Douglas Partners
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Report on
Supplementary Contamination Investigation

Proposed Industrial Development
Stage 3, Sydney Business Park, Marsden Park, NSW

Prepared for
Marsden Park Developments Pty Ltd

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

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Report on Supplementary Contamination Investigation
Proposed Industrial Development
Stage 3, Sydney Business Park, Marsden Park, NSW

1. Introduction

This report details the methodology and results of a supplementary contamination investigation (SCI) undertaken by Douglas Partners Pty Ltd (DP) for Stage 3 of Sydney Business Park, Marsden Park, NSW (the site as shown on Drawing 1 – Appendix A). The SCI was commissioned by Marsden Park Developments Pty Ltd (MPD) to support a State Significant Development Application SSD 10477 submitted to NSW Planning, Industry and Environment for the development of the site for industrial land use.

The site comprises an area of approximately 29.1 ha and for the purposes of the SCI has been divided into northern and southern parts (20.3 ha and 8.8 ha, respectively). As discussed in Section 4, several previous environmental assessments have been completed at the site including Phase 1 and 2 contamination assessments prior to 2009. A SCI was completed by DP for the northern part of the site in 2017.

This SCI includes a review of the previous investigation completed for the northern part of the site and additional contamination data for the southern part of the site. The primary objective of the SCI was to assess the suitability of the site, from a contamination perspective, for the proposed land use. The SCI was conducted and reported with reference to the National Environment Protection Council (NEPC) *National Environment Protection (Assessment of Site Contamination) Measure 1999* (amended 2013) (NEPC, 2013).

The SCI was completed in conjunction with geotechnical and salinity investigations as reported in DP reports 94616.00.R.001 and 94616.01.R.002, respectively.

2. Scope of Works

The scope of works for the SCI was as follows:

- Review of previous contamination assessments and available site information, including local and regional soils, geological and hydrogeological information;
- Undertake a desktop investigation to update site history information to determine areas of environmental concern (AEC). The desktop investigation included reference to the following sources:
  - Recent Nearmap aerial photographs;
  - Search of the Contaminated Land Register for Notices issued under the Contaminated Land Management Act 1997; and
  - NSW Department of Primary Industries Water groundwater bore search.

- Completion of a site walkover;
- Preparation of a conceptual site model (CSM) and sampling and analysis quality plan (SAQP);
- Excavation and soil sampling at nine test pits within the site. A sediment sample was also collected from an on-site dam;
- Review of test pit and borehole logs completed as part of the salinity and geotechnical investigations;
- Analysis of selected samples for contaminants of potential concern (COPC) at a NATA accredited laboratory:
- Assessment (as a Tier 1 assessment) of analytical results against relevant investigation and screening levels presented in Schedule B1 of NEPC (2013). The NEPC guidelines are endorsed by the NSW EPA under the CLM Act 1997; and
- Preparation of this SCI report detailing the methodology, results and conclusions of the assessment.

3. Site Identification

The site is located within SBP, Marsden Park in the local government area of Blacktown City Council. The site has an area of approximately 29.1 ha and incorporates the following property identifiers:

- Part Lot 36 in Deposited Plan (D.P.) 262886; and
- Part Lots 4 and 5 D.P. 1210172.

Surrounding land uses comprise the following:

North (central and west):	Astoria Street, beyond which is vacant land and the Ikea Sydney distribution centre;
North (east):	Tigerpak warehouse and offices, beyond which is Astoria Street, vacant land and then the Blacktown Waste Services landfill;
East (north):	A high voltage transmission line easement and Stoney Creek residential community;
East (south):	A commercial warehouse and offices;
South:	Vacant land, beyond which is residential land;
West:	South Street, beyond which is vacant land.

The site and surrounding features are shown on Drawing 1.

4. Previous Investigations

The following previous contamination investigations where reviewed as part of the SCI:

- GHD (2008), *Phase 1 Contamination Assessment and Sampling, Analysis and Quality Plan, Report for Marsden Park Industrial Precinc*t, Project 21/17717/142931 dated November 2008;
- GHD (2009), *Phase 2 Contamination Assessment, Report for Marsden Park Industrial Precinct*, Project (21/17717/145254) dated May 2009;
- DP (2017), *Supplementary Contamination Investigation, Proposed Commercial Development, Stage 3.02, Sydney Business Park, Marsden Park, NSW*, Project 76669.03.R.001.Rev0; and
- DP (2019) *Contamination Cover Letter, Sydney Business Park – Stage 3.02, Sydney Business Park, Marsden Park, NSW*, Project 76669.05.R.001.Rev1.

4.1 GHD 2008 and 2009

GHD (2008 & 2009) were completed for the larger Sydney Business Park site which incorporates the current site. GHD identified an area referred to as 'the Paddock' which was believed to have been used for the disposal of nightsoil materials and overburden from a nearby landfill site. The extent of the area referred to as the Paddock, in relation to the site, is shown on Figure 6 of GHD (2009) provided in Appendix A.

GHD considered that potential contamination issues for land within the current site, outside of the Paddock, were localised and not likely to pose a constraint to the proposed use.

Investigations within the Paddock included the excavation and collection of soil samples from 14 test pits. Eleven soil samples were analysed for COPC. Field results indicated that fill material was present within the area to depths of greater than 2.6 m. Fill material was generally re-worked clay material or shale spoil from quarrying activities historically located in SBP north of the site. No evidence of nightsoil was noted. Occasional plastic and metal fragments were noted in the fill material. Concentrations of COPC were below the applicable human health criteria. Some exceedances of ecological criteria were noted. Based on the results on the assessments, GHD considered that the Paddock appeared suitable for the proposed use.

4.2 DP 2017

DP (2017) comprised a contamination investigation undertaken to evaluate the contamination status of Stage 3.02 of Sydney Business Park with regards to its compatibility, from a contamination perspective, for commercial/industrial land use. As shown on Drawing 1, the DP (2017) site incorporates the whole of the northern part of the site.

The investigation included a review of previous GHD reports, a desktop assessment, site walkover and analysis of soil samples collected from 38 test pits. Of the 38 test pits, 21 (TP14 to TP16, TP18, TP19, TP22 to TP27 and TP 29 to TP38) were in the current site boundary. A mulch stockpile (SP3); an area containing a large east/west aligned grass covered soil stockpile, with a number of adjacent small

stockpiles (identified as ground disturbance (GD) 1), and a model airplane recreation area were identified within the site. The source of the GD1 stockpile was unknown, however, a review of Nearmap aerial photographs indicated that the stockpiles had been present on site prior to 2009.

Test pit sampling locations were positioned to target these potential contamination sources, as well as to provide general site coverage. Selected analytical results for metals, PAH, TRH, OCP, OPP, PCB, phenols and asbestos were assessed against the adopted commercial/industrial land use site assessment criteria as per Schedule B1 in NEPM (2013).

Results of the intrusive investigations reported filling to depths of between 0.4 m and 4.0 m at 15 of the 18 test pits (TP14 to TP16, TP19, TP23 to TP27, TP30, TP32 to TP34, TP37 and TP38) within the site. Trace concentrations of brick, concrete, plastic and glass were also identified in fill in TP16, TP23, TP26 and TP27.

Analytical results reported the following:

- Concentrations of metals were below the adopted SAC in all samples submitted for laboratory analysis, with the exception of zinc in sample TP14 / 0 - 0.1 (830 mg/kg), which exceeded the EIL (750 mg/kg);
- Concentrations of PAH, TRH, BTEX, OCP, OPP, PCB and Phenols were below the adopted SAC in all samples submitted for laboratory analysis; and
- Asbestos (500 mL and 10 L samples) was not detected in the soil.

No areas of environmental concern (AEC) were identified within the site, however two AEC (including stockpiles and surficial asbestos containing material [ACM]) were identified outside of the site. The two AEC are not considered to represent a constraint to the site.

DP (2017) concluded that the Stage 3.02 site was suitable, from a contamination perspective, for the proposed commercial/industrial land use, subject to the further investigation and/or remediation of the two AEC, both of which were located outside of the current site.

4.3 DP 2019

DP (2019) was completed to assess a portion of the Stage 3.02 site (as shown on Drawing 1) and included a review of DP (2017); recent Nearmap aerial photography and a site walkover. The Nearmap review identified the spreading of the GD1 soil stockpile (see Section 4.2) in an approximate 8 ha area of the DP (2019) site since the completion of DP (2017). During the walkover, several fragments of bonded ACM were observed on the ground surface of the footprint of the spread stockpile. The distribution of ACM on the ground surface within the area appeared to be very sparse. The approximate extent of the spread GD1 stockpile (referred to as the disturbed area) is shown on Drawing 1.

At locations where ACM was observed, DP collected and screened 10 L soil samples for asbestos with reference to NEPM (2013) and the Western Australian Department of Health (2009) *Guidelines for the Assessment, Remediation and Management of Asbestos Contaminated Sites in Western Australia* (DoH, 2009).

The estimated concentration of ACM at the sampled locations were below the industrial criteria for bonded asbestos in soil. While a grid-based assessment was not undertaken with reference to the NEPM (2013) and DoH (2009), it was considered that a targeted assessment was a more suitable method in determining ACM concentrations at the site given that the distribution of ACM appeared to be very sparse.

ACM was present on the ground surface which exceeds the NEPM (2013) land use criteria for surface soils. Given the presence of visible asbestos in surface soils, DP considered that the site can be made suitable, from a contamination perspective, subject to the implementation of an appropriate environmental management plan (EMP) during construction. The EMP should contain controls to:

- Manage asbestos during construction; and
- Appropriately cover ACM impacted fill with reference to the NEPM (2013) at the completion of the development, if appropriate.

5. Desktop Study

Site history information from readily available sources has been reviewed as part of this report to determine potentially contaminating activities, contamination sources and types of contamination that may have occurred since the completion of GHD (2009). The sources of desktop information comprised recent aerial photographs (2009 to 2020), publicly available registers of contaminated sites, NSW Department of Primary Industries Water groundwater bore search and available local and regional soils, geological and hydrogeological information.

It is understood that no significant development has occurred at the site since the completion of GHD (2009). As such, it is considered that review of historical land title deed information, Council records and SafeWork NSW records would not provide any further beneficial information on potential contaminating activities relevant to the site.

5.1 Aerial Photographs

Site features observed in the aerial photograph review are shown on Drawing 1.

Northern Part of the site.

Nearmap aerial photographs of the northern part of the site were reviewed for the period August 2019 to June 2020 to observe any land use changes since the completion of DP (2019).

2019 (October): The northern part of the site comprises vacant land and appears similar to that described in DP (2019). Surrounding land is also vacant.

2020 (June): The northern part of the site appears to remain unchanged, except for a raised fill pad in the north-eastern portion of the site. Surrounding land remains unchanged, except for the construction of the Tigerpak and Bucher facilities to the northwest of the site.

Based on an email from MPD representative Mr Michael Gray on 1 July 2020, DP understands that the raised fill pad in the north-eastern portion of the site was constructed from overburden generated during construction of the Tigerpak facility and potentially also the Bucher facility. The Tigerpak and Bucher facilities are both within the DP (2017) site and were previously assessed as suitable for proposed commercial / industrial use.

Southern Part of the site.

Nearmap aerial photographs of the southern part of the site were reviewed for the period 2009 to June 2020 to observe any land use changes since the completion of GHD (2009).

2009 (October): The southern part of the site comprises vacant land and appears similar to that described in GHD (2009). The following site features were present:

- A NE/SW aligned high voltage transmission line;
- A N/S aligned vehicle access track;
- A farm dam within the south-western site boundary; and
- The area was grass covered with trees present in the southern part of the area.

Surrounding land was vacant, except for the Stoney Creek residential community to the northeast of the site.

2009 (October) to 2020 (February): The southern part of the site appears to remain unchanged. Surrounding land is also unchanged, except for development of the industrial complex to the east of the site from late 2017.

2020 (June): The southern part of the site appears unchanged, except for the construction of a turning bay at the termination of Hollinsworth Road. Surrounding land also appears unchanged.

5.2 Regulatory Notice Search under the CLM Act

The NSW EPA Contaminated Land Public Record was accessed via the internet. A search of the Contaminated Land Public Record was undertaken on 6 July 2020, as detailed below.

Notices under the CLM Act relate to the investigation and/or remediation of significantly contaminated land as defined under this Act. More specifically, the Notices cover the following:

- Actions taken by the EPA under Sections 15, 17 and 28 of the CLM Act; and
- Site audit statements provided to the EPA under Section 52 of the CLM Act on sites subject to an in-force declaration or order.

There were no Records of Notices for Contaminated Land for the site on the Contaminated Land Public Record. Further, there were no Records of Notices for Contaminated Land for adjacent sites on the Contaminated Land Public Record.

5.3 Groundwater Bore Search

A search of the NSW Department of Primary Industries Water groundwater bore database found no bores within an approximate 1 km radius of the Site.

5.4 Regional Topography, Geology and Hydrogeology

Site topography (Figure 1) generally slopes down from southeast to west from approximately 50 m AHD to 36 m AHD.

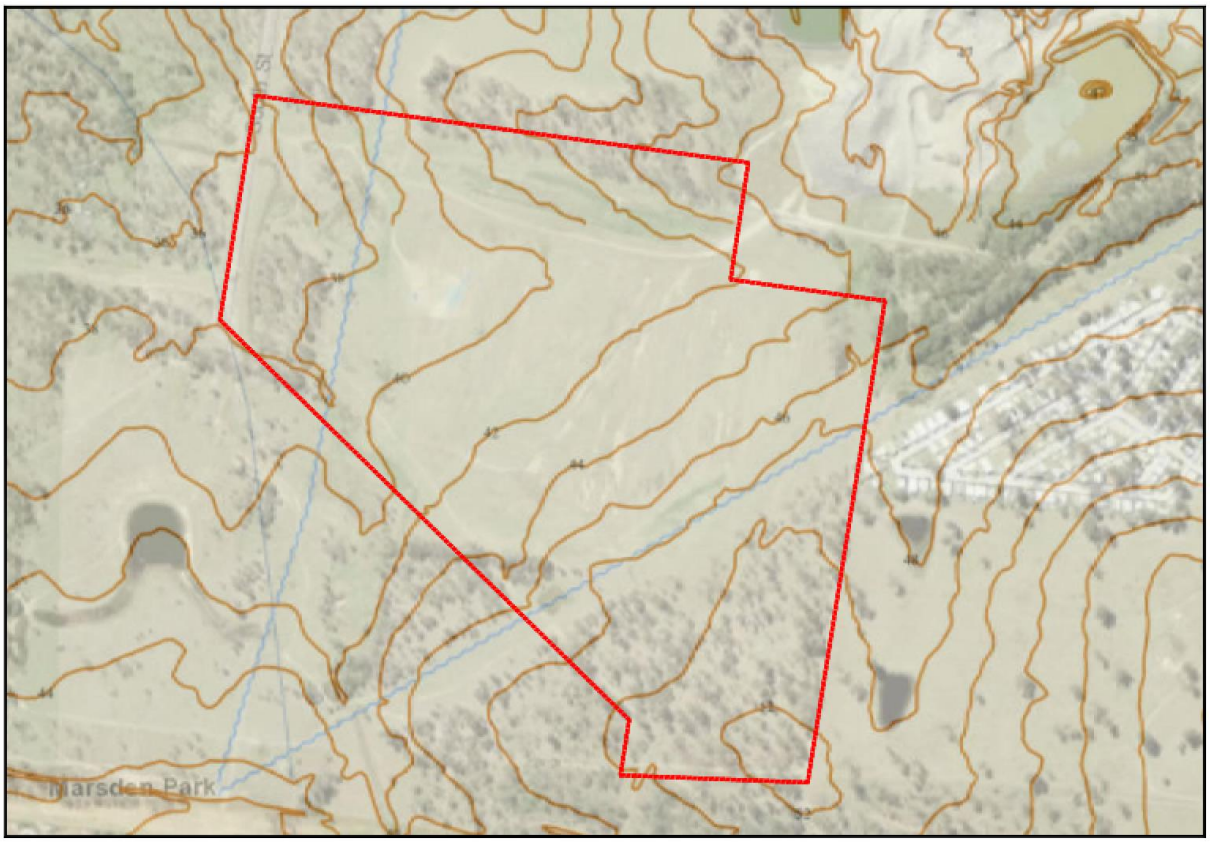


Figure 1: 2 m Topographic Contours at the site

Reference to the Penrith 1:100 000 Soil Landscapes Sheet (Figure 2) indicates that most of the site is mapped as alluvial soil of the Berkshire Park soil landscape (mapping unit bp). This soil landscape associated with the Hawkesbury and Nepean River Systems is characterised by orange heavy clays and clayey sands, often mottled and with ironstone nodules common. The south eastern portion of the Site is mapped as the Blacktown soil landscape (mapping unit bt) of the Wianamatta Group of Triassic age which is characterised by red and brown podzolic soils on Wianamatta and Hawkesbury Shales.

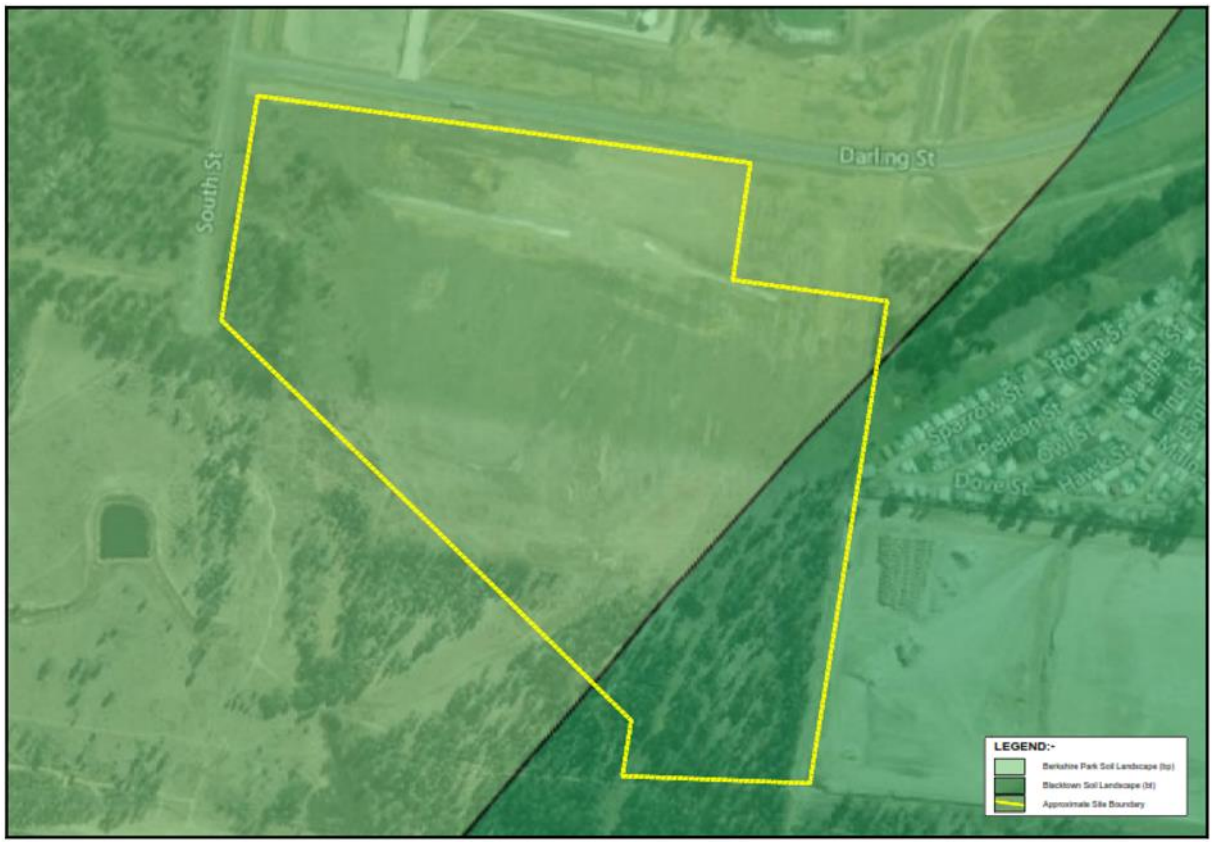


Figure 2: Soil Landscape at the site

Reference to the Penrith 1:100 000 Geological Series Sheets indicates that the Site is underlain by Bringelly Shale (mapping unit Rwb) of the Wianamatta Group of Triassic age. This formation typically comprises shale, carbonaceous claystone, claystone, laminite and some minor coaly bands which weather to form clays of high plasticity.

Reference to the Map of Salinity Potential in Western Sydney (Figure 3), indicates that most of the site is located within an area of “moderate salinity potential” where “saline areas may occur which have not yet been identified or may occur if risk factors change adversely". The western and north western areas of the site are mapped as “high salinity potential” where “conditions are similar to areas of known salinity”.

The Investigation of urban salinity – case studies from Western Sydney, Urban Salt 2005 Conference Paper, Parramatta (McNally, 2005), describes some general features of the hydrogeology of Western Sydney which are relevant to this Site. The shale terrain of much of Western Sydney is known for saline groundwater, resulting either from the release of connate salt in shales of marine origin or from the accumulation of windblown sea salt. Seasonal groundwater level changes of 1 m to 2 m can occur in a shallow regolith aquifer or a deeper shale aquifer due to natural influences.

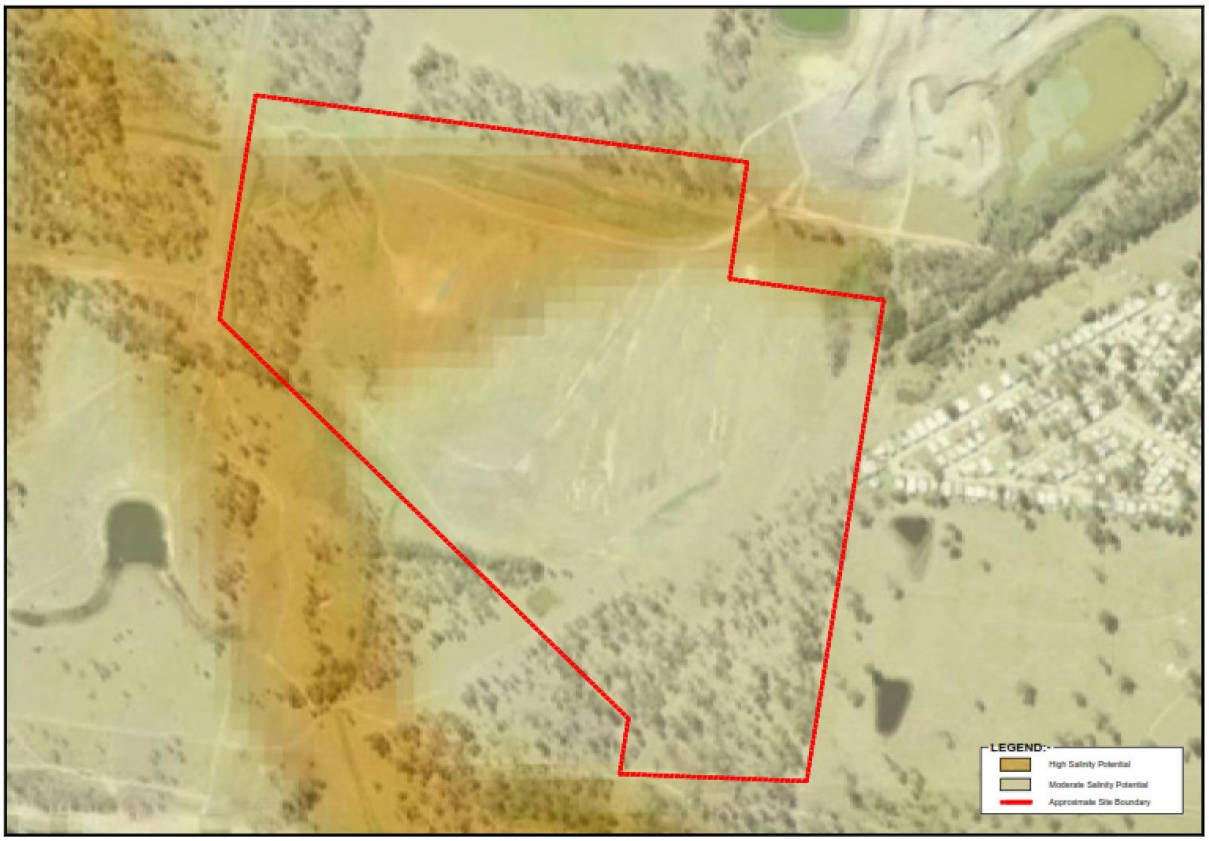


Figure 3: Salinity Potential at the site

A north westerly flowing ephemeral creek is present in the south western portion of the Site. The creek meanders in a generally northerly direction prior to joining South Creek approximately 4 km north of the site.

6. Site Walkover

A walkover of the site was completed by a DP environmental scientist on 22 June 2020. Photographs from the walkover are included in Appendix B and relevant features are shown on Drawing 1. The following site features were observed during the walkover:

- Material within the raised fill pad in the north-eastern part of the site comprised grey/brown/orange/red mottled silty clay with trace shale, ironstone, sandstone and siltstone gravel/cobbles (Photograph 1). Given the material composition (as would be expected of locally sourced material) and the correspondence from MPD (discussed in Section 5.1), DP does not consider the fill pad as an area of environmental concern;
- The northern portion of the southern part of the site was generally cleared of woody vegetation. The southern portion of the southern part of the site contained stands of medium sized trees (< 7 m high). Vegetation generally appeared to be in healthy condition;
- A farm dam is present within the south-western site boundary (Photograph 2);

- The N/S aligned vehicle access track observed in the 2009 aerial photograph was raised (likely from filling) up to approximately 0.8 m high above the surrounding ground surface (Photograph 3);
- Several stockpiles of dumped material were present. Stockpiles (as shown on Drawing 1) included soil, timber and various anthropogenic waste materials (plastic, metal, timber etc) (Photograph 4); and
- Anthropogenic wastes were also observed on ground surfaces in multiple areas surrounding the stockpiles in the southern portion of the southern part of the site (Photograph 5).

No suspected ACM was observed during the site walkover. Except for the stockpiles of dumped material, no visual or olfactory evidence of contamination were observed during the site walkover.

7. Conceptual Site Model

7.1 Preliminary Site Conceptual Model

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

The CSM is applicable to the southern part of the site only, given the findings and recommendations of DP (2017) and DP (2019).

7.2 Potential Contamination Sources

Potential sources of contamination are listed in Table 1 and are based on the site walkover and review of aerial photograph and previous investigations.

Table 1: Potential Contamination Sources and Contaminants of Concern

Potential Source	Description of Potential Contaminating Activity	COPC*	Requirement for Additional Data and / or Management
Fill (S1)	The Paddock – Filling of quarry overburden and potential night soil within the Paddock. GDC (2009) concluded that the paddock was suitable for the proposed use. Filling used in the raise vehicle access track.	Metals, TRH, BTEX, PAH, OCP, OPP, PCB, and asbestos	An intrusive investigation is required for the Paddock (portion within the southern part of the site) and the vehicle access track to quantify and assess possible contamination including chemical testing of soil (and groundwater if deemed necessary).
Dumped waste (S2)	Stockpiled and surficial dumped waste		Stockpiled and surficial waste to be disposed from the site prior to development.

* COPC

- Metals – arsenic, cadmium, chromium, copper, lead, mercury, nickel, zinc;
- TRH – total recoverable hydrocarbons;
- BTEX – monocyclic aromatic hydrocarbons (benzene, toluene, ethylbenzene and xylenes;
- PAH – polycyclic aromatic hydrocarbons;
- OCP and OPP – organochlorine and organophosphorus pesticides; and
- PCB – polychlorinated biphenyls.

7.3 Potential Contamination Migration Pathways

The pathways by which the potential sources of contamination could reach potential receptors are described below:

- P1 - Dermal contact and ingestion;
- P2 - Inhalation of dust/vapours;
- P3 - Surface run off;
- P4 - Leaching and vertical migration into groundwater;
- P5 - Lateral migration of groundwater providing base flow to water courses; and
- P6 - Direct contact with ecology

7.4 Potential Receptors of Concern

The potential receptors of potential contamination sourced from the Site are considered to be:

- R1 - Site users (current, future, visitors);
- R2 - Adjacent site users (current and future);
- R3 - Construction and maintenance workers;

- R4 - Groundwater;
- R5 - Surface water; and
- R6 - Terrestrial ecology.

7.5 Preliminary Conceptual Site Model

A preliminary CSM is presented in Table 2 based on the information presented in Sections 7.2 to 7.4.

Table 2: Preliminary Conceptual Site Model

Potential Source	Pathway	Receptor
S1 - Fill Dumped waste (S2)	P1 - Dermal contact and ingestion P2 - Inhalation of dust / vapours.	R1 - Site users R3 - Construction, maintenance workers
	P2 - Inhalation of dust / vapours.	R2 - Adjacent site users
	P4 -Vertical migration to groundwater.	R4 - Groundwater
	P3 – Surface run off P5 - Lateral migration of groundwater.	R5 - Surface water
	P6 - Direct contact with ecology	R6 - Terrestrial ecology

8. Site Assessment Criteria

The site is proposed to be redeveloped for industrial use. The site assessment criteria (SAC) applied in the current investigation is based on the CSM which identified human and ecological receptors to potential contamination on the site, and the Data Quality Objectives (Appendix E). Analytical results were assessed (as a Tier 1 assessment) against the SAC comprising the investigation and screening levels of Schedule B1, NEPC (2013). The NEPC guidelines are endorsed by the NSW EPA under the CLM Act 1997.

The investigation and screening levels are applicable to generic land use settings and include consideration of, where relevant, the soil type and the depth of contamination. The investigation and screening levels are not intended to be used as clean up levels. Rather, they establish concentrations above which further appropriate investigation (eg: Tier 2 assessment) should be undertaken. They are intentionally conservative and are based on a reasonable worst-case scenario.

The investigation and screening levels applied in the current investigation comprise levels adopted for a commercial/industrial land use scenario.

8.1 Health Investigation and Screening Levels

The Health Investigation Levels (HIL) and Health Screening Levels (HSL) are scientifically-based, generic assessment criteria designed to be used in the first stage (Tier 1) of an assessment of potential human health risk from chronic exposure to contaminants.

HIL are applicable to assessing health risk arising *via* all relevant pathways of exposure for a range of metals and organic substances. The HIL are generic to all soil types and apply generally to a depth of 3 m below the surface for residential use. Site-specific conditions may determine the depth to which HIL apply for other land uses.

HSLs are applicable to selected petroleum compounds and fractions to assess the risk to human health via inhalation and direct contact pathways. HSL have been developed for different land uses, soil types and depths to contamination. Petroleum based Health Screening Levels for direct contact have been adopted from the Cooperative Research Centre for Contamination Assessment and Remediation of the Environment (CRC CARE) *Technical Report no.10 Health screening levels for petroleum hydrocarbons in soil and groundwater* (2011) as referenced by NEPC (2013).

