEQ)	Total PAH	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(g,h,i)perylene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Phenanthrene	Pyrene	TRH C6 - C10	TRH >C10-C16	F1 ((C6-C10)-BTEX)	F2 (>C10-C16 less Naphthalene)	F3 (>C16-C34)	F4 (>C34-C40)	TRH C6 - C9	TRH C10-C36
346557	314	0.5 m	12/03/24	Soil	mg/kg	<4	<0.4	7	18	3	<0.1	46	7	<1	0.06	<0.5	4.6	<0.1	<0.1	<0.1	0.4	<0.1	0.3	<0.1	1	<0.1	<0.1	1.8	0.6	<25	<50	<25	<50	280	<100	<25	330
346557	D2/SBK	0 m	13/03/24	Soil	mg/kg	<4	<0.4	6	17	4	<0.1	43	9	<1	<0.05	<0.5	3.3	<0.1	<0.1	<0.1	0.2	<0.1	0.2	<0.1	0.7	<0.1	<0.1	1.3	0.4	<25	<50	<25	<50	290	<100	<25	350
			Difference		mg/kg	0	0	1	1	1	0	3	2	0	0.01	0	13	0	0	0	0.2	0	0.1	0	0.3	0	0	0.5	0.2	0	0	0	0	10	0	0	20
			RPD		%	0%	0%	15%	6%	29%	0%	7%	25%	0%	18%	0%	33%	0%	0%	0%	67%	0%	40%	0%	35%	0%	0%	32%	40%	0%	0%	0%	0%	4%	0%	0%	6%

Table QA1: Relative Percentage Difference Results – Soil Sampling (continued)

Lab Report No	Sample ID	Depth	Sample Date	Sample Type	Units	Priority phenols	Priority OCP								OCP						Priority OPP	OPP												
						Total Phenolics	DDT+DDE+DDD [c]	Aldrin + Dieldrin	Total Chlordane	Total Endosulfan	Endrin	Heptachlor	Hexachlorobenzene	Methoxychlor	Mirex	Heptachlor Epoxide	Endrin Aldehyde	alpha-BHC	beta-BHC	delta-BHC	Lindane	Chlorpyriphos	Azinphos methyl (Guthion)	Bromophos-ethyl	Chlorpyriphos-methyl	Diazinon	Dichlorvos	Dimethoate	Ethion	Ronnel (fenchlorphos)	Fenitrothion	Fenthion	Malathion	Parathion	Parathion-methyl	Methidathion	Fenamiphos
346557	314	0.5 m	12/03/24	Soil	mg/kg	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
346557	D2/SBK	0 m	13/03/24	Soil	mg/kg	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
			Difference		mg/kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	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%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Douglas PARTNERS

CHAIN OF CUSTODY DESPATCH SHEET

Project No:	224763.02	**Suburb:**	Muswellbrook	**To:**	Envirolab Services
Project Manager:	Michael Gawn	**Order Number:**	NC232573	**Sampler:**	SBK
					12 Ashley St, Chatswood NSW 2067
Email:	Michael.Gawn@douglaspartners.com.au			**Attn:**	Sample Receipt
					(02) 9910 6200 samplereceipt@envirolab.com

Turnaround time: ☑ Standard ☐ 72 hour ☐ 48 hour ☐ 24 hour ☐ Same day

Prior Storage ☑ Fridge ☐ Freezer ☐ Esky ☑ Shelf

Do samples contain 'potential' HBM? ☑ No ☐ Yes (If YES, handle, transport, store in accordance with FPM HAZID)

Lab ID	Sample ID: Location / Other ID	Depth From	Depth To	Date Sampled	Sample Type: S - soil W - water M - Material	Container Type: G - glass P - plastic	Analytes: Combo 8	Combo 3	Absestos NEPM (500ml)							Notes/ Preservation/ Additional Requirements
1	313	0.2	0.2	12/03/24	S	G,P	x		x							
2	313	0.8	0.8	12/03/24	S	G,P		x								
3	314	0.05	0.05	12/03/24	S	G,P	x									
4	314	0.5	0.5	12/03/24	S	G,P	x									
5	314	1.5	1.5	12/03/24	S	G,P	x	x								
6	315	0.2	0.2	12/03/24	S	G,P	x									
7	315	0.5	0.5	12/03/24	S	G,P		x								
8	318	0.1	0.1	12/03/24	S	G,P	x									
9	318	1.0	1.0	12/03/24	S	G,P	x		x							
10	318	1.5	1.5	12/03/24	S	G,P		x								
11	319	0.3	0.3	12/03/24	S	G,P	x		x							
12	319	0.5	0.5	12/03/24	S	G,P		x								
13	320	0.2	0.2	12/03/24	S	G,P		x								
14	321	0.1	0.1	12/03/24	S	G,P	x									

