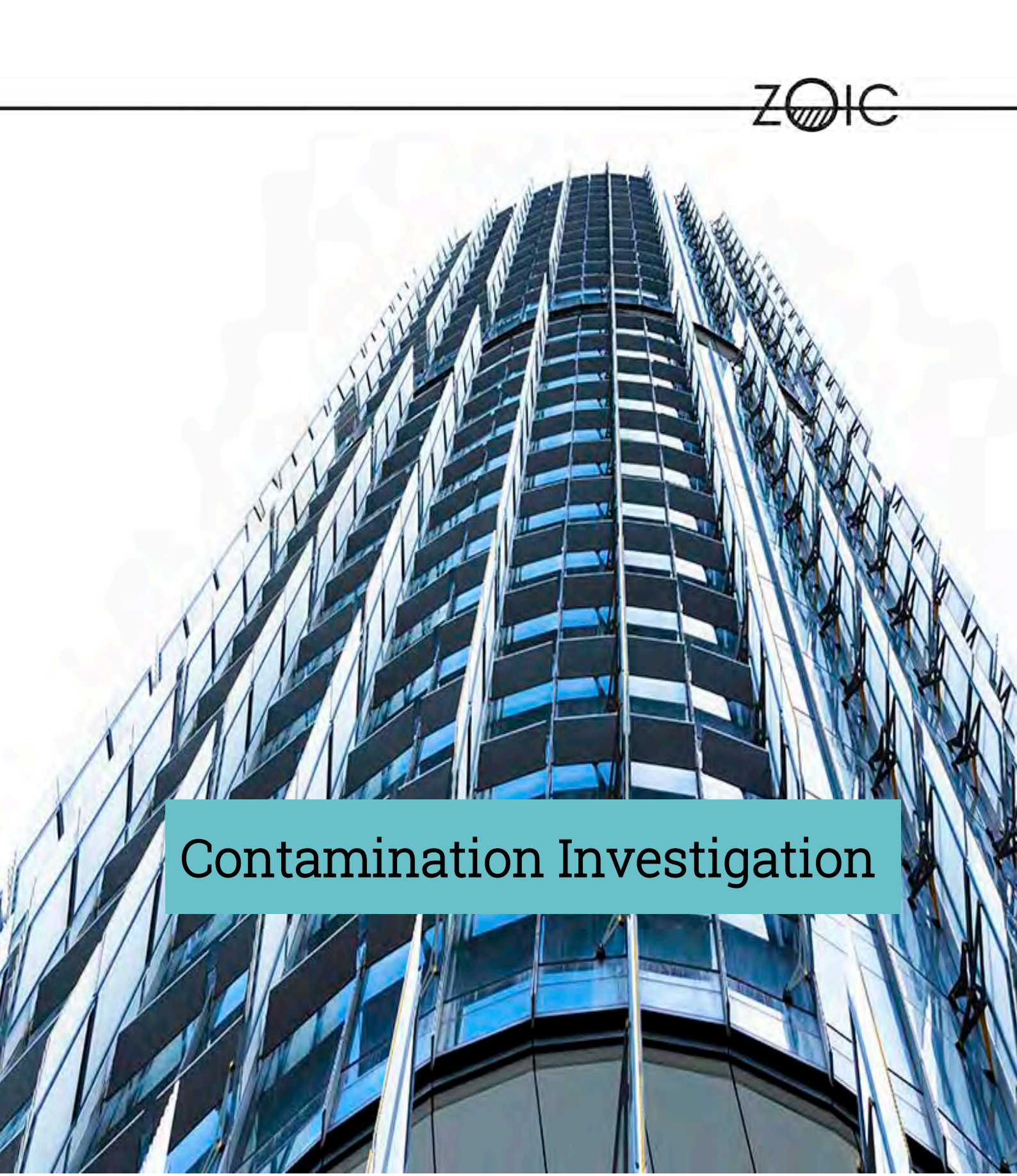

Contamination Investigation

Alterations and Additions to the Gladesville Bay Marina
380 Victoria Place, Drummoyne NSW 2047

Gladesville Bay Marina Pty Ltd
30 September 2019

18166

Quality Management

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This report was prepared in accordance with the scope of services set out in the contract between Zoic Environmental Pty Ltd, ABN 23 154 745 525, and the client.

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Executive Summary

Zoic Environmental Pty Ltd (Zoic) was requested by Gladesville Bay Marina Pty Ltd to complete a contamination assessment of soil, sediment and groundwater at 380 Victoria Place, Drummoyne, NSW ("the site"), to support a development application. The development application relates to a proposed extension and upgrading of facilities on site, including extending the marina. Available information indicates that site excavation is not proposed during site redevelopment. The slipway has been considered as a component of this investigation, noting that slipway portions extend beyond the site boundary into Parramatta River.

The assessment included a desktop study of relevant background information, and an intrusive investigation on site, including the installation of groundwater monitoring wells. The desktop study found two underground petrol storage tank's had been removed from site, and that the use of Organotins (tributyltin - TBT) was likely in boat cleaning and maintenance activities. Zoic drilled five boreholes and installed two groundwater wells, including the collection of soil samples from the soil profile, sampling of the wells and collection of sediment samples from three locations, including two adjoining the site's boat slipway.

Reported concentrations of petroleum hydrocarbons (TPH), heavy metals (copper, nickel, lead, mercury and zinc), and organotins (TBT) exceed the adopted criteria in slipway sediments/soils. Sediment impact was additionally identified in samples collected from Parramatta River, adjacent to the site, by Zoic and Marine Pollution Research Pty Ltd. Site redevelopment work that is to be carried out on the slipway and workshop area would be subject to a Remedial Action Plan (RAP) as sediments/soils pose potential ecological and human health exposure risk. The RAP will require additional assessment of contaminant concentrations along the slipway, propose remedial measures, and detail site management requirements. Site materials impacted with organotins will require management in accordance with the NSW EPA *Organotin Waste Materials Chemical Control Order 1989*, which requires that organotin waste produced during the application or removal of antifouling compounds from marine vessels shall be promptly collected for disposal, and shall be prevented from entering any waters. The order states that organotin waste materials shall be disposed of in a controlled landfill in sealed containers. NSW EPA approval is required for any disposal of TBT source material (e.g. paint chips and blasting grit) and organotin impacted soils as waste to landfill. It is considered that site materials exhibiting hydrocarbon and heavy metal impact could be managed accordingly, subject to collection of additional waste classification data.

The results of this investigation indicate that any extension/improvement of the marina facilities must take into consideration the need to avoid/reduce sediment disturbance in areas proximate to the slipway to minimise impacts to marine flora and fauna. It is understood that the slipway area will not be used for maintenance operations under the new marina design and the underlying concrete slab will not be physically altered or removed as part of the works. It is noted that sediments beneath the slipway hard stand require further assessment, as the site was operational at the time of investigation to confirm that the risk from potential contaminants under the slipway are acceptable for any future use of the land. Groundwater monitoring results indicate a low risk to human health and the environment. Based on results of this investigation, there is considered to be a low likelihood that the former UST tankpit has any ongoing impact on soil or groundwater conditions on site.

Based on observed contaminant concentrations in slipway sediments, site activities must be managed to ensure that site workers and future site occupants are not exposed to soils and sediments within / beneath the slipway and workshop areas.

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1. Introduction

1.1 Background

Zoic Environmental Pty Ltd (Zoic) was engaged by Gladesville Bay Marina Pty Ltd (GBM) ("the client") to conduct a Contamination Investigation for the Gladesville Bay Marina, located at 380 Victoria Place, Drummoyne NSW ("the site"). It is understood the client requires this report for submission with a Development Application to the City of Canada Bay Council (Council), relating to the proposed extensions to, and upgrading of facilities at the marina.

The site location and layout are shown in Figures 1 and 2 of Appendix A.

1.2 Objective

The objective was to investigate soil, sediment and groundwater contamination at the site, with respect to relevant human health and ecological criteria, to support submission of a Development Application to Council.

1.3 Scope of Work

The scope of works completed during this investigation included:

- Completion of a desktop study for the site to obtain relevant background information.
- Completion of a site inspection to assess site conditions.
- Service clearance to confirm absence of underground services.
- Drilling of boreholes at five locations in or close proximity to the proposed development area, with collection of samples from underlying soils.
- Conversion of two of the drilled boreholes into groundwater monitoring wells.
- Development, purging and sampling of the groundwater wells.
- Collection of sediment samples from targeted foreshore areas.
- NATA accredited laboratory analysis of selected soil samples for heavy metals (As, Cd, Cr, Cu, Ni, Pb, Hg, Zn), petroleum hydrocarbons (TRH/BTEX), polycyclic aromatic hydrocarbons (PAHs), Organotins - Tributyltin (TBT), and asbestos.
- NATA accredited laboratory analysis of sediment samples for heavy metals, TRH/BTEX, PAHs and TBT.
- NATA accredited laboratory analysis of groundwater samples for heavy metals, TRH/BTEX and PAHs.
- Determination of groundwater flow direction across the site by surveying the wells.
- Preparation of a contamination investigation report of the targeted areas in general accordance with NSW OEH (2011) Guidelines for Consultants Reporting on Contaminated Sites

2. Site Identification

2.1 Site Identification

Relevant site information is provided in Table 2.1.

Table 2.1: Site Identification

Title	Details
Street Address:	380 Victoria Place, Drummoyne NSW 2047
Property Description:	Lot B DP401843 (western portion of site) Lot 1 DP430123 (central portion of site) Lot 1 DP 549352 (eastern portion of site)
Current Site Ownership:	Gladesville Bay Marina Pty Ltd
Geographical Coordinates (approx. to centre of site):	Lat: -33.8440 Long: 151.1454
Property Size:	940 m^2
Local Government Area:	City of Canada Bay Council
Current Use	Marina and marine repair facility
Zoning – Existing:	Medium Density Residential (Canada Bay Local Environmental Plan)

2.2 Surrounding Land Use

Land uses immediately adjoining the site are described in Table 2.2.

Table 2.2: Immediate Site Surrounds

Title	Details
North-east:	Parramatta River.
South-East:	Residential properties.
South-west:	Victoria Place with recreational property beyond.
North-West:	Access driveway with Victoria Place, recreational land and Parramatta River beyond.

3. Site Condition and Environment

The site condition based on published information and site observations made during fieldwork are presented in Table 3.1. At the time of the conducted works, the site consisted of a brick building with a workshop and office areas. The workshop area comprised the sites south-eastern portion, and contained a slipway for boats, internal workshop and vehicle parking area. A sealed driveway and parking area were present to the north-west of the site building, and a concrete sealed area providing wharf access to the north-east. Site features are described on Figure 2 of this report.

Table 3.1: General Site Conditions

Title	Details
Topography and Drainage	The majority of the site area was generally flat at approximately 2m Australian Height datum (AHD), situated below Victoria Place (at approximately 8m AHD). External site areas appeared to fall slightly to the east. The site was separated from Victoria Place, to the south-west, by a 6m high retaining wall. The driveway to the north-west extended from site level up to Victoria Place. Grated stormwater drains were present across the site, and were observed in the workshop area. Surface water falling on external site areas and the driveway is expected to be captured within these drains and flow into the stormwater system, which discharges to Parramatta River.
Boundary Condition	The site was accessible by a driveway to the north-west. Southern site boundaries comprised fencing and/or retaining walls. No fencing was present to the north/east of site, which fronts Parramatta River.
Vegetation	The site was sealed. No relevant vegetation was observed, although brick planter boxes were present on the wharf area.
Presence of Drums, Wastes and Fill Materials	It is understood that chemicals are stored onsite. The site Hazardous Materials list is provided as Appendix K. No stockpiled fill materials were observed, although it is likely that portions of the site are built on fill materials (including areas of presumed reclaimed land). Section 4 and Section 11 details the location and extent of fill material present on site.
Odours	No odours were noted during site works.
Condition of Buildings & Roads	Site buildings and sealed areas were observed to be in a maintained condition.
Quality of Surface Water	No sheens or odours were noted for pooled surface water observed at the site, which entered via the site driveway due to rainfall.
Relevant Local Sensitive Environments	Sensitive human receptors associated with the site are: • Current site occupants (staff and customers); • Future site occupants i.e. staff and visitors; • Construction and maintenance workers during upgrade works; • Residential neighbours. The nearest ecological receptor is Parramatta River, to the immediate north east of site.

4. Geology, Hydrogeology and Hydrology

The geology, hydrogeology and hydrology of the site are summarised in Table 4.1 using available information as presented in the Enviro-Screen Report (Appendix D). Background sediment data was provided by Marine Pollution Research Pty Ltd (Appendix L), which was obtained as part of their investigation of sediments in channels likely to be used by vessels after realignment of the marina.

Table 4.1: Subsurface Conditions

Title	Details
Geology Map Conditions	Review of the 1:100 000 Geological Series 9030 (1991) indicated that the site is underlain by Mesozoic Hawkesbury Sandstone (Triassic), which is characterised by medium to coarse grained quartz sandstone, very minor shale and laminite lenses.
Soil Map Conditions	Review of the regional soil map (Appendix D) indicates that the site lies within the Lambert (Erosional) soil landscape group. The Lambert soil landscape group is characterised by shallow (<50 cm) discontinuous Earthy Sands (Uc5.11, Uc5.22) and Yellow Earths (Gn2.2) on crests and insides of benches; shallow (<20 cm) Siliceous Sands/Lithosols (Uc1.2) on leading edges; shallow to moderately deep (<150 cm) Leached Sands (Uc2.21), Grey Earths (Gn2.81) and Gleyed Podzolic Soils (Dg4.21) in poorly drained areas; localised Yellow Podzolic Soils (Dy4.1, Dy5.2) associated with shale lenses. Limitations: very high soil erosion hazard, rock outcrop, seasonally perched watertables, shallow, highly permeable soil, very low soil fertility.
Acid Sulfate Soils (ASS)	A review of the ASS Risk Maps (Appendix D) indicates that the site is located on Class 2 and 5 ASS. A review of CSIROs ASRIS Atlas of Australian Sulfate Soils map indicated that ASS has a 'high probability of occurrence' on site. Site observations indicated that site soils comprised clayey gravel/sand fill overlaying shallow sandstone, with no sulfurous odours noted. Based on these observations, acid sulfate soils are not anticipated within site development areas.
Fill Materials	Information provided by the site manager stated that fill material exists beneath the external wharf area to the north-east of the site building, which is outside of the proposed development area. Historical site aerials indicate that initial land reclamation likely took place at the site prior to 1930 (Section 5).
Summary of Registered Bores	A search of the Department of Primary Industries (DPI) database revealed no ground water wells within 1km of the site. Two registered groundwater bores within 2km of the site, although both are located on the opposite (northern) side of Parramatta River.
Depth to Groundwater	Observed standing water levels at the site from the investigation indicate that the depth to groundwater ranges from approximately 0.4m below ground surface (bgs) (south-western portion) to 0.9m bgs (north-eastern portion). This gradient is generally consistent with observed topography in the area, which falls towards Parramatta River. Groundwater is expected to flow predominantly at the interface between the soil layer and underlying bedrock and be influenced by surface water recharge from rainfall events.
Direction of Groundwater Flow	Based on topographical and geological features, it is expected that groundwater beneath the site would flow in a north easterly direction towards Parramatta River, which is consistent with observed standing water levels (SWL) in the monitoring wells.
Nearest Water Body	The nearest water body is Parramatta River, located to the immediate adjacent to the site, forming the north/east boundary.
Background Sediment Data	Sediment data collected from Parramatta River, proximate to the site, by Marine Pollution Research Pty Ltd (Appendix L) indicated two exceedances of ANZECC Guidance Values and Sediment Quality Guidelines (SQG – High). A lead exceedance of 240 mg/kg was reported approximately 20m north-east of the site's slipway, and a zinc

Title	Details
	exceedance of 436 mg/kg was reported approximately 50m east of the slipway. The adopted criteria for lead and zinc in sediment is 220 mg/kg and 410 mg/kg, respectively (Section 10).

