
Detailed Contamination Assessment

Lot 152 DP 1202468 Raven
Street, Kooragang NSW.

NEW20P-0171-AD
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Executive Summary

Qualtest Laboratory NSW Pty Ltd (Qualtest) has carried out a Detailed Contamination Assessment (DCA) for EJE Architecture Pty Ltd (EJE) for a site located at 70 Raven Street (Lot 152 DP1202468), Kooragang, NSW (the site).

The site is owned by Port of Newcastle (PoN), who engaged EJE to lodge a Development Application (DA) for an industrial development. The site is about 1.05ha, and information provided by EJE indicates the proposed development area on the site is about 5,800m², located in the eastern portion of the site.

Qualtest completed a Preliminary Contamination Assessment (PCA) on the site in February 2021 (ref: NEW20P-0171-AA dated 8 February 2021). The PCA identified two Areas of Environmental Concern (AECs) for the site. The AECs related to; importation of fill; and the potential impact from surrounding industrial land uses. The PCA recommended additional assessment, comprising intrusive investigations in the proposed development area.

The objectives of the DCA were to:

- Assess the presence of soil contamination within the Areas of Environmental Concern (AECs) previously identified at the site by Qualtest (2021) within the proposed development area;
- Update the Conceptual Site Model (CSM) for the site based on the findings of the assessment; and
- Provide recommendations for further assessments, remediation and/or management, as required.

In order to achieve the above objectives, Qualtest carried out the following scope:

- Collection of soil samples from 11 borehole locations;
- Collection of water samples from two existing on-site groundwater monitoring wells;
- Laboratory analysis of soil and groundwater samples for identified contaminants of concern; and,
- Data assessment and preparation of this Detailed Contamination Assessment Report.

Based on the results of the Detailed Contamination Assessment and results of field and laboratory investigations, it is considered that the site is suitable for the proposed development. As a precaution it is recommended that an Unexpected Finds Procedure be included in the Construction Environmental Management Plan, and implemented during earthworks.

Based on the insitu assessment, if the surface/fill material is proposed to be disposed offsite to a licenced waste facility, the material classifies as **General Solid Waste** in accordance with the NSW EPA (2014) *Waste Classification Guidelines, Part 1 – Classifying Waste*. Qualtest previously completed an Acid Sulfate Soil Assessment on the site. Based on the field observations, and the laboratory results, the estuarine/alluvial sands and clays below fill material (from about 1.5m bgs) were assessed to comprise Acid Sulfate Soils and a management plan was developed for the site, refer to NEW20P-0171-AC, dated 8 February 2021. This ASSMP should be implemented during redevelopment of the site.

If conditions other than those encountered during this assessment are uncovered, further assessment by an environmental consultant may be necessary.

This report was prepared in general accordance with the relevant sections of the NSW EPA (2020) *Guidelines for Consultants Reporting on Contaminated Land* and the National Environment Protection (Assessment of Site Contamination) Measure 1999 (April 2013), NEPC 2013, Canberra (referred to as ASC NEPM 2013).

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1.0 Introduction

Qualtest Laboratory NSW Pty Ltd (Qualtest) has carried out a Detailed Contamination Assessment for EJE Architecture Pty Ltd (EJE) for a site located at 70 Raven Street (Lot 152 DP1202468), Kooragang, NSW (the site). Figure 1, Appendix A, shows the site location.

The site is owned by Port of Newcastle (PoN), who engaged EJE to lodge a Development Application (DA) for an industrial development. The site is about 1.05ha, and information provided by EJE indicates the proposed development area on the site is about 5,800m², located in the eastern portion of the site. Figure 2, Appendix A, shows the location of the proposed development area.

Qualtest completed a Preliminary Contamination Assessment (PCA)) on the site in February 2021 (ref: NEW20P-0171-AA dated 8 February 2021). The PCA identified two Areas of Environmental Concern (AECs) for the site. The AECs related to; importation of fill; and potential impact from surrounding industrial land uses. The PCA recommended additional assessment, comprising intrusive investigations in the proposed development area.

This report was prepared in general accordance with the relevant sections of the NSW EPA (2020) Guidelines for Consultants Reporting on Contaminated Land and the *National Environment Protection (Assessment of Site Contamination) Measure 1999 (April 2013)*, NEPC 2013, Canberra (referred to as ASC NEPM 2013).

1.1 Objectives

The objectives of the assessment were to:

- Assess the presence of soil contamination within the Areas of Environmental Concern (AECs) previously identified at the site by Qualtest (2021) within the proposed development area;
- Update the Conceptual Site Model (CSM) for the site based on the findings of the assessment; and
- Provide recommendations for further assessments, remediation and/or management, as required.

1.2 Scope of Works

In order to achieve the above objectives, Qualtest carried out the following scope:

- Collection of soil samples from 11 borehole locations;
- Collection of water samples from two existing on-site groundwater monitoring wells installed by others;
- Laboratory analysis of soil and groundwater samples for identified contaminants of potential concern; and,
- Data assessment and preparation of this Detailed Contamination Assessment Report.

2.0 Site Description

2.1 Site Identification

General site information is provided below in Table 2.1. The site location is shown in Figure 1, Appendix A.

Table 2.1: Summary of Site Details

Site Address:	70 Raven Street, Kooragang NSW
Approximate site area and dimensions:	Approx. 1.05 ha. Proposed development area 0.58 ha. Approx. 150m long by 60m wide at its widest and longest points within the proposed development area.
Title Identification Details:	Lot 152 DP1202468, within the Newcastle local government area, Parish of Newcastle, County of Northumberland.
Current Zoning	SP1 Special activities
Current Ownership:	Port of Newcastle Lessor Pty Ltd
Current Occupier:	Vacant land used as a carpark, and access from Raven Street to Port Waratah Coal Services to the north.
Previous and Current Landuse:	Vacant land used as a carpark, and access from Raven Street to Port Waratah Coal Services to the north.
Proposed Landuse:	Industrial Development
Adjoining Site Uses:	Heavy industry to the north, east, south and west: • Port Waratah Coal Services to the north and east; • J Steel to the west; and, • Cargills (oil seed processing plant) to the south.
Site Coordinates for approx. centre of site:	32°52'46.96 S 151°46'15.02 E

2.2 Topography and Drainage

Reference to the NSW Land and Property Information Spatial Information Exchange website (<https://six.nsw.gov.au/wps/portal/>) indicated the elevation of the site was below 10m AHD.

During the site investigation the site was observed to be relatively level, with a very slight slope towards the south. The ground surface consisted of gravel hardstand with some asphalt pavement.

Rain falling on the site would be expected to infiltrate into the site surface. Excess surface water is expected to follow the site topography, and flow to the south towards Raven Street and subsequently into municipal stormwater drains. It is expected that the municipal stormwater system discharges to South Channel of the Hunter River located approximately 840m south of the site.

2.3 Regional Geology

Reference to the 1:100,000 Newcastle-Hunter Coastal Quaternary Geology map indicates that the site is underlain by “modern fill on Quaternary deposits”.

2.4 Hydrogeology

Groundwater beneath the site is anticipated to be present in an unconfined aquifer within fill or alluvial/estuarine deposits. Groundwater is expected to be less than 3m below ground surface (bgs). Groundwater flow direction is anticipated to follow the surface topography and flow to the south south-east and discharge into the Hunter River located approximately 820m south to south-east of the site.

It should be noted that groundwater conditions can vary due to rainfall and other influences including regional groundwater flow, temperature, permeability, recharge areas, surface condition, and subsoil drainage.

A search of the NSW Department of Primary Industries (Office of Water) registered groundwater bores located within a 500m radius of the site was undertaken. The search revealed that there were fifty bores within this radius. A summary of the information available for the bores is provided in Table 2.2 below. A copy of the search is provided in Appendix C. Thirty-four bores were found to the north of the site within the Port Waratah Coal Services land. None of these 34 bores had information available, and so have not been included in Table 2.4 below.

Table 2.4 – Summary of Registered Groundwater Bore Information

Bore ID	Installation Date	Purpose	Approx. Distance and Gradient from Site	Water Bearing Zones (mbgs)
GW202649	13/05/2009	Monitoring bore	Approx. 350m E	4.45
GW202650	13/05/2009	Monitoring bore	Approx. 350m E	4.20
GW202654	20/08/2009	Monitoring bore	Approx. 475m E	6.60
GW202657	19/07/1996	Monitoring bore	Approx. 160m NW	2.60 8.20
GW202658	19/07/1996	Monitoring bore	Approx. 160m NW	2.20
GW202795	29/10/2012	Monitoring bore	Approx. 400m SE	2.80-7.00
GW202982	19/08/2014	Monitoring bore	Approx. 305 SW	2.00-6.20
GW202983	13/09/2014	Monitoring bore	Approx. 250m S	2.00-8.00
GW202984	13/09/2014	Monitoring bore	Approx. 265m S	2.00-8.00
GW202988	13/08/2012	Monitoring bore	Approx. 350m E	5.95
GW202989	13/08/2012	Monitoring bore	Approx. 350m E	6.50
GW202990	14/08/2020	Monitoring bore	Approx. 350m E	5.65
GW202991	14/08/2012	Monitoring bore	Approx. 350m E	5.95
GW202992	14/08/2012	Monitoring bore	Approx. 350m E	5.95

Bore ID	Installation Date	Purpose	Approx. Distance and Gradient from Site	Water Bearing Zones (mbgs)
GW202993	14/08/2012	Monitoring bore	Approx. 350m E	6.45
GW202994	14/08/2012	Monitoring bore	Approx. 350m E	6.00
GW203212	12/09/2014	Monitoring bore	Approx. 242m S	2.00-4.00

Note: NK – not known; N – North, E – East, S – South, W – West

2.5 Acid Sulfate Soils

Reference to the Acid Sulfate Soil Risk Mapping for Lower Hunter Catchment (1:25,000 scale, 2008 Edition 3) indicates that the site is located within an area of "disturbed terrain".

Qualtest completed an Acid Sulfate Soil Assessment in conjunction with the PCA assessment. Based on the field observations, and the laboratory results, the estuarine/alluvial sands and clays below fill material (from about 1.5m bgs) were assessed to comprise Acid Sulfate Soils and a management plan was developed for the site, refer to NEW20P-0171-AC, dated 8 February 2021.

3.0 Previous Reports

Qualtest carried out a Preliminary Contamination Assessment (PCA) for the site in February 2021, ref NEW20P-0171-AA dated 8 February 2021. Relevant information available from the PCA (Qualtest, 2021) is summarised below.

The objectives of the PCA were to:

- Provide an assessment of potential sources of contamination and associated chemicals of concern;
- Provide a preliminary assessment of the location and extent of potential soil contamination on the site; and
- Provide recommendations on the need for further assessment, management and/or remediation.

In order to achieve the above objectives, Qualtest carried out the following scope:

- Desktop study and site history review;
- Site walkover;
- Collection of soil samples from 4 locations;
- Laboratory analysis of soil samples from a suite of common contaminants; and,
- Data assessment and preparation of a Preliminary Contamination Assessment Report.

The site history review showed the site had been undeveloped, potentially stock grazing land until the 1950s to 1960s. In the 1960s and 1980s the site was subjected to filling, likely with dredged material from the Hunter River. From the 1990s the site had been used for vehicle traffic from Raven Street (south) to Port Waratah Coal Services (north), with asphalt paved roads and gravel hardstand being constructed. The site was surrounded by industrial properties on each side.

Two Areas of Environmental Concern (AECs) were identified for the site relating to:

1. Imported Fill - Potential use of contaminated imported fill.
2. Surrounding industrial land uses and potential off-site impacts - Potential for contaminated groundwater to migrate onto the site; and Potential for contaminated dust, particularly coal, to migrate onto the site

To provide a preliminary assessment, soil sampling from four locations (BH01 to BH04) was carried out across the site. The laboratory results reported concentrations of contaminants below the adopted criteria. Due to the limited sampling carried out, the site was not considered to have been characterised in accordance with NSW EPA (1994) Sampling Design Guidelines. The borehole logs for BH01 to BH04 are included in Appendix D of this report. The results of the sampling and analysis for these locations are included in Table 1 and Table 2, Appendix B of this report.

The Preliminary Conceptual Site Model (CSM) (in Section 4 below) indicated that if soil, sediment, surface water and/or groundwater contamination existed on the site, then a potential exposure pathway could exist to current and future site users and the environment. Further assessment was required to assess if exposure pathways were complete or incomplete.

Based on the site history and observations during field investigations, it was recommended that an additional assessment, comprising additional intrusive investigations in the AECs identified be carried out, in accordance with NSW EPA guidelines.

4.0 Site Observations

During the PCA (Qualtest, 2021) a Qualtest Environmental Scientist carried out a site walkover to assess site features. During the site walkover the site was observed to contain an asphalt paved road in the western portion of the site running approximately north-south, and an asphalt paved crossing in the northern portion of the site running approximately east-west. The remainder of the site was covered with varying thicknesses of road base gravel material. Grass was present along the eastern boundary, and in small areas not frequently traversed by vehicles. Slopes on the site were observed to be relatively flat, with a very slight slope down to the south. Refer to Qualtest PCA (Qualtest, 2021) for further details.

Based on information provided by PON two groundwater wells were identified on the site. The groundwater wells were constructed with flush mounted gatic covers and covered with gravel and grass. The location of the groundwater wells are shown on Figure 3, Appendix A.

5.0 Preliminary Conceptual Site Model

Based on the results of the PCA, a Preliminary Conceptual Site Model (CSM) was developed, and is shown below in Table 5.1

Table 5.1 – Preliminary Conceptual Site Model

AEC	COPC	Likelihood of Contamination	Mechanism of Contamination	Potentially Affected Media	Human & Ecological Receptors	Potential mechanisms of exposure	Potential & Complete Exposure Pathways	Comments
1. Imported Fill: Potential use of contaminated imported fill.	TRH, BTEX, PAH, Metals, Asbestos	Low to medium	- Top-down and to depth of fill - Leaching of contaminants from fill into underlying soils - Leaching of soil contaminants to groundwater	- Fill soils - Underlying soils - Surface water - Groundwater	- Current site visitors - Future construction workers & site users - Offsite groundwater discharge point – Hunter River located approximately 820m to the south to south-east of the site.	- Direct dermal contact with contaminated soil and/or groundwater - Ingestion of contaminated soil and/or groundwater - Inhalation of asbestos fibres, or contaminated soil (as dust) - Inhalation of petroleum hydrocarbon vapours - Leaching of soil contaminants to groundwater - Groundwater discharge from onsite to offsite Hunter River. Direct dermal contact with contaminated soil and/or surface water	- Complete exposure pathway for current site visitors, future construction workers and site users (if contaminated and not remediated/ managed). - Potentially incomplete exposure pathway for offsite surface water, due to groundwater discharging to surface water greater than 800m from the site. - Complete exposure pathway for groundwater, due to sandy soils and shallow depth of groundwater (if contaminated and not remediated/managed).	Exposure pathway currently potentially incomplete for soil as preliminary soil sampling results were reported below adopted guidelines. Additional sampling and analysis to sufficiently characterise the fill would be required to confirm the exposure pathway is incomplete.
2. Surrounding industrial land uses: - Potential for contaminated groundwater to migrate onto the site; - Potential for contaminated dust, particularly coal, to migrate onto the site.	TRH, BTEX, PAH, Metals	Low	- Top-down settlement of dust on site surface. - Migration of contaminated groundwater onto site.	- Surface soils - Surface water - Groundwater - Dust	- Current site visitors - Future construction workers & site users - Offsite groundwater discharge point – Hunter River located approximately 820m to the south to south-east of the site.	- Direct dermal contact with contaminated soil and/or groundwater - Ingestion of contaminated soil and/or groundwater - Inhalation of contaminated soil (as dust) - Inhalation of petroleum hydrocarbon vapours - Leaching of soil contaminants to groundwater - Groundwater discharge from onsite to offsite Hunter River.	- Complete exposure pathway for current site visitors, future construction workers and site users (if contaminated and not remediated/ managed). - Potentially incomplete exposure pathway for offsite surface water, due to groundwater discharging to surface water greater than 800m from the site. - Complete exposure pathway for groundwater, due to sandy soils and shallow depth of groundwater (if contaminated and not remediated/managed).	Exposure pathways would be incomplete if soils and groundwater are found to not be contaminated via sampling & analysis.

6.0 Data Quality Objectives

6.1 Step 1 – State the Problem

There is a potential for soil, surface water and/or groundwater contamination to exist from past filling, past landuse and surrounding industrial land. Should contamination exist the site may not be suitable for the intended use without remediation and or management.

Two AECs have been identified for the site and require assessment:

1. Imported Fill across site - Potential use of contaminated imported fill.
2. Surrounding industrial land uses - Potential for contaminated groundwater to migrate onto the site; and Potential for contaminated dust, particularly coal, to migrate onto the site

6.2 Step 2 – Identify the Decisions

The decisions to be made based on the Preliminary Contamination Assessment (site history review, site observations and limited sampling & analysis) are:

- Are the concentrations of COPCs above the adopted landuse criteria; and
- Will the site require remediation, and if so, what level and type of remediation will be required to make the site suitable for the proposed land use, from a contamination perspective?

6.3 Step 3 – Identify the Inputs to the Decisions

Inputs into the decision are:

- Have samples been collected in the required areas of the site (the identified AECs)?
- Have samples been collected at the required frequencies and adequately represent the conditions on site?
- Is the data set adequate to perform statistical analysis, if required (i.e. calculate 95% UCL)?
- Have the samples been analysed for the COPCs identified?
- Have concentrations exceeding the adopted criteria been reported in the samples?
- If concentrations exceeding adopted criteria have been reported, will these areas require remediation and/or management?

The informational inputs into the decision are:

- Field observations and field screening results (PID);
- Laboratory results (concentrations of contaminants in soil);
- QA/QC documentation and data;
- Adopted assessment criteria (see Section 6); and,
- Relevant NSW EPA endorsed Guidelines.

The media to be sampled and analysed is:

- Soil; and
- Groundwater.

6.4 Step 4 – Define the Study Boundaries

The study boundary is defined laterally as the site boundary, Lot 152 DP1202468, within the Newcastle local government area, Parish of Newcastle, County of Northumberland. The site is located at 70 Raven Street, Kooragang, NSW, the proposed development area on the site is about 5,800m², located in the eastern portion of the site (refer to Figure 1 and Figure 2, Appendix A). Vertically, the study boundary will be defined by the depth of soil contamination and/or depth to groundwater. It is anticipated the vertical boundary would be a maximum of 5m bgs.

6.5 Step 5 – Develop a Decision Rule

Chemicals of Potential Concern (COPCs) are identified in Section 3.11, above. The COPCs and the associated assessment criteria are listed in Section 8 below.

The decision rules can be defined as: -

- If the laboratory quality assurance/ quality control data are within the acceptable ranges, the data will be considered suitable for use;
- If the COPCs are reported above the adopted criteria and/or at elevated levels (where no criteria are available) then it will be considered whether further assessment, remediation and/or management measures are required; and
- Where concentrations are below the assessment criteria, then no further assessment, remediation and/or management of that contaminant, in that area, in that media, is required. This is provided samples have been collected at the required frequencies (as per NSW EPA guidelines) and adequately represent the conditions on site, if not, additional sampling may be required.

6.6 Step 6 – Specify Acceptable Limits on Decision Errors

There are two types of errors:

- Type 1 – finding that the site is contaminated, when it is not;
- Type 2 – finding that the site is uncontaminated, when it is.

To reduce the potential for errors, the following will be applied:

- Appropriate field sampling methodologies and collection of field data (including sampling frequency);
- Robust QA/QC assessment of field procedures and laboratory data;
- Appropriate sampling and analytical density;
- Use of statistics (i.e. 95% UCL) to assess arithmetic average of COPCs. Use of statistics will also take into account:
 - No sample should report a concentration more than 250% of the adopted criteria; and,
 - The standard deviation of a sample population should not exceed 50% of the adopted criteria.

6.7 Step 7 – Optimise the Design for Obtaining Data

The methodologies presented in this report are designed to meet the nominated DQOs (for a preliminary assessment). Optimisation of the data collection process will be achieved by:

- Working closely with the analytical laboratories and sampling equipment suppliers so that appropriate procedures and processes are developed and implemented prior to and during the field work and that sampling, handling, and transport to, and processing by, the analytical laboratories is appropriate.
- Conduct sampling in accordance with industry best practice and Standard Operating Procedures (SOPs) for the type of sampling being conducted.

7.0 Field and Laboratory Investigations

7.1 Sampling Plan

The site is about 1.05ha and the available building area on the site is about 0.58ha. The NSW EPA (1995) Sampling Design Guidelines recommend a minimum of 15 sample locations to characterise a site of 0.58ha.

During the PCA, four sampling locations were carried out in the eastern portion of the site (within the proposed building area). For the current DCA an additional 11 boreholes were drilled in the eastern portion of the site.

Two existing groundwater wells were also sampled on the site.

The sampling locations are shown on Figure 3, Appendix A.

5.2 Soil Sampling

The fifteen boreholes (BH01 to BH15) were drilled across the site using a truck mounted drill rig fitted push tubes. The boreholes were drilled to approximate maximum depths of between 2.1m and 4.1m bgs.

Soil samples were collected from the boreholes in the fill materials and underlying natural materials. Samples from BH01 to BH04 were collected using a split spoon sampler (SPT) and samples collected from BH05 to BH15 were collected using push tubes. All samples were collected using a clean pair of nitrile gloves per sample.

The soil samples were placed into 250mL laboratory supplied glass jars and zip locked bags for laboratory analysis. Each soil sample was placed directly into an ice-chilled esky and remained chilled during fieldwork and transportation to the laboratory.

7.3 Groundwater Sampling

Two existing groundwater monitoring wells KIBMW1 and KIBMW2 were identified by PON on the site and sampled by Qualtest on the 23 February 2021. The locations of the groundwater monitoring wells are shown on Figure 3, Appendix B.

The monitoring well installation and construction details were not provided to Qualtest.

Groundwater sampling was undertaken on 23 February 2021. The wells were gauged for depth to product (if present), depth to water and total depth using an interface probe (IP). The wells were then purged using a micropurge pump until they were purged of three well volumes. Water quality parameters (pH, temperature, and redox potential) were measured using a portable water quality meter (WQM) during purging. It is noted that water quality parameters for Electrical conductivity (EC) and dissolved oxygen (DO) could not be obtained due to a WQM malfunction. Samples were collected in laboratory supplied and preserved sample bottles and placed directly into an ice-chilled esky during field work and during transportation to the laboratory.

7.4 Laboratory analysis

The samples were dispatched to the NATA-accredited Eurofins MGT laboratory under chain of custody conditions.

Nine soil samples were selected for analysis as part of the PCA (Qualtest, 2021). A further twelve soil samples were selected for analysis as part of this DCA based on field observations. The soil samples were analysed for the following:

- Total Recoverable Hydrocarbons (TRH) – 7 primary samples;
- Benzene, Toluene, Ethylbenzene, Xylenes (BTEX) – 7 primary samples;
- Polycyclic Aromatic Hydrocarbons (PAHs) – 12 primary samples;
- Metals (arsenic, cadmium, chromium, copper, lead, nickel, zinc and mercury) – 12 primary samples;
- Asbestos (presence/absence) – 7 primary soil samples; and,

One duplicate sample was also analysed for heavy metals and PAHs for quality control purposes.

Two water samples were also selected for analysis as part of this DCA. The water samples were analysed for the following:

- Total Recoverable Hydrocarbons (TRH) – 2 primary samples;
- Benzene, Toluene, Ethylbenzene, Xylenes (BTEX) – 2 primary samples;
- Polycyclic Aromatic Hydrocarbons (PAHs) – 2 primary samples; and
- Metals (filtered) (arsenic, cadmium, chromium, copper, lead, nickel, zinc and mercury) – 2 primary samples.

8.0 Investigation Criteria

8.1 Health and Ecological Levels (Soil)

The health and ecological investigation levels for soil, presented in the *National Environment Protection (Assessment of Site Contamination) Measure 1999 (April 2013)*, NEPC 2013, Canberra (referred to as ASC NEPM 2013) are generally used in NSW when selecting investigation levels for chemical contaminants in soil.

The purpose of the ASC NEPM (2013) is to '*establish a nationally consistent approach to the assessment of site contamination to ensure sound environmental management practices by the community which includes regulators, site assessors, environmental auditors, landowners, developers and industry*'.

ASC NEPM (2013) provides health and ecological investigation and screening levels for different exposure scenarios based on a proposed land use. Health and ecological investigation and screening levels are applicable to the first stage (Tier 1) of site assessment and are used to assist in the iterative development of a Conceptual Site Model (CSM). They are adopted as concentrations of a contaminant above which either further appropriate investigation and/or evaluation will be required, or development of an appropriate management strategy (including remediation).

Health Investigation Levels (HILs) and Health Screening levels (HSLs) are applicable for assessing human health risk via relevant exposure pathways.

The HILs were developed for a broad range of metals and organic substances. These are generic to all soil types.

The HSLs have been developed for selected petroleum compounds and fractions and are applicable to assessing human health risk via inhalation and direct contact with soil and groundwater. The HSLs depend on specific soil physicochemical properties, building configurations, land use scenarios and the depth that groundwater is encountered.

Ecological Investigation Levels (EILs) and Ecological Screening Levels (ESLs) are applicable for assessing risk to terrestrial ecosystems under residential, open space and commercial/industrial land use scenarios. They apply to the top 2m of soil, which corresponds to the root zone and habitation zone of many species.

The EILs are associated with selected metals and organic compounds. The EILs are site specific and are determined by calculating an Ambient Background Concentration (ABC) and an Added Contaminant Limit (ACL) for the site, which are added together to get the EIL. In the absence of ambient background concentration data, a generic ACL, based on the soils pH, Cation Exchange Capacity (CEC) and clay content, has been adopted.

The ESLs are associated with petroleum compounds and fractions and are dependent on specific soil physical properties (i.e. coarse and fine-grained soil).

Based on the proposed site use the investigation and screening levels for commercial/industrial land use have been adopted, and are shown in Table 1, Appendix B.

8.2 Management Limits

The ASC NEPM (2013) provides management limits for petroleum hydrocarbons. The purpose of the Management Limits is to 'avoid or minimise' potential effects of petroleum hydrocarbons. ASC NEPM (1999, amended 2013) Schedule B(1) provides these as effects as:

- Formation of observable Light Non-Aqueous Phase Liquid (LNAPL);
- Fire and explosive hazards; and,
- Effects on buried infrastructure e.g. penetration of, or damage to, in-ground services by hydrocarbons.

Management limits were derived by Canada-Wide Standard for Petroleum Hydrocarbons (CWS-PHC) in Soil (2008) where the lowest limiting value for each effect became the Recommended Management Limit. Based on site specific information, the applicability of management limits as soil investigation levels for the site was reviewed, and is discussed further in Table 6.1 below.

Table 6.1 discusses the derivation of the revised management limits. These management limits will be applied to soils. As described in the ASC NEPM (2013) the magnitude of an exceedance will be considered in the context of whether the exposure pathways are plausible and whether exposure will result in harm. Depending on the level of the exceedance further qualitative or quantitative risk assessment may be required.

Table 6.1 - Site Specific Applicability of Management Limits

TRH Fraction	Basis of Recommended Management Limits (coarse soils)	Appropriateness of Recommended Management Limits for Adopted Criteria
F1 (C6-C10)	Formation of free phase NAPL 700mg/kg Effects on Workers in Trenches 1,000mg/kg Fire/Explosion Risk 1,400mg/kg	The limiting value of 700mg/kg for formation of free phase NAPL is considered appropriate. The value for effects on workers is not considered relevant as HSLs have been derived for Australian conditions and considered to be more appropriate.
F2 (C10-C16)	Effects on Workers in Trenches 1,000mg/kg Formation of free-phase Total F1 to F3 10,000mg/kg Fire/Explosion Risk 5,200mg/kg	'Effects on Workers in Trenches' is not appropriate for adoption as a criteria. These values are based on occupational exposure limits for gasoline and jet fuel, as there is no relevant acute toxicity endpoints available. CRC Care (2011) has established HSLs for 'Intrusive Maintenance Worker' for both vapour intrusion and direct contact of 'Not Limiting' and 20,000mg/kg respectively. HSLs are considered more appropriate for Australian conditions and the robustness in which they are derived. The limiting value of 5,200mg/kg for explosion risk to intrusive maintenance workers is considered appropriate.
F3 (C16-C34)	Effectiveness of bioremediation 3,500mg/kg Formation of free phase NAPL Total F1 to F3 10,000mg/kg	'Effectiveness of bioremediation' is not appropriate as a validation criteria, rather more of a guide for assessing whether bioremediation may be a viable option. It should be noted that this criterion was developed based on Canadian conditions, where bioremediation may not be as accelerated compared to the generally warmer Australian climate. The limiting value of 10,000mg/kg for formation of free phase NAPL is considered appropriate.
F4 (C34-C40)	Formation of free phase NAPL 10,000mg/kg	The limiting value of 10,000mg/kg for formation of free phase NAPL is considered appropriate.

The adopted management limits are shown in Table 1, Appendix B.

8.3 Asbestos Materials in Soil

The assessment of known and suspected asbestos contamination in soil is based on:

- *National Environment Protection (Assessment of Site Contamination) Measure 1999 (April 2013), NEPC 2013, Canberra; and*
- *WA DoH 2009 Guidelines of the assessment and management of asbestos contaminated sites in Western Australia, WA Department of Health and Department of Environment and Conservation.*

Schedule B1, Section 4 NEPM (2013) provides guidance on the assessment of both friable and non-friable forms of asbestos in soil. This guidance is based on the WA DoH (2009) Guidelines that presented risk-based screening levels for asbestos in soil under various land use scenarios.

For the purpose of assessing asbestos impacts in soil, three groups are recognised:

- *Asbestos Containing Material (ACM)* - which is in sound condition although possibly broken or fragmented and the asbestos is bound in a matrix. This is restricted to material that cannot pass through a 7mm x 7mm sieve;
- *Fibrous asbestos (FA)* - friable asbestos material, such as severely weathered ACM, and asbestos in the form of loose fibrous material such as insulation products;
- *Asbestos fines (AF)* - includes free fibres of asbestos, small fibre bundles and also ACM fragments that pass through a 7mm x 7mm sieve.

The adopted health screening levels for asbestos in soil under various land use scenarios, are shown in Table 6.2.

It is noted that Qualtest have carried out asbestos sampling and analysis on a "present/absent" basis, and therefore the guidelines above are not practical to apply. Therefore, a guideline of "detected" has been adopted.

Table 6.2 Health Screening Levels for Asbestos contamination in soil (NEPM 2013)

Form of Asbestos	Health Screening Level
	<u>HIL A</u>
Bonded ACM (%)	0.01
FA and AF (%)	0.001
All forms of Asbestos	No visible asbestos for surface soil (top 10cm)

8.4 Waste Classification

In order to provide a waste classification, the laboratory results were compared to the Contaminant Threshold (CT) and Specific Contaminant Concentration (SCC) values for General and Restricted Solid Waste in the NSW EPA (2014) Waste Classification Guidelines.

8.5 Groundwater Investigation Levels

8.5.1 Assessment of Environmental Values

The NSW EPA Guidelines for the Assessment and Management of Groundwater Contamination (NSW DEC, 2007) describes the process to identify environmental values which must be considered in groundwater investigations at contaminated sites. Based on these guidelines, assessment of relevant environmental values requires that the consultant:

- Determines whether the aquifer beneath the site is included in the NSW Office of Water list of major aquifers of drinking water quality;

- Assesses the identified uses of groundwater from the aquifer; and
- Uses groundwater indicators to assess whether the aquifer is suitable for use as a drinking water source. The NSW EPA has stated that, *'Groundwater with total dissolved solids (TDS) concentrations below 2,000 mg/L is suitable for potential drinking water supply, and hence should be afforded this level of protection from contamination unless other site-specific factors, such as low yield, render such use unlikely.'* (NSW DEC, 2007).