The generic HIL and HSL for commercial / industrial land use considered to be appropriate for the assessment of contamination at the site.

In addition, the HSL adopted are predicated on the inputs summarised in Table 3.

Table 3: Inputs to the Derivation of HSLs

Variable	Input	Rationale
Potential exposure pathway	Soil vapour intrusion (inhalation) / Direct contact *	With the potential for vapour intrusion into new buildings, and direct contact with soils during construction, both pathways are considered viable.
Soil Type	Silt	Silt and silty clay were encountered in the test pits (Section 10.1).
Depth to contamination	0 m to <1 m	0 to <1 m for soil HSL (fill encountered to depths of between 0.1 m and 1.55 m – Section 10).

* Developed by CRC CARE (2011)

The adopted HIL and HSL for the analytes included in the SCI are listed in Table 4.

Table 4: Health Investigation and Screening Levels (in mg/kg unless otherwise indicated)

Contaminants		HIL-D & HSL-D Direct Contact	HSL-D Vapour Intrusion
Metals	Arsenic	3,000	-
	Cadmium	900	-
	Chromium (VI)	3,600	-
	Copper	240,000	-
	Lead	1,500	-
	Mercury (inorganic)	730	-
	Nickel	6,000	-
	Zinc	400,000	-
PAH	Benzo(a)pyrene TEQ[1]	40	-
	Naphthalene	11,000 (HSL)	NL
	Total PAH	4000	-
TRH	C6 – C10 (less BTEX) [F1]	26,000 (HSL)	250
	>C10-C16 (less Naphthalene) [F2]	20,000 (HSL)	NL
	>C16-C34 [F3]	27,000 (HSL)	-
	>C34-C40 [F4]	38,000 (HSL)	-
BTEX	Benzene	430 (HSL)	4
	Toluene	99,000 (HSL)	NL
	Ethylbenzene	27,000 (HSL)	NL
	Xylenes	81,000 (HSL)	NL
Phenol	Pentachlorophenol (used as an initial screen)	660	-
OCP	Aldrin + Dieldrin	45	-
	Chlordane	530	-
	DDT+DDE+DDD	3,600	-
	Endosulfan	2,000	-
	Endrin	100	-
	Heptachlor	50	-
	HCB	80	-
	Methoxychlor	2,500	-
PCB[2]		7	-

Notes:
1. sum of carcinogenic PAH
2. non dioxin-like PCBs only
3. NL – not limiting.

8.2 Ecological Investigation Levels

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

The EIL is calculated using the following formula:

EIL = ABC + ACL.

The ABC is determined through direct measurement at an appropriate reference site (preferred) or through the use of methods defined by Olszowy et al *Trace element concentrations in soils from rural and urban areas of Australia*, Contaminated Sites monograph no. 4, South Australian Health Commission, Adelaide, Australia 1995 (Olszowy, 1995) or Hamon et al, *Geochemical indices allow estimation of heavy metal background concentrations in soils*, Global Biogeochemical Cycles, vol. 18, GB1014, (Hamon, 2004). ACL is based on the soil characteristics of pH, CEC and clay content.

EIL (and ACL where appropriate) have been derived in NEPC (2013) for only a short list of contaminants comprising As, Cu, Cr (III), DDT, naphthalene, Ni, Pb and Zn. An *Interactive (Excel) Calculation Spreadsheet* was used for calculating site-specific EIL for these contaminants, and has been provided in the ASC NEPM Toolbox available on the SCEW (Standing Council on Environment and Water) website (http://www.scew.gov.au/node/941).

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

- A protection level of 95% has been adopted;
- The EILs will apply to the top 2 m of the soil profile;
- Potential contamination is considered as “aged” (>2 years);
- ABCs have been derived using the Interactive (Excel) Calculation Spreadsheet using input parameters of the State of NSW in which the Site is located, and low for traffic volumes. No background concentration is assumed for lead (conservative); and
- Site specific pH and CEC values determined through analysis of samples TP138-.05, TP151-0.5 and TP155-2.0. Average pH was pH 5.90 and CEC was 32 $cmol_c/kg$.

Table 5: Ecological Investigation Levels (EIL) in mg/kg

Contaminants		EIL	Comments
Metals	Arsenic	160	Adopted pH of 5.9 and CEC of 32 $cmol_c/kg$]; assumed clay content 10%.
	Copper	280	
	Nickel	630	
	Chromium III	670	
	Lead	1800	
	Zinc	650	
OCP	DDT	640	
PAH	Naphthalene	370	

8.3 Ecological Screening Levels – Petroleum Hydrocarbons

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

ESL have been derived in NEPC (2013) for petroleum fractions F1 to F4, as well as BTEX and benzo(a)pyrene. Site specific data and assumptions as summarised in Table 6 have been used to determine the ESL. The adopted ESL, from Table 1B(6), Schedule B1 of NEPC (2013) are shown in Table 7.

Table 6: Inputs to the derivation of ESL

Variable	Input	Rationale
Depth of ESL application	Top 2 m of the soil profile	The top 2 m depth below ground level corresponds to the root zone and habitation zone of many species.
Land use	Commercial/Industrial	As discussed in Section 1 – the proposed used is commercial/industrial
Soil Texture	Fine	Dominant soil type in surface soils (Section 10).

Table 7: Ecological Screening Levels (ESL) in mg/kg

Analyte		ESL	Comments
TRH	C6 – C10 (less BTEX) [F1]	215*	All ESLs are low reliability, apart from those marked with * which are moderate reliability
	>C10-C16 (less Naphthalene) [F2]	170*	
	>C16-C34 [F3]	2500	
	>C34-C40 [F4]	6600	
BTEX	Benzene	95	
	Toluene	135	
	Ethylbenzene	185	
	Xylenes	95	
PAH	Benzo(a)pyrene	1.4	

8.4 Management Limits – Petroleum Hydrocarbons

In addition to appropriate consideration and application of the HSL, 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.

Management Limits to avoid or minimise these potential effects have been adopted in NEPC (2013) as interim Tier 1 guidance. Management Limits have been derived in NEPC (2013) for the same four petroleum fractions as the HSL (F1 to F4). The adopted Management Limits, from Table 1B(7), Schedule B1 of NEPC (2013) are shown in the following Table 8. The following site specific data and assumptions have been used to determine the Management Limits:

- The Management Limits will apply to any depth within the soil profile;
- The Management Limits commercial and industrial apply; and
- A “fine” soil texture has been adopted as this is the dominant soil type in surface soils (Section 10).

Table 8: Management Limits in mg/kg

Analyte		Management Limit
TRH	$C_6 – C_{10}$ (F1) #	800
	$>C_{10}-C_{16}$ (F2) #	1,000
	$>C_{16}-C_{34}$ (F3)	5,000
	$>C_{34}-C_{40}$ (F4)	10,000

Separate management limits for BTEX and naphthalene are not available hence these have not been subtracted from the relevant fractions to obtain F1 and F2.

8.5 Asbestos in Soil

Soil samples collected from each test pit were screened for the presence of asbestos. The presence or absence of asbestos at a limit of reporting of 0.1 g/kg has been adopted for this assessment as an initial screen.

9. Sampling and Analysis Plan

9.1 Sampling Rational

Intrusive investigations were required to assess the contamination status of the southern part of the site. Field investigations were undertaken between 26 June and 8 July 2020. The sampling regime was based on a site walkover and the information discussed in Sections 4 to 6 of this report.

Field work consisted of the excavation and soil sampling of nine test pits (TP138 to TP140, TP145, TP151 to TP152, TP155 and TP156). A sediment sample was also collected from the farm dam (Dam 1). Test pits and boreholes logs from the geotechnical and salinity investigations were also reviewed as part of the SCI.

The test pit sampling locations are shown on Drawing 2 (Appendix A). Drawing 2 includes the location of the geotechnical and salinity investigations test pits (TP 112 to TP156) and borehole (BH101 to BH111 and BH157). Three of the boreholes (BH106, BH109 and BH110) were converted to groundwater monitoring wells at the completion of drilling. The wells involved inserting Class 18 uPVC screen and casing to the required depths, backfilling the screened length with clean gravel, sealing the top of the gravel with bentonite pellets and backfilling the casing with drilling spoil. Following installation, the wells were purged of groundwater (1 July 2020) and measurement of the groundwater levels occurred on three subsequent occasions.

As no significant soil contamination was detected and there were no off-site sources of contamination (see Section 11), a groundwater investigation (ie: sampling and analysis) was not undertaken.

All test pits were extended to a minimum of 0.5 m into natural underlying soil. Samples were collected from the near surface horizon at a depth of 0.0 to 0.1 m below ground level (bgl), with additional deeper samples collected from selected depths based on field observations made at each location.

A summary of sampling locations and their rationale is provided in Table 9 below.

Table 9: Sample Location and Rationale Summary

Sample Location	Description	Depth
TP138	The Paddock	Excavated to between 0.1 m and 3.2 m bgl (limit of investigation)
TP139	The Paddock	
TP140	Background area – drainage line	
TP145	Background area	
TP150	Background area	
TP151	Raised road embankment	
TP152	Background area	
TP155	Background area	
TP156	Raised road embankment	
Dam 1	Sediment sample	0 - 0.1 m bgl

As no significant soil contamination was detected and there were no off-site sources of contamination, a groundwater investigation was not considered necessary for the site.

9.2 Sampling Procedure

Sampling data was recorded to comply with routine Chain-of-Custody requirements and DP's standard operating procedures. The general sampling, handling, transport and tracking procedures are detailed below:

- Sample locations were pre-determined using GIS prior to field work and were located in the field using a differential GPS;
- Disposable nitrile gloves were used to collect all samples. Gloves were replaced prior to the collection of each sample in order to prevent cross-contamination;
- A 14-tonne excavator fitted with a 300 mm toothed bucket was used to excavate all test pits. Samples were collected from the freshly exposed walls of the test pit or from the excavator bucket;
- Surface samples were collected from the ground surface using disposable nitrile gloves and hand tools. Samples were collected from soils that did not come into contact with the hand tools. Gloves were replaced prior to the collection of each sample;
- The dam sediment sample was collected using hand tools;
- Each sample was transferred into a new laboratory prepared glass jar, with minimal headspace, and sealed with a Teflon lined lid. Each jar was individually sealed to eliminate cross contamination during transportation to the laboratory;
- Sample containers were labelled with individual and unique identification including project number, sample ID, depth and date of sampling;
- Logs were completed for all test pits (Appendix D); and
- Field records of observations made during stockpile test pit excavation (Section 10).

9.3 Field Quality Assurance and Quality Control

The field QC procedures for sampling were as prescribed in the Douglas Partners' Field Procedures Manual and are outlined later in this section.

One field replicates was recovered and analysed for a limited suite of contaminants by means of intra-laboratory analysis. Trip blanks and trip spikes were also taken into the field. This is in accordance with standard industry practice and guidelines.

9.4 Laboratory QA/QC

The analytical laboratory (Envirolab Services Pty Ltd), accredited by NATA, is required to conduct in-house QA/QC procedures. These are normally incorporated into every analytical run and include reagent blanks, spike recovery, surrogate recovery and duplicate samples. These results are included in the laboratory certificate of analysis provided in Appendix G.

The results of the DP assessment of laboratory QA/QC are in Appendix F.

9.5 Analytical Rationale

The analytical scheme was designed to obtain an indication of the potential presence and possible distribution of contaminants that may be attributable to past and present activities, and features within the site, as discussed in Section 7.

Laboratory analytical methods as stated by Envirolab Services Pty Ltd are provided in the laboratory certificate of analysis in Appendix G and are summarised in the QA/QC section in Appendix F.

In the absence of visual or olfactory evidence of contamination within the test pits, samples from the rear surface horizon were generally selected for contaminant analysis. Additional samples from deep fill horizons were analysed in test pits excavated within the Paddock. Twelve samples were analysed from grid based test pits for metals, PAH, TRH, BTEX, phenols, OCP, OPP and PCB and asbestos.

10. Results

10.1 Field Observations

The test pit logs are included in Appendix D and should be read in conjunction with the accompanying standard notes that define classification methods and descriptive terms. Relatively inconsistent conditions were encountered in the test pits, with the general succession of strata is broadly summarised as follows:

- Topsoil - silty clay topsoil at most locations (except Pit 115) to depths ranging between 0.1 m and 0.3 m. Inclusions of rootlets and gravel were encountered within the topsoil; overlying
- Fill - Bores 101 to 105 and 157 and TP112 to TP143 encountered fill to depths of up to 3.9 m was encountered. The fill typically comprised a gravelly clay with siltstone gravel, cobbles and boulders (estimated to be up to high strength);
  - Bores 106 to 111 and TP144 to TP156 encountered fill ranged from 0.2 m to 0.9 m, with most of the fill being present along an elevated access road extending from near the end of Hollinsworth Road;
- Natural Soil - typically stiff to very stiff silty clay with some hard layers; overlying,
- Bedrock - Either sandstone, siltstone or laminite (interbedded siltstone and sandstone) bedrock, ranging in strength from very low to high strength at depths of 2.5 m to 5.5 m.

No free groundwater was observed following excavation of pits or drilling of bores. Backfilling of bores (excluding BH106, BH109 and BH110) and pits at the completion of drilling or excavation precluded long-term monitoring of the groundwater levels.

Groundwater levels were measured in the monitoring wells on three subsequent occasions. A summary of the groundwater levels measured to date are provided in Table 10.

Table 10: Results of Groundwater Level Measurements

Bore	Surface RL (m AHD)	Monitoring Well Measurements – Water Level									
		1 July 2020[1]		3 July 2020		8 July 2020		16 July 2020		22 July 2020	
		Depth (m)	RL (m AHD)	Depth (m)	RL (m AHD)	Depth (m)	RL (m AHD)	Depth (m)	RL (m AHD)	Depth (m)	RL (m AHD)
106	49.5	2.1[1]		4.4	45.1	4.3	45.2	4.3	45.2	4.4	45.1
109	51.9	5.6	46.3	5.6	46.3	5.7	46.2	5.6	46.3	5.7	46.2
110	50.9	5.6	45.3	5.7	45.2	5.8	45.1	5.8	45.1	5.9	45.0

Note: RL Reduced Levels relative to Australian Height Datum (AHD)
1. Readings taken prior to purging well of water. The reading of Borehole 106 on 1 July 2020 is not considered representative and may have been affected by water trapped in the well following drilling

There were no signs of gross chemical contamination (eg: odours or staining) noted during the field work.

10.2 Laboratory Results

The laboratory results for COPC for the soil samples collected during the SCI are summarised in Tables C1 and C2 in Appendix C, together with the adopted SAC. The laboratory certificate of analysis is provided in Appendix G and sampling locations are provided on Drawing 2 (Appendix A). A summary of results is provided below:

- Concentrations of metals and PAH were below the adopted SAC in all samples submitted for laboratory analysis;
- Concentrations of TRH, BTEX, OCP, OPP and PCB were below the laboratory limit of reporting (LOR) and SAC in all samples submitted for laboratory analysis; and
- Asbestos was not detected in soil samples above the LOR.

10.3 QA/QC Assessment

The results of the QA/QC assessment are provided in Appendix F and are considered to be reliable and useable for this investigation.

11. Discussion

The SCI included a review of previous environmental investigations, aerial photographs and a site walkover. In the southern part of the site, the SCI included excavation of test pits, soil and sediment sampling and laboratory analysis for COPC.

Northern Part of the site

DP previously completed a SCI for the northern part of the site (DP, 2017) which concluded that the site was suitable for the proposed industrial use. During DP (2019), ACM was observed on the ground surface (of a limited portion of the northern part of the site – referred to as the Disturbed Area) which exceeds the NEPM (2013) land use criteria for surface soils. Given the presence of visible asbestos in surface soils, DP considered that the northern part of the site can be made suitable, from a contamination perspective, subject to the implementation of an appropriate environmental management plan (EMP) during construction. The EMP should contain controls to:

- Manage asbestos during construction; and
- Appropriately cover ACM impacted fill with reference to the NEPM (2013) at the completion of the development if appropriate.

No additional potential areas of environmental concern were observed in the northern part of the site since the completion of DP (2019).

Southern part of the site

The review of previous investigations, recent aerial photographs and the site walkover identified filling associated with an area referred to as the Paddock and a raised access track as potential sources of contamination. Stockpiles and surficial waste were also identified as potential sources of contamination.

The SCI included the excavation and sampling of test pits within the identified fill areas. Fill generally comprising silty clay with trace shale, ironstone, sandstone and siltstone gravel/cobbles was observed. Concentrations of COPC were below the adopted SAC.

Based on the results of the investigation, DP considers that the site has a low potential for contamination and is suitable from a contamination perspective for the proposed industrial use subject to the removal of the stockpiled and surficial waste in the southern part of the site.

Groundwater

Groundwater levels on-site have been recorded between RL 45.0 and 46.2 m AHD. The groundwater level appears to be within siltstone and sandstone bedrock. Groundwater within the bedrock is likely to seep through fractures within the bedrock. Groundwater levels are expected to fluctuate with changing climatic conditions or possible up-gradient activities that could interfere with groundwater flows.

As no significant soil contamination was detected and there were no off-site sources of contamination, a groundwater investigation was not considered necessary for the site.

12. Conclusion and Recommendations

Based on the review of previous reports, and field and analytical results presented in this report, DP considers that the site is suitable, from a contamination perspective, for the proposed industrial land use, subject to the following:

- Implementation of an appropriate environmental management plan (EMP) for ACM impacted surface soils in a limited area of the northern part of the site. The EMP should contain controls to:
  - Manage asbestos during construction; and
  - Appropriately cover ACM impacted fill with reference to the NEPM (2013) at the completion of the development, if appropriate;
- Removal of surficial waste and waste stockpiles from the southern part of the site.

Given the low sampling density undertaken as part of the SCI, the potential remains for isolated pockets of contamination to be present in other areas of the site. To appropriately manage unexpected potential contamination encountered during development works, DP recommends the development and implementation of an Unexpected Finds Protocol. Additionally, any materials requiring off-site disposal must be classified, managed and disposed in accordance with the *Protection of the Environment Operations Act* 1997.

13. Limitations

Douglas Partners Pty Ltd (DP) has prepared this report for this project at Stage 3 of Sydney Business Park, Marsden Park, NSW in accordance with DP's proposal NWS200092, dated 18 June 2020. The work was carried out under DP's Conditions of Engagement. This report is provided for the exclusive use of Marsden Park Developments Pty Ltd (MPD) 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 subsurface 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. Subsurface conditions can change abruptly due to variable geological processes and also as a result of human influences. Such changes may occur after DP's field testing has been completed.

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

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

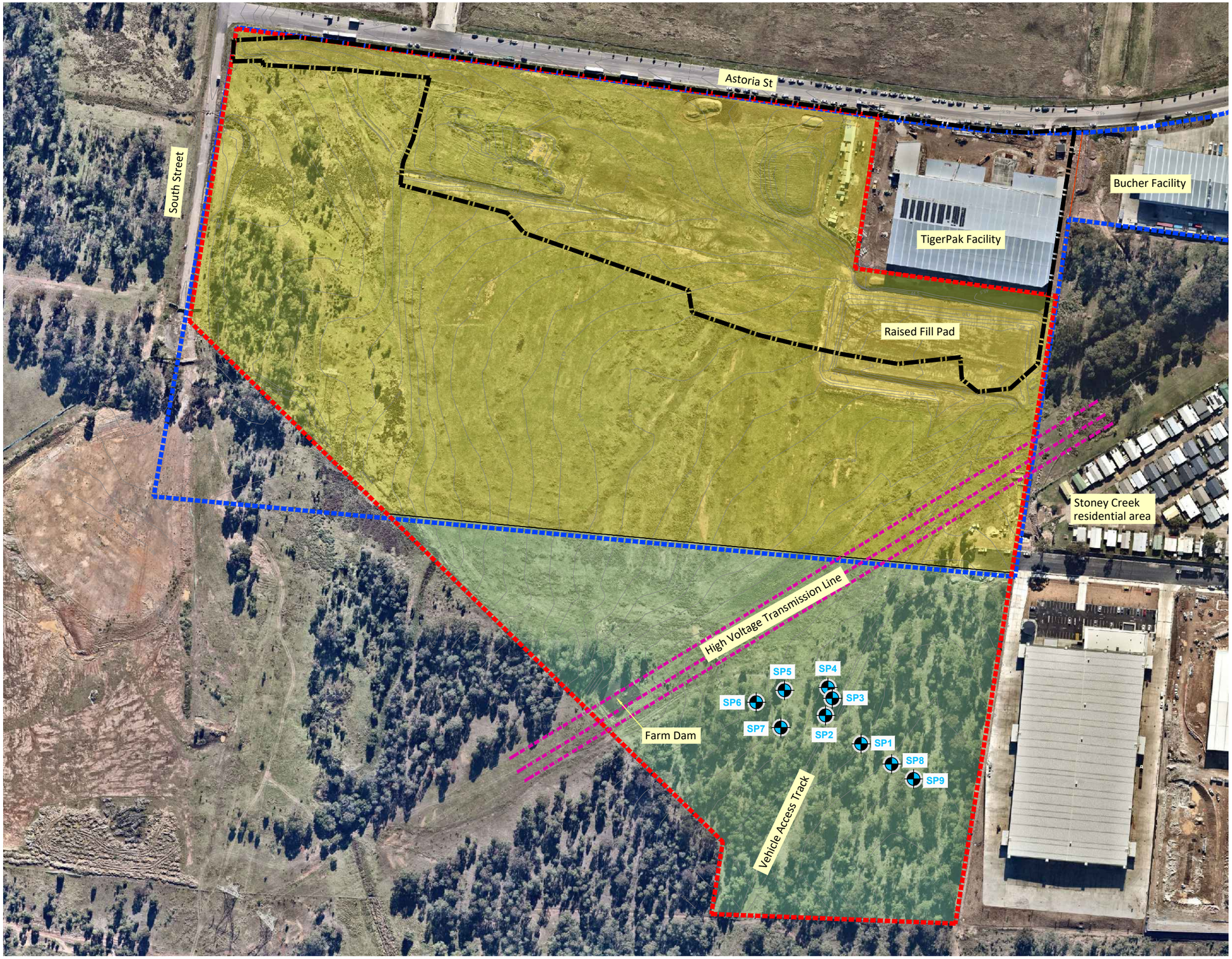
This report, or sections from this report, should not be used as part of a specification for a project, without review and agreement by DP. This is because this report has been written as advice and opinion rather than instructions for construction.

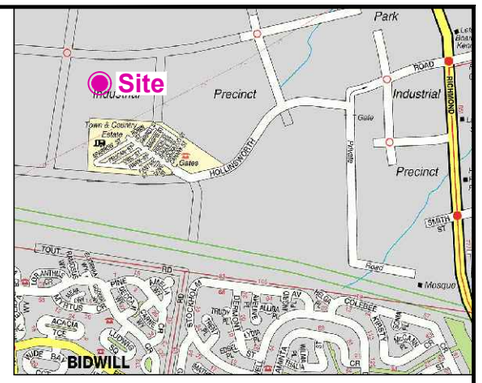
The contents of this report do not constitute formal design components such as are required, by the Health and Safety Legislation and Regulations, to be included in a Safety Report specifying the hazards likely to be encountered during construction and the controls required to mitigate risk. This design process requires risk assessment to be undertaken, with such assessment being dependent upon factors relating to likelihood of occurrence and consequences of damage to property and to life. This, in turn, requires project data and analysis presently beyond the knowledge and project role respectively of DP. DP may be able, however, to assist the client in carrying out a risk assessment of potential hazards contained in the Comments section of this report, as an extension to the current scope of works, if so requested, and provided that suitable additional information is made available to DP. Any such risk assessment would, however, be necessarily restricted to the environmental components set out in this report and to their application by the project designers to project design, construction, maintenance and demolition.

Douglas Partners Pty Ltd

Appendix A

Drawings 1 to 2
Figure 6 from GHD (2009)





Location Plan

N

0 20 40 60 80 100

SCALE 1:3,000 (A3)

LEGEND:-

- Stockpiles
- Site boundary
- DP (2017) Site Boundary
- Disturbed Area
- Northern Part of the site
- Southern part of the site

NOTE:-

1. Image obtained from Near Map. Date of imagery 23-06-2020.
2. Plan adapted from drawing No.20-0127-01-SK-000 provided by Marsden Park Developments (Construction) Pty Ltd.

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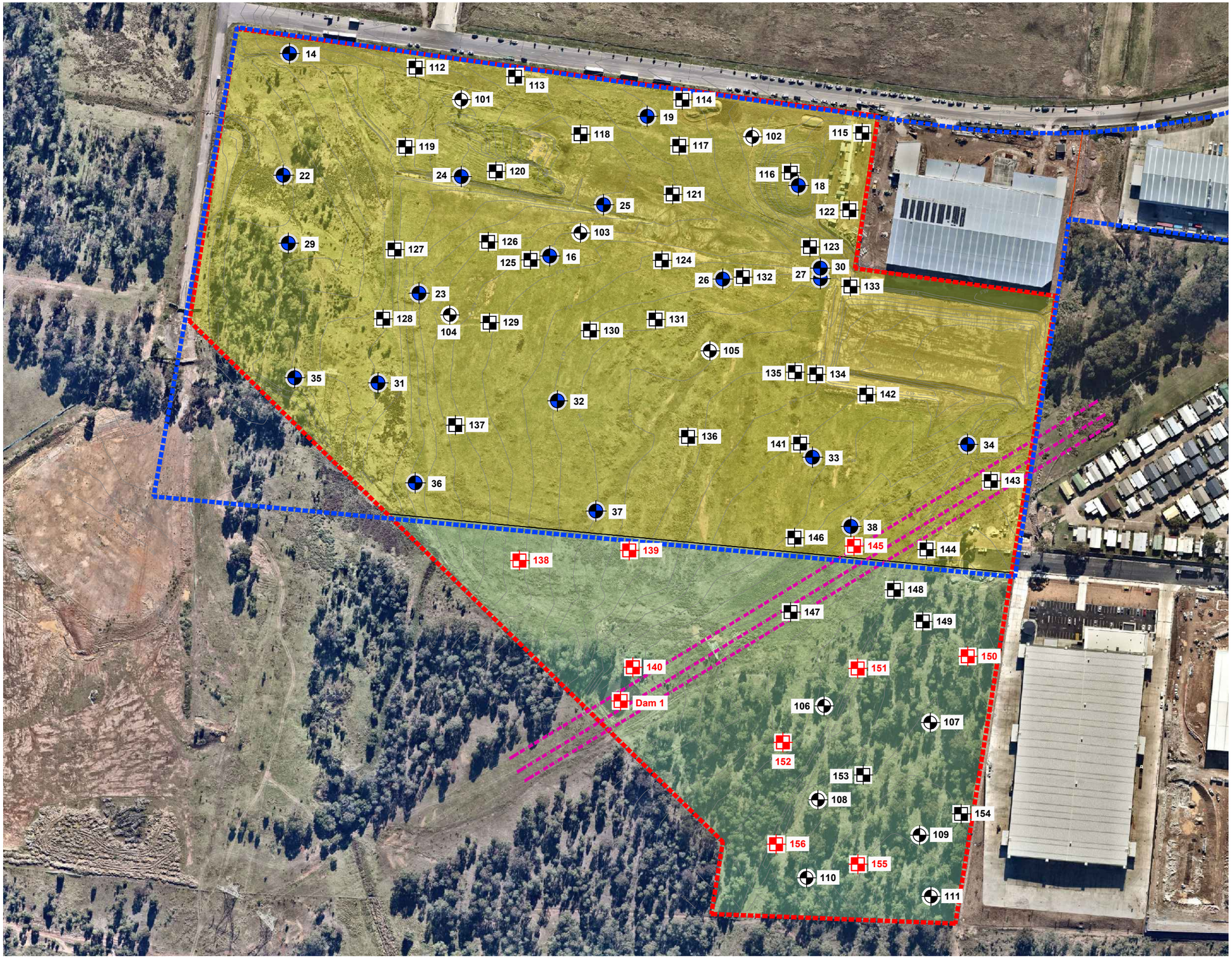
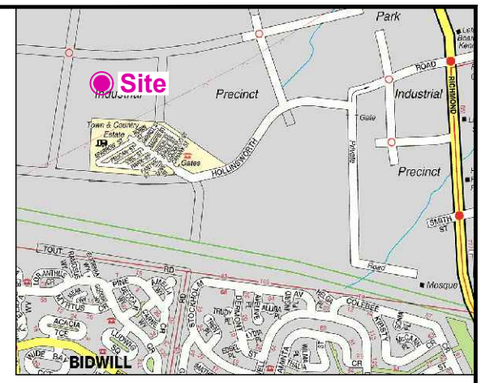
Geotechnics | Environment | Groundwater

CLIENT: Marsden Park Developments (Construction) Pty Ltd		TITLE: **Site Location and Layout**	PROJECT No: 94616.01
OFFICE: North West Sydney	DRAWN BY: JST	**Sydney Business Park Stage 3**	DRAWING No: 1
SCALE: As shown	DATE: 22 July 2020	**Astoria Street, Marsden Park**	REVISION: 0

P:\Grange Projects\94616.01\Contamination Dwgs\94616.01.D.001.Rev0.dwg





Location Plan

0 20 40 60 80 100

SCALE 1:3,000 (A3)

LEGEND:-

- Site boundary
- DP (2017) Site boundary
- Northern Part of the site
- Southern part of the site
- Contamination sampling locations.
- Previous contamination sampling locations
- Geotechnical and salinity sampling locations

NOTE:-

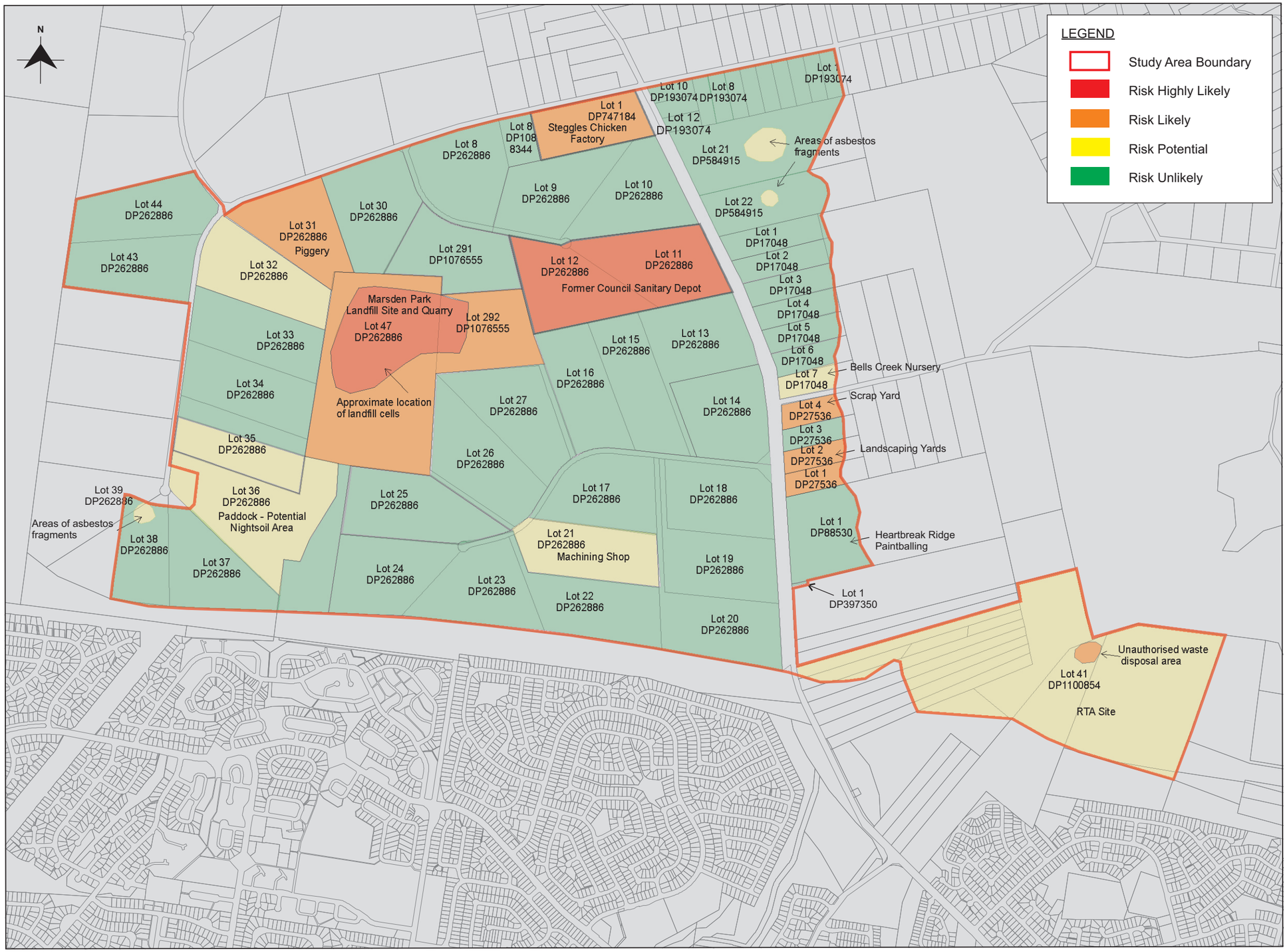
1. Image obtained from Near Map. Date of imagery 23-06-2020.
2. Plan adapted from drawing No.20-0127-01-SK-000 provided by Marsden Park Developments (Construction) Pty Ltd.