5. Site History

Site history is summarised in Table 5.1 using available information as presented in the Enviro-Screen Report (Appendix D):

Table 5.1: Summary of Site History

Source	Details
EPA Records	The site is not listed on the EPA's register of regulated or notified sites under the Protection of the Environment Operations Act (POEO) public register. A search of the EPA's register of sites notified to the EPA was completed and identified one property located within 1km of the site: the former Sydney Wiremills (BHP) site, located 944m to the south-west of site. The record states that regulation under the CLM Act is not required for this site. Additionally, this site is not considered a potential contamination risk as it is located in Chiswick, which is beyond Drummoyne Bay on the other side of the water body within a separate catchment. There were no identified premises within 500m of the site that hold a licence under the POEO Act (1997).
Dangerous Goods Records	A review of the Dangerous Goods Records for the site indicates that two underground tanks, of ~2,300 L in volume, were decommissioned and filled with sand in 1994, and removed from the site in 2004. The tanks had previously stored petrol. There is a schematic drawing that indicates the tanks were adjacent to Victoria Place, with two pipelines running beneath the boatshed to the jetty. The Dangerous Goods Record indicates the vent lines were filled with cement in 1996, and that the dip and bowser lines had previously been removed. Dangerous goods search documentation is provided in Appendix J. A review of the chemical inventory for other chemicals stored onsite was not performed.
Aerial Photographs	Current and historic aerial photographs were reviewed to identify any major land use changes both on and adjacent to the site. Findings from the aerial photograph review are summarised as follows: • **1930:** Although difficult to distinguish due to low photograph resolution, the site appeared developed and likely to partially comprise reclaimed land. The likely reclaimed land extended onto property to the south-east of site. Property to the immediate north/west appeared undeveloped, with buildings visible beyond. Property to the south/east appeared commercial/industrial and/or residential in nature, with property further to the south-east residential, and many wharfs and boats present. Parramatta River was present to the immediate north/east. Victoria Place was present to the south-west, with what appeared rural residential property beyond. A bridge was present extending from the headland to the north-west of site across Parramatta River. • **1943**: The eastern site portion appeared to comprise foreshore/estuarine habitat, with a wharf visible. A building was present in the sites south western corner. The sites south/eastern corner appeared undeveloped with various items/small structures visible. Disturbed ground surface was apparent in along the sites southern boundary, adjacent to Victoria Place. Although removed from the site, the reclaimed land previously visible still extended to the south/east and appeared to comprise garden areas. Land to the north-west appeared undeveloped with vegetation present. Additional residential development was apparent to the south east and south of site. • **1961:** The site appeared similar to the current layout, with a building in the south-western corner, smaller building in the north eastern corner (with potential slipway). Small structures and boats were visible in the northern portion of the site, with what appeared to be a marina extending beyond. Property to the south and east appeared generally residential. Areas to the west and north west were now predominantly parkland

Source	Details
	• **1965:** The site appeared similar to the previous photograph. The slipway was visible. The sites eastern portion appeared grassed with a walking path visible. Land to the north west of site appeared undeveloped, with a road visible, likely providing vehicle access to the site. Residential units had been developed to the south-west of site, beyond Victoria Place, which had been widened. It appeared that the bridge to the north-west of site was being decommissioned as a section had been removed. Parkland area to the north west was reduced and a large building constructed to the south. The new Gladesville Bridge is visible. • **1971:** The site appears to be reasonably similar to the previous photo with the marina area extended. The pontoon to the east of site had been removed. The bridge had been removed from the headland to the north-west of site, as had a proximate wharf. • **1975:** The site appeared generally similar to the previous photograph, with disturbed ground surface apparent in the eastern portion. • **1986:** The driveway to the north of site was more visible, and the slipway visibly comprised concrete (difficult to tell on previous photographs). Various items/small structures were visible on the ground surface in the sites eastern portion, which appeared unsealed. • **1991:** The eastern site portion appeared to have been concreted, and the marina had been reconstructed extending from the sites eastern edge. Various items, vehicles and boats were visible on the ground surface. • **2002:** The site appeared generally similar to the previous photograph, although additional items were visible on the ground surface in the eastern portion, and the marina had been extended further. • **2004:** The roof of the main site building appeared to have been extended to cover the smaller building in the south. Less items were visible on the ground surface in the eastern portion, with several boats present. Development was visible to the immediate south of site. • **2007:** The site and surrounds appeared generally similar to the previous photograph. • **2010:** The site appeared generally similar to the previous photograph, with less items stored on the ground surface. • **2014:** The site and surrounds appeared generally similar to the previous photograph, although an extension had been built to the east of the site building. • **2017:** The site and surrounds appeared generally similar to the previous photograph. • **2019:** The site and surrounds appeared generally similar to the previous photograph.
Dry Cleaners, Motor Garages and Service Stations	The site is used for a marina, boat repairs and associated administration. The site is not listed as having been a dry cleaner.
Potentially Contaminating Sites	A search for sites that may represent a potential contamination source was completed for premises within 200m of the site. The search identified that the subject site is currently used for boat repairs and boat dealer imports. Identified surrounding sites that may represent a risk of potential contamination include: • Drummoyne Auto Care (repair facility), located ~60m south-east of site. It is noted that this facility no longer exists, and is therefore not considered a contamination risk to the site. • It is noted that the five sites detailed as 'Motor Engineers and Repairs' or 'Motor Cars, Lorries and Garages' in the enviro-screen report are not considered a contamination risk to the site, as the listed addresses are located several kms to the north of site on Victoria Road, beyond Parramatta River. The site is not listed as within the area of a PFAS investigation program.
Land Title Records	A review of the land title records was not completed for the site.
Council Records	A review of the Section 10.7(2) and (5) planning certificate was not completed for the site.

Source	Details
Inventory of Chemicals and Waste	A 'Hazardous Materials List' for the site was provided by the site manager (Appendix K), which includes antifouling chemicals, thinners, primers, and various other chemicals including fuels. A waste inventory was not requested for review.
Asbestos Containing Material (ACM) Documentation	ACM survey documentation was not requested as part of the investigation.
Anecdotal evidence	A conversation with the site manager was conducted, with the following noted: • The former UST in the site's south-western portion was removed several years ago (was not sure of year). • Up to 200L of fuel is stored onsite in approved 20L containers inside a fuel locker for workboat refuelling.
Description of Manufacturing / Industrial Processes and Location	The site operates as a boat repair facility, with a range of mechanical and maintenance activities taking place inside the workshop, and on the slipway (which contains a hydraulic chain system to retrieve boats from the water). No information was available regarding process streams from the mechanical workshop.
Product Spill and Loss History:	No documentation regarding spill or product loss was available for review. No evidence of staining of the ground surface was observed at the time of the inspection.
Discharge to Land, Air and Water	No documentation regarding discharge to land, air and water was available for review.
Complaint History	No documentation regarding complaint history was available for review.
Sewer and Service Plans	No service plans were reviewed as part of this investigation.
Summary of Previous Land Use & Chronological List	Historical aerial photographs indicate that the site's eastern portion comprised reclaimed land in 1930, which was mostly removed by 1943, then reclaimed again by 1961. A site building and potential slip way are visible in site photographs dating back to 1961.
Integrity Assessment	Reviewed sources of information were in general agreement. This degree of consistency suggests that the historical assessment described above has an appropriate level of accuracy. Supporting records are included in Appendix I.

6. Conceptual Site Model

6.1 Known or Potential Sources of Contamination

Table 6.1 presents a summary of potentially contaminating activities that have occurred at the site or in the surrounding area, and associated contaminants of potential concern (COPC):

Table 6.1 Summary of Potentially Contaminating Activities

Activity	Potential Contaminants
Filling of reclaimed land and uncontrolled site fill	Metals (cadmium, arsenic, copper, lead, mercury, zinc, nickel, chromium), total recoverable hydrocarbons (TRHs), polycyclic aromatic hydrocarbons (PAHs), benzene, toluene, ethylbenzene, xylene (BTEX), and asbestos.
Boat repair works	Metals, TRH/BTEX, PAH and Organotins (Tributyltin - TBT).
Former UST tankpit	TRH, BTEX, Lead

6.2 Potentially Affected Media

Given the nature of the potentially contaminating activities outlined in Table 6.1, the following media could be potentially affected:

- Site fill and natural soils.
- Fill used for reclaimed land.
- Groundwater beneath the site.
- Foreshore sediment at, and down-gradient of, the site.

6.3 Potential Human and Ecological Receptors

Potential human receptors may include:

- Current site occupants.
- Future site workers and occupants.
- Neighbouring site users.

Potential ecological receptors may include:

- Parramatta River.

6.4 Potential Exposure Pathways

It is proposed that the property will remain in use as a marina and offices. Boat repair facilities will be discontinued. Information made available prior to this investigation indicates that the concrete cap will remain intact across the site. Based on this, potential direct exposure to soil, sediment and/or groundwater during site redevelopment is likely limited to accumulated sediments in the slipway.

Potential exposure pathways are detailed in the following subsections.

6.4.1 Human Receptors

Based on the proposed development scenario, potential exposure pathways of identified COPC to human receptors include:

- Current site occupants: Nil site covered in building and hardstand
- Future site occupants: dermal contact and incidental ingestion of sediments during use of slipway for small boat launching.
- Construction site workers: Potential inhalation of dust, dermal contact / incidental ingestion of soil, sediment and groundwater (excavations, slipway, foreshore).
- Neighbouring site users: Potential inhalation of dust during demolition, excavation and stockpiling of soil.

6.4.2 Flora and Aquatic Ecosystem

Potential soil impacts present a low risk to flora given that the site is generally clear of vegetation (Section 3). Where vegetation occurs (potted/bed plants), flora appears not to be unduly affected by current site conditions.

Site layout indicates potential for surface runoff and groundwater from the site to enter Parramatta River, potentially impacting sediment and river flora / fauna.

7. Data Quality Objectives

The data quality objectives (DQO) process is a systematic planning tool based on the scientific method for establishing criteria for data quality and for developing data collection designs. The DQOs define the experimental process required to test a hypothesis. By using the DQO process to plan the investigation effort, the relevant parties can improve the effectiveness, efficiency and defensibility of a decision in a resource and cost-effective manner.

Data quality objectives (DQOs) developed for the validation assessment are discussed in the following sections.

7.1 State the Problem

Investigation of contamination conditions at the site was required to support submission of a development application to Council. Available information indicates that site excavation is not proposed during redevelopment.

7.2 Identify the Decision

The following decision was required to be made during the investigation:

- Do chemical concentrations in analysed soil, sediment or groundwater samples exceed the adopted human health criteria?
- Do chemical concentrations in analysed sediment or groundwater samples exceed the adopted ecological criteria?
- Do identified contaminant conditions at the site indicate requirement for any further assessment, remediation or management, with respect to the proposed redevelopment?

7.3 Identified Inputs to the Decision

Inputs in the decision are:

- Site setting and history.
- Physical observations and photographs.
- Soil and sediment analytical data from targeted sampling locations.
- Groundwater analytical data from installed wells at the site.
- Groundwater levels and measurement of water quality parameters within wells.

7.4 Define the Study Boundaries

The site comprised the area detailed in Table 2.1, with the approximate area shown on Figure 2. The slipway has been considered as a component of this investigation, noting that slipway portions extend beyond the site boundary into Parramatta River.

The maximum vertical extent of the investigation was 2m below ground surface (bgs), due to refusal on sandstone bedrock.

Seasonality was not considered relevant to the investigation.

7.5 Develop a Decision Rule

The decision rules adopted to answer the decisions outlined in Section 7.2 are summarised in Table 7.1:

Table 7.1: Decision Rules

No.	Decision to be Made	Decision Rule
1	Do chemical concentrations in analysed soil, sediment or groundwater samples exceed the adopted human health criteria?	If contaminant concentrations are compliant with adopted human health criteria, there is considered to be a low human health risk at the site.
2	Do chemical concentrations in analysed sediment or groundwater samples exceed the adopted ecological criteria?	If contaminant concentrations are compliant with adopted ecological criteria, there is considered to be a low ecological risk at the site.
3	Do identified contaminant conditions at the site indicate requirement for any further assessment, remediation or management, with respect to the proposed redevelopment?	If contaminant concentrations in soil, sediment and groundwater are compliant with the adopted human health and ecological criteria, then further assessment, remediation or management is not considered necessary.

7.6 Specify Limits of Decision Error

This step is to establish the decision maker's tolerable limits on decision errors, which are used to establish performance goals for limiting uncertainty in the data. Data generated during this project must be appropriate to allow decisions to be made with confidence.

Specific limits for this project have been adopted in accordance with the appropriate guidance from the NSW EPA, NEPC (2013), appropriate indicators of data quality (DQIs used to assess QA/QC) and standard procedures for field sampling and handling.

To assess the usability of the data prior to making decisions, the data was assessed against predetermined DQIs established for the project as discussed below in relation to precision, accuracy, representativeness, comparability, and completeness and sensitivity (PARCCS parameters). The acceptable limit on decision error is 95% compliance with DQIs.

The DQIs and data assessment criteria are summarised in Table 8.2.

Table 7.2: Summary of Quality Assurance/Quality Control

Data Quality Objectives	Frequency	Data Quality Indicator
Precision		
Blind duplicates (intra laboratory) for primary COC only	1/20 Samples	<50% RPD
Blind duplicates (inter laboratory) for primary COC only	1/20 Samples	<50% RPD
Laboratory duplicate	1/20 Samples	<50% RPD
Accuracy		
Surrogate spikes	All organic samples	70-130%

Data Quality Objectives	Frequency	Data Quality Indicator
Laboratory control samples	1 per lab batch	70-130%
Matrix spikes	1 per lab batch	70-130%
Representativeness		
Sampling appropriate for media and analytes	-	Yes
Samples extracted and analysed within holding times.	-	Organics (7-14 days), inorganics (6 months)
Trip spike (for volatiles)	1 per sample batch	60-140%R for organics
Trip blank	1 per sample batch	<LOR
Rinsate	Not required as all sampling equipment was disposable	NA
Comparability		
Standard operating procedures for sample collection & handling	All samples	Yes
Standard analytical methods used for all analyses	All samples	Yes
Consistent field conditions, sampling staff and laboratory analysis	All samples	Yes
Limits of reporting appropriate and consistent	All samples	Yes
Completeness		
Sample description and COCs completed and appropriate	All samples	Yes
Appropriate documentation	All samples	Yes
Satisfactory frequency and result for QC samples	All samples	Yes
Data from critical samples is considered valid	-	Critical samples valid
Sensitivity		
Analytical methods and limits of recovery appropriate for media and adopted site assessment criteria	-	LOR<= Site assessment criteria

7.7 Optimise the Design for Obtaining Data

Soil and sediment sampling was completed at limited locations targeting areas of identified contamination risk, including the former UST tank pit and slipway, and to provide general coverage in accordance with the investigation scope.

The positioning of the groundwater monitoring wells were selected to assess the quality of groundwater onsite, with locations down-gradient of the slipway/workshop and inside the former UST tank pit. It is noted that shallow bedrock prevented well installation in certain site areas and the installation of an upgradient well.

Sampling locations and monitoring wells are shown in Figure 3.

8. Sampling and Analysis Plan

The rationale behind the sampling and analysis plan is presented in the sections below.

8.1 Sampling Pattern

The investigation completed at the site was targeted in nature, which complies with the requirements of the NSW EPA Sampling Design Guidelines (1995) given that only portions of the site will be subject to redevelopment.

Justification for sampling locations is detailed in Table 8.1.

Table 8.1: Sampling Justification

Location	Justification
BH01 / MW01	Immediately down-gradient of slipway / workshop, suspected reclaimed land. Slipway operations.
BH02 / MW02	Former UST tank pit, proximate to workshop.
BH03	Up-gradient of suspected reclaimed land / cross-gradient from workshop / slipway.
BH04	Down-gradient location, possible reclaimed land.
BH05	Vehicle parking area.
SD-1 / SD-2	Down-gradient / adjoining slipway.
SD-3	Cove to the immediate north of site (within Parramatta River).

Sampling locations are displayed in Figure 2.