Based on these steps, it is identified that:

- The listed Water Sharing Plans do not include the area of the site. The site is not listed as situated in an Unincorporated Area Groundwater Management Area (GMU). This GMU is not considered to be part of the NSW Office of Water list of protected aquifers as an actual or potential drinking water supply (NSW DEC, 2007).
- The closest potential exposure point to groundwater contamination is considered to be the Hunter River located approximately 840m south of the site.
- The Hunter River is considered to be tidal at Kooragang. Due to a WQM malfunction, no electrical conductivity (TDS) values were calculated during sampling.
- Due to the industrial nature of the site and the presence of reticulated water in the area it is considered unlikely that groundwater beneath the site and/or the Hunter River (around Kooragang) would be used for drinking water, livestock or agricultural irrigation purposes.

Based on the above, it is considered that the principal receptors from contaminated groundwater (if present) is the Hunter Rivers groundwater discharge zone. Consequently, environmental values for groundwater quality are for protection of fresh and marine water aquatic species (based on potential groundwater uses, discharge zones, and tidal nature of the water).

8.5.2 Protection of Aquatic Ecosystems

The trigger values for marine water species presented in the ANZECC (2018) (<http://www.waterquality.gov.au/anz-guidelines>) are considered applicable for the protection of aquatic ecosystems of the receiving waters.

The guidelines present 'Default Guideline Values' which are defined as concentrations of key performance parameters below which there is a low risk that adverse biological effects will occur. It is important to note that these are not threshold values at which an environmental problem is likely to occur if exceeded. Rather, if the trigger values are exceeded, then further action is required which may include either, further site-specific investigations to assess whether or not there is an actual problem, or the implementation of management / remedial actions.

Default Guideline Values are provided for the protection of 80-99% of species in fresh and marine waters, with the DGV depending on the health of the receiving waters.

It is considered that the fresh and marine water trigger values for protection of 95% of species (99% for bio-accumulative compounds) are applicable for investigating chemical concentrations in groundwater, based on the conductivity measured (brackish to saline) and the potential discharge zones (potentially fresh water).

8.5.3 Protection of Human Health Via Vapour Intrusion

Based on NEPM Schedule B1, Guideline on the Investigation Levels for Soil and Groundwater, the following criteria were adopted:

- Groundwater HSLs for vapour intrusion for Commercial/Industrial Land Use (HSL D), Sand, 2m to <4m.

9.0 Quality Assurance/Quality Control

Sampling activities were undertaken in accordance with normal, industry accepted practices and standards. The assessment of field and laboratory quality assurance / quality control (QA / QC) procedures is provided below, and a data validation report is presented in Appendix E.

In order to assess field quality assurance / quality control (QA/QC) procedures, the following quality control samples were collected and analysed:

QC Sample	Type	Lab	Analysis
D.12.01.21	Duplicate of BH01 0.0-0.1	Eurofins mgt	TRH, BTEX, PAH, Metals
D.22.2.21	Duplicate of BH05 0.5-0.8	Eurofins mgt	PAH, Metals

Primary and intra lab duplicate samples were analysed by the NATA-accredited Eurofins mgt laboratory.

Table 3, Appendix B, presents the relative percentage differences (RPDs) between the primary and duplicate samples. A review of the Qualtest QA / QC results indicates that RPDs were within the acceptable range. It is noted that low concentrations can exaggerate the percentage differences with respect to small total concentrations, therefore where results for primary and duplicate sample were less than 10 times the LOR, the RPDs have been disregarded.

The laboratory internal QA/QC reports indicated that the appropriate laboratory QA / QC procedures and rates were undertaken for contamination studies, and that:

- Laboratory blank samples were free of contamination;
- Matrix spike recoveries were within the control limits;
- Laboratory duplicate RPDs were recorded within the control limits;
- Surrogates and laboratory control samples were within the laboratories acceptable range.

Based on the above, and the data validation report in Appendix E, it is considered that the field and laboratory methods for soil sampling are appropriate and that the data obtained is usable and considered to reasonably represent the concentrations at the sampling points at the time of sampling.

10.0 Results

10.1 Subsurface Conditions

The soils observed during drilling are summarised below in Table 10.1. The borehole logs are presented in Appendix D.

Table 10.1 – Summary of Geotechnical Units and Soil Types

Unit	Soil Type	Description	Depth Range (m bgs)
1A	ASPHALT (BH03 only)	Asphalt	0.0 to 0.25
1B	FILL	Sandy GRAVEL– fine to medium grained sub-rounded to sub-angular, pale grey to brown, fine to medium grained sand, trace fines of low plasticity. SILT – low to medium plasticity, white to pale grey, with some crystalline material, possibly gypsum. SAND – fine to medium grained, pale brown to yellow/brown, brown, grey to dark grey, with shells, trace glass. Clayey Sandy GRAVEL – fine to medium grained, brown to grey/brown, fine to coarse grained sand, fines of low to medium plasticity. Gravelly SAND – fine to medium grains, brown fine grained gravel. CLAY – medium to high plasticity brown to dark brown.	0.0 to 2.0
2	Estuarine Soils	Sandy CLAY – medium to high plasticity, grey to dark grey. Silty Sandy CLAY – medium to high plasticity, grey to dark grey, fine to medium grained sand. Clayey SAND – fine to medium grained, grey to dark grey, fines of low plasticity. CLAY – medium to high plasticity, grey to dark grey with some brown and red-brown.	1.4 to EOH*
3	Alluvial Soils	SAND – fine to medium grained, dark grey to grey, grey-brown and dark brown to brown, pale brown with some pale brown to white, with shells.	1.6 to EOH*

* End of hole

Anthropogenic materials (glass) were observed within fill material at BH01. A white crystalline material, assumed to be gypsum was also observed in fill at BH02, BH03, BH06 to BH11 and BH13 to BH14. Trace coal was observed in BH11.

Groundwater inflows were observed between 2.1 and 3.0m bgs during drilling and soil sampling.

No odours were observed during sampling.

10.2 Groundwater Gauging and Field Water Quality

The gauging and water quality parameters are shown in Table 5 and Table 6, Appendix B, and are summarised in Table 10.2 below.

Table 10.2 – Summary of Gauging Data and Water Quality Parameters

Item	Item Description	
Depth to Groundwater	Gauged depths to groundwater ranged between 2.144m btoc (KIB MW1) and 2.347m btoc (KIB MW2) on 23 February 2021.	
Non-Aqueous Phase Hydrocarbons (NAPL)	NAPL was not detected in the groundwater wells.	
Groundwater Flow	As no survey data was available for the wells no groundwater contours were developed. It is anticipated that groundwater flows to the south south-east and discharges into the Hunter River located approximately 820m south to south-east of the site.	
Groundwater Quality Parameters	Parameter	Range
	Redox potential	3 mV to 10 mV
	Dissolved Oxygen	No results, machine malfunction
	Electrical conductivity (EC)	No results, machine malfunction
	pH	6.85 to 6.98
	Temperature	24.0°C to 24.9°C

Notes: btoc = below top of casing.

10.3 Laboratory Results

Soil

Soil analytical results for the contamination assessment are summarised in Table 1, Appendix B. The laboratory analytical reports are also included in Appendix F.

The soil laboratory results were compared to the investigation levels described in Sections 6.

The analytical results indicated that concentrations of contaminants were reported below the adopted commercial industrial landuse criteria, and asbestos was not detected.

Groundwater

Groundwater analytical results for the contamination assessment are summarised in Table 6, Appendix B. The laboratory analytical reports are also included in Appendix F.

The groundwater laboratory results were compared to the investigation levels described in Section 8. The analytical results indicated that concentrations of contaminants were reported below the adopted criteria, with the exception of:

- Concentrations of chromium above the aquatic ecosystem DGV (0.001mg/L) in samples KIB MW1 (0.003mg/L) and KIB MW2 (0.009mg/L);
- Concentrations of copper above the aquatic ecosystem DGV (0.0014mg/L) in samples KIB MW1 (0.009mg/L) and KIB MW2 (0.013mg/L); and
- Concentrations of zinc above the aquatic ecosystem DGV (0.008mg/L) in samples KIB MW1 (0.099mg/L) and KIB MW2 (0.038mg/L).

It is considered unlikely that the metals concentrations exceedences were due to site activities due to the top down nature of potential contamination and due to low metal concentrations in the fill material. Therefore, the metal concentrations are considered to be indicative of regional background water quality, and do not warrant further investigation or remediation.

Preliminary waste Classification

Qualtest followed the six step process described in Part 1 of the guidelines for assessing the classification of the in-situ soil on the site. According to the waste classification procedure:

- **Step 1 – Is the waste special waste?:** The material is not classified as a 'special waste'.
- **Step 2 – Is the waste liquid waste?:** The material assessed is not to be a 'liquid waste' in its current form. The material requiring offsite disposal was soil and capable of being picked up by a spade or shovel.
- **Step 3 – Is the waste pre-classified?:** The material assessed is not 'pre-classified'.
- **Step 4 – Does the waste possess hazardous characteristics?:** The material assessed does not appear to possess hazardous characteristics from the onsite observations made.
- **Step 5 - Determining a waste's classification using chemical assessment:** The material has been assessed by chemical analyses. Soil analytical results are presented in Table 3 (attached). Laboratory certificates and chain of custody records are also attached. The results show concentrations below the general solid waste criteria (CT1/SCC1/TCLP1).
- **Step 6 - Is the waste putrescible or non-putrescible?:** The material is composed predominantly of soil. NSW EPA (2014) notes that materials that are generally not classified as putrescible include soils, timber, garden trimmings, agricultural, forestry and crop materials, and natural fibrous organic and vegetative materials. Based on observations by Qualtest, the material is considered to be non-putrescible.

Based on the above, the fill material on the site classifies as General Solid Waste in accordance with the NSW (2014) Waste Classification Guidelines.

11.0 Conceptual Site Model

Based on the results of the detailed contamination assessment, including sampling and analysis results, carried out on the site, the Conceptual Site Model (CSM) has been updated.

Table 11.1 – Updated Conceptual Site Model Following Assessment

AEC	COPC	Likelihood of Contamination	Mechanism of Contamination	Potentially Affected Media	Human & Ecological Receptors	Potential mechanisms of exposure	Sampling Completed	Potential & Complete Exposure Pathways
1. Imported Fill: Potential use of contaminated imported fill.	TRH, BTEX, PAH, Metals, Asbestos	Low to medium	- Top-down and to base of fill - Leaching of contaminants from fill into underlying soils - Leaching of soil contaminants to groundwater	- Fill soils - Underlying soils - Surface water - Groundwater	- Current site visitors - Future construction workers & site users - Offsite groundwater discharge point – Hunter River located approximately 820m to the south to south-east of the site.	- Direct dermal contact with contaminated soil and/or groundwater - Ingestion of contaminated soil and/or groundwater - Inhalation of asbestos fibres, or contaminated soil (as dust) - Inhalation of petroleum hydrocarbon vapours - Leaching of soil contaminants to groundwater - Groundwater discharge from onsite to offsite Hunter River. Direct dermal contact with contaminated soil and/or surface water	- BH01 to BH15 - Groundwater wells - KIBMW1 and KIBMW2	No contamination was identified in the fill soils, therefore there is an incomplete exposure pathway for current site visitors, future construction workers, site users, soil biota, surface water and groundwater.
2. Surrounding industrial land uses: - Potential for contaminated groundwater to migrate onto the site; - Potential for contaminated dust, particularly coal, to migrate onto the site.	TRH, BTEX, PAH, Metals	Low	- Top-down settlement of dust on site surface. - Migration of contaminated groundwater onto site.	- Surface soils - Surface water - Groundwater - Dust	- Current site visitors - Future construction workers & site users - Offsite groundwater discharge point – Hunter River located approximately 820m to the south to south-east of the site.	- Direct dermal contact with contaminated soil and/or groundwater - Ingestion of contaminated soil and/or groundwater - Inhalation of contaminated soil (as dust) - Inhalation of petroleum hydrocarbon vapours - Leaching of soil contaminants to groundwater - Groundwater discharge from onsite to offsite Hunter River.	- BH01 to BH15 - Groundwater wells - KIBMW1 and KIBMW2	No contamination was identified therefore there is an incomplete exposure pathway for current site visitors, future construction workers, site users, soil biota, surface water and groundwater.

12.0 Conclusions and Recommendations

Based on the results of the Detailed Contamination Assessment and results of field and laboratory investigations, it is considered that the site is suitable for the proposed development.

As a precaution it is recommended that an Unexpected Finds Procedure be included in the Construction Environmental Management Plan, and implemented during earthworks.

Based on the insitu assessment, if the surface/fill material is proposed to be disposed offsite to a licenced waste facility, the material classifies as **General Solid Waste** in accordance with the NSW EPA (2014) *Waste Classification Guidelines, Part 1 – Classifying Waste*.

Qualtest previously completed an Acid Sulfate Soil Assessment on the site. Based on the field observations, and the laboratory results, the estuarine/alluvial sands and clays below fill material (from about 1.5m bgs) were assessed to comprise Acid Sulfate Soils and a management plan was developed for the site, refer to NEW20P-0171-AC, dated 8 February 2021. This ASSMP should be implemented during redevelopment of the site.

If conditions other than those encountered during this assessment are uncovered, further assessment by an environmental consultant may be necessary.

This report was prepared in general accordance with the relevant sections of the NSW EPA (2020) Guidelines for Consultants Reporting on Contaminated Land and the National Environment Protection (Assessment of Site Contamination) Measure 1999 (April 2013), NEPC 2013, Canberra (referred to as ASC NEPM 2013).

13.0 Limitations

The findings presented in the report and used as the basis for recommendations presented herein were obtained using normal, industry accepted practices and standards. To our knowledge, they represent a reasonable interpretation of the general site history of the site relevant to potential contamination.

Data and opinions contained within the report may not be used in other contexts or for any other purposes without prior review and agreement by Qualtest. If this report is reproduced, it must be in full.

14.0 References

NSW Department of Primary Industries (Office of Water) Registered Groundwater Bore Map, accessed from <http://allwaterdata.water.nsw.gov.au/water.stm>, accessed on 28 October 2020.

NSW Land and Property Information, Spatial Information eXchange (SIX) Maps - Topographic Map, accessed from <https://maps.six.nsw.gov.au/>, accessed on 28 October 2020.

Department of Environment and Climate Change (2008) Acid Sulfate Soil Risk Mapping for Part of the Lower Hunter River Catchment, 1:25,000 scale (Edition 3).

NSW EPA (2020) Guidelines for Consultants Reporting on Contaminated Land.

NEPC (2013) National Environment Protection (Assessment of Site Contamination) Measure 1999 (April 2013), Canberra (ASC NEPM 2013).

Troedson A. L. & Deyssing L. (2016) Newcastle-Hunter Area 1:25,000 Coastal Quaternary Geology Map Series, Geological Survey of NSW

APPENDIX A:

Figures



Image obtained from Sixmaps (<https://maps.six.nsw.gov.au/>) 11 January 2021



Client:	EJE ARCHITECTURE PTY LTD	Drawing No:	FIGURE 1
Project:	PRELIMINARY CONTAMINATION ASSESSMENT	Project No:	NEW20P-0171-AD
Location:	70 RAVEN STREET (LOT 152 DP1202468)	Scale:	N.T.S.
Title:	SITE LOCATION PLAN	Date:	4/3/2021

LEGEND:

Site Boundary

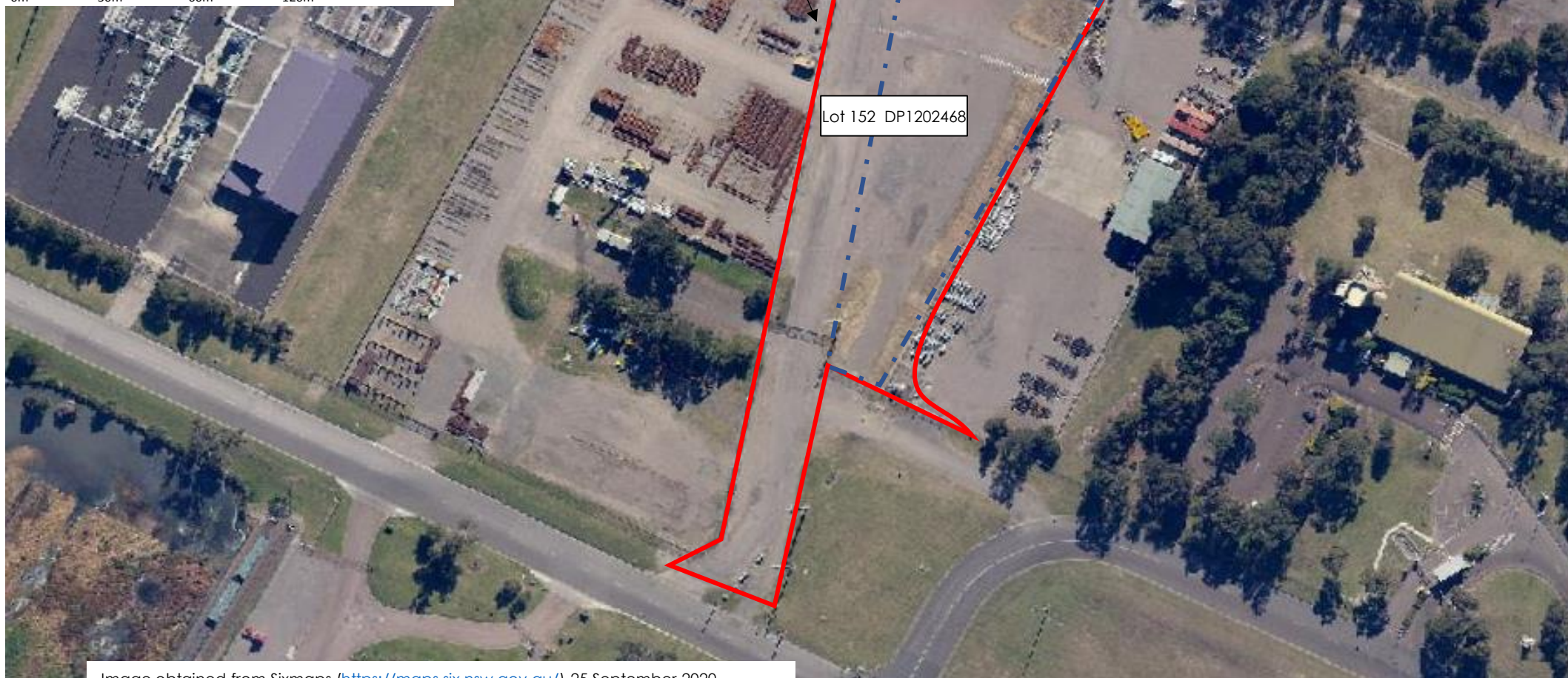


Proposed Development Area

Approx. Scale Bar



0m 30m 60m 120m

Image obtained from Sixmaps (<https://maps.six.nsw.gov.au/>) 25 September 2020

Client:	EJE ARCHITECTURE PTY LTD	Drawing No:	FIGURE 2
Project:	PRELIMINARY CONTAMINATION ASSESSMENT	Project No:	NEW20P-0171-AD
Location:	70 RAVEN STREET (LOT 152 DP1202468)	Scale:	N.T.S.
Title:	LOT LAYOUT AND PROPOSED DEVELOPMENT AREA	Date:	4/03/2021

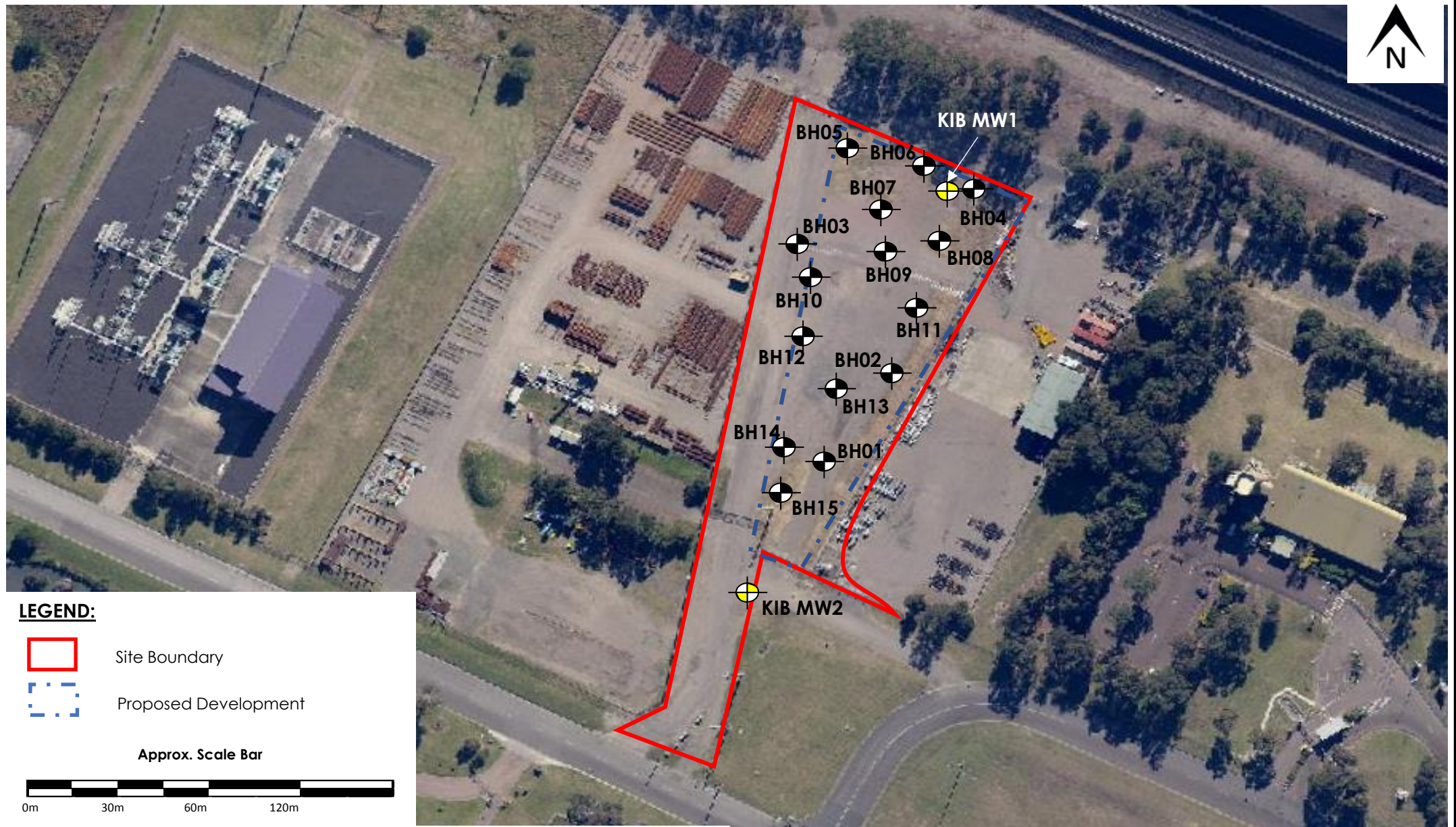


Image obtained from Sixmaps (<https://maps.six.nsw.gov.au/>) 11 January 2021

Client:	EJE ARCHITECTURE PTY LTD	Drawing No:	FIGURE 3
Project:	DETAILED CONTAMINATION ASSESSMENT	Project No:	NEW20P-0171-AD
Location:	70 RAVEN STREET (LOT 152 DP1202468)	Scale:	N.T.S.
Title:	SAMPLING LOCATIONS	Date:	4/03/2021

APPENDIX B:

Tables

Table 1 - Soil Analytical Results - TRH, BTEX, PAH, Metals, Asbestos
Raven Street, Kooragang



							Field ID	BH01 0.0-0.1	BH01 1.0-1.1	BH01 2.0-2.1	BH02 0.0-0.1	BH02 1.0-1.1	BH03 0.25-0.35	BH03 1.5-1.6	BH04 0.0-0.1	BH04 0.5-0.6	BH05 0.5-0.8	BH06 0.0-0.3
							Date	12/01/2021	12/01/2021	12/01/2021	12/01/2021	12/01/2021	12/01/2021	12/01/2021	12/01/2021	12/01/2021	2/02/2021	2/02/2021
Analytes		Units	LOR	HIL D ¹	HSL D ²	EIL/ESL D ³	Mgmt Limits ⁴											
Metals	Arsenic	mg/kg	2	3000		160		2.4	2.2	7.2	3.4	4.7	< 2	< 2	2.4	< 2	2.5	3
	Cadmium	mg/kg	0.4	900				0.6	< 0.5	< 0.5	5.3	4.1	7.4	< 0.5	0.6	< 0.5	< 0.4	< 0.4
	Chromium	mg/kg	5	3600		320*		53	< 5	49	10	16	51	14	6.5	< 5	< 5	8.3
	Copper	mg/kg	5	240000		110*		5.9	< 5	35	6.7	10	< 5	21	< 5	< 5	< 5	5.6
	Lead	mg/kg	5	1500		1800		7.9	< 5	30	14	51	10	44	7.6	5.3	< 5	14
	Mercury	mg/kg	5	730				0.2	< 0.1	0.1	1.7	0.2	0.3	< 0.1	0.1	< 0.1	< 0.1	< 0.1
	Nickel	mg/kg	5	6000		60*		< 5	< 5	48	< 5	10	5.7	< 5	< 5	< 5	< 5	6
	Zinc	mg/kg	5	400000		230*		58	16	320	56	180	21	67	28	20	28	56
PAHs	Acenaphthene	mg/kg	0.5					< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Acenaphthylene	mg/kg	0.5					< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Anthracene	mg/kg	0.5					< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Benz(a)anthracene	mg/kg	0.5					< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Benzo(a)pyrene	mg/kg	0.5			1.4		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Benzo(a)pyrene TEQ (medium bound)	mg/kg	0.6	40				0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
	Benzo(b&j)fluoranthene	mg/kg	0.5					< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Benzo(g,h,i)perylene	mg/kg	0.5					< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Benzo(k)fluoranthene	mg/kg	0.5					< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Chrysene	mg/kg	0.5					< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Dibenz(a,h)anthracene	mg/kg	0.5					< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Fluoranthene	mg/kg	0.5					< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Fluorene	mg/kg	0.5					< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Indeno(1,2,3-cd)pyrene	mg/kg	0.5					< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Naphthalene	mg/kg	0.5					< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Phenanthrene	mg/kg	0.5					< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Pyrene	mg/kg	0.5					< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Total PAH	mg/kg	0.5	4000				< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
BTEX	Benzene	mg/kg	0.1		3	75		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	-
	Toluene	mg/kg	0.1		NL	135		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	-
	Ethylbenzene	mg/kg	0.1		NL	165		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	-
	Xylenes - Total	mg/kg	0.3		230	180		< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	-
TRH	Naphthalene	mg/kg	0.5			370		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	-
	TRH C6-C10	mg/kg	20			215	700	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	-
	TRH C6-C10 less BTEX (F1)	mg/kg	20		260			< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	-
	TRH >C10-C16	mg/kg	50			170	5200	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	-
	TRH >C10-C16 less Naphthalene (F2)	mg/kg	50		NL			< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	-
	TRH >C16-C34	mg/kg	100			1700	10000	110	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	-
	TRH >C34-C40	mg/kg	100			3300	10000	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	-
Asbestos	Asbestos	-	-	Detect				ND	-	-	ND	-	ND	-	ND	-	ND	-

Notes

* Clay content 1%, and using Ambient Background Concentration obtained from

ND Not detected

NL Not limiting

Result Concentration exceeds adopted health investigation level (Commercial/Industrial)

Result Concentration exceeds adopted health screening level, vapour intrusion (Commercial/Industrial, Sand, 0-1m)

Result Concentration exceeds the adopted ecological investigation/screening levels

Result Concentration exceeds adopted Management Limits

¹ NEPC (2013) National Environmental Protection (Assessment of Site)

² NEPC (2013) Soil Health Screening Levels for Vapour Intrusion, Commercial/Industrial, Sand 0m to <1m

³ NEPC (2013) Soil Ecological Investigation & Screening Levels, commercial/industrial

⁴ NEPC (2013) Management Limits for TPH Fractions F1-F4 in Soil, adjusted as described in report

Table 1 - Soil Analytical Results - TRH, BTEX, PAH, Metals, Asbestos
Raven Street, Kooragang



						BH07 0.0-0.25	BH08 0.0-0.25	BH09 0.0-0.2	BH09 0.95-1.3	BH10 0.0-0.25	BH11 0.0-0.45	BH12 0.0-0.15	BH13 0.3-0.75	BH14 0.0-0.2	BH15 1.1-1.4
						2/02/2021	2/02/2021	2/02/2021	2/02/2021	2/02/2021	2/02/2021	2/02/2021	2/02/2021	2/02/2021	2/02/2021
Analytes		Units	LOR	HIL D ¹	HSL D ²										
Metals	Arsenic	mg/kg	2	3000		3.9	4.5	4.9	< 2	6.7	4.3	5.4	< 2	4.3	2.3
	Cadmium	mg/kg	0.4	900		4.2	1	< 0.4	< 0.4	1.8	< 0.4	< 0.4	19	1.7	< 0.4
	Chromium	mg/kg	5	3600		23	10	11	< 5	290	10	17	9.9	150	7.2
	Copper	mg/kg	5	240000		8.1	7.4	< 5	< 5	18	< 5	< 5	< 5	140	< 5
	Lead	mg/kg	5	1500		20	14	16	6.9	35	11	13	< 5	22	< 5
	Mercury	mg/kg	5	730		1	0.2	< 0.1	0.1	0.4	< 0.1	< 0.1	3	0.2	< 0.1
	Nickel	mg/kg	5	6000		5.2	6.2	5.5	< 5	16	5	< 5	< 5	8.1	< 5
	Zinc	mg/kg	5	400000		72	51	43	21	73	43	44	22	61	25
PAHs	Acenaphthene	mg/kg	0.5			< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Acenaphthylene	mg/kg	0.5			< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Anthracene	mg/kg	0.5			< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Benz(a)anthracene	mg/kg	0.5			< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Benzo(a)pyrene	mg/kg	0.5			< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Benzo(a)pyrene TEQ (medium bound)	mg/kg	0.6	40		0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
	Benzo(b&j)fluoranthene	mg/kg	0.5			< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Benzo(g,h,i)perylene	mg/kg	0.5			< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Benzo(k)fluoranthene	mg/kg	0.5			< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Chrysene	mg/kg	0.5			< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Dibenz(a,h)anthracene	mg/kg	0.5			< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Fluoranthene	mg/kg	0.5			< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Fluorene	mg/kg	0.5			< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Indeno(1.2.3-cd)pyrene	mg/kg	0.5			< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Naphthalene	mg/kg	0.5			< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Phenanthrene	mg/kg	0.5			< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Pyrene	mg/kg	0.5			< 0.5	< 0.5	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Total PAH	mg/kg	0.5	4000		< 0.5	< 0.5	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
BTEX	Benzene	mg/kg	0.1		3	< 0.1	-	< 0.1	< 0.1	-	< 0.1	< 0.1	-	-	< 0.1
	Toluene	mg/kg	0.1		NL	< 0.1	-	< 0.1	< 0.1	-	< 0.1	< 0.1	-	-	< 0.1
	Ethylbenzene	mg/kg	0.1		NL	< 0.1	-	< 0.1	< 0.1	-	< 0.1	< 0.1	-	-	< 0.1
	Xylenes - Total	mg/kg	0.3		230	< 0.3	-	< 0.3	< 0.3	-	< 0.3	< 0.3	-	-	< 0.3
TRH	Naphthalene	mg/kg	0.5			< 0.5	-	< 0.5	< 0.5	-	< 0.5	< 0.5	-	-	< 0.5
	TRH C6-C10	mg/kg	20			< 20	-	< 20	< 20	-	< 20	< 20	-	-	< 20
	TRH C6-C10 less BTEX (F1)	mg/kg	20		260	< 20	-	< 20	< 20	-	< 20	< 20	-	-	< 20
	TRH >C10-C16	mg/kg	50			< 50	-	< 50	< 50	-	< 50	< 50	-	-	< 50
	TRH >C10-C16 less Naphthalene (F2)	mg/kg	50		NL	< 50	-	< 50	< 50	-	< 50	< 50	-	-	< 50
	TRH >C16-C34	mg/kg	100			< 100	-	< 100	< 100	-	< 100	< 100	-	-	< 100
TRH >C34-C40	mg/kg	100			< 100	-	< 100	< 100	-	< 100	< 100	-	-	< 100	
Asbestos	Asbestos	-	-	Detect		ND	-	ND	ND	-	ND	ND	-	-	ND