Douglas Partners
Geotechnics | Environment | Groundwater

CLIENT: Marsden Park Developments (Construction) Pty Ltd		TITLE: **Sampling Locations**
OFFICE: North West Sydney	DRAWN BY: JST	**Sydney Business Park Stage 3**
SCALE: As shown	DATE: 13 July 2020	**Astoria Street, Marsden Park**

PROJECT No:	94616.01
DRAWING No:	2
REVISION:	0

E:\PDF\Outbox\94616.00\94616.01.D.002.Rev0.dwg



GHD Note: Not all areas of the Site have been accessed therefore some risk rankings may be subject to change

Source: Growth Centres Commission

Phase 2 Contamination Assessment - Marsden Park Industrial Precinct
Marsden Park Developments Pty Ltd

Final Contamination Risk Ranking

scale | as shown | date | November 2008

job no | 21-17717
file ref | 21_17717-P2Fig6.cdr

Figure 6

GHD CLIENTS |PEOPLE| PERFORMANCE

10 Bond Street Sydney NSW 2000 **T** 61 2 9239 7100 **F** 61 2 9239 7194 **E** sydmail@ghd.com.au **W** www.ghd.com.au

Appendix B

Site Photographs

Photo 1 - Raised fill pad in the north eastern part of the site.

Photo 2 - Farm dam.

Douglas Partners Geotechnics / Environment / Groundwater	Site Photographs	PROJECT: 94616.01
	Proposed Industrial Development	PLATE No: 1
	Lot 36, Lot 4 and Lot 5, Marsden Park, NSW	REV: 0
	CLIENT: Marsden Park Developments Pty Ltd	DATE: Jul 2020

Photo 3 - Raised vehicle track.

Photo 4 - Stockpiled waste.

Douglas Partners Geotechnics / Environment / Groundwater	Site Photographs	PROJECT: 94616.01
	Proposed Industrial Development	PLATE No: 2
	Lot 36, Lot 4 and Lot 5, Marsden Park, NSW	REV: 0
	CLIENT: Marsden Park Developments Pty Ltd	DATE: Jul 2020

Photo 5 - Surficial waste.

Douglas Partners Geotechnics / Environment / Groundwater	Site Photographs	PROJECT: 94616.01
	Proposed Industrial Development	PLATE No: 3
	Lot 36, Lot 4 and Lot 5, Marsden Park, NSW	REV: 0
	CLIENT: Marsden Park Developments Pty Ltd	DATE: Jul 2020

Appendix C

Summary of Results

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Table C1: Summary of Laboratory Results – Metals, TRH, BTEX, PAH

			Metals								TRH						BTEX				PAH			
			Arsenic	Cadmium	Total Chromium	Copper	Lead	Mercury (inorganic)	Nickel	Zinc	TRH C6 - C10	TRH >C10-C16	F1 ((C6-C10)-BTEX)	F2 (>C10-C16 less Naphthalene)	F3 (>C16-C34)	F4 (>C34-C40)	Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene [b]	Benzo(a)pyrene (BaP)	Benzo(a)pyrene TEQ	Total PAHs
		PQL	4	0.4	1	1	1	0.1	1	1	25	50	25	50	100	100	0.2	0.5	1	1	1	0.05	0.5	0.05
Sample ID	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
TP138-0.1	0 m	29/06/2020	**6** 3000 160	<0.4 900 NC	**16** 3600 670	**19** 240000 280	**25** 1500 1800	<0.1 730 NC	**7** 6000 630	**220** 400000 650	<25 NC NC	<50 NC NC	<25 250 215	<50 NL 170	<100 NC 2500	<100 NC 6600	<0.2 4 95	<0.5 NL 135	<1 NL 185	<1 NL 95	<1 NL 370	**0.07** NC 1.4	<0.5 40 NC	**0.07** 4000 NC
BD1	0 m	29/06/2020	**8** 3000 160	<0.4 900 NC	**20** 3600 670	**18** 240000 280	**27** 1500 1800	<0.1 730 NC	**8** 6000 630	**210** 400000 650	NT NC NC	NT NC NC	NT 250 215	NT NL 170	NT NC 2500	NT NC 6600	NT 4 95	NT NL 135	NT NL 185	NT NL 95	<0.1 NL 370	**0.1** NC 1.4	<0.5 40 NC	**0.7** 4000 NC
TP138-1.5	0 m	29/06/2020	**10** 3000 160	<0.4 900 NC	**22** 3600 670	**16** 240000 280	**28** 1500 1800	<0.1 730 NC	**7** 6000 630	**160** 400000 650	<25 NC NC	<50 NC NC	<25 250 215	<50 NL 170	<100 NC 2500	<100 NC 6600	<0.2 4 95	<0.5 NL 135	<1 NL 185	<1 NL 95	<1 NL 370	<0.05 NC 1.4	<0.5 40 NC	<0.05 4000 NC
TP139-0.1	0 m	29/06/2020	**7** 3000 160	<0.4 900 NC	**34** 3600 670	**32** 240000 280	**23** 1500 1800	**0.1** 730 NC	**34** 6000 630	**190** 400000 650	<25 NC NC	<50 NC NC	<25 250 215	<50 NL 170	<100 NC 2500	<100 NC 6600	<0.2 4 95	<0.5 NL 135	<1 NL 185	<1 NL 95	<1 NL 370	**0.3** NC 1.4	<0.5 40 NC	**2.9** 4000 NC
TP139-1.1-1.3	0 m	29/06/2020	<4 3000 160	<0.4 900 NC	**15** 3600 670	**24** 240000 280	**10** 1500 1800	<0.1 730 NC	**21** 6000 630	**120** 400000 650	<25 NC NC	<50 NC NC	<25 250 215	<50 NL 170	<100 NC 2500	<100 NC 6600	<0.2 4 95	<0.5 NL 135	<1 NL 185	<1 NL 95	<1 NL 370	<0.05 NC 1.4	<0.5 40 NC	<0.05 4000 NC
TP140-0.1	0 m	29/06/2020	**8** 3000 160	<0.4 900 NC	**14** 3600 670	**5** 240000 280	**13** 1500 1800	<0.1 730 NC	**8** 6000 630	**34** 400000 650	<25 NC NC	<50 NC NC	<25 250 215	<50 NL 170	<100 NC 2500	<100 NC 6600	<0.2 4 95	<0.5 NL 135	<1 NL 185	<1 NL 95	<1 NL 370	<0.05 NC 1.4	<0.5 40 NC	<0.05 4000 NC
TP145-0.1	0 m	26/06/2020	<4 3000 160	<0.4 900 NC	**58** 3600 670	**23** 240000 280	**16** 1500 1800	<0.1 730 NC	**75** 6000 630	**220** 400000 650	<25 NC NC	<50 NC NC	<25 250 215	<50 NL 170	<100 NC 2500	<100 NC 6600	<0.2 4 95	<0.5 NL 135	<1 NL 185	<1 NL 95	<1 NL 370	**0.87** NC 1.4	**1.1** 40 NC	**8.4** 4000 NC
TP150-0.1	0 m	26/06/2020	**4** 3000 160	<0.4 900 NC	**17** 3600 670	**10** 240000 280	**12** 1500 1800	<0.1 730 NC	**4** 6000 630	**16** 400000 650	<25 NC NC	<50 NC NC	<25 250 215	<50 NL 170	<100 NC 2500	<100 NC 6600	<0.2 4 95	<0.5 NL 135	<1 NL 185	<1 NL 95	<1 NL 370	<0.05 NC 1.4	<0.5 40 NC	<0.05 4000 NC
TP151-0.1	0 m	26/06/2020	<4 3000 160	<0.4 900 NC	**100** 3600 670	**28** 240000 280	**5** 1500 1800	<0.1 730 NC	**100** 6000 630	**44** 400000 650	<25 NC NC	<50 NC NC	<25 250 215	<50 NL 170	<100 NC 2500	<100 NC 6600	<0.2 4 95	<0.5 NL 135	<1 NL 185	<1 NL 95	<1 NL 370	<0.05 NC 1.4	<0.5 40 NC	<0.05 4000 NC
TP152-0.1	0 m	26/06/2020	**4** 3000 160	<0.4 900 NC	**15** 3600 670	**7** 240000 280	**17** 1500 1800	<0.1 730 NC	**5** 6000 630	**30** 400000 650	<25 NC NC	<50 NC NC	<25 250 215	<50 NL 170	<100 NC 2500	<100 NC 6600	<0.2 4 95	<0.5 NL 135	<1 NL 185	<1 NL 95	<1 NL 370	<0.05 NC 1.4	<0.5 40 NC	<0.05 4000 NC
TP155-0.1	0 m	26/06/2020	**5** 3000 160	<0.4 900 NC	**16** 3600 670	**9** 240000 280	**19** 1500 1800	<0.1 730 NC	**3** 6000 630	**18** 400000 650	<25 NC NC	<50 NC NC	<25 250 215	<50 NL 170	<100 NC 2500	<100 NC 6600	<0.2 4 95	<0.5 NL 135	<1 NL 185	<1 NL 95	<1 NL 370	<0.05 NC 1.4	<0.5 40 NC	<0.05 4000 NC
TP156-0.1	0 m	26/06/2020	<4 3000 160	<0.4 900 NC	**72** 3600 670	**28** 240000 280	**8** 1500 1800	<0.1 730 NC	**100** 6000 630	**54** 400000 650	<25 NC NC	<50 NC NC	<25 250 215	<50 NL 170	<100 NC 2500	<100 NC 6600	<0.2 4 95	<0.5 NL 135	<1 NL 185	<1 NL 95	<1 NL 370	<0.05 NC 1.4	<0.5 40 NC	<0.05 4000 NC
Dam Sample	0 m	08/07/2020	**11** 3000 160	<0.4 900 NC	**27** 3600 670	**5** 240000 280	**18** 1500 1800	<0.1 730 NC	**5** 6000 630	**23** 400000 650	<25 NC NC	<50 NC NC	<25 250 215	<50 NL 170	<100 NC 2500	<100 NC 6600	<0.2 4 95	<0.5 NL 135	<1 NL 185	<1 NL 95	<1 NL 370	<0.05 NC 1.4	<0.5 40 NC	<0.05 4000 NC

Lab result
HIL/HSL value EIL/ESL value

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

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

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

Notes:

HIL/HSL/DC	NEPC, Schedule B1 - HIL D (undefined), HSL D (undefined), DC HSL D (undefined)
EIL/ESL	NEPC, Schedule B1 - EIL C/Ind (undefined), ESL C/Ind (undefined)
ML	NEPC, Schedule B1 - ML C/Ind (undefined)
a	QA/QC replicate of sample listed directly below the primary sample
b	reported naphthalene laboratory result obtained from BTEXN suite
c	criteria applies to DDT only

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Table C2: Summary of Laboratory Results – Phenol, OCP, OPP, PCB, Asbestos

			Phenol	OCP											OPP	PCB	Asbestos		
			Phenol	DDT+DDE+DDD [c]	DDD	DDE	DDT	Aldrin & Dieldrin	Total Chlordane	Total Endosulfan	Endrin	Heptachlor	Hexachlorobenzene	Methoxychlor	Chlorpyriphos	Total PCB	Asbestos ID in soil >0.1g/kg	Trace Analysis	Asbestos (50 g)
		PQL	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			
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	-	-	-
TP138-0.1	0 m	29/06/2020	<5 660 NC	<0.1 3600 640	<0.1 NC NC	<0.1 NC NC	<0.1 NC 640	<0.1 45 NC	<0.1 530 NC	<0.1 2000 NC	<0.1 100 NC	<0.1 50 NC	<0.1 80 NC	<0.1 2500 NC	<0.1 2000 NC	<0.1 7 NC	NAD	NAD	NAD
BD1	0 m	29/06/2020	NT 660 NC	NT 3600 640	NT NC NC	NT NC NC	NT NC 640	NT 45 NC	NT 530 NC	NT 2000 NC	NT 100 NC	NT 50 NC	NT 80 NC	NT 2500 NC	NT 2000 NC	NT 7 NC	NT	NT	NT
TP138-1.5	0 m	29/06/2020	NT 660 NC	NT 3600 640	NT NC NC	NT NC NC	NT NC 640	NT 45 NC	NT 530 NC	NT 2000 NC	NT 100 NC	NT 50 NC	NT 80 NC	NT 2500 NC	NT 2000 NC	NT 7 NC	NAD	NAD	NAD
TP139-0.1	0 m	29/06/2020	NT 660 NC	<0.1 3600 640	<0.1 NC NC	<0.1 NC NC	<0.1 NC 640	<0.1 45 NC	<0.1 530 NC	<0.1 2000 NC	<0.1 100 NC	<0.1 50 NC	<0.1 80 NC	<0.1 2500 NC	<0.1 2000 NC	<0.1 7 NC	NAD	NAD	NAD
TP139-1.1-1.3	0 m	29/06/2020	NT 660 NC	NT 3600 640	NT NC NC	NT NC NC	NT NC 640	NT 45 NC	NT 530 NC	NT 2000 NC	NT 100 NC	NT 50 NC	NT 80 NC	NT 2500 NC	NT 2000 NC	NT 7 NC	NAD	NAD	NAD
TP140-0.1	0 m	29/06/2020	NT 660 NC	<0.1 3600 640	<0.1 NC NC	<0.1 NC NC	<0.1 NC 640	<0.1 45 NC	<0.1 530 NC	<0.1 2000 NC	<0.1 100 NC	<0.1 50 NC	<0.1 80 NC	<0.1 2500 NC	<0.1 2000 NC	<0.1 7 NC	NAD	NAD	NAD
TP145-0.1	0 m	26/06/2020	<5 660 NC	<0.1 3600 640	<0.1 NC NC	<0.1 NC NC	<0.1 NC 640	<0.1 45 NC	<0.1 530 NC	<0.1 2000 NC	<0.1 100 NC	<0.1 50 NC	<0.1 80 NC	<0.1 2500 NC	<0.1 2000 NC	<0.1 7 NC	NAD	NAD	NAD
TP150-0.1	0 m	26/06/2020	NT 660 NC	<0.1 3600 640	<0.1 NC NC	<0.1 NC NC	<0.1 NC 640	<0.1 45 NC	<0.1 530 NC	<0.1 2000 NC	<0.1 100 NC	<0.1 50 NC	<0.1 80 NC	<0.1 2500 NC	<0.1 2000 NC	<0.1 7 NC	NAD	NAD	NAD
TP151-0.1	0 m	26/06/2020	NT 660 NC	<0.1 3600 640	<0.1 NC NC	<0.1 NC NC	<0.1 NC 640	<0.1 45 NC	<0.1 530 NC	<0.1 2000 NC	<0.1 100 NC	<0.1 50 NC	<0.1 80 NC	<0.1 2500 NC	<0.1 2000 NC	<0.1 7 NC	NAD	NAD	NAD
TP152-0.1	0 m	26/06/2020	NT 660 NC	<0.1 3600 640	<0.1 NC NC	<0.1 NC NC	<0.1 NC 640	<0.1 45 NC	<0.1 530 NC	<0.1 2000 NC	<0.1 100 NC	<0.1 50 NC	<0.1 80 NC	<0.1 2500 NC	<0.1 2000 NC	<0.1 7 NC	NAD	NAD	NAD
TP155-0.1	0 m	26/06/2020	NT 660 NC	<0.1 3600 640	<0.1 NC NC	<0.1 NC NC	<0.1 NC 640	<0.1 45 NC	<0.1 530 NC	<0.1 2000 NC	<0.1 100 NC	<0.1 50 NC	<0.1 80 NC	<0.1 2500 NC	<0.1 2000 NC	<0.1 7 NC	NAD	NAD	NAD
TP156-0.1	0 m	26/06/2020	NT 660 NC	<0.1 3600 640	<0.1 NC NC	<0.1 NC NC	<0.1 NC 640	<0.1 45 NC	<0.1 530 NC	<0.1 2000 NC	<0.1 100 NC	<0.1 50 NC	<0.1 80 NC	<0.1 2500 NC	<0.1 2000 NC	<0.1 7 NC	NAD	NAD	NAD

Lab result
HIL/HSL value EIL/ESL value

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

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

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

Notes:

HIL/HSL/DC	NEPC, Schedule B1 - HIL D (undefined), HSL D (undefined), DC HSL D (undefined)
EIL/ESL	NEPC, Schedule B1 - EIL C/Ind (undefined), ESL C/Ind (undefined)
ML	NEPC, Schedule B1 - ML C/Ind (undefined)
a	QA/QC replicate of sample listed directly below the primary sample
b	reported naphthalene laboratory result obtained from BTEXN suite
c	criteria applies to DDT only

Appendix D

Test Pit and Borehole Logs

TEST PIT LOG

CLIENT: Marsden Park Developments Pty Ltd
PROJECT: Proposed Industrial Development
LOCATION: Astoria Street, Marsden Park

SURFACE LEVEL: 40.3 mAHD
EASTING: 298142
NORTHING: 6266946

PIT No: 112
PROJECT No: 94616.00
DATE: 30/6/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
40	0.1	FILL / TOPSOIL : gravelly clay CL, brown, with rootlets throughout		D	0.1				
	0.45	FILL / Gravelly CLAY CL: low to medium plasticity, dark-brown, trace cobbles (gravel is igneous and siltstone), w < PL, appears well compacted							
		Silty CLAY CH: medium to high plasticity, red-brown, trace ironstone gravel, very stiff to hard, w < PL, residual		B	0.5				
				D	0.6				
39	1			D	1.2				
					1.5		pp >400		
	2			D	2.0		pp >400		
38					2.5		pp = 400		
	3								
	3.0	SILTSTONE: grey, very low to low strength, highly weathered, with clay bands, Bringelly Shale		D	3.0				
37	3.2	Pit discontinued at 3.2m							
	4								
36									

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: 14 tonne excavator - 600mm bucket

LOGGED: RB

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

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

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TEST PIT LOG

CLIENT: Marsden Park Developments Pty Ltd
PROJECT: Proposed Industrial Development
LOCATION: Astoria Street, Marsden Park

SURFACE LEVEL: 41.5 mAHD
EASTING: 298219
NORTHING: 6266939

PIT No: 113
PROJECT No: 94616.00
DATE: 30/6/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
41	0.15	FILL / TOPSOIL: Gravelly clay CL, low to medium plasticity, grey, gravel is ripped siltstone, trace sand, with rootlets throughout		D	0.1				
		Silty CLAY CH: medium to high plasticity, brown and grey, with ironstone gravel, w < PL, stiff to very stiff, residual (possibly disturbed to 0.4m)		D	0.5				
	1			D	1.0				
40				D	1.5		pp = 250		
		1.4m: with ironstone bands,							
	2			D	2.0		pp = 300		
39					2.5				
	2.8	SILTSTONE: grey brown, very low to low strength, with clay bands, Bringelly Shale		D	2.9				
	3 3.0	Pit discontinued at 3.0m							
38									
	4								
37									

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: 14 tonne excavator - 600mm bucket

LOGGED: RB

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

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

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TEST PIT LOG

CLIENT: Marsden Park Developments Pty Ltd
PROJECT: Proposed Industrial Development
LOCATION: Astoria Street, Marsden Park

SURFACE LEVEL: 42.9 mAHD
EASTING: 298350
NORTHING: 6266921

PIT No: 114
PROJECT No: 94616.00
DATE: 30/6/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
42	0.1	FILL / TOPSOIL : gravelly clay CL, brown, with rootlets throughout		D	0.1				
	0.3	FILL / Gravelly CLAY CH: medium to high plasticity, dark-brown, with cobbles (gravel and cobbles are siltstone of medium and high strength), w < PL, appears well compacted							
		Silty CLAY CH: medium to high plasticity, orange brown, trace ironstone gravel, w < PL, stiff to very stiff, residual (possible disturbed to 0.5m)		D	0.5				
	1	0.9m: grading to grey mottled red-brown		D	1.0		pp = 250		
		1.4m: hard (possibly extremely weathered sandstone)		D	1.4				
	1.5				1.5				
	1.6	SANDSTONE: fine grained, grey and brown, very low to low strength, highly weathered, Bringelly Shale							
		Pit discontinued at 1.6m Practical refusal on at least low strength sandstone							
41	2								
40	3								
39	4								
38									

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: 14 tonne excavator - 600mm bucket

LOGGED: RB

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

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

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TEST PIT LOG

CLIENT: Marsden Park Developments Pty Ltd
PROJECT: Proposed Industrial Development
LOCATION: Astoria Street, Marsden Park

SURFACE LEVEL: 45.8 mAHD
EASTING: 298490
NORTHING: 6266896

PIT No: 115
PROJECT No: 94616.00
DATE: 30/6/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
45	0.1	FILL/ROADBASE: 20 mm, fine to medium, grey, igneous		D	0.0				
		FILL / Silty CLAY CH: low to medium plasticity, brown, trace gravel, (igneous and siltstone) w < PL, appears well compacted			0.1				
	0.5			D	0.4				
		FILL / Gravelly CLAY CH: medium to high plasticity, red-brown, gravel (siltstone), w,PL, appears well compacted		D	0.6				
				D	0.7				
	1			D	1.0				1
		1.1m: gravel band (150mm)							
				D	1.5				
44	1.9	Silty CLAY CH: medium to high plasticity, red-brown, trace ironstone gravel, w < PL, very stiff, residual		D	2.0		pp = 350		2
	2.1	Pit discontinued at 2.1m							
43	3								3
42	4								4
41									

RIG: 14 tonne excavator - 600mm bucket

LOGGED: RB

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

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

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TEST PIT LOG

CLIENT: Marsden Park Developments Pty Ltd
PROJECT: Proposed Industrial Development
LOCATION: Astoria Street, Marsden Park

SURFACE LEVEL: 46.1 mAHD
EASTING: 298435
NORTHING: 6266864

PIT No: 116
PROJECT No: 94616.00
DATE: 30/6/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
46	0.15	FILL / TOPSOIL: gravelly clay CL, medium plasticity, dark-brown, with gravel and rootlets throughout, w < PL		D	0.1				
		FILL /CLAY CH: medium to high plasticity, dark-brown, trace rootlets, with siltstone gravel, w ~ PL, poorly compacted			0.4				
				B D	0.5 0.6				
45	1			D	1.0				1
				D	1.5				
44	2	1.9m: brown, w < PL, appears well compacted below 1.9 m		D	2.0				2
				D	2.5				
	3	2.9m: metal fragments		D	3.0				3
43	3.0	Pit discontinued at 3.0m							
42	4								4

RIG: 14 tonne excavator - 600mm bucket

LOGGED: RB

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

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

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TEST PIT LOG

CLIENT: Marsden Park Developments Pty Ltd
PROJECT: Proposed Industrial Development
LOCATION: Astoria Street, Marsden Park

SURFACE LEVEL: 42.5 mAHD
EASTING: 298347
NORTHING: 6266885

PIT No: 117
PROJECT No: 94616.00
DATE: 30/6/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
42	0.15	FILL / TOPSOIL: silty clay CH, medium to high plasticity, dark-brown, with siltstone/sandstone gravel, trace cobbles, with rootlets throughout		D	0.1				
		Silty CLAY CH: medium to high plasticity, red-brown and grey, with ironstone gravel, with tree roots to 0.6m depth, w < PL, stiff, residual		D	0.5				
41	1.0	Silty CLAY CH: medium to high plasticity, red-brown mottled grey, with ironstone gravel, w < PL, very stiff, residual		D	1.0				
				D	1.5		pp = 300		
	1.65	SANDSTONE: fine to medium grained, grey-brown, very low to low strength, highly weathered, Bringelly Shale		D	1.7				
	1.75	Pit discontinued at 1.75m Practical refusal on at least low strength sandstone							

RIG: 14 tonne excavator - 600mm bucket

LOGGED: RB

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

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

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TEST PIT LOG

CLIENT: Marsden Park Developments Pty Ltd
PROJECT: Proposed Industrial Development
LOCATION: Astoria Street, Marsden Park

SURFACE LEVEL: 41.3 mAHD
EASTING: 298271
NORTHING: 6266894

PIT No: 118
PROJECT No: 94616.00
DATE: 30/6/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
41	0.1	FILL / TOPSOIL: silty clay CH, medium to high plasticity, dark-brown, with siltstone gravel and rootlets throughout		D	0.05				
		Silty CLAY CH: medium to high plasticity, red-brown and grey, with ironstone gravel, w < PL, stiff to very stiff, residual (possibly disturbed to 0.4m)		D	0.5				
40	1			D	1.0				1
					1.5		pp = 300		
	1.7				1.7				
	1.8	SILTSTONE: grey, very low to low strength, highly weathered, Bringelly Shale		D	1.8				
		Pit discontinued at 1.8m Practical refusal on at least low strength siltstone							
39	2								2
38	3								3
37	4								4

RIG: 14 tonne excavator - 600mm bucket

LOGGED: RB

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Marsden Park Developments Pty Ltd
PROJECT: Proposed Industrial Development
LOCATION: Astoria Street, Marsden Park

SURFACE LEVEL: 39.6 mAHD
EASTING: 298134
NORTHING: 6266885

PIT No: 119
PROJECT No: 94616.00
DATE: 30/6/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
									5 10 15 20
	0.2	FILL / TOPSOIL: silty clay CH, low to medium plasticity, brown, trace sand and gravel, with rootlets throughout		D	0.1				
		FILL / Gravelly CLAY CH: low to medium plasticity, grey, trace cobbles (gravel and cobbles are silstone estimated to be of low and medium strength), w < PL, appears well compacted (ripped shale)		B	0.3				
				D	0.4				
39				B	0.6				
	0.95	Silty CLAY CH: medium to high plasticity, red-brown, with ironstone gravel, w < PL, stiff to very stiff, residual (possibly disturbed to 1.2m)		D	1.1				1
	1			D	1.5				
38									
	2	2.0m: grey with red-brown, hard (possiblyt extremely weathered siltstone)		D	2.0		pp = 400		2
					2.5		pp >400		
37									
	2.8	SILTSTONE: grey, very low to low strength, highly weathered, with clay bands, Bringelly Shale		D	2.8				
	2.9	Pit discontinued at 2.9m Practical refusal on at least low strength siltstone			2.9				3
	3								
36									
	4								4
35									

RIG: 14 tonne excavator - 600mm bucket

LOGGED: RB

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

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

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TEST PIT LOG

CLIENT: Marsden Park Developments Pty Ltd
PROJECT: Proposed Industrial Development
LOCATION: Astoria Street, Marsden Park

SURFACE LEVEL: 41.5 mAHD
EASTING: 298204
NORTHING: 6266866

PIT No: 120
PROJECT No: 94616.00
DATE: 30/6/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
41	0.15	FILL / TOPSOIL: silty clay CH, low to medium plasticity, brown, trace sand and gravel, with rootlets throughout		D	0.1				
		FILL / Silty CLAY CH: medium to high plasticity, dark-brown, with gravel and trace rootlets, w >PL, poorly compacted			0.4				
				B D	0.5 0.6				
	0.9	FILL / Gravelly CLAY: low to medium plasticity, grey, with cobbles and boulders (gravel, cobbles and boulders are siltstone estimated to be of medium or high strength), w < PL, variably compacted (ripped shale)		D	1.0				
40	1.5	Silty CLAY CH: medium to high plasticity, red-brown and grey, with ironstone gravel, w < PL, very stiff to hard, residual		D	1.6				
					2.0		pp = 250		
39		2.5m: with ironstone bands		D	2.5		pp = 350		
				D	3.0				
38	3.3	Pit discontinued at 3.3m							
37									

RIG: 14 tonne excavator - 600mm bucket

LOGGED: RB

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

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

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TEST PIT LOG

CLIENT: Marsden Park Developments Pty Ltd
PROJECT: Proposed Industrial Development
LOCATION: Astoria Street, Marsden Park

SURFACE LEVEL: 41.8 mAHD
EASTING: 298342
NORTHING: 6266848

PIT No: 121
PROJECT No: 94616.00
DATE: 30/6/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
41	0.1	FILL / TOPSOIL: silty clay CH, low to medium plasticity, brown, trace gravel, with rootlets throughout		D	0.1				
		FILL / Silty CLAY CH: medium to high plasticity, brown to dark-brown, with gravel, cobbles and boulders (siltstone estimated to be of medium or high strength), w < PL, variably compacted (ripped shale)		D	0.5				
	0.7	Silty CLAY CH: medium to high plasticity, red-brown and grey, trace ironstone gravel and rootlets, w < PL, very stiff to hard (possibly disturbed to 0.9m)		D	1.0				
	1				1.2				
				D	1.5		pp = 250		
				D					
	1.7	SANDSTONE: fine grained, grey brown, very low to low strength, highly weathered, Bringelly Shale			1.8				
40	1.8	Pit discontinued at 1.8m Practical refusal on at least low strength sandstone							
	2								
39									
	3								
38									
	4								
37									