8.2 Soil and Sediment Sampling Methodology

Intrusive sampling for the investigation was carried out using a drill rig fitted with a solid flight auger:

- Ground conditions were logged with detail on stratigraphy, discolouration, staining, odours, moisture or other indicators of contamination.
- Soil samples were taken with clean disposable nitrile gloves directly from the auger flights with care taken to collect soil that had not come into contact with the auger stem. Samples were then placed in laboratory-supplied sample containers with a Teflon sealed lid.

Sediment samples were collected using a sampling pole, with an attachment for single-use laboratory-supplied sample containers.

8.3 Groundwater Installation and Sampling Methodology

Each groundwater well was constructed with lengths of 50 mm diameter screw threaded casing. A length of machine slotted casing was positioned to intercept groundwater, and to extend above the water table, regardless of tide. Lengths of solid casing extended to the surface. The well annulus was backfilled with gravel pack to above the screened interval, and a bentonite seal placed over the gravel pack. The remaining well void was backfilled with soil cuttings from the drilling.

Installation of a monitoring well at BH03 was not possible due to shallow bedrock.

Groundwater wells were developed after installation through the use of a stainless-steel bailer, and then left to equilibrate.

Sampling was conducted nine days later on 13 June 2019 using a peristaltic pump:

- Standing water levels and total well depths were measured using an interface probe.
- Water quality parameters were recorded, including pH, redox potential (Eh), electrical conductivity, dissolved oxygen and temperature (Appendix I).
- Groundwater samples were placed into laboratory supplied containers.
- All metal samples were field filtered.

A ground elevation survey of installed wells was not completed, as a minimum of three well locations are required to accurately determine groundwater flow direction using survey data. It would be Zoic's observation that groundwater would flow towards the Parramatta River

Borelogs are included as Appendix H.

8.4 Sample Handling

Containers were labelled with the sample number, project number and date. Samples were placed in an ice-cooled Esky and despatched under a chain of custody. Samples were transported to the primary laboratory, Envirolab Services in Sydney, after the completion of sampling activities, within applicable holding times. Inter-laboratory testing of triplicate samples was conducted by Eurofins in Sydney.

8.5 Analytical Schedule

Selected soil samples were analysed for heavy metals, TRH, BTEX, PAH, Organotins (TBT) and asbestos.

Sediment samples were analysed for heavy metals, TRH, BTEX, PAH and Organotins (TBT).

Groundwater samples were analysed for heavy metals, TRH, BTEX and PAH.

8.6 Field QA/QC Sampling

The methodology for obtaining QA/QC samples was conducted as follows:

Duplicate Samples

In accordance with NEPM (2013), at least 5% of soil samples and groundwater samples were duplicates collected in the field for analysis at the primary laboratory. They were collected from the same sampling point and divided into two separate and unrelated sample containers for analysis at the same laboratory (intra-laboratory precision).

- Soil duplicate: DUP-1 = BH02 (1.9)
- Groundwater duplicate: DUP-2 = MW02

Triplicate Split Samples

At least 5% of soil samples and groundwater samples were duplicates collected in the field for analysis at the secondary laboratory. They were collected from the same sampling point and divided into two separate and unrelated sample containers for analysis at the secondary laboratory (inter-laboratory precision).

- Soil triplicate: TRIP-1 = BH02 (1.9)

- Groundwater triplicate: TRIP-2 = MW02

9. Evaluation of QA/QC

Field QA/QC

Soil samples were taken with clean disposable nitrile gloves directly from the auger flights with care taken to collect soil that had not come in contact with the auger stem. Samples were then placed in laboratory-supplied sample containers with Teflon sealed lid.

Sediment samples were scooped directly into the sample bottles, which were laboratory-supplied, sterile and closed with a sealed Teflon lid. The sampling pole used to hold the sampling bottle was washed free of sediment between sampling locations.

Groundwater samples were collected using clean dedicated tubing at each well to prevent any potential cross contamination and were placed into laboratory supplied containers.

The QA/QC results for soil and groundwater duplicate (intra-laboratory) and triplicate (inter-laboratory) samples are summarised below with results presented in Appendix F.

Based on the information referenced above, the field data is of an acceptable quality to achieve the objectives of this study, with the following comments:

- Soil Relative Percent Differences (RPDs) calculated for inter-laboratory and intra-laboratory samples were generally within the accepted range, with the exception of RPDs for some PAHs, hydrocarbons and heavy metals, likely indicative of the heterogenous composition of fill materials. RPDs were also exceeded for benzene, ethylbenzene, xylene and naphthalene due to differing laboratory LORs.
- Groundwater RPDs calculated for inter-laboratory and intra-laboratory samples were within the accepted range, with the exception of RPDs for PAHs and some heavy metals, potentially indicative of uneven distribution of contaminants within the water column. RPDs were also exceeded for naphthalene and cadmium due to differing laboratory LORs.

Laboratory QA/QC

Samples were received and analysed by the primary and secondary laboratories with colling undertaken and within sample holding times.

Detailed QA/QC results are presented on the laboratory testing certificates presented in Appendix C and summarised in Table G-1 in Appendix G.

The laboratory QA/QC procedures indicate the data is accurate, precise and therefore suitable to rely on, with the following comments:

a. Relative Percent Differences (RPDs) calculated for inter-laboratory and intra-laboratory samples for chromium, copper, nickel and zinc are indicative of heterogeneous composition within the fill material.

b. Relative Percent Differences (RPDs) calculated for inter-laboratory samples for benzo(a)pyrene are also indicative of heterogenous composition within the fill material;

c. There was some minor variation in TRH concentrations between the primary sample (MW02) and its duplicate (Trip-2), but all results were well below the applicable criteria, indicating the variation is acceptable.

10. Site Assessment Criteria

The criteria below have been developed based on continued use of the site for commercial / industrial land use (i.e. marina).

10.1 Soil Criteria

Soil analytical results were assessed against the Australian guidelines listed below, with adopted soil criteria summarised below in Table 10.1.

- National Environment Protection Measure (NEPM) (2013) Health Investigation Levels: HIL D (commercial / industrial).
- NEPM (2013) Health Screening Levels: HSL D (commercial / industrial) – coarse soils 0 - <1m (conservative). The HSLs apply to vapour intrusion for TRH (F1 and F2 Fractions), BTEX, and naphthalene.

NEPC (2013) ecological criteria for soil was not considered as the site is covered by hardstand, and vegetation on site is largely absent. This will be retained within the proposed development.

In the absence of Australian guidance for tributyl tin in soil, a number of guidance from other jurisdictions has been considered. The Region 9 US EPA Regional Screening Levels (RSL) for commercial/industrial exposure to soil is considered appropriate for the proposed site works and ongoing commercial/industrial landuse (with concrete hardstand across the site), in the absence of published Australian or New South Wales-specific guidance. The relevant US EPA RSL value for tributyl tin in soil is 2.5 mg/kg.

Table 10.1: Soil Criteria

NEPM (2013) Soil Site Suitability Criteria	HIL D – Commercial / Industrial (mg/kg)	Soil HSL D Commercial / Industrial (vapour intrusion) for Sand Soil (mg/kg)				Management Limits[1]	US EPA RSL[2]
		0 to <1m		1 to <2m	2 to <4m	4m+	
F1	-	260	700	370	630	NL	
F2	-	NL	1000	NL	NL	NL	
F3 (>C16-C34)	-	-	3500	-	-	-	
F4 (>C34-C40)	-	-	10000	-	-	-	
Benzene	-	3	-	3	3	3	
Toluene	-	NL	-	NL	NL	NL	
Ethylbenzene	-	NL	-	NL	NL	NL	
Xylenes (Total)	-	230	-	NL	NL	NL	
Naphthalene	-	NL	-	NL	NL	NL	
Benzo (a) Pyrene	40	-	-	-	-	-	
Total PAHs	4000	-	-	-	-	-	
Arsenic	3000	-	-	-	-	-	
Cadmium	900	-	-	-	-	-	

NEPM (2013) Soil Site Suitability Criteria	HIL D – Commercial / Industrial (mg/kg)	Soil HSL D Commercial / Industrial (vapour intrusion) for Sand Soil (mg/kg)				Management Limits[1]	US EPA RSL[2]
		0 to <1m		1 to <2m	2 to <4m	4m+	
Chromium (VI)	3600	-	-	-	-	-	
Copper	240000	-	-	-	-	-	
Lead	1500	-	-	-	-	-	
Mercury	730	-	-	-	-	-	
Nickel	6000	-	-	-	-	-	
Zinc	400000	-	-	-	-	-	
Tributyltin							2.5
Asbestos[3]	0.01%[3]	-	-	-	-	-	-

1. Management Limits – Commercial / Industrial (mg/kg) for Coarse Soil
2. US EPA Regional Screening Level
3. Asbestos was screened for absence/presence due to poor retrieval of saturated soils. Any presence would warrant quantification, with limits as per Table 8.1.

10.2 Sediment Criteria

Sediment analytical results were assessed against criteria provided in the ANZECC / ARMCANZ (2013) Sediment Quality Guidelines, with the adopted sediment criteria summarised below in Tables 10.2. Given the Parramatta River estuary has a history of industrial use, and the slipway itself is used for industrial cleaning and maintenance activities, it is reasonable to refer to the Sediment Quality Guideline – High (SDQ-H) for the site.

Table 10.2. Sediment Criteria

ANZECC/ARMCANZ Sediment Quality Guidelines 2013	Guideline Value (mg/kg)	SQG – High (mg/kg)
TPH*	280	550
Total PAH*	10000	50000
Arsenic	20	70
Cadmium	1.5	10
Chromium (VI)	80	370
Copper	65	270
Lead	50	220
Mercury	0.15	1
Nickel	21	52
Zinc	200	410
Tributyltin**	9	70

*Mg/kg dry weight, 1%TOC ** µg Sn/kg dry weight, 1% TOC

10.3 Groundwater Criteria

Groundwater analytical results were assessed against the guidelines listed below, with adopted groundwater criteria summarised in Table 10.3.

- NEPM (2013) Groundwater Investigation Levels (GILs) for Marine Waters. Note that the values are consistent with ANZG (2018) Australian and New Zealand Guidelines for Fresh and Marine Water Quality.

It is noted that NEPM (2013) Groundwater HSL criteria is not relevant to the site, as groundwater is shallower that 2m bgs.

Table 10.3. Groundwater Criteria

NEPM (2013) Groundwater Site Suitability Criteria	GILs for Marine Waters (µg/L)
Heavy Metals	
Arsenic	13*
Cadmium	0.7
Chromium (VI)	4.4
Copper	1.3
Lead	4.4
Mercury	0.1
Nickel	7
Zinc	15
Cyanide (as un-ionised Cn)	4
PAHs	
Benzo (a) Pyrene	0.1**
BTEXN & TRH	
Benzene	500
Toluene	180**
Ethylbenzene	80**
Xylenes (Total)	350/75/200***
Naphthalene	50
F1	-
F2	-

*Fresh Waters Investigation Level used in absence of Marine Investigation Level. **Low Reliability value used in absence of Marine/Fresh Waters Investigation Levels. *** o-xylene / m-Xylene / p-Xylene

10.4 Other Assessment Criteria

Where no relevant Australia criterion is available, the limit of reporting (LOR) will be adopted as a preliminary screening criterion. Where the concentration exceeds the LOR, reference criteria will be selected from national and international guidance as appropriate to determine the significance or otherwise of the detected analyte.

11. Field Observations

Zoic conducted site investigation of soil on 4 June 2019, and sediments and groundwater on 13 June 2019. The site location is shown on Figure 1, and sample locations are provided on Figure 3. Borelogs are included as Appendix H, and groundwater data sheets as Appendix I.

Observations made during the environmental investigation are detailed in the following subsections.

11.1 General Observations

General observations made during fieldworks are:

- Surface conditions onsite generally consisted of concrete storage/parking space, a workshop/office building, a concrete wharf area and a slip-way. The concrete hardstand was generally observed to be in good condition, although cracks were noted in areas.
- Works areas of the slipway could not be inspected due to access limitations from site works / structures.
- From below the concrete surface, encountered soils generally comprised brown to dark grey clayey sand to gravel fill material, with inclusions of sandstone cobbles (BH01, BH03) and wood (BH04).
- Fill material was underlain by sandstone bedrock, ranging from 0.2m bgs (BH03) to 2.0m bgs (BH02).
- Soils became wet immediately beneath the concrete at BH03, at 0.5m bgs at BH01, and at 0.9m bgs at BH02.
- Site observations generally indicated groundwater running through the fill / soil layer overlying the sandstone bedrock.
- No potential asbestos containing material (including fibre cement fragments), staining or odours were observed during sampling works.
- Zoic was supplied an inventory of chemicals held on site by the client. The chemical storage area was noted on site, although no inspection or audit of the chemical storage area was completed;
- Site vegetation was limited to pot plants and a small garden bed.
- Collected sediment samples were observed to comprise fine to medium grained, brown to dark-grey silty sand, with inclusions of gravel and shell grit. Paint chips and other small debris from boat cleaning activity was noted in the slipway.
- Accumulated sediment was observed in areas of the slipway, overlying concrete.

11.2 Groundwater Observations

Boreholes BH01 and BH02 were converted to groundwater monitoring wells (MW01 and MW02) and developed using a stainless steel bailer following installation. A minimum of three times well volume was bailed from each well during development.

Groundwater Field Chemistry Parameters are presented in Table 11.1. Calibration certificates are provided in Appendix E.

Table 11.1 Groundwater Field Chemistry Parameters (13 June 2019)

Well ID	Date	Temp (°C)	pH	Redox (mV)	DO (ppm)	Cond. (mS/cm)	Comments
MW01	13.06.19	19.2	7.26	178.1	7.02	48.61	Brown-grey, slightly turbidity, no odour, no sheen.
MW02	13.06.19	17.2	11.24	-295.0	8.94	1.22	As above.

Field observations of groundwater encountered during groundwater sampling activities include:

- Standing water levels were 0.89m bgs at MW01 and 0.37m bgs at MW02, noting that a slight topographical decline was observed towards the north-east;
- Strongly alkaline conditions at borehole MW02, and slightly alkaline conditions at borehole MW01;
- Strongly reducing conditions at borehole MW02, and oxidising conditions at borehole MW01;
- Conditions indicative of marine waters (highly saline) at borehole MW01;
- Conditions indicative of brackish waters at borehole MW02; and
- No phase separated hydrocarbon (PSH) or hydrocarbon sheen was observed during groundwater sampling.

Copies of groundwater field observations sheets are provided in Appendix I.

12. Laboratory Results

12.1 Soil

Soil samples were submitted for analysis for heavy metals, TRH, BTEX, PAH, Organotins (TBT) and asbestos.

The soil analytical results indicated concentrations of contaminants of potential concern (COPC) were below the adopted human health criteria for all samples analysed.

Four soil samples were analysed for asbestos in soil, with all results reported below the laboratory LOR.

Data summary tables are provided in Appendix B.

12.2 Sediment

Sediment samples were submitted for analysis of heavy metals, TRH, BTEX, PAH and Organotins (TBT).

Analytical results for sediment indicate a number of COPC above both the ANZECC Guidance Values and the adopted Sediment Quality Guidelines (SQG – High).

The following exceedances of Guidance Values and SPGs were reported:

- SD-1 for TPH, copper, lead, zinc and TBT.
- SD-2 for TPH, copper, lead, mercury, zinc and TBT.
- SD-3 for copper, mercury and TBT.

The following exceedances of Guidance Values only were reported:

- SD-1 for nickel and mercury.
- SD-2 for chromium.
- SD-3 for lead and zinc.

Data summary tables are provided in Appendix B, and summary of exceedances shown on Figure 4.

12.3 Groundwater

Groundwater samples were submitted for analysis of heavy metals, TRH, BTEX and PAH.

All groundwater samples reported analytical results below the adopted ecological criteria, with the exception of the following:

- MW01 for copper and zinc.
- MW02 for chromium, copper and zinc.

NEPM (2013) Groundwater HSL criteria is not considered relevant to the site due to shallow groundwater. Reported concentrations of TRH/BTEX compounds in the groundwater samples analysed were noted, however, at levels indicating a low risk of vapour intrusion / exposure, particularly as the site is covered by a concrete hardstand.

Data summary tables are provided in Appendix B.