Notes

* Clay content 1%, and using Ambient Background Concentration obtained from

ND Not detected

NL Not limiting

Result Concentration exceeds adopted health investigation level (Commercial/Industrial)

Result Concentration exceeds adopted health screening level, vapour intrusion (Commercial/Industrial, San

Result Concentration exceeds the adopted ecological investigation/screening levels

Result Concentration exceeds adopted Management Limits

¹ NEPC (2013) National Environmental Protection (Assessment of Site

² NEPC (2013) Soil Health Screening Levels for Vapour Intrusion, Commercial/Industrial, Sand 0m to <1

³ NEPC (2013) Soil Ecological Investigation & Screening Levels, commercial/industrial

⁴ NEPC (2013) Management Limits for TPH Fractions F1-F4 in Soil, adjusted as described in report

Table 2: Waste Classification Analytical Results
Raven Street, Kooragang



						Field ID	BH01 0.0-0.1	BH01 1.0-1.1	BH01 2.0-2.1	BH02 0.0-0.1	BH02 1.0-1.1	BH03 0.25-0.35	BH03 1.5-1.6	BH04 0.0-0.1	BH04 0.5-0.6	BH05 0.5-0.8	BH06 0.0-0.3	BH07 0.0-0.25
						Date	12/01/2021	12/01/2021	12/01/2021	12/01/2021	12/01/2021	12/01/2021	12/01/2021	12/01/2021	12/01/2021	2/02/2021	2/02/2021	2/02/2021
Analytes		Units	LOR	General Solid Waste without TCLP	General Solid Waste with TCLP													
				CT1	SCC1	TCLP1												
Metals	Arsenic	mg/kg	2	100	500		2.4	2.2	7.2	3.4	4.7	< 2	< 2	2.4	< 2	2.5	3	3.9
	Cadmium	mg/kg	0.4	20			0.6	< 0.5	< 0.5	5.3	4.1	7.4	< 0.5	0.6	< 0.5	< 0.4	< 0.4	4.2
	Chromium	mg/kg	5	100	1900		53	< 5	49	10	16	51	14	6.5	< 5	< 5	8.3	23
	chromium	mg/L	0.01			5	-	-	-	-	-	-	-	-	-	-	-	-
	Copper	mg/kg	5				5.9	< 5	35	6.7	10	< 5	21	< 5	< 5	< 5	5.6	8.1
	Lead	mg/kg	5	100	1500		7.9	< 5	30	14	51	10	44	7.6	5.3	< 5	14	20
	Mercury	mg/kg	5	4			0.2	< 0.1	0.1	1.7	0.2	0.3	< 0.1	0.1	< 0.1	< 0.1	< 0.1	1
	Nickel	mg/kg	5	40	1050		< 5	< 5	48	< 5	10	5.7	< 5	< 5	< 5	< 5	6	5.2
	Nickel TCLP	mg/L	0.01			2	-	-	0.06	-	-	-	-	-	-	-	-	-
Zinc	mg/kg	5				58	16	320	56	180	21	67	28	20	28	56	72	
PAH	Acenaphthene	mg/kg	0.5				< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Acenaphthylene	mg/kg	0.5				< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Anthracene	mg/kg	0.5				< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Benz(a)anthracene	mg/kg	0.5				< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Benzo(a)pyrene	mg/kg	0.5	0.8			< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Benzo(a)pyrene TEQ	mg/kg	0.6				0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
	Benzo(b&j)fluoranthene	mg/kg	0.5				< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Benzo(g,h,i)perylene	mg/kg	0.5				< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Benzo(k)fluoranthene	mg/kg	0.5				< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Chrysene	mg/kg	0.5				< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Dibenz(a,h)anthracene	mg/kg	0.5				< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Fluoranthene	mg/kg	0.5				< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Fluorene	mg/kg	0.5				< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Indeno(1.2.3-cd)pyrene	mg/kg	0.5				< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Naphthalene	mg/kg	0.5				< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Phenanthrene	mg/kg	0.5				< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Pyrene	mg/kg	0.5				< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Total PAH*	mg/kg	0.5	200			< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
BTEx	Benzene	mg/kg	0.1	10			< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1
	Ethylbenzene	mg/kg	0.1	600			< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1
	Toluene	mg/kg	0.1	288			< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1
	Xylenes - Total	mg/kg	0.3	1000			< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	-	< 0.3
TRH	TRH C6-C9	mg/kg	20	650			< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	-	< 20
	TRH C10-C14	mg/kg	20				< 20	< 20	< 20	< 20	21	< 20	< 20	< 20	< 20	< 20	-	< 20
	TRH C15-C28	mg/kg	50				< 50	65	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	-	< 50
	TRH C29-C36	mg/kg	50				< 50	60	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	-	< 50
	TRH C10-36 (Total)	mg/kg	50	10000			< 50	125	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	-	< 50
Asbestos				Detect			ND	-	-	ND	-	ND	-	ND	-	ND	-	ND

Notes:

Value	Result exceeds criteria for General Solid Waste without TCLP (CT1)
Value	Result exceeds criteria for General Solid Waste with TCLP (SCC1/TCLP1)
Value	Asbestos Detected

ND Not detected

Criteria from NSW EPA (2014) Waste Classification Guidelines, Tables\ 1 and 2

Table 2: Waste Classification Analytical Results
Raven Street, Kooragang



						Field ID	BH08 0.0-0.25	BH09 0.0-0.2	BH09 0.95-1.3	BH10 0.0-0.25	BH11 0.0-0.45	BH12 0.0-0.15	BH13 0.3-0.75	BH14 0.0-0.2	BH15 1.1-1.4
						Date	2/02/2021	2/02/2021	2/02/2021	2/02/2021	2/02/2021	44229	44229	44229	44229
Analytes		Units	LOR	General Solid Waste without TCLP	General Solid Waste with TCLP										
				CT1	SCC1	TCLP1									
Metals	Arsenic	mg/kg	2	100	500		4.5	4.9	< 2	6.7	4.3	5.4	< 2	4.3	2.3
	Cadmium	mg/kg	0.4	20			1	< 0.4	< 0.4	1.8	< 0.4	< 0.4	19	1.7	< 0.4
	Chromium	mg/kg	5	100	1900		10	11	< 5	290	10	17	9.9	150	7.2
	chromium	mg/L	0.01			5	-	-	-	<0.05	-	-	-	-	-
	Copper	mg/kg	5				7.4	< 5	< 5	18	< 5	< 5	< 5	140	< 5
	Lead	mg/kg	5	100	1500		14	16	6.9	35	11	13	< 5	22	< 5
	Mercury	mg/kg	5	4			0.2	< 0.1	0.1	0.4	< 0.1	< 0.1	3	0.2	< 0.1
	Nickel	mg/kg	5	40	1050		6.2	5.5	< 5	16	5	< 5	< 5	8.1	< 5
	Nickel TCLP	mg/L	0.01			2	-	-	-	-	-	-	-	-	-
Zinc	mg/kg	5				51	43	21	73	43	44	22	61	25	
PAH	Acenaphthene	mg/kg	0.5				< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Acenaphthylene	mg/kg	0.5				< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Anthracene	mg/kg	0.5				< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Benz(a)anthracene	mg/kg	0.5				< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Benzo(a)pyrene	mg/kg	0.5	0.8			< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Benzo(a)pyrene TEQ	mg/kg	0.6				0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
	Benzo(b&j)fluoranthene	mg/kg	0.5				< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Benzo(g,h,i)perylene	mg/kg	0.5				< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Benzo(k)fluoranthene	mg/kg	0.5				< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Chrysene	mg/kg	0.5				< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Dibenz(a,h)anthracene	mg/kg	0.5				< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Fluoranthene	mg/kg	0.5				< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Fluorene	mg/kg	0.5				< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Indeno(1.2.3-cd)pyrene	mg/kg	0.5				< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Naphthalene	mg/kg	0.5				< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Phenanthrene	mg/kg	0.5				< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Pyrene	mg/kg	0.5				< 0.5	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Total PAH*	mg/kg	0.5	200			< 0.5	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	
BTEx	Benzene	mg/kg	0.1	10			-	< 0.1	< 0.1	-	< 0.1	< 0.1	-	-	< 0.1
	Ethylbenzene	mg/kg	0.1	600			-	< 0.1	< 0.1	-	< 0.1	< 0.1	-	-	< 0.1
	Toluene	mg/kg	0.1	288			-	< 0.1	< 0.1	-	< 0.1	< 0.1	-	-	< 0.1
	Xylenes - Total	mg/kg	0.3	1000			-	< 0.3	< 0.3	-	< 0.3	< 0.3	-	-	< 0.3
TRH	TRH C6-C9	mg/kg	20	650			-	< 20	< 20	-	< 20	< 20	-	-	< 20
	TRH C10-C14	mg/kg	20				-	< 20	< 20	-	< 20	< 20	-	-	< 20
	TRH C15-C28	mg/kg	50				-	< 50	< 50	-	69	< 50	-	-	< 50
	TRH C29-C36	mg/kg	50				-	< 50	< 50	-	54	< 50	-	-	< 50
	TRH C10-36 (Total)	mg/kg	50	10000			-	< 50	< 50	-	123	< 50	-	-	< 50
Asbestos				Detect			-	ND	ND	-	ND	ND	-	-	ND

Notes:

Value	Result exceeds criteria for General Solid Waste without TCLP (CT1)
Value	Result exceeds criteria for General Solid Waste with TCLP (SCC1/TCLP1)
Value	Asbestos Detected

ND Not detected

Criteria from NSW EPA (2014) Waste Classification Guidelines, Tables\ 1 and 2

Table 3 - Quality Control Results - Duplicates
Raven Street, Kooragang

				BH01 0.0-0.1	D.12.1.21	RPD %	BH05 0.5-0.8	D.22.2.21	RPD %
				12/01/2021	12/01/2021		2/02/2021	2/02/2021	
Analytes		Units	LOR						
Metals	Arsenic	mg/kg	2	2.4	2.8	15	2.5	2.4	4
	Cadmium	mg/kg	0.4	0.6	0.6	0	< 0.4	< 0.4	0
	Chromium	mg/kg	5	53	50	6	< 5	< 5	0
	Copper	mg/kg	5	5.9	6.2	5	< 5	< 5	0
	Lead	mg/kg	5	7.9	8.4	6	< 5	5.9	17
	Mercury	mg/kg	5	0.2	0.2	0	< 0.1	< 0.1	0
	Nickel	mg/kg	5	< 5	< 5	0	< 5	< 5	0
	Zinc	mg/kg	5	58	45	25	28	30	7
PAHs	Acenaphthene	mg/kg	0.5	< 0.5	< 0.5	0	< 0.5	< 0.5	0
	Acenaphthylene	mg/kg	0.5	< 0.5	< 0.5	0	< 0.5	< 0.5	0
	Anthracene	mg/kg	0.5	< 0.5	< 0.5	0	< 0.5	< 0.5	0
	Benz(a)anthracene	mg/kg	0.5	< 0.5	< 0.5	0	< 0.5	< 0.5	0
	Benzo(a)pyrene	mg/kg	0.5	< 0.5	< 0.5	0	< 0.5	< 0.5	0
	Benzo(b&j)fluoranthene	mg/kg	0.5	< 0.5	< 0.5	0	< 0.5	< 0.5	0
	Benzo(g,h,i)perylene	mg/kg	0.5	< 0.5	< 0.5	0	< 0.5	< 0.5	0
	Benzo(k)fluoranthene	mg/kg	0.5	< 0.5	< 0.5	0	< 0.5	< 0.5	0
	Chrysene	mg/kg	0.5	< 0.5	< 0.5	0	< 0.5	< 0.5	0
	Dibenz(a,h)anthracene	mg/kg	0.5	< 0.5	< 0.5	0	< 0.5	< 0.5	0
	Fluoranthene	mg/kg	0.5	< 0.5	< 0.5	0	< 0.5	< 0.5	0
	Fluorene	mg/kg	0.5	< 0.5	< 0.5	0	< 0.5	< 0.5	0
	Indeno(1,2,3-cd)pyrene	mg/kg	0.5	< 0.5	< 0.5	0	< 0.5	< 0.5	0
	Naphthalene	mg/kg	0.5	< 0.5	< 0.5	0	< 0.5	< 0.5	0
	Phenanthrene	mg/kg	0.5	< 0.5	< 0.5	0	< 0.5	< 0.5	0
	Pyrene	mg/kg	0.5	< 0.5	< 0.5	0	< 0.5	< 0.5	0
	Total PAH	mg/kg	0.5	< 0.5	< 0.5	0	< 0.5	< 0.5	0
BTEX	Benzene	mg/kg	0.1	< 0.1	< 0.1	0	< 0.1	-	0
	Toluene	mg/kg	0.1	< 0.1	< 0.1	0	< 0.1	-	0
	Ethylbenzene	mg/kg	0.1	< 0.1	< 0.1	0	< 0.1	-	0
	Xylenes - Total	mg/kg	0.3	< 0.3	< 0.3	0	< 0.3	-	0
TRH	Naphthalene	mg/kg	0.5	< 0.5	< 0.5	0	< 0.5	-	0
	TRH C6-C10	mg/kg	20	< 20	< 20	0	< 20	-	0
	TRH C6-C10 less BTEX (F1)	mg/kg	20	< 20	< 20	0	< 20	-	0
	TRH >C10-C16	mg/kg	50	< 50	< 50	0	< 50	-	0
	TRH >C10-C16 less Naphthalene (F2)	mg/kg	50	< 50	< 50	0	< 50	-	0
	TRH >C16-C34	mg/kg	100	110	200	58	< 100	-	0
	TRH >C34-C40	mg/kg	100	< 100	< 100	0	< 100	-	0

*RPDs have only been considered where a concentration is greater than 10 times the EQL.

**High RPDs are in bold (Acceptable RPD range is 30% (>10 x EQL))

**Table 4 - Groundwater Gauging
Raven Street, Kooragang**

Sample ID	Date	Time	Event	Top of Well Casing Elevation (m AHD)	Depth to Water (m)	Total Well Depth (m BTOC)	Water Elevation (m AHD)	Comments
KIB MW1	23.02.21	8:15	Pre-purge	*	2.144	4.005	*	Cloudy, brown, no obvious odour
KIB MW2	23.02.21	9:30	Pre-purge	*	2.347	3.940	*	Greeny-brown, slight organic odour

Notes

ID = identification

mAHD = metres above Australia Height Datum

m = metres

* No survey data available

**Table 5 - Field Water Quality Parameters
Raven Street, Kooragang**

Sample ID	Date	Event	Dissolved Oxygen (mg/L)	Electrical Conductivity (µS/cm)	pH	Redox Potential (mV)	Temperature (oC)	Comments (Clarity, Odour, Colour, Sediments, Sheens etc)
KIB MW1	23.02.21	post-purge	*	*	6.85	10.0	24.0	Cloudy, brown, no obvious odour
KIB MW2	23.02.21	post-purge	*	*	6.98	3.0	24.9	Greeny-brown, slight organic odour

Notes

ID = identification

* WQM Malfunction

Table 6: Groundwater Analytical Results - TR, BTEX, PAH, Metals
Raven Street, Kooragang

						Field ID	KIB MW1	KIB MW2
						Date	23/02/2021	23/02/2021
Analytes		Units	LOR	Aquatic Ecosystem ¹		HSL D ²		
				Freshwater	Marine			
Metals	Arsenic	mg/L	0.001	0.013			0.002	0.004
	Cadmium	mg/L	0.0002	0.0002	0.0007		< 0.0002	< 0.0002
	Chromium	mg/L	0.001	0.001	0.0044		0.003	0.009
	Copper	mg/L	0.001	0.0014	0.0013		0.009	0.013
	Lead	mg/L	0.001	0.0034	0.0044		0.002	< 0.001
	Mercury	mg/L	0.0001	0.00006	0.0001		< 0.0001	< 0.0001
	Nickel	mg/L	0.001	0.011	0.07		0.005	0.008
	Zinc	mg/L	0.005	0.008	0.015		0.099	0.038
BTEX	Benzene	mg/L	0.001		0.95	5	< 0.001	< 0.001
	Toluene	mg/L	0.001		0.18	NL	< 0.001	< 0.001
	Ethylbenzene	mg/L	0.001		0.08	NL	< 0.001	< 0.001
	Xylenes	mg/L	0.003		0.075	NL	< 0.003	< 0.003
TRH	Naphthalene	mg/L	0.01			NL	< 0.01	< 0.01
	TRH C6-C10	mg/L	0.02				< 0.02	< 0.02
	TRH C6-C10 less BTEX (F1)	mg/L	0.02			6	< 0.02	< 0.02
	TRH >C10-C16	mg/L	0.05				< 0.05	< 0.05
	TRH >C10-C16 less Naphthalene (F2)	mg/L	0.05			NL	< 0.05	< 0.05
	TRH >C16-C34	mg/L	0.1				< 0.1	< 0.1
PAHs	TRH >C34-C40	mg/L	0.1				< 0.1	< 0.1
	Acenaphthene	mg/L	0.001				< 0.001	< 0.001
	Acenaphthylene	mg/L	0.001				< 0.001	< 0.001
	Anthracene	mg/L	0.001	0.00001	0.00001		< 0.001	< 0.001
	Benz(a)anthracene	mg/L	0.001				< 0.001	< 0.001
	Benzo(a)pyrene	mg/L	0.001	0.0001	0.0001		< 0.001	< 0.001
	Benzo(b&j)fluoranthene	mg/L	0.001				< 0.001	< 0.001
	Benzo(g,h,i)perylene	mg/L	0.001				< 0.001	< 0.001
	Benzo(k)fluoranthene	mg/L	0.001				< 0.001	< 0.001
	Chrysene	mg/L	0.001				< 0.001	< 0.001
	Dibenz(a,h)anthracene	mg/L	0.001				< 0.001	< 0.001
	Fluoranthene	mg/L	0.001				< 0.001	< 0.001
	Fluorene	mg/L	0.001				< 0.001	< 0.001
	Indeno(1.2.3-cd)pyrene	mg/L	0.001				< 0.001	< 0.001
	Naphthalene	mg/L	0.001	0.016	0.016		< 0.001	< 0.001
	Phenanthrene	mg/L	0.001				< 0.001	< 0.001
	Pyrene	mg/L	0.001				< 0.001	< 0.001
	Total PAH	mg/L	0.001				< 0.001	< 0.001

Notes:

Result Concentration exceeds the Protection of 95-99% of species in Marine water trigger values

Result Concentration exceeds the Protection of 95-99% of species in Fresh water trigger values

Result Concentration exceeds Health Screening Levels

Italics LOR exceeds adopted criteria

1 ANZECC (2018) Australian and New Zealand Guidelines for Fresh and Marine Water Quality

2 NEPC (2013) National Environmental Protection (Assessment of Site Contamination) Measure (NEPM 2013) - Health Screening Levels, Commercial/Industrial, Clay 2m to <4m

APPENDIX C:

Groundwater Bore Search

Groundwater Bores

- Groundwater works
- ♦ Telemetered bores
- ▲ Logged bores
- Manual bores

Monitoring Bore Types

Alluvial

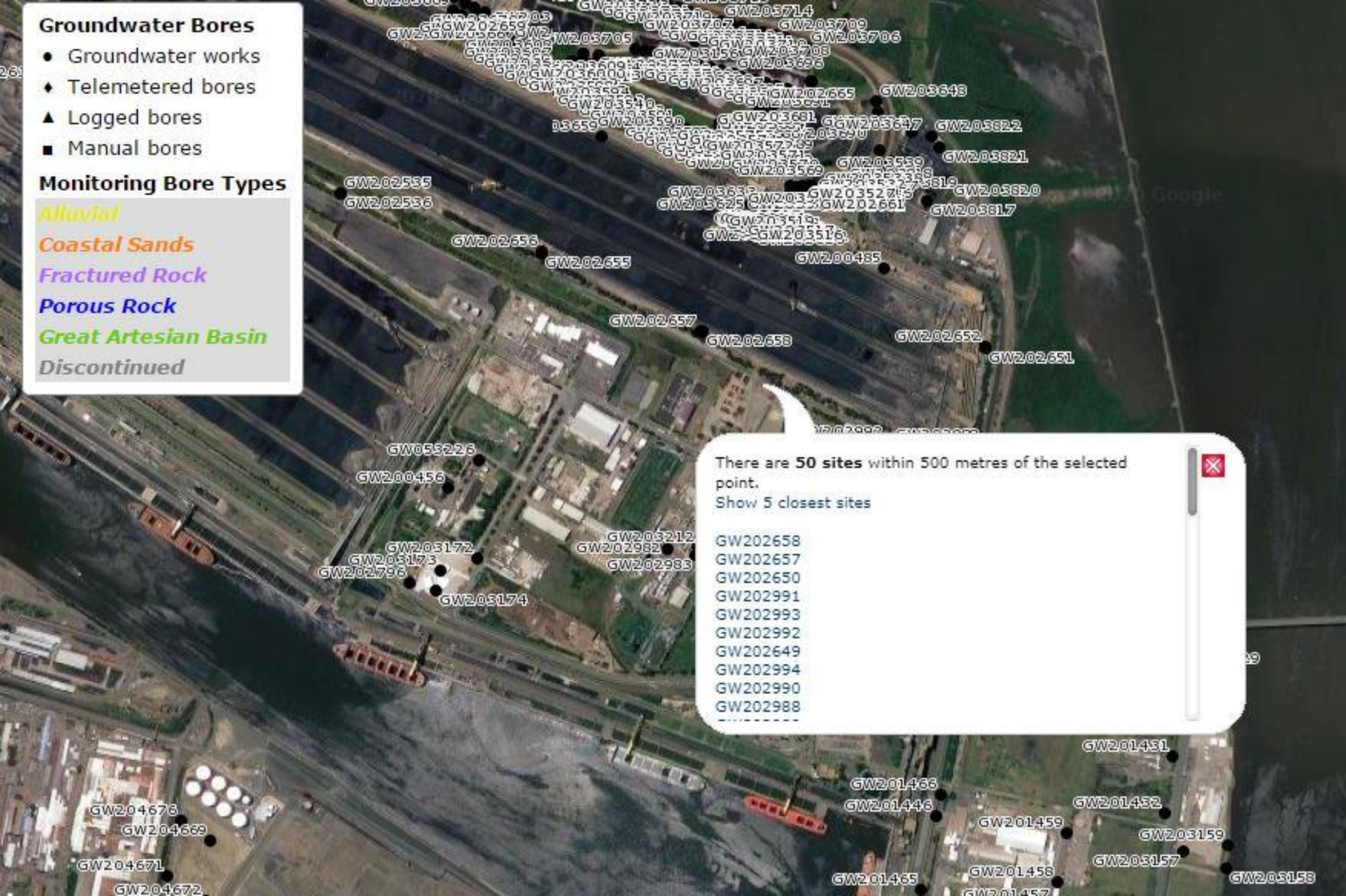
Coastal Sands

Fractured Rock

Porous Rock

Great Artesian Basin

Discontinued



WaterNSW

Work Summary

GW202649

Licence: 20BL173444

Licence Status: ACTIVE

Authorised Purpose(s): MONITORING BORE

Intended Purpose(s): MONITORING BORE

Work Type: Bore

Work Status: Equipped

Construct.Method: Auger - Hollow

Owner Type: Mines

Commenced Date:

Completion Date: 13/05/2009

Final Depth: 4.45 m

Drilled Depth: 4.45 m

Contractor Name: BR & M ATKINS

Driller: Brian Richard Atkins

Assistant Driller:

Property: N A Off Cormorant Rd
KOORAGANG ISLAND 2304 NSW

Standing Water Level 1.900 (m):

GWMA: -

Salinity Description:

GW Zone: -

Yield (L/s):

Site Details

Site Chosen By:

County

Form A: NORTHUMBERLAND

Licensed: NORTHUMBERLAND

Parish

NEWCA

NEWCASTLE

Cadastre

1/775775

Whole Lot 1/775775

Region: 20 - Hunter

CMA Map: 9232-3N

River Basin: 210 - HUNTER RIVER

Grid Zone:

Area/District:

Scale:

Elevation: 0.00 m (A.H.D.)

Northing: 6361292.000

Elevation Source: Unknown

Easting: 385361.000

Latitude: 32°52'49.9"S

Longitude: 151°46'28.2"E

GS Map: -

MGA Zone: 56

Coordinate Source: GPS - Global

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	4.45	150			Auger - Hollow Flight
1		Annulus	Cement	0.00	0.20	150	58		PL:Poured/Shovelled
1		Annulus	Bentonite	0.20	0.60	150	58		PL:Poured/Shovelled
1		Annulus	Waterworn/Rounded	0.60	4.00	150	58		Graded, PL:Poured/Shovelled
1	1	Casing	Pvc Class 18	0.00	1.00	58	50		Seated on Bottom, Screwed
1	1	Opening	Slots - Horizontal	1.00	4.00	58		0	Mechanically Slotted, PVC Class 18, Screwed, SL: 30.0mm, A: 0.50mm

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
0.00	4.45	4.45	Unknown	1.90					

Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	0.15	0.15	Topsoil/Fill; generally brown fien to medium	Topsoil	

			slightly silty sand, with abundant rootlets 0.1m		
0.15	0.75	0.60	Fill; brown fine to medium sand, with trace to some silt, damp	Fill	
0.75	1.60	0.85	Fill; light brown, fine to medium sand, with trace shells, damp to moist	Fill	
1.60	1.90	0.30	Fill; as abov, from about 1.6m wet	Fill	
1.90	2.30	0.40	Fill; as above, from 1.9m saturated	Fill	
2.30	4.45	2.15	Fill; as above, from 2.3m, trace to some fine to medium subangular gravel & shells	Fill	

Remarks

13/05/2009: Form A Remarks:
Nat Carling, 15-Feb-2013; All details were provided by client/consultant retrospectively.

*** End of GW202649 ***

Warning To Clients: This raw data has been supplied to the WaterNSW by drillers, licensees and other sources. WaterNSW does not verify the accuracy of this data. The data is presented for use by you at your own risk. You should consider verifying this data before relying on it. Professional hydrogeological advice should be sought in interpreting and using this data.

WaterNSW

Work Summary

GW202650

Licence:

Licence Status:

Authorised Purpose(s):

Intended Purpose(s): MONITORING BORE

Work Type: Bore

Work Status: Equipped

Construct.Method: Auger - Hollow

Owner Type: Mines

Commenced Date:

Completion Date: 13/05/2009

Final Depth: 4.20 m

Drilled Depth: 4.20 m

Contractor Name: BR & M ATKINS

Driller: Brian Richard Atkins

Assistant Driller:

Property:

Standing Water Level 2.000 (m):

GWMA:

Salinity Description:

GW Zone:

Yield (L/s):

Site Details

Site Chosen By:

County

Parish

Cadastre

Form A: NORTHUMBERLAND

NEWCA

1/775775

Licensed:

Region: 20 - Hunter

CMA Map: 9232-3N

River Basin: 210 - HUNTER RIVER

Grid Zone:

Scale:

Area/District:

Elevation: 0.00 m (A.H.D.)

Northing: 6361293.000

Latitude: 32°52'49.9"S

Elevation Source: Unknown

Easting: 385350.000

Longitude: 151°46'27.8"E

GS Map: -

MGA Zone: 56

Coordinate Source: GPS - Global

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	4.20	150			Auger - Hollow Flight
1		Annulus	Cement	0.00	0.25	150	58		PL:Pour ed/Shovelled
1		Annulus	Bentonite	0.25	0.60	150	58		PL:Pour ed/Shovelled
1		Annulus	Waterworn/Rounded	0.60	4.00	150	58		Graded, PL:Pour ed/Shovelled
1	1	Casing	Pvc Class 18	0.00	1.00	58	50		Seated on Bottom, Screwed
1	1	Opening	Slots - Horizontal	1.00	4.00	58		0	Mechanically Slotted, PVC Class 18, Screwed, SL: 30.0mm, A: 0.50mm

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
0.00	4.20	4.20	Unknown	2.00					

Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	0.15	0.15	Topsoil/Fill; brown fine to medium grained,	Topsoil	

			slightly silty sand, with abundant rootlets to 0.10m		
0.15	0.80	0.65	Fill; generally brown fine to medium sand, with trace to some silt, damp	Fill	
0.80	1.60	0.80	Fill; generally dense light brown fine to medium sand, with trace fine to mediumg rained (up to 15mm) & trace shells, da	Fill	
1.60	2.00	0.40	Fill; as above, from 1.8m, moist to wet	Fill	
2.00	4.20	2.20	Fill; as above, from approx 2m, saturated	Fill	

Remarks

13/05/2009: Form A Remarks:
Nat Carling, 15-Feb-2013; All details were provided by client/consultant retrospectively.

*** End of GW202650 ***

Warning To Clients: This raw data has been supplied to the WaterNSW by drillers, licensees and other sources. WaterNSW does not verify the accuracy of this data. The data is presented for use by you at your own risk. You should consider verifying this data before relying on it. Professional hydrogeological advice should be sought in interpreting and using this data.

WaterNSW

Work Summary

GW202654

Licence:

Licence Status:

Authorised Purpose(s):

Intended Purpose(s): MONITORING BORE

Work Type: Bore

Work Status: Equipped

Construct.Method: Auger - Hollow

Owner Type: Mines

Commenced Date:

Completion Date: 20/08/2009

Final Depth: 6.60 m

Drilled Depth: 7.45 m

Contractor Name: BR & M ATKINS

Driller: Brian Richard Atkins

Assistant Driller:

Property:

Standing Water Level 4.500 (m):

GWMA:

Salinity Description:

GW Zone:

Yield (L/s):

Site Details

Site Chosen By:

County

Parish

Cadastre

Form A: NORTHUMBERLAND

NEWCA

1/775775

Licensed:

Region: 20 - Hunter

CMA Map: 9232-2S

River Basin: 210 - HUNTER RIVER

Grid Zone:

Scale:

Area/District:

Elevation: 0.00 m (A.H.D.)

Northing: 6361172.000

Latitude: 32°52'53.8"S

Elevation Source: Unknown

Easting: 385476.000

Longitude: 151°46'32.6"E

GS Map: -

MGA Zone: 56

Coordinate Source: GPS - Global

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	7.45	140			Auger - Hollow Flight
1		Annulus	Bentonite	0.00	2.50	140	58		PL:Pour ed/Shovelled
1		Annulus	Waterworn/Rounded	2.50	6.50	140	58		Graded, PL:Pour ed/Shovelled
1	1	Casing	Pvc Class 18	0.00	3.50	58	50		Seated on Bottom, Screwed
1	1	Opening	Slots - Horizontal	3.50	6.50	58		0	Mechanically Slotted, PVC Class 18, Screwed, SL: 30.0mm, A: 0.50mm

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
0.00	6.60	6.60	Unknown	4.50					

Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	0.34	0.34	Fill; brown fine to mediumg rained sand, with trace shell fragments & trace rootlets	Fill	

			to 0.03m, dry		
0.34	4.25	3.91	Fill; as above, from 3.4m, moist to wet	Fill	
4.25	4.50	0.25	Fill; as above, from 4.25m, light to dark grey	Fill	
4.50	6.60	2.10	Fill; as above, from 4.5m, saturated	Fill	
6.60	7.45	0.85	Clay; soft, dark grey	Clay	

Remarks

20/08/2009: Form A Remarks:
Nat Carling, 18-Feb-2013; All details were provided by client/consultant retrospectively.

*** End of GW202654 ***

Warning To Clients: This raw data has been supplied to the WaterNSW by drillers, licensees and other sources. WaterNSW does not verify the accuracy of this data. The data is presented for use by you at your own risk. You should consider verifying this data before relying on it. Professional hydrogeological advice should be sought in interpreting and using this data.