Dynamic Penetrometer Test (blows per 150mm): 5 10 15 20

RIG: 14 tonne excavator - 600mm bucket

LOGGED: RB

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

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

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TEST PIT LOG

CLIENT: Marsden Park Developments Pty Ltd
PROJECT: Proposed Industrial Development
LOCATION: Astoria Street, Marsden Park

SURFACE LEVEL: 45.6 mAHD
EASTING: 298480
NORTHING: 6266835

PIT No: 122
PROJECT No: 94616.00
DATE: 30/6/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
45	0.2	FILL / TOPSOIL: silty clay CH, low to medium plasticity, brown, trace sand and gravel, with rootlets throughout		D	0.1				
		FILL / Gravelly CLAY CH: medium plasticity, dark-brown, with cobbles (siltstone estimated to be medium strength), w < PL, appears well compacted		B	0.4				
				D	0.5				
	1			D	1.0				
44				D	1.5				
				D	1.9				
	2	2.0 Pit discontinued at 2.0m Practical refusal. Very slow progress in fill			2.0				
43	3								
42	4								
41									

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: 14 tonne excavator - 600mm bucket

LOGGED: RB

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

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

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Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Marsden Park Developments Pty Ltd
PROJECT: Proposed Industrial Development
LOCATION: Astoria Street, Marsden Park

SURFACE LEVEL: 43.1 mAHD
EASTING: 298450
NORTHING: 6266807

PIT No: 123
PROJECT No: 94616.00
DATE: 30/6/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
43	0.25	FILL / TOPSOIL: silty clay CH, low to medium plasticity, brown, trace gravel and cobbles, with rootlets throughout		D	0.1				
		FILL / Gravelly CLAY CH: medium plasticity, dark-brown, with cobbles (siltstone estimated to be of medium strength), w < PL, appears well compacted (ripped shale)		D	0.4				
42	1.1			D	1.0				
		FILL / Gravelly CLAY CH: medium to high plasticity, dark brown, with gravel (siltstone and river gravel), w < PL, appears well compacted (mixture of ripped shale and river gravel)		D	1.4				
	1.6	Silty CLAY CH: medium to high plasticity, brown and grey, with ironstone gravel, w < PL, hard, residual		D	1.9		pp >400		
41	2.1	Pit discontinued at 2.1m							
40									
39									

RIG: 14 tonne excavator - 600mm bucket

LOGGED: RB

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

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

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Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Marsden Park Developments Pty Ltd
PROJECT: Proposed Industrial Development
LOCATION: Astoria Street, Marsden Park

SURFACE LEVEL: 43.1 mAHD
EASTING: 298334
NORTHING: 6266796

PIT No: 124
PROJECT No: 94616.00
DATE: 26/6/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
43	0.15	FILL / Topsoil: silty clay CH, medium to high plasticity, red-brown and dark brown, with rootlets and gravel		D	0.05				
		FILL / Silty CLAY CH: medium to high plasticity, brown and grey, with gravel (siltstone), w<PL, variably compacted			0.1				
				D	0.4				
	0.6				0.5				
		FILL / Gravelly CLAY CL: medium plasticity, grey, trace siltstone cobbles and boulders , w < PL, appears well compacted (ripped shale)							
42	1			D	0.9				
					1.0				
41	2								
	2.5	- siltstone boulders (estimated to be high or very high strength) up to 0.5 m diameter at 2.4m							
		Pit discontinued at 2.5m = Practical Refusal. Very slow progress in fill							
40	3								
39	4								

RIG: 8 tonne excavator - 600mm bucket

LOGGED: RB

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

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

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TEST PIT LOG

CLIENT: Marsden Park Developments Pty Ltd
PROJECT: Proposed Industrial Development
LOCATION: Astoria Street, Marsden Park

SURFACE LEVEL: 41.9 mAHD
EASTING: 298231
NORTHING: 6266796

PIT No: 125
PROJECT No: 94616.00
DATE: 29/6/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
									5 10 15 20
		FILL / TOPSOIL: silty clay CH, low to medium plasticity, brown, trace sand and gravel, with rootlets throughout		D	0.0				
	0.2				0.1				
		FILL / Gravelly CLAY CH: low to medium plasticity, grey, with cobbles and trace boulders (gravel, cobbles and boulders are siltstone estimated to be of medium and high strength), w < PL, appears well compacted (ripped shale and sandstone)		D	0.3				
					0.4				
41	1			D	1.0				1
					1.2				
40	2			D	2.0				2
					2.1				
39	3								3
	3.1			D	3.1		pp = 300		
	3.2	Silty CLAY CH: medium to high plasticity, grey and red-brown, ironstone gravel, w < PL, very stiff, residual			3.2				
		Pit discontinued at 3.2m							
38	4								4
37									

RIG: 14 tonne excavator - 600mm bucket

LOGGED: RB

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

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

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TEST PIT LOG

CLIENT: Marsden Park Developments Pty Ltd
PROJECT: Proposed Industrial Development
LOCATION: Astoria Street, Marsden Park

SURFACE LEVEL: 41.4 mAHD
EASTING: 298199
NORTHING: 6266811

PIT No: 126
PROJECT No: 94616.00
DATE: 29/6/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
41	0.15	FILL / TOPSOIL: silty clay CH, low to medium plasticity, brown, trace sand and gravel, with rootlets throughout		D	0.1				
		FILL / Gravelly CLAY CH: low to medium plasticity, grey, with cobbles and trace boulders (gravel, cobbles and boulders are siltstone and sandstone estimated to be of medium and high strength), w < PL, appears well compacted (ripped shale and sandstone)		D	0.5				
40	2.3	Silty CLAY CH: medium to high plasticity, grey and red-brown, trace ironstone gravel, w < PL, stiff to very stiff, residual		D	2.5		pp = 200		
39				D	2.9		pp = 300		
38	3.0	Pit discontinued at 3.0m			3.0				
37									

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20; 1, 2, 3, 4; >>

RIG: 14 tonne excavator - 600mm bucket

LOGGED: RB

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

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

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Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Marsden Park Developments Pty Ltd
PROJECT: Proposed Industrial Development
LOCATION: Astoria Street, Marsden Park

SURFACE LEVEL: 39.1 mAHD
EASTING: 298125
NORTHING: 6266805

PIT No: 127
PROJECT No: 94616.00
DATE: 29/6/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
39	0.15	FILL / TOPSOIL: silty clay CH, low to medium plasticity, brown, trace sand and gravel, with rootlets throughout		D	0.1				
		FILL / Silty CLAY CH: medium plasticity, brown, trace sand, gravel, cobbles and boulders (gravel, cobbles and boulders are siltstone estimated to be medium or high strength), w < PL, poorly compacted (ripped shale)		D	0.5				
38	1								1
	1.2	FILL / Sandy GRAVEL GC: fine to coarse, grey, with clay, cobbles and boulders (gravel, cobbles and boulders are a mixture of sub-rounded river gravel and silstone estimated to be of medium and high strength), wet, variably compacted (a mixture of river gravels and ripped shale)		D	1.5				
	1.7	Silty CLAY CH: medium to high plasticity, grey and red-brown, ironstone gravel, w < PL, stiff to very stiff, residual		D	1.9				
37	2			D	2.0		pp = 250		2
					2.5		pp = 200		
	2.9	SILTSTONE: grey brown, very low to low strength, highly weathered, Bringelly Shale							
36	3			D	3.0				3
	3.0	Pit discontinued at 3.0m							
35	4								4

RIG: 14 tonne excavator - 600mm bucket

LOGGED: RB

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

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

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TEST PIT LOG

CLIENT: Marsden Park Developments Pty Ltd
PROJECT: Proposed Industrial Development
LOCATION: Astoria Street, Marsden Park

SURFACE LEVEL: 38.8 mAHD
EASTING: 298116
NORTHING: 6266750

PIT No: 128
PROJECT No: 94616.00
DATE: 29/6/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
38	0.15	FILL / TOPSOIL: silty clay CH, low to medium plasticity, brown, trace gravel and glass fragments, with rootlets throughout		D	0.1				
		FILL / Gravelly CLAY CH: medium to high plasticity, dark brown, trace cobbles (gravel and cobbles are siltstone estimated to be of medium and high strength), w < PL, appears well compacted (ripped shale)		D	0.5				
	0.6	Silty CLAY CH: medium to high plasticity, grey and red-brown, with ironstone gravel, w < PL, firm to stiff, residual		D	1.0				
37	1.5	Silty CLAY CH: medium to high plasticity, grey and red-brown, with ironstone gravel, w < PL, stiff to very stiff, residual		D	1.5		pp = 200		
					2.0		pp = 200		
36				D	2.5		pp = 250		
	3.0	Pit discontinued at 3.0m		D	3.0				
35									
34									

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20; 1, 2, 3, 4

RIG: 14 tonne excavator - 600mm bucket

LOGGED: RB

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

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

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TEST PIT LOG

CLIENT: Marsden Park Developments Pty Ltd
PROJECT: Proposed Industrial Development
LOCATION: Astoria Street, Marsden Park

SURFACE LEVEL: 42.3 mAHD
EASTING: 298200
NORTHING: 6266748

PIT No: 129
PROJECT No: 94616.00
DATE: 29/6/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
42	0.15	FILL / TOPSOIL: silty clay CH, low to medium plasticity, brown, trace gravel and cobbles with rootlets throughout		D	0.1				
		FILL / Gravelly CLAY CH: medium to high plasticity, dark brown, trace cobbles (gravel and cobbles are siltstone and sandstone estimated to be of medium and high strength), w < PL, appears well compacted (ripped shale)		D	0.5				
41	1			D	1.0				1 >>
				D	1.5				
40	2			D	2.0				2
39	3	3.0 Pit discontinued at 3.0m							3
38	4								4

5 10 15 20

RIG: 14 tonne excavator - 600mm bucket

LOGGED: RB

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Marsden Park Developments Pty Ltd
PROJECT: Proposed Industrial Development
LOCATION: Astoria Street, Marsden Park

SURFACE LEVEL: 43.6 mAHD
EASTING: 298278
NORTHING: 6266741

PIT No: 130
PROJECT No: 94616.00
DATE: 26/6/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
43	0.05	FILL / TOPSOIL: silty clay CH, low plasticity, brown, trace fine gravel, with vegetation throughout		D	0.1				
		FILL / Gravelly CLAY CL: low plasticity, grey, trace cobbles and boulders up to 400mm diameter (siltstone and sandstone estimated to be up to very high strength), w < PL, appears well compacted (ripped shale and sandstone)			0.2				
				D	0.4				
					0.5				
				D	1.4				
					1.5				
41	2.8	Pit discontinued at 2.8m = Practical Refusal. Very slow progress in fill							

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20; 1, 2, 3, 4

RIG: 8 tonne excavator - 600mm bucket

LOGGED: RB

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Marsden Park Developments Pty Ltd
PROJECT: Proposed Industrial Development
LOCATION: Astoria Street, Marsden Park

SURFACE LEVEL: 43.7 mAHD
EASTING: 298329
NORTHING: 6266750

PIT No: 131
PROJECT No: 94616.00
DATE: 29/6/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
43	0.2	FILL / TOPSOIL: silty clay CH, low plasticity, brown, trace fine gravel, with rootlets throughout, w < PL		D	0.1				
		FILL / Gravelly CLAY CL: low to medium plasticity, grey, with cobbles and trace boulders (gravel, cobbles and boulders are siltstone estimated to be high or very high strength), w < PL, variably compacted (ripped shale)		D	0.5				
42	1.9	- grading brown at 1.4m							
		FILL / Sandy GRAVEL: fine to coarse, brown, trace cobbles and boulders (gravel, cobbles and boulders are siltstone and sandstone estimated to be high or very high strength), moist, appears well compacted (ripped shale)		D	2.0				
41	2.6	FILL / Gravelly CLAY CL: low to medium plasticity, dark brown, with sand, cobbles and boulders (cobbles and boulders are siltstone estimated to be of medium and high strength), w < PL, appears well compacted (ripped shale)		D	2.8 2.9				
40	3.3	Pit discontinued at 3.3m							
39									

RIG: 14 tonne excavator - 600mm bucket

LOGGED: RB

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Marsden Park Developments Pty Ltd
PROJECT: Proposed Industrial Development
LOCATION: Astoria Street, Marsden Park

SURFACE LEVEL: 43.4 mAHD
EASTING: 298397
NORTHING: 6266783

PIT No: 132
PROJECT No: 94616.00
DATE: 26/6/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
43	0.15	FILL / TOPSOIL: silty clay CH, low plasticity, brown, trace fine gravel, with rootlets throughout		D	0.05				
		FILL / Gravelly CLAY CH: medium plasticity, brown, trace cobbles (gravel and cobbles are either siltstone and estimated to be medium or high strength or river gravel), w < PL, appears well compacted (predominantly ripped shale)			0.1				
				D	0.4				
					0.5				
42					1.5				
					2.1				
				D	2.3				
41	2.4	Pit discontinued at 2.4m = Practical Refusal. Very slow progress in fill			2.4				

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20; 1, 2, 3, 4

RIG: 14 tonne excavator - 600mm bucket

LOGGED: RB

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Marsden Park Developments Pty Ltd
PROJECT: Proposed Industrial Development
LOCATION: Astoria Street, Marsden Park

SURFACE LEVEL: 43.6 mAHD
EASTING: 298486
NORTHING: 6266776

PIT No: 133
PROJECT No: 94616.00
DATE: 29/6/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
43	0.15	FILL / TOPSOIL: silty clay CH, low to medium plasticity, brown, trace gravel and cobbles with rootlets throughout		D	0.1				
		FILL / Gravelly CLAY CH: medium plasticity, brown, trace cobbles and boulders (siltstone estimated to be medium or high strength), w<PL, well compacted (ripped shale)		B	0.4				
	1				0.6				1
42	1.6	Silty CLAY: medium to high plasticity, red-brown then brown, trace ironstone gravel, w < PL, very stiff to hard, residual		D	2.0		pp >400		2
	2			D	2.4		pp = 350		
41	2.5	Pit discontinued at 2.5m							3
	3								
40	4								4
39									

RIG: 14 tonne excavator - 600mm bucket

LOGGED: RB

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

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

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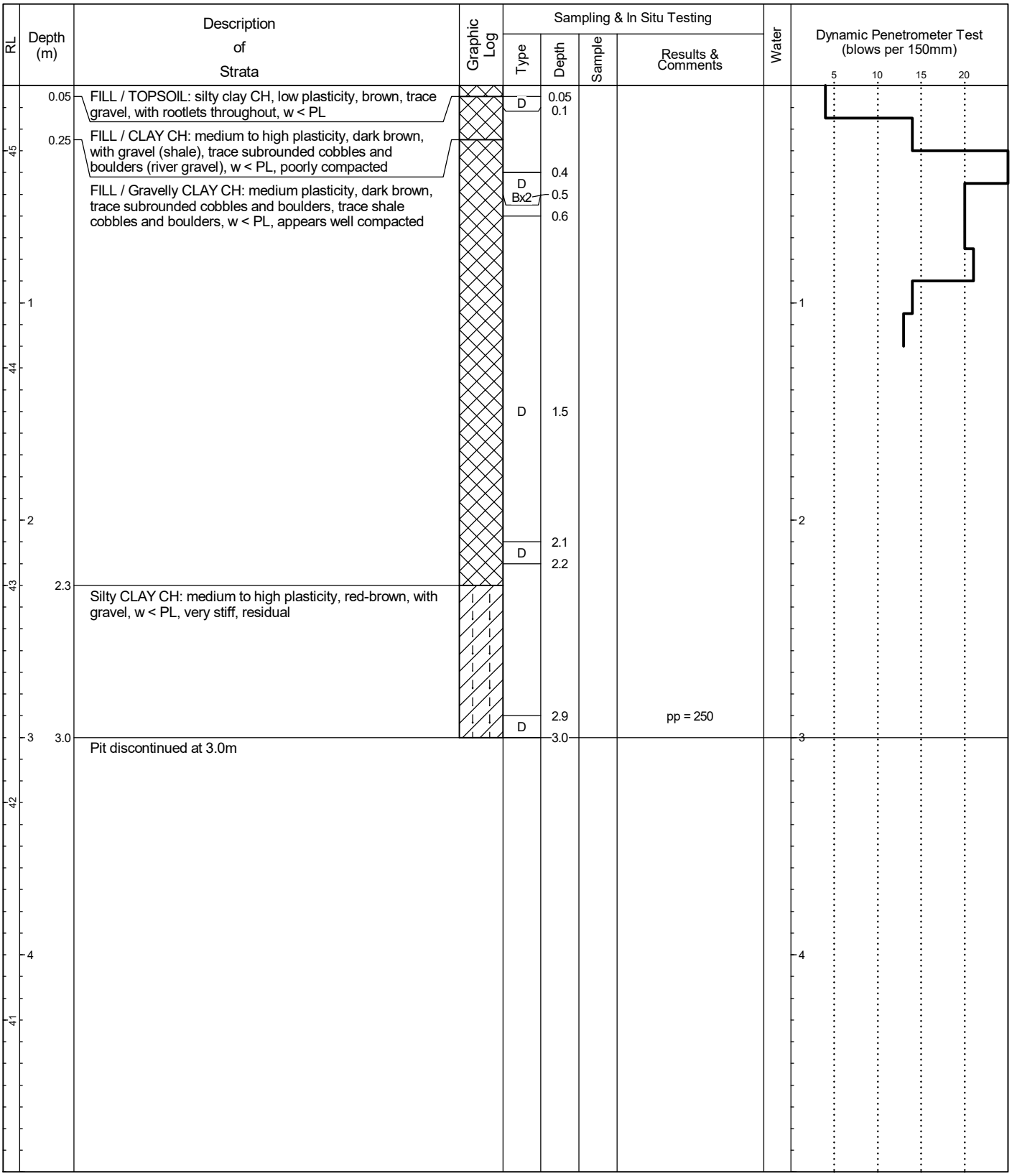
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Marsden Park Developments Pty Ltd
PROJECT: Proposed Industrial Development
LOCATION: Astoria Street, Marsden Park

SURFACE LEVEL: 45.3 mAHD
EASTING: 298454
NORTHING: 6266707

PIT No: 134
PROJECT No: 94616.00
DATE: 26/6/2020
SHEET 1 OF 1



RIG: 14 tonne excavator - 600mm bucket

LOGGED: RB

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Marsden Park Developments Pty Ltd
PROJECT: Proposed Industrial Development
LOCATION: Astoria Street, Marsden Park

SURFACE LEVEL: 45.1 mAHD
EASTING: 298438
NORTHING: 6266709

PIT No: 135
PROJECT No: 94616.00
DATE: 26/6/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
45	0.1	FILL / TOPSOIL: silty clay CH, low plasticity, brown, trace fine gravel, with rootlets throughout, w < PL		D	0.05				
		FILL / Silty CLAY CH: medium plasticity, red-brown and dark brown, with gravel and trace cobbles (gravel and cobbles a mixture of siltstone estimated to be medium and high strength and subrounded river gravel), w < PL, variably compacted			0.1				
				D	0.4				
	0.6				0.5				
		FILL / Gravelly CLAY CH: medium plasticity, brown, trace cobbles and boulders (gravel, cobbles and boulders are siltstone estimated to be high or very high strength), variably compacted (ripped shale)							
44	1			D	0.9				
					1.0				
	2			D	2.0				
43					2.1				
				D	2.8				
	3				2.9				
	3.0	Pit discontinued at 3.0m							
42									
	4								
41									

5 10 15 20

RIG: 8 tonne excavator - 600mm bucket

LOGGED: RB

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

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

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Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Marsden Park Developments Pty Ltd
PROJECT: Proposed Industrial Development
LOCATION: Astoria Street, Marsden Park

SURFACE LEVEL: 44.8 mAHD
EASTING: 298355
NORTHING: 6266659

PIT No: 136
PROJECT No: 94616.00
DATE: 29/6/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
44	0.2	FILL / TOPSOIL: gravelly clay CH, medium plasticity, brown, with rootlets throughout							
	0.6	FILL / Gravelly CLAY CH: medium plasticity, grey, siltstone and sandstone, angular to subangular, w < PL, variably compacted, with cobbles, trace boulders, w < PL, variably compacted							
	1	FILL / Gravelly CLAY CH: medium plasticity, grey, with cobbles and trace boulders (gravel, cobbles and boulders are a mixture of siltstone and sandstone estimated to be of medium or high strength) , w < PL, appears well compacted		D	1.0				
43	2			D	1.6				
42	2.7	Silty CLAY CH: medium to high plasticity, grey and red-brown, trace ironstone gravel, w < PL, very stiff, residual (first 300mm possibly disturbed)			2.8		pp = 250		
	3								
	3.0	Pit discontinued at 3.0m							
41	4								
40									

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: 14 tonne excavator - 600mm bucket

LOGGED: RB

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Marsden Park Developments Pty Ltd
PROJECT: Proposed Industrial Development
LOCATION: Astoria Street, Marsden Park

SURFACE LEVEL: 41.8 mAHD
EASTING: 298173
NORTHING: 6266667

PIT No: 137
PROJECT No: 94616.00
DATE: 29/6/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
41	0.15	FILL / TOPSOIL: silty clay CH, low plasticity, brown, trace gravel and cobbles, with rootlets throughout, w < PL		D	0.0 – 0.1				
		FILL / Gravelly CLAY CH: medium plasticity, grey, with cobbles and boulders (gravel, cobbles and boulders siltstone estimated to be of medium or high strength), w < PL, appears generally well compacted below 0.6 m depth		D	0.5				
	1			D	1.0				
40	2								
	2.7	Silty CLAY CL: medium to high plasticity, pale brown and red-brown, w<PL, very stiff, residual							
39	3			D	3.0		pp = 250		
	3.1	Pit discontinued at 3.1m							
38	4								
37									

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: 14 tonne excavator - 600mm bucket

LOGGED: RB

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Marsden Park Developments Pty Ltd
PROJECT: Proposed Industrial Development
LOCATION: Astoria Street, Marsden Park

SURFACE LEVEL: 42.8 mAHD
EASTING: 298223
NORTHING: 6266562

PIT No: 138
PROJECT No: 94616.00
DATE: 29/6/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
42	0.1	FILL / TOPSOIL: silty clay CH low plasticity, brown, trace fine gravel, with rootlets throughout, w < PL		E,D	0.1				
	0.3	FILL / Silty CLAY CH: medium to high plasticity, brown, trace gravel and ironstone, w < PL, variably compacted							
		FILL / Gravelly CLAY CL: medium plasticity, grey, with cobbles and trace boulders (gravel, cobbles and boulders a mixture of river gravel and siltstone estimated to be of medium or high strength, w < PL, appears well compacted		E, D	0.5				
	1			E,D	1.0				
				E,D	1.5				
	1.55	Gravelly CLAY CL: medium to high plasticity, brown, ironstone, angular to subangular, very stiff, w < PL, residual (top 300mm possibly disturbed)							
41	1.9								
	2	Silty CLAY CH: medium to high plasticity, red-brown, with ironstone gravel, w < PL, very stiff, residual			2.0				
				D	2.5		pp = 250		
40	3								
	3.0	Pit discontinued at 3.0m		D	3.0		pp = 250		
39	4								
38									

RIG: 14 tonne excavator - 600mm bucket

LOGGED: RB

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

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

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Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Marsden Park Developments Pty Ltd
PROJECT: Proposed Industrial Development
LOCATION: Astoria Street, Marsden Park

SURFACE LEVEL: 44.6 mAHD
EASTING: 298309
NORTHING: 6266570

PIT No: 139
PROJECT No: 94616.00
DATE: 29/6/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
44	0.15	FILL / TOPSOIL: silty clay CH low plasticity, brown, trace fine gravel, with rootlets throughout, w < PL		D	0.1				
		FILL / Gravelly CLAY CH: low to medium plasticity, grey and brown, with cobbles and trace boulders (gravel, cobbles and boulders are siltstone and sandstone estimated to be of medium, high and very high strength), w < PL, appears well compacted		D	0.5				
	1			D	1.0				1
				D,E	1.3				
43	1.5	Silty CLAY CH: medium to high plasticity, red-brown and grey, trace ironstone gravel, trace decomposed rootlets, w < PL, very stiff, residual			1.5				
	2			D,E	2.0		pp = 300		2
42				D	2.5		pp = 250		
	3								3
	3.2	Pit discontinued at 3.2m							
41	4								4
40									

RIG: 14 tonne excavator - 600mm bucket

LOGGED: RB

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Marsden Park Developments Pty Ltd
PROJECT: Proposed Industrial Development
LOCATION: Astoria Street, Marsden Park

SURFACE LEVEL: 46.8 mAHD
EASTING: 298311
NORTHING: 6266479

PIT No: 140
PROJECT No: 94616.00
DATE: 29/6/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
46	0.1	FILL / TOPSOIL: silty clay CH, low plasticity, brown, trace gravel, with rootlets throughout, w < PL		D	0.1				
	0.25	FILL / Silty CLAY CH: low to medium plasticity, dark brown, with rootlets and sand, trace gravel, w < PL, variably compacted							
		Silty CLAY CH: medium to high plasticity, red-brown, w < PL, very stiff, residual		D	0.5				
		- extremely weathered sandstone from 0.7m		D	0.8				
	0.9	SANDSTONE: very low strength, highly weathered, red-brown and grey, sandstone, Bringelly Shale							
45	1.0	Pit discontinued at 1.0m							
		- Practical refusal on at least low strengh sandstone							
44									
43									
42									

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20; depths 1, 2, 3, 4

RIG: 14 tonne excavator - 600mm bucket

LOGGED: RB

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Marsden Park Developments Pty Ltd
PROJECT: Proposed Industrial Development
LOCATION: Astoria Street, Marsden Park

SURFACE LEVEL: 45.9 mAHD
EASTING: 298442
NORTHING: 6266653

PIT No: 141
PROJECT No: 94616.00
DATE: 26/6/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
45	0.0	FILL / TOPSOIL: silty clay CH, brown, with siltstone gravel, trace sand and rootlets throughout		D	0.0 – 0.1				
	0.2	FILL / Clayey GRAVEL: grey, with trace cobbles (gravel and cobbles are siltstone estimated to be of medium to high strength), w < PL, variably compacted		D	0.2 – 0.3				
	0.4	FILL / Silty CLAY CH: medium to high plasticity, grey-brown, with gravel, cobbles and boulders (gravel and cobbles are siltstone and sandstone estimated to be of medium and high strength), w < PL, appears well compacted (ripped shale)		B	0.5 – 0.6				
				D	0.9 – 1.0				
				D	1.4 – 1.5				
44	2.4	Silty CLAY CH: medium to high plasticity, grey mottled red-brown, trace rootlets, w < PL, very stiff to hard, residual (possibly fill)		D	2.5		pp = 400		
	2.6	Pit discontinued at 2.6m			2.6				
43									
42									
41									

RIG: 14 tonne excavator - 600mm bucket

LOGGED: RB

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Marsden Park Developments Pty Ltd
PROJECT: Proposed Industrial Development
LOCATION: Astoria Street, Marsden Park

SURFACE LEVEL: 46.0 mAHD
EASTING: 298494
NORTHING: 6266691

PIT No: 142
PROJECT No: 94616.00
DATE: 26/6/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
46	0.0	FILL / TOPSOIL: silty clay CH, brown, with siltstone gravel, trace sand and rootlets throughout		D	0.0 – 0.1				
	0.2	FILL / Gravelly CLAY CL: brown, gravel (siltstone gravel), w < PL, appears well compacted		D	0.4 – 0.5				
	0.6	FILL / GRAVEL: grey, with sub-rounded cobbles and boulders (river gravel estimated to be medium and high strength), trace clay, dry, appears variable compacted		D	0.9 – 1.0				
45	1								1
	1.1	FILL / Silty CLAY CH: medium to high plasticity, grey-brown, with gravel and cobbles (ironstone and siltstone estimated to be medium and high strength), w < PL, appears well compacted		D	1.4 – 1.5				
		- siltstone boulder (up to 300mm diameter) at 1.7m							
44	2								2
				D	2.6 – 2.7				
	2.8	Silty CLAY CH: medium to high plasticity, pale grey mottled red-brown, trace rootlets, w < PL, hard, residual		D	2.8 – 2.9		pp >400		
43	3								3
	3.0	Pit discontinued at 3.0m							
42	4								4

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: 14 tonne excavator - 600mm bucket

LOGGED: RB

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

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

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TEST PIT LOG

CLIENT: Marsden Park Developments Pty Ltd
PROJECT: Proposed Industrial Development
LOCATION: Astoria Street, Marsden Park

SURFACE LEVEL: 48.2 mAHD
EASTING: 298591
NORTHING: 6266624

PIT No: 143
PROJECT No: 94616.00
DATE: 26/6/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
	0.0			D	0.0				
	0.1	FILL / TOPSOIL: silty clay CH, low plasticity, brown, trace fine gravel, with rootlets throughout, w < PL			0.1				
48	0.2	FILL / Silty CLAY CH: low to medium plasticity, dark brown, with gravel, w < PL, poorly compacted							
	0.5	Silty CLAY CH: medium to high plasticity, pale brown grey, w < PL, soft to firm, residual (possibly disturbed)		D	0.5		pp = 100		
		Silty CLAY CH: medium to high plasticity, pale brown and red brown, with ironstone gravel, w < PL,stiff, residual							
					0.8		pp = 150		
				D	0.9				
	1.0	Silty CLAY CH: medium to high plasticity, pale brown and red brown, with ironstone gravel, w < PL, hard, residual (extremely weathered sandstone)							
47	1.2				1.2				
	1.3	SANDSTONE: very low and low strength, red-brown and grey, Bringelly Shale		D	1.3				
		Pit discontinued at 1.3m							
		- Practical refusal on at least low strengh sandstone							
46									
45									
44									

RIG: 14 tonne excavator - 600mm bucket

LOGGED: RB

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

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

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TEST PIT LOG

CLIENT: Marsden Park Developments Pty Ltd
PROJECT: Proposed Industrial Development
LOCATION: Astoria Street, Marsden Park

SURFACE LEVEL: 49.5 mAHD
EASTING: 298541
NORTHING: 6266571

PIT No: 144
PROJECT No: 94616.00
DATE: 29/6/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
49	0.0	FILL / TOPSOIL: gravelly clay CH, low to medium plasticity, brown, with rootlets throughout		D	0.0				
	0.2	FILL / Sandy GRAVEL GM: fine to coarse, dark brown, with cobbles (sandstone estimated to be of medium strength), moist, variably compacted		B	0.3				
	0.6	Silty CLAY CH: medium to high plasticity, red-brown, trace ironstone gravel, w < PL, very stiff, residual (top 300mm possibly disturbed)		D	0.5				
48	1.5	Silty CLAY CH: medium to high plasticity, red-brown mottled grey, trace ironstone gravel, w < PL, very stiff, residual		D	1.0				
				D	1.5		pp >400		
47				D	2.0		pp >400		
				D	2.5		pp >400		
46	3.2	Pit discontinued at 3.2m							
45									