13. Discussion

13.1 Human Health Considerations

Although the adopted criteria for sediments in this assessment are ecological in nature, reported concentrations of petroleum hydrocarbons (TPH), heavy metals (copper, nickel, lead, mercury and zinc), and organotins (TBT) in slipway sediments indicate concentrations that may pose potential for human health exposure risk. Any works / activities in slipway areas will therefore require management to prevent future exposure to impacted soil and sediment. Available information suggests that associated activities proposed primarily relate to amendments to surface structures within the slipway (site workers), and ongoing use of the slipway areas (site workers / occupants). Consideration will additionally be required in areas where accumulated sediment in the slipway was noted (based on site observations).

Analytical data indicates that there is no human health risk posed by concentrations of chemicals of concern in soil or groundwater observed at the site, noting that sampling was not achieved beneath the slipway/workshop as it was operational. However, the potential risks associated with the presence of any contaminants under the slipway in the future will still need to be assessed. Reported concentrations of hydrocarbon compounds in groundwater indicate a low risk of vapour intrusion / exposure, which is supported by the site being covered with concrete hardstand.

13.2 Ecological Considerations

Site assessment indicates that foreshore sediments adjoining the site slipway are impacted by a number of chemicals of concern, including petroleum hydrocarbons, heavy metals and organotins (TBT). Reported sediment concentrations of TPH (SD-2), copper (SD-1, SD-2), lead (SD-1), zinc (SD-1, SD-2) and TBT (SD-1, SD-2, SD-3) can be considered hotspots, as they are over 250% greater than the adopted criteria. SD-3 indicates that the current and historical slipway has impacted site sediments in the immediate vicinity of the site. This tends to be supported by sediment data provided by Marine Pollution Research Pty Ltd (Appendix L), which indicated exceedances of the adopted site sediment criteria in Parramatta River for lead (approximately 20m north-east of the site's slipway) and zinc (approximately 50m east of the slipway).

Several chemicals of concern were identified in groundwater at concentrations above the adopted marine water criteria, with exceedances of chromium, copper and zinc reported. These chemical exceedances do not significantly exceed criteria and are indicative of the ubiquitous nature of these metals in an urban environment.

Groundwater conditions at borehole MW01 indicated strongly alkaline, fresh water. The difference in electrical conductivity (i.e. salinity) between boreholes MW01 and MW02 can be explained by the proximity of MW01 to the Parramatta River (< 5 m), and the incline towards MW02, which is likely to be receiving fresh water from up gradient locations.

13.3 Site Management Requirements

Given the reported exceedances of petroleum hydrocarbons, heavy metals and organotins (TBT) in sediment samples collected from the foreshore area of the slipway, and other proximate areas, a site Remedial Action Plan (RAP) is recommended to facilitate site redevelopment. The RAP will require additional data gap assessment of contaminant concentrations along the slipway, propose remedial measures, and detail site management requirements. Site materials impacted with organotins will require management in accordance with the NSW EPA *Organotin Waste Materials Chemical Control Order 1989*, which requires that organotin waste produced during the application or removal of

antifouling compounds from marine vessels shall be promptly collected for disposal, and shall be prevented from entering any waters. The order further states that organotin waste materials shall be disposed of in a controlled landfill in sealed containers. NSW EPA approval is required for any disposal of TBT source material (e.g. paint chips and blasting grit) and organotin impacted soils as waste to landfill. It is considered that site materials exhibiting hydrocarbon and heavy metal impact could be managed accordingly, subject to collection of additional waste classification data.

The results of this investigation indicate that any extension/improvement of the marina facilities must take into consideration the need to avoid/reduce sediment disturbance in areas proximate to the slipway to minimise impacts to marine flora and fauna. It is understood that the slipway area will not be used for maintenance operations under the new marina design and the underlying concrete slab will not be physically altered or removed as part of the works. It is noted that sediments beneath the slipway/hardstand require further assessment to confirm that the risk from potential contaminants under the slipway are acceptable for any future use of the land, as the slipway was operational at the time of investigation preventing investigations at the time. Groundwater monitoring results indicate a low risk to human health or the environment. Based on results of this investigation, there is considered to be a low likelihood that the former UST tankpit has any ongoing impact on soil or groundwater conditions on site.

Contaminant concentrations in sediment accumulated at the base of the slipway indicates potential for human health risk should this area be used in the future. Site procedures must therefore be managed to ensure that site workers and future site occupants are not exposed to soil or sediment within / beneath the slipway and workshop areas.

Based on the above, the RAP would require implementation of a construction and environment management plan (CEMP) for the duration of site works, which would consider potential human health and environmental impacts arising from the development. Any future development must consider the identified impact to sediment and groundwater at the site, and potentially soils beneath the slipway, as well as the proximity of the site to the Parramatta River. An appropriate soil/sediment management plan should be implemented for the duration of the works to minimise the risk of negative impacts on the surrounding environment. An EMP may also be required for future management of contaminants under the slipway should these be identified during investigation under the slab.

14. Conclusions and Recommendations

Zoic Environmental Pty Ltd was requested by Gladesville Bay Marina Pty Ltd to complete a contamination assessment of soil, sediment and groundwater on site to support a development application. The assessment included a desktop study of relevant background information, and an intrusive investigation on site, including the installation of groundwater monitoring wells. The desktop study found two underground petrol storage tank's had been removed from site, and that the use of Organotins (tributyltin - TBT) was likely in boat cleaning and maintenance activities. Zoic drilled five boreholes and installed two groundwater wells, including the collection of soil samples from the soil profile, sampling of the wells and collection of sediment samples from three locations, including two adjoining the site's boat slipway.

Reported concentrations of petroleum hydrocarbons (TPH), heavy metals (copper, nickel, lead, mercury and zinc), and organotins (TBT) exceed the adopted criteria in slipway sediments/soils. Site redevelopment work that is to be carried out on the slipway and workshop area would be subject to a Remedial Action Plan (RAP) as sediments/soils pose potential ecological and human health exposure risk. The RAP will require additional assessment of contaminant concentrations along the slipway, propose remedial measures, and detail site management requirements. Site materials impacted with organotins will require management in accordance with the NSW EPA *Organotin Waste Materials Chemical Control Order 1989*, which requires that organotin waste produced during the application or removal of antifouling compounds from marine vessels shall be promptly collected for disposal, and shall be prevented from entering any waters. The order states that organotin waste materials shall be disposed of in a controlled landfill in sealed containers. NSW EPA approval is required for any disposal of TBT source material (e.g. paint chips and blasting grit) and organotin impacted soils as waste to landfill. It is considered that site materials exhibiting hydrocarbon and heavy metal impact could be managed accordingly, subject to collection of additional waste classification data.

The results of this investigation indicate that any extension/improvement of the marina facilities must take into consideration the need to avoid/reduce sediment disturbance in areas proximate to the slipway to minimise impacts to marine flora and fauna. It is understood that the slipway area will not be used for maintenance operations under the new marina design and the underlying concrete slab will not be physically altered or removed as part of the works. It is noted that sediments beneath the slipway hard stand require further assessment to confirm that the risk from potential contaminants under the slipway are acceptable for any future use of the land, as the site was operational at the time of investigation. Groundwater monitoring results indicate a low risk to human health or the environment. Based on results of this investigation, there is considered to be a low likelihood that the former UST tankpit has any ongoing impact on soil or groundwater conditions on site.

Based on observed contaminant concentrations in slipway sediments, site activities must be managed to ensure that site workers and future site occupants are not exposed to soils and sediments within / beneath the slipway and workshop areas.

15. References

ANZECC / ARMCANZ (2013) Sediment Quality Guidelines.

AS 4482 (1999) Guide to the sampling and investigation of potentially contaminated soil. Standards Australia, Sydney.

NEPM (2013) National Environment Protection (Assessment of Site Contamination) Measure, Schedule A and Schedules B(1)-B(9). National Environment Protection Council, Adelaide.

NSW EPA (1985) Organotin Waste Materials Chemical Control Order 1989, NSW EPA, Sydney.

NSW EPA (2017) Contaminated Land Management: Guidelines for the NSW Site Auditor Scheme (3rd edition). NSW EPA, Sydney.

NSW EPA (1995) Contaminated Sites: Sampling Design Guidelines. NSW EPA, Sydney.

NSW EPA (2014) NSW EPA Waste Classification Guidelines, Part 1: Classifying Waste

NSW EPA (2015) Contaminated Sites: Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997. NSW DECC, Sydney.

NSW OEH (2011) Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites. NSW OEH, Sydney.

US EPA (2017) Regional Screening Levels (RSLs) – Region 9.

16. Limitations

This report has been prepared for use by the Client who commissioned the works in accordance with the project brief only, and has been based in part on information obtained from the Client and other parties. The findings of this report are based on the scope of work outlined in Section 2.3. The report has been prepared specifically for the Client for the purposes of the commission, and use by any nominated third party in the agreement between Zoic and the Client. No warranties, express or implied, are offered to any third parties and no liability will be accepted for use or interpretation of this report by any third party (other than where specifically nominated in an agreement with the Client).

This report relates to only this project and all results, conclusions and recommendations made should be reviewed by a competent person with experience in environmental investigations, before being used for any other purpose. This report should not be reproduced without prior approval by the Client, or amended in any way without prior approval by Zoic.

Subject to the scope of work, Zoic's assessment was limited strictly to identifying typical environmental conditions associated with the subject property area and does not include evaluation of any other issues.

Changes to the subsurface conditions may occur subsequent to the investigations described herein, through natural processes or through the intentional or accidental addition of contaminants. The conclusions and recommendations reached in this report are based on the information obtained at the time of the investigation.

This report does not comment on any regulatory obligations based on the findings. This report relates only to the objectives stated and does not relate to any other work conducted for the Client.

The absence of any identified hazardous or toxic materials on the site should not be interpreted as a guarantee that such materials do not exist on the site.

All conclusions regarding the site are the professional opinions of the Zoic personnel involved with the project, subject to the qualifications made above. While normal assessments of data reliability have been made, Zoic assumes no responsibility or liability for errors in any data obtained from regulatory agencies, statements from sources outside of Zoic, or developments resulting from situations outside the scope of this project.

Zoic is not engaged in environmental assessment and reporting for the purpose of advertising sales promoting, or endorsement of any client interests, including raising investment capital, recommending investment decisions, or other publicity purposes. The Client acknowledges that this report is for its exclusive use.

Appendix A Figures

LEGEND

Approximate Site Location

This product has been created to support the main report and is not suitable for other purposes. Image courtesy of Google Maps

Not to Scale

Figure 1: Site Location Plan

Site Address: 380 Victoria Place, Drummoyne NSW

Client: Gladesville Bay Marina Pty Ltd

Job Number: 18166

Date: September 2019

LEGEND

Approximate Site Boundary

This product has been created to support the main report and is not suitable for other purposes. Image courtesy of Google Maps

0m 10m

Scale indicative only

Figure 2: Site Layout

Site Address: Site Address: 380 Victoria Place, Drummoyne

Client: Gladesville Bay Marina Pty Ltd

Job Number: 18166

Date: September 2019

ZOIC

LEGEND

- Approximate Site Boundary
- Borehole location
- Borehole and monitoring well location
- Sediment sample location

This product has been created to support the main report and is not suitable for other purposes. Image courtesy of Google Maps

0m 10m

Scale indicative only

Figure 3: Sampling Locations

Site Address: 380 Victoria Place, Drummoyne

Client: Gladesville Bay Marina Pty Ltd

Job Number: 18166

Date: September 2019

Field ID	Type	Analyte	Concentration	Exceedance	Criteria
SD-3	Sediment	Copper	570 mg/kg	Ecological	270 mg/kg
SD-3	Sediment	Mercury	1.6 mg/kg	Ecological	1 mg/kg
SD-3	Sediment	TBT	4.9 mg/kg	Ecological	0.07 mg/kg

Field ID	Type	Analyte	Concentration	Exceedance	Criteria
SD-1	Sediment	TPH	975 mg/kg	Ecological	550 mg/kg
SD-1	Sediment	Copper	10000 mg/kg	Ecological	270 mg/kg
SD-1	Sediment	Lead	920 mg/kg	Ecological	220 mg/kg
SD-1	Sediment	Zinc	7500 mg/kg	Ecological	410 mg/kg
SD-1	Sediment	TBT	36 mg/kg	Ecological	0.07 mg/kg

Field ID	Type	Analyte	Concentration	Exceedance	Criteria
MW01	Groundwater	Copper	22 µg/L	Ecological	1.3 µg/L
MW01	Groundwater	Zinc	66 µg/L	Ecological	15 µg/L

Field ID	Type	Analyte	Concentration	Exceedance	Criteria
SD-2	Sediment	TPH	2825 mg/kg	Ecological	550 mg/kg
SD-2	Sediment	Copper	19000 mg/kg	Ecological	270 mg/kg
SD-2	Sediment	Lead	280 mg/kg	Ecological	220 mg/kg
SD-2	Sediment	Mercury	1.8 mg/kg	Ecological	1 mg/kg
SD-2	Sediment	Zinc	6300 mg/kg	Ecological	410 mg/kg
SD-2	Sediment	TBT	52 mg/kg	Ecological	0.07 mg/kg

Field ID	Type	Analyte	Concentration	Exceedance	Criteria
MW02	Groundwater	Chromium	7 µg/L	Ecological	4.4 µg/L
MW02	Groundwater	Copper	6 µg/L	Ecological	1.3 µg/L
MW02	Groundwater	Zinc	22 µg/L	Ecological	15 µg/L

LEGEND

- Approximate Site Boundary
- Borehole location
- Borehole and monitoring well location
- Sediment sample location

This product has been created to support the main report and is not suitable for other purposes. Image courtesy of Google Maps

0m 10m

Scale indicative only

Figure 4: Site Exceedances

Site Address: 380 Victoria Place, Drummoyne

Client: Gladesville Bay Marina Pty Ltd

Job Number: 18166

Date: September 2019

LEGEND

Approximate Site Boundary

This product has been created to support the main report and is not suitable for other purposes. Image courtesy of Google Maps

0m 10m

Scale indicative only

Figure 5: Site Work Considerations

Site Address: 380 Victoria Place, Drummoyne

Client: Gladesville Bay Marina Pty Ltd

Job Number: 18166

Date: September 2019

Appendix B Result Summary Tables

Soil Analytical Data (mg/kg) - 4 June 2019

	Benzene	Toluene	Ethylbenzene	Xylenes	TRH-F1	Naphthalene	B(a)P TEQ	B(a)P	PAHs	As	Cd	Cr	Cu	Ni	Pb	Hg	Zn	TBT	Friable Asbestos
Soil HIL D							40	**3**	4000	3000	900	3600 (VI)	240000	6000	1500	730	400000		Presence
Soil HSL D (<1m)	3	NL	NL	230	260	5													
USEPA RSL																		2.5	
BH01 (0.1)	<0.2	<0.5	<1	<3	<25	<0.1	<0.5	<0.05	<0.05	<4	<0.4	15	1	<1	5	<0.1	6	<0.0005	Non-detect
BH02 (0.1)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Non-detect
BH02 (1.9)	<0.2	<0.5	<1	<3	<25	<0.1	<0.5	0.2	0.51	<4	<0.4	13	38	9	25	<0.1	46	0.0046	-
BH03 (0.2)	<0.2	<0.5	<1	<3	<25	<0.1	<0.5	1.3	1.6	6	<0.4	28	25	8	45	<0.1	48	0.28	Non-detect
BH04 (0.1)	<0.2	<0.5	<1	<3	<25	0.1	1.9	1.3	13	16	2	16	4700	25	1000	2.5	1200	<0.01	Non-detect
Dup-1	<0.2	<0.5	<1	<3	<25	<0.1	<0.5	<0.05	<0.05	<4	<0.4	9	25	4	15	<0.1	22	0.0018	-
Trip-1	<0.1	<0.1	<0.1	<0.3	<20	<0.5	<0.5	<0.5	<0.5	4.6	<0.4	17	34	8.8	36	<0.1	60	0.0011	-