WaterNSW

Work Summary

GW202795

Licence:

Licence Status:

Authorised Purpose(s):

Intended Purpose(s): MONITORING BORE

Work Type: Bore

Work Status: Equipped

Construct.Method: Auger - Solid

Owner Type: Private

Commenced Date:

Completion Date: 29/10/2012

Final Depth: 5.50 m

Drilled Depth: 7.45 m

Contractor Name: FICO

Driller: Daniel James Dudley

Assistant Driller: Shaun Currie

Property:

GWMA:

GW Zone:

Standing Water Level (m):

Salinity Description:

Yield (L/s):

Site Details

Site Chosen By:

County

Parish

Cadastre

Form A: NORTHUMBERLAND

NEWCA

RD ADJ 14/1144748

Licensed:

Region: 20 - Hunter

CMA Map: 9232-2S

River Basin: 210 - HUNTER RIVER

Grid Zone:

Scale:

Area/District:

Elevation: 0.00 m (A.H.D.)

Northing: 6360901.000

Latitude: 32°53'02.5"S

Elevation Source: Unknown

Easting: 385108.000

Longitude: 151°46'18.3"E

GS Map: -

MGA Zone: 56

Coordinate Source: GPS - Global

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	7.00	110			Auger - Solid Flight
1		Annulus	Bentonite/Grout	0.00	2.10	110	58		PL:Poured/Shovelled
1		Annulus	Waterworn/Rounded	2.10	5.50	110	58		Graded, PL:Poured/Shovelled
1	1	Casing	Pvc Class 18	0.00	2.50	58	50		Seated on Bottom, Screwed
1	1	Opening	Slots - Horizontal	2.50	5.50	58		0	Mechanically Slotted, PVC Class 18, Screwed, SL: 30.0mm, A: 0.50mm

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
2.80	7.00	4.20	Unknown						

Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	1.80	1.80	Fill	Fill	
1.80	2.70	0.90	Clay, silty sandy	Clay	

2.70	7.45	4.75	Sand	Sand	
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Remarks

29/10/2012: Form A Remarks:
Nat Carling, 5-Mar-2014; GPS provided by the drillers.

*** End of GW202795 ***

Warning To Clients: This raw data has been supplied to the WaterNSW by drillers, licensees and other sources. WaterNSW does not verify the accuracy of this data. The data is presented for use by you at your own risk. You should consider verifying this data before relying on it. Professional hydrogeological advice should be sought in interpreting and using this data.

WaterNSW

Work Summary

GW202657

Licence:

Licence Status:

Authorised Purpose(s):

Intended Purpose(s): MONITORING BORE

Work Type: Bore

Work Status: Equipped

Construct.Method: Auger - Solid

Owner Type: Mines

Commenced Date:

Completion Date: 19/07/1996

Final Depth: 8.20 m

Drilled Depth: 8.20 m

Contractor Name: McDermott Drilling

Driller: Unkown Unknown

Assistant Driller: Lance

Property:

Standing Water Level 1.400 (m):

GWMA:

Salinity Description:

GW Zone:

Yield (L/s):

Site Details

Site Chosen By:

County

Parish

Cadastre

Form A: NORTHUMBERLAND

NEWCA

1/775775

Licensed:

Region: 20 - Hunter

CMA Map: 9232-2S

River Basin: 210 - HUNTER RIVER

Grid Zone:

Scale:

Area/District:

Elevation: 0.00 m (A.H.D.)

Northing: 6361582.000

Latitude: 32°52'40.3"S

Elevation Source: Unknown

Easting: 384871.000

Longitude: 151°46'09.5"E

GS Map: -

MGA Zone: 56

Coordinate Source: GPS - Global

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	3.10	150			Auger - Solid Flight
1		Hole	Hole	3.10	8.20	150			Rot. Rev. Circ Mud
1		Annulus	Waterworn/Rounded	0.00	2.20	150	58		Graded, PL:Pour
1		Annulus	Bentonite	2.20	5.00	150	58		Graded, PL:Pour
1		Annulus	Waterworn/Rounded	5.00	8.20	150	58		Graded, PL:Pour
1	1	Casing	Pvc Class 18	0.00	5.20	58	50		Seated on Bottom, Screwed
1	1	Opening	Slots - Horizontal	5.20	8.20	58		0	Mechanically Slotted, PVC Class 18, Screwed, SL: 30.0mm, A: 0.50mm

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
0.00	2.60	2.60	Unknown	1.40					
4.00	8.20	4.20	Unknown						

Drillers Log

From	To	Thickness	Drillers Description	Geological Material	Comments
------	----	-----------	----------------------	---------------------	----------

(m)	(m)	(m)			
0.00	0.20	0.20	Sand; moist, brown, loose, silty (topsoil)	Sand	
0.20	0.50	0.30	Gravel; moist, grey, dense, coarse, & Cobbles (blast furnace slag fill)	Gravel	
0.50	2.20	1.70	Sand; moist, light brown, medium grained, dense (dredged fill), wet @ 1.5m	Sand	
2.20	2.60	0.40	Clay; wet, black, loose/soft, sandy/clayey sand (alluvium)	Clay	
2.60	4.00	1.40	Clay; wet, black, fine to stiff, with a trace of sand (alluvium)	Clay	
4.00	5.20	1.20	Sand; wet, black, loose, with clay (alluvium)	Sand	
5.20	8.20	3.00	Sand; wet, light grey, fine grey, fine grained, medium dense (Alluvium)	Sand	

Remarks

19/07/1996: Form A Remarks:
Nat Carling, 18-Feb-2013; All details were provided by client/consultant retrospectively.

*** End of GW202657 ***

Warning To Clients: This raw data has been supplied to the WaterNSW by drillers, licensees and other sources. WaterNSW does not verify the accuracy of this data. The data is presented for use by you at your own risk. You should consider verifying this data before relying on it. Professional hydrogeological advice should be sought in interpreting and using this data.

WaterNSW

Work Summary

GW202982

Licence: 20BL173112

Licence Status: ACTIVE

Authorised Purpose(s): MONITORING BORE

Intended Purpose(s): MONITORING BORE

Work Type: Bore

Work Status: Filled,Backfilled

Construct.Method: Jetted - Water

Owner Type: Private

Commenced Date:

Completion Date: 19/08/2014

Final Depth: 6.00 m

Drilled Depth: 6.20 m

Contractor Name: CARGILL AUSTRALIA

Driller: Andrew Forbes

Assistant Driller: Gareth Fitzgerald

Property: N A 51 Raven St KOORAGANG
2304 NSW

Standing Water Level (m):

GWMA: -

Salinity Description:

GW Zone: -

Yield (L/s):

Site Details

Site Chosen By:

County

Form A: NORTHUMBERLAND

Licensed: NORTHUMBERLAND

Parish

NEWCA

NEWCASTLE

Cadastre

2//858206

Whole Lot 2//858206

Region: 20 - Hunter

CMA Map: 9232-2S

River Basin: 210 - HUNTER RIVER

Grid Zone:

Scale:

Area/District:

Elevation: 0.00 m (A.H.D.)

Northing: 6361014.000

Latitude: 32°52'58.7"S

Elevation Source: Unknown

Easting: 384793.000

Longitude: 151°46'06.2"E

GS Map: -

MGA Zone: 56

Coordinate Source: GIS - Geogra

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	6.00	150			Jetted - Water
1		Backfill	Clay	0.00	6.00	150			
1	1	Casing	Pvc Class 9	0.00	6.00	50	46		Seated, Other
1	1	Opening	Slots - Horizontal	0.00	6.00	50		0	Mechanically Slotted, PVC Class 18, Other, SL: 50.0mm, A: 0.50mm

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
2.00	6.20	4.20	Unknown						

Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	0.60	0.60	Fill; roadbase	Fill	
0.60	1.00	0.40	(Unknown); Geo Fabric, shell grit	(Unknown)	
1.00	2.40	1.40	Mud; med to dark	Mud	

2.40	3.40	1.00	Silt, Sandy	Silt	
3.40	5.90	2.50	Mud/Clay; silty, dark	Mud	
5.90	6.20	0.30	Silty	Silt	

Remarks

19/08/2014: Form A Remarks:
Nat Carling, 5-May-2015; Coordinates based on location map provided with the Form-A.

*** End of GW202982 ***

Warning To Clients: This raw data has been supplied to the WaterNSW by drillers, licensees and other sources. WaterNSW does not verify the accuracy of this data. The data is presented for use by you at your own risk. You should consider verifying this data before relying on it. Professional hydrogeological advice should be sought in interpreting and using this data.

WaterNSW

Work Summary

GW202658

Licence:	Licence Status:
Authorised Purpose(s): Intended Purpose(s): MONITORING BORE	
Work Type: Bore	
Work Status: Equipped	
Construct.Method: Auger - Solid	
Owner Type: Mines	
Commenced Date:	Final Depth: 2.20 m
Completion Date: 19/07/1996	Drilled Depth: 2.20 m
Contractor Name: McDermott Drilling	
Driller: Unkown Unknown	
Assistant Driller: Jamie	
Property:	Standing Water Level (m):
GWMA:	Salinity Description:
GW Zone:	Yield (L/s):

Site Details

Site Chosen By:	County	Parish	Cadastre
	Form A: NORTHUMBERLAND	NEWCA	1/775775
	Licensed:		
Region: 20 - Hunter	CMA Map: 9232-2S		
River Basin: 210 - HUNTER RIVER	Grid Zone:	Scale:	
Area/District:			
Elevation: 0.00 m (A.H.D.)	Northing: 6361582.000	Latitude: 32°52'40.3"S	
Elevation Source: Unknown	Easting: 384877.000	Longitude: 151°46'09.7"E	
GS Map: -	MGA Zone: 56	Coordinate Source: GPS - Global	

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	2.20	140			Auger - Solid Flight
1		Annulus	Crushed Aggregate	0.00	2.20	140	58		Ungraded, PL:Poured/Shovelled
1	1	Casing	Pvc Class 18	0.00	0.70	58	50		Seated on Bottom, Screwed
1	1	Opening	Slots - Horizontal	0.70	2.20	58		0	Mechanically Slotted, PVC Class 18, Screwed, SL: 30.0mm, A: 0.50mm

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
0.00	2.20	2.20	Unknown						

Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	0.20	0.20	Sand; moist, brown, loose, silty (topsoil)	Sand	
0.20	0.40	0.20	Gravel; moist, grey, dense, coarse grained,	Gravel	

			with some sand & cobbles (slag fill)		
0.40	2.20	1.80	Sand; moist, light brown, medium grained, dense (dredged fill), varying to wet ~1.4m	Sand	

Remarks

19/07/1996: Form A Remarks:
Nat Carling, 18-Feb-2013; All details were provided by client/consultant retrospectively.

*** End of GW202658 ***

Warning To Clients: This raw data has been supplied to the WaterNSW by drillers, licensees and other sources. WaterNSW does not verify the accuracy of this data. The data is presented for use by you at your own risk. You should consider verifying this data before relying on it. Professional hydrogeological advice should be sought in interpreting and using this data.

WaterNSW

Work Summary

GW202983

Licence:	Licence Status:
Authorised Purpose(s): Intended Purpose(s): MONITORING BORE	
Work Type: Bore	
Work Status: Equipped	
Construct.Method: Jetted - Water	
Owner Type: Private	
Commenced Date:	Final Depth: 8.00 m
Completion Date: 13/09/2014	Drilled Depth: 8.00 m
Contractor Name: CARGILL AUSTRALIA	
Driller: Andrew Forbes	
Assistant Driller: Gareth Fitzgerald	
Property:	Standing Water Level (m):
GWMA:	Salinity Description:
GW Zone:	Yield (L/s): 15.000

Site Details

Site Chosen By:	County	Parish	Cadastre
	Form A: NORTHUMBERLAND	NEWCA	2//858206
	Licensed:		
Region: 20 - Hunter	CMA Map: 9232-2S		
River Basin: 210 - HUNTER RIVER	Grid Zone:	Scale:	
Area/District:			
Elevation: 0.00 m (A.H.D.)	Northing: 6360995.000	Latitude: 32°52'59.4"S	
Elevation Source: Unknown	Easting: 384864.000	Longitude: 151°46'08.9"E	
GS Map: -	MGA Zone: 56	Coordinate Source: GPS - Global	

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	8.00	250			Jetted - Water
1		Annulus	Cement	0.00	0.50	250	100		
1		Annulus	Waterworn/Rounded	0.50	8.00	250	100		Graded, Q:0.500m3
1	1	Casing	Pvc Class 12	0.00	6.00	100	94		Seated, Other
1	1	Opening	Slots - Horizontal	5.00	6.00	100		0	Mechanically Slotted, PVC Class 12, Other, SL: 500.0mm, A: 1.00mm

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
2.00	8.00	6.00	Unknown			15.00			

Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	0.40	0.40	Fill; Cement	Fill	
0.40	1.40	1.00	Silt, Sandy	Silt	

1.40	3.90	2.50	Mud; silty, Clay, dark	Mud	
3.90	4.20	0.30	Clay, silty; grey	Clay	
4.20	8.00	3.80	Mud, silty; Clay dark	Mud	

Remarks

13/09/2014: Form A Remarks:
Nat Carling, 5-May-2015; GPS provided on the Form-A.

*** End of GW202983 ***

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WaterNSW

Work Summary

GW202984

Licence:

Licence Status:

Authorised Purpose(s):

Intended Purpose(s): MONITORING BORE

Work Type: Bore

Work Status: Equipped

Construct.Method: Jetted - Water

Owner Type: Private

Commenced Date:

Completion Date: 13/09/2014

Final Depth: 8.00 m

Drilled Depth: 8.00 m

Contractor Name: CARGILL AUSTRALIA

Driller: Andrew Forbes

Assistant Driller: Gareth Fitzgerald

Property:

Standing Water Level (m):

GWMA:

Salinity Description:

GW Zone:

Yield (L/s): 0.500

Site Details

Site Chosen By:

County

Parish

Cadastre

Form A: NORTHUMBERLAND

NEWCA

2//858206

Licensed:

Region: 20 - Hunter

CMA Map: 9232-2S

River Basin: 210 - HUNTER RIVER

Grid Zone:

Scale:

Area/District:

Elevation: 0.00 m (A.H.D.)

Northing: 6360988.000

Latitude: 32°52'59.6"S

Elevation Source: Unknown

Easting: 384928.000

Longitude: 151°46'11.4"E

GS Map: -

MGA Zone: 56

Coordinate Source: GPS - Global

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	8.00	250			Jetted - Water
1		Annulus	Cement	0.00	0.50	250	100		PL:Poured/Shovelled
1		Annulus	Waterworn/Rounded	0.50	8.00	250	100		Graded, Q:0.500m3, PL:Poured/Shovelled
1	1	Casing	Pvc Class 12	0.00	6.00	100	94		Seated, Other
1	1	Opening	Slots - Horizontal	3.00	6.00	100		0	Mechanically Slotted, PVC Class 12, Other, SL: 500.0mm, A: 0.50mm

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
2.00	8.00	6.00	Unknown			0.50			

Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	0.40	0.40	Fill; Cement	Fill	
0.40	1.40	1.00	Silt, Sandy	Silt	

1.40	3.90	2.50	Mud, silty/Clay, dark	Mud	
3.90	4.20	0.30	Clay, silty; grey	Clay	
4.20	8.00	3.80	Mud, silty/Clay, dark	Mud	

Remarks

13/09/2014: Form A Remarks:
Nat Carling, 5-May-2015; GPS provided on the Form-A.

*** End of GW202984 ***

Warning To Clients: This raw data has been supplied to the WaterNSW by drillers, licensees and other sources. WaterNSW does not verify the accuracy of this data. The data is presented for use by you at your own risk. You should consider verifying this data before relying on it. Professional hydrogeological advice should be sought in interpreting and using this data.

WaterNSW

Work Summary

GW202988

Licence:	Licence Status:
Authorised Purpose(s): Intended Purpose(s): MONITORING BORE	
Work Type: Bore	
Work Status: Equipped	
Construct.Method: Auger - Solid	
Owner Type: Private	
Commenced Date:	Final Depth: 5.50 m
Completion Date: 13/08/2012	Drilled Depth: 5.95 m
Contractor Name: FICO Group	
Driller: Daniel James Dudley	
Assistant Driller: Shaun Currie	
Property:	Standing Water Level 3.800 (m):
GWMA:	Salinity Description:
GW Zone:	Yield (L/s):

Site Details

Site Chosen By:	County	Parish	Cadastre
	Form A: NORTHUMBERLAND	NEWCA	1/775775
	Licensed:		
Region: 20 - Hunter	CMA Map: 9232-2S		
River Basin: 210 - HUNTER RIVER	Grid Zone:	Scale:	
Area/District:			
Elevation: 0.00 m (A.H.D.)	Northing: 6361290.000	Latitude: 32°52'50.0"S	
Elevation Source: Unknown	Easting: 385374.000	Longitude: 151°46'28.7"E	
GS Map: -	MGA Zone: 56	Coordinate Source: GIS - Geogra	

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	5.95	150			Auger - Solid Flight
1		Annulus	Bentonite	0.00	0.60	150	58		PL:Poured/Shovelled
1		Annulus	Waterworn/Rounded	0.60	5.50	150	58		Graded, PL:Poured/Shovelled
1		Backfill	Drilled Cutting	5.50	5.95	150			
1	1	Casing	Pvc Class 18	0.00	0.90	58	50		Seated on Bottom, Screwed
1	1	Opening	Slots - Horizontal	0.90	5.50	58		0	Mechanically Slotted, PVC Class 18, Screwed, SL: 30.0mm, A: 0.50mm

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
0.00	5.95	5.95	Unknown	3.80					

Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	0.25	0.25	Fill; Asphalt	Fill	

0.25	3.50	3.25	Fill; generally light brown, medium grained sandy, trace shell inclusions, moist	Fill	
3.50	3.80	0.30	Fill; as above, increasing moisture	Fill	
3.80	5.35	1.55	Fill; as above, grey brown sand, trace to some shells, moist to wet	Fill	
5.35	5.95	0.60	Clay, Silty; soft, dark grey with trace sand	Clay	

Remarks

13/08/2012: Form A Remarks:

Nat Carling, 5-May-2015; GPS provided on Form-A was in wrong projection, coordinates based on location map provided with the Form-A. Backfill & lithology details were taken from sketch provided on consultants log.

*** End of GW202988 ***

Warning To Clients: This raw data has been supplied to the WaterNSW by drillers, licensees and other sources. WaterNSW does not verify the accuracy of this data. The data is presented for use by you at your own risk. You should consider verifying this data before relying on it. Professional hydrogeological advice should be sought in interpreting and using this data.

WaterNSW

Work Summary

GW202989

Licence:

Licence Status:

Authorised Purpose(s):

Intended Purpose(s): MONITORING BORE

Work Type: Bore

Work Status: Equipped

Construct.Method: Auger - Solid

Owner Type: Private

Commenced Date:

Completion Date: 13/08/2012

Final Depth: 6.50 m

Drilled Depth: 6.50 m

Contractor Name: FICO Group

Driller: Daniel James Dudley

Assistant Driller: Shaun Currie

Property:

Standing Water Level 4.800 (m):

GWMA:

Salinity Description:

GW Zone:

Yield (L/s):

Site Details

Site Chosen By:

County

Parish

Cadastre

Form A: NORTHUMBERLAND

NEWCA

1/775775

Licensed:

Region: 20 - Hunter

CMA Map: 9232-2S

River Basin: 210 - HUNTER RIVER

Grid Zone:

Scale:

Area/District:

Elevation: 0.00 m (A.H.D.)

Northing: 6361274.000

Latitude: 32°52'50.5"S

Elevation Source: Unknown

Easting: 385368.000

Longitude: 151°46'28.5"E

GS Map: -

MGA Zone: 56

Coordinate Source: GIS - Geogra

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	6.50	150			Auger - Solid Flight
1		Annulus	Bentonite	0.00	0.40	150	58		PL:Poured/Shovelled
1		Annulus	Waterworn/Rounded	0.40	6.50	150	58		Graded, PL:Poured/Shovelled
1	1	Casing	Pvc Class 18	0.00	0.50	58	50		Seated on Bottom, Screwed
1	1	Opening	Slots - Horizontal	0.50	6.50	58		0	Mechanically Slotted, PVC Class 18, Screwed, SL: 30.0mm, A: 0.50mm

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
0.00	6.50	6.50	Unknown	4.80					

Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	0.17	0.17	Fill; Concrete	Fill	
0.17	2.10	1.93	Fill; generally light brown, medium grained	Fill	

			sand, with trace gravel & shell inclusions, trace coal to approx 2.1m, moist		
2.10	4.00	1.90	Fill; as above, some gravel, cobbles & coal reject	Fill	
4.00	4.60	0.60	Fill; as above, grey/brown, sand filling	Fill	
4.60	4.80	0.20	Fill; as above, trace rubber	Fill	
4.80	5.50	0.70	Fill; as above, wet	Fill	
5.50	6.10	0.60	Fill; as above, loose sand	Fill	
6.10	6.40	0.30	Clay, Silty Sandy; soft, grey	Clay	
6.40	6.50	0.10	Clay, Silty; stiff, grey	Clay	

Remarks

13/08/2012: Form A Remarks:

Nat Carling, 5-May-2015; GPS provided on Form-A was in wrong projection, coordinates based on location map provided with the Form-A.
Lithology details were taken from sketch provided on consultants log.

*** End of GW202989 ***

Warning To Clients: This raw data has been supplied to the WaterNSW by drillers, licensees and other sources. WaterNSW does not verify the accuracy of this data. The data is presented for use by you at your own risk. You should consider verifying this data before relying on it. Professional hydrogeological advice should be sought in interpreting and using this data.

WaterNSW

Work Summary

GW202990

Licence:

Licence Status:

Authorised Purpose(s):

Intended Purpose(s): MONITORING BORE

Work Type: Bore

Work Status: Equipped

Construct.Method: Auger - Solid

Owner Type: Private

Commenced Date:

Completion Date: 14/08/2012

Final Depth: 5.65 m

Drilled Depth: 5.65 m

Contractor Name: FICO Group

Driller: Daniel James Dudley

Assistant Driller: Shaun Currie

Property:

Standing Water Level 4.000 (m):

GWMA:

Salinity Description:

GW Zone:

Yield (L/s):

Site Details

Site Chosen By:

County

Parish

Cadastre

Form A: NORTHUMBERLAND

NEWCA

1/775775

Licensed:

Region: 20 - Hunter

CMA Map: 9232-2S

River Basin: 210 - HUNTER RIVER

Grid Zone:

Scale:

Area/District:

Elevation: 0.00 m (A.H.D.)

Northing: 6361287.000

Latitude: 32°52'50.1"S

Elevation Source: Unknown

Easting: 385369.000

Longitude: 151°46'28.5"E

GS Map: -

MGA Zone: 56

Coordinate Source: GIS - Geogra

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	5.65	150			Auger - Solid Flight
1		Annulus	Bentonite	0.00	0.40	150	58		PL:Pour ed/Shovelled
1		Annulus	Waterworn/Rounded	0.40	5.65	150	58		Graded, PL:Pour ed/Shovelled
1	1	Casing	Pvc Class 18	0.00	0.50	58	50		Seated on Bottom, Screwed
1	1	Opening	Slots - Horizontal	0.50	5.65	58		0	Mechanically Slotted, PVC Class 18, Screwed, SL: 30.0mm, A: 0.50mm

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
0.00	5.65	5.65	Unknown	4.00					

Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	0.25	0.25	Fill; Asphalt	Fill	
0.25	2.50	2.25	Fill; generally light brown, medium grained	Fill	

			sandy, with trace shell inclusions, moist		
2.50	4.00	1.50	Fill; as above, from 2.5m, sand filling	Fill	
4.00	5.40	1.40	Fill; as above, from 4.0m wet grey/brown sand filling	Fill	
5.40	5.65	0.25	Clay, Silty Sandy; dark grey	Clay	

Remarks

14/08/2012: Form A Remarks:
Nat Carling, 5-May-2015; GPS provided on Form-A was in wrong projection, coordinates based on location map provided with the Form-A.
Lithology details were taken from sketch provided on consultants log.

*** End of GW202990 ***

Warning To Clients: This raw data has been supplied to the WaterNSW by drillers, licensees and other sources. WaterNSW does not verify the accuracy of this data. The data is presented for use by you at your own risk. You should consider verifying this data before relying on it. Professional hydrogeological advice should be sought in interpreting and using this data.

WaterNSW

Work Summary

GW202991

Licence:

Licence Status:

Authorised Purpose(s):

Intended Purpose(s): MONITORING BORE

Work Type: Bore

Work Status: Equipped

Construct.Method: Auger - Solid

Owner Type: Private

Commenced Date:

Completion Date: 14/08/2012

Final Depth: 5.60 m

Drilled Depth: 5.95 m

Contractor Name: FICO Group

Driller: Daniel James Dudley

Assistant Driller: Shaun Currie

Property:

Standing Water Level 4.000 (m):

GWMA:

Salinity Description:

GW Zone:

Yield (L/s):

Site Details

Site Chosen By:

County

Parish

Cadastre

Form A: NORTHUMBERLAND

NEWCA

1/775775

Licensed:

Region: 20 - Hunter

CMA Map: 9232-2S

River Basin: 210 - HUNTER RIVER

Grid Zone:

Scale:

Area/District:

Elevation: 0.00 m (A.H.D.)

Northing: 6361296.000

Latitude: 32°52'49.8"S

Elevation Source: Unknown

Easting: 385359.000

Longitude: 151°46'28.1"E

GS Map: -

MGA Zone: 56

Coordinate Source: GIS - Geogra

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	5.95	150			Auger - Solid Flight
1		Annulus	Bentonite	0.00	0.40	150	58		PL:Poured/Shovelled
1		Annulus	Waterworn/Rounded	0.40	5.60	150	58		Graded, PL:Poured/Shovelled
1		Backfill	Drilled Cutting	5.60	5.95	150			
1	1	Casing	Pvc Class 18	0.00	0.60	58	50		Seated on Bottom, Screwed
1	1	Opening	Slots - Horizontal	0.60	5.60	58		0	Mechanically Slotted, PVC Class 18, Screwed, SL: 30.0mm, A: 0.50mm

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
0.00	5.95	5.95	Unknown	4.00					

Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	0.15	0.15	Fill; generally brown, medium grained silty	Fill	

			sandy topsoil with some rootlets & organics, moist		
0.15	1.10	0.95	Fill; generally light brown, medium grained sandy filling with trace shell inclusions, moist	Fill	
1.10	4.00	2.90	Fill; as above, from 1.1m to 1.15m, gravel/cobbles	Fill	
4.00	5.50	1.50	Fill; as above, from 4m grey/brown sand filling with trace shells, wet	Fill	
5.50	5.60	0.10	Clay, Silty; dark grey with trace sand	Clay	
5.60	5.95	0.35	Clay, Silty; as above, from 5.6m no sand	Clay	

Remarks

14/08/2012: Form A Remarks:

Nat Carling, 5-May-2015; GPS provided on Form-A was in wrong projection, coordinates based on location map provided with the Form-A. Lithology & backfill details were taken from sketch provided on consultants log.

*** End of GW202991 ***

Warning To Clients: This raw data has been supplied to the WaterNSW by drillers, licensees and other sources. WaterNSW does not verify the accuracy of this data. The data is presented for use by you at your own risk. You should consider verifying this data before relying on it. Professional hydrogeological advice should be sought in interpreting and using this data.

WaterNSW

Work Summary

GW202992

Licence:	Licence Status:
Authorised Purpose(s): Intended Purpose(s): MONITORING BORE	
Work Type: Bore	
Work Status: Equipped	
Construct.Method: Auger - Solid	
Owner Type: Private	
Commenced Date:	Final Depth: 5.60 m
Completion Date: 14/08/2012	Drilled Depth: 5.95 m
Contractor Name: FICO Group	
Driller: Daniel James Dudley	
Assistant Driller: Shaun Currie	
Property:	Standing Water Level 4.000 (m):
GWMA:	Salinity Description:
GW Zone:	Yield (L/s):

Site Details

Site Chosen By:	County	Parish	Cadastre
	Form A: NORTHUMBERLAND	NEWCA	1/775775
	Licensed:		
Region: 20 - Hunter	CMA Map: 9232-2S		
River Basin: 210 - HUNTER RIVER	Grid Zone:	Scale:	
Area/District:			
Elevation: 0.00 m (A.H.D.)	Northing: 6361300.000	Latitude: 32°52'49.6"S	
Elevation Source: Unknown	Easting: 385363.000	Longitude: 151°46'28.3"E	
GS Map: -	MGA Zone: 56	Coordinate Source: GIS - Geogra	

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	5.95	150			Auger - Solid Flight
1		Annulus	Bentonite	0.00	0.40	150	58		PL:Poured/Shovelled
1		Annulus	Waterworn/Rounded	0.40	5.60	150	58		Graded, PL:Poured/Shovelled
1		Backfill	Drilled Cutting	5.60	5.95	150			
1	1	Casing	Pvc Class 18	0.00	0.60	58	50		Seated on Bottom, Screwed
1	1	Opening	Slots - Horizontal	0.60	5.60	58		0	Mechanically Slotted, PVC Class 18, Screwed, SL: 30.0mm, A: 0.50mm

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
0.00	5.95	5.95	Unknown	4.00					

Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	0.15	0.15	Fill; generally brown, medium grained silty	Fill	

			sandy topsoil filling, moist		
0.15	2.50	2.35	Fill; generally light brown, medium grained sandy filling with trace shell inclusions, moist	Fill	
2.50	4.00	1.50	Fill; as above, from 2.5 to 2.56m, trace coal ash	Fill	
4.00	5.40	1.40	Fill; as above, from 4m grey/brown sand filling, wet, @ 4.1m, some yellow concrete & shells found	Fill	
5.40	5.95	0.55	Clay, Silty; soft to firm, dark grey	Clay	

Remarks

14/08/2012: Form A Remarks:
Nat Carling, 5-May-2015; GPS provided on Form-A was in wrong projection, coordinates based on location map provided with the Form-A.
Lithology & backfill details were taken from sketch provided on consultants log.

*** End of GW202992 ***

Warning To Clients: This raw data has been supplied to the WaterNSW by drillers, licensees and other sources. WaterNSW does not verify the accuracy of this data. The data is presented for use by you at your own risk. You should consider verifying this data before relying on it. Professional hydrogeological advice should be sought in interpreting and using this data.

WaterNSW

Work Summary

GW202993

Licence:	Licence Status:
Authorised Purpose(s):	
Intended Purpose(s): MONITORING BORE	
Work Type: Bore	
Work Status: Equipped	
Construct.Method: Auger - Solid	
Owner Type: Private	
Commenced Date:	Final Depth: 6.20 m
Completion Date: 14/08/2012	Drilled Depth: 6.45 m
Contractor Name: FICO Group	
Driller: Daniel James Dudley	
Assistant Driller: Shaun Currie	
Property:	Standing Water Level 4.600 (m):
GWMA:	Salinity Description:
GW Zone:	Yield (L/s):

Site Details

Site Chosen By:	County	Parish	Cadastre
	Form A: NORTHUMBERLAND	NEWCA	1/775775
	Licensed:		
Region: 20 - Hunter	CMA Map: 9232-2S		
River Basin: 210 - HUNTER RIVER	Grid Zone:	Scale:	
Area/District:			
Elevation: 0.00 m (A.H.D.)	Northing: 6361275.000	Latitude: 32°52'50.4"S	
Elevation Source: Unknown	Easting: 385349.000	Longitude: 151°46'27.7"E	
GS Map: -	MGA Zone: 56	Coordinate Source: GIS - Geogra	

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	6.45	150			Auger - Solid Flight
1		Annulus	Bentonite	0.00	0.60	150	58		PL:Poured/Shovelled
1		Annulus	Waterworn/Rounded	0.60	6.20	150	58		Graded, PL:Poured/Shovelled
1		Backfill	Drilled Cutting	6.20	6.45	150			
1	1	Casing	Pvc Class 18	0.00	1.00	58	50		Seated on Bottom, Screwed
1	1	Opening	Slots - Horizontal	1.00	6.20	58		0	Mechanically Slotted, PVC Class 18, Screwed, SL: 30.0mm, A: 0.50mm

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
0.00	6.45	6.45	Unknown	4.60					

Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	0.05	0.05	Fill; generally brown silty sandy topsoil,	Fill	

			abundant organics, moist		
0.05	1.00	0.95	Fill; generally light brown, medium grained sandy filling with trace shell inclusions, moist	Fill	
1.00	2.50	1.50	Fill; as above, from 1 to 1.05m, light green & blue slag cobbles	Fill	
2.50	3.50	1.00	Fill; as above, from 2.5m, dense sand filling, at approx 2.5m, light green slag cobble	Fill	
3.50	4.60	1.10	Fill; as above, from 3.5m, slight increase in moisture	Fill	
4.60	5.50	0.90	Fill; as above, from 4.6m, wet	Fill	
5.50	6.00	0.50	Fill; as above, from 5.5m, grey/brown sand filling	Fill	
6.00	6.45	0.45	Clay, Silty; soft, dark grey, with trace shells	Clay	

Remarks

14/08/2012: Form A Remarks:

Nat Carling, 5-May-2015; GPS provided on Form-A was in wrong projection, coordinates based on location map provided with the Form-A. Lithology & backfill details were taken from sketch provided on consultants log.