ENVIROLAB

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

Job No: 346340557
Date Received: 15/3/24
Time Received: 1045
Received By: CH
Temp: Cool/Ambient 5°C.
Cooling: Ice/Icepack
Security: Intact/Broken/None

Metals to analyse: HM8 (As, Cd, Cr, Cu, Pb, Hg, Ni, Zn)

Number of samples in container:

Transported to laboratory by: courier

Send results to: Douglas Partners Pty Ltd

Address: 15 Callistemon Close, Warabrook NSW 2

Phone: (02) 4960 9600

Relinquished by: SBK

Date: 14/03/2024 **Signed:**

LAB RECEIPT

Lab Ref. No: 346557

Received by: Christine Ho

Date & Time 15/3/24 1045

Signed:

Douglas PARTNERS

CHAIN OF CUSTODY DESPATCH SHEET

Project No: 224763.02 | **Suburb:** Muswellbrook | **To:** Envirolab Services

Project Manager: Michael Gawn | **Dispatch date:** 45365

Lab ID	Sample ID: Location / Other ID	Depth From	Depth To	Date Sampled	Sample Type: S - soil W - water M -	Container Type: G - glass P - plastic	Analytes: Combo 8	Combo 3	Absestos NEPM (500ml)								Notes/ Preservation/ Additional Requirements
15	321	0.3	0.3	12/03/24	S	G,P		x									
16	322	0.05	0.05	12/03/24	S	G,P	x										
17	322	0.3	0.3	12/03/24	S	G,P	x		x								#346557.
18	322	1.0	1.0	12/03/24	S	G,P		x									CH 15/3/24.
19	323	0.1	0.1	12/03/24	S	G,P		x									
20	324	0.5	0.5	12/03/24	S	G,P		x									
21	D2/SBK			13/03/24	S	G,P	x										

346557-A
due 5/4/24

Douglas PARTNERS

CHAIN OF CUSTODY DESPATCH SHEET

Project No:	224763.02	**Suburb:**	Muswellbrook	**To:**	Envirolab Services
Project Manager:	Patrick Heads	**Order Number:**		**Sampler:** SBK	12 Ashley St, Chatswood NSW 2067
Email:	patrick.heads@douglaspartners.com.au			**Attn:**	Sample Receipt
Turnaround time	☐ Standard ☑ 72 hour ☐ 48 hour ☐ 24 hour ☐ Same day				(02) 9910 6200 samplereceipt@envirolab.cor
Prior Storage	☑ Fridge ☐ Freezer ☐ Esky ☐ Shelf	**Do samples contain 'potential' HBM?**	☑ No ☐ Yes	(If YES, handle, transport, store in accordance with FPM HAZID)	

Lab ID	Sample ID: Location / Other ID	Depth From	Depth To	Date Sampled	Sample Type: S - soil W - water M - Material	Container Type: G - glass P - plastic	Analytes: TCLP Ni	PFAS short suite	TCLP PFAS									Notes/ Preservation/ Additional Requirements
4	314	0.5	0.5	12/03/24	S	G	×	×	×									
5	314	1.5	1.5	12/03/24	S	G	×	×	×									
8	318	0.1	0.1	12/03/24	S	G	×	×	×									
16	322	0.05	0.05	12/03/24	S	G	×	×	×									

Metals to analyse:				**LAB RECEIPT**	
Number of samples in container:	at lab	**Transported to laboratory by:**	at lab	**Lab Ref. No:**	
Send results to:	Douglas Partners Pty Ltd			**Received by:**	
Address:	15 Callistemon Close, Warabrook NSW 23	**Phone:**	(02) 4960 9600	**Date & Tim**	
Relinquished by:		**Date:**	**Signed:**	**Signed:**	

Douglas Partners
Geotechnics | Environment | Groundwater

CHAIN OF CUSTODY FIELD SHEET

Project No: 224763.02	**Client Project Name:** Proposed Muswellbrook Substation
Client: Ausgrid	**Location:** 20 Sandy Creek Road
Project Manager: MPG	**DP Lab Received** By: Date:

Do samples contain 'potential' HBM? Yes ☐ No ☐ (If YES, then handle, transport and store in accordance with FPM HAZID)