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20; 1, 2, 3, 4

RIG: 14 tonne excavator - 600mm bucket

LOGGED: RB

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

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

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TEST PIT LOG

CLIENT: Marsden Park Developments Pty Ltd
PROJECT: Proposed Industrial Development
LOCATION: Astoria Street, Marsden Park

SURFACE LEVEL: 47.8 mAHD
EASTING: 298484
NORTHING: 6266573

PIT No: 145
PROJECT No: 94616.00
DATE: 26/6/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
47	0.2	FILL / TOPSOIL: silty clay CH, medium plasticity, dark brown, with siltstone gravel and rootlets, trace sand		D	0.0 0.1				
		Silty CLAY CL: medium to high plasticity, red-brown and grey, trace gravel, w < PL, stiff, residual (top 200mm possibly disturbed)		D	0.5		pp = 250		
					0.7		pp = 250		
				B	0.9				
46	1.0 1.1	SANDSTONE: very low strength, brown and grey, Bringelly Shale		D	1.0 1.1				
		Pit discontinued at 1.15m - Practical refusal on at least low strengh sandstone							
45									
44									
43									

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20; depth ticks 1, 2, 3, 4

RIG: 14 tonne excavator - 600mm bucket

LOGGED: RB

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

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

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TEST PIT LOG

CLIENT: Marsden Park Developments Pty Ltd
PROJECT: Proposed Industrial Development
LOCATION: Astoria Street, Marsden Park

SURFACE LEVEL: 46.6 mAHD
EASTING: 298438
NORTHING: 6266580

PIT No: 146
PROJECT No: 94616.00
DATE: 26/6/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
46	0.0	FILL / TOPSOIL: silty clay CH, brown, trace sand, with siltstone gravel and rootlets throughout		D	0.0–0.1				
	0.2	FILL / Silty CLAY CH: medium to high plasticity, trace ironstone gravel and rootlets, w < PL, variably compacted		D	0.2–0.3				
	0.4	FILL / Silty CLAY CL: low plasticity, brown, trace gravel (siltstone) and sand, w < PL, variably compacted		D	0.4–0.5				
	0.9	Silty CLAY CH: medium to high plasticity, pale grey mottled orange and red, trace ironstone gravel, w < PL, stiff to very stiff, residual		B	0.9–1.0		pp = 200		
45	1								1
	2								2
44				D	2.4–2.5		pp = 300		
	3								3
43	3.0	Pit discontinued at 3.0m							
	4								4
42									

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: 14 tonne excavator - 600mm bucket

LOGGED: RB

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

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

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TEST PIT LOG

CLIENT: Marsden Park Developments Pty Ltd
PROJECT: Proposed Industrial Development
LOCATION: Astoria Street, Marsden Park

SURFACE LEVEL: 48.3 mAHD
EASTING: 298434
NORTHING: 6266522

PIT No: 147
PROJECT No: 94616.00
DATE: 26/6/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
48	0.2	FILL / TOPSOIL: silty clay CH, low plasticity, brown, trace sand and rootlets, glass shard fragments observed with rootlets throughout		D	0.0 0.1				
		Silty CLAY CH: medium plasticity, mottled grey and orange, with gravel, w < PL, stiff, residual (0.2 - 0.5m possibly disturbed)		D	0.4 0.6		pp = 150		
	0.7 0.8	SANDSTONE: fine grained, grey, very low strength, Bringelly Shale		D	0.7 0.8				
		Pit discontinued at 0.8m - Practical refusal on at least low strengh sandstone							
47	1								1
46	2								2
45	3								3
44	4								4

RIG: 14 tonne excavator - 600mm bucket

LOGGED: RB

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

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

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Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Marsden Park Developments Pty Ltd
PROJECT: Proposed Industrial Development
LOCATION: Astoria Street, Marsden Park

SURFACE LEVEL: 50.1 mAHD
EASTING: 298515
NORTHING: 6266539

PIT No: 148
PROJECT No: 94616.00
DATE: 26/6/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
50	0.07	FILL / TOPSOIL: silty clay CH, medium plasticity, dark brown, with gravel and rootlets throughout		D	0.05 0.1				
		FILL / Silty CLAY: medium plasticity, brown with gravel, trace cobbles (siltstone), w<PL, appears well compacted		B D	0.4 0.5				
	0.8	Silty CLAY CH: medium to high plasticity, red-brown and grey, with ironstone gravel, w < PL, stiff to very stiff, residual			1.5		pp = 300		
49	1								1
	1.9	SANDSTONE: fine grained, very low and low strength, grey, Bringelly Shale		D	1.9 2.0				
48	2								2
	2.4	Pit discontinued at 2.4m - Practical refusal on at least low strengh sandstone							
47	3								3
46	4								4

RIG: 14 tonne excavator - 600mm bucket

LOGGED: RB

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Marsden Park Developments Pty Ltd
PROJECT: Proposed Industrial Development
LOCATION: Astoria Street, Marsden Park

SURFACE LEVEL: 50.4 mAHD
EASTING: 298538
NORTHING: 6266514

PIT No: 149
PROJECT No: 94616.00
DATE: 26/6/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
50	0.1	FILL / TOPSOIL: silty clay CH, medium plasticity, dark brown, with gravel and rootlets throughout		D	0.05				
					0.1				
		Silty CLAY CH: medium to high plasticity, dark brown then brown, with rootlets, w < PL, very stiff, residual (possibly fill)		D	0.25				
	0.5				0.3				
		Silty CLAY CH: medium to high plasticity, grey with brown, trace ironstone gravel, w < PL, very stiff, residual							
	1			D	0.6				1
					0.7				
49									
				D	1.4				
					1.5		pp = 300		
	1.9								
		SANDSTONE: very low to low strength, highly weathered, sandstone		D	1.9				
	2				2.0				2
	2.1	Pit discontinued at 2.1m							
		- Practical refusal on at least low strengh sandstone							
48									
	3								3
47									
	4								4
46									

RIG: 14 tonne excavator - 600mm bucket

LOGGED: RB

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

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

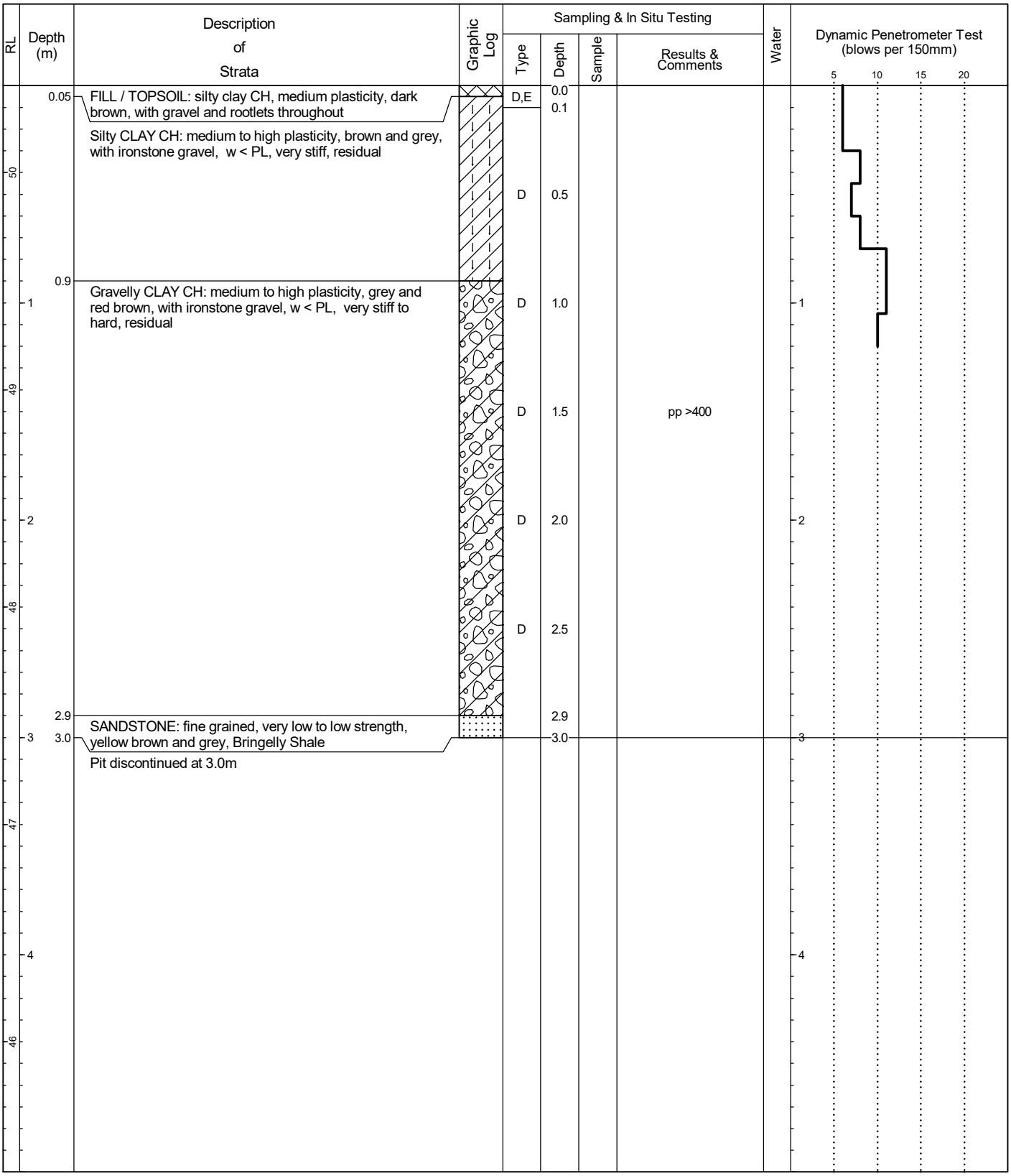
Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Marsden Park Developments Pty Ltd
PROJECT: Proposed Industrial Development
LOCATION: Astoria Street, Marsden Park

SURFACE LEVEL: 50.4 mAHD
EASTING: 298573
NORTHING: 6266487

PIT No: 150
PROJECT No: 94616.00
DATE: 26/6/2020
SHEET 1 OF 1



RIG: 14 tonne excavator - 600mm bucket

LOGGED: RB

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Marsden Park Developments Pty Ltd
PROJECT: Proposed Industrial Development
LOCATION: Astoria Street, Marsden Park

SURFACE LEVEL: 50.7 mAHD
EASTING: 298487
NORTHING: 6266478

PIT No: 151
PROJECT No: 94616.00
DATE: 26/6/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
	0.05	FILL / TOPSOIL: silty clay CH, medium plasticity, dark brown, with gravel and rootlets throughout		D,E	0.01				
	0.15	FILL / Gravelly CLAY CH: low plasticity, dark brown, with sand and rootlets, trace siltstone cobbles, w < PL, variably compacted		D	0.1				
		FILL/ Gravelly CLAY CH : low plasticity, brown, trace cobbles and boulders (siltstone estimated to be low and medium strength), w < PL, appears well compacted (ripped shale)		D, E	0.5				
50	0.7	Silty CLAY CH: medium to high plasticity, red-brown, trace gravel, ironstone, w < PL, very stiff to hard, residual							
	1				1.0		pp >400		1
				D	1.5		pp >400		
49	2				2.0		pp >400		2
					2.2				
				D	2.5				
				D					
48	2.7	SILTSTONE: very low to low strength, grey, Bringelly Shale			2.8				
	2.8	Pit discontinued at 2.8m - Practical refusal on at least low strengh siltstone							3
47	3								
	4								4
46									

RIG: 14 tonne excavator - 600mm bucket

LOGGED: RB

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Marsden Park Developments Pty Ltd
PROJECT: Proposed Industrial Development
LOCATION: Astoria Street, Marsden Park

SURFACE LEVEL: 49.2 mAHD
EASTING: 298428
NORTHING: 6266420

PIT No: 152
PROJECT No: 94616.00
DATE: 26/6/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
49	0.05	FILL / TOPSOIL: silty clay CH, medium plasticity, dark brown, with gravel and rootlets throughout		D,E	0.0				
					0.1				
	0.3	FILL / Silty CLAY CH: medium to high plasticity, brown, with rootlets and gravel (mixture of siltstone and river gravel), trace sand, w < PL, appears well compacted			0.4				
		Silty CLAY CH: medium to high plasticity, red-brown and grey, trace roots to 0.6m depth, trace ironstone gravel, w < PL, very stiff, residual,		Bx2 D,S	0.5 0.6				
48	1			D,S	1.0				1
					1.2				
				D					
	1.7	SANDSTONE: fine grained, very low to low strength, red-brown and grey, Bringelly Shale			1.8				
	1.9	Pit discontinued at 1.9m - Practical refusal on at least low strengh sandstone							
	2								2
47									
	3								3
46									
	4								4
45									

RIG: 14 tonne excavator - 600mm bucket

LOGGED: RB

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Marsden Park Developments Pty Ltd
PROJECT: Proposed Industrial Development
LOCATION: Astoria Street, Marsden Park

SURFACE LEVEL: 50.8 mAHD
EASTING: 298491
NORTHING: 6266395

PIT No: 153
PROJECT No: 94616.00
DATE: 26/6/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
50	0.05	FILL / TOPSOIL: silty clay CH, medium plasticity, dark brown, with gravel and rootlets throughout		D	0.0				
					0.1				
	0.3	Silty CLAY CH: medium to high plasticity, brown, with rootlets, trace gravel, w < PL, very stiff, residual (possibly disturbed)							
		Silty CLAY CH: medium to high plasticity, red-brown and grey, trace roots to 0.6m, w < PL, stiff to very stiff, residual		D	0.5				
49				D	1.5		pp >400		
					2.0		pp >400		
48				D	2.5		pp >400		
		2.9m: hard (extremely weathered siltstone)							
47	3.0	Pit discontinued at 3.0m							
46									

RIG: 14 tonne excavator - 600mm bucket

LOGGED: RB

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

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

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Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Marsden Park Developments Pty Ltd
PROJECT: Proposed Industrial Development
LOCATION: Astoria Street, Marsden Park

SURFACE LEVEL: 51.3 mAHD
EASTING: 298568
NORTHING: 6266364

PIT No: 154
PROJECT No: 94616.00
DATE: 26/6/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
51	0.15	FILL / TOPSOIL: silty clay CH, medium plasticity, dark brown, with gravel and rootlets throughout		D	0.1				
		Silty CLAY CH: medium to high plasticity, red-brown, with rootlets to 0.5m, w < PL, stiff to very stiff, residual		D	0.5				
50	1.5	Silty CLAY CH: medium to high plasticity, red-brown, with ironstone gravel, w < PL, stiff to very stiff, residual		D	1.5		pp >400		
49		2.8m: ironstone bands		D	2.0		pp <=400		
48	3.0	Pit discontinued at 3.0m							
47									

RIG: 14 tonne excavator - 600mm bucket

LOGGED: RB

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

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

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TEST PIT LOG

CLIENT: Marsden Park Developments Pty Ltd
PROJECT: Proposed Industrial Development
LOCATION: Astoria Street, Marsden Park

SURFACE LEVEL: 52.0 mAHD
EASTING: 298487
NORTHING: 6266325

PIT No: 155
PROJECT No: 94616.00
DATE: 26/6/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
52	0.1	FILL / TOPSOIL: silty clay CH, medium plasticity, dark brown, with gravel and rootlets throughout		D,E	0.0				
		Silty CLAY CH: medium to high plasticity, brown, with rootlets, w<PL, very stiff, residual (possibly disturbed)			0.1				
	0.45	Silty CLAY CH: medium to high plasticity, pale brown, with ironstone gravel, w < PL, very stiff, residual		D	0.5				
51	1			D	1.0				1
				D	1.5		pp = 300		
50	2			D	2.0		pp = 350		2
				D	2.5		pp = 350		
49	3			D	3.0				3
	3.1	Pit discontinued at 3.1m							
48	4								4

RIG: 14 tonne excavator - 600mm bucket

LOGGED: RB

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Marsden Park Developments Pty Ltd
PROJECT: Proposed Industrial Development
LOCATION: Astoria Street, Marsden Park

SURFACE LEVEL: 51.1 mAHD
EASTING: 298423
NORTHING: 6266341

PIT No: 156
PROJECT No: 94616.00
DATE: 26/6/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
51	0.1	FILL / TOPSOIL: silty clay CH, low plasticity, brown, trace fine gravel, with rootlets throughout		E,D	0.0				
		FILL / Gravelly CLAY CH: medium plasticity, brown, trace sand, cobbles and boulders (gravel, cobbles and boulders siltstone estimated to be of medium or high strength), w < PL, appears well compacted			0.1				
	0.8	Silty CLAY CH: medium to high plasticity, red-brown, trace gravel, w < PL, very stiff, residual		D	0.8				
					0.9				
50	1			B	1.0		pp = 250		1
				D	1.1				
				D	1.5		pp = 350		
		1.8m: grading to grey with red-brown							
49	2			D	2.0		pp = 250		2
				D	2.5		pp = 300		
		- hard, possibly extremely weathered sandstone							
	3			D	3.0				3
48	3.1				3.1				
	3.2	SANDSTONE: fine grained, very low to low strength, grey and brown, Bringelly Shale		D	3.2				
		Pit discontinued at 3.2m							
47	4								4

RIG: 14 tonne excavator - 600mm bucket

LOGGED: RB

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

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

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Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Marsden Park Developments Pty Ltd
PROJECT: Proposed Industrial Development
LOCATION: Astoria Street, Marsden Park

SURFACE LEVEL: 40.5 mAHD
EASTING: 298178
NORTHING: 6266922
DIP/AZIMUTH: 90°/--

BORE No: 101
PROJECT No: 94616.00
DATE: 2/7/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Type	Core Rec. %	RQD %	Test Results & Comments
40	0.1	FILL / TOPSOIL: silty clay CH, medium plasticity, brown, with rootlets throughout, trace gravel										
	0.3	FILL / Silty CLAY CH: medium to high plasticity, brown and grey, trace fine gravel, w < PL, variably compacted							D			pp = 150
1									D			
39		Silty CLAY CH: medium to high plasticity, pale grey mottled orange and brown, trace ironstone and shale gravel, w < PL, stiff to very stiff, residual							S			5,9,11 N = 20
2								Note: Unless otherwise stated all defects are bedding planes dipping 0-15°, pl, sm, cly vn or fe stn	D			
38	2.5	SILTSTONE: grey-brown, very low strength, moderately weathered, fractured, trace sandstone laminations Bringelly Shale							S			20/100B refusal
3								2.78 - 2.86m: J80°, pl, sm, fe stn (x2) 2.93m: J25-35°, ir, sm, he (x2)				
	3.25	SANDSTONE: fine grained, orange-brown, low strength, moderately weathered, fractured, trace siltstone laminations, Bringelly Shale						3.05m: Cs, 200mm 3.38m: J30°, pl, sm, fe stn	C			100,34 refusal PL(A) = 0.15
37	3.63	SILTSTONE: grey, low strength, moderately then slightly weathered, fractured, with 30% sandstone laminations, Bringelly Shale						3.5m: J20-45°, ir, sm, fe stn 3.69m: J55°, pl, sm, cly vn 3.98m: Cs, 20mm 4.17m: J30°, pl, sm, cly vn				PL(A) = 0.19 PL(A) = 0.11
4												
36												
5								5.35m: J80-90°, ir, sm, he	C			100,72 refusal PL(A) = 0.18
35								5.88m: J45-80°, ir, sm, he 6.02m: J70°, pl, sm, he				PL(A) = 0.22
6								6.44m: J30°, pl, sm, cly vn 6.5m: Cs, 30mm 6.79m: fg, 20mm				PL(A) = 0.27
34												
7	7.0	Bore discontinued at 7.0m										
33												
8												
32												
9												
31												

RIG: XC **DRILLER:** Traccess **LOGGED:** JY **CASING:** 0-2.6m

TYPE OF BORING: 150mm diameter SFA to 2.6m then NMLC coring to 7.0m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

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

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BORE:BH101 **PROJECT: 94616.00** **July 2020**

2.6m – 7.0m

BOREHOLE LOG

CLIENT: Marsden Park Developments Pty Ltd
PROJECT: Proposed Industrial Development
LOCATION: Astoria Street, Marsden Park

SURFACE LEVEL: 43.7 mAHD
EASTING: 298405
NORTHING: 6266893
DIP/AZIMUTH: 90°/--

BORE No: 102
PROJECT No: 94616.00
DATE: 1/7/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Degree of Weathering	Graphic Log	Rock Strength	Water	Fracture Spacing (m)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
43.65	0.05	FILL / TOPSOIL: silty clay CH, grey-brown, with fine to coarse gravel, trace rootlets, w < PL,							D			
43	0.7	FILL / Silty CLAY CI: grey-brown, trace fine to coarse gravel, w <PL, variably compacted							D			
42	1	Silty CLAY CH: medium to high plasticity, orange brown and brown, w < PL, stiff to very stiff, residual - becoming pale grey mottled orange-brown, with ironstone gravel from 1.0m							S			7,7,8 N = 15
41	1.9	Silty CLAY CH: medium to high plasticity, pale grey mottled orange-brown, with ironstone and shale gravel,w <PL, hard, residual (possibly extremely weathered bedrock)						Note: Unless otherwise stated all defects are bedding planes dipping 0-10°, pl, ro, cly vn or cly inf 5mm	D			
	2.5								D S			10/40B refusal
40	3	SANDSTONE: fine to medium grained, orange-brown, with approximately 10-20% siltstone laminations and 5% extremely weathered (clay) bands, medium to high strength, moderately weathered fractured, Bringelly Shale 3.3-3.37m: siltstone band 3.51-4.15m: low to medium strength band						2.98m: Cs, 20mm 3.26m: B, 5°, pl, ro, fg inf 5mm 3.27m: J90°, pl, ro, cly ct, fe stn 3.6 - 3.95 m Cs, 10 mm to 20mm (x3) 4.1m: fg, 50mm	C	100	60	PL(A) = 0.54 PL(A) = 0.81 PL(A) = 0.26 PL(A) = 1.16
39	4.74	LAMINITE: dark grey (50%) siltstone interbedded and interlaminated, with fine to medium grained, orange-brown and yellow-brown sandstone (50%), medium to high strength, moderately to slightly weathered, fractured to slightly fractured, Bringelly Shale						4.64-4.71m: J80°, pl, ro, cly vn 4.74-5.11m: J70-80°, pl, ro, fe stn 5.42m: Cs, 30mm 5.73m: fg, 30mm	C	100	97	PL(A) = 0.44 PL(A) = 3.27
38	5.8	SILTSTONE: pale grey, with approximately 10% sandstone laminations, very high strength, fresh with some iron staining, unbroken, Bringelly Shale						6.58m: J50°, pl, ro, fe stn				
37	6.74	Bore discontinued at 6.74m										
36	7											
35	8											
34	9											

RIG: XC **DRILLER:** Traccess **LOGGED:** JY / IT **CASING:** 0-2.6m

TYPE OF BORING: 150mm diameter SFA to 2.6m then NMLC coring to 6.74m.

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

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

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BORE:BH102 **PROJECT: 94616.00** **July 2020**

2.6m – 6.74m

BOREHOLE LOG

CLIENT: Marsden Park Developments Pty Ltd
PROJECT: Proposed Industrial Development
LOCATION: Astoria Street, Marsden Park

SURFACE LEVEL: 41.9 mAHD
EASTING: 298270
NORTHING: 6266817
DIP/AZIMUTH: 90°/--

BORE No: 103
PROJECT No: 94616.00
DATE: 30/6/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
41	0.1	FILL / TOPSOIL: silty clay CH, grey-brown, trace rootlets							
	0.5	FILL / Silty CLAY CH: medium to high plasticity, pale grey mottled orange, w <PL		D	0.4 0.5				
	1	FILL / Gravelly CLAY CH: grey with sand, ripped shale gravel, w < PL		S	1.5 1.95		13,9,11 N = 20		
40	2								
	2.5	Silty CLAY CH: medium to high plasticity, pale grey mottled orange-brown, w < PL, very stiff, residual		D U50	2.9 3.0 3.2				
39	3								
	3.8	SHALE: grey-brown, very low strength, moderately weathered, Bringelly Shale		D S	3.9 4.0 4.06		20/608 refusal		
38	4								
	4.06	Bore discontinued at 4.06m							
37	5								
36	6								
35	7								
34	8								
33	9								
32									

RIG: Hanjin D&B 8D **DRILLER:** Sytech **LOGGED:** JY **CASING:** Uncased
TYPE OF BORING: 150mm diameter SFA
WATER OBSERVATIONS: No free groundwater observed
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Marsden Park Developments Pty Ltd
PROJECT: Proposed Industrial Development
LOCATION: Astoria Street, Marsden Park

SURFACE LEVEL: 41.8 mAHD
EASTING: 298168
NORTHING: 6266753
DIP/AZIMUTH: 90°/--

BORE No: 104
PROJECT No: 94616.00
DATE: 1/7/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Degree of Weathering	Graphic Log	Rock Strength	Water	Fracture Spacing (m)	Discontinuities	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
			EW HW MW SW FS FR		Ex Low Very Low Low Medium High Very High Ex High		0.01 0.05 0.10 0.50 1.00	B - Bedding J - Joint S - Shear F - Fault				
41	0.1	FILL/ TOPSOIL: silty clay CH, grey-brown,trace gravel and rootlets, w <PL							D			
	0.5	FILL / Silty CLAY CH: grey-brown, trace gravel, w<PL							D			
	1	FILL / Gravelly CLAY CL: grey, ripped shale gravel, trace sand, w < PL							S			8,12,8 N = 20
40	2								D			
39	3								S			10,14,13 N = 27
38	3.9	Silty CLAY CH: medium to high plasticity, orange-brown mottled grey, trace fine to medium ironstone gravel and rootlets, w < PL, stiff, residual							D			
	4	- becoming very stiff and pale grey mottled orange from 4.5m							S D U			4,5,6 N = 11
37	5							Unless stated otherwise all defects are bedding planes dipping at 0-10°				
	5.5	SILTSTONE: dark brown to dark grey, with approximately 10% extremely weathered (clay bands), very low to low strength, highly to moderately weathered, fractured, Bringelly Shale							S			18/50 refusal
36	6							5.8m: fg, 20mm 5.87m: Cs, 90mm 5.93m: Ds, 30mm 5.97m: J45-80°, cu, sm, cly ct 6.13m: J60-90°, cu, sm, cly ct 6.38m: J40°, pl, ro, cly vn, fe stn 6.6m: Cs, 20mm 6.7m: Cs, 10mm 6.72m: Cs, 30mm 6.77m: J85°, pl, ro, cly vn 6.89m: fg, 20mm 7.08-7.15m: J70°, un, ro, cly co 7.3m: J25°, pl , ro, cly co 8m: J80°, vn, he	C	100		PL(A) = 0.25
35	7											PL(A) = 0.13
	7.42	SILTSTONE / SHALE: dark grey, with approximately 10% sandstone laminations, low to medium strength, fresh, slightly fractured to unbroken, Bringelly Shale										PL(A) = 0.17
34	8											PL(A) = 0.27
33	9							8.62m: Cs, 20mm 8.72m: 80°, pl, ro, fg inf 10mm	C	100		PL(A) = 0.34
												PL(A) = 0.3
32	10.0							9.7m: fg, 20mm 9.94 :fg, 20 mm				PL(A) = 0.36

Bore discontinued at 10.0m

RIG: XC **DRILLER:** Traccess **LOGGED:** JY **CASING:** 0-5.7m

TYPE OF BORING: 150mm diameter SFA to 5.55m then NMLC coring to 10.0m

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

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

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BORE:BH104 PROJECT: 94616.00 July 2020

5.7m – 10.0m

BOREHOLE LOG

CLIENT: Marsden Park Developments Pty Ltd
PROJECT: Proposed Industrial Development
LOCATION: Astoria Street, Marsden Park

SURFACE LEVEL: 44.3 mAHD
EASTING: 298372
NORTHING: 6266725
DIP/AZIMUTH: 90°/--

BORE No: 105
PROJECT No: 94616.00
DATE: 30/6/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Degree of Weathering	Graphic Log	Rock Strength	Water	Fracture Spacing (m)	Discontinuities	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
			EW HW MW SW FS FR		Ex Low / Very Low / Low / Medium / High / Very High / Ex High		0.01 / 0.05 / 0.10 / 0.50 / 1.00	B - Bedding J - Joint S - Shear F - Fault				
44	0.1	FILL / TOPSOIL / Silty CLAY: grey-brown, trace gravel rootlets, w < PL, surficial rootlets										
		FILL / Gravelly CLAY: grey, with sand, gravel is fine to coarse siltstone, w < PL, apparently well compacted							D			
43	1											
42	2								D			
	3											
41	3.2	Silty CLAY CH: medium to high plasticity, pale grey mottled red and orange, w < PL, stiff to very stiff, residual							D			
								Note: Unless stated otherwise all defects are bedding planes dipping 0-10°, pl, ro, cly vn or cly inf 5-10mm	S			6,8,8 N = 16
40	4											
	4.4	LAMINITE: fine grained, orange-brown to red-brown, interbedded sandstone (60-80%) with approximately 20 - 40% siltstone laminations, medium strength, moderately weathered, Bringelly Shale						4.44m: Cs, 20mm 4.64-4.71m: J70°, pl, ro, fe stn 4.98m: Cs, 20mm 5.2-5.27m: J80°, pl, ro, fe, stn 5.49-5.62m: J70°, pl, ro, fe stn 5.92m: Cs, 50mm	C	100	90	PL(A) = 0.57 PL(A) = 0.95 PL(A) = 0.53
39	5											
		5.63m: grading to medium grained sandstone										
38	6											
	6.55	SANDSTONE: fine grained, pale grey and orange-brown, medium to high strength, fresh with some iron staining, unbroken, Bringelly Shale										PL(A) = 0.6
37	7											PL(A) = 0.64
									C	100	100	
36	8											PL(A) = 1.08
	8.54	Bore discontinued at 8.54m										
35	9											

RIG: XC **DRILLER:** Traccess **LOGGED:** JY / IT **CASING:** Uncased

TYPE OF BORING: 150mm diameter SFA to 4.4m then NMLC coring to 8.54m

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics / Environment / Groundwater

BORE:BH105 **PROJECT: 94616.00** **July 2020**

4.4m – 8.54m

BOREHOLE LOG

CLIENT: Marsden Park Developments Pty Ltd
PROJECT: Proposed Industrial Development
LOCATION: Astoria Street, Marsden Park