*** End of GW202993 ***

Warning To Clients: This raw data has been supplied to the WaterNSW by drillers, licensees and other sources. WaterNSW does not verify the accuracy of this data. The data is presented for use by you at your own risk. You should consider verifying this data before relying on it. Professional hydrogeological advice should be sought in interpreting and using this data.

WaterNSW

Work Summary

GW202994

Licence:

Licence Status:

Authorised Purpose(s):

Intended Purpose(s): MONITORING BORE

Work Type: Bore

Work Status: Equipped

Construct.Method: Auger - Solid

Owner Type: Private

Commenced Date:

Completion Date: 14/08/2012

Final Depth: 6.00 m

Drilled Depth: 6.00 m

Contractor Name: FICO Group

Driller: Daniel James Dudley

Assistant Driller: Shaun Currie

Property:

Standing Water Level 4.500 (m):

GWMA:

Salinity Description:

GW Zone:

Yield (L/s):

Site Details

Site Chosen By:

County

Parish

Cadastre

Form A: NORTHUMBERLAND

NEWCA

1/775775

Licensed:

Region: 20 - Hunter

CMA Map: 9232-2S

River Basin: 210 - HUNTER RIVER

Grid Zone:

Scale:

Area/District:

Elevation: 0.00 m (A.H.D.)

Northing: 6361275.000

Latitude: 32°52'50.5"S

Elevation Source: Unknown

Easting: 385358.000

Longitude: 151°46'28.1"E

GS Map: -

MGA Zone: 56

Coordinate Source: GIS - Geogra

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	6.00	150			Auger - Solid Flight
1		Annulus	Bentonite	0.00	0.60	150	58		PL:Pour ed/Shovelled
1		Annulus	Waterworn/Rounded	0.60	6.00	150	58		Graded, PL:Pour ed/Shovelled
1	1	Casing	Pvc Class 18	0.00	1.00	58	50		Seated on Bottom, Screwed
1	1	Opening	Slots - Horizontal	1.00	6.00	58		0	Mechanically Slotted, PVC Class 18, Screwed, SL: 30.0mm, A: 0.50mm

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
0.00	6.00	6.00	Unknown	4.50					

Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	0.17	0.17	Fill; concrete	Fill	
0.17	0.20	0.03	Fill; generally light brown, medium grained	Fill	

			sandy filling with trace shells & gravel inclusions, moist		
0.20	4.00	3.80	Fill; as above, from 0.2m to 0.4m, abundant gravel & cobbles, max diameter 0.05mm	Fill	
4.00	5.80	1.80	Fill; as above, from 4m, blue/black slag, refusal on SPT	Fill	
5.80	6.00	0.20	Clay, Silty; dark grey	Clay	

Remarks

14/08/2012: Form A Remarks:
Nat Carling, 5-May-2015; GPS provided on Form-A was in wrong projection, coordinates based on location map provided with the Form-A.
Lithology details were taken from sketch provided on consultants log.

*** End of GW202994 ***

Warning To Clients: This raw data has been supplied to the WaterNSW by drillers, licensees and other sources. WaterNSW does not verify the accuracy of this data. The data is presented for use by you at your own risk. You should consider verifying this data before relying on it. Professional hydrogeological advice should be sought in interpreting and using this data.

WaterNSW

Work Summary

GW203212

Licence:	Licence Status:
Authorised Purpose(s):	
Intended Purpose(s): DEWATERING (GROU	
Work Type: Bore	
Work Status: Abandoned,Backfilled	
Construct.Method: Jetted - Water	
Owner Type: Private	
Commenced Date:	Final Depth: 6.00 m
Completion Date: 12/09/2014	Drilled Depth: 6.00 m
Contractor Name: CARGILL AUSTRALIA	
Driller: Andrew Forbes	
Assistant Driller: Gareth Fitzgerald	
Property:	Standing Water Level (m):
GWMA:	Salinity Description:
GW Zone:	Yield (L/s):

Site Details

Site Chosen By:	County	Parish	Cadastre
Form A: NORTHUMBERLAND	NEWCA	2//858206	
Licensed:			
Region: 20 - Hunter	CMA Map: 9232-2S		
River Basin: 210 - HUNTER RIVER	Grid Zone:	Scale:	
Area/District:			
Elevation: 0.00 m (A.H.D.)	Northing: 6361018.000	Latitude: 32°52'58.6"S	
Elevation Source: Unknown	Easting: 384873.000	Longitude: 151°46'09.3"E	
GS Map: -	MGA Zone: 56	Coordinate Source: Unknown	

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel
Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	6.00	250			Jetted - Water
1		Backfill	Concrete	0.00	0.40	250			
1		Backfill	Sand	0.40	6.00	250			
1		Annulus	Waterworn/Rounded	0.50	6.00	250	100		Graded, Q:0.500m3, PL:Pour
1	1	Casing	Pvc Class 12	0.00	6.00	100	94		Seated, Other
1	1	Opening	Slots - Horizontal	5.00	6.00	100		0	Mechanically Slotted, PVC Class 12, Other, SL: 500.0mm, A: 0.50mm

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
2.00	6.00	4.00	Unknown						

Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	0.40	0.40	Mud, mid to dark	Mud	

0.40	1.40	1.00	Silt, sandy	Silt	
1.40	3.90	2.50	Mud/Clay, silty, dark	Mud	
3.90	4.20	0.30	Mud, silty	Mud	
4.20	6.00	1.80	Mud/Clay, silty, dark	Mud	

Remarks

12/09/2014: Form A Remarks:
Nat Carling, 27-May-2015; Coordinates based on location map provided with the Form-A.

*** End of GW203212 ***

Warning To Clients: This raw data has been supplied to the WaterNSW by drillers, licensees and other sources. WaterNSW does not verify the accuracy of this data. The data is presented for use by you at your own risk. You should consider verifying this data before relying on it. Professional hydrogeological advice should be sought in interpreting and using this data.

APPENDIX D:

Borehole Logs

ENGINEERING LOG - BOREHOLE

CLIENT: NORTHROP CONSULTING ENGINEERS
PROJECT: PROPOSED INDUSTRIAL WAREHOUSE FACILITY
LOCATION: LOT 152, RAVEN STREET, KOORAGANG

BOREHOLE NO: BH01
PAGE: 1 OF 1
JOB NO: NEW20P-0171
LOGGED BY: BS
DATE: 12/1/21

DRILL TYPE: TRACK MOUNTED DRILL RIG
BOREHOLE DIAMETER: 100 mm

SURFACE RL:
DATUM: AHD

Drilling and Sampling					Material description and profile information					Field Test		Structure and additional observations
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	Result	
AD/T		E 0.10m				GP	FILL: Sandy GRAVEL - fine to medium grained, sub-angular to angular, pale grey to brown, fine to medium grained sand, trace fines of low plasticity.	D				FILL
		0.50m SPT 11, 17, 21 N* = 38		0.5			FILL: SAND - fine to medium grained, brown, with shells.					
		0.95m 1.00m		1.0		SP		D - M				
		E 1.10m										
		1.50m SPT 3, 3, 4 N* = 7		1.5			Silty CLAY - medium to high plasticity, grey to dark grey.					ESTUARINE DEPOSITS
		1.95m 2.00m		2.0		CH		M > w _p	F / St	HP	100	
		E 2.10m								HP	110	
		2.50m SPT 7, 9, 11 N* = 20		2.5		CH	Silty Sandy CLAY - medium to high plasticity, grey to dark grey, fine to medium grained sand.			HP	55	
		2.95m 3.00m		3.0		SC	Clayey SAND - fine to medium grained, grey to dark grey, fines of low to medium plasticity.			HP	65	ALLUVIUM / ESTUARINE DEPOSITS
		E 3.10m										
				3.5			SAND - fine to medium grained, grey, with shells.	W				ALLUVIUM
				4.0		SP						
		4.00m E 4.10m					Hole Terminated at 4.10 m Borehole Collapse					

LEGEND:		Notes, Samples and Tests		Consistency		UCS (kPa)	Moisture Condition	
Water		U ₅₀ 50mm Diameter tube sample		VS	Very Soft	<25	D	Dry
Water Level (Date and time shown)		CBR Bulk sample for CBR testing		S	Soft	25 - 50	M	Moist
Water Inflow		E Environmental sample (Glass jar, sealed and chilled on site)		F	Firm	50 - 100	W	Wet
Water Outflow		ASS Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)		St	Stiff	100 - 200	W _p	Plastic Limit
Strata Changes		B Bulk Sample		VSt	Very Stiff	200 - 400	W _L	Liquid Limit
Gradational or transitional strata		Field Tests		H	Hard	>400		
Definitive or distinct strata change		PID Photoionisation detector reading (ppm)		Fb	Friable			
		DCP(x-y) Dynamic penetrometer test (test depth interval shown)		Density	V	Very Loose	Density Index <15%	
		HP Hand Penetrometer test (UCS kPa)			L	Loose	Density Index 15 - 35%	
					MD	Medium Dense	Density Index 35 - 65%	
					D	Dense	Density Index 65 - 85%	
					VD	Very Dense	Density Index 85 - 100%	

ENGINEERING LOG - BOREHOLE

CLIENT: NORTHROP CONSULTING ENGINEERS
PROJECT: PROPOSED INDUSTRIAL WAREHOUSE FACILITY
LOCATION: LOT 152, RAVEN STREET, KOORAGANG

BOREHOLE NO: BH02
PAGE: 1 OF 1
JOB NO: NEW20P-0171
LOGGED BY: BS
DATE: 12/1/21

DRILL TYPE: TRACK MOUNTED DRILL RIG
BOREHOLE DIAMETER: 100 mm

SURFACE RL:
DATUM: AHD

Drilling and Sampling					Material description and profile information					Field Test		Structure and additional observations	
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	Result		
AD/T		E 0.10m				GC	FILL: Clayey Sandy GRAVEL - fine to medium grained, sub angular to angular, brown to grey-brown, fine to coarse grained sand, fines of low to medium plasticity.	M		HP HP HP	270 330 250	FILL	
		0.50m		0.5									
		SPT 2, 1, 1 N* = 2				0.65m	ML	FILL: SILT - low plasticity, white to pale grey, with some crystalline material, possibly gypsum.					M < w _p
		0.95m		1.0		0.85m	SP	FILL: SAND - fine to medium grained, brown.	D - M				
		1.00m				1.10m	CH	FILL: CLAY - medium to high plasticity, brown to dark brown.	VSt				
		SPT 3, 4, 6 N* = 10				1.30m							
		1.45m		1.5	1.50m	SP	FILL: SAND - fine to medium grained, grey to dark grey, with some black, with trace glass.	M - W					ALLUVIUM / POSSIBLE FILL
		1.50m					SAND - fine to medium grained, brown.	W					
		E 1.60m				SP	Becoming brown to pale brown.						
		2.00m		2.0									
	E 2.10m			2.20m									
				2.5			Hole Terminated at 2.20 m Borehole Collapse						
				3.0									
				3.5									
				4.0									

LEGEND:		Notes, Samples and Tests		Consistency		UCS (kPa)	Moisture Condition	
Water		U ₃₀	50mm Diameter tube sample	VS	Very Soft	<25	D	Dry
Water Level (Date and time shown)		CBR	Bulk sample for CBR testing	S	Soft	25 - 50	M	Moist
Water Inflow		E	Environmental sample (Glass jar, sealed and chilled on site)	F	Firm	50 - 100	W	Wet
Water Outflow		ASS	Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)	St	Stiff	100 - 200	W _p	Plastic Limit
Strata Changes		B	Bulk Sample	VSt	Very Stiff	200 - 400	W _L	Liquid Limit
Gradational or transitional strata				H	Hard	>400		
Definitive or distinct strata change				Fb	Friable			
		Field Tests		Density				
		PID	Photoionisation detector reading (ppm)	V	Very Loose		Density Index <15%	
		DCP(x-y)	Dynamic penetrometer test (test depth interval shown)	L	Loose		Density Index 15 - 35%	
		HP	Hand Penetrometer test (UCS kPa)	MD	Medium Dense		Density Index 35 - 65%	
				D	Dense		Density Index 65 - 85%	
				VD	Very Dense		Density Index 85 - 100%	

DRILL TYPE: TRACK MOUNTED DRILL RIG
BOREHOLE DIAMETER: 100 mm

SURFACE RL:
DATUM: AHD

Drilling and Sampling					Material description and profile information					Field Test		Structure and additional observations
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	Result	
AD/T		0.25m					Asphalt.	D				ASPHALT
		E				ML	FILL: SILT - low plasticity, white to pale grey, with some crystalline material, possibly gypsum.	M < w _p				FILL
		0.35m		0.5								
		0.50m				SP	FILL: SAND - fine to medium grained, pale brown to yellow-brown.	D				
		SPT 12, 20, 25 N* = 45										
		0.95m		1.0		SP	FILL: SAND - fine to medium grained, grey to grey-brown, trace fine grained angular gravel, with shells.	D - M				
		1.50m		1.5		SP	FILL: SAND - fine to medium grained, brown to dark brown with some grey-brown, trace fine grained, sub-rounded to sub-angular gravel, with shells.	D				
		SPT 8, 10, 10 N* = 20										
		1.95m		2.0				SAND - fine to medium grained, grey to dark grey-brown.	M			
	2.00m											
	E											
	2.10m											
	2.50m		2.5			SP	Becoming brown to pale brown.	M - W				
	SPT 3, 5, 6 N* = 11											
	2.95m		3.0									
	3.00m											
	E											
	3.10m											
	3.50m		3.5				Becoming brown to grey-brown.	W				
	E											
	3.60m											
	4.00m		4.0			SP	SAND - fine to coarse grained, grey with some grey-brown.					
	E											
	4.10m						Hole Terminated at 4.10 m Borehole Collapse					

LEGEND:

Water

-  Water Level
(Date and time shown)
-  Water Inflow
-  Water Outflow

Strata Changes

- Strata changes
- — Gradational or transitional strata
 - Definitive or distinct strata change

Notes, Samples and Tests

- | | |
|-----------------|--|
| U ₅₀ | 50mm Diameter tube sample |
| CBR | Bulk sample for CBR testing |
| E | Environmental sample
(Glass jar, sealed and chilled on site) |
| ASS | Acid Sulfate Soil Sample
(Plastic bag, air expelled, chilled) |
| B | Bulk Sample |

Field Tests

- | | |
|----------|---|
| PID | Photoionisation detector reading (ppm) |
| DCP(x-y) | Dynamic penetrometer test (test depth interval shown) |
| HP | Hand Penetrometer test (UCS kPa) |

Consistency

- | | |
|-----|------------|
| VS | Very Soft |
| S | Soft |
| F | Firm |
| St | Stiff |
| VSt | Very Stiff |
| H | Hard |
| Fb | Friable |

UCS (kPa)
100
150
200
250
300
350
400
450
500
550
600
650
700
750
800
850
900
950
1000

- <25
25 - 50
50 - 100
100 - 200
200 - 400
>400

Moisture Condition

- | | |
|-------|---------------|
| D | Dry |
| M | Moist |
| W | Wet |
| W_p | Plastic Limit |
| W_l | Liquid Limit |

- | <u>Density</u> | | | |
|-----------------------|--------------|---------------|-----------|
| V | Very Loose | Density Index | <15% |
| L | Loose | Density Index | 15 - 35% |
| MD | Medium Dense | Density Index | 35 - 65% |
| D | Dense | Density Index | 65 - 85% |
| VD | Very Dense | Density Index | 85 - 100% |

ENGINEERING LOG - BOREHOLE

CLIENT: NORTHROP CONSULTING ENGINEERS
PROJECT: PROPOSED INDUSTRIAL WAREHOUSE FACILITY
LOCATION: LOT 152, RAVEN STREET, KOORAGANG

BOREHOLE NO: BH04
PAGE: 1 OF 1
JOB NO: NEW20P-0171
LOGGED BY: BS
DATE: 12/1/21

DRILL TYPE: TRACK MOUNTED DRILL RIG
BOREHOLE DIAMETER: 100 mm

SURFACE RL:
DATUM: AHD

Drilling and Sampling					Material description and profile information					Field Test		Structure and additional observations
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	Result	
AD/T		E 0.10m				GP	FILL: Sandy GRAVEL - fine to medium grained, sub-angular to angular, grey-brown to brown, fine to medium grained sand, trace fines of low plasticity.	D - M				FILL
						SP	FILL: Gravelly SAND - fine to medium grained, brown, fine grained, angular to sub-angular gravel.	M				
		0.50m SPT 8, 10, 12 N* = 22		0.5			FILL: SAND - fine to medium grained, brown and pale brown, with shells.					
		0.95m 1.00m SPT 2, 5, 5 N* = 10		1.0		SP		M				ESTUARINE DEPOSITS
		1.45m 1.50m		1.5								
		E 1.60m										
		2.00m		2.0			CLAY - medium to high plasticity, grey and dark grey.			HP	120	
		E 2.10m										
		2.50m SPT 2, 3, 9 N* = 12		2.5		CH		M > w _p	F / St	HP	110	
										HP	170	
										HP	150	
		2.95m 3.00m		3.0			SAND - fine to medium grained, grey, trace fines of low plasticity, trace fine grained, sub-rounded gravel.				100	
	E 3.10m							M - W			ALLUVIAL	
	3.50m		3.5		SP	Becoming brown and pale brown.						
	E 3.60m											
	4.00m		4.0						W			
	E 4.10m						4.10m					
							Hole Terminated at 4.10 m Borehole Collapse					

LEGEND:		Notes, Samples and Tests		Consistency		UCS (kPa)	Moisture Condition	
Water		U ₃₀ 50mm Diameter tube sample		VS	Very Soft	<25	D	Dry
Water Level (Date and time shown)		CBR Bulk sample for CBR testing		S	Soft	25 - 50	M	Moist
Water Inflow		E Environmental sample (Glass jar, sealed and chilled on site)		F	Firm	50 - 100	W	Wet
Water Outflow		ASS Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)		St	Stiff	100 - 200	W _p	Plastic Limit
Strata Changes		B Bulk Sample		VSt	Very Stiff	200 - 400	W _L	Liquid Limit
Gradational or transitional strata		Field Tests		H	Hard	>400		
Definitive or distinct strata change		PID Photoionisation detector reading (ppm)		Fb	Friable			
		DCP(x-y) Dynamic penetrometer test (test depth interval shown)		Density	V	Very Loose	Density Index <15%	
		HP Hand Penetrometer test (UCS kPa)			L	Loose	Density Index 15 - 35%	
					MD	Medium Dense	Density Index 35 - 65%	
					D	Dense	Density Index 65 - 85%	
					VD	Very Dense	Density Index 85 - 100%	

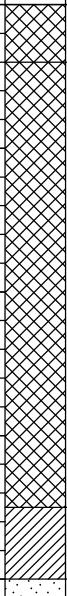
ENGINEERING LOG - BOREHOLE

CLIENT: NORTHROP CONSULTING ENGINEERS
PROJECT: PROPOSED INDUSTRIAL WAREHOUSE FACILITY
LOCATION: LOT 152, RAVEN STREET, KOORAGANG

BOREHOLE NO: BH05
PAGE: 1 OF 1
JOB NO: NEW20P-0171
LOGGED BY: BS
DATE: 22/2/21

DRILL TYPE: TRACK MOUNTED DRILL RIG
BOREHOLE DIAMETER: 100 mm

SURFACE RL:
DATUM: AHD

Drilling and Sampling					Material description and profile information					Field Test		Structure and additional observations	
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	Result		
PT		E 0.20m				GP	FILL: Sandy GRAVEL - fine to medium grained, sub-rounded to sub-angular, brown, fine to medium grained sand.	D - M				FILL	
		0.50m		0.5			FILL: SAND - fine to medium grained, brown to pale brown with shells.						
		E 0.80m		1.0		SP							
		1.50m		1.5									
		E 1.75m		1.75					ESTUARINE DEPOSITS				
		E 2.00m		2.0		CH	CLAY - medium to high plasticity, dark brown to dark grey-brown.	M > w _p			ALLUVIUM		
				2.10		SP	SAND - fine to medium grained, grey, with shells.						
				2.5			Hole Terminated at 2.10 m Limit Of Required Investigation						
				3.0									
				3.5									
				4.0									

LEGEND:		Notes, Samples and Tests		Consistency		UCS (kPa)	Moisture Condition
Water		U ₃₀ 50mm Diameter tube sample		VS	Very Soft	<25	D Dry
Water Level (Date and time shown)		CBR Bulk sample for CBR testing		S	Soft	25 - 50	M Moist
Water Inflow		E Environmental sample (Glass jar, sealed and chilled on site)		F	Firm	50 - 100	W Wet
Water Outflow		ASS Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)		St	Stiff	100 - 200	W _p Plastic Limit
Strata Changes		B Bulk Sample		VSt	Very Stiff	200 - 400	W _L Liquid Limit
Gradational or transitional strata		Field Tests		H	Hard	>400	
Definitive or distinct strata change		PID Photoionisation detector reading (ppm)		Fb	Friable		
		DCP(x-y) Dynamic penetrometer test (test depth interval shown)		V	Very Loose	Density Index <15%	
		HP Hand Penetrometer test (UCS kPa)		L	Loose	Density Index 15 - 35%	
				MD	Medium Dense	Density Index 35 - 65%	
				D	Dense	Density Index 65 - 85%	
				VD	Very Dense	Density Index 85 - 100%	

ENGINEERING LOG - BOREHOLE

CLIENT: NORTHROP CONSULTING ENGINEERS
PROJECT: PROPOSED INDUSTRIAL WAREHOUSE FACILITY
LOCATION: LOT 152, RAVEN STREET, KOORAGANG

BOREHOLE NO: BH06
PAGE: 1 OF 1
JOB NO: NEW20P-0171
LOGGED BY: BS
DATE: 22/2/21

DRILL TYPE: TRACK MOUNTED DRILL RIG
BOREHOLE DIAMETER: 100 mm

SURFACE RL:
DATUM: AHD

Drilling and Sampling					Material description and profile information					Field Test		Structure and additional observations
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	Result	
PT		E 0.30m				GP	FILL: Sandy GRAVEL - fine to medium grained, sub-rounded to sub-angular, brown, fine to medium grained sand.	D - M			FILL	
		0.50m		0.5		SP	FILL: SAND - fine to medium grained, brown, with shells. Pale grey-brown.	M				
		E 0.75m				ML	FILL: Silt - low to medium plasticity, pale brown to white.	M < w _p				
		E 0.90m		1.0		ML	FILL: SAND - pale grey to pale brown.	M				
		1.00m										
		E 1.30m		1.5		SP	Grey to pale grey.	M				
		1.60m										
		E 1.80m				CL	FILL: CLAY - low to medium plasticity, brown to dark brown, some fine grained sand.	M < w _p				
		1.85m				SP	FILL: SAND - fine to medium grained, grey-brown.	M				
		E 2.10m		2.0		CH	CLAY - medium to high plasticity, dark brown with some red-brown and grey-brown to grey.	M > w _p				
							Hole Terminated at 2.10 m Limit Of Required Investigation					ESTUARINE DEPOSITS
				2.5								
				3.0								
				3.5								
				4.0								

LEGEND:		Notes, Samples and Tests		Consistency		UCS (kPa)	Moisture Condition
Water		U ₅₀	50mm Diameter tube sample	VS	Very Soft	<25	D Dry
Water Level (Date and time shown)		CBR	Bulk sample for CBR testing	S	Soft	25 - 50	M Moist
Water Inflow		E	Environmental sample (Glass jar, sealed and chilled on site)	F	Firm	50 - 100	W Wet
Water Outflow		ASS	Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)	St	Stiff	100 - 200	W _p Plastic Limit
Strata Changes		B	Bulk Sample	VSt	Very Stiff	200 - 400	W _L Liquid Limit
Gradational or transitional strata				H	Hard	>400	
Definitive or distinct strata change				Fb	Friable		
		Field Tests		Density			
		PID	Photoionisation detector reading (ppm)	V	Very Loose	Density Index <15%	
		DCP(x-y)	Dynamic penetrometer test (test depth interval shown)	L	Loose	Density Index 15 - 35%	
		HP	Hand Penetrometer test (UCS kPa)	MD	Medium Dense	Density Index 35 - 65%	
				D	Dense	Density Index 65 - 85%	
				VD	Very Dense	Density Index 85 - 100%	

ENGINEERING LOG - BOREHOLE

CLIENT: NORTHROP CONSULTING ENGINEERS
PROJECT: PROPOSED INDUSTRIAL WAREHOUSE FACILITY
LOCATION: LOT 152, RAVEN STREET, KOORAGANG

BOREHOLE NO: BH07
PAGE: 1 OF 1
JOB NO: NEW20P-0171
LOGGED BY: BS
DATE: 22/2/21

DRILL TYPE: TRACK MOUNTED DRILL RIG
BOREHOLE DIAMETER: 100 mm

SURFACE RL:
DATUM: AHD

Drilling and Sampling					Material description and profile information					Field Test		Structure and additional observations
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	Result	
PT		E 0.25m				GP	FILL: Sandy GRAVEL - fine to medium grained, sub-rounded to sub-angular, brown, fine to medium grained sand.	D - M				FILL / AEOLIAN DEPOSITS
		0.40m				ML	FILL: Silt - low to medium plasticity, pale brown to white.	M < w _p				FILL
		E 0.70m		0.5			FILL: SAND - fine to medium grained, brown. Pale brown.	M				
				1.0		SP						
		1.40m		1.5								
		E 1.70m										
		1.80m										
		E 1.95m		2.0		CH	Brown to dark brown.	w _p > w _L				ESTUARINE DEPOSITS
						SP	CLAY - medium to high plasticity, dark brown with some red-brown and grey-brown to grey.					ALLUVIUM
						CH	SAND - fine to medium grained, brown to pale brown.					ESTUARINE DEPOSITS
					SP	CLAY - medium to high plasticity, dark brown with some red-brown and grey-brown to grey.					ALLUVIUM	
				2.5			SAND - fine to medium grained, brown to pale brown.					
							Hole Terminated at 2.10 m Limit Of Required Investigation					
				3.0								
				3.5								
				4.0								

LEGEND:		Notes, Samples and Tests		Consistency		UCS (kPa)	Moisture Condition
Water		U ₃₀	50mm Diameter tube sample	VS	Very Soft	<25	D Dry
Water Level (Date and time shown)		CBR	Bulk sample for CBR testing	S	Soft	25 - 50	M Moist
Water Inflow		E	Environmental sample (Glass jar, sealed and chilled on site)	F	Firm	50 - 100	W Wet
Water Outflow		ASS	Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)	St	Stiff	100 - 200	W _p Plastic Limit
Strata Changes		B	Bulk Sample	VSt	Very Stiff	200 - 400	W _L Liquid Limit
Gradational or transitional strata				H	Hard	>400	
Definitive or distinct strata change				Fb	Friable		
		Field Tests		Density			
		PID	Photoionisation detector reading (ppm)	V	Very Loose	Density Index <15%	
		DCP(x-y)	Dynamic penetrometer test (test depth interval shown)	L	Loose	Density Index 15 - 35%	
		HP	Hand Penetrometer test (UCS kPa)	MD	Medium Dense	Density Index 35 - 65%	
				D	Dense	Density Index 65 - 85%	
				VD	Very Dense	Density Index 85 - 100%	

ENGINEERING LOG - BOREHOLE

CLIENT: NORTHROP CONSULTING ENGINEERS
PROJECT: PROPOSED INDUSTRIAL WAREHOUSE FACILITY
LOCATION: LOT 152, RAVEN STREET, KOORAGANG

BOREHOLE NO: BH08
PAGE: 1 OF 1
JOB NO: NEW20P-0171
LOGGED BY: BS
DATE: 22/2/21

DRILL TYPE: TRACK MOUNTED DRILL RIG
BOREHOLE DIAMETER: 100 mm

SURFACE RL:
DATUM: AHD

Drilling and Sampling					Material description and profile information					Field Test		Structure and additional observations
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	Result	
PT		E 0.25m				GP	FILL: Sandy GRAVEL - fine to medium grained, sub-rounded to sub-angular, brown, fine to medium grained sand.	M				FILL
		E 0.55m		0.5		ML	FILL: Silt - low to medium plasticity, pale brown to white.	M < w _p				
		E 0.85m 0.90m				SP	FILL: SAND - fine to medium grained, brown to pale brown, with shells.	D - M				
		E 1.20m		1.0		CH	CLAY - medium to high plasticity, dark grey-brown with some red-brown.	M > w _p				
				1.5	SP	SAND - fine to medium grained, dark grey to dark brown. Pale grey.	D - M	ALLUVIAL				
			2.0		Grey.							
				2.10m	Hole Terminated at 2.10 m Limit Of Required Investigation							
				2.5								
				3.0								
				3.5								
				4.0								

LEGEND:		Notes, Samples and Tests		Consistency		UCS (kPa)	Moisture Condition
Water		U ₅₀	50mm Diameter tube sample	VS	Very Soft	<25	D Dry
Water Level (Date and time shown)		CBR	Bulk sample for CBR testing	S	Soft	25 - 50	M Moist
Water Inflow		E	Environmental sample (Glass jar, sealed and chilled on site)	F	Firm	50 - 100	W Wet
Water Outflow		ASS	Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)	St	Stiff	100 - 200	W _p Plastic Limit
Strata Changes		B	Bulk Sample	VSt	Very Stiff	200 - 400	W _L Liquid Limit
Gradational or transitional strata				H	Hard	>400	
Definitive or distinct strata change				Fb	Friable		
		Field Tests		Density			
		PID	Photoionisation detector reading (ppm)	V	Very Loose	Density Index <15%	
		DCP(x-y)	Dynamic penetrometer test (test depth interval shown)	L	Loose	Density Index 15 - 35%	
		HP	Hand Penetrometer test (UCS kPa)	MD	Medium Dense	Density Index 35 - 65%	
				D	Dense	Density Index 65 - 85%	
				VD	Very Dense	Density Index 85 - 100%	

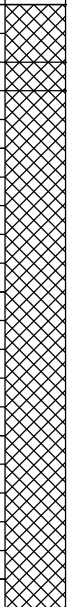
ENGINEERING LOG - BOREHOLE

CLIENT: NORTHROP CONSULTING ENGINEERS
PROJECT: PROPOSED INDUSTRIAL WAREHOUSE FACILITY
LOCATION: LOT 152, RAVEN STREET, KOORAGANG

BOREHOLE NO: BH09
PAGE: 1 OF 1
JOB NO: NEW20P-0171
LOGGED BY: BS
DATE: 22/2/21

DRILL TYPE: TRACK MOUNTED DRILL RIG
BOREHOLE DIAMETER: 100 mm

SURFACE RL:
DATUM: AHD

Drilling and Sampling					Material description and profile information					Field Test		Structure and additional observations
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	Result	
PT		E 0.20m				GP	FILL: Sandy GRAVEL - fine to medium grained, sub-rounded to sub-angular, brown, fine to medium grained sand.	D - M				FILL / AEOLIAN DEPOSITS
		0.30m				ML	FILL: Silt - low to medium plasticity, pale brown to white.	M < w _p			FILL	
		E 0.70m		0.5			FILL: SAND - fine to medium grained, pale brown to pale grey-white, with shells.	D - M				
		0.95m		1.0			Becoming brown to grey-brown.					
		E 1.30m		1.5		SP	Becoming dark grey to dark brown.					
		1.60m		2.0			Becoming pale grey to white.	M				
		E 1.90m		2.10m								
				2.5								
				3.0								
				3.5								
			4.0									
				2.5			Hole Terminated at 2.10 m Limit Of Required Investigation					
				3.0								
				3.5								
				4.0								
				4.5								
				5.0								
				5.5								
				6.0								
				6.5								
				7.0								
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				83.0								
				83.5								