Field									DP Lab	For Despatch to			Notes
Sample ID	Depth (m)	Duplicate Sample	Sample Type S - soil W - water	Container Type G - glass P - plastic	ASS Samples	Sampling By	Sampling Date	Sampling Time	Storage Locn *	Lab 1 [A] Date	Lab 2 [B] Date	Lab 3 [C] Date	
313	0.2		S	G, P		SBK	12/3/24	8:30	Friday Tray 103				
↓	0.8		↓	↓		↓	↓	↓	↓				
↓	1.5		↓	↓		↓	↓	↓	↓				
314	0.05	"	↓	↓		↓	↓	↓	↓				
↓	0.5	D2/SBK	↓	↓		↓	↓	↓	↓				
↓	1.5		↓	↓		↓	↓	↓	↓				
↓	2.5		↓	↓		↓	↓	↓	↓				
315	0.2		↓	↓		↓	↓	↓	↓				
↓	0.5		↓	↓		↓	↓	↓	↓				
↓	1.0		↓	↓		↓	↓	↓	↓				
↓	2.0		↓	↓		↓	↓	↓	↓				
316	0.2		↓	↓		↓	↓	↓	↓				
↓	0.7		↓	↓		↓	↓	↓	↓				
↓	1.2		↓	↓		↓	↓	↓	↓				
↓	1.7		↓	↓		↓	↓	↓	↓				
317	0.1		↓	↓		↓	↓	↓	↓				
↓	0.6		↓	↓		↓	↓	3:00	↓				

* **Default storage: glass containers in fridge, plastic containers shelved, ASS in freezer, water samples in fridge**

A Provide name of Lab 1

B Provide name of Lab 2

C Provide name of Lab 3

Douglas Partners
Geotechnics / Environment / Groundwater

CHAIN OF CUSTODY FIELD SHEET

Project No: 224763.02	**Client Project Name:** Proposed Muswellbrook Substation
Client: Ausgrid	**Location:** 20 Sandy Creek Road
Project Manager:	**DP Lab Received** By: Date:

Do samples contain 'potential' HBM? Yes ☑ No ☐ (If YES, then handle, transport and store in accordance with FPM HAZID)

Field									DP Lab	For Despatch to			Notes
Sample ID	Depth (m)	Duplicate Sample	Sample Type S - soil W - water	Container Type G - glass P - plastic	ASS Samples	Sampling By	Sampling Date	Sampling Time	Storage Locn *	Lab 1 [A] Date	Lab 2 [B] Date	Lab 3 [C] Date	
317	1.5		S	G, P		SBK	12/3/24	8:30	Fridge/Bag 163				
318	0.1		↓	↓		↓	↓	↓	↓				
↓	0.5		↓	↓		↓	↓	↓	↓				
↓	1.0		↓	↓		↓	↓	↓	↓				
↓	1.5	D3/SBK	↓	↓		↓	↓	↓	↓				
319	0.1		↓	↓		↓	↓	↓	↓				
↓	0.3		↓	↓		↓	↓	↓	↓				
↓	0.5		↓	↓		↓	↓	↓	↓				
↓	1.6		↓	↓		↓	↓	↓	↓				
320	0.2		↓	↓		↓	↓	↓	↓				
↓	0.7		↓	↓		↓	↓	↓	↓				
↓	1.5		↓	↓		↓	↓	↓	↓				
321	0.1		↓	↓		↓	↓	↓	↓				
↓	0.3		↓	↓		↓	↓	↓	↓				
↓	1.0		↓	↓		↓	↓	↓	↓				
322	0.05		↓	↓		↓	↓	↓	↓				
↓	0.3		↓	↓		↓	↓	3:00	↓				

*** Default storage:** **glass containers in fridge,** **plastic containers shelved,** **ASS in freezer,** **water samples in fridge**

A Provide name of Lab 1

B Provide name of Lab 2

C Provide name of Lab 3

Douglas Partners
Geotechnics I Environment I Groundwater

CHAIN OF CUSTODY FIELD SHEET

Project No: 224763.02	**Client Project Name:** Proposed Muswellbrook Substation
Client: Ausgrid	**Location:** 20 Sandy Creek Road
Project Manager: MPG	**DP Lab Received** By: Date:

Do samples contain 'potential' HBM? Yes ☐ No ☐ (If YES, then handle, transport and store in accordance with FPM HAZID)

Field									DP Lab	For Despatch to			Notes
Sample ID	Depth (m)	Duplicate Sample	Sample Type S - soil W - water	Container Type G - glass P - plastic	ASS Samples	Sampling By	Sampling Date	Sampling Time	Storage Locn *	Lab 1 [A] Date	Lab 2 [B] Date	Lab 3 [C] Date	
322	1.0		S	G, P		SBK	12/3/24	8:30	Fridge Bay 10?				
↓	2.0		↓	↓		↓	↓	↓	↓				
323	0.1												
↓	0.3												
	1.0												
↓	2.5												
324	0.2	QI/SBK											
↓	0.5							↓					
↓	1.0		↓	↓		↓	↓	3:00	↓				

* **Default storage: glass containers in fridge, plastic containers shelved, ASS in freezer, water samples in fridge**