SURFACE LEVEL: 49.5 mAHD
EASTING: 298461
NORTHING: 6266448
DIP/AZIMUTH: 90°/--

BORE No: 106
PROJECT No: 94616.00
DATE: 30/6/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Degree of Weathering	Graphic Log	Rock Strength	Water	Fracture Spacing (m)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
49	0.05	FILL/TOPSOIL: silty clay CH, brown with rootlets throughout	EW HW MW SW FS FR		Ex Low Very Low Low Medium High Very High Ex High		0.01 0.05 0.10 0.50 1.00					
		Silty CLAY CH: medium to high plasticity, orange-brown mottled grey, trace fine gravel, w < PL, stiff to very stiff, residual							U50			6,8,10 N = 18
48	1	= becoming very stiff from 0.7m							S			
		= becoming pale grey mottled orange and red and trace of ironstone gravel from 1.0m							D			
47	2							Note: Unless stated otherwise all defects are bedding planes dipping 0-10°, pl, ro, cly vn or cly inf 5-10mm	D			
	2.5	SANDSTONE: fine grained, red-brown, medium strength, moderately weathered, fractured to slightly fractured, Bringelly Shale							S			15/60B refusal
46	3							3.28 - 3.43 m; Cs, 20 - 30 mm (x2)				PL(A) = 0.88
												PL(A) = 0.92
45	4							4.09-4.38m: J80-90°, un, ro, fe stn	C	100	91	
	4.38	SANDSTONE: fine to medium grained, orange-brown and pale grey,laminated with cross bedding, with ironstone bands, high strength, moderately to slightly weathered, fractured, Bringelly Shale						4.81-4.89m: (x2) B80°, pl, ro, fe, stn				PL(A) = 1.31
	5											PL(A) = 1.46
	5.21	LAMINITE: fine to medium grained, pale grey and orange-brown, 60 - 70% sandstone and 30 - 40 % siltstone, laminated to very thinly bedded, with ironstone bands, low strength, moderately to slightly weathered, slightly fractured to unbroken, Bringelly Shale										PL(A) = 0.47
44								5.61m: fg, 20mm				
	6											PL(A) = 0.33
		6.51m: grading to low strength sandstone										PL(A) = 0.16
43	7								C	100	55	
												PL(A) = 0.22
42	7.71	SILTSTONE: fine to coarse grained, pale grey, 50 - 60% sandstone and 40 - 50% siltstone, interbedded and interlaminated, low and medium strength with high strength band, fresh, slightly fractured, Bringelly Shale										PL(A) = 0.79
	8											PL(A) = 1.87
								8.23m: fg, 50mm				
41		8.75m: grading to 70% siltstone and 30% sandstone, moderately weathered										PL(A) = 0.25
	9	8.98m: highly fractured							C	100	31	
								9.2m: Cs, 40mm				
40								9.16 - 9.77 m: Cs, 10 - 40 mm (x3)				PL(A) = 0.7
	9.79	Bore discontinued at 9.79m						9.44-9.52m: J60°, pl, sm, cly co				

RIG: Hanjin D&B 8D **DRILLER:** Sytech **LOGGED:** JY **CASING:** 0-2.5m

TYPE OF BORING: 150mm diameter SFA to 2.5m then NMLC coring to 9.79m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Well constructions details: Blank 0-5.3m, Screen 5.3-8.3m, Backfill: 5mm gravel 0-4.3m bgl, Bentonite 4.3-4.8m bgl, 5mm gravel 4.8-9.79m

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics / Environment / Groundwater

BORE: BH106 PROJECT: 94616.00 July 2020

2.54m – 7.0m

BORE: BH106 PROJECT: 94616.00 July 2020

7.0m – 9.79m

BOREHOLE LOG

CLIENT: Marsden Park Developments Pty Ltd
PROJECT: Proposed Industrial Development
LOCATION: Astoria Street, Marsden Park

SURFACE LEVEL: 51.0 mAHD
EASTING: 298543
NORTHING: 6266435
DIP/AZIMUTH: 90°/--

BORE No: 107
PROJECT No: 94616.00
DATE: 30/6/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
51	0.05	FILL/TOPSOIL: silty clay CH, brown with vegetation throughout							
		FILL / Silty CLAY: brown and grey, trace fine to medium gravel, w <PL		D	0.4 0.5				
	0.8	Silty CLAY: medium to high plasticity, pale grey mottled red and orange, w < PL, very stiff, residual							
50	1			U50	1.0 1.25				1
					1.5				
				S			6,10,13 N = 23		
49	2				1.95				2
48	3	- hard clay (possibly extremely weathered shale)			3.0				3
				S			11,15,20/120 refusal		
	3.6				3.42				
	3.7	SHALE: grey-brown, very low strength, with clay seams, moderately weathered, Bringelly Shale							
47	4	Bore discontinued at 3.7m - Practical refusal at 3.7m							4
46	5								5
45	6								6
44	7								7
43	8								8
42	9								9

RIG: XC **DRILLER:** Traccess **LOGGED:** JY **CASING:** Uncased

TYPE OF BORING: 150mm diameter SFA

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

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

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BOREHOLE LOG

CLIENT: Marsden Park Developments Pty Ltd
PROJECT: Proposed Industrial Development
LOCATION: Astoria Street, Marsden Park

SURFACE LEVEL: 51.8 mAHD
EASTING: 298456
NORTHING: 6266375
DIP/AZIMUTH: 90°/--

BORE No: 108
PROJECT No: 94616.00
DATE: 30/6/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Degree of Weathering	Graphic Log	Rock Strength	Water	Fracture Spacing (m)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
51	0.05	FILL/TOPSOIL: silty clay CH, brown with vegetation throughout							D			
		Silty CLAY CH: medium to high plasticity, mottled pale grey and orange-brown, w <PL, stiff, residual										
50	1.0	Silty CLAY CH: medium to high plasticity, pale grey mottled red, trace ironstone gravel, w < PL, very stiff, residual							S			6,9,12 N = 21
	2								D			
49	2.85	- hard (extremely weathered siltstone)						Note: Unless otherwise stated all defects are bedding planes dipping 0-10°, pl, sm, cly ct	S			20,R refusal
		SILTSTONE: grey and orange-brown, low strength, moderately weathered, fractured, with extremely weathered seams, Bringelly Shale						2.86- 3.16m: Cs 30 - 40 mm (x2) 3.2-3.3m: J90°, st, ro, fe stn 3.39-3.44m: J80°, pl, sm, cly cu				
48	3.63	LAMINITE: fine grained, grey-brown, medium strength, moderately weathered, slightly fractured, 40 - 50% sandstone with 50- 60% siltstone laminations, Bringelly Shale						3.44m: Cs, 70mm 3.44- 3.54m: Cs 70 - 90 mm (x2) 3.64m: J40-90°, vn, ro, fe stn	C	100	30	PL(A) = 0.94
47	5							5.31m: B0°, pl, ro, fg, cly inf	C	100	67	PL(A) = 0.68
46	6.0	SANDSTONE: fine to medium grained, pale grey and brown, high strength, moderately to slightly weathered, slightly fractured, Bringelly Shale										PL(A) = 1.77
45	7							7.15m: fg, 20mm 7.58m: B0°, pl, ro, fg, inf	C	100	83	PL(A) = 1.05
44	8.35	8.20-8.23m and 8.4-8.44m: siltstone band										PL(A) = 0.51
43	9	SILTSTONE: fine to medium grained, grey, medium strength, fresh stained, with 30% sandstone laminations, Bringelly Shale						9.28-9.33m: J60°, pl, ro, cly vn	C	100	72	PL(A) = 0.56
42	10.0	Bore discontinued at 10.0m										

RIG: XC **DRILLER:** Traccess **LOGGED:** JY **CASING:** 0-2.85m

TYPE OF BORING: 150mm diameter SFA to __ then NMLC coring to

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

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

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BORE: BH108 PROJECT: 94616.00 July 2020

2.85m – 7.0m

BORE: BH108 PROJECT: 94616.00 July 2020

7.0m – 10.0m

BOREHOLE LOG

CLIENT: Marsden Park Developments Pty Ltd
PROJECT: Proposed Industrial Development
LOCATION: Astoria Street, Marsden Park

SURFACE LEVEL: 51.9 mAHD
EASTING: 298535
NORTHING: 6266348
DIP/AZIMUTH: 90°/--

BORE No: 109
PROJECT No: 94616.00
DATE: 29/6/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Degree of Weathering	Graphic Log	Rock Strength	Water	Fracture Spacing (m)	Discontinuities	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
			EW HW MW SW FS FR		Ex Low Very Low Low Medium High Very High Ex High		0.01 0.05 0.10 0.50 1.00	B - Bedding J - Joint S - Shear F - Fault				
51	0.05	FILL/TOPSOIL: silty clay CH, brown with vegetation throughout							D			
		Silty CLAY CH: medium to high plasticity, pale grey mottled orange, trace ironstone gravel and carbonaceous material, w < PL, stiff, residual							S			3,6,7 N = 13
50	1.5	Silty CLAY CH: medium to high plasticity, pale grey mottled red, with ironstone gravel, w < PL, very stiff, residual							S			7,10,16 N = 26
									D			
49	3.0	Silty CLAY CH: medium to high plasticity, pale grey mottled red, with bands of ironstone and extremely weathered siltstone,w < PL, hard, residual (extremely weathered siltstone)						Note: Unless stated otherwise all defects are bedding planes dipping 0-10°, pl, ro, clyn vn or fe stn				
								3.15m: Cs, 300m	S			12,16,20 N = 36
48	3.87	SILTSTONE: grey-brown, very low strength, highly to moderately weathered, slightly fractured, with 5% clay seams, Bringelly Shale						3.5m: Cs, 60mm 3.68m: Cs, 50mm 3.77m: Cs, 100mm	C	100	5	PL(A) = 0.09
								4.65m: Cs, 20mm				
47	5.0	LAMINITE: grey and brown, low strength, moderately then slightly weathered, fractured, 30% sandstone laminations, Bringelly Shale						4.93m: Cs, 70mm				PL(A) = 0.22
												PL(A) = 0.09
46								5.85m: (2x) J20-45°, ir, ro, he				
								6.19m: J40-80°, cu, ro, he				PL(A) = 0.19
45								6.53m: J45°, pl, ro, cly vn, fe stn 6.76-6.84m: (2x) J45°, pl, ro, cly vn, fe stn	C	100	57	
								7.17m: fg, 10mm 7.2m: Cs, 10mm 7.41m: fg, 10mm				
44												PL(A) = 0.23
												PL(A) = 0.11
43	8.55	LAMINITE: grey, medium then high strength, fresh stained, with 60% sandstone laminations, Bringelly Shale						8.54m: Cs, 10mm				PL(A) = 0.93
									C	100	83	PL(A) = 1.08
42	10.0	Bore discontinued at 10.0m						9.57m: Ds, 10mm				

RIG: Hanjin D&B 8D **DRILLER:** Sytech **LOGGED:** JY **CASING:** 0-3.15m

TYPE OF BORING: 150mm diameter SFA to 3.0m then coring to 10.0m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Well construction details: Blank 0-5.3m, Screen 5.3-8.3m, Backfill: 5mm gravel, Bentonite 4.3-4.8m, 5mm gravel 4.8-10m

SAMPLING & IN SITU TESTING LEGEND

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

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BORE: BH109 PROJECT: 94616.00 July 2020

3.15m – 8.0m

BORE: BH109 PROJECT: 94616.00 July 2020

8.0m – 10.0m

BOREHOLE LOG

CLIENT: Marsden Park Developments Pty Ltd
PROJECT: Proposed Industrial Development
LOCATION: Astoria Street, Marsden Park

SURFACE LEVEL: 50.9 mAHD
EASTING: 298447
NORTHING: 6266314
DIP/AZIMUTH: 90°/--

BORE No: 110
PROJECT No: 94616.00
DATE: 29/6/2020
SHEET 1 OF 2

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low / Very Low / Low / Medium / High / Very High / Ex High)	Water	Fracture Spacing (m) (0.01 / 0.05 / 0.10 / 0.50 / 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
50	0.1	FILL/TOPSOIL: silty clay CH, brown with vegetation throughout							D			
		Silty CLAY CH: medium to high plasticity, pale grey mottled red, with ironstone gravel, w < PL, very stiff, residual							U50			
49	1								D			
									S			7,9,12 N = 21
48	2								D			
								Note: Unless otherwise stated all defects are bedding planes dipping 0-10°, pl, ro, cly inf 5mm or fg 5mm	S			10,13,16 N = 29
	3	- hard from 2.8m (extremely weathered siltstone)										
	3.0	SILTSTONE: pale brown, very low strength siltstone with 30% clay seams, highly then moderately weathered, fractured, Bringelly Shale						3.2m: CORE LOSS: 220mm	C	100	0	
47	3.42	CORE LOSS						3.62-3.87m:Cs, 40 -60mm (x3)				
	4							4.03m: J90°, pl, ro, he 4.18m: J75°, un, sm, he 4.18-4.68 m: Cs, 20 - 80 mm (x4)	C	89	7	
46	4.78	LAMINITE: grey and brown, low strength with very low to low strength bands, moderately weathered, fractured, Bringelly Shale										PL(A) = 0.1
	5							5.15m: J70°, pl, ro, cln 5.34 - 6.63 m: J60°, pl, ro, fe stn (x3)				
45	6											PL(A) = 0.2
												PL(A) = 0.1
44	7								C	100	67	
												PL(A) = 0.1
43	7.9	LAMINITE: grey and brown, high strength bands, moderately to slightly weathered, fractured, Bringelly Shale										PL(A) = 0.2 PL(A) = 2.6
	8											
42	8.65	SANDSTONE: fine to medium grained, grey, high strength, slightly fractured, fresh stained, with 20-30% siltstone laminations, Bringelly Shale							C	100	79	
	9											
41												

RIG: Hanjin D&B 8D **DRILLER:** Sytech **LOGGED:** JY **CASING:** 0-3.0m

TYPE OF BORING: 150mm diameter SFA to 30.0m then NMLC coring to 10.14m

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Well construction details: Blank 0-5.6m, Screen 5.6-8.6m, Backfill: 5mm gravel 0-2.5m, Bentonite 2.5-3.0m, 5mm gravel 3.0-8.6m

SAMPLING & IN SITU TESTING LEGEND

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

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BOREHOLE LOG

CLIENT: Marsden Park Developments Pty Ltd
PROJECT: Proposed Industrial Development
LOCATION: Astoria Street, Marsden Park

SURFACE LEVEL: 50.9 mAHD
EASTING: 298447
NORTHING: 6266314
DIP/AZIMUTH: 90°/--

BORE No: 110
PROJECT No: 94616.00
DATE: 29/6/2020
SHEET 2 OF 2

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
	10.14	Bore discontinued at 10.14m							C	100	79	PL(A) = 2.08
40	11											
39	12											
38	13											
37	14											
36	15											
35	16											
34	17											
33	18											
32	19											
31												

RIG: Hanjin D&B 8D **DRILLER:** Sytech **LOGGED:** JY **CASING:** 0-3.0m

TYPE OF BORING: 150mm diameter SFA to 30.0m then NMLC coring to 10.14m

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Well construction details: Blank 0-5.6m, Screen 5.6-8.6m, Backfill: 5mm gravel 0-2.5m, Bentonite 2.5-3.0m, 5mm gravel 3.0-8.6m

SAMPLING & IN SITU TESTING LEGEND

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

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BORE: BH110 PROJECT: 94616.00 July 2020

3.0m – 7.0m

BORE: BH110 PROJECT: 94616.00 July 2020

7.0m – 10.14m

BOREHOLE LOG

CLIENT: Marsden Park Developments Pty Ltd
PROJECT: Proposed Industrial Development
LOCATION: Astoria Street, Marsden Park

SURFACE LEVEL: 41.9 mAHD
EASTING: 298309
NORTHING: 6266894
DIP/AZIMUTH: 90°/--

BORE No: 157
PROJECT No: 94616.00
DATE: 2/7/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Degree of Weathering	Graphic Log	Rock Strength	Water	Fracture Spacing (m)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
41	0.1	FILL / TOPSOIL: Silty CLAY: brown, with rootlets throughout, trace sand and fine gravel,										
	0.3	FILL / Silty CLAY CH: grey-brown, trace sand and fine gravel, w < PL, appears well compacted							D			
	1	Silty CLAY CH: medium to high plasticity, red-brown mottled grey, trace fine ironstone gravel, w < PL, stiff to very stiff, residual							S			4,5,7 N = 12
40	1.8	LAMINITE: grey-brown, very low strength, moderately weathered, fractured, Bringelly Shale						Note: Unless stated otherwise all defects are bedding planes dipping 0-10°, pl, ro, cly vn or fe stn	D S			8/80B refusal
	2											
	2.5	SANDSTONE: fine to medium grained, grey-brown, medium then high strength, moderately weathered, slightly fractured, 30% siltstone laminations, Bringelly Shale										PL(A) = 0.6
39	3											PL(A) = 1.2
	3.7	SANDSTONE: fine grained, grey and orange-brown, very high strength, moderately weathered and fresh stained, slightly fractured, Bringelly Shale										PL(A) = 3.5
38	4								C	100	87	
	5.0	SANDSTONE: fine to medium grained, grey, fresh stained, slightly fractured with 10% siltstone laminations, Bringelly Shale						4.26m: J90°, pl, ro, cly vn, fe stn 4.32m: J45°, pl, ro, cly vn, fe stn 4.32-4.64m: J40-45°, pl, ro, cly vn, fe stn (x2)				PL(A) = 0.7
37	5											
	5.5	Bore discontinued at 5.5m										
36	6											
35	7											
34	8											
33	9											
32												

RIG: XC **DRILLER:** Traccess **LOGGED:** JY **CASING:** 0-2.5m

TYPE OF BORING: 150mm diameter SFA to 2.5 m then NMLC Coring to 5.5 m

WATER OBSERVATIONS: No free groundwater observed

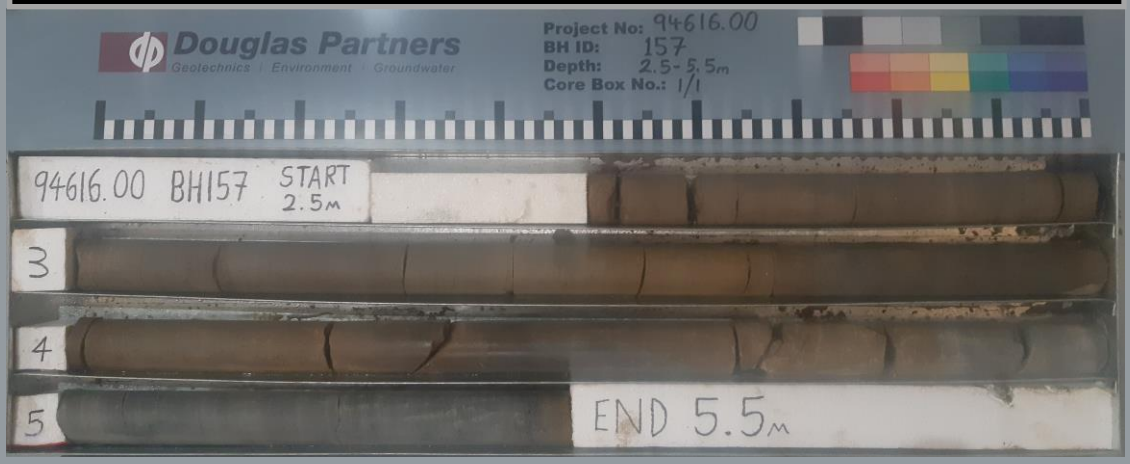
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics / Environment / Groundwater

BORE:BH157 PROJECT: 94616.00 July 2020



2.5m – 5.5m

BOREHOLE LOG

CLIENT: Marsden Park Developments Pty Ltd
PROJECT: Proposed Industrial Development
LOCATION: Astoria Street, Marsden Park

SURFACE LEVEL: 53.2 mAHD
EASTING: 298544
NORTHING: 6266300
DIP/AZIMUTH: 90°/--

BORE No: 111
PROJECT No: 94616.00
DATE: 30/6/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
53	0.05	FILL/TOPSOIL: silty clay CH, brown with vegetation throughout							
		Silty CLAY CH: medium to high plasticity, brown mottled grey, w < PL, stiff, residual, surficial vegetation		D	0.4 0.5				
52	1.0	Silty CLAY CH: medium to high plasticity, pale grey mottled orange and brown, trace carbonaceous material and ironstone gravel, w < PL, very stiff, residual		S	1.0 1.45		5,8,10 N = 18		
51	2			D	1.9 2.0				
				S	2.5 2.95		6,11,17 N = 28		
50	3	- hard from 3.7m (extremely weathered siltstone)							
49	4.1 4.2	SILTSTONE: grey-brown, very low strength, moderately weathered, Bringelly Shale		S	4.0 4.21		20,20/60 refusal		
		Bore discontinued at 4.21m							
48	5								
47	6								
46	7								
45	8								
44	9								

RIG: Hanjin D&B 8D **DRILLER:** Sytech **LOGGED:** JY **CASING:** Uncased
TYPE OF BORING: 150mm diameter SFA
WATER OBSERVATIONS: No free groundwater observed
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics / Environment / Groundwater

Appendix E

Data Quality Objectives

Appendix E - Data Quality Objectives

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

E.1 State the Problem

The site is proposed to be redeveloped for industrial land use. The desktop study and site walkover identified the following within the Site:

- Filling within the Paddock comprising overburden from the shale quarry and potential night soils;
- Filling from an unknown source used to raise the vehicle access track;
- Waste stockpiles containing timber and various anthropogenic waste materials (plastic, metal, timber etc);
- Anthropogenic wastes were also observed on ground surfaces in multiple areas surrounding the stockpiles in the southern portion of the southern part of the site; and
- The remainder of the site has been identified as having a low potential for contamination based on site inspections and historical searches.

The “problem” to be addressed is that the extent and nature of potential contamination at the site is unknown, and as such, it is unclear whether the Site is compatible with the proposed development.

The objectives of the SCI are as follows:

- Assess the nature and extent of contamination at the site (if any): and
- Make recommendations for further investigations and/or remediation to render the site compatible with the proposed development (if required).

E.2 Identify the Decision/Goal of the Study

The compatibility of the site for proposed industrial use was assessed based on a comparison of the analytical results for all COPC, with the adopted SAC as detailed in Section 8 of the report and discussed below.

Based on the desktop study and site walkover, DP considered that the site has a generally low potential for contamination. To assess the contamination status of the Site, a sampling density of one location per hectare was adopted. Sampling locations were positioned to target potential contamination sources as discussed in Section 7.2 and F.1 above. Selected soil samples collected were analysed for a selection of the following COPC: metals; BTEX; TRH; PAH; OCP; OPP; PCB; and asbestos.

The analytical data from the samples was compared to the health-based investigation and screening levels (HILs and HSL, respectively) and ecological investigation and screening levels (EILs and ESLs) for commercial use as per Schedule B1,NEPC (2013).

The following specific decisions were considered as part of the DSI:

- Did field observation and analytical results identify potential contamination sources which were not included in the preliminary CSM?
- Were COPC present in soil at concentrations that pose a potential risk to identified receptors?
- Do concentrations of COPC in soil present a risk to groundwater or surface water in the vicinity of the Site?
- Is the data sufficient to make a decision regarding the abovementioned risks, the compatibility of the Site for the proposed development, or are additional investigations required?
- Does contamination at the Site, if encountered, trigger the Duty to Report requirements under the CLM Act 1997?
- Are there any off-site migration issues that need to be considered?
- Is the data sufficient to enable the preparation of a Remediation Action Plan (RAP) and/or Environmental Management Plan (EMP) should the data suggest these are required?

E.3 Identify Information Inputs

Inputs into the decisions are as follows:

- Review of previous investigations GHD (2008 and 2009) and DP (2017 and 2019);
- Regional geology, topography and hydrogeology information;
- Analytical data from soil samples collected in a general grid pattern across the Site.
- The lithology of the site as described in the test pit logs (Appendix E);
- Field and laboratory QA/QC data to assess the suitability of the environmental data for the SCI (Appendix F);
- All analysis was undertaken at a NATA accredited laboratory; and
- Laboratory reported concentrations of contaminants of concern were compared with the NEPC (2013) criteria discussed in Section F.2.

E.4 Define the Study Boundaries

The Site is located within SBP, Marsden Park in the local government area of Blacktown City Council. The Site has an area of approximately 38.75 ha and incorporates the following property identifiers:

- Part Lot 36 in Deposited Plan (D.P.) 262886; and
- Part Lots 4 and 5 D.P. 1210172.

As shown on Drawing 1 – Appendix A.

E.5 Develop the Analytical Approach (or decision rule)

The information obtained during the assessment was used to assess the site in terms of contamination issues and risk to human health and the environment. The decision rules used in assessing the site were as follows:

- The adopted SAC were NSW Environment Protection Authority (EPA) endorsed criteria; and
- The contaminant concentrations in soil and fill material were compared to the adopted SAC to determine whether further investigation or remedial action was required.

Field and laboratory test results were considered useable for the assessment after evaluation against the following data quality indicators (DQIs):

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

The specific limits are outlined in the data QA/QC procedures and results (Appendix F).

E.6 Specify the Performance or Acceptable Criteria

Decision errors for the respective COPC for fill and natural soils are:

1. Deciding that fill and natural soil at the Site exceeds the adopted SAC when they truly do not; and
2. Deciding that fill and natural soil at the Site are within the adopted SAC when they truly do not.

Decision errors for the DSI were minimised and measured by the following:

- The sampling regime targeted each stratum identified to account for site variability;
- Sample collection and handling techniques were in accordance with DP's *Field Procedures Manual*;
- Samples were prepared and analysed by a NATA-accredited laboratory with the acceptance limits for laboratory QA/QC parameters based on the laboratory reported acceptance limits and those stated in NEPC (2013);
- The analyte selection is based on the available site history, past site activities, site features and the findings of GHD (2008 and 2009). The potential for contaminants other than those proposed to be analysed is considered to be low;
- The SAC were adopted from established and NSW EPA endorsed guidelines. The SAC have risk probabilities already incorporated; and

- A NATA accredited laboratory using NATA endorsed methods are used to perform laboratory analysis. Where NATA endorsed methods are not used, the reasons are stated. The effect of using non-NATA methods on the decision making process are explained.

E7 Optimise the design for obtaining data

Sampling design and procedures that were implemented to optimise data collection for achieving the DQOs included the following;

- A NATA accredited laboratory using NATA endorsed methods were used to perform laboratory analysis whenever possible;
- Adequately experienced environmental scientists/engineers were chosen to conduct field work and sample analysis interpretation.

Appendix F

Quality Assurance and Quality Control Assessment

Appendix F
Data Quality Assurance and Quality Control Assessment

F1 Data Quality Indicators

Field and laboratory procedures were assessed against the following data quality indicators (DQIs):

Table F1: Data Quality Indicators

DQI	Performance Indicator	Acceptable Range
Precision		
Field considerations	SOPs appropriate and complied with	Field staff follow SOPs in the DP *Field Procedures Manual*
	field replicates	Precision average relative percent difference (RPD) result <5 times PQL, no limit; results >5 times PQL, 0% - 30%
Laboratory considerations	laboratory duplicates	Precision average RPD result <5 times PQL, no limit; results >5 times PQL, 0% - 50%
	laboratory-prepared volatile trip spikes	Recovery of 60-140%
Accuracy (bias)		
Field considerations	SOPs appropriate and complied with	Field staff follow SOPs in the DP *Field Procedures Manual*
Laboratory considerations	Analysis of:	
	method blanks (laboratory blanks)	Recovery of 60-140%
	matrix spikes	Recovery of 70-130% (inorganics); 60-140% (organics)
	matrix spike duplicates	Recovery of 70-130% (inorganics); 60-140% (organics); Recovery 70 “low” to 130% “high” indicates interference
	surrogate spikes	Recovery of 70-130% (inorganics); 60-140% (organics)
	laboratory control samples	Recovery of 70-130% (inorganics); 60-140% (organics)
Completeness		
Field considerations	All critical locations sampled	All critical locations sampled in accordance with the DQO’s (Appendix F)
	SOPs appropriate and complied with	Field staff follow SOPs in the DP *Field Procedures Manual*
	Experienced sampler	Experienced DP Environmental Engineer conducted field work and sampling
	Documentation correct	Maintain COC documentation at all times
	Sample holding times complied with	Sample holding times complied with
Laboratory considerations	All critical samples analysed according to DQO’s	All critical locations analysed in accordance with the DQO’s
	Appropriate methods and PQLs	Appropriate methods and PQLs have been used by the contract laboratory
	Sample documentation complete	Maintain COC documentation at all times

DQI	Performance Indicator	Acceptable Range
Comparability		
Field considerations	Same SOPs used on each occasion	Field staff follow SOPs in the DP *Field Procedures Manual*
	Experienced sampler	Experienced DP Environmental Scientist/Engineer conducted field work and sampling
	Same types of samples collected	Same types of samples collected
Laboratory considerations	Sample analytical methods used (including clean-up)	Methods NATA accredited
	Sample PQLs (justify/quantify if different)	Consistent PQLs used
	Same laboratories (justify/quantify if different)	Same analytical laboratory for primary samples used
Representativeness		
Field considerations	Appropriate media sampled according to DQO's (Appendix E)	Appropriate media sampled according to DQO's (Appendix G)
	All media identified in DQO's sampled	All media identified in DQO's sampled
Laboratory considerations	All samples analysed according to DQO's	All samples analysed according to DQO's

Notes to Table 1:
SOP Standard Operating Procedure
DQO Data Quality Objectives (Appendix G)

F2 Field Quality Assurance and Quality Control

The field QC procedures for sampling as prescribed in the standard operating procedures (SOPs) in the Douglas Partners *Field Procedures Manual* were followed at all times during the assessment. All sample locations and media were in accordance with the DQO (i.e. as per scope of work in DP's proposal).

F2.1 Sampling Team

Sampling was undertaken by an experienced DP Environmental Engineer.

F2.2 Sample Collection and Weather Conditions

Sample collection procedures and dispatch are reported in body of the report. Sampling was undertaken during sunny and mild conditions with the exception of one day when work was cancelled due to inclement weather.

F2.3 Logs

Logs for each soil grid based test pit sampling location were recorded in the field. The individual samples were recorded on the field logs along with the sample identity, location, depth, initials of sampler, duplicate locations, duplicate type and site observations. Logs are presented in Appendix D.

F2.4 Chain of Custody

Chain of custody information was recorded on the Chain of Custody (COC) sheets and accompanied samples to the analytical laboratory. Signed copies of COCs are presented in Appendix G, prior to the laboratory certificate.

F2.5 Sample Splitting Techniques

Replicate samples were collected in the field as a measure of precision of the results. Field replicate soil samples were collected from the same location and an identical depth to the primary sample. Equal portions of the primary sample were placed into the sampling jars and sealed. The sample was not homogenised in a bowl to prevent the loss of volatiles from the soil. Replicate samples were labelled with a DP identification number, recorded on DP Test Pit logs, so as to conceal their relationship to their primary sample from the analysing laboratory.

F2.6 Duplicate Frequency

Field sampling comprised intra-laboratory duplicate sampling, at a rate of approximately one duplicate sample for every ten primary samples.