Sediment Analytical Data (mg/kg) - 13 June 2019

	TPHs	PAHs	As	Cd	Cr	Cu	Ni	Pb	Hg	Zn	TBT
Guidance Value	280	10000	20	1.5	80	65	21	50	0.15	200	0.009
SQG - High	550	50000	70	10	370	270	52	220	1	410	0.07
SD-1	975	5.8	12	<0.4	61	10000	27	920	0.8	7500	36
SD-2	2825	15	17	1	150	19000	75	280	1.8	6300	52
SD-3	<75	5.9	10	<0.4	17	570	5	130	1.6	260	4.9

Groundwater Analytical Data (µg/L) - 13 June 2019

	Benzene	Toluene	Ethylbenzene	m+p-xylene	o-xylene	Xylene(total)	TRH-F1	B(a)P	Naphthalene	Anthracene	Fluoranthene	Penanthrene	As	Cd	Cr	Cu	Ni	Pb	Hg	Zn
Marine Water	700	180	80	75*	350	-	-	0.1	70	0.1	1		13	5.5	4.4	1.3	70	4.4	0.4	15
MW01	<1	<1	<1	<2	<1	<3	<10	<1	<1	<1	<1	<1	<1	0.8	1	22	4	2	<0.05	66
MW02	7	43	6	30	18	48	70	<1	<1	<1	<1	<1	7	<0.1	7	4	6	<1	0.4	5
Dup-2	7	40	6	27	17	44	74	<1	<1	<1	<1	<1	7	<0.1	7	6	8	<1	0.4	22
Trip-2	6	39	5	25	16	41	60	2	<1	1	2	2	7	0.2	10	4	7	1	0.5	5

* Value for m-xylene (most conservative)

** Marine criteria below laboratory LOR for B(a)P and Anthracene (all results non-detect)

*** Freshwater value adopted for As.

Appendix C Laboratory Certificates

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CERTIFICATE OF ANALYSIS 218969

Client Details

Client	Zoic Environmental
Attention	Tyler Creese
Address	Suite 1, Level 9, 189 Kent Street, Sydney, NSW, 2000

Sample Details

Your Reference	**18166 - Marina**
Number of Samples	9 soil, 2 water
Date samples received	04/06/2019
Date completed instructions received	04/06/2019

Analysis Details

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

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

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

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

Report Details

Date results requested by	12/06/2019
Date of Issue	20/06/2019
Reissue Details	This report replaces R00 created on 12/06/2019 due to: Sample ID Amended (Client Request)

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

Results Approved By
Giovanni Agosti, Group Technical Manager
Lucy Zhu, Senior Asbestos Analyst
Nancy Zhang, Laboratory Manager, Sydney
Steven Luong, Organics Supervisor

Authorised By

Nancy Zhang, Laboratory Manager

vTRH(C6-C10)/BTEXN in Soil					
Our Reference		218969-1	218969-5	218969-6	218969-7
Your Reference	UNITS	BH01	BH02	BH03	BH04
Depth		0.1	1.9	0.2	0.1
Date Sampled		04/06/2019	04/06/2019	04/06/2019	04/06/2019
Type of sample		soil	soil	soil	soil
Date extracted	-	06/06/2019	06/06/2019	06/06/2019	06/06/2019
Date analysed	-	07/06/2019	07/06/2019	07/06/2019	07/06/2019
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	110	104	104	102

svTRH (C10-C40) in Soil					
Our Reference		218969-1	218969-5	218969-6	218969-7
Your Reference	UNITS	BH01	BH02	BH03	BH04
Depth		0.1	1.9	0.2	0.1
Date Sampled		04/06/2019	04/06/2019	04/06/2019	04/06/2019
Type of sample		soil	soil	soil	soil
Date extracted	-	06/06/2019	06/06/2019	06/06/2019	06/06/2019
Date analysed	-	06/06/2019	07/06/2019	07/06/2019	07/06/2019
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100	<100	100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	100
Surrogate o-Terphenyl	%	79	78	78	80

PAHs in Soil					
Our Reference		218969-1	218969-5	218969-6	218969-7
Your Reference	UNITS	BH01	BH02	BH03	BH04
Depth		0.1	1.9	0.2	0.1
Date Sampled		04/06/2019	04/06/2019	04/06/2019	04/06/2019
Type of sample		soil	soil	soil	soil
Date extracted	-	06/06/2019	06/06/2019	06/06/2019	06/06/2019
Date analysed	-	07/06/2019	07/06/2019	07/06/2019	07/06/2019
Naphthalene	mg/kg	<0.1	<0.1	<0.1	0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	0.2
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	0.1	0.1	1.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	0.2
Fluoranthene	mg/kg	<0.1	0.2	0.3	2.1
Pyrene	mg/kg	<0.1	0.2	0.3	2.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	0.1	1.1
Chrysene	mg/kg	<0.1	<0.1	0.2	1.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	0.3	2.1
Benzo(a)pyrene	mg/kg	<0.05	0.06	0.2	1.3
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	0.7
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	0.2
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	0.1	0.9
Total +ve PAH's	mg/kg	<0.05	0.51	1.6	13
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	1.9
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	1.9
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	1.9
Surrogate p-Terphenyl-d14	%	88	85	87	90

Acid Extractable metals in soil						
Our Reference		218969-1	218969-5	218969-6	218969-7	218969-12
Your Reference	UNITS	BH01	BH02	BH03	BH04	BH01 - [TRIPLICATE]
Depth		0.1	1.9	0.2	0.1	0.1
Date Sampled		04/06/2019	04/06/2019	04/06/2019	04/06/2019	04/06/2019
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	06/06/2019	06/06/2019	06/06/2019	06/06/2019	06/06/2019
Date analysed	-	06/06/2019	06/06/2019	06/06/2019	06/06/2019	06/06/2019
Arsenic	mg/kg	<4	<4	6	16	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	2	<0.4
Chromium	mg/kg	15	13	28	16	9
Copper	mg/kg	1	38	25	4,700	1
Lead	mg/kg	5	25	45	1,000	5
Mercury	mg/kg	<0.1	<0.1	<0.1	2.5	<0.1
Nickel	mg/kg	<1	9	8	25	<1
Zinc	mg/kg	6	46	48	1,200	6

Moisture					
Our Reference		218969-1	218969-5	218969-6	218969-7
Your Reference	UNITS	BH01	BH02	BH03	BH04
Depth		0.1	1.9	0.2	0.1
Date Sampled		04/06/2019	04/06/2019	04/06/2019	04/06/2019
Type of sample		soil	soil	soil	soil
Date prepared	-	06/06/2019	06/06/2019	06/06/2019	06/06/2019
Date analysed	-	07/06/2019	07/06/2019	07/06/2019	07/06/2019
Moisture	%	7.8	17	23	21

Asbestos ID - soils					
Our Reference		218969-1	218969-4	218969-6	218969-7
Your Reference	UNITS	BH01	BH02	BH03	BH04
Depth		0.1	0.1	0.2	0.1
Date Sampled		04/06/2019	04/06/2019	04/06/2019	04/06/2019
Type of sample		soil	soil	soil	soil
Date analysed	-	07/06/2019	07/06/2019	07/06/2019	07/06/2019
Sample mass tested	g	Approx. 30g	Approx. 40g	Approx. 50g	Approx. 35g
Sample Description	-	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected

Organotin Compounds					
Our Reference		218969-1	218969-5	218969-6	218969-7
Your Reference	UNITS	BH01	BH02	BH03	BH04
Depth		0.1	1.9	0.2	0.1
Date Sampled		04/06/2019	04/06/2019	04/06/2019	04/06/2019
Type of sample		soil	soil	soil	soil
Date extracted	-	07/06/2019	07/06/2019	07/06/2019	07/06/2019
Date analysed	-	08/06/2019	08/06/2019	08/06/2019	08/06/2019
Tributyltin as Sn	µg/kg	<0.5	4.6	280	<10
Surrogate (Tripropyltin)	%	100	96	100	100

vTRH(C6-C10)/BTEXN in Water			
Our Reference	UNITS	218969-10	218969-11
Your Reference		Trip Spike	Trip Blank
Depth		-	-
Date Sampled		04/06/2019	04/06/2019
Type of sample		water	water
Date extracted	-	05/06/2019	05/06/2019
Date analysed	-	06/06/2019	06/06/2019
TRH C_6 - C_9	µg/L	[NA]	<10
TRH C_6 - C_{10}	µg/L	[NA]	<10
TRH C_6 - C_{10} less BTEX (F1)	µg/L	[NA]	<10
Benzene	µg/L	95%	<1
Toluene	µg/L	94%	<1
Ethylbenzene	µg/L	95%	<1
m+p-xylene	µg/L	89%	<2
o-xylene	µg/L	90%	<1
Naphthalene	µg/L	[NA]	<1
Surrogate Dibromofluoromethane	%	112	106
Surrogate toluene-d8	%	97	94
Surrogate 4-BFB	%	102	87

Method ID	Methodology Summary
ASB-001	Asbestos ID - Qualitative identification of asbestos in bulk samples using Polarised Light Microscopy and Dispersion Staining Techniques including Synthetic Mineral Fibre and Organic Fibre as per Australian Standard 4964-2004.
Ext-054	Analysed by MPL Envirolab
Inorg-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
Metals-020	Determination of various metals by ICP-AES.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis. Note, the Total +ve TRH PQL is reflective of the lowest individual PQL and is therefore "Total +ve TRH" is simply a sum of the positive individual TRH fractions (>C10-C40).
Org-012	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013. For soil results:- 1. 'EQ PQL'values are assuming all contributing PAHs reported as <PQL are actually at the PQL. This is the most conservative approach and can give false positive TEQs given that PAHs that contribute to the TEQ calculation may not be present. 2. 'EQ zero'values are assuming all contributing PAHs reported as <PQL are zero. This is the least conservative approach and is more susceptible to false negative TEQs when PAHs that contribute to the TEQ calculation are present but below PQL. 3. 'EQ half PQL'values are assuming all contributing PAHs reported as <PQL are half the stipulated PQL. Hence a mid-point between the most and least conservative approaches above. Note, the Total +ve PAHs PQL is reflective of the lowest individual PQL and is therefore "Total +ve PAHs" is simply a sum of the positive individual PAHs.
Org-013	Water samples are analysed directly by purge and trap GC-MS.
Org-014	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS.

Method ID	Methodology Summary
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater. Note, the Total +ve Xylene PQL is reflective of the lowest individual PQL and is therefore "Total +ve Xylenes" is simply a sum of the positive individual Xylenes.

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	218969-5
Date extracted	-			06/06/2019	1	06/06/2019	06/06/2019		06/06/2019	06/06/2019
Date analysed	-			07/06/2019	1	07/06/2019	07/06/2019		07/06/2019	07/06/2019
TRH C_6 - C_9	mg/kg	25	Org-016	<25	1	<25	<25	0	104	93
TRH C_6 - C_{10}	mg/kg	25	Org-016	<25	1	<25	<25	0	104	93
Benzene	mg/kg	0.2	Org-016	<0.2	1	<0.2	<0.2	0	96	87
Toluene	mg/kg	0.5	Org-016	<0.5	1	<0.5	<0.5	0	109	97
Ethylbenzene	mg/kg	1	Org-016	<1	1	<1	<1	0	105	98
m+p-xylene	mg/kg	2	Org-016	<2	1	<2	<2	0	105	91
o-Xylene	mg/kg	1	Org-016	<1	1	<1	<1	0	105	93
naphthalene	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	121	1	110	110	0	124	109

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	218969-5
Date extracted	-			06/06/2019	1	06/06/2019	06/06/2019		06/06/2019	06/06/2019
Date analysed	-			06/06/2019	1	06/06/2019	07/06/2019		06/06/2019	07/06/2019
TRH C_{10} - C_{14}	mg/kg	50	Org-003	<50	1	<50	<50	0	108	88
TRH C_{15} - C_{28}	mg/kg	100	Org-003	<100	1	<100	<100	0	110	95
TRH C_{29} - C_{36}	mg/kg	100	Org-003	<100	1	<100	<100	0	100	90
TRH >C_{10} -C_{16}	mg/kg	50	Org-003	<50	1	<50	<50	0	108	88
TRH >C_{16} -C_{34}	mg/kg	100	Org-003	<100	1	<100	<100	0	110	95
TRH >C_{34} -C_{40}	mg/kg	100	Org-003	<100	1	<100	<100	0	100	90
Surrogate o-Terphenyl	%		Org-003	123	1	79	79	0	94	87

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	218969-5
Date extracted	-			06/06/2019	1	06/06/2019	06/06/2019		06/06/2019	06/06/2019
Date analysed	-			07/06/2019	1	07/06/2019	07/06/2019		07/06/2019	07/06/2019
Naphthalene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	108	102
Acenaphthylene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	100	92
Phenanthrene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	96	85
Anthracene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	92	84
Pyrene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	94	86
Benzo(a)anthracene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	98	95
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-012	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012	<0.05	1	<0.05	<0.05	0	98	93
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	94	1	88	85	3	91	87

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	218969-5
Date prepared	-			06/06/2019	1	06/06/2019	06/06/2019		06/06/2019	06/06/2019
Date analysed	-			06/06/2019	1	06/06/2019	06/06/2019		06/06/2019	06/06/2019
Arsenic	mg/kg	4	Metals-020	<4	1	<4	<4	0	104	103
Cadmium	mg/kg	0.4	Metals-020	<0.4	1	<0.4	<0.4	0	102	89
Chromium	mg/kg	1	Metals-020	<1	1	15	9	50	104	94
Copper	mg/kg	1	Metals-020	<1	1	1	2	67	105	80
Lead	mg/kg	1	Metals-020	<1	1	5	6	18	107	100
Mercury	mg/kg	0.1	Metals-021	<0.1	1	<0.1	<0.1	0	90	83
Nickel	mg/kg	1	Metals-020	<1	1	<1	<1	0	99	89
Zinc	mg/kg	1	Metals-020	<1	1	6	6	0	103	98

QUALITY CONTROL: Organotin Compounds						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	218969-5
Date extracted	-			07/06/2019	1	07/06/2019	07/06/2019		07/06/2019	07/06/2019
Date analysed	-			07/06/2019	1	08/06/2019	08/06/2019		07/06/2019	07/06/2019
Tributyltin as Sn	µg/kg	0.5	Ext-054	<0.5	1	<0.5	<0.5	0	100	96
Surrogate (Tripropyltin)	%		Ext-054	100	1	100	99	1	103	97

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date extracted	-			05/06/2019	[NT]	[NT]	[NT]	[NT]	05/06/2019	[NT]
Date analysed	-			06/06/2019	[NT]	[NT]	[NT]	[NT]	06/06/2019	[NT]
TRH C_6 - C_9	µg/L	10	Org-016	<10	[NT]	[NT]	[NT]	[NT]	97	[NT]
TRH C_6 - C_{10}	µg/L	10	Org-016	<10	[NT]	[NT]	[NT]	[NT]	97	[NT]
Benzene	µg/L	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	106	[NT]
Toluene	µg/L	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	104	[NT]
Ethylbenzene	µg/L	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	93	[NT]
m+p-xylene	µg/L	2	Org-016	<2	[NT]	[NT]	[NT]	[NT]	91	[NT]
o-xylene	µg/L	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	95	[NT]
Naphthalene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-016	104	[NT]	[NT]	[NT]	[NT]	96	[NT]
Surrogate toluene-d8	%		Org-016	95	[NT]	[NT]	[NT]	[NT]	102	[NT]
Surrogate 4-BFB	%		Org-016	96	[NT]	[NT]	[NT]	[NT]	92	[NT]

Result Definitions

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

Quality Control Definitions

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

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

Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

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

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

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

Report Comments

Asbestos: Excessive sample volume was provided for asbestos analysis. A portion of the supplied sample was sub-sampled according to Envirolab procedures. We cannot guarantee that this sub-sample is indicative of the entire sample. Envirolab recommends supplying 40-50g (50mL) of sample in its own container as per AS4964-2004.
Note: Samples 218969-1, 4, 6, 7 were sub-sampled from bags provided by the client.

Acid Extractable Metals in Soil: The laboratory RPD acceptance criteria has been exceeded for 218969-1 for Cr. Therefore a triplicate result has been issued as laboratory sample number 218969-12.