A Provide name of Lab 1 B Provide name of Lab 2 C Provide name of Lab 3

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

SAMPLE RECEIPT ADVICE

Client Details

Client	Douglas Partners Newcastle
Attention	Michael Gawn

Sample Login Details

Your reference	224763.02, Muswellbrook
Envirolab Reference	346557
Date Sample Received	15/03/2024
Date Instructions Received	15/03/2024
Date Results Expected to be Reported	22/03/2024

Sample Condition

Samples received in appropriate condition for analysis	Yes
No. of Samples Provided	21 Soil
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	5
Cooling Method	Ice
Sampling Date Provided	YES

Comments

Nil

Please direct any queries to:

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

Analysis Underway, details on the following page:

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Sample ID	vTRH(C6-C10)/BTEXN in Soil	svTRH (C10-C40) in Soil	PAHs in Soil	Organochlorine Pesticides in soil	Organophosphorus Pesticides in Soil	PCBs in Soil	Acid Extractable metalsin soil	Misc Soil - Inorg	Asbestos ID - soils NEPM
313-0.2	✓	✓	✓	✓	✓	✓	✓	✓	✓
313-0.8	✓	✓	✓				✓		
314-0.05	✓	✓	✓	✓	✓	✓	✓	✓	
314-0.5	✓	✓	✓	✓	✓	✓	✓	✓	
314-1.5	✓	✓	✓	✓	✓	✓	✓	✓	
315-0.2	✓	✓	✓	✓	✓	✓	✓	✓	
315-0.5	✓	✓	✓				✓		
318-0.1	✓	✓	✓	✓	✓	✓	✓	✓	
318-1.0	✓	✓	✓	✓	✓	✓	✓	✓	✓
318-1.5	✓	✓	✓				✓		
319-0.3	✓	✓	✓	✓	✓	✓	✓	✓	✓
319-0.5	✓	✓	✓				✓		
320-0.2	✓	✓	✓				✓		
321-0.1	✓	✓	✓	✓	✓	✓	✓	✓	
321 -0.3	✓	✓	✓				✓		
322-0.05	✓	✓	✓	✓	✓	✓	✓	✓	
322-0.3	✓	✓	✓	✓	✓	✓	✓	✓	✓
322-1.0	✓	✓	✓				✓		
326-0.1	✓	✓	✓				✓		
324-0.5	✓	✓	✓				✓		
D2/SBK	✓	✓	✓	✓	✓	✓	✓	✓	

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

Additional Info

Sample storage - Waters are routinely disposed of approximately 1 month and soils approximately 2 months from receipt.
Requests for longer term sample storage must be received in writing.
Please contact the laboratory immediately if observed settled sediment present in water samples is to be included in the extraction and/or analysis (exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS analysis where solids are included by default.
TAT for Micro is dependent on incubation. This varies from 3 to 6 days.

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

SAMPLE RECEIPT ADVICE

Client Details

Client	Douglas Partners Newcastle
Attention	Patrick Heads

Sample Login Details

Your reference	224763.02, Muswellbrook
Envirolab Reference	346557-A
Date Sample Received	15/03/2024
Date Instructions Received	02/04/2024
Date Results Expected to be Reported	05/04/2024

Sample Condition

Samples received in appropriate condition for analysis	Yes
No. of Samples Provided	additional testing
Turnaround Time Requested	3 days
Temperature on Receipt (°C)	5
Cooling Method	Ice
Sampling Date Provided	YES

Comments

Nil

Please direct any queries to:

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

Analysis Underway, details on the following page:

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ABN 37 112 535 645
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Sample ID	PFAS in Soils Short	pH of soil for fluid#determ.	pH of soil TCLP (after HCl)	Extraction fluid used	pH of final Leachate	Nickel	PFAS in TCLP Short	On Hold
313-0.2								✓
313-0.8								✓
314-0.05								✓
314-0.5	✓	✓	✓	✓	✓	✓	✓	
314-1.5	✓	✓	✓	✓	✓	✓	✓	
315-0.2								✓
315-0.5								✓
318-0.1	✓	✓	✓	✓	✓	✓	✓	
318-1.0								✓
318-1.5								✓
319-0.3								✓
319-0.5								✓
320-0.2								✓
321-0.1								✓
321 -0.3								✓
322-0.05	✓	✓	✓	✓	✓	✓	✓	
322-0.3								✓
322-1.0								✓
326-0.1								✓
324-0.5								✓
D2/SBK								✓
319 - [TRIPLICATE]-0.3								✓
322 - [TRIPLICATE]-0.3								✓

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

Additional Info

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

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

Please contact the laboratory immediately if observed settled sediment present in water samples is to be included in the extraction and/or analysis (exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS analysis where solids are included by default.

TAT for Micro is dependent on incubation. This varies from 3 to 6 days.