F2.7 Relative Percentage Difference

A measure of the consistency of results for field samples is derived by the calculation of relative percentage differences (RPDs) for duplicate samples. RPDs have only been considered where a concentration is greater than five times the practical quantitation limit (PQL).

F2.7.1 Intra and Inter-Laboratory Replicate Analysis

Replicates were tested to assess data 'precision' and the reproducibility within the primary laboratory (Envirolab Pty Ltd) and Secondary Laboratory (ALS Pty Ltd) as a measure of consistency of sampling techniques. Three replicate samples were analysed. The Relative Percent Difference (RPD) between replicate results is used as a measure of laboratory reproducibility and is given by the following:

$$\text{RPD} = \frac{(\text{Replicate result 1} - \text{Replicate result 2})}{(\text{Replicate result 1} + \text{Replicate result 2})/2} \text{ x } 100$$

The RPD can have a value between 0% and 200%. An RPD data quality objective of up to 30% is considered to be within the acceptable range.

The comparative results of analysis between primary and duplicate samples are summarised in the table below. Where one or both results were below the PQL, an RPD was not calculated.

Table F2: RPD Results

	Metals								PAH			
	Arsenic	Cadmium	Total Chromium	Copper	Lead	Mercury (inorganic)	Nickel	Zinc	Naphthalene [b]	Benzo(a)pyrene (BaP)	Benzo(a)pyrene TEQ	Total PAHs
Sample ID	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
BD1	8	<0.4	20	18	27	<0.1	8	210	<0.1	0.1	<0.5	0.7
TP138-0.1	6	<0.4	16	19	25	<0.1	7	220	<1	0.07	<0.5	0.07
	2	0	4	1	2	0	1	10	0	0.03	0	0.63
	29%	0%	22%	5%	8%	0%	13%	5%	0%	**35%**	0%	**164%**

Notes: Bold RPD >30
Concentration of either paired duplicated not greater than five times PQL

With the exception of the RPD for BaP and Total PAH, RPD values were within the acceptable range of ± 30. The result outside the acceptable range is not considered to be significant because:

- Replicates, rather than homogenised duplicates were used to avoid volatile loss, hence greater variability can be expected;
- The samples and replicant were collected from fill which is inherently heterogenous; and
- The higher result was compared against the SAC.

Overall, the intra-laboratory comparisons indicate that the sampling technique was consistent and repeatable and therefore acceptable precision was achieved.

F3 Laboratory Quality Assurance and Quality Control

Envirolab Services Pty Ltd was used as the primary laboratory. Appropriate methods and PQLs were used by the laboratory.

F3.1 Surrogate Spike

This sample is prepared by adding a known amount of surrogate, which behaves similarly to the analyte, prior to analysis to each sample. The recovery result indicates the proportion of the known concentration of the surrogate that is detected during analysis and is used to assess data 'accuracy'. Results within acceptance limits indicate that the extraction technique was effective.

F3.2 Reference and Daily Check Sample Results – Laboratory Control Sample (LCS)

This sample comprises spiking either a standard reference material or a control matrix (such as a blank of sand or water) with a known concentration of specific analytes. The LCS is then analysed and results compared against each other to determine how the laboratory has performed with regard to sample preparation and analytical procedure and is used to assess data 'accuracy'. LCSs are analysed at a frequency of one in 20, with a minimum of one analysed per batch.

F3.3 Laboratory Duplicate Results

These are additional portions of a sample which are analysed in exactly the same manner as all other samples and is used to assess data 'precision'. The laboratory acceptance criteria for duplicate samples is: in cases where the level is <5xPQL – any RPD is acceptable; and in cases where the level is >5xPQL – 0-50% RPD is acceptable.

F3.4 Laboratory Blank Results

The laboratory blank, sometimes referred to as the method blank or reagent blank is the sample prepared and analysed at the beginning of every analytical run, following calibration of the analytical apparatus and is used to assess data 'accuracy'. This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, it can be determined by processing solvents and reagents in exactly the same manner as for samples. Laboratory blanks are analysed at a frequency of 1 in 20, with a minimum of one per batch.

F3.5 Matrix Spike

This is a sample duplicate prepared by adding a known amount of analyte prior to analysis, and then treated exactly the same as all other samples. The recovery result indicates the proportion of the known concentration of the analyte that is detected during analysis and is used to assess data 'accuracy'. The laboratory acceptance criteria for matrix spike samples is generally 70-130% for inorganic/metals; and 60-140% for organics; and 10-140% for SVOC and speciated phenols.

F3.6 Results of Laboratory QC

The laboratory QC for surrogate spikes, LCS, laboratory duplicate results, laboratory blanks and matrix spikes results are reported in the laboratory certificates of analysis.

The laboratory quality control samples were within the laboratory acceptance criteria. It is considered that an acceptable level of laboratory precision and accuracy was achieved and that surrogate spikes, LCS, laboratory duplicate results, laboratory blanks and matrix spike results were of an acceptable level overall. On the basis of this assessment, the laboratory data set is considered to have complied with the DQIs.

F3.7 Overall Assessment of QA/QC

Specific limits associated with sample handling and laboratory QA/QC were assessed against the DQIs and a summary of compliance is presented in the following table.

Table F3: Data Quality Indicators

DQI	Performance Indicator	Acceptable Range	Compliance
Precision			
Field considerations	SOPs appropriate and complied with	Field staff follow SOPs in the DP *Field Procedures Manual*	C
	field replicates	Precision average relative percent difference (RPD) result <5 times PQL, no limit; results >5 times PQL, 0% - 30%	PC
Laboratory considerations	laboratory duplicates	Precision average RPD result <5 times PQL, no limit; results >5 times PQL, 0% - 50%	C
	laboratory-prepared volatile trip spikes	Recovery of 60-140%	C
Accuracy (bias)			
Field considerations	SOPs appropriate and complied with	Field staff follow SOPs in the DP *Field Procedures Manual*	C
Laboratory considerations	Analysis of:		
	method blanks (laboratory blanks)	Recovery of 60-140%	C
	matrix spikes	Recovery of 70-130% (inorganics); 60-140% (organics)	C
	matrix spike duplicates	Recovery of 70-130% (inorganics); 60-140% (organics); Recovery 70 “low” to 130% “high” indicates interference	C
	surrogate spikes	Recovery of 70-130% (inorganics); 60-140% (organics)	C
	laboratory control samples	Recovery of 70-130% (inorganics); 60-140% (organics)	C
Completeness			
Field considerations	All critical locations sampled	All critical locations sampled in accordance with the SAQP	C
	SOPs appropriate and complied with	Field staff follow SOPs in the DP *Field Procedures Manual*	C
	Experienced sampler	Experienced DP Environmental Scientist/Engineer conducted field work and sampling	C
	Documentation correct	Maintain COC documentation at all times	C
	Sample holding times complied with	Sample holding times complied with	C
Laboratory considerations	All critical samples analysed according to SAQP	All critical locations analysed in accordance with the SAQP	C
	Appropriate methods and PQLs	Appropriate methods and PQLs have been used by the contract laboratory	C
	Sample documentation complete	Maintain COC documentation at all times	C

DQI	Performance Indicator	Acceptable Range	Compliance
Comparability			
Field considerations	Same SOPs used on each occasion	Field staff follow SOPs in the DP *Field Procedures Manual*	C
	Experienced sampler	Experienced DP Environmental Scientist/Engineer conducted field work and sampling	C
	Same types of samples collected (filtered)	Field filtering for metals	NA
Laboratory considerations	Sample analytical methods used (including clean-up)	Methods to be NATA accredited	C
	Sample PQLs (justify/quantify if different)	Consistent PQLs used	C
	Same laboratories (justify/quantify if different)	Same analytical laboratory for primary samples used	C
Representativeness			
Field considerations	Appropriate media sampled according to DQOs	Appropriate media sampled according to DQOs	C
	All media identified in DQOs sampled	All media identified in DQOs sampled	C
Laboratory considerations	All samples analysed according to DQOs	All samples analysed according to DQOs	C

Notes to Table 5:
C – Compliance
PC – Partial Compliance
NC – Non-Compliance
NA – Not Applicable
SOP – Standard Operating Procedure
DQO – Data Quality Objectives

A review of the adopted QA/QC procedures and results indicates that the DQIs have generally been met with compliance and a minor partial-compliance. On this basis, the sampling and laboratory methods used during the investigation were found to meet DQOs for this project.

Appendix G

Laboratory Certificate of Analysis
and Chain of Custody Documentation
Notes About This Report

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 246224

Client Details

Client	Douglas Partners Pty Ltd
Attention	Rod Gray
Address	96 Hermitage Rd, West Ryde, NSW, 2114

Sample Details

Your Reference	**94616.01, Proposed Open Space Development**
Number of Samples	22 Soil
Date samples received	03/07/2020
Date completed instructions received	03/07/2020

Analysis Details

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

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

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

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

Report Details

Date results requested by	10/07/2020
Date of Issue	09/07/2020

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

Results Approved By
Diego Bigolin, Team Leader, Inorganics
Dragana Tomas, Senior Chemist
Loren Bardwell, Senior Chemist
Lucy Zhu, Asbestos Supervisor
Manju Dewendrage, Chemist
Priya Samarawickrama, Senior Chemist

Authorised By

Nancy Zhang, Laboratory Manager

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		246224-1	246224-3	246224-5	246224-7	246224-9
Your Reference	UNITS	TP138-0.1	TP138-1.5	TP139-0.1	TP139-1.1-1.3	TP140-0.1
Date Sampled		29/06/2020	29/06/2020	29/06/2020	29/06/2020	29/06/2020
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	06/07/2020	06/07/2020	06/07/2020	06/07/2020	06/07/2020
Date analysed	-	07/07/2020	07/07/2020	07/07/2020	07/07/2020	07/07/2020
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<3	<3	<3	<3	<3
Surrogate aaa-Trifluorotoluene	%	114	123	111	115	119

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		246224-10	246224-11	246224-12	246224-14	246224-15
Your Reference	UNITS	TP145-0.1	TP150-0.1	TP151-0.1	TP152-0.1	TP155-0.1
Date Sampled		26/06/2020	26/06/2020	26/06/2020	26/06/2020	26/06/2020
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	06/07/2020	06/07/2020	06/07/2020	06/07/2020	06/07/2020
Date analysed	-	07/07/2020	07/07/2020	07/07/2020	07/07/2020	07/07/2020
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<3	<3	<3	<3	<3
Surrogate aaa-Trifluorotoluene	%	95	112	101	107	108

vTRH(C6-C10)/BTEXN in Soil			
Our Reference		246224-17	246224-20
Your Reference	UNITS	TP156-0.1	TS
Date Sampled		26/06/2020	29/06/2020
Type of sample		Soil	Soil
Date extracted	-	06/07/2020	06/07/2020
Date analysed	-	07/07/2020	07/07/2020
TRH C_6 - C_9	mg/kg	<25	[NA]
TRH C_6 - C_{10}	mg/kg	<25	[NA]
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	[NA]
Benzene	mg/kg	<0.2	102%
Toluene	mg/kg	<0.5	85%
Ethylbenzene	mg/kg	<1	78%
m+p-xylene	mg/kg	<2	75%
o-Xylene	mg/kg	<1	78%
naphthalene	mg/kg	<1	[NA]
Total +ve Xylenes	mg/kg	<3	[NA]
Surrogate aaa-Trifluorotoluene	%	100	101

svTRH (C10-C40) in Soil						
Our Reference		246224-1	246224-3	246224-5	246224-7	246224-9
Your Reference	UNITS	TP138-0.1	TP138-1.5	TP139-0.1	TP139-1.1-1.3	TP140-0.1
Date Sampled		29/06/2020	29/06/2020	29/06/2020	29/06/2020	29/06/2020
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	06/07/2020	06/07/2020	06/07/2020	06/07/2020	06/07/2020
Date analysed	-	07/07/2020	07/07/2020	07/07/2020	07/07/2020	07/07/2020
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	<50
Surrogate o-Terphenyl	%	86	87	84	98	101

svTRH (C10-C40) in Soil						
Our Reference		246224-10	246224-11	246224-12	246224-14	246224-15
Your Reference	UNITS	TP145-0.1	TP150-0.1	TP151-0.1	TP152-0.1	TP155-0.1
Date Sampled		26/06/2020	26/06/2020	26/06/2020	26/06/2020	26/06/2020
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	06/07/2020	06/07/2020	06/07/2020	06/07/2020	06/07/2020
Date analysed	-	07/07/2020	07/07/2020	07/07/2020	07/07/2020	07/07/2020
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	<50
Surrogate o-Terphenyl	%	87	98	86	99	99

svTRH (C10-C40) in Soil		
Our Reference		246224-17
Your Reference	UNITS	TP156-0.1
Date Sampled		26/06/2020
Type of sample		Soil
Date extracted	-	06/07/2020
Date analysed	-	07/07/2020
TRH C_{10} - C_{14}	mg/kg	<50
TRH C_{15} - C_{28}	mg/kg	<100
TRH C_{29} - C_{36}	mg/kg	<100
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	<100
TRH >C_{34} -C_{40}	mg/kg	<100
Total +ve TRH (>C10-C40)	mg/kg	<50
Surrogate o-Terphenyl	%	87

PAHs in Soil						
Our Reference		246224-1	246224-3	246224-5	246224-7	246224-9
Your Reference	UNITS	TP138-0.1	TP138-1.5	TP139-0.1	TP139-1.1-1.3	TP140-0.1
Date Sampled		29/06/2020	29/06/2020	29/06/2020	29/06/2020	29/06/2020
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	06/07/2020	06/07/2020	06/07/2020	06/07/2020	06/07/2020
Date analysed	-	06/07/2020	06/07/2020	06/07/2020	06/07/2020	06/07/2020
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	0.4	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	0.4	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	0.3	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	0.3	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	0.5	<0.2	<0.2
Benzo(a)pyrene	mg/kg	0.07	<0.05	0.3	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	0.2	<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	0.2	<0.1	<0.1
Total +ve PAH's	mg/kg	0.07	<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	%	102	102	102	104	104

PAHs in Soil						
Our Reference		246224-10	246224-11	246224-12	246224-14	246224-15
Your Reference	UNITS	TP145-0.1	TP150-0.1	TP151-0.1	TP152-0.1	TP155-0.1
Date Sampled		26/06/2020	26/06/2020	26/06/2020	26/06/2020	26/06/2020
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	06/07/2020	06/07/2020	06/07/2020	06/07/2020	06/07/2020
Date analysed	-	06/07/2020	06/07/2020	06/07/2020	06/07/2020	06/07/2020
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	0.4	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	0.2	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	1.3	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	1.7	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	0.8	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	0.8	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	1	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	0.87	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	0.4	<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	0.6	<0.1	<0.1	<0.1	<0.1
Total +ve PAH's	mg/kg	8.4	<0.05	<0.05	<0.05	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	1.1	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	1.2	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	1.2	<0.5	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	101	103	102	103	102

PAHs in Soil				
Our Reference		246224-17	246224-19	246224-21
Your Reference	UNITS	TP156-0.1	BD1	TB
Date Sampled		26/06/2020	29/06/2020	29/06/2020
Type of sample		Soil	Soil	Soil
Date extracted	-	06/07/2020	06/07/2020	06/07/2020
Date analysed	-	06/07/2020	06/07/2020	06/07/2020
Naphthalene	mg/kg	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	0.1	<0.1
Pyrene	mg/kg	<0.1	0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	0.1	<0.1
Chrysene	mg/kg	<0.1	0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	0.1	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1
Total +ve PAH's	mg/kg	<0.05	0.70	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	103	102	104

Organochlorine Pesticides in soil						
Our Reference		246224-1	246224-5	246224-9	246224-10	246224-11
Your Reference	UNITS	TP138-0.1	TP139-0.1	TP140-0.1	TP145-0.1	TP150-0.1
Date Sampled		29/06/2020	29/06/2020	29/06/2020	26/06/2020	26/06/2020
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	06/07/2020	06/07/2020	06/07/2020	06/07/2020	06/07/2020
Date analysed	-	06/07/2020	06/07/2020	06/07/2020	06/07/2020	06/07/2020
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	102	112	107	104	112

Organochlorine Pesticides in soil					
Our Reference		246224-12	246224-14	246224-15	246224-17
Your Reference	UNITS	TP151-0.1	TP152-0.1	TP155-0.1	TP156-0.1
Date Sampled		26/06/2020	26/06/2020	26/06/2020	26/06/2020
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	06/07/2020	06/07/2020	06/07/2020	06/07/2020
Date analysed	-	06/07/2020	06/07/2020	06/07/2020	06/07/2020
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	113	111	103	112

Organophosphorus Pesticides in Soil						
Our Reference		246224-1	246224-5	246224-9	246224-10	246224-11
Your Reference	UNITS	TP138-0.1	TP139-0.1	TP140-0.1	TP145-0.1	TP150-0.1
Date Sampled		29/06/2020	29/06/2020	29/06/2020	26/06/2020	26/06/2020
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	06/07/2020	06/07/2020	06/07/2020	06/07/2020	06/07/2020
Date analysed	-	06/07/2020	06/07/2020	06/07/2020	06/07/2020	06/07/2020
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	102	112	107	104	112

Organophosphorus Pesticides in Soil					
Our Reference		246224-12	246224-14	246224-15	246224-17
Your Reference	UNITS	TP151-0.1	TP152-0.1	TP155-0.1	TP156-0.1
Date Sampled		26/06/2020	26/06/2020	26/06/2020	26/06/2020
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	06/07/2020	06/07/2020	06/07/2020	06/07/2020
Date analysed	-	06/07/2020	06/07/2020	06/07/2020	06/07/2020
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	113	111	103	112

PCBs in Soil						
Our Reference		246224-1	246224-5	246224-9	246224-10	246224-11
Your Reference	UNITS	TP138-0.1	TP139-0.1	TP140-0.1	TP145-0.1	TP150-0.1
Date Sampled		29/06/2020	29/06/2020	29/06/2020	26/06/2020	26/06/2020
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	06/07/2020	06/07/2020	06/07/2020	06/07/2020	06/07/2020
Date analysed	-	06/07/2020	06/07/2020	06/07/2020	06/07/2020	06/07/2020
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	%	102	112	107	104	112

PCBs in Soil					
Our Reference		246224-12	246224-14	246224-15	246224-17
Your Reference	UNITS	TP151-0.1	TP152-0.1	TP155-0.1	TP156-0.1
Date Sampled		26/06/2020	26/06/2020	26/06/2020	26/06/2020
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	06/07/2020	06/07/2020	06/07/2020	06/07/2020
Date analysed	-	06/07/2020	06/07/2020	06/07/2020	06/07/2020
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	113	111	103	112

Acid Extractable metals in soil						
Our Reference		246224-1	246224-3	246224-5	246224-7	246224-9
Your Reference	UNITS	TP138-0.1	TP138-1.5	TP139-0.1	TP139-1.1-1.3	TP140-0.1
Date Sampled		29/06/2020	29/06/2020	29/06/2020	29/06/2020	29/06/2020
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	06/07/2020	06/07/2020	06/07/2020	06/07/2020	06/07/2020
Date analysed	-	06/07/2020	06/07/2020	06/07/2020	06/07/2020	06/07/2020
Arsenic	mg/kg	6	10	7	<4	8
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	16	22	34	15	14
Copper	mg/kg	19	16	32	24	5
Lead	mg/kg	25	28	23	10	13
Mercury	mg/kg	<0.1	<0.1	0.1	<0.1	<0.1
Nickel	mg/kg	7	7	34	21	8
Zinc	mg/kg	220	160	190	120	34

Acid Extractable metals in soil						
Our Reference		246224-10	246224-11	246224-12	246224-14	246224-15
Your Reference	UNITS	TP145-0.1	TP150-0.1	TP151-0.1	TP152-0.1	TP155-0.1
Date Sampled		26/06/2020	26/06/2020	26/06/2020	26/06/2020	26/06/2020
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	06/07/2020	06/07/2020	06/07/2020	06/07/2020	06/07/2020
Date analysed	-	06/07/2020	06/07/2020	06/07/2020	06/07/2020	06/07/2020
Arsenic	mg/kg	<4	4	<4	4	5
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	58	17	100	15	16
Copper	mg/kg	23	10	28	7	9
Lead	mg/kg	16	12	5	17	19
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	75	4	100	5	3
Zinc	mg/kg	220	16	44	30	18

Acid Extractable metals in soil					
Our Reference		246224-17	246224-19	246224-21	246224-23
Your Reference	UNITS	TP156-0.1	BD1	TB	TP156-0.1 - [TRIPLICATE]
Date Sampled		26/06/2020	29/06/2020	29/06/2020	26/06/2020
Type of sample		Soil	Soil	Soil	Soil
Date prepared	-	06/07/2020	06/07/2020	06/07/2020	06/07/2020
Date analysed	-	06/07/2020	06/07/2020	06/07/2020	06/07/2020
Arsenic	mg/kg	<4	8	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	72	20	<1	68
Copper	mg/kg	28	18	<1	27
Lead	mg/kg	8	27	<1	8
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	100	8	<1	100
Zinc	mg/kg	54	210	<1	50

Misc Soil - Inorg			
Our Reference		246224-1	246224-10
Your Reference	UNITS	TP138-0.1	TP145-0.1
Date Sampled		29/06/2020	26/06/2020
Type of sample		Soil	Soil
Date prepared	-	6/07/2020	6/07/2020
Date analysed	-	6/07/2020	6/07/2020
Total Phenolics (as Phenol)	mg/kg	<5	<5

Moisture						
Our Reference		246224-1	246224-3	246224-5	246224-7	246224-9
Your Reference	UNITS	TP138-0.1	TP138-1.5	TP139-0.1	TP139-1.1-1.3	TP140-0.1
Date Sampled		29/06/2020	29/06/2020	29/06/2020	29/06/2020	29/06/2020
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	06/07/2020	06/07/2020	06/07/2020	06/07/2020	06/07/2020
Date analysed	-	07/07/2020	07/07/2020	07/07/2020	07/07/2020	07/07/2020
Moisture	%	13	14	14	9.4	8.4

Moisture						
Our Reference		246224-10	246224-11	246224-12	246224-14	246224-15
Your Reference	UNITS	TP145-0.1	TP150-0.1	TP151-0.1	TP152-0.1	TP155-0.1
Date Sampled		26/06/2020	26/06/2020	26/06/2020	26/06/2020	26/06/2020
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	06/07/2020	06/07/2020	06/07/2020	06/07/2020	06/07/2020
Date analysed	-	07/07/2020	07/07/2020	07/07/2020	07/07/2020	07/07/2020
Moisture	%	13	9.1	10	9.7	9.8

Moisture			
Our Reference		246224-17	246224-19
Your Reference	UNITS	TP156-0.1	BD1
Date Sampled		26/06/2020	29/06/2020
Type of sample		Soil	Soil
Date prepared	-	06/07/2020	06/07/2020
Date analysed	-	07/07/2020	07/07/2020
Moisture	%	9.4	15

Asbestos ID - soils						
Our Reference		246224-1	246224-3	246224-5	246224-7	246224-9
Your Reference	UNITS	TP138-0.1	TP138-1.5	TP139-0.1	TP139-1.1-1.3	TP140-0.1
Date Sampled		29/06/2020	29/06/2020	29/06/2020	29/06/2020	29/06/2020
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	09/07/2020	09/07/2020	09/07/2020	09/07/2020	09/07/2020
Sample mass tested	g	Approx. 35g	Approx. 35g	Approx. 30g	Approx. 40g	Approx. 30g
Sample Description	-	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Asbestos comments	-	NO	NO	NO	NO	NO
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected

Asbestos ID - soils						
Our Reference		246224-10	246224-11	246224-12	246224-14	246224-15
Your Reference	UNITS	TP145-0.1	TP150-0.1	TP151-0.1	TP152-0.1	TP155-0.1
Date Sampled		26/06/2020	26/06/2020	26/06/2020	26/06/2020	26/06/2020
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	09/07/2020	09/07/2020	09/07/2020	09/07/2020	09/07/2020
Sample mass tested	g	Approx. 30g	Approx. 35g	Approx. 30g	Approx. 30g	Approx. 25g
Sample Description	-	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Asbestos comments	-	NO	NO	NO	NO	NO
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected

Asbestos ID - soils		
Our Reference		246224-17
Your Reference	UNITS	TP156-0.1
Date Sampled		26/06/2020
Type of sample		Soil
Date analysed	-	09/07/2020
Sample mass tested	g	Approx. 30g
Sample Description	-	Brown coarse-grained soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Asbestos comments	-	NO
Trace Analysis	-	No asbestos detected

Miscellaneous Inorg - soil						
Our Reference		246224-4	246224-8	246224-13	246224-16	246224-18
Your Reference	UNITS	TP138-2.0	TP139-2.0	TP151-0.5	TP155-2.0	TP156-2.0
Date Sampled		29/06/2020	29/06/2020	26/06/2020	26/06/2020	26/06/2020
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	08/07/2020	08/07/2020	08/07/2020	08/07/2020	08/07/2020
Date analysed	-	08/07/2020	08/07/2020	08/07/2020	08/07/2020	08/07/2020
Sulphate, SO4 1:5 soil:water	mg/kg	75	72	29	58	54
Chloride, Cl 1:5 soil:water	mg/kg	28	27	10	21	20

Method ID	Methodology Summary
ASB-001	Asbestos ID - Qualitative identification of asbestos in bulk samples using Polarised Light Microscopy and Dispersion Staining Techniques including Synthetic Mineral Fibre and Organic Fibre as per Australian Standard 4964-2004.
Inorg-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
Inorg-031	Total Phenolics by segmented flow analyser (in line distillation with colourimetric finish). Solids are extracted in a caustic media prior to analysis.
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.
Org-020	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-020	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis. Note, the Total +ve TRH PQL is reflective of the lowest individual PQL and is therefore "Total +ve TRH" is simply a sum of the positive individual TRH fractions (>C10-C40).
Org-021	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD.
Org-021	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD. Note, the Total +ve PCBs PQL is reflective of the lowest individual PQL and is therefore" Total +ve PCBs" is simply a sum of the positive individual PCBs.
Org-022	Determination of VOCs sampled onto coconut shell charcoal sorbent tubes, that can be desorbed using carbon disulphide, and analysed by GC-MS.
Org-022/025	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS/GC-MSMS.

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-5	246224-5
Date extracted	-			06/07/2020	1	06/07/2020	06/07/2020		06/07/2020	06/07/2020
Date analysed	-			07/07/2020	1	07/07/2020	07/07/2020		07/07/2020	07/07/2020
TRH C_6 - C_9	mg/kg	25	Org-023	<25	1	<25	<25	0	95	82
TRH C_6 - C_{10}	mg/kg	25	Org-023	<25	1	<25	<25	0	95	82
Benzene	mg/kg	0.2	Org-023	<0.2	1	<0.2	<0.2	0	99	89
Toluene	mg/kg	0.5	Org-023	<0.5	1	<0.5	<0.5	0	92	80
Ethylbenzene	mg/kg	1	Org-023	<1	1	<1	<1	0	82	72
m+p-xylene	mg/kg	2	Org-023	<2	1	<2	<2	0	101	85
o-Xylene	mg/kg	1	Org-023	<1	1	<1	<1	0	90	77
naphthalene	mg/kg	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-023	124	1	114	124	8	117	110

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	06/07/2020	06/07/2020		[NT]	[NT]
Date analysed	-			[NT]	17	07/07/2020	07/07/2020		[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	100	121	19	[NT]	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-5	246224-5
Date extracted	-			06/07/2020	1	06/07/2020	06/07/2020		06/07/2020	06/07/2020
Date analysed	-			07/07/2020	1	07/07/2020	07/07/2020		07/07/2020	07/07/2020
TRH C_{10} - C_{14}	mg/kg	50	Org-020	<50	1	<50	<50	0	112	116
TRH C_{15} - C_{28}	mg/kg	100	Org-020	<100	1	<100	<100	0	97	107
TRH C_{29} - C_{36}	mg/kg	100	Org-020	<100	1	<100	<100	0	108	94
TRH >C_{10} -C_{16}	mg/kg	50	Org-020	<50	1	<50	<50	0	112	116
TRH >C_{16} -C_{34}	mg/kg	100	Org-020	<100	1	<100	<100	0	97	107
TRH >C_{34} -C_{40}	mg/kg	100	Org-020	<100	1	<100	<100	0	108	94
Surrogate o-Terphenyl	%		Org-020	99	1	86	86	0	103	114

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	06/07/2020	06/07/2020		[NT]	[NT]
Date analysed	-			[NT]	17	07/07/2020	07/07/2020		[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	87	101	15	[NT]	[NT]

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-5	246224-5
Date extracted	-			06/07/2020	1	06/07/2020	06/07/2020		06/07/2020	06/07/2020
Date analysed	-			06/07/2020	1	06/07/2020	06/07/2020		06/07/2020	06/07/2020
Naphthalene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	108	104
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	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	112	110
Phenanthrene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	120	114
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	116	114
Pyrene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	0.1	0	118	113
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	86	78
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	0.07	0.1	35	112	104
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	106	1	102	102	0	102	99

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	17	06/07/2020	06/07/2020		[NT]	[NT]
Date analysed	-			[NT]	17	06/07/2020	06/07/2020		[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	103	104	1	[NT]	[NT]

QUALITY CONTROL: Organochlorine Pesticides in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-5	246224-5
Date extracted	-			06/07/2020	1	06/07/2020	06/07/2020		06/07/2020	06/07/2020
Date analysed	-			06/07/2020	1	06/07/2020	06/07/2020		06/07/2020	06/07/2020
alpha-BHC	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	94	92
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	98	94
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	88	88
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	98	94
Heptachlor Epoxide	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	96	94
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	100	94
Dieldrin	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	94	92
Endrin	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	86	84
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	92	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	92	84
Methoxychlor	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-022/025	115	1	102	111	8	112	108

QUALITY CONTROL: Organochlorine Pesticides in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	17	06/07/2020	06/07/2020		[NT]	[NT]
Date analysed	-			[NT]	17	06/07/2020	06/07/2020		[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]
Surrogate TCMX	%		Org-022/025	[NT]	17	112	113	1	[NT]	[NT]

QUALITY CONTROL: Organophosphorus Pesticides in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-5	246224-5
Date extracted	-			06/07/2020	1	06/07/2020	06/07/2020		06/07/2020	06/07/2020
Date analysed	-			06/07/2020	1	06/07/2020	06/07/2020		06/07/2020	06/07/2020
Dichlorvos	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	96	100
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]
Chlorpyriphos-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	102	100
Fenitrothion	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	86	98
Malathion	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	83	113
Chlorpyriphos	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	104	106
Parathion	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	104	120
Bromophos-ethyl	mg/kg	0.1	Org-022	<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	100	112
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-022/025	115	1	102	111	8	112	108

QUALITY CONTROL: Organophosphorus Pesticides in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	17	06/07/2020	06/07/2020		[NT]	[NT]
Date analysed	-			[NT]	17	06/07/2020	06/07/2020		[NT]	[NT]
Dichlorvos	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]
Chlorpyriphos-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]
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	[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]
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-022/025	[NT]	17	112	113	1	[NT]	[NT]

QUALITY CONTROL: PCBs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-5	246224-5
Date extracted	-			06/07/2020	1	06/07/2020	06/07/2020		06/07/2020	06/07/2020
Date analysed	-			06/07/2020	1	06/07/2020	06/07/2020		06/07/2020	06/07/2020
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	70	70
Aroclor 1260	mg/kg	0.1	Org-021	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-021	115	1	102	111	8	112	108

QUALITY CONTROL: PCBs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	17	06/07/2020	06/07/2020		[NT]	[NT]
Date analysed	-			[NT]	17	06/07/2020	06/07/2020		[NT]	[NT]
Aroclor 1016	mg/kg	0.1	Org-021	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-021	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-021	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-021	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-021	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-021	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1260	mg/kg	0.1	Org-021	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-021	[NT]	17	112	113	1	[NT]	[NT]

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-5	246224-5
Date prepared	-			06/07/2020	1	06/07/2020	06/07/2020		06/07/2020	06/07/2020
Date analysed	-			06/07/2020	1	06/07/2020	06/07/2020		06/07/2020	06/07/2020
Arsenic	mg/kg	4	Metals-020	<4	1	6	6	0	101	86
Cadmium	mg/kg	0.4	Metals-020	<0.4	1	<0.4	<0.4	0	96	76
Chromium	mg/kg	1	Metals-020	<1	1	16	16	0	92	88
Copper	mg/kg	1	Metals-020	<1	1	19	21	10	88	83
Lead	mg/kg	1	Metals-020	<1	1	25	27	8	95	72
Mercury	mg/kg	0.1	Metals-021	<0.1	1	<0.1	<0.1	0	93	82
Nickel	mg/kg	1	Metals-020	<1	1	7	7	0	93	#
Zinc	mg/kg	1	Metals-020	<1	1	220	220	0	99	#

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	06/07/2020	06/07/2020		[NT]	[NT]
Date analysed	-			[NT]	17	06/07/2020	06/07/2020		[NT]	[NT]
Arsenic	mg/kg	4	Metals-020	[NT]	17	<4	<4	0	[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	72	42	53	[NT]	[NT]
Copper	mg/kg	1	Metals-020	[NT]	17	28	25	11	[NT]	[NT]
Lead	mg/kg	1	Metals-020	[NT]	17	8	11	32	[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	100	77	26	[NT]	[NT]
Zinc	mg/kg	1	Metals-020	[NT]	17	54	55	2	[NT]	[NT]

QUALITY CONTROL: Misc Soil - Inorg						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-5	[NT]
Date prepared	-			06/07/2020	[NT]	[NT]	[NT]	[NT]	06/07/2020	[NT]
Date analysed	-			06/07/2020	[NT]	[NT]	[NT]	[NT]	06/07/2020	[NT]
Total Phenolics (as Phenol)	mg/kg	5	Inorg-031	<5	[NT]	[NT]	[NT]	[NT]	102	[NT]

QUALITY CONTROL: Miscellaneous Inorg - soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-5	[NT]
Date prepared	-			08/07/2020	4	08/07/2020	08/07/2020		08/07/2020	[NT]
Date analysed	-			08/07/2020	4	08/07/2020	08/07/2020		08/07/2020	[NT]
Sulphate, SO4 1:5 soil:water	mg/kg	10	Inorg-081	<10	4	75	72	4	100	[NT]
Chloride, Cl 1:5 soil:water	mg/kg	10	Inorg-081	<10	4	28	27	4	106	[NT]

Result Definitions

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

Quality Control Definitions

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

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

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

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

Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals (not SPOCAS); 60-140% for organics/SPOCAS (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

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

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

Report Comments

8 metals in soil:
- The laboratory RPD acceptance criteria has been exceeded for 246224-17 for Cr. Therefore a triplicate result has been issued as laboratory sample number 246224-23.
- # Percent recovery is not possible to report due to the inhomogeneous nature of the element/s in the sample/s. However an acceptable recovery was obtained for the LCS.