Organotin Compounds - analysed by MPL, report no 227765.

CHAIN OF CUSTODY - Client

ENVIROLAB SERVICES

Client: Zoic Environmental	**Client Project Name and Number:** 18166 - Marina	**Envirolab Services**	
Project Mgr: T. Creese		12 Ashley St, Chatswood, NSW, 2067	
Sampler: TC	**PO No.:**		
Address:	**Envirolab Services Quote No. :**	**Phone:** 02 9910 6200	
	Date results required:	**Fax:** 02 9910 6201	
Email: tyler.creese@zoic.com.au	**Or choose:** standard	**E-mail:** ahie@envirolabservices.com.au	
Phone: 0481775243 **Fax:**	*Note: Inform lab in advance if urgent turnaround is required - surcharge applies*	**Contact:** Aileen Hie	

Sample information				Tests Required						Comments
Envirolab Sample ID	Client Sample ID	Date sampled	Type of sample	TRH/BTEX	TBT (Tributyl Tin)	Combo 3a	Asbestos	Combo 3		Provide as much information about the sample as you can
1	BH01 (0.1)	4/6/19	Soil		X	X				
2	BH01 (0.5)									(#) Combo 3a =
3	BH01 (1.4)									- TRH/BTEX
4	BH02 (0.1)						X			- BAHs
5	BH02 (1.9)				X			X		- 8 metals
6	BH03 (0-2)				X	X				- asbestos (presence/absence)
7	BH04 (0.1)				X	X				
8	BH04 (0.5)									
9	Dup - 1									
—	Trip - 1			Please send to eurofins						
10	Trip spike			X						
11	Trip blank			X						(#) Asbestos = presence/absence

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

Job No: 218969
Date Received: 4/6/19
Time Received: 16:07
Received by: TD
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

Relinquished by (company): Zoic	**Received by (company):** ELS	**Samples Received:** Cool or Ambient (circle one)
Print Name: T. Creese	**Print Name:** Tony Doherty	**Temperature Recieved at:** (If applicable)
Date & Time: 4/6/19	**Date & Time:** 4/6/19 16:07	**Transported by:** Hand delivered / courier
Signature:	**Signature:**	**Page No:**

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

SAMPLE RECEIPT ADVICE

Client Details

Client	Zoic Environmental
Attention	Tyler Creese

Sample Login Details

Your reference	18166 - Marina
Envirolab Reference	218969
Date Sample Received	04/06/2019
Date Instructions Received	04/06/2019
Date Results Expected to be Reported	12/06/2019

Sample Condition

Samples received in appropriate condition for analysis	Yes
No. of Samples Provided	9 soil, 2 water
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	9.2
Cooling Method	Ice
Sampling Date Provided	YES

Comments

Nil

Please direct any queries to:

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

Analysis Underway, details on the following page:

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

Sample ID	vTRH(C6-C10)/BTEXN in Soil	svTRH (C10-C40) in Soil	PAHs in Soil	Acid Extractable metalsin soil	Asbestos ID - soils	Organotin Compounds	vTRH(C6-C10)/BTEXN in Water	On Hold
BH01	✓	✓	✓	✓	✓	✓		
BH01								✓
BH01								✓
BH02					✓			
BH02	✓	✓	✓	✓		✓		
BH03	✓	✓	✓	✓	✓	✓		
BH04	✓	✓	✓	✓	✓	✓		
BH04								✓
Dup-1								✓
Trip Spike							✓	
Trip Blank							✓	

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

Additional Info

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

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CERTIFICATE OF ANALYSIS 218969-A

Client Details

Client	Zoic Environmental
Attention	Tyler Creese
Address	Suite 1, Level 9, 189 Kent Street, Sydney, NSW, 2000

Sample Details

Your Reference	**18166 - Marina**
Number of Samples	9 soil, 2 water
Date samples received	04/06/2019
Date completed instructions received	20/06/2019

Analysis Details

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

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

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

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

Report Details

Date results requested by	21/06/2019
Date of Issue	28/06/2019

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

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

Results Approved By
Giovanni Agosti, Group Technical Manager
Jaimie Loa-Kum-Cheung, Metals Supervisor
Ken Nguyen, Reporting Supervisor
Lucy Zhu, Senior Asbestos Analyst
Steven Luong, Organics Supervisor

Authorised By

Nancy Zhang, Laboratory Manager

vTRH(C6-C10)/BTEXN in Soil		
Our Reference		218969-A-9
Your Reference	UNITS	Dup-1
Depth		-
Date Sampled		04/06/2019
Type of sample		soil
Date extracted	-	20/06/2019
Date analysed	-	21/06/2019
TRH C_6 - C_9	mg/kg	<25
TRH C_6 - C_{10}	mg/kg	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25
Benzene	mg/kg	<0.2
Toluene	mg/kg	<0.5
Ethylbenzene	mg/kg	<1
m+p-xylene	mg/kg	<2
o-Xylene	mg/kg	<1
naphthalene	mg/kg	<1
Total +ve Xylenes	mg/kg	<3
Surrogate aaa-Trifluorotoluene	%	95

svTRH (C10-C40) in Soil		
Our Reference		218969-A-9
Your Reference	UNITS	Dup-1
Depth		-
Date Sampled		04/06/2019
Type of sample		soil
Date extracted	-	20/06/2019
Date analysed	-	21/06/2019
TRH C_{10} - C_{14}	mg/kg	<50
TRH C_{15} - C_{28}	mg/kg	<100
TRH C_{29} - C_{36}	mg/kg	<100
TRH >C_{10} -C_{16}	mg/kg	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50
TRH >C_{16} -C_{34}	mg/kg	<100
TRH >C_{34} -C_{40}	mg/kg	<100
Total +ve TRH (>C10-C40)	mg/kg	<50
Surrogate o-Terphenyl	%	79

PAHs in Soil		
Our Reference		218969-A-9
Your Reference	UNITS	Dup-1
Depth		-
Date Sampled		04/06/2019
Type of sample		soil
Date extracted	-	20/06/2019
Date analysed	-	21/06/2019
Naphthalene	mg/kg	<0.1
Acenaphthylene	mg/kg	<0.1
Acenaphthene	mg/kg	<0.1
Fluorene	mg/kg	<0.1
Phenanthrene	mg/kg	<0.1
Anthracene	mg/kg	<0.1
Fluoranthene	mg/kg	<0.1
Pyrene	mg/kg	<0.1
Benzo(a)anthracene	mg/kg	<0.1
Chrysene	mg/kg	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2
Benzo(a)pyrene	mg/kg	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1
Total +ve PAH's	mg/kg	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5
Surrogate p-Terphenyl-d14	%	88

Acid Extractable metals in soil		
Our Reference		218969-A-9
Your Reference	UNITS	Dup-1
Depth		-
Date Sampled		04/06/2019
Type of sample		soil
Date prepared	-	20/06/2019
Date analysed	-	21/06/2019
Arsenic	mg/kg	<4
Cadmium	mg/kg	<0.4
Chromium	mg/kg	9
Copper	mg/kg	25
Lead	mg/kg	15
Mercury	mg/kg	<0.1
Nickel	mg/kg	4
Zinc	mg/kg	22

Moisture		
Our Reference		218969-A-9
Your Reference	UNITS	Dup-1
Depth		-
Date Sampled		04/06/2019
Type of sample		soil
Date prepared	-	20/06/2019
Date analysed	-	21/06/2019
Moisture	%	23

Asbestos ID - soils		
Our Reference		218969-A-9
Your Reference	UNITS	Dup-1
Depth		-
Date Sampled		04/06/2019
Type of sample		soil
Date analysed	-	21/06/2019
Sample mass tested	g	Approx. 40g
Sample Description	-	Beige clayey soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected

Organotin Compounds		
Our Reference		218969-A-9
Your Reference	UNITS	Dup-1
Depth		-
Date Sampled		04/06/2019
Type of sample		soil
Date extracted	-	27/06/2019
Date analysed	-	28/06/2019
Tributyltin as Sn	µg/kg	1.8
Surrogate Triphenyltin	%	95

Method ID	Methodology Summary
ASB-001	Asbestos ID - Qualitative identification of asbestos in bulk samples using Polarised Light Microscopy and Dispersion Staining Techniques including Synthetic Mineral Fibre and Organic Fibre as per Australian Standard 4964-2004.
Ext-054	Analysed by MPL Envirolab
Inorg-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
Metals-020	Determination of various metals by ICP-AES.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis. Note, the Total +ve TRH PQL is reflective of the lowest individual PQL and is therefore "Total +ve TRH" is simply a sum of the positive individual TRH fractions (>C10-C40).
Org-012	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013. For soil results:- 1. 'EQ PQL'values are assuming all contributing PAHs reported as <PQL are actually at the PQL. This is the most conservative approach and can give false positive TEQs given that PAHs that contribute to the TEQ calculation may not be present. 2. 'EQ zero'values are assuming all contributing PAHs reported as <PQL are zero. This is the least conservative approach and is more susceptible to false negative TEQs when PAHs that contribute to the TEQ calculation are present but below PQL. 3. 'EQ half PQL'values are assuming all contributing PAHs reported as <PQL are half the stipulated PQL. Hence a mid-point between the most and least conservative approaches above. Note, the Total +ve PAHs PQL is reflective of the lowest individual PQL and is therefore "Total +ve PAHs" is simply a sum of the positive individual PAHs.
Org-014	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS.
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.

Method ID	Methodology Summary
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater. Note, the Total +ve Xylene PQL is reflective of the lowest individual PQL and is therefore "Total +ve Xylenes" is simply a sum of the positive individual Xylenes.

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-8	[NT]
Date extracted	-			20/06/2019	[NT]	[NT]	[NT]	[NT]	20/06/2019	[NT]
Date analysed	-			21/06/2019	[NT]	[NT]	[NT]	[NT]	21/06/2019	[NT]
TRH C_6 - C_9	mg/kg	25	Org-016	<25	[NT]	[NT]	[NT]	[NT]	79	[NT]
TRH C_6 - C_{10}	mg/kg	25	Org-016	<25	[NT]	[NT]	[NT]	[NT]	79	[NT]
Benzene	mg/kg	0.2	Org-016	<0.2	[NT]	[NT]	[NT]	[NT]	94	[NT]
Toluene	mg/kg	0.5	Org-016	<0.5	[NT]	[NT]	[NT]	[NT]	78	[NT]
Ethylbenzene	mg/kg	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	73	[NT]
m+p-xylene	mg/kg	2	Org-016	<2	[NT]	[NT]	[NT]	[NT]	76	[NT]
o-Xylene	mg/kg	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	74	[NT]
naphthalene	mg/kg	1	Org-014	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	101	[NT]	[NT]	[NT]	[NT]	94	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-8	[NT]
Date extracted	-			20/06/2019	[NT]	[NT]	[NT]	[NT]	20/06/2019	[NT]
Date analysed	-			21/06/2019	[NT]	[NT]	[NT]	[NT]	21/06/2019	[NT]
TRH C_{10} - C_{14}	mg/kg	50	Org-003	<50	[NT]	[NT]	[NT]	[NT]	108	[NT]
TRH C_{15} - C_{28}	mg/kg	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	111	[NT]
TRH C_{29} - C_{36}	mg/kg	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	114	[NT]
TRH >C_{10} -C_{16}	mg/kg	50	Org-003	<50	[NT]	[NT]	[NT]	[NT]	108	[NT]
TRH >C_{16} -C_{34}	mg/kg	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	111	[NT]
TRH >C_{34} -C_{40}	mg/kg	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	114	[NT]
Surrogate o-Terphenyl	%		Org-003	85	[NT]	[NT]	[NT]	[NT]	102	[NT]

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-8	[NT]
Date extracted	-			20/06/2019	[NT]	[NT]	[NT]	[NT]	20/06/2019	[NT]
Date analysed	-			21/06/2019	[NT]	[NT]	[NT]	[NT]	21/06/2019	[NT]
Naphthalene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	106	[NT]
Acenaphthylene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	98	[NT]
Phenanthrene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	90	[NT]
Anthracene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	92	[NT]
Pyrene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	96	[NT]
Benzo(a)anthracene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	94	[NT]
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-012	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012	<0.05	[NT]	[NT]	[NT]	[NT]	96	[NT]
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	98	[NT]	[NT]	[NT]	[NT]	92	[NT]

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-8	[NT]
Date prepared	-			20/06/2019	[NT]	[NT]	[NT]	[NT]	20/06/2019	[NT]
Date analysed	-			21/06/2019	[NT]	[NT]	[NT]	[NT]	21/06/2019	[NT]
Arsenic	mg/kg	4	Metals-020	<4	[NT]	[NT]	[NT]	[NT]	114	[NT]
Cadmium	mg/kg	0.4	Metals-020	<0.4	[NT]	[NT]	[NT]	[NT]	109	[NT]
Chromium	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	112	[NT]
Copper	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	109	[NT]
Lead	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	111	[NT]
Mercury	mg/kg	0.1	Metals-021	<0.1	[NT]	[NT]	[NT]	[NT]	93	[NT]
Nickel	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	105	[NT]
Zinc	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	109	[NT]

QUALITY CONTROL: Organotin Compounds						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-8	[NT]
Date extracted	-			27/06/2019	[NT]	[NT]	[NT]	[NT]	27/06/2019	[NT]
Date analysed	-			28/06/2019	[NT]	[NT]	[NT]	[NT]	28/06/2019	[NT]
Tributyltin as Sn	µg/kg	0.5	Ext-054	<0.5	[NT]	[NT]	[NT]	[NT]	111	[NT]
Surrogate Triphenyltin	%		Ext-054	100	[NT]	[NT]	[NT]	[NT]	100	[NT]

Result Definitions

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

Quality Control Definitions

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

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

Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

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

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

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

Report Comments

Asbestos: A portion of the supplied sample was sub-sampled for asbestos analysis according to Envirolab procedures.
We cannot guarantee that this sub-sample is indicative of the entire sample. Envirolab recommends supplying 40-50g of sample in its own container.
Note: Sample 218969-A-9 was sub-sampled from a jar provided by the client.

Organotins analysed by MPL. Report no. 228753

Zoic Environmental Pty Ltd
Suite 1, Level 9, 189 Kent Street
Sydney
NSW 2000

Attention: **Tyler Creese**

Report **659866-S**
Project name SOIL ANALYSIS
Received Date Jun 05, 2019

Client Sample ID			**TRIP-1**
Sample Matrix			**Soil**
Eurofins | mgt Sample No.			**S19-Jn08327**
Date Sampled			**Jun 04, 2019**
Test/Reference	LOR	Unit	
BTEX			
Benzene	0.1	mg/kg	< 0.1
Toluene	0.1	mg/kg	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2
o-Xylene	0.1	mg/kg	< 0.1
Xylenes - Total	0.3	mg/kg	< 0.3
4-Bromofluorobenzene (surr.)	1	%	105
Total Recoverable Hydrocarbons - 2013 NEPM Fractions			
Naphthalene[N02]	0.5	mg/kg	< 0.5
TRH C6-C10	20	mg/kg	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20
TRH >C10-C16	50	mg/kg	< 50
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50
TRH >C16-C34	100	mg/kg	< 100
TRH >C34-C40	100	mg/kg	< 100
TRH >C10-C40 (total)*	100	mg/kg	< 100
Total Recoverable Hydrocarbons			
TRH C6-C9	20	mg/kg	< 20
Total Recoverable Hydrocarbons - 1999 NEPM Fractions			
TRH C10-C14	20	mg/kg	< 20
TRH C15-C28	50	mg/kg	< 50
TRH C29-C36	50	mg/kg	< 50
TRH C10-36 (Total)	50	mg/kg	< 50
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

Client Sample ID			TRIP-1
Sample Matrix			Soil
Eurofins | mgt Sample No.			S19-Jn08327
Date Sampled			Jun 04, 2019
Test/Reference	LOR	Unit	
Polycyclic Aromatic Hydrocarbons			
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	%	132
p-Terphenyl-d14 (surr.)	1	%	140
Heavy Metals			
Arsenic	2	mg/kg	4.6
Cadmium	0.4	mg/kg	< 0.4
Chromium	5	mg/kg	17
Copper	5	mg/kg	34
Lead	5	mg/kg	36
Mercury	0.1	mg/kg	< 0.1
Nickel	5	mg/kg	8.8
Zinc	5	mg/kg	60
Tributyltin (TBT)			see attached
% Moisture	1	%	15

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 (regarding both quality and NATA accreditation).