ENGINEERING LOG - BOREHOLE

CLIENT: NORTHROP CONSULTING ENGINEERS
PROJECT: PROPOSED INDUSTRIAL WAREHOUSE FACILITY
LOCATION: LOT 152, RAVEN STREET, KOORAGANG

BOREHOLE NO: BH10
PAGE: 1 OF 1
JOB NO: NEW20P-0171
LOGGED BY: BS
DATE: 22/2/21

DRILL TYPE: TRACK MOUNTED DRILL RIG
BOREHOLE DIAMETER: 100 mm

SURFACE RL:
DATUM: AHD

Drilling and Sampling					Material description and profile information					Field Test		Structure and additional observations
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	Result	
PT		E 0.25m				GP	FILL: Sandy GRAVEL - fine grained, sub-angular to sub-rounded gravel, brown, fine to coarse grained sand.	D - M				FILL - ROADBASE
				ML		0.25m 0.32m Dark brown.	M < w _p	FILL				
		0.50m					FILL: Silt - low to medium plasticity, pale brown to white.	M				
		E 0.80m					FILL: SAND - fine to medium grained, grey-brown, with shells. Pale grey to pale brown. Brown with some dark brown.	D - M				
		1.15m					Brown to pale brown.					
		E 1.45m					Dark brown.					
		E 1.60m		1.5	CH	1.45m 1.60m	CLAY - medium to high plasticity, dark brown with some grey and red-brown.	M > w _p			ESTUARINE DEPOSITS	
							SAND - fine to medium grained, white to pale brown.	M			ALLUVIUM	
				2.0		SP						
						2.10m	Hole Terminated at 2.10 m Limit Of Required Investigation					
				2.5								
				3.0								
				3.5								
				4.0								

LEGEND:		Notes, Samples and Tests		Consistency		UCS (kPa)	Moisture Condition
Water		U ₃₀	50mm Diameter tube sample	VS	Very Soft	<25	D Dry
Water Level (Date and time shown)		CBR	Bulk sample for CBR testing	S	Soft	25 - 50	M Moist
Water Inflow		E	Environmental sample (Glass jar, sealed and chilled on site)	F	Firm	50 - 100	W Wet
Water Outflow		ASS	Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)	St	Stiff	100 - 200	W _p Plastic Limit
Strata Changes		B	Bulk Sample	VSt	Very Stiff	200 - 400	W _L Liquid Limit
Gradational or transitional strata				H	Hard	>400	
Definitive or distinct strata change				Fb	Friable		
Field Tests		PID	Photoionisation detector reading (ppm)	Density		V Very Loose	Density Index <15%
DCP(x-y)			Dynamic penetrometer test (test depth interval shown)	L	Loose		Density Index 15 - 35%
HP			Hand Penetrometer test (UCS kPa)	MD	Medium Dense		Density Index 35 - 65%
				D	Dense		Density Index 65 - 85%
				VD	Very Dense		Density Index 85 - 100%

ENGINEERING LOG - BOREHOLE

CLIENT: NORTHROP CONSULTING ENGINEERS
PROJECT: PROPOSED INDUSTRIAL WAREHOUSE FACILITY
LOCATION: LOT 152, RAVEN STREET, KOORAGANG

BOREHOLE NO: BH11
PAGE: 1 OF 1
JOB NO: NEW20P-0171
LOGGED BY: BS
DATE: 22/2/21

DRILL TYPE: TRACK MOUNTED DRILL RIG
BOREHOLE DIAMETER: 100 mm

SURFACE RL:
DATUM: AHD

Drilling and Sampling					Material description and profile information					Field Test		Structure and additional observations		
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	Result			
PT		E				GP	FILL: Sandy GRAVEL - sub-rounded to sub-angular, fine to medium grained, dark grey with trace black, fine to coarse grained sand, trace coal. Brown.	D				FILL		
		0.45m												
		E				0.5	ML	FILL: Silt - low to medium plasticity, pale brown to white.				M < w _p		
		0.90m				0.90m								
		1.00m				1.0	SP	FILL: SAND - fine to medium grained, brown to pale brown, with some orange-brown.				D		
		E				CH	CLAY - medium to high plasticity, dark brown with some grey and red-brown.	M > w _p				ESTUARINE DEPOSITS		
		1.35m										ALLUVIUM		
				1.5			SAND - fine to medium grained, dark grey-brown, with some coarse grained sand.	W						
				2.0			Grey.							
				2.5			Pale grey.							
				3.0			With some fines of low plasticity. Grey to dark grey.							
				3.10m										
				3.5			Hole Terminated at 3.10 m Limit Of Required Investigation							
				4.0										

LEGEND:		Notes, Samples and Tests		Consistency		UCS (kPa)	Moisture Condition
Water		U ₅₀	50mm Diameter tube sample	VS	Very Soft	<25	D Dry
 Water Level (Date and time shown)		CBR	Bulk sample for CBR testing	S	Soft	25 - 50	M Moist
 Water Inflow		E	Environmental sample (Glass jar, sealed and chilled on site)	F	Firm	50 - 100	W Wet
 Water Outflow		ASS	Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)	St	Stiff	100 - 200	W _p Plastic Limit
Strata Changes		B	Bulk Sample	VSt	Very Stiff	200 - 400	W _L Liquid Limit
 Gradational or transitional strata		Field Tests		H	Hard	>400	
 Definitive or distinct strata change		PID	Photoionisation detector reading (ppm)	Fb	Friable		
		DCP(x-y)	Dynamic penetrometer test (test depth interval shown)	V	Very Loose	Density Index <15%	
		HP	Hand Penetrometer test (UCS kPa)	L	Loose	Density Index 15 - 35%	
				MD	Medium Dense	Density Index 35 - 65%	
				D	Dense	Density Index 65 - 85%	
				VD	Very Dense	Density Index 85 - 100%	

ENGINEERING LOG - BOREHOLE

CLIENT: NORTHROP CONSULTING ENGINEERS
PROJECT: PROPOSED INDUSTRIAL WAREHOUSE FACILITY
LOCATION: LOT 152, RAVEN STREET, KOORAGANG

BOREHOLE NO: BH12
PAGE: 1 OF 1
JOB NO: NEW20P-0171
LOGGED BY: BS
DATE: 22/2/21

DRILL TYPE: TRACK MOUNTED DRILL RIG
BOREHOLE DIAMETER: 100 mm

SURFACE RL:
DATUM: AHD

Drilling and Sampling					Material description and profile information					Field Test		Structure and additional observations
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	Result	
PT		E 0.15m				GP	FILL: Sandy GRAVEL - fine grained, sub-angular to sub-rounded gravel, brown, fine to coarse grained sand.					FILL - ROADBASE
		0.30m					FILL: SAND - fine to medium grained, brown to pale brown with shells.					FILL
		E		0.5		SP	Brown to dark brown. Brown, trace fine grained, sub-rounded to rounded gravel.	D - M				
		0.80m										
		0.90m		1.0								
		E										
		1.25m				CH	CLAY - medium to high plasticity, dark brown with some grey and red-brown.	W _p				ESTUARINE DEPOSITS
		1.32m					SAND - fine to medium grained, grey-brown.	M				ALLUVIUM
		E		1.5		SP	Pale brown to white.	M				
		1.60m		2.0								
				2.10m			Hole Terminated at 2.10 m Limit Of Required Investigation					
				2.5								
				3.0								
				3.5								
				4.0								

LEGEND:		Notes, Samples and Tests		Consistency		UCS (kPa)	Moisture Condition	
Water		U ₅₀	50mm Diameter tube sample	VS	Very Soft	<25	D	Dry
Water Level (Date and time shown)		CBR	Bulk sample for CBR testing	S	Soft	25 - 50	M	Moist
Water Inflow		E	Environmental sample (Glass jar, sealed and chilled on site)	F	Firm	50 - 100	W	Wet
Water Outflow		ASS	Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)	St	Stiff	100 - 200	W _p	Plastic Limit
Strata Changes		B	Bulk Sample	VSt	Very Stiff	200 - 400	W _L	Liquid Limit
Gradational or transitional strata		Field Tests		H	Hard	>400		
Definitive or distinct strata change		PID	Photoionisation detector reading (ppm)	Fb	Friable			
		DCP(x-y)	Dynamic penetrometer test (test depth interval shown)	V	Very Loose		Density Index <15%	
		HP	Hand Penetrometer test (UCS kPa)	L	Loose		Density Index 15 - 35%	
				MD	Medium Dense		Density Index 35 - 65%	
				D	Dense		Density Index 65 - 85%	
				VD	Very Dense		Density Index 85 - 100%	

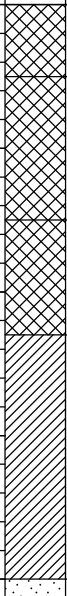
ENGINEERING LOG - BOREHOLE

CLIENT: NORTHROP CONSULTING ENGINEERS
PROJECT: PROPOSED INDUSTRIAL WAREHOUSE FACILITY
LOCATION: LOT 152, RAVEN STREET, KOORAGANG

BOREHOLE NO: BH13
PAGE: 1 OF 1
JOB NO: NEW20P-0171
LOGGED BY: BS
DATE: 22/2/21

DRILL TYPE: TRACK MOUNTED DRILL RIG
BOREHOLE DIAMETER: 100 mm

SURFACE RL:
DATUM: AHD

Drilling and Sampling					Material description and profile information					Field Test		Structure and additional observations	
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	Result		
PT		E 0.15m				GP	FILL: Sandy GRAVEL - fine grained, sub-angular to sub-rounded gravel, brown, fine to coarse grained sand.	D - M				FILL - ROADBASE	
		0.30m					0.25m	FILL: Silt - low to medium plasticity, pale brown to white.					FILL
		E 0.75m		0.5		ML			M < w _p				
							0.75m	FILL: SAND - fine to medium grained, brown, trace shells.					
		1.15m		1.0		SP			M				ESTUARINE DEPOSITS
		E 1.45m		1.5		CH	CLAY - medium to high plasticity, dark brown with some grey and red-brown.		M > w _p				
				2.0									
						SP	2.00m 2.10m SAND - fine to medium grained, dark grey.	M				ALLUVIUM	
							Hole Terminated at 2.10 m Limit Of Required Investigation						
				2.5									
				3.0									
				3.5									
				4.0									

LEGEND:		Notes, Samples and Tests		Consistency		UCS (kPa)	Moisture Condition
Water		U ₅₀ 50mm Diameter tube sample		VS	Very Soft	<25	D Dry
 Water Level (Date and time shown)		CBR Bulk sample for CBR testing		S	Soft	25 - 50	M Moist
 Water Inflow		E Environmental sample (Glass jar, sealed and chilled on site)		F	Firm	50 - 100	W Wet
 Water Outflow		ASS Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)		St	Stiff	100 - 200	W _p Plastic Limit
Strata Changes		B Bulk Sample		VSt	Very Stiff	200 - 400	W _L Liquid Limit
 Gradational or transitional strata		Field Tests		H	Hard	>400	
 Definitive or distinct strata change		PID Photoionisation detector reading (ppm)		Fb	Friable		
		DCP(x-y) Dynamic penetrometer test (test depth interval shown)		V	Very Loose		Density Index <15%
		HP Hand Penetrometer test (UCS kPa)		L	Loose		Density Index 15 - 35%
				MD	Medium Dense		Density Index 35 - 65%
				D	Dense		Density Index 65 - 85%
				VD	Very Dense		Density Index 85 - 100%

ENGINEERING LOG - BOREHOLE

CLIENT: NORTHROP CONSULTING ENGINEERS
PROJECT: PROPOSED INDUSTRIAL WAREHOUSE FACILITY
LOCATION: LOT 152, RAVEN STREET, KOORAGANG

BOREHOLE NO: BH14
PAGE: 1 OF 1
JOB NO: NEW20P-0171
LOGGED BY: BS
DATE: 22/2/21

DRILL TYPE: TRACK MOUNTED DRILL RIG
BOREHOLE DIAMETER: 100 mm

SURFACE RL:
DATUM: AHD

Drilling and Sampling					Material description and profile information					Field Test		Structure and additional observations
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	Result	
PT		E 0.20m 0.30m				GP ML GP	FILL: Sandy GRAVEL - fine grained, sub-angular to sub-rounded gravel, brown, fine to coarse grained sand. FILL: Silt - low to medium plasticity, pale brown to white. FILL: Sandy GRAVEL - fine grained, sub-angular to sub-rounded gravel, brown, fine to coarse grained sand. FILL: SAND - fine to medium grained, brown.	M V M				FILL - ROADBASE FILL FILL - ROADBASE FILL
		E 0.80m 0.95m		0.5								
		E 1.35m		1.0		SP	Dark brown with shells.	D - M				
				1.5								
		2.00m		2.0		CH	CLAY - medium to high plasticity, dark brown and grey with some red-brown. SAND - fine to medium grained, dark grey. Grey-brown.	M A W _P				ESTUARINE DEPOSITS ALLUVIUM
		E 2.30m		2.5		SP	Grey.	W				
				3.0								
				3.10m								
				3.5								
				4.0								

LEGEND:		Notes, Samples and Tests		Consistency		UCS (kPa)	Moisture Condition
Water		U ₅₀	50mm Diameter tube sample	VS	Very Soft	<25	D Dry
Water Level (Date and time shown)		CBR	Bulk sample for CBR testing	S	Soft	25 - 50	M Moist
Water Inflow		E	Environmental sample (Glass jar, sealed and chilled on site)	F	Firm	50 - 100	W Wet
Water Outflow		ASS	Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)	St	Stiff	100 - 200	W _p Plastic Limit
Strata Changes		B	Bulk Sample	VSt	Very Stiff	200 - 400	W _L Liquid Limit
Gradational or transitional strata				H	Hard	>400	
Definitive or distinct strata change				Fb	Friable		
Field Tests		PID	Photoionisation detector reading (ppm)	Density		V Very Loose	Density Index <15%
DCP(x-y)			Dynamic penetrometer test (test depth interval shown)	L	Loose		Density Index 15 - 35%
HP			Hand Penetrometer test (UCS kPa)	MD	Medium Dense		Density Index 35 - 65%
				D	Dense		Density Index 65 - 85%
				VD	Very Dense		Density Index 85 - 100%

ENGINEERING LOG - BOREHOLE

CLIENT: NORTHROP CONSULTING ENGINEERS
PROJECT: PROPOSED INDUSTRIAL WAREHOUSE FACILITY
LOCATION: LOT 152, RAVEN STREET, KOORAGANG

BOREHOLE NO: BH15
PAGE: 1 OF 1
JOB NO: NEW20P-0171
LOGGED BY: BS
DATE: 22/2/21

DRILL TYPE: TRACK MOUNTED DRILL RIG
BOREHOLE DIAMETER: 100 mm

SURFACE RL:
DATUM: AHD

Drilling and Sampling					Material description and profile information					Field Test		Structure and additional observations
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	Result	
PT		E 0.20m				GP	FILL: Sandy GRAVEL - fine to medium grained, sub-angular to sub-rounded gravel, grey-brown, fine to medium grained sand.	D				FILL - ROADBASE
				SP		FILL: SAND - fine to medium grained, brown.	D - M	FILL				
		0.55m		0.5		SP	FILL: SAND (cemented) - fine to medium grained, brown.	D				
		E 0.90m					FILL: SAND - fine to medium grained, grey-brown.					
		1.10m		1.0		SP	Pale grey.					
		E 1.40m					Pale grey to pale brown.	M				
				1.5			Brown. Brown to pale brown.					
		1.75m		1.75m			CLAY - medium to high plasticity, dark grey and dark brown with some red-brown.					ESTUARINE DEPOSITS
	E 2.10m		2.0	CH	2.10m	M > w _p						
							Hole Terminated at 2.10 m Limit Of Required Investigation					
				2.5								
				3.0								
				3.5								
				4.0								

LEGEND:		Notes, Samples and Tests		Consistency		UCS (kPa)	Moisture Condition
Water		U ₃₀ 50mm Diameter tube sample		VS	Very Soft	<25	D Dry
Water Level (Date and time shown)		CBR Bulk sample for CBR testing		S	Soft	25 - 50	M Moist
Water Inflow		E Environmental sample (Glass jar, sealed and chilled on site)		F	Firm	50 - 100	W Wet
Water Outflow		ASS Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)		St	Stiff	100 - 200	W _p Plastic Limit
Strata Changes		B Bulk Sample		VSt	Very Stiff	200 - 400	W _L Liquid Limit
Gradational or transitional strata		Field Tests		H	Hard	>400	
Definitive or distinct strata change		PID Photoionisation detector reading (ppm)		Fb	Friable		
		DCP(x-y) Dynamic penetrometer test (test depth interval shown)		V	Very Loose	Density Index <15%	
		HP Hand Penetrometer test (UCS kPa)		L	Loose	Density Index 15 - 35%	
				MD	Medium Dense	Density Index 35 - 65%	
				D	Dense	Density Index 65 - 85%	
				VD	Very Dense	Density Index 85 - 100%	

APPENDIX E:

Data Validation Report

QA/QC DATA VALIDATION REPORT

Job No: NEW20P-0171AD - VALIDATION

Eurofins report: 776003-AID, 776003-S_report, 775980-W

1. SAMPLE HANDLING

Item	Yes/No	Comments
Were the sample holding times met?	Yes	
Were the samples in proper custody between collection in the field and reaching the laboratory?	Yes	
Were the samples properly and adequately preserved?	Yes	
Were the samples received by the laboratory in good condition?	Yes	

Sampling Handling was:

Satisfactory : ✓	Partially Satisfactory:	Unsatisfactory:
---------------------------------------	-------------------------	-----------------

2. PRECISION AND ACCURACY ASSESSMENT

Item	Yes/No	Comment
Was a NATA registered laboratory used?	Yes	-
Did the laboratory perform the requested tests?	Yes	-
Were the laboratory methods adopted NATA endorsed?	Yes	-
Were the appropriate test procedures followed?	Yes	-
Were the reporting limits satisfactory?	Yes	-
Was the NATA seal on the reports?	Yes	-
Were the reports signed by an authorised person?	Yes	-

Laboratory Precision and Accuracy was:

Satisfactory : ✓	Partially Satisfactory:	Unsatisfactory:
---------------------------------------	-------------------------	-----------------

3. FIELD QA/QC**Soil and Sediment Samples**

	Soil
No. Samples Analysed	15
No. of Duplicates	1
No. of Triplicates	0
No. of Wash Blanks	0
No. of Trip Blanks	0
No. of Trip Spikes	0

No. Days Sampling

Item	Soil
Number of Days Sampling	2
Number of Sampling Events	2

Field Duplicates

Item	Yes/No	Comments
Were an adequate number of field duplicates collected?	Yes	Intra duplicates collected at a rate of 1 per 15 samples.
Were RPDs within control limits? No Limit for 5-10 x EQL and 30% for >10 x EQL	Yes	

Trip Blanks/Trip Spikes

Item	Yes/No	Comments
Were an adequate number of trip blanks and trip spikes collected?	No	Trip blanks and trip spikes were not collected. Taking into account field observations (odours, PID readings), the lack of trip blank/spike samples is not considered to affect the outcome of the assessment.
Were the trip blanks free of contaminants? (If no, comment whether the contaminants present are also detected in the samples and whether they are common laboratory chemicals).	N/A	
Were the trip spikes within recovery limits (between 80% and 120%)	N/A	

Rinsate Samples

Item	Yes/No	Comments
Were an adequate number of rinsate samples used? (1 per day of using reusable sampling equipment – trowel, hand auger etc)	N/A	No re-useable sampling equipment was used, therefore wash black sample was not required.
Were the rinsate samples free of contaminants? (If no, comment whether the contaminants present are also detected in the samples and whether they are common laboratory chemicals).	N/A	

4. LABORATORY INTERNAL QUALITY CONTROL PROCEDURES

A) Type of QA/QC Sample	Yes/No	Comments
Laboratory Blanks/Reagent Blanks (at least 1 per batch)	Yes	
Laboratory Duplicates (at least 1 per batch or 1 per 10 samples)	Yes	
Matrix Spikes, Matrix Spike Duplicates (1 for each soil type)	Yes	
Laboratory Control Spike	Yes	
Surrogate (where appropriate)	Yes	

Item	Yes/No	Comments
B) Were the laboratory blanks and/or reagent blanks free of contamination?	Yes	
C) Were the spike recoveries within control limits? I: <i>Organics/inorganics/metals (50% to 150%)</i> II: <i>Phenols (20% to 130%)</i>	Yes	
D) Were the RPDs of the laboratory duplicates within control limits?	No	Laboratory duplicates in batch 776003 for Arsenic (36%) and Chromium (98%) and duplicate in batch 775980 for Nickel (43%). The lab code Q15 was quoted: <i>"The RPD reported passes Eurofins mgt's QC – Acceptance Criteria as defined in the internal Quality Control Review and Glossary page of this report"</i> ;
E) Were the surrogate recoveries within control limits?	Yes	

Laboratory Internal QA/QC was:

Satisfactory :	✓	Partially Satisfactory:	Unsatisfactory:
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5. DATA USABILITY

Item	Yes/No	Comments
Was the data directly usable?	Yes	
Was the data usable with the following corrections/modifications? (see comments)	NA	
Was the data not usable?	NA	

APPENDIX F:

Laboratory Documents



CHAIN OF CUSTODY RECORD

Eurofins | Environment Testing ABN 50 005 065 921

☐ Sydney Laboratory

Unit F3 Bld F 16 Kian Road Lane Cove NSW 2066
02 9000 8400 EnviroSampleNSW@eurofins.com

☐ Brisbane Laboratory

Unit 1 21 Stanwood Place Mirani QLD 4172
07 3902 4500 EnviroSampleQLD@eurofins.com

☐ Perth Laboratory

Unit 2 91 Larch Highway Kewdale WA 6105
08 9251 9000 EnviroSampleWA@eurofins.com

☐ Melbourne Laboratory

6 Montery Road Dandenong South VIC 3175
03 8554 5000 EnviroSampleVIC@eurofins.com

Company	Qualitest
Address	8 Ironbark Close Warbrook NSW 2204
Contact Name	Libby Betz
Phone No	
Special Directions	
Purchase Order	
Quote ID No	180622QUAN-1

Project No	NEW20P-0171
Project Name	EJE KOORAGANG
Analyses	PAHs, Metals Asbestos (presence/absence) Suite B1 TRH, BTEX

Handled over by	Billy Snow
Sampler(s)	Billy Snow
Email for Invoice	accounts@qualitest.com.au
Email for Results	libbybetz@qualitest.com.au stephcalder@qualitest.com.au billysnow@qualitest.com.au
Containers	500mL Plastic 250mL Plastic 125mL Plastic 200mL Amber Glass 40mL VOA vial 500mL PFAS Bottle Jar (Glass or HDPE) Other (Asbestos AS4964, WA Guidelines)
Required Turnaround Time (TAT)	Overnight (reporting by 9am) Same day 2 days 5 days (Standard) Other
Sample Comments	Dangerous Goods Hazard Warning

No	Client Sample ID	Sampled Date/Time	Matrix	PAHs, Metals	Asbestos (presence/absence)	Suite B1 TRH, BTEX
1	BH05 0.0-0.2	22/02/21	SOIL			
2	BH05 0.5-0.8	22/02/21	SOIL	X	X	X
3	BH05 1.5-1.75	22/02/21	SOIL			
4	BH05 1.75-2.0	22/02/21	SOIL			
5	BH06 0.0-0.3	22/02/21	SOIL	X		
6	BH06 0.5-0.75	22/02/21	SOIL			
7	BH06 0.75-0.90	22/02/21	SOIL			
8	BH06 1.0-1.3	22/02/21	SOIL			
9	BH06 1.5-1.8	22/02/21	SOIL			
10	BH06 1.85-2.1	22/02/21	SOIL			
Total Counts				2	1	1

Method of Shipment	☐ Courier (#) ☐ Hand Delivered	Name	Signature	Date	Time
Laboratory Use Only	Received By	Received By	Signature	Date	Time
		SV0 BNE MEL PER ADL NTL DRW	Signature	Date	Time
		SV0 BNE MEL PER ADL NTL DRW	Signature	Date	Time



EUROFINS | Environment Testing ABN 50 005 086 534

Unit F3 Bld.F 16 Mars Road Lane Cove West NSW 2066
02 9600 8400 Email: Sales@NICM.com.au

Unit F3 Bld.F-16 Mars Road Lane Cove West NSW
02 9900 8470 Enquiries@NCA.com.au

MSW 2066

Brisbane Laboratory
Unit 1 21 Smallwood Place Murarie QLD 4172

Unit 1 21 Smallwood Place Murarie QLD 4172

LD 4172

Perth Laboratory
Unit 2 91 Leach Highway Kewdale WA 6105

Unit 2 91 Leach Highway Kenndale WA 6105

Melbourne Laboratory
6 Monieray Road Dandenong South VIC 3175

Melbourne Laboratory
6 Monterey Road Dandenong South VIC 3175

Q5000, 911. Modified by D. P. Stevens. Approved by Q. Jackson. Approved in a August 2019.

Submission of samples to the laboratory will be deemed as acceptance of Eurofins | Environment Testing Standard Terms and Conditions unless agreed otherwise. A copy is available on request.

2065



Eurofins | Environment Testing ABN 50 005 085 521

☐ Sydney Laboratory

Unit F3 Bld.F 16 Mairs Road Lane Cove West NSW 2066
02 9900 8400 EnviroSampleNSW@eurofins.com

EnviroSampleNSW@eurofins.com

Brisbane Laboratory

Unit 1 21 Smallwood Place Murarie QLD 4172
07 3902 4600 EnviroSampleQLD@eurofins.com

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Perth Laboratory

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08 9251 9600 EnviroSampleWA@eurofins.com

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Melbourne Laboratory

6 Monterey Road Dandenong South VIC 3175
03 8564 5000 EnviatoSampleView@auromfms.com

03 8564 5000 EnviroSampleVind@eurofins.com

[illegible]

Submission of samples to the laboratory will be deemed as acceptance of Eurofins | Environment Testing Standard Terms and Conditions unless agreed otherwise. A copy is available on request.

OSTROY, M.D. Modified by Dr. R. Brown. Approved by J. Walker. Approved on 8 August 2019.



Eurofins | Environment Testing ABN 50 005 085 521

Unif F3 Bid. F 16 Mars
02 9900 8400 Envir

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02 9900 8400 EnviroSampleNSW@eurofins.com

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Unit 1 21 Smallwood Place Murarie QLD 4172
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07 3902 4600 EnviroSampleQLD@eurofins.com

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Unit 2 91 Leach Highway Kowdale WA 6105
08 9251 9600 EnviroSampleWA@eurofins.com

08 9251 9600 EnviroSampleWA@eurofins.com

☐ **Melbourne Laboratory**
6 Monterey Road Dandenong South VIC 3175
03 8564 5000 Enquiries@melb.vic.gov.au

6 Monterey Road Dandenong South VIC 3175
03 8564 5000 Enviromental@aurionline.com.au

03 8564 5000 EnvirosampleVIC@austrliac.com
6 Molliberry Road Dandenong South VIC 3175

[illegible]

OS 0103-0110 Modified by Dr. H. Binnema. Approved by Dr. Jackson. Approved on 9 August 1998.

Submission of samples to the laboratory will be deemed as acceptance of Eurofins | Environment Testing Standard Terms and Conditions unless agreed otherwise. A copy is available on request.

4 of 5



sydney Laboratory
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02 9900 8400 EnviroSampleNSW@eurofins.com

Brisbane Laboratory
Unit 1 21 Smallwood Place Murarie QLD 4172
07 3902 4500 EnviroSampleQLD@eurofins.com

Perth Laboratory
Unit 2 91 Leach Highway Kewdale WA 6105
08 9251 9600 EnviroSampleWA@eurofins.com

☐ **Melbourne Laboratory**
6 Monterey Road Danvers, South V/C 3175
03 4564 5000 EnviatoSampleV/c@eurofilms.com

CR1000 R10: Modified by Dr. R. T. Jones. Approved by O. J. Norton. Approved on 8 August 2019

Submission of samples to the laboratory will be deemed as acceptance of Eurofins | Environment Testing Standard Terms and Conditions unless agreed otherwise. A copy is available on request.

8-1745

#AU04_Enviro_Sample_NSW

Subject: FW: 2 DAY TAT ADDITIONAL LEACHATES: FW: 776003 - TCLP
Attachments: 776003-S_report.pdf; 776003_COC.pdf
Importance: High

From: Libby Betz <LibbyBetz@qualtest.com.au>
Sent: Thursday, 4 March 2021 2:00 PM
To: Andrew Black <AndrewBlack@eurofins.com>
Subject: 776003 - TCLP

EXTERNAL EMAIL*

Hi Andrew,

Can I please have the additional TCLP analysis carried out:

Nickel – BH1 2.0-2.0

Chromium – BH10 0.0-0.25

2 day TAT.

Thanks,

Libby

Libby Betz
Senior Environmental Scientist



Mob: +61 432189418
Tel: +61 2 4968 4468
Fax: +61 2 4960 9775
Web: www.qualtest.com.au
8 Ironbark Close, Warabrook, NSW, 2304
Libbybetz@qualtest.com.au

Click [here](#) to report this email as spam.

ScannedByWebsenseForEurofins

* WARNING - EXTERNAL: This email originated from outside of Eurofins. Do not click any links or open any attachments unless you trust the sender and know that the content is safe!

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IANZ # 1327

Christchurch

43 Detroit Drive
Rolleston, Christchurch 7675
Phone : 0800 856 450
IANZ # 1290

Sample Receipt Advice

Company name: Qualtest
Contact name: Emma Coleman
Project name: EJE KOORAGANG
Project ID: NEW20P-0171
Turnaround time: 5 Day
Date/Time received: Feb 23, 2021 2:30 PM
Eurofins reference: 776003

Sample Information

- ✓ A detailed list of analytes logged into our LIMS, is included in the attached summary table.
- ✓ All samples have been received as described on the above COC.
- ✓ COC has been completed correctly.
- ✓ Attempt to chill was evident.
- ✓ Appropriately preserved sample containers have been used.
- ✓ All samples were received in good condition.
- ✓ Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
- ✓ Appropriate sample containers have been used.
- ✓ Sample containers for volatile analysis received with zero headspace.
- ✗ Split sample sent to requested external lab.
- ✗ Some samples have been subcontracted.
- N/A Custody Seals intact (if used).

Notes

Contact

If you have any questions with respect to these samples, please contact your Analytical Services Manager:

Andrew Black on phone : (+61) 2 9900 8490 or by email: AndrewBlack@eurofins.com

Results will be delivered electronically via email to Emma Coleman - emmacoleman@qualtest.com.au.