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

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CERTIFICATE OF ANALYSIS 246224-A

Client Details

Client	Douglas Partners Pty Ltd
Attention	Rod Gray
Address	96 Hermitage Rd, West Ryde, NSW, 2114

Sample Details

Your Reference	**94616.01, Proposed Open Space Development**
Number of Samples	22 Soil
Date samples received	03/07/2020
Date completed instructions received	06/07/2020

Analysis Details

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

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

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

Report Details

Date results requested by	13/07/2020
Date of Issue	09/07/2020

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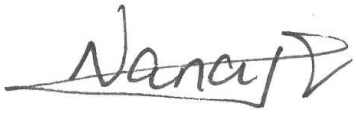
Results Approved By
Jaimie Loa-Kum-Cheung, Metals Supervisor

Authorised By



Nancy Zhang, Laboratory Manager

ESP/CEC				
Our Reference		246224-A-2	246224-A-13	246224-A-16
Your Reference	UNITS	TP138-0.5	TP151-0.5	TP155-2.0
Date Sampled		29/06/2020	26/06/2020	26/06/2020
Type of sample		Soil	Soil	Soil
Date prepared	-	08/07/2020	08/07/2020	08/07/2020
Date analysed	-	08/07/2020	08/07/2020	08/07/2020
Exchangeable Ca	meq/100g	14	36	<0.1
Exchangeable K	meq/100g	0.6	0.4	0.3
Exchangeable Mg	meq/100g	14	17	7.1
Exchangeable Na	meq/100g	2.5	0.60	3.3
Cation Exchange Capacity	meq/100g	31	54	11
ESP	%	8	1	31

Method ID	Methodology Summary
Metals-020	Determination of exchangeable cations and cation exchange capacity in soils using 1M Ammonium Chloride exchange and ICP-AES analytical finish.

QUALITY CONTROL: ESP/CEC						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			08/07/2020	[NT]	[NT]	[NT]	[NT]	08/07/2020	[NT]
Date analysed	-			08/07/2020	[NT]	[NT]	[NT]	[NT]	08/07/2020	[NT]
Exchangeable Ca	meq/100g	0.1	Metals-020	<0.1	[NT]	[NT]	[NT]	[NT]	102	[NT]
Exchangeable K	meq/100g	0.1	Metals-020	<0.1	[NT]	[NT]	[NT]	[NT]	102	[NT]
Exchangeable Mg	meq/100g	0.1	Metals-020	<0.1	[NT]	[NT]	[NT]	[NT]	99	[NT]
Exchangeable Na	meq/100g	0.1	Metals-020	<0.1	[NT]	[NT]	[NT]	[NT]	93	[NT]

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LCS	Laboratory Control Sample
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Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals (not SPOCAS); 60-140% for organics/SPOCAS (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

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

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

Andrew (Fitzy) Fitzsimons

From: Aileen Hie
Sent: Monday, 6 July 2020 10:29 AM
To: Andrew (Fitzy) Fitzsimons
Subject: FW: Sample Receipt for 246224 94616.01, Proposed Open Space Development

Follow Up Flag: Follow up
Flag Status: Flagged

246224-A
Due: 13/7/20

Kind Regards,

Aileen Hie | Customer Service Coordinator | Envirolab Services Pty Ltd
(Monday to Friday 10am to 6pm)
***Celebrating 15 years of* Great Science. Great Service.**
12 Ashley Street Chatswood NSW 2067
T 612 9910 6200 **F** 612 9910 6201
E ahie@envirolab.com.au | **W** www.envirolab.com.au

From: Rod Gray <Rod.Gray@douglaspartners.com.au>
Sent: Monday, 6 July 2020 10:14 AM
To: Aileen Hie <AHie@envirolab.com.au>
Subject: RE: Sample Receipt for 246224 94616.01, Proposed Open Space Development

Hi Aileen,

Could I please also get sodicity on samples:

- 2 – 138-0.5
- 13 – 151-0.5
- 16 – 155-2.0

Thanks

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 Pty Ltd
Attention	Rod Gray

Sample Login Details

Your reference	94616.01, Proposed Open Space Development
Envirolab Reference	246224-A
Date Sample Received	03/07/2020
Date Instructions Received	06/07/2020
Date Results Expected to be Reported	13/07/2020

Sample Condition

Samples received in appropriate condition for analysis	Yes
No. of Samples Provided	22 Soil
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	15.5
Cooling Method	None
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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customerservice@envirolab.com.au
www.envirolab.com.au

Sample ID	ESP/CEC	On Hold
TP138-0.1		✓
TP138-0.5	✓	
TP138-1.5		✓
TP138-2.0		✓
TP139-0.1		✓
TP139-0.5		✓
TP139-1.1-1.3		✓
TP139-2.0		✓
TP140-0.1		✓
TP145-0.1		✓
TP150-0.1		✓
TP151-0.1		✓
TP151-0.5	✓	
TP152-0.1		✓
TP155-0.1		✓
TP155-2.0	✓	
TP156-0.1		✓
TP156-2.0		✓
BD1		✓
TS		✓
TB		✓
TP150 0.5		✓

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
Geotechnics | Environment | Groundwater

CHAIN OF CUSTODY DESPATCH SHEET

Project No:	94616.01	**Suburb:**	Marsden Park	**To:**	Envirolab Services
Project Name:	Proposed Open Space Development	**Order Number**			12 Ashley St, Chatswood
Project Manager:	Rod Gray	**Sampler:**	Jeremie Young	**Attn:**	Aileen Hie
Emails:	rod.gray@douglaspartners.com.au				
Date Required:	Same day ☐ 24 hours ☐ 48 hours ☐ 72 hours ☐ Standard ☑				
Prior Storage:	☐ Esky ☐ Fridge ☐ Shelved	Do samples contain 'potential' HBM?	Yes ☐ No ☐ (If YES, then handle, transport and store in accordance with FPM HAZID)		

Sample ID	Lab ID	Date Sampled	Sample Type (S - soil, W - water)	Container Type (G - glass, P - plastic)	Analytes: Combo 6a	Combo 8a	Metals + PAH	Combo 3a	Chloride and sulphate					Notes/preservation
TP138-0.1	1	29/06/20	S	G		x								
TP138-0.5	2	29/06/20	S	G										hold
TP138-1.5	3	29/06/20	S	G				x						
TP138-2.0	4	29/06/20	S	G					x					
TP139-0.1	5	29/06/20	S	G	x									
TP139-0.5	6	29/06/20	S	G										hold
TP139-1.1-1.3	7	29/06/20	S	G				x						
TP139-2.0	8	29/06/20	S	G					x					
TP140-0.1	9	29/06/20	S	G	x									
TP145-0.1	10	26/06/20	S	G		x								
TP150-0.1	11	26/06/20	S	G	x									
TP151-0.1	12	26/06/20	S	G	x									
TP151-0.5	13	26/06/20	S	G					x					
TP152-0.1	14	26/06/20	S	G	x									
PQL (S) mg/kg														**ANZECC PQLs req'd for all water analytes** ☐

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

Job No: 246224
Date Received: 3/7/20
Time Received: 11:10
Received by: WM
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

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

Metals to Analyse: 8HM unless specified here:

Lab Report/Reference No:

Total number of samples in container: **Relinquished by:** **Transported to laboratory by:**

Send Results to: Douglas Partners Pty Ltd **Address:** 18 Waler Cres, Smeaton Grange NSW 2567 **Phone:** **Fax:**

Signed: **Received by:** EUS JyCl UNCLEAR **Date & Time:** 3/7/20 11:10

Douglas Partners
Geotechnics / Environment / Groundwater

246224 CM

CHAIN OF CUSTODY DESPATCH SHEET

Project No:	94616.01	**Suburb:**	Marsden Park	**To:**	Envirolab Services
Project Name:	Proposed Open Space Development	**Order Number**			12 Ashley St, Chatswood
Project Manager:	Rod Gray	**Sampler:**	Jeremie Young	**Attn:**	Aileen Hie
Emails:	rod.gray@douglaspartners.com.au				
Date Required:	Same day ☐ 24 hours ☐ 48 hours ☐ 72 hours ☐ Standard ☑				
Prior Storage:	☐ Esky ☐ Fridge ☐ Shelved	Do samples contain 'potential' HBM?	Yes ☐ No ☐ (If YES, then handle, transport and store in accordance with FPM HAZID)		

Sample ID	Lab ID	Sampling Date	Sample Type (S - soil W - water)	Container Type (G - glass P - plastic)	Analytes: Combo 6a	Combo 8a	metals and PAH	BTEX	Chloride and sulphate					Notes/preservation
TP155-0.1	15	26/06/20	S	G	x									
TP155-2.0	16	26/06/20	S	G					x					
TP156-0.1	17	26/06/20	S	G	x									
TP156-2.0	18	26/06/20	S	G					x					
BD1	19	29/06/20	S	G			x							
TS	20		S	G				x						
TB	21		S	G			x							
TP150 0.5	22		S	- Extra received										
PQL (S) mg/kg													**ANZECC PQLs req'd for all water analytes** ☐	

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

Metals to Analyse: 8HM unless specified here:

Lab Report/Reference No:

Total number of samples in container:	**Relinquished by:**	**Transported to laboratory by:**	
Send Results to: Douglas Partners Pty Ltd	**Address:** 18 Waler Cres, Smeaton Grange NSW 2567	**Phone:**	**Fax:**
Signed:	**Received by:**	**Date & Time:**	

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customerservice@envirolab.com.au
www.envirolab.com.au

SAMPLE RECEIPT ADVICE

Client Details

Client	Douglas Partners Pty Ltd
Attention	Rod Gray

Sample Login Details

Your reference	94616.01, Proposed Open Space Development
Envirolab Reference	246224
Date Sample Received	03/07/2020
Date Instructions Received	03/07/2020
Date Results Expected to be Reported	10/07/2020

Sample Condition

Samples received in appropriate condition for analysis	Yes
No. of Samples Provided	22 Soil
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	15.5
Cooling Method	None
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	PCBsin Soil	Acid Extractable metalsin soil	Misc Soil - Inorg	Asbestos ID - soils	Sulphate, SO41:5 soil:water	Chloride, Cl1:5 soil:water	On Hold
TP138-0.1	✓	✓	✓	✓	✓	✓	✓	✓	✓			
TP138-0.5												✓
TP138-1.5	✓	✓	✓				✓		✓			
TP138-2.0										✓	✓	
TP139-0.1	✓	✓	✓	✓	✓	✓	✓		✓			
TP139-0.5												✓
TP139-1.1-1.3	✓	✓	✓				✓		✓			
TP139-2.0										✓	✓	
TP140-0.1	✓	✓	✓	✓	✓	✓	✓		✓			
TP145-0.1	✓	✓	✓	✓	✓	✓	✓	✓	✓			
TP150-0.1	✓	✓	✓	✓	✓	✓	✓		✓			
TP151-0.1	✓	✓	✓	✓	✓	✓	✓		✓			
TP151-0.5										✓	✓	
TP152-0.1	✓	✓	✓	✓	✓	✓	✓		✓			
TP155-0.1	✓	✓	✓	✓	✓	✓	✓		✓			
TP155-2.0										✓	✓	
TP156-0.1	✓	✓	✓	✓	✓	✓	✓		✓			
TP156-2.0										✓	✓	
BD1			✓				✓					
TS	✓											
TB			✓				✓					
TP150 0.5												✓

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.

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CERTIFICATE OF ANALYSIS 246615

Client Details

Client	Douglas Partners Pty Ltd
Attention	Rod Gray
Address	96 Hermitage Rd, West Ryde, NSW, 2114

Sample Details

Your Reference	**94616.01, Marsden Park**
Number of Samples	1 Soil
Date samples received	09/07/2020
Date completed instructions received	09/07/2020

Analysis Details

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

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

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

Report Details

Date results requested by	10/07/2020
Date of Issue	10/07/2020

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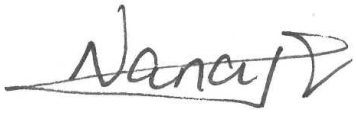
Accredited for compliance with ISO/IEC 17025 - Testing. **Tests not covered by NATA are denoted with ***

Results Approved By
Loren Bardwell, Senior Chemist
Manju Dewendrage, Chemist
Steven Luong, Organics Supervisor

Authorised By



Nancy Zhang, Laboratory Manager

vTRH(C6-C10)/BTEXN in Soil		
Our Reference		246615-1
Your Reference	UNITS	Dam Sample
Date Sampled		08/07/2020
Type of sample		Soil
Date extracted	-	09/07/2020
Date analysed	-	09/07/2020
TRH C_6 - C_9	mg/kg	<25
TRH C_6 - C_{10}	mg/kg	<25
vTPH 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	<3
Surrogate aaa-Trifluorotoluene	%	93

svTRH (C10-C40) in Soil		
Our Reference		246615-1
Your Reference	UNITS	Dam Sample
Date Sampled		08/07/2020
Type of sample		Soil
Date extracted	-	09/07/2020
Date analysed	-	09/07/2020
TRH C_{10} - C_{14}	mg/kg	<50
TRH C_{15} - C_{28}	mg/kg	<100
TRH C_{29} - C_{36}	mg/kg	<100
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	<100
TRH >C_{34} -C_{40}	mg/kg	<100
Total +ve TRH (>C10-C40)	mg/kg	<50
Surrogate o-Terphenyl	%	89

PAHs in Soil		
Our Reference	UNITS	246615-1
Your Reference		Dam Sample
Date Sampled		08/07/2020
Type of sample		Soil
Date extracted	-	09/07/2020
Date analysed	-	09/07/2020
Naphthalene	mg/kg	<0.1
Acenaphthylene	mg/kg	<0.1
Acenaphthene	mg/kg	<0.1
Fluorene	mg/kg	<0.1
Phenanthrene	mg/kg	<0.1
Anthracene	mg/kg	<0.1
Fluoranthene	mg/kg	<0.1
Pyrene	mg/kg	<0.1
Benzo(a)anthracene	mg/kg	<0.1
Chrysene	mg/kg	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2
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	<0.05
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	%	111

Organochlorine Pesticides in soil		
Our Reference		246615-1
Your Reference	UNITS	Dam Sample
Date Sampled		08/07/2020
Type of sample		Soil
Date extracted	-	09/07/2020
Date analysed	-	09/07/2020
alpha-BHC	mg/kg	<0.1
HCB	mg/kg	<0.1
beta-BHC	mg/kg	<0.1
gamma-BHC	mg/kg	<0.1
Heptachlor	mg/kg	<0.1
delta-BHC	mg/kg	<0.1
Aldrin	mg/kg	<0.1
Heptachlor Epoxide	mg/kg	<0.1
gamma-Chlordane	mg/kg	<0.1
alpha-chlordane	mg/kg	<0.1
Endosulfan I	mg/kg	<0.1
pp-DDE	mg/kg	<0.1
Dieldrin	mg/kg	<0.1
Endrin	mg/kg	<0.1
Endosulfan II	mg/kg	<0.1
pp-DDD	mg/kg	<0.1
Endrin Aldehyde	mg/kg	<0.1
pp-DDT	mg/kg	<0.1
Endosulfan Sulphate	mg/kg	<0.1
Methoxychlor	mg/kg	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1
Surrogate TCMX	%	93

Organophosphorus Pesticides in Soil		
Our Reference		246615-1
Your Reference	UNITS	Dam Sample
Date Sampled		08/07/2020
Type of sample		Soil
Date extracted	-	09/07/2020
Date analysed	-	09/07/2020
Dichlorvos	mg/kg	<0.1
Dimethoate	mg/kg	<0.1
Diazinon	mg/kg	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1
Ronnel	mg/kg	<0.1
Fenitrothion	mg/kg	<0.1
Malathion	mg/kg	<0.1
Chlorpyriphos	mg/kg	<0.1
Parathion	mg/kg	<0.1
Bromophos-ethyl	mg/kg	<0.1
Ethion	mg/kg	<0.1
Azinphos-methyl (Guthion)	mg/kg	<0.1
Surrogate TCMX	%	93

PCBs in Soil		
Our Reference		246615-1
Your Reference	UNITS	Dam Sample
Date Sampled		08/07/2020
Type of sample		Soil
Date extracted	-	09/07/2020
Date analysed	-	09/07/2020
Aroclor 1016	mg/kg	<0.1
Aroclor 1221	mg/kg	<0.1
Aroclor 1232	mg/kg	<0.1
Aroclor 1242	mg/kg	<0.1
Aroclor 1248	mg/kg	<0.1
Aroclor 1254	mg/kg	<0.1
Aroclor 1260	mg/kg	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1
Surrogate TCMX	%	93

Acid Extractable metals in soil		
Our Reference		246615-1
Your Reference	UNITS	Dam Sample
Date Sampled		08/07/2020
Type of sample		Soil
Date prepared	-	10/07/2020
Date analysed	-	10/07/2020
Arsenic	mg/kg	11
Cadmium	mg/kg	<0.4
Chromium	mg/kg	27
Copper	mg/kg	5
Lead	mg/kg	18
Mercury	mg/kg	<0.1
Nickel	mg/kg	5
Zinc	mg/kg	23

Moisture		
Our Reference		246615-1
Your Reference	UNITS	Dam Sample
Date Sampled		08/07/2020
Type of sample		Soil
Date prepared	-	09/07/2020
Date analysed	-	10/07/2020
Moisture	%	33

Method ID	Methodology Summary
Inorg-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
Metals-020	Determination of various metals by ICP-AES.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Org-020	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-020	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis. Note, the Total +ve TRH PQL is reflective of the lowest individual PQL and is therefore "Total +ve TRH" is simply a sum of the positive individual TRH fractions (>C10-C40).
Org-021	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD.
Org-021	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD. Note, the Total +ve PCBs PQL is reflective of the lowest individual PQL and is therefore" Total +ve PCBs" is simply a sum of the positive individual PCBs.
Org-022	Determination of VOCs sampled onto coconut shell charcoal sorbent tubes, that can be desorbed using carbon disulphide, and analysed by GC-MS.
Org-022/025	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS/GC-MSMS.
Org-022/025	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-MS/GC-MSMS. Note, the Total +ve reported DDD+DDE+DDT PQL is reflective of the lowest individual PQL and is therefore simply a sum of the positive individually report DDD+DDE+DDT.

Method ID	Methodology Summary
Org-022/025	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS and/or GC-MS/MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013. For soil results:- 1. 'EQ PQL'values are assuming all contributing PAHs reported as <PQL are actually at the PQL. This is the most conservative approach and can give false positive TEQs given that PAHs that contribute to the TEQ calculation may not be present. 2. 'EQ zero'values are assuming all contributing PAHs reported as <PQL are zero. This is the least conservative approach and is more susceptible to false negative TEQs when PAHs that contribute to the TEQ calculation are present but below PQL. 3. 'EQ half PQL'values are assuming all contributing PAHs reported as <PQL are half the stipulated PQL. Hence a mid-point between the most and least conservative approaches above. Note, the Total +ve PAHs PQL is reflective of the lowest individual PQL and is therefore "Total +ve PAHs" is simply a sum of the positive individual PAHs.
Org-023	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS.
Org-023	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.
Org-023	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater. Note, the Total +ve Xylene PQL is reflective of the lowest individual PQL and is therefore "Total +ve Xylenes" is simply a sum of the positive individual Xylenes.

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-6	246615-1
Date extracted	-			09/07/2020	1	09/07/2020	09/07/2020		09/07/2020	09/07/2020
Date analysed	-			09/07/2020	1	09/07/2020	09/07/2020		09/07/2020	09/07/2020
TRH C_6 - C_9	mg/kg	25	Org-023	<25	1	<25	<25	0	90	80
TRH C_6 - C_{10}	mg/kg	25	Org-023	<25	1	<25	<25	0	90	80
Benzene	mg/kg	0.2	Org-023	<0.2	1	<0.2	<0.2	0	92	83
Toluene	mg/kg	0.5	Org-023	<0.5	1	<0.5	<0.5	0	86	77
Ethylbenzene	mg/kg	1	Org-023	<1	1	<1	<1	0	90	80
m+p-xylene	mg/kg	2	Org-023	<2	1	<2	<2	0	90	81
o-Xylene	mg/kg	1	Org-023	<1	1	<1	<1	0	90	81
naphthalene	mg/kg	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-023	100	1	93	100	7	99	90

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-6	246615-1
Date extracted	-			09/07/2020	1	09/07/2020	09/07/2020		09/07/2020	09/07/2020
Date analysed	-			09/07/2020	1	09/07/2020	09/07/2020		09/07/2020	10/07/2020
TRH C_{10} - C_{14}	mg/kg	50	Org-020	<50	1	<50	<50	0	115	112
TRH C_{15} - C_{28}	mg/kg	100	Org-020	<100	1	<100	<100	0	93	88
TRH C_{29} - C_{36}	mg/kg	100	Org-020	<100	1	<100	<100	0	138	98
TRH >C_{10} -C_{16}	mg/kg	50	Org-020	<50	1	<50	<50	0	115	112
TRH >C_{16} -C_{34}	mg/kg	100	Org-020	<100	1	<100	<100	0	93	88
TRH >C_{34} -C_{40}	mg/kg	100	Org-020	<100	1	<100	<100	0	138	98
Surrogate o-Terphenyl	%		Org-020	89	1	89	85	5	103	101

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-6	246615-1
Date extracted	-			09/07/2020	1	09/07/2020	09/07/2020		09/07/2020	09/07/2020
Date analysed	-			09/07/2020	1	09/07/2020	09/07/2020		09/07/2020	09/07/2020
Naphthalene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	102	96
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	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	92	106
Phenanthrene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	114	106
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	102	92
Pyrene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	106	98
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	86	82
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	110	104
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	109	1	111	113	2	108	96

QUALITY CONTROL: Organochlorine Pesticides in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-6	246615-1
Date extracted	-			09/07/2020	1	09/07/2020	09/07/2020		09/07/2020	09/07/2020
Date analysed	-			09/07/2020	1	09/07/2020	09/07/2020		09/07/2020	09/07/2020
alpha-BHC	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	92	116
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	84	106
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	104	90
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	116	100
Heptachlor Epoxide	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	110	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	110	92
Dieldrin	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	112	120
Endrin	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	104	88
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	100	88
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	108	84
Methoxychlor	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-022/025	87	1	93	93	0	88	91

QUALITY CONTROL: Organophosphorus Pesticides in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-6	246615-1
Date extracted	-			09/07/2020	1	09/07/2020	09/07/2020		09/07/2020	09/07/2020
Date analysed	-			09/07/2020	1	09/07/2020	09/07/2020		09/07/2020	09/07/2020
Dichlorvos	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	110	102
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]
Chlorpyriphos-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	116	102
Fenitrothion	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	112	130
Malathion	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	100	105
Chlorpyriphos	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	118	112
Parathion	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	116	118
Bromophos-ethyl	mg/kg	0.1	Org-022	<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	100	96
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-022/025	87	1	93	93	0	88	91

QUALITY CONTROL: PCBs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-6	246615-1
Date extracted	-			09/07/2020	1	09/07/2020	09/07/2020		09/07/2020	09/07/2020
Date analysed	-			09/07/2020	1	09/07/2020	09/07/2020		09/07/2020	09/07/2020
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	82	70
Aroclor 1260	mg/kg	0.1	Org-021	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-021	87	1	93	93	0	88	91

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-6	246615-1
Date prepared	-			10/07/2020	1	10/07/2020	10/07/2020		10/07/2020	10/07/2020
Date analysed	-			10/07/2020	1	10/07/2020	10/07/2020		10/07/2020	10/07/2020
Arsenic	mg/kg	4	Metals-020	<4	1	11	14	24	103	80
Cadmium	mg/kg	0.4	Metals-020	<0.4	1	<0.4	<0.4	0	98	75
Chromium	mg/kg	1	Metals-020	<1	1	27	32	17	98	71
Copper	mg/kg	1	Metals-020	<1	1	5	2	86	96	78
Lead	mg/kg	1	Metals-020	<1	1	18	19	5	103	73
Mercury	mg/kg	0.1	Metals-021	<0.1	1	<0.1	<0.1	0	90	84
Nickel	mg/kg	1	Metals-020	<1	1	5	5	0	102	70
Zinc	mg/kg	1	Metals-020	<1	1	23	20	14	100	73

Result Definitions

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

Quality Control Definitions

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

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

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

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

Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals (not SPOCAS); 60-140% for organics/SPOCAS (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

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

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

Douglas Partners
Geotechnics / Environment / Groundwater

CHAIN OF CUSTODY DESPATCH SHEET

Project No:	94616.01	**Suburb:**	Marsden Park	**To:**	Envirolab Services
Project Name:	Proposed Open Space Development	**Order Number**			12 Ashley St, Chatswood
Project Manager:	Rod Gray	**Sampler:**	Jeremie Young	**Attn:**	Aileen Hie
Emails:	rod.gray@douglaspartners.com.au				
Date Required:	24 hours ☑				

Prior Storage: ☑ Esky ☑ Fridge ☐ Shelved Do samples contain 'potential' HBM? Yes ☐ No ☑ (If YES, then handle, transport and store in accordance with FPM HAZID)

Sample ID	Lab ID	Date Sampled	Sample Type (S - soil, W - water)	Container Type (G - glass, P - plastic)	Analytes: Combo 6									Notes/preservation
Dam Sample	1	~~8.7.20~~ 8.7.20	S	G	x									
PQL (S) mg/kg														**ANZECC PQLs req'd for all water analytes** ☐

ENVIROLAB — Envirolab Services, 12 Ashley St, Chatswood NSW 2067, Ph: (02) 9910 6200

Job No: 246615 9/7/20 1001

Date Received:
Time Received:
Received By: CM
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

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

Metals to Analyse: 8HM unless specified here:

Lab Report/Reference No: 246615

Total number of samples in container: 1 | **Relinquished by:** JY | **Transported to laboratory by:**

Send Results to: Douglas Partners Pty Ltd | **Address:** 18 Waler Cres, Smeaton Grange NSW 2567 | **Phone:** | **Fax:**

Signed: | **Received by:** EJ JMd C.Mullins | **Date & Time:** 9/7/20 1001

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 Pty Ltd
Attention	Rod Gray

Sample Login Details

Your reference	94616.01
Envirolab Reference	246615
Date Sample Received	09/07/2020
Date Instructions Received	09/07/2020
Date Results Expected to be Reported	10/07/2020

Sample Condition

Samples received in appropriate condition for analysis	Yes
No. of Samples Provided	1 Soil
Turnaround Time Requested	1 day
Temperature on Receipt (°C)	6.8
Cooling Method	Ice Pack
Sampling Date Provided	YES

Comments

Nil

Please direct any queries to:

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

Analysis Underway, details on the following page:

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

Sample ID	vTRH(C6-C10)/BTEXN in Soil	svTRH (C10-C40) in Soil	PAHs in Soil	Organochlorine Pesticides in soil	Organophosphorus Pesticides in Soil	PCBsin Soil	Acid Extractable metalsin soil
Dam Sample	✓	✓	✓	✓	✓	✓	✓

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.