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
BTEX	Sydney	Jun 14, 2019	14 Day
- Method: LTM-ORG-2150 VOCs in Soils Liquid and other Aqueous Matrices			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Sydney	Jun 14, 2019	14 Day
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Sydney	Jun 14, 2019	
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons	Sydney	Jun 14, 2019	14 Day
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Sydney	Jun 14, 2019	14 Day
- Method: LTM-ORG-2010 TRH C6-C40			
Polycyclic Aromatic Hydrocarbons	Sydney	Jun 14, 2019	14 Days
- Method: LTM-ORG-2130 PAH and Phenols in Soil and Water			
Metals M8	Sydney	Jun 14, 2019	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
% Moisture	Sydney	Jun 07, 2019	14 Day
- Method: LTM-GEN-7080 Moisture			

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NATA # 1261
Site # 23736

Company Name:	Zoic Environmental Pty Ltd	**Order No.:**		**Received:**	Jun 5, 2019 2:21 PM
Address:	Suite 1, Level 9, 189 Kent Street Sydney NSW 2000	**Report #:**	659866	**Due:**	Jun 17, 2019
		Phone:	02 9251 8070	**Priority:**	7 Day
		Fax:		**Contact Name:**	Tyler Creese
Project Name:	SOIL ANALYSIS				

Eurofins | mgt Analytical Services Manager : Andrew Black

Sample Detail						Tributyltin (TBT)	Moisture Set	Eurofins | mgt Suite B7
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217							X	X
Brisbane Laboratory - NATA Site # 20794								
Perth Laboratory - NATA Site # 23736								
External Laboratory						X		
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**			
1	TRIP-1	Jun 04, 2019		Soil	S19-Jn08327	X	X	X
Test Counts						1	1	1

Internal Quality Control Review and Glossary

General

1. 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, April 2011 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. 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 5.2 2018
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	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 50-150%-Phenols & PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.2 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

1. 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.
2. 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.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. 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.
6. 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.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. 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	%	90			70-130	Pass	
Toluene	%	90			70-130	Pass	
Ethylbenzene	%	94			70-130	Pass	
m&p-Xylenes	%	93			70-130	Pass	
o-Xylene	%	93			70-130	Pass	
Xylenes - Total	%	93			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	%	113			70-130	Pass	
TRH C6-C10	%	82			70-130	Pass	
TRH >C10-C16	%	72			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons							
TRH C6-C9	%	85			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C10-C14	%	70			70-130	Pass	
LCS - % Recovery							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	%	88			70-130	Pass	
Acenaphthylene	%	89			70-130	Pass	
Anthracene	%	89			70-130	Pass	
Benz(a)anthracene	%	86			70-130	Pass	
Benzo(a)pyrene	%	85			70-130	Pass	
Benzo(b&j)fluoranthene	%	87			70-130	Pass	
Benzo(g.h.i)perylene	%	87			70-130	Pass	
Benzo(k)fluoranthene	%	87			70-130	Pass	
Chrysene	%	88			70-130	Pass	
Dibenz(a.h)anthracene	%	85			70-130	Pass	
Fluoranthene	%	89			70-130	Pass	
Fluorene	%	89			70-130	Pass	
Indeno(1.2.3-cd)pyrene	%	85			70-130	Pass	
Naphthalene	%	88			70-130	Pass	
Phenanthrene	%	88			70-130	Pass	
Pyrene	%	89			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Arsenic	%	106			70-130	Pass	
Cadmium	%	107			70-130	Pass	
Chromium	%	106			70-130	Pass	
Copper	%	108			70-130	Pass	
Lead	%	110			70-130	Pass	
Mercury	%	104			70-130	Pass	
Nickel	%	105			70-130	Pass	
Zinc	%	107			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
BTEX				Result 1					
Benzene	S19-Jn08327	CP	%	91			70-130	Pass	
Toluene	S19-Jn08327	CP	%	94			70-130	Pass	
Ethylbenzene	S19-Jn08327	CP	%	95			70-130	Pass	
m&p-Xylenes	S19-Jn08327	CP	%	96			70-130	Pass	
o-Xylene	S19-Jn08327	CP	%	95			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Xylenes - Total	S19-Jn08327	CP	%	96			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	S19-Jn08327	CP	%	89			70-130	Pass	
TRH C6-C10	S19-Jn08327	CP	%	94			70-130	Pass	
TRH >C10-C16	S19-Jn15951	NCP	%	75			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons				Result 1					
TRH C6-C9	S19-Jn08327	CP	%	93			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C10-C14	S19-Jn15951	NCP	%	73			70-130	Pass	
Spike - % Recovery									
Polycyclic Aromatic Hydrocarbons				Result 1					
Acenaphthene	S19-Jn14662	NCP	%	92			70-130	Pass	
Acenaphthylene	S19-Jn14662	NCP	%	90			70-130	Pass	
Anthracene	S19-Jn14662	NCP	%	90			70-130	Pass	
Benz(a)anthracene	S19-Jn14662	NCP	%	86			70-130	Pass	
Benzo(a)pyrene	S19-Jn14662	NCP	%	87			70-130	Pass	
Benzo(b&j)fluoranthene	S19-Jn14662	NCP	%	82			70-130	Pass	
Benzo(g.h.i)perylene	S19-Jn14662	NCP	%	90			70-130	Pass	
Benzo(k)fluoranthene	S19-Jn14662	NCP	%	94			70-130	Pass	
Chrysene	S19-Jn14662	NCP	%	91			70-130	Pass	
Dibenz(a.h)anthracene	S19-Jn14662	NCP	%	88			70-130	Pass	
Fluoranthene	S19-Jn14662	NCP	%	92			70-130	Pass	
Fluorene	S19-Jn14662	NCP	%	91			70-130	Pass	
Indeno(1.2.3-cd)pyrene	S19-Jn14662	NCP	%	89			70-130	Pass	
Naphthalene	S19-Jn14662	NCP	%	89			70-130	Pass	
Phenanthrene	S19-Jn14662	NCP	%	91			70-130	Pass	
Pyrene	S19-Jn14662	NCP	%	92			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	S19-Jn16292	NCP	%	115			70-130	Pass	
Cadmium	S19-Jn16292	NCP	%	103			70-130	Pass	
Chromium	S19-Jn16292	NCP	%	115			70-130	Pass	
Copper	S19-Jn16292	NCP	%	100			70-130	Pass	
Lead	S19-Jn16292	NCP	%	99			70-130	Pass	
Mercury	S19-Jn16292	NCP	%	97			70-130	Pass	
Nickel	S19-Jn16292	NCP	%	103			70-130	Pass	
Zinc	S19-Jn16292	NCP	%	100			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	S19-Jn10938	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Toluene	S19-Jn10938	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Ethylbenzene	S19-Jn10938	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
m&p-Xylenes	S19-Jn10938	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
o-Xylene	S19-Jn10938	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Xylenes - Total	S19-Jn10938	NCP	mg/kg	< 0.3	< 0.3	<1	30%	Pass	

Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	S19-Jn10938	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
TRH C6-C10	S19-Jn10938	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH >C10-C16	S19-Jn15950	NCP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH >C16-C34	S19-Jn15950	NCP	mg/kg	130	120	6.0	30%	Pass	
TRH >C34-C40	S19-Jn15950	NCP	mg/kg	< 100	< 100	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons				Result 1	Result 2	RPD			
TRH C6-C9	S19-Jn10938	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C10-C14	S19-Jn15950	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C15-C28	S19-Jn15950	NCP	mg/kg	76	67	12	30%	Pass	
TRH C29-C36	S19-Jn15950	NCP	mg/kg	74	75	<1	30%	Pass	
Duplicate									
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD			
Acenaphthene	S19-Jn08327	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Acenaphthylene	S19-Jn08327	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Anthracene	S19-Jn08327	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benz(a)anthracene	S19-Jn08327	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(a)pyrene	S19-Jn08327	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(b&j)fluoranthene	S19-Jn08327	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(g.h.i)perylene	S19-Jn08327	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(k)fluoranthene	S19-Jn08327	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Chrysene	S19-Jn08327	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Dibenz(a.h)anthracene	S19-Jn08327	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluoranthene	S19-Jn08327	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluorene	S19-Jn08327	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Indeno(1.2.3-cd)pyrene	S19-Jn08327	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Naphthalene	S19-Jn08327	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Phenanthrene	S19-Jn08327	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Pyrene	S19-Jn08327	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	S19-Jn15989	NCP	mg/kg	5.4	3.3	<1	30%	Pass	
Cadmium	S19-Jn15989	NCP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	S19-Jn15989	NCP	mg/kg	11	10	5.0	30%	Pass	
Copper	S19-Jn15989	NCP	mg/kg	53	42	<1	30%	Pass	
Lead	S19-Jn15989	NCP	mg/kg	60	37	<1	30%	Pass	
Mercury	S19-Jn15989	NCP	mg/kg	0.2	0.2	1.0	30%	Pass	
Nickel	S19-Jn15989	NCP	mg/kg	11	8.1	<1	30%	Pass	
Zinc	S19-Jn15989	NCP	mg/kg	59	44	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	S19-Jn07774	NCP	%	16	18	10	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	Yes

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

Authorised By

Andrew Black	Analytical Services Manager
Andrew Sullivan	Senior Analyst-Organic (NSW)
Gabriele Cordero	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.

CHAIN OF CUSTODY RECORD

ABN 50 005 085 521

☐ **Sydney Laboratory** Unit F3 Bld F, 16 Mars Rd, Lane Cove West, NSW 2066 02 9900 8400 EnviroSampleNSW@eurofins.com

☐ **Brisbane Laboratory** Unit 1, 21 Smallwood Pl., Murarrie, QLD 4172 07 3902 4600 EnviroSampleQLD@eurofins.com

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

☐ **Melbourne Laboratory** 2 Kingston Town Close, Oakleigh, VIC 3166 03 8564 5000 EnviroSampleVic@eurofins.com

Company	Zoic Environmental	Project №		Project Manager	
Address		Project Name		EDD Format (ESdat, EQuIS, Custom)	
Contact Name	Tyler Creese				
Phone №	481775243				
Special Directions					
Purchase Order					
Quote ID №					

Sampler(s)	TC
Handed over by	TC
Email for Invoice	tyler.creese@zoic.com.au
Email for Results	tyler.creese@zoic.com.au

Turnaround Time (TAT) Requirements (Default will be 5 days if not ticked)

☐ Overnight (9am)* ☐ 1 Day* ☐ 2 Day* ☐ 3 Day* ☑ 5 Day * Surcharges apply ☐ Other ( )

№	Client Sample ID	Sampled Date/Time (dd/mm/yy hh:mm)	Matrix (Solid (S) Water (W))	Analyses (Note: Where metals are requested, please specify "Total" or "Filtered"; SUITE code must be used to assign SUITE group)				Containers: 1L Plastic	250mL Plastic	125mL Plastic	200mL Amber Glass	40mL VOA vial	500mL PFAS Bottle	Jar (Glass or HDPE)	Other (Asbestos AS4964, WA Guidelines)	Sample Comments / Dangerous Goods Hazard Warning
				~~TSS~~ (Tribu/Tin)	TRH/BTEX	PAH	8 metals									
1	Trip-1	4/6/19	Soil	X	X	X	X									
2																
3																
4																
5																
6																
7																
8																
9																
10																
	Total Counts															

Method of Shipment	☑ Courier (#)	☐ Hand Delivered	☐ Postal	Name	T. Creese	Signature		Date	4/6/19	Time	:__
Eurofins | mgt Laboratory Use Only	Received By	Grace Tuckwell	SYD BNE MEL PER ADL NTL DRW	Signature		Date	5/6/19	Time	2:21	Temperature	10.7
	Received By		SYD BNE MEL PER ADL NTL DRW	Signature		Date	__/__/__	Time	:__	Report №	659866

Eurofins Environment Testing Australia Pty Ltd trading as Eurofins | mgt

218969

Relinquished: Tanya Doherty 5/6/19

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Sample Receipt Advice

Company name:	**Zoic Environmental Pty Ltd**
Contact name:	Tyler Creese
Project name:	SOIL ANALYSIS
COC number:	Not provided
Turn around time:	7 Day
Date/Time received:	Jun 5, 2019 2:21 PM
Eurofins | mgt reference:	**659866**

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.

☒ Split sample sent to requested external lab.

☑ Some samples have been subcontracted.

N/A Custody Seals intact (if used).

Contact notes

If you have any questions with respect to these samples please contact:

Andrew Black on Phone : (+61) 2 9900 8490 or by e.mail: AndrewBlack@eurofins.com

Results will be delivered electronically via e.mail to Tyler Creese - tyler.creese@zoic.com.au.

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customerservice@envirolab.com.au
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CERTIFICATE OF ANALYSIS 219565

Client Details

Client	Zoic Environmental
Attention	Tyler Creese
Address	Suite 1, Level 9, 189 Kent Street, Sydney, NSW, 2000

Sample Details

Your Reference	**18166 GME & Sediment**
Number of Samples	5 WATER, 3 SOIL
Date samples received	13/06/2019
Date completed instructions received	13/06/2019

Analysis Details

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

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

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

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

Report Details

Date results requested by	21/06/2019
Date of Issue	24/06/2019

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

Results Approved By
Giovanni Agosti, Group Technical Manager
Ken Nguyen, Reporting Supervisor
Steven Luong, Organics Supervisor

Authorised By

Nancy Zhang, Laboratory Manager

vTRH(C6-C10)/BTEXN in Soil				
Our Reference		219565-3	219565-4	219565-5
Your Reference	UNITS	SD-1	SD-2	SD-3
Date Sampled		13/06/2019	13/06/2019	13/06/2019
Type of sample		SOIL	SOIL	SOIL
Date extracted	-	17/06/2019	17/06/2019	17/06/2019
Date analysed	-	19/06/2019	19/06/2019	19/06/2019
TRH C_6 - C_9	mg/kg	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1
Total +ve Xylenes	mg/kg	<3	<3	<3
Surrogate aaa-Trifluorotoluene	%	115	98	105

svTRH (C10-C40) in Soil				
Our Reference		219565-3	219565-4	219565-5
Your Reference	UNITS	SD-1	SD-2	SD-3
Date Sampled		13/06/2019	13/06/2019	13/06/2019
Type of sample		SOIL	SOIL	SOIL
Date extracted	-	17/06/2019	17/06/2019	17/06/2019
Date analysed	-	18/06/2019	18/06/2019	18/06/2019
TRH C_{10} - C_{14}	mg/kg	98	310	<50
TRH C_{15} - C_{28}	mg/kg	440	1,400	<100
TRH C_{29} - C_{36}	mg/kg	330	890	<100
TRH >C_{10} -C_{16}	mg/kg	65	210	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	65	210	<50
TRH >C_{16} -C_{34}	mg/kg	670	2,000	<100
TRH >C_{34} -C_{40}	mg/kg	210	560	<100
Total +ve TRH (>C10-C40)	mg/kg	950	2,800	<50
Surrogate o-Terphenyl	%	94	113	86