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ABN: 50 005 085 521 web: www.eurofins.com.au email: EnviroSales@eurofins.com

Company Name: Qualtest
Address: 8 Ironbark Close
Warabrook
NSW 2304

Project Name: ADDITIONAL EJE KOORAGANG
Project ID: NEW20P-0171

Order No.:
Report #: 778179
Phone: 02 4968 4468
Fax: 02 4960 9775

Received: Mar 4, 2021 2:00 PM
Due: Mar 8, 2021
Priority: 2 Day
Contact Name: Emma Coleman

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Chromium	Nickel	USA Leaching Procedure	USA Leaching Procedure
Melbourne Laboratory - NATA Site # 1254 & 14271									
Sydney Laboratory - NATA Site # 18217						X			X
Brisbane Laboratory - NATA Site # 20794							X	X	
Perth Laboratory - NATA Site # 23736									
Mayfield Laboratory									
External Laboratory									
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID				
1	BH1 2.0-2.1	Feb 22, 2021		US Leachate	S21-Ma09667		X	X	
2	BH10 0.0-0.25	Feb 22, 2021		US Leachate	S21-Ma09668	X			X
Test Counts						1	1	2	2

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ABN: 50 005 085 521 web: www.eurofins.com.au email: EnviroSales@eurofins.com

Company Name: Qualtest
Address: 8 Ironbark Close
Warabrook
NSW 2304

Project Name: EJE KOORAGANG
Project ID: NEW20P-0171

Order No.:
Report #: 776003
Phone: 02 4968 4468
Fax: 02 4960 9775

Received: Feb 23, 2021 2:30 PM
Due: Mar 2, 2021
Priority: 5 Day
Contact Name: Emma Coleman

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Asbestos - AS4964	HOLD	Polycyclic Aromatic Hydrocarbons	Metals M8	Moisture Set	Eurofins Suite B1
Melbourne Laboratory - NATA Site # 1254 & 14271											
Sydney Laboratory - NATA Site # 18217						X	X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794											
Perth Laboratory - NATA Site # 23736											
Mayfield Laboratory											
External Laboratory											
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID						
1	BH05 0.5-0.8	Feb 22, 2021		Soil	S21-Fe46455	X		X	X	X	X
2	BH06 0.0-0.3	Feb 22, 2021		Soil	S21-Fe46456			X	X	X	
3	BH07 0.0-0.25	Feb 22, 2021		Soil	S21-Fe46457	X		X	X	X	X
4	BH08 0.0-0.25	Feb 22, 2021		Soil	S21-Fe46458			X	X	X	
5	BH09 0.0-0.2	Feb 22, 2021		Soil	S21-Fe46459	X		X	X	X	X
6	BH09 0.95-1.3	Feb 22, 2021		Soil	S21-Fe46460	X		X	X	X	X
7	BH10 0.0-0.25	Feb 22, 2021		Soil	S21-Fe46461			X	X	X	
8	BH11 0.0-0.45	Feb 22, 2021		Soil	S21-Fe46462	X		X	X	X	X
9	BH12 0.0-0.15	Feb 22, 2021		Soil	S21-Fe46463	X		X	X	X	X

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Company Name: Qualtest
Address: 8 Ironbark Close
Warabrook
NSW 2304

Project Name: EJE KOORAGANG
Project ID: NEW20P-0171

Order No.:
Report #: 776003
Phone: 02 4968 4468
Fax: 02 4960 9775

Received: Feb 23, 2021 2:30 PM
Due: Mar 2, 2021
Priority: 5 Day
Contact Name: Emma Coleman

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Asbestos - AS4964	HOLD	Polycyclic Aromatic Hydrocarbons	Metals M8	Moisture Set	Eurofins Suite B1
Melbourne Laboratory - NATA Site # 1254 & 14271											
Sydney Laboratory - NATA Site # 18217						X	X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794											
Perth Laboratory - NATA Site # 23736											
Mayfield Laboratory											
External Laboratory											
10	BH13 0.3-0.75	Feb 22, 2021		Soil	S21-Fe46464			X	X	X	
11	BH14 0.0-0.2	Feb 22, 2021		Soil	S21-Fe46465			X	X	X	
12	BH15 1.1-1.4	Feb 22, 2021		Soil	S21-Fe46466	X		X	X	X	X
13	D.22.2.21	Feb 22, 2021		Soil	S21-Fe46467			X	X	X	
14	BH05 0.0-0.2	Feb 22, 2021		Soil	S21-Fe46468		X				
15	BH05 1.5-1.75	Feb 22, 2021		Soil	S21-Fe46469		X				
16	BH05 1.75-2.0	Feb 22, 2021		Soil	S21-Fe46470		X				
17	BH06 0.5-0.75	Feb 22, 2021		Soil	S21-Fe46471		X				
18	BH06 0.75-0.90	Feb 22, 2021		Soil	S21-Fe46472		X				
19	BH06 1.0-1.3	Feb 22, 2021		Soil	S21-Fe46473		X				

Australia

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Company Name: Qualtest
Address: 8 Ironbark Close
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NSW 2304

Project Name: EJE KOORAGANG
Project ID: NEW20P-0171

Order No.:
Report #: 776003
Phone: 02 4968 4468
Fax: 02 4960 9775

Received: Feb 23, 2021 2:30 PM
Due: Mar 2, 2021
Priority: 5 Day
Contact Name: Emma Coleman

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Asbestos - AS4964	HOLD	Polycyclic Aromatic Hydrocarbons	Metals M8	Moisture Set	Eurofins Suite B1
Melbourne Laboratory - NATA Site # 1254 & 14271											
Sydney Laboratory - NATA Site # 18217						X	X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794											
Perth Laboratory - NATA Site # 23736											
Mayfield Laboratory											
External Laboratory											
20	BH06 1.6-1.8	Feb 22, 2021		Soil	S21-Fe46474		X				
21	BH06 1.85-2.1	Feb 22, 2021		Soil	S21-Fe46475		X				
22	BH07 0.4-0.7	Feb 22, 2021		Soil	S21-Fe46476		X				
23	BH07 1.4-1.7	Feb 22, 2021		Soil	S21-Fe46477		X				
24	BH07 1.8-1.95	Feb 22, 2021		Soil	S21-Fe46478		X				
25	BH08 0.25-0.55	Feb 22, 2021		Soil	S21-Fe46479		X				
26	BH08 0.55-0.85	Feb 22, 2021		Soil	S21-Fe46480		X				
27	BH08 0.9-1.2	Feb 22, 2021		Soil	S21-Fe46481		X				
28	BH09 0.3-0.7	Feb 22, 2021		Soil	S21-Fe46482		X				

Australia

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Company Name: Qualtest
Address: 8 Ironbark Close
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Project Name: EJE KOORAGANG
Project ID: NEW20P-0171

Order No.:
Report #: 776003
Phone: 02 4968 4468
Fax: 02 4960 9775

Received: Feb 23, 2021 2:30 PM
Due: Mar 2, 2021
Priority: 5 Day
Contact Name: Emma Coleman

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Asbestos - AS4964	HOLD	Polycyclic Aromatic Hydrocarbons	Metals M8	Moisture Set	Eurofins Suite B1
Melbourne Laboratory - NATA Site # 1254 & 14271											
Sydney Laboratory - NATA Site # 18217						X	X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794											
Perth Laboratory - NATA Site # 23736											
Mayfield Laboratory											
External Laboratory											
29	BH09 1.6-1.9	Feb 22, 2021		Soil	S21-Fe46483		X				
30	BH10 0.5-0.8	Feb 22, 2021		Soil	S21-Fe46484		X				
31	BH10 1.15-1.45	Feb 22, 2021		Soil	S21-Fe46485		X				
32	BH10 1.45-1.6	Feb 22, 2021		Soil	S21-Fe46486		X				
33	BH11 0.45-0.9	Feb 22, 2021		Soil	S21-Fe46487		X				
34	BH11 1.0-1.35	Feb 22, 2021		Soil	S21-Fe46488		X				
35	BH12 0.3-0.8	Feb 22, 2021		Soil	S21-Fe46489		X				
36	BH12 0.9-1.25	Feb 22, 2021		Soil	S21-Fe46490		X				
37	BH12 1.32-1.60	Feb 22, 2021		Soil	S21-Fe46491		X				

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Company Name: Qualtest
Address: 8 Ironbark Close
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NSW 2304

Project Name: EJE KOORAGANG
Project ID: NEW20P-0171

Order No.:
Report #: 776003
Phone: 02 4968 4468
Fax: 02 4960 9775

Received: Feb 23, 2021 2:30 PM
Due: Mar 2, 2021
Priority: 5 Day
Contact Name: Emma Coleman

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Asbestos - AS4964	HOLD	Polycyclic Aromatic Hydrocarbons	Metals M8	Moisture Set	Eurofins Suite B1
Melbourne Laboratory - NATA Site # 1254 & 14271											
Sydney Laboratory - NATA Site # 18217						X	X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794											
Perth Laboratory - NATA Site # 23736											
Mayfield Laboratory											
External Laboratory											
38	BH13 0.0-0.15	Feb 22, 2021		Soil	S21-Fe46492		X				
39	BH13 0.15-1.45	Feb 22, 2021		Soil	S21-Fe46493		X				
40	BH14 0.3-0.8	Feb 22, 2021		Soil	S21-Fe46494		X				
41	BH14 0.95-1.35	Feb 22, 2021		Soil	S21-Fe46495		X				
42	BH14 2.0-2.30	Feb 22, 2021		Soil	S21-Fe46496		X				
43	BH15 0.0-0.2	Feb 22, 2021		Soil	S21-Fe46497		X				
44	BH15 0.55-0.9	Feb 22, 2021		Soil	S21-Fe46498		X				
45	BH15 1.75-2.1	Feb 22, 2021		Soil	S21-Fe46499		X				
Test Counts						7	32	13	13	13	7

Qualitest
8 Ironbark Close
Warabrook
NSW 2304



NATA Accredited
Accreditation Number 1261
Site Number 18217

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

Attention: Emma Coleman
Report 776003-AID
Project Name EJE KOORAGANG
Project ID NEW20P-0171
Received Date Feb 23, 2021
Date Reported Mar 02, 2021

Methodology:

Asbestos Fibre
 Identification

Conducted in accordance with the Australian Standard AS 4964 – 2004: Method for the Qualitative Identification of Asbestos in Bulk Samples and in-house Method LTM-ASB-8020 by polarised light microscopy (PLM) and dispersion staining (DS) techniques.

NOTE: Positive Trace Analysis results indicate the sample contains detectable respirable fibres.

Unknown Mineral
 Fibres

Mineral fibres of unknown type, as determined by PLM with DS, may require another analytical technique, such as Electron Microscopy, to confirm unequivocal identity.

NOTE: While Actinolite, Anthophyllite and Tremolite asbestos may be detected by PLM with DS, due to variability in the optical properties of these materials, AS4964 requires that these are reported as UMF unless confirmed by an independent technique.

Subsampling Soil
 Samples

The whole sample submitted is first dried and then passed through a 10mm sieve followed by a 2mm sieve. All fibrous matter greater than 10mm, greater than 2mm as well as the material passing through the 2mm sieve are retained and analysed for the presence of asbestos. If the sub 2mm fraction is greater than approximately 30 to 60g then a sub-sampling routine based on ISO 3082:2009(E) is employed.

NOTE: Depending on the nature and size of the soil sample, the sub-2 mm residue material may need to be sub-sampled for trace analysis, in accordance with AS 4964-2004.

Bonded asbestos-
 containing material
 (ACM)

The material is first examined and any fibres isolated for identification by PLM and DS. Where required, interfering matrices may be removed by disintegration using a range of heat, chemical or physical treatments, possibly in combination. The resultant material is then further examined in accordance with AS 4964 - 2004.

NOTE: Even after disintegration it may be difficult to detect the presence of asbestos in some asbestos-containing bulk materials using PLM and DS. This is due to the low grade or small length or diameter of the asbestos fibres present in the material, or to the fact that very fine fibres have been distributed intimately throughout the materials. Vinyl/asbestos floor tiles, some asbestos-containing sealants and mastics, asbestos-containing epoxy resins and some ore samples are examples of these types of material, which are difficult to analyse.

Limit of Reporting

The performance limitation of the AS 4964 (2004) method for non-homogeneous samples is around 0.1 g/kg (equivalent to 0.01% (w/w)). Where no asbestos is found by PLM and DS, including Trace Analysis, this is considered to be at the nominal reporting limit of 0.01% (w/w).

The NEPM screening level of 0.001% (w/w) is intended as an on-site determination, not a laboratory Limit of Reporting (LOR), per se. Examination of a large sample size (e.g. 500 mL) may improve the likelihood of detecting asbestos, particularly AF, to aid assessment against the NEPM criteria. Gravimetric determinations to this level of accuracy are outside of AS 4964 and hence NATA Accreditation does not cover the performance of this service (non-NATA results shown with an asterisk).

NOTE: NATA News March 2014, p.7, states in relation to AS 4964: "This is a qualitative method with a nominal reporting limit of 0.01 % " and that currently in Australia "there is no validated method available for the quantification of asbestos". This report is consistent with the analytical procedures and reporting recommendations in the NEPM and the WA DoH.

Project Name EJE KOORAGANG
Project ID NEW20P-0171
Date Sampled Feb 22, 2021
Report 776003-AID

Client Sample ID	Eurofins Sample No.	Date Sampled	Sample Description	Result
BH05 0.5-0.8	21-Fe46455	Feb 22, 2021	Approximate Sample 64g Sample consisted of: Brown coarse-grained sandy soil and shell	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No trace asbestos detected.
BH07 0.0-0.25	21-Fe46457	Feb 22, 2021	Approximate Sample 57g Sample consisted of: Brown coarse-grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No trace asbestos detected.
BH09 0.0-0.2	21-Fe46459	Feb 22, 2021	Approximate Sample 68g Sample consisted of: Brown coarse-grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No trace asbestos detected.
BH09 0.95-1.3	21-Fe46460	Feb 22, 2021	Approximate Sample 52g Sample consisted of: Brown coarse-grained sandy soil	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No trace asbestos detected.
BH11 0.0-0.45	21-Fe46462	Feb 22, 2021	Approximate Sample 64g Sample consisted of: Brown coarse-grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No trace asbestos detected.
BH12 0.0-0.15	21-Fe46463	Feb 22, 2021	Approximate Sample 57g Sample consisted of: Brown coarse-grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No trace asbestos detected.
BH15 1.1-1.4	21-Fe46466	Feb 22, 2021	Approximate Sample 63g Sample consisted of: Brown coarse-grained sandy soil and shell	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No trace asbestos detected.

Sample History

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

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

Description

Asbestos - LTM-ASB-8020

Testing Site

Sydney

Extracted

Feb 24, 2021

Holding Time

Indefinite

Australia

Melbourne
6 Monterey Road
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Site # 1254 & 14271

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Brisbane
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ABN: 50 005 085 521 web: www.eurofins.com.au email: EnviroSales@eurofins.com

Company Name: Qualtest
Address: 8 Ironbark Close
Warabrook
NSW 2304

Project Name: EJE KOORAGANG
Project ID: NEW20P-0171

Order No.:
Report #: 776003
Phone: 02 4968 4468
Fax: 02 4960 9775

Received: Feb 23, 2021 2:30 PM
Due: Mar 2, 2021
Priority: 5 Day
Contact Name: Emma Coleman

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Asbestos - AS4964	HOLD	Polycyclic Aromatic Hydrocarbons	Metals M8	Moisture Set	Eurofins Suite B1
Melbourne Laboratory - NATA Site # 1254 & 14271											
Sydney Laboratory - NATA Site # 18217						X	X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794											
Perth Laboratory - NATA Site # 23736											
Mayfield Laboratory											
External Laboratory											
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID						
1	BH05 0.5-0.8	Feb 22, 2021		Soil	S21-Fe46455	X		X	X	X	X
2	BH06 0.0-0.3	Feb 22, 2021		Soil	S21-Fe46456			X	X	X	
3	BH07 0.0-0.25	Feb 22, 2021		Soil	S21-Fe46457	X		X	X	X	X
4	BH08 0.0-0.25	Feb 22, 2021		Soil	S21-Fe46458			X	X	X	
5	BH09 0.0-0.2	Feb 22, 2021		Soil	S21-Fe46459	X		X	X	X	X
6	BH09 0.95-1.3	Feb 22, 2021		Soil	S21-Fe46460	X		X	X	X	X
7	BH10 0.0-0.25	Feb 22, 2021		Soil	S21-Fe46461			X	X	X	
8	BH11 0.0-0.45	Feb 22, 2021		Soil	S21-Fe46462	X		X	X	X	X
9	BH12 0.0-0.15	Feb 22, 2021		Soil	S21-Fe46463	X		X	X	X	X

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Due: Mar 2, 2021
Priority: 5 Day
Contact Name: Emma Coleman

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Asbestos - AS4964	HOLD	Polycyclic Aromatic Hydrocarbons	Metals M8	Moisture Set	Eurofins Suite B1
Melbourne Laboratory - NATA Site # 1254 & 14271											
Sydney Laboratory - NATA Site # 18217						X	X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794											
Perth Laboratory - NATA Site # 23736											
Mayfield Laboratory											
External Laboratory											
10	BH13 0.3-0.75	Feb 22, 2021		Soil	S21-Fe46464			X	X	X	
11	BH14 0.0-0.2	Feb 22, 2021		Soil	S21-Fe46465			X	X	X	
12	BH15 1.1-1.4	Feb 22, 2021		Soil	S21-Fe46466	X		X	X	X	X
13	D.22.2.21	Feb 22, 2021		Soil	S21-Fe46467			X	X	X	
14	BH05 0.0-0.2	Feb 22, 2021		Soil	S21-Fe46468		X				
15	BH05 1.5-1.75	Feb 22, 2021		Soil	S21-Fe46469		X				
16	BH05 1.75-2.0	Feb 22, 2021		Soil	S21-Fe46470		X				
17	BH06 0.5-0.75	Feb 22, 2021		Soil	S21-Fe46471		X				
18	BH06 0.75-0.90	Feb 22, 2021		Soil	S21-Fe46472		X				
19	BH06 1.0-1.3	Feb 22, 2021		Soil	S21-Fe46473		X				

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Melbourne Laboratory - NATA Site # 1254 & 14271											
Sydney Laboratory - NATA Site # 18217						X	X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794											
Perth Laboratory - NATA Site # 23736											
Mayfield Laboratory											
External Laboratory											
20	BH06 1.6-1.8	Feb 22, 2021		Soil	S21-Fe46474		X				
21	BH06 1.85-2.1	Feb 22, 2021		Soil	S21-Fe46475		X				
22	BH07 0.4-0.7	Feb 22, 2021		Soil	S21-Fe46476		X				
23	BH07 1.4-1.7	Feb 22, 2021		Soil	S21-Fe46477		X				
24	BH07 1.8-1.95	Feb 22, 2021		Soil	S21-Fe46478		X				
25	BH08 0.25-0.55	Feb 22, 2021		Soil	S21-Fe46479		X				
26	BH08 0.55-0.85	Feb 22, 2021		Soil	S21-Fe46480		X				
27	BH08 0.9-1.2	Feb 22, 2021		Soil	S21-Fe46481		X				
28	BH09 0.3-0.7	Feb 22, 2021		Soil	S21-Fe46482		X				

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Sydney Laboratory - NATA Site # 18217						X	X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794											
Perth Laboratory - NATA Site # 23736											
Mayfield Laboratory											
External Laboratory											
29	BH09 1.6-1.9	Feb 22, 2021		Soil	S21-Fe46483		X				
30	BH10 0.5-0.8	Feb 22, 2021		Soil	S21-Fe46484		X				
31	BH10 1.15-1.45	Feb 22, 2021		Soil	S21-Fe46485		X				
32	BH10 1.45-1.6	Feb 22, 2021		Soil	S21-Fe46486		X				
33	BH11 0.45-0.9	Feb 22, 2021		Soil	S21-Fe46487		X				
34	BH11 1.0-1.35	Feb 22, 2021		Soil	S21-Fe46488		X				
35	BH12 0.3-0.8	Feb 22, 2021		Soil	S21-Fe46489		X				
36	BH12 0.9-1.25	Feb 22, 2021		Soil	S21-Fe46490		X				
37	BH12 1.32-1.60	Feb 22, 2021		Soil	S21-Fe46491		X				

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Sydney Laboratory - NATA Site # 18217						X	X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794											
Perth Laboratory - NATA Site # 23736											
Mayfield Laboratory											
External Laboratory											
38	BH13 0.0-0.15	Feb 22, 2021		Soil	S21-Fe46492		X				
39	BH13 0.15-1.45	Feb 22, 2021		Soil	S21-Fe46493		X				
40	BH14 0.3-0.8	Feb 22, 2021		Soil	S21-Fe46494		X				
41	BH14 0.95-1.35	Feb 22, 2021		Soil	S21-Fe46495		X				
42	BH14 2.0-2.30	Feb 22, 2021		Soil	S21-Fe46496		X				
43	BH15 0.0-0.2	Feb 22, 2021		Soil	S21-Fe46497		X				
44	BH15 0.55-0.9	Feb 22, 2021		Soil	S21-Fe46498		X				
45	BH15 1.75-2.1	Feb 22, 2021		Soil	S21-Fe46499		X				
Test Counts						7	32	13	13	13	7

Internal Quality Control Review and Glossary

General

1. QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. Samples were analysed on an 'as received' basis.
4. Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
5. This report replaces any interim results previously issued.

Holding Times

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

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

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

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

Units

% w/w: weight for weight basis	grams per kilogram
Filter loading:	fibres/100 graticule areas
Reported Concentration:	fibres/mL
Flowrate:	L/min

Terms

Dry	Sample is dried by heating prior to analysis
LOR	Limit of Reporting
COC	Chain of Custody
SRA	Sample Receipt Advice
ISO	International Standards Organisation
AS	Australian Standards
WA DOH	Reference document for the NEPM. Government of Western Australia, Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia (2009), including supporting document Recommended Procedures for Laboratory Analysis of Asbestos in Soil (2011)
NEPM	National Environment Protection (Assessment of Site Contamination) Measure, 2013 (as amended)
ACM	Asbestos Containing Materials. Asbestos contained within a non-asbestos matrix, typically presented in bonded and/or sound condition. For the purposes of the NEPM, ACM is generally restricted to those materials that do not pass a 7mm x 7mm sieve.
AF	Asbestos Fines. Asbestos containing materials, including friable, weathered and bonded materials, able to pass a 7mm x 7mm sieve. Considered under the NEPM as equivalent to "non-bonded / friable".
FA	Fibrous Asbestos. Asbestos containing materials in a friable and/or severely weathered condition. For the purposes of the NEPM, FA is generally restricted to those materials that do not pass a 7mm x 7mm sieve.
Friable	Asbestos-containing materials of any size that may be broken or crumbled by hand pressure. For the purposes of the NEPM, this includes both AF and FA. It is outside of the laboratory's remit to assess degree of friability.
Trace Analysis	Analytical procedure used to detect the presence of respirable fibres in the matrix.

Comments

The samples received were not collected in an approved asbestos bag and was therefore sub-sampled from the 250mL glass jar. Valid sub-sampling procedures were applied so as to ensure that the sub-samples to be analysed accurately represented the samples received.

Sample Integrity

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

Qualifier Codes/Comments

Code	Description
N/A	Not applicable

Asbestos Counter/Identifier:

Sayeed Abu Senior Analyst-Asbestos (NSW)

Authorised by:

Chamath JHM Annakkage Senior Analyst-Asbestos (NSW)



Glenn Jackson
General Manager

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

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

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

Eurofins shall not be liable for loss, cost, damages or expenses incurred by the client, or any other person or company, resulting from the use of any information or interpretation given in this report. In no case shall Eurofins be liable for consequential damages including, but not limited to, lost profits, damages for failure to meet deadlines and lost production arising from this report. This document shall not be reproduced except in full and relates only to the items tested. Unless indicated otherwise, the tests were performed on the samples as received.

Qualtest
8 Ironbark Close
Warabrook
NSW 2304



NATA Accredited
Accreditation Number 1261
Site Number 18217

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

Attention: Emma Coleman

Report 776003-S
Project name EJE KOORAGANG
Project ID NEW20P-0171
Received Date Feb 23, 2021

Client Sample ID			BH05 0.5-0.8	BH06 0.0-0.3	BH07 0.0-0.25	BH08 0.0-0.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S21-Fe46455	S21-Fe46456	S21-Fe46457	S21-Fe46458
Date Sampled			Feb 22, 2021	Feb 22, 2021	Feb 22, 2021	Feb 22, 2021
Test/Reference	LOR	Unit				
BTEX						
Benzene	0.1	mg/kg	< 0.1	-	< 0.1	-
Toluene	0.1	mg/kg	< 0.1	-	< 0.1	-
Ethylbenzene	0.1	mg/kg	< 0.1	-	< 0.1	-
m&p-Xylenes	0.2	mg/kg	< 0.2	-	< 0.2	-
o-Xylene	0.1	mg/kg	< 0.1	-	< 0.1	-
Xylenes - Total*	0.3	mg/kg	< 0.3	-	< 0.3	-
4-Bromofluorobenzene (surr.)	1	%	132	-	77	-
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene ^{N02}	0.5	mg/kg	< 0.5	-	< 0.5	-
TRH C6-C10	20	mg/kg	< 20	-	< 20	-
TRH C6-C10 less BTEX (F1) ^{N04}	20	mg/kg	< 20	-	< 20	-
TRH >C10-C16	50	mg/kg	< 50	-	< 50	-
TRH >C10-C16 less Naphthalene (F2) ^{N01}	50	mg/kg	< 50	-	< 50	-
TRH >C16-C34	100	mg/kg	< 100	-	< 100	-
TRH >C34-C40	100	mg/kg	< 100	-	< 100	-
TRH >C10-C40 (total)*	100	mg/kg	< 100	-	< 100	-
Total Recoverable Hydrocarbons						
TRH C6-C9	20	mg/kg	< 20	-	< 20	-
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C10-C14	20	mg/kg	< 20	-	< 20	-
TRH C15-C28	50	mg/kg	< 50	-	< 50	-
TRH C29-C36	50	mg/kg	< 50	-	< 50	-
TRH C10-C36 (Total)	50	mg/kg	< 50	-	< 50	-
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6	0.6	0.6	0.6
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2	1.2	1.2	1.2
Acenaphthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benz(a)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(b&j)fluoranthene ^{N07}	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(g,h,i)perylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5

Client Sample ID			BH05 0.5-0.8	BH06 0.0-0.3	BH07 0.0-0.25	BH08 0.0-0.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S21-Fe46455	S21-Fe46456	S21-Fe46457	S21-Fe46458
Date Sampled			Feb 22, 2021	Feb 22, 2021	Feb 22, 2021	Feb 22, 2021
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons						
Chrysene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Dibenz(a,h)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Fluorene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Naphthalene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Phenanthrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Total PAH*	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
2-Fluorobiphenyl (surr.)	1	%	63	68	61	56
p-Terphenyl-d14 (surr.)	1	%	96	82	92	86
Heavy Metals						
Arsenic	2	mg/kg	2.5	3.0	3.9	4.5
Cadmium	0.4	mg/kg	< 0.4	< 0.4	4.2	1.0
Chromium	5	mg/kg	< 5	8.3	23	10
Copper	5	mg/kg	< 5	5.6	8.1	7.4
Lead	5	mg/kg	< 5	14	20	14
Mercury	0.1	mg/kg	< 0.1	< 0.1	1.0	0.2
Nickel	5	mg/kg	< 5	6.0	5.2	6.2
Zinc	5	mg/kg	28	56	72	51
% Moisture	1	%	6.3	9.2	7.4	12

Client Sample ID			BH09 0.0-0.2	BH09 0.95-1.3	BH10 0.0-0.25	BH11 0.0-0.45
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S21-Fe46459	S21-Fe46460	S21-Fe46461	S21-Fe46462
Date Sampled			Feb 22, 2021	Feb 22, 2021	Feb 22, 2021	Feb 22, 2021
Test/Reference	LOR	Unit				
BTEX						
Benzene	0.1	mg/kg	< 0.1	< 0.1	-	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1	-	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	-	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	-	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	-	< 0.1
Xylenes - Total*	0.3	mg/kg	< 0.3	< 0.3	-	< 0.3
4-Bromofluorobenzene (surr.)	1	%	80	72	-	71
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene ^{N02}	0.5	mg/kg	< 0.5	< 0.5	-	< 0.5
TRH C6-C10	20	mg/kg	< 20	< 20	-	< 20
TRH C6-C10 less BTEX (F1) ^{N04}	20	mg/kg	< 20	< 20	-	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50	-	< 50
TRH >C10-C16 less Naphthalene (F2) ^{N01}	50	mg/kg	< 50	< 50	-	< 50
TRH >C16-C34	100	mg/kg	< 100	< 100	-	< 100
TRH >C34-C40	100	mg/kg	< 100	< 100	-	< 100
TRH >C10-C40 (total)*	100	mg/kg	< 100	< 100	-	< 100
Total Recoverable Hydrocarbons						
TRH C6-C9	20	mg/kg	< 20	< 20	-	< 20

Client Sample ID			BH09 0.0-0.2	BH09 0.95-1.3	BH10 0.0-0.25	BH11 0.0-0.45
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S21-Fe46459	S21-Fe46460	S21-Fe46461	S21-Fe46462
Date Sampled			Feb 22, 2021	Feb 22, 2021	Feb 22, 2021	Feb 22, 2021
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C10-C14	20	mg/kg	< 20	< 20	-	< 20
TRH C15-C28	50	mg/kg	< 50	< 50	-	69
TRH C29-C36	50	mg/kg	< 50	< 50	-	54
TRH C10-C36 (Total)	50	mg/kg	< 50	< 50	-	123
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6	0.6	0.6	0.6
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2	1.2	1.2	1.2
Acenaphthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benz(a)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(b&j)fluoranthene ^{N07}	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(g,h,i)perylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Chrysene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Dibenz(a,h)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Fluorene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Indeno(1,2,3-cd)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Naphthalene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Phenanthrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Pyrene	0.5	mg/kg	0.5	< 0.5	< 0.5	< 0.5
Total PAH*	0.5	mg/kg	0.5	< 0.5	< 0.5	< 0.5
2-Fluorobiphenyl (surr.)	1	%	62	68	60	61
p-Terphenyl-d14 (surr.)	1	%	89	104	88	89
Heavy Metals						
Arsenic	2	mg/kg	4.9	< 2	6.7	4.3
Cadmium	0.4	mg/kg	< 0.4	< 0.4	1.8	< 0.4
Chromium	5	mg/kg	11	< 5	290	10
Copper	5	mg/kg	< 5	< 5	18	< 5
Lead	5	mg/kg	16	6.9	35	11
Mercury	0.1	mg/kg	< 0.1	0.1	0.4	< 0.1
Nickel	5	mg/kg	5.5	< 5	16	5.0
Zinc	5	mg/kg	43	21	73	43
% Moisture	1	%	5.7	3.4	6.9	6.6

Client Sample ID			BH12 0.0-0.15 Soil	BH13 0.3-0.75 Soil	BH14 0.0-0.2 Soil	BH15 1.1-1.4 Soil
Sample Matrix			S21-Fe46463	S21-Fe46464	S21-Fe46465	S21-Fe46466
Eurofins Sample No.			Feb 22, 2021	Feb 22, 2021	Feb 22, 2021	Feb 22, 2021
Date Sampled						
Test/Reference	LOR	Unit				
BTEX						
Benzene	0.1	mg/kg	< 0.1	-	-	< 0.1
Toluene	0.1	mg/kg	< 0.1	-	-	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	-	-	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	-	-	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	-	-	< 0.1
Xylenes - Total*	0.3	mg/kg	< 0.3	-	-	< 0.3
4-Bromofluorobenzene (surr.)	1	%	82	-	-	80
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene ^{N02}	0.5	mg/kg	< 0.5	-	-	< 0.5
TRH C6-C10	20	mg/kg	< 20	-	-	< 20
TRH C6-C10 less BTEX (F1) ^{N04}	20	mg/kg	< 20	-	-	< 20
TRH >C10-C16	50	mg/kg	< 50	-	-	< 50
TRH >C10-C16 less Naphthalene (F2) ^{N01}	50	mg/kg	< 50	-	-	< 50
TRH >C16-C34	100	mg/kg	< 100	-	-	< 100
TRH >C34-C40	100	mg/kg	< 100	-	-	< 100
TRH >C10-C40 (total)*	100	mg/kg	< 100	-	-	< 100
Total Recoverable Hydrocarbons						
TRH C6-C9	20	mg/kg	< 20	-	-	< 20
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C10-C14	20	mg/kg	< 20	-	-	< 20
TRH C15-C28	50	mg/kg	< 50	-	-	< 50
TRH C29-C36	50	mg/kg	< 50	-	-	< 50
TRH C10-C36 (Total)	50	mg/kg	< 50	-	-	< 50
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6	0.6	0.6	0.6
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2	1.2	1.2	1.2
Acenaphthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benz(a)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(b&j)fluoranthene ^{N07}	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(g,h,i)perylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Chrysene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Dibenz(a,h)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Fluorene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Indeno(1,2,3-cd)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Naphthalene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Phenanthrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Total PAH*	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
2-Fluorobiphenyl (surr.)	1	%	77	70	67	70
p-Terphenyl-d14 (surr.)	1	%	85	97	84	99

Client Sample ID			BH12 0.0-0.15	BH13 0.3-0.75	BH14 0.0-0.2	BH15 1.1-1.4
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S21-Fe46463	S21-Fe46464	S21-Fe46465	S21-Fe46466
Date Sampled			Feb 22, 2021	Feb 22, 2021	Feb 22, 2021	Feb 22, 2021
Test/Reference	LOR	Unit				
Heavy Metals						
Arsenic	2	mg/kg	5.4	< 2	4.3	2.3
Cadmium	0.4	mg/kg	< 0.4	19	1.7	< 0.4
Chromium	5	mg/kg	17	9.9	150	7.2
Copper	5	mg/kg	< 5	< 5	140	< 5
Lead	5	mg/kg	13	< 5	22	< 5
Mercury	0.1	mg/kg	< 0.1	3.0	0.2	< 0.1
Nickel	5	mg/kg	< 5	< 5	8.1	< 5
Zinc	5	mg/kg	44	22	61	25
% Moisture	1	%	4.3	33	5.4	13

Client Sample ID			D.22.2.21
Sample Matrix			Soil
Eurofins Sample No.			S21-Fe46467
Date Sampled			Feb 22, 2021
Test/Reference	LOR	Unit	
Polycyclic Aromatic Hydrocarbons			
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2
Acenaphthene	0.5	mg/kg	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5
Anthracene	0.5	mg/kg	< 0.5
Benz(a)anthracene	0.5	mg/kg	< 0.5
Benzo(a)pyrene	0.5	mg/kg	< 0.5
Benzo(b&j)fluoranthene ^{N07}	0.5	mg/kg	< 0.5
Benzo(g,h,i)perylene	0.5	mg/kg	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5
Chrysene	0.5	mg/kg	< 0.5
Dibenz(a,h)anthracene	0.5	mg/kg	< 0.5
Fluoranthene	0.5	mg/kg	< 0.5
Fluorene	0.5	mg/kg	< 0.5
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5
Naphthalene	0.5	mg/kg	< 0.5
Phenanthrene	0.5	mg/kg	< 0.5
Pyrene	0.5	mg/kg	< 0.5
Total PAH*	0.5	mg/kg	< 0.5
2-Fluorobiphenyl (surr.)	1	%	67
p-Terphenyl-d14 (surr.)	1	%	105
Heavy Metals			
Arsenic	2	mg/kg	2.4
Cadmium	0.4	mg/kg	< 0.4
Chromium	5	mg/kg	< 5
Copper	5	mg/kg	< 5
Lead	5	mg/kg	5.9
Mercury	0.1	mg/kg	< 0.1
Nickel	5	mg/kg	< 5
Zinc	5	mg/kg	30

Client Sample ID			D.22.2.21
Sample Matrix			Soil
Eurofins Sample No.			S21-Fe46467
Date Sampled			Feb 22, 2021
Test/Reference	LOR	Unit	
% Moisture	1	%	6.9

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.