PAHs in Soil				
Our Reference		219565-3	219565-4	219565-5
Your Reference	UNITS	SD-1	SD-2	SD-3
Date Sampled		13/06/2019	13/06/2019	13/06/2019
Type of sample		SOIL	SOIL	SOIL
Date extracted	-	17/06/2019	17/06/2019	17/06/2019
Date analysed	-	18/06/2019	18/06/2019	18/06/2019
Naphthalene	mg/kg	<0.1	0.1	<0.1
Acenaphthylene	mg/kg	<0.1	0.2	<0.1
Acenaphthene	mg/kg	<0.1	0.4	<0.1
Fluorene	mg/kg	<0.1	0.1	<0.1
Phenanthrene	mg/kg	0.4	1.5	0.2
Anthracene	mg/kg	0.1	0.3	<0.1
Fluoranthene	mg/kg	0.8	2.4	0.9
Pyrene	mg/kg	1.2	2.3	0.9
Benzo(a)anthracene	mg/kg	0.5	1.1	0.6
Chrysene	mg/kg	0.6	1.2	0.6
Benzo(b,j+k)fluoranthene	mg/kg	0.9	2.3	1
Benzo(a)pyrene	mg/kg	0.56	1.3	0.72
Indeno(1,2,3-c,d)pyrene	mg/kg	0.3	0.7	0.4
Dibenzo(a,h)anthracene	mg/kg	<0.1	0.2	<0.1
Benzo(g,h,i)perylene	mg/kg	0.5	1	0.5
Total +ve PAH's	mg/kg	5.8	15	5.9
Benzo(a)pyrene TEQ calc (zero)	mg/kg	0.7	1.9	0.9
Benzo(a)pyrene TEQ calc(half)	mg/kg	0.8	1.9	1
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	0.8	1.9	1.0
Surrogate p-Terphenyl-d14	%	101	100	102

Acid Extractable metals in soil				
Our Reference		219565-3	219565-4	219565-5
Your Reference	UNITS	SD-1	SD-2	SD-3
Date Sampled		13/06/2019	13/06/2019	13/06/2019
Type of sample		SOIL	SOIL	SOIL
Date prepared	-	17/06/2019	17/06/2019	17/06/2019
Date analysed	-	17/06/2019	17/06/2019	17/06/2019
Arsenic	mg/kg	12	17	10
Cadmium	mg/kg	<0.4	1	<0.4
Chromium	mg/kg	61	150	17
Copper	mg/kg	10,000	19,000	570
Lead	mg/kg	920	280	130
Mercury	mg/kg	0.8	1.8	1.6
Nickel	mg/kg	27	75	5
Zinc	mg/kg	7,500	6,300	260

Moisture				
Our Reference		219565-3	219565-4	219565-5
Your Reference	UNITS	SD-1	SD-2	SD-3
Date Sampled		13/06/2019	13/06/2019	13/06/2019
Type of sample		SOIL	SOIL	SOIL
Date prepared	-	17/06/2019	17/06/2019	17/06/2019
Date analysed	-	18/06/2019	18/06/2019	18/06/2019
Moisture	%	40	50	32

Organotin Compounds				
Our Reference		219565-3	219565-4	219565-5
Your Reference	UNITS	SD-1	SD-2	SD-3
Date Sampled		13/06/2019	13/06/2019	13/06/2019
Type of sample		SOIL	SOIL	SOIL
Date extracted	-	21/06/2019	21/06/2019	21/06/2019
Date analysed	-	22/06/2019	22/06/2019	22/06/2019
Tributyltin as Sn	µg/kg	36,000	52,000	4,900
Surrogate Triphenyltin	%	100	100	100

vTRH(C6-C10)/BTEXN in Water						
Our Reference	UNITS	219565-1	219565-2	219565-6	219565-7	219565-8
Your Reference		MW01	MW02	DUP-2	TB	TS
Date Sampled		13/06/2019	13/06/2019	13/06/2019	13/06/2019	13/06/2019
Type of sample		WATER	WATER	WATER	WATER	WATER
Date extracted	-	17/06/2019	17/06/2019	17/06/2019	17/06/2019	17/06/2019
Date analysed	-	18/06/2019	18/06/2019	18/06/2019	18/06/2019	18/06/2019
TRH C_6 - C_9	µg/L	<10	130	120	<10	[NA]
TRH C_6 - C_{10}	µg/L	<10	170	170	<10	[NA]
TRH C_6 - C_{10} less BTEX (F1)	µg/L	<10	70	74	<10	[NA]
Benzene	µg/L	<1	7	7	<1	97%
Toluene	µg/L	<1	43	40	<1	100%
Ethylbenzene	µg/L	<1	6	6	<1	99%
m+p-xylene	µg/L	<2	30	27	<2	97%
o-xylene	µg/L	<1	18	17	<1	95%
Naphthalene	µg/L	<1	<1	<1	<1	[NA]
Surrogate Dibromofluoromethane	%	108	106	106	106	109
Surrogate toluene-d8	%	99	98	97	99	100
Surrogate 4-BFB	%	101	101	102	95	101

svTRH (C10-C40) in Water				
Our Reference		219565-1	219565-2	219565-6
Your Reference	UNITS	MW01	MW02	DUP-2
Date Sampled		13/06/2019	13/06/2019	13/06/2019
Type of sample		WATER	WATER	WATER
Date extracted	-	17/06/2019	17/06/2019	17/06/2019
Date analysed	-	18/06/2019	18/06/2019	18/06/2019
TRH C_{10} - C_{14}	µg/L	<50	200	170
TRH C_{15} - C_{28}	µg/L	<100	170	110
TRH C_{29} - C_{36}	µg/L	<100	<100	<100
TRH >C_{10} - C_{16}	µg/L	<50	190	140
TRH >C_{10} - C_{16} less Naphthalene (F2)	µg/L	<50	190	140
TRH >C_{16} - C_{34}	µg/L	<100	140	<100
TRH >C_{34} - C_{40}	µg/L	<100	<100	<100
Surrogate o-Terphenyl	%	93	111	97

PAHs in Water				
Our Reference	UNITS	219565-1	219565-2	219565-6
Your Reference		MW01	MW02	DUP-2
Date Sampled		13/06/2019	13/06/2019	13/06/2019
Type of sample		WATER	WATER	WATER
Date extracted	-	17/06/2019	17/06/2019	17/06/2019
Date analysed	-	18/06/2019	18/06/2019	18/06/2019
Naphthalene	µg/L	<1	<1	<1
Acenaphthylene	µg/L	<1	<1	<1
Acenaphthene	µg/L	<1	<1	<1
Fluorene	µg/L	<1	<1	<1
Phenanthrene	µg/L	<1	<1	<1
Anthracene	µg/L	<1	<1	<1
Fluoranthene	µg/L	<1	<1	<1
Pyrene	µg/L	<1	<1	<1
Benzo(a)anthracene	µg/L	<1	<1	<1
Chrysene	µg/L	<1	<1	<1
Benzo(b,j+k)fluoranthene	µg/L	<2	<2	<2
Benzo(a)pyrene	µg/L	<1	<1	<1
Indeno(1,2,3-c,d)pyrene	µg/L	<1	<1	<1
Dibenzo(a,h)anthracene	µg/L	<1	<1	<1
Benzo(g,h,i)perylene	µg/L	<1	<1	<1
Benzo(a)pyrene TEQ	µg/L	<5	<5	<5
Total +ve PAH's	µg/L	NIL (+)VE	NIL (+)VE	NIL (+)VE
Surrogate p-Terphenyl-d14	%	99	93	90

HM in water - dissolved				
Our Reference	UNITS	219565-1	219565-2	219565-6
Your Reference		MW01	MW02	DUP-2
Date Sampled		13/06/2019	13/06/2019	13/06/2019
Type of sample		WATER	WATER	WATER
Date prepared	-	17/06/2019	17/06/2019	17/06/2019
Date analysed	-	17/06/2019	17/06/2019	17/06/2019
Arsenic-Dissolved	µg/L	<1	7	7
Cadmium-Dissolved	µg/L	0.8	<0.1	<0.1
Chromium-Dissolved	µg/L	1	7	7
Copper-Dissolved	µg/L	22	4	6
Lead-Dissolved	µg/L	2	<1	<1
Mercury-Dissolved	µg/L	<0.05	0.40	0.40
Nickel-Dissolved	µg/L	4	6	8
Zinc-Dissolved	µg/L	66	5	22

Method ID	Methodology Summary
Ext-054	Analysed by MPL Envirolab
Inorg-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
Metals-020	Determination of various metals by ICP-AES.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Metals-022	Determination of various metals by ICP-MS.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis. Note, the Total +ve TRH PQL is reflective of the lowest individual PQL and is therefore "Total +ve TRH" is simply a sum of the positive individual TRH fractions (>C10-C40).
Org-012	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013.
Org-012	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013. For soil results:- 1. 'EQ PQL'values are assuming all contributing PAHs reported as <PQL are actually at the PQL. This is the most conservative approach and can give false positive TEQs given that PAHs that contribute to the TEQ calculation may not be present. 2. 'EQ zero'values are assuming all contributing PAHs reported as <PQL are zero. This is the least conservative approach and is more susceptible to false negative TEQs when PAHs that contribute to the TEQ calculation are present but below PQL. 3. 'EQ half PQL'values are assuming all contributing PAHs reported as <PQL are half the stipulated PQL. Hence a mid-point between the most and least conservative approaches above. Note, the Total +ve PAHs PQL is reflective of the lowest individual PQL and is therefore "Total +ve PAHs" is simply a sum of the positive individual PAHs.
Org-013	Water samples are analysed directly by purge and trap GC-MS.
Org-014	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS.

Method ID	Methodology Summary
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater. Note, the Total +ve Xylene PQL is reflective of the lowest individual PQL and is therefore "Total +ve Xylenes" is simply a sum of the positive individual Xylenes.

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	[NT]
Date extracted	-			17/06/2019	[NT]	[NT]	[NT]	[NT]	17/06/2019	[NT]
Date analysed	-			19/06/2019	[NT]	[NT]	[NT]	[NT]	19/06/2019	[NT]
TRH C_6 - C_9	mg/kg	25	Org-016	<25	[NT]	[NT]	[NT]	[NT]	94	[NT]
TRH C_6 - C_{10}	mg/kg	25	Org-016	<25	[NT]	[NT]	[NT]	[NT]	94	[NT]
Benzene	mg/kg	0.2	Org-016	<0.2	[NT]	[NT]	[NT]	[NT]	109	[NT]
Toluene	mg/kg	0.5	Org-016	<0.5	[NT]	[NT]	[NT]	[NT]	94	[NT]
Ethylbenzene	mg/kg	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	88	[NT]
m+p-xylene	mg/kg	2	Org-016	<2	[NT]	[NT]	[NT]	[NT]	90	[NT]
o-Xylene	mg/kg	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	88	[NT]
naphthalene	mg/kg	1	Org-014	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	108	[NT]	[NT]	[NT]	[NT]	108	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	[NT]
Date extracted	-			17/06/2019	[NT]	[NT]	[NT]	[NT]	17/06/2019	[NT]
Date analysed	-			17/06/2019	[NT]	[NT]	[NT]	[NT]	18/06/2019	[NT]
TRH C_{10} - C_{14}	mg/kg	50	Org-003	<50	[NT]	[NT]	[NT]	[NT]	118	[NT]
TRH C_{15} - C_{28}	mg/kg	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	120	[NT]
TRH C_{29} - C_{36}	mg/kg	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	114	[NT]
TRH >C_{10} -C_{16}	mg/kg	50	Org-003	<50	[NT]	[NT]	[NT]	[NT]	118	[NT]
TRH >C_{16} -C_{34}	mg/kg	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	120	[NT]
TRH >C_{34} -C_{40}	mg/kg	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	114	[NT]
Surrogate o-Terphenyl	%		Org-003	130	[NT]	[NT]	[NT]	[NT]	72	[NT]

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	[NT]
Date extracted	-			17/06/2019	[NT]	[NT]	[NT]	[NT]	17/06/2019	[NT]
Date analysed	-			18/06/2019	[NT]	[NT]	[NT]	[NT]	18/06/2019	[NT]
Naphthalene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	106	[NT]
Acenaphthylene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	95	[NT]
Phenanthrene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	96	[NT]
Anthracene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	93	[NT]
Pyrene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	97	[NT]
Benzo(a)anthracene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	98	[NT]
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-012	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012	<0.05	[NT]	[NT]	[NT]	[NT]	97	[NT]
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	106	[NT]	[NT]	[NT]	[NT]	103	[NT]

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	[NT]
Date prepared	-			17/06/2019	[NT]	[NT]	[NT]	[NT]	17/06/2019	[NT]
Date analysed	-			17/06/2019	[NT]	[NT]	[NT]	[NT]	17/06/2019	[NT]
Arsenic	mg/kg	4	Metals-020	<4	[NT]	[NT]	[NT]	[NT]	110	[NT]
Cadmium	mg/kg	0.4	Metals-020	<0.4	[NT]	[NT]	[NT]	[NT]	106	[NT]
Chromium	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	108	[NT]
Copper	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	108	[NT]
Lead	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	109	[NT]
Mercury	mg/kg	0.1	Metals-021	<0.1	[NT]	[NT]	[NT]	[NT]	90	[NT]
Nickel	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	107	[NT]
Zinc	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	110	[NT]

QUALITY CONTROL: Organotin Compounds						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	[NT]
Date extracted	-			21/06/2019	[NT]	[NT]	[NT]	[NT]	21/06/2019	[NT]
Date analysed	-			22/06/2019	[NT]	[NT]	[NT]	[NT]	22/06/2019	[NT]
Tributyltin as Sn	µg/kg	0.5	Ext-054	<0.5	[NT]	[NT]	[NT]	[NT]	105	[NT]
Surrogate Triphenyltin	%		Ext-054	100	[NT]	[NT]	[NT]	[NT]	103	[NT]

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			17/06/2019	6	17/06/2019	18/06/2019		17/06/2019	[NT]
Date analysed	-			19/06/2019	6	18/06/2019	19/06/2019		18/06/2019	[NT]
TRH C_6 - C_9	µg/L	10	Org-016	<10	6	120	140	15	95	[NT]
TRH C_6 - C_{10}	µg/L	10	Org-016	<10	6	170	170	0	95	[NT]
Benzene	µg/L	1	Org-016	<1	6	7	7	0	96	[NT]
Toluene	µg/L	1	Org-016	<1	6	40	42	5	88	[NT]
Ethylbenzene	µg/L	1	Org-016	<1	6	6	6	0	95	[NT]
m+p-xylene	µg/L	2	Org-016	<2	6	27	28	4	99	[NT]
o-xylene	µg/L	1	Org-016	<1	6	17	17	0	96	[NT]
Naphthalene	µg/L	1	Org-013	<1	6	<1	<1	0	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-016	111	6	106	111	5	101	[NT]
Surrogate toluene-d8	%		Org-016	96	6	97	98	1	93	[NT]
Surrogate 4-BFB	%		Org-016	89	6	102	104	2	110	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W4	219565-2
Date extracted	-			17/06/2019	1	17/06/2019	17/06/2019		17/06/2019	17/06/2019
Date analysed	-			18/06/2019	1	18/06/2019	18/06/2019		18/06/2019	18/06/2019
TRH C_{10} - C_{14}	µg/L	50	Org-003	<50	1	<50	<50	0	77	99
TRH C_{15} - C_{28}	µg/L	100	Org-003	<100	1	<100	<100	0	79	100
TRH C_{29} - C_{36}	µg/L	100	Org-003	<100	1	<100	<100	0	81	100
TRH >C_{10} - C_{16}	µg/L	50	Org-003	<50	1	<50	<50	0	77	99
TRH >C_{16} - C_{34}	µg/L	100	Org-003	<100	1	<100	<100	0	79	100
TRH >C_{34} - C_{40}	µg/L	100	Org-003	<100	1	<100	<100	0	81	100
Surrogate o-Terphenyl	%		Org-003	98	1	93	74	23	85	111

QUALITY CONTROL: PAHs in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	219565-2
Date extracted	-			17/06/2019	1	17/06/2019	17/06/2019		17/06/2019	17/06/2019
Date analysed	-			18/06/2019	1	18/06/2019	18/06/2019		18/06/2019	18/06/2019
Naphthalene	µg/L	1	Org-012	<1	1	<1	<1	0	90	94
Acenaphthylene	µg/L	1	Org-012	<1	1	<1	<1	0	[NT]	[NT]
Acenaphthene	µg/L	1	Org-012	<1	1	<1	<1	0	[NT]	[NT]
Fluorene	µg/L	1	Org-012	<1	1	<1	<1	0	78	96
Phenanthrene	µg/L	1	Org-012	<1	1	<1	<1	0	72	84
Anthracene	µg/L	1	Org-012	<1	1	<1	<1	0	[NT]	[NT]
Fluoranthene	µg/L	1	Org-012	<1	1	<1	<1	0	70	86
Pyrene	µg/L