A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

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

Description	Testing Site	Extracted	Holding Time
Eurofins Suite B1			
BTEX	Sydney	Feb 26, 2021	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Sydney	Feb 26, 2021	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Sydney	Feb 26, 2021	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons	Sydney	Feb 26, 2021	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Sydney	Feb 26, 2021	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Polycyclic Aromatic Hydrocarbons	Sydney	Feb 26, 2021	14 Days
- Method: LTM-ORG-2130 PAH and Phenols in Soil and Water			
Metals M8	Sydney	Feb 26, 2021	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
% Moisture	Sydney	Feb 24, 2021	14 Days
- Method: LTM-GEN-7080 Moisture			

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Company Name: Qualtest
Address: 8 Ironbark Close
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NSW 2304

Project Name: EJE KOORAGANG
Project ID: NEW20P-0171

Order No.:
Report #: 776003
Phone: 02 4968 4468
Fax: 02 4960 9775

Received: Feb 23, 2021 2:30 PM
Due: Mar 2, 2021
Priority: 5 Day
Contact Name: Emma Coleman

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Asbestos - AS4964	HOLD	Polycyclic Aromatic Hydrocarbons	Metals M8	Moisture Set	Eurofins Suite B1
Melbourne Laboratory - NATA Site # 1254 & 14271											
Sydney Laboratory - NATA Site # 18217						X	X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794											
Perth Laboratory - NATA Site # 23736											
Mayfield Laboratory											
External Laboratory											
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID						
1	BH05 0.5-0.8	Feb 22, 2021		Soil	S21-Fe46455	X		X	X	X	X
2	BH06 0.0-0.3	Feb 22, 2021		Soil	S21-Fe46456			X	X	X	
3	BH07 0.0-0.25	Feb 22, 2021		Soil	S21-Fe46457	X		X	X	X	X
4	BH08 0.0-0.25	Feb 22, 2021		Soil	S21-Fe46458			X	X	X	
5	BH09 0.0-0.2	Feb 22, 2021		Soil	S21-Fe46459	X		X	X	X	X
6	BH09 0.95-1.3	Feb 22, 2021		Soil	S21-Fe46460	X		X	X	X	X
7	BH10 0.0-0.25	Feb 22, 2021		Soil	S21-Fe46461			X	X	X	
8	BH11 0.0-0.45	Feb 22, 2021		Soil	S21-Fe46462	X		X	X	X	X
9	BH12 0.0-0.15	Feb 22, 2021		Soil	S21-Fe46463	X		X	X	X	X

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Address: 8 Ironbark Close
Warabrook
NSW 2304

Project Name: EJE KOORAGANG
Project ID: NEW20P-0171

Order No.:
Report #: 776003
Phone: 02 4968 4468
Fax: 02 4960 9775

Received: Feb 23, 2021 2:30 PM
Due: Mar 2, 2021
Priority: 5 Day
Contact Name: Emma Coleman

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Asbestos - AS4964	HOLD	Polycyclic Aromatic Hydrocarbons	Metals M8	Moisture Set	Eurofins Suite B1
Melbourne Laboratory - NATA Site # 1254 & 14271											
Sydney Laboratory - NATA Site # 18217						X	X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794											
Perth Laboratory - NATA Site # 23736											
Mayfield Laboratory											
External Laboratory											
10	BH13 0.3-0.75	Feb 22, 2021		Soil	S21-Fe46464			X	X	X	
11	BH14 0.0-0.2	Feb 22, 2021		Soil	S21-Fe46465			X	X	X	
12	BH15 1.1-1.4	Feb 22, 2021		Soil	S21-Fe46466	X		X	X	X	X
13	D.22.2.21	Feb 22, 2021		Soil	S21-Fe46467			X	X	X	
14	BH05 0.0-0.2	Feb 22, 2021		Soil	S21-Fe46468		X				
15	BH05 1.5-1.75	Feb 22, 2021		Soil	S21-Fe46469		X				
16	BH05 1.75-2.0	Feb 22, 2021		Soil	S21-Fe46470		X				
17	BH06 0.5-0.75	Feb 22, 2021		Soil	S21-Fe46471		X				
18	BH06 0.75-0.90	Feb 22, 2021		Soil	S21-Fe46472		X				
19	BH06 1.0-1.3	Feb 22, 2021		Soil	S21-Fe46473		X				

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Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Perth
2/91 Leach Highway
Kewdale WA 6105
Phone : +61 8 9251 9600
NATA # 1261
Site # 23736

Newcastle
4/52 Industrial Drive
Mayfield East NSW 2304
PO Box 60 Wickham 2293
Phone : +61 2 4968 8448

New Zealand

Auckland
35 O'Rourke Road
Penrose, Auckland 1061
Phone : +64 9 526 45 51
IANZ # 1327

Christchurch
43 Detroit Drive
Rolleston, Christchurch 7675
Phone : 0800 856 450
IANZ # 1290

ABN: 50 005 085 521 web: www.eurofins.com.au email: EnviroSales@eurofins.com

Company Name: Qualtest
Address: 8 Ironbark Close
Warabrook
NSW 2304

Project Name: EJE KOORAGANG
Project ID: NEW20P-0171

Order No.:
Report #: 776003
Phone: 02 4968 4468
Fax: 02 4960 9775

Received: Feb 23, 2021 2:30 PM
Due: Mar 2, 2021
Priority: 5 Day
Contact Name: Emma Coleman

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Asbestos - AS4964	HOLD	Polycyclic Aromatic Hydrocarbons	Metals M8	Moisture Set	Eurofins Suite B1
Melbourne Laboratory - NATA Site # 1254 & 14271											
Sydney Laboratory - NATA Site # 18217						X	X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794											
Perth Laboratory - NATA Site # 23736											
Mayfield Laboratory											
External Laboratory											
20	BH06 1.6-1.8	Feb 22, 2021		Soil	S21-Fe46474		X				
21	BH06 1.85-2.1	Feb 22, 2021		Soil	S21-Fe46475		X				
22	BH07 0.4-0.7	Feb 22, 2021		Soil	S21-Fe46476		X				
23	BH07 1.4-1.7	Feb 22, 2021		Soil	S21-Fe46477		X				
24	BH07 1.8-1.95	Feb 22, 2021		Soil	S21-Fe46478		X				
25	BH08 0.25-0.55	Feb 22, 2021		Soil	S21-Fe46479		X				
26	BH08 0.55-0.85	Feb 22, 2021		Soil	S21-Fe46480		X				
27	BH08 0.9-1.2	Feb 22, 2021		Soil	S21-Fe46481		X				
28	BH09 0.3-0.7	Feb 22, 2021		Soil	S21-Fe46482		X				

Australia

Melbourne
6 Monterey Road
Dandenong South VIC 3175
Phone : +61 3 8564 5000
NATA # 1261
Site # 1254 & 14271

Sydney
Unit F3, Building F
16 Mars Road
Lane Cove West NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
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Sydney Laboratory - NATA Site # 18217						X	X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794											
Perth Laboratory - NATA Site # 23736											
Mayfield Laboratory											
External Laboratory											
29	BH09 1.6-1.9	Feb 22, 2021		Soil	S21-Fe46483		X				
30	BH10 0.5-0.8	Feb 22, 2021		Soil	S21-Fe46484		X				
31	BH10 1.15-1.45	Feb 22, 2021		Soil	S21-Fe46485		X				
32	BH10 1.45-1.6	Feb 22, 2021		Soil	S21-Fe46486		X				
33	BH11 0.45-0.9	Feb 22, 2021		Soil	S21-Fe46487		X				
34	BH11 1.0-1.35	Feb 22, 2021		Soil	S21-Fe46488		X				
35	BH12 0.3-0.8	Feb 22, 2021		Soil	S21-Fe46489		X				
36	BH12 0.9-1.25	Feb 22, 2021		Soil	S21-Fe46490		X				
37	BH12 1.32-1.60	Feb 22, 2021		Soil	S21-Fe46491		X				

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Melbourne Laboratory - NATA Site # 1254 & 14271											
Sydney Laboratory - NATA Site # 18217						X	X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794											
Perth Laboratory - NATA Site # 23736											
Mayfield Laboratory											
External Laboratory											
38	BH13 0.0-0.15	Feb 22, 2021		Soil	S21-Fe46492		X				
39	BH13 0.15-1.45	Feb 22, 2021		Soil	S21-Fe46493		X				
40	BH14 0.3-0.8	Feb 22, 2021		Soil	S21-Fe46494		X				
41	BH14 0.95-1.35	Feb 22, 2021		Soil	S21-Fe46495		X				
42	BH14 2.0-2.30	Feb 22, 2021		Soil	S21-Fe46496		X				
43	BH15 0.0-0.2	Feb 22, 2021		Soil	S21-Fe46497		X				
44	BH15 0.55-0.9	Feb 22, 2021		Soil	S21-Fe46498		X				
45	BH15 1.75-2.1	Feb 22, 2021		Soil	S21-Fe46499		X				
Test Counts						7	32	13	13	13	7

Internal Quality Control Review and Glossary

General

- Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
- All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
- All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
- Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
- Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
- SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
- Samples were analysed on an 'as received' basis.
- Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
- This report replaces any interim results previously issued.

Holding Times

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

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

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

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

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

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

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.3
CP	Client Parent - QC was performed on samples pertaining to this report
NC	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

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

Results <10 times the LOR : No Limit

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

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

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

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

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

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
BTEX							
Benzene	mg/kg	< 0.1			0.1	Pass	
Toluene	mg/kg	< 0.1			0.1	Pass	
Ethylbenzene	mg/kg	< 0.1			0.1	Pass	
m&p-Xylenes	mg/kg	< 0.2			0.2	Pass	
o-Xylene	mg/kg	< 0.1			0.1	Pass	
Xylenes - Total*	mg/kg	< 0.3			0.3	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	mg/kg	< 0.5			0.5	Pass	
TRH C6-C10	mg/kg	< 20			20	Pass	
TRH >C10-C16	mg/kg	< 50			50	Pass	
TRH >C16-C34	mg/kg	< 100			100	Pass	
TRH >C34-C40	mg/kg	< 100			100	Pass	
Method Blank							
Total Recoverable Hydrocarbons							
TRH C6-C9	mg/kg	< 20			20	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C10-C14	mg/kg	< 20			20	Pass	
TRH C15-C28	mg/kg	< 50			50	Pass	
TRH C29-C36	mg/kg	< 50			50	Pass	
Method Blank							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	mg/kg	< 0.5			0.5	Pass	
Acenaphthylene	mg/kg	< 0.5			0.5	Pass	
Anthracene	mg/kg	< 0.5			0.5	Pass	
Benz(a)anthracene	mg/kg	< 0.5			0.5	Pass	
Benzo(a)pyrene	mg/kg	< 0.5			0.5	Pass	
Benzo(b&j)fluoranthene	mg/kg	< 0.5			0.5	Pass	
Benzo(g,h,i)perylene	mg/kg	< 0.5			0.5	Pass	
Benzo(k)fluoranthene	mg/kg	< 0.5			0.5	Pass	
Chrysene	mg/kg	< 0.5			0.5	Pass	
Dibenz(a,h)anthracene	mg/kg	< 0.5			0.5	Pass	
Fluoranthene	mg/kg	< 0.5			0.5	Pass	
Fluorene	mg/kg	< 0.5			0.5	Pass	
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.5			0.5	Pass	
Naphthalene	mg/kg	< 0.5			0.5	Pass	
Phenanthrene	mg/kg	< 0.5			0.5	Pass	
Pyrene	mg/kg	< 0.5			0.5	Pass	
Method Blank							
Heavy Metals							
Arsenic	mg/kg	< 2			2	Pass	
Cadmium	mg/kg	< 0.4			0.4	Pass	
Chromium	mg/kg	< 5			5	Pass	
Copper	mg/kg	< 5			5	Pass	
Lead	mg/kg	< 5			5	Pass	
Mercury	mg/kg	< 0.1			0.1	Pass	
Nickel	mg/kg	< 5			5	Pass	
Zinc	mg/kg	< 5			5	Pass	
LCS - % Recovery							

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
BTEX									
Benzene			%	75			70-130	Pass	
Toluene			%	79			70-130	Pass	
Ethylbenzene			%	104			70-130	Pass	
m&p-Xylenes			%	104			70-130	Pass	
o-Xylene			%	105			70-130	Pass	
Xylenes - Total*			%	105			70-130	Pass	
LCS - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions									
Naphthalene			%	110			70-130	Pass	
TRH C6-C10			%	90			70-130	Pass	
TRH >C10-C16			%	99			70-130	Pass	
LCS - % Recovery									
Total Recoverable Hydrocarbons									
TRH C6-C9			%	90			70-130	Pass	
LCS - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions									
TRH C10-C14			%	101			70-130	Pass	
LCS - % Recovery									
Polycyclic Aromatic Hydrocarbons									
Acenaphthene			%	73			70-130	Pass	
Acenaphthylene			%	76			70-130	Pass	
Anthracene			%	77			70-130	Pass	
Benz(a)anthracene			%	79			70-130	Pass	
Benzo(a)pyrene			%	89			70-130	Pass	
Benzo(b&j)fluoranthene			%	71			70-130	Pass	
Benzo(g,h,i)perylene			%	82			70-130	Pass	
Benzo(k)fluoranthene			%	88			70-130	Pass	
Chrysene			%	73			70-130	Pass	
Dibenz(a,h)anthracene			%	78			70-130	Pass	
Fluoranthene			%	80			70-130	Pass	
Fluorene			%	76			70-130	Pass	
Indeno(1,2,3-cd)pyrene			%	88			70-130	Pass	
Naphthalene			%	77			70-130	Pass	
Phenanthrene			%	80			70-130	Pass	
Pyrene			%	81			70-130	Pass	
LCS - % Recovery									
Heavy Metals									
Arsenic			%	98			80-120	Pass	
Cadmium			%	97			80-120	Pass	
Chromium			%	101			80-120	Pass	
Copper			%	99			80-120	Pass	
Lead			%	97			80-120	Pass	
Mercury			%	93			80-120	Pass	
Nickel			%	100			80-120	Pass	
Zinc			%	95			80-120	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
BTEX									
				Result 1					
Benzene	S21-Ma00295	NCP	%	80			70-130	Pass	
Toluene	S21-Fe45605	NCP	%	76			70-130	Pass	
Ethylbenzene	S21-Fe45605	NCP	%	79			70-130	Pass	
m&p-Xylenes	S21-Fe45605	NCP	%	80			70-130	Pass	
o-Xylene	S21-Fe45605	NCP	%	82			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Xylenes - Total*	S21-Fe45605	NCP	%	81			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	S21-Fe45605	NCP	%	90			70-130	Pass	
TRH C6-C10	S21-Fe45605	NCP	%	71			70-130	Pass	
TRH >C10-C16	S21-Fe45626	NCP	%	94			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons				Result 1					
TRH C6-C9	S21-Fe45605	NCP	%	72			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C10-C14	S21-Fe45626	NCP	%	95			70-130	Pass	
Spike - % Recovery									
Polycyclic Aromatic Hydrocarbons				Result 1					
Acenaphthene	S21-Fe52169	NCP	%	78			70-130	Pass	
Acenaphthylene	S21-Fe52169	NCP	%	80			70-130	Pass	
Anthracene	S21-Fe52169	NCP	%	80			70-130	Pass	
Benz(a)anthracene	S21-Fe52169	NCP	%	73			70-130	Pass	
Benzo(a)pyrene	S21-Fe52169	NCP	%	76			70-130	Pass	
Benzo(b&j)fluoranthene	S21-Fe38649	NCP	%	81			70-130	Pass	
Benzo(g,h,i)perylene	S21-Fe52169	NCP	%	74			70-130	Pass	
Benzo(k)fluoranthene	S21-Fe52169	NCP	%	83			70-130	Pass	
Chrysene	S21-Fe52169	NCP	%	78			70-130	Pass	
Dibenz(a,h)anthracene	S21-Fe38649	NCP	%	83			70-130	Pass	
Fluoranthene	S21-Fe52169	NCP	%	85			70-130	Pass	
Fluorene	S21-Fe52169	NCP	%	79			70-130	Pass	
Indeno(1,2,3-cd)pyrene	S21-Fe38649	NCP	%	88			70-130	Pass	
Naphthalene	S21-Fe52169	NCP	%	84			70-130	Pass	
Phenanthrene	S21-Fe52169	NCP	%	82			70-130	Pass	
Pyrene	S21-Fe52169	NCP	%	84			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Mercury	S21-Fe50279	NCP	%	98			75-125	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	S21-Fe46464	CP	%	117			75-125	Pass	
Cadmium	S21-Fe46464	CP	%	87			75-125	Pass	
Chromium	S21-Fe46464	CP	%	96			75-125	Pass	
Copper	S21-Fe46464	CP	%	88			75-125	Pass	
Lead	S21-Fe46464	CP	%	107			75-125	Pass	
Nickel	S21-Fe46464	CP	%	103			75-125	Pass	
Zinc	S21-Fe46464	CP	%	92			75-125	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
TRH >C10-C16	S21-Fe46455	CP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH >C16-C34	S21-Fe46455	CP	mg/kg	< 100	< 100	<1	30%	Pass	
TRH >C34-C40	S21-Fe46455	CP	mg/kg	< 100	< 100	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C10-C14	S21-Fe46455	CP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C15-C28	S21-Fe46455	CP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH C29-C36	S21-Fe46455	CP	mg/kg	< 50	< 50	<1	30%	Pass	

Duplicate								
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD		
Acenaphthene	S21-Fe46455	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Acenaphthylene	S21-Fe46455	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Anthracene	S21-Fe46455	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Benz(a)anthracene	S21-Fe46455	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Benzo(a)pyrene	S21-Fe46455	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Benzo(b&j)fluoranthene	S21-Fe46455	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Benzo(g,h,i)perylene	S21-Fe46455	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Benzo(k)fluoranthene	S21-Fe46455	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Chrysene	S21-Fe46455	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Dibenz(a,h)anthracene	S21-Fe46455	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Fluoranthene	S21-Fe46455	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Fluorene	S21-Fe46455	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Indeno(1,2,3-cd)pyrene	S21-Fe46455	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Naphthalene	S21-Fe46455	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Phenanthrene	S21-Fe46455	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Pyrene	S21-Fe46455	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Duplicate								
BTX				Result 1	Result 2	RPD		
Benzene	S21-Fe46459	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
Toluene	S21-Fe46459	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
Ethylbenzene	S21-Fe46459	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
m&p-Xylenes	S21-Fe46459	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass
o-Xylene	S21-Fe46459	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
Xylenes - Total*	S21-Fe46459	CP	mg/kg	< 0.3	< 0.3	<1	30%	Pass
Duplicate								
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD		
Naphthalene	S21-Fe46459	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
TRH C6-C10	S21-Fe46459	CP	mg/kg	< 20	< 20	<1	30%	Pass
Duplicate								
Total Recoverable Hydrocarbons				Result 1	Result 2	RPD		
TRH C6-C9	S21-Fe46459	CP	mg/kg	< 20	< 20	<1	30%	Pass
Duplicate								
BTX				Result 1	Result 2	RPD		
Benzene	S21-Fe46460	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
Toluene	S21-Fe46460	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
Ethylbenzene	S21-Fe46460	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
m&p-Xylenes	S21-Fe46460	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass
o-Xylene	S21-Fe46460	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
Xylenes - Total*	S21-Fe46460	CP	mg/kg	< 0.3	< 0.3	<1	30%	Pass
Duplicate								
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD		
Naphthalene	S21-Fe46460	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
TRH C6-C10	S21-Fe46460	CP	mg/kg	< 20	< 20	<1	30%	Pass
Duplicate								
Total Recoverable Hydrocarbons				Result 1	Result 2	RPD		
TRH C6-C9	S21-Fe46460	CP	mg/kg	< 20	< 20	<1	30%	Pass
Duplicate								
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD		
TRH >C10-C16	S21-Fe46462	CP	mg/kg	< 50	< 50	<1	30%	Pass
TRH >C16-C34	S21-Fe46462	CP	mg/kg	< 100	< 100	<1	30%	Pass
TRH >C34-C40	S21-Fe46462	CP	mg/kg	< 100	< 100	<1	30%	Pass

Duplicate								
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD		
TRH C10-C14	S21-Fe46462	CP	mg/kg	< 20	< 20	<1	30%	Pass
TRH C15-C28	S21-Fe46462	CP	mg/kg	69	64	8.0	30%	Pass
TRH C29-C36	S21-Fe46462	CP	mg/kg	54	< 50	8.0	30%	Pass
Duplicate								
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD		
Acenaphthene	S21-Fe46462	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Acenaphthylene	S21-Fe46462	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Anthracene	S21-Fe46462	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Benz(a)anthracene	S21-Fe46462	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Benzo(a)pyrene	S21-Fe46462	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Benzo(b&j)fluoranthene	S21-Fe46462	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Benzo(g,h,i)perylene	S21-Fe46462	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Benzo(k)fluoranthene	S21-Fe46462	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Chrysene	S21-Fe46462	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Dibenz(a,h)anthracene	S21-Fe46462	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Fluoranthene	S21-Fe46462	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Fluorene	S21-Fe46462	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Indeno(1,2,3-cd)pyrene	S21-Fe46462	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Naphthalene	S21-Fe46462	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Phenanthrene	S21-Fe46462	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Pyrene	S21-Fe46462	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Duplicate								
Heavy Metals				Result 1	Result 2	RPD		
Arsenic	S21-Fe46463	CP	mg/kg	5.4	3.8	36	30%	Fail Q15
Cadmium	S21-Fe46463	CP	mg/kg	< 0.4	< 0.4	<1	30%	Pass
Chromium	S21-Fe46463	CP	mg/kg	17	51	98	30%	Fail Q15
Copper	S21-Fe46463	CP	mg/kg	< 5	< 5	<1	30%	Pass
Lead	S21-Fe46463	CP	mg/kg	13	13	1.0	30%	Pass
Mercury	S21-Fe46463	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
Nickel	S21-Fe46463	CP	mg/kg	< 5	< 5	<1	30%	Pass
Zinc	S21-Fe46463	CP	mg/kg	44	42	4.0	30%	Pass
Duplicate								
				Result 1	Result 2	RPD		
% Moisture	S21-Fe46463	CP	%	4.3	4.5	6.0	30%	Pass

Comments

Sample Integrity

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

Qualifier Codes/Comments

Code	Description
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.
N07	Please note:- These two PAH isomers closely co-elute using the most contemporary analytical methods and both the reported concentration (and the TEQ) apply specifically to the total of the two co-eluting PAHs
Q15	The RPD reported passes Eurofins Environment Testing's QC - Acceptance Criteria as defined in the Internal Quality Control Review and Glossary page of this report.

Authorised by:

Andrew Black	Analytical Services Manager
Andrew Sullivan	Senior Analyst-Organic (NSW)
John Nguyen	Senior Analyst-Metal (NSW)



Glenn Jackson
General Manager

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

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

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

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Australia
Melbourne

6 Monterey Road
Dandenong South VIC 3175
Phone : +61 3 8564 5000
NATA # 1261
Site # 1254 & 14271

Sydney

Unit F3, Building F
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NATA # 1261 Site # 18217

Brisbane

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NATA # 1261 Site # 20794

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Phone : +64 9 526 45 51
IANZ # 1327

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Rolleston, Christchurch 7675
Phone : 0800 856 450
IANZ # 1290

Sample Receipt Advice

Company name: Qualtest
Contact name: Emma Coleman
Project name: ADDITIONAL EJE KOORAGANG
Project ID: NEW20P-0171
Turnaround time: 2 Day
Date/Time received: Mar 4, 2021 2:00 PM
Eurofins reference: 778179

Sample Information

- ✓ A detailed list of analytes logged into our LIMS, is included in the attached summary table.
- ✓ All samples have been received as described on the above COC.
- ✓ COC has been completed correctly.
- ✓ Attempt to chill was evident.
- ✓ Appropriately preserved sample containers have been used.
- ✓ All samples were received in good condition.
- ✓ Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
- ✓ Appropriate sample containers have been used.
- ✓ Sample containers for volatile analysis received with zero headspace.
- ✗ Split sample sent to requested external lab.
- ✗ Some samples have been subcontracted.
- N/A Custody Seals intact (if used).

Notes

Contact

If you have any questions with respect to these samples, please contact your Analytical Services Manager:

Andrew Black on phone : (+61) 2 9900 8490 or by email: AndrewBlack@eurofins.com

Results will be delivered electronically via email to Emma Coleman - emmacoleman@qualtest.com.au.

Qualtest
8 Ironbark Close
Warabrook
NSW 2304



NATA Accredited
Accreditation Number 1261
Site Number 18217

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

Attention: **Emma Coleman**

Report **778179-L**
 Project name **ADDITIONAL EJE KOORAGANG**
 Project ID **NEW20P-0171**
 Received Date **Mar 04, 2021**

Client Sample ID			BH1 2.0-2.1	BH10 0.0-0.25
Sample Matrix			US Leachate	US Leachate
Eurofins Sample No.			S21-Ma09667	S21-Ma09668
Date Sampled			Feb 22, 2021	Feb 22, 2021
Test/Reference	LOR	Unit		
Heavy Metals				
Chromium	0.05	mg/L	-	< 0.05
Nickel	0.01	mg/L	0.06	-
USA Leaching Procedure				
Leachate Fluid ^{C01}		comment	1.0	1.0
pH (initial)	0.1	pH Units	5.1	7.8
pH (Leachate fluid)	0.1	pH Units	5.1	5.0
pH (off)	0.1	pH Units	5.3	6.5
pH (USA HCl addition)	0.1	pH Units	1.0	1.6

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.

A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

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

Description**Heavy Metals**

- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS

USA Leaching Procedure

- Method: LTM-GEN-7010 Leaching Procedure for Soils & Solid Wastes

Testing Site

Brisbane

Brisbane

Extracted

Mar 08, 2021

Mar 08, 2021

Holding Time

180 Days

14 Days

Australia

Melbourne
6 Monterey Road
Dandenong South VIC 3175
Phone : +61 3 8564 5000
NATA # 1261
Site # 1254 & 14271

Sydney
Unit F3, Building F
16 Mars Road
Lane Cove West NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Perth
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Kewdale WA 6105
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Rolleston, Christchurch 7675
Phone : 0800 856 450
IANZ # 1290

ABN: 50 005 085 521 web: www.eurofins.com.au email: EnviroSales@eurofins.com

Company Name: Qualtest
Address: 8 Ironbark Close
Warabrook
NSW 2304

Project Name: ADDITIONAL EJE KOORAGANG
Project ID: NEW20P-0171

Order No.:
Report #: 778179
Phone: 02 4968 4468
Fax: 02 4960 9775

Received: Mar 4, 2021 2:00 PM
Due: Mar 8, 2021
Priority: 2 Day
Contact Name: Emma Coleman

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Chromium	Nickel	USA Leaching Procedure	USA Leaching Procedure
Melbourne Laboratory - NATA Site # 1254 & 14271									
Sydney Laboratory - NATA Site # 18217						X			X
Brisbane Laboratory - NATA Site # 20794							X	X	
Perth Laboratory - NATA Site # 23736									
Mayfield Laboratory									
External Laboratory									
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID				
1	BH1 2.0-2.1	Feb 22, 2021		US Leachate	S21-Ma09667		X	X	
2	BH10 0.0-0.25	Feb 22, 2021		US Leachate	S21-Ma09668	X			X
Test Counts						1	1	2	2

Internal Quality Control Review and Glossary

General

- Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
- All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
- All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
- Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
- Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
- SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
- Samples were analysed on an 'as received' basis.
- Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
- This report replaces any interim results previously issued.

Holding Times

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

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

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

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

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

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

Units

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

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.3
CP	Client Parent - QC was performed on samples pertaining to this report
NC	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

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

Results <10 times the LOR : No Limit

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

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

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

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

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

Quality Control Results

Test				Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank										
Heavy Metals										
Chromium				mg/L	< 0.05			0.05	Pass	
Nickel				mg/L	< 0.01			0.01	Pass	
LCS - % Recovery										
Heavy Metals										
Chromium				%	97			80-120	Pass	
Nickel				%	88			80-120	Pass	
Test	Lab Sample ID	QA Source		Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery										
Heavy Metals										
Nickel					Result 1					
S21-Ma09667				CP	%	90		75-125	Pass	
Spike - % Recovery										
Heavy Metals										
Chromium					Result 1					
S21-Ma10920				NCP	%	99		75-125	Pass	
Test	Lab Sample ID	QA Source		Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate										
Heavy Metals										
Nickel					Result 1	Result 2	RPD			
S21-Ma09667				CP	mg/L	0.06	0.06	1.0	30%	Pass
Duplicate										
Heavy Metals										
Chromium					Result 1	Result 2	RPD			
S21-Ma09668				CP	mg/L	< 0.05	< 0.05	<1	30%	Pass
Nickel					Result 1	Result 2	RPD			
S21-Ma09668				CP	mg/L	< 0.01	< 0.01	<1	30%	Pass

Comments

Sample Integrity

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

Qualifier Codes/Comments

Code	Description
C01	Leachate Fluid Key: 1 - pH 5.0; 2 - pH 2.9; 3 - pH 9.2; 4 - Reagent (DI) water; 5 - Client sample, 6 - other

Authorised by:

Andrew Black	Analytical Services Manager
John Nguyen	Senior Analyst-Metal (NSW)
Steven Trout	Senior Analyst-Metal (QLD)



Glenn Jackson
General Manager

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

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

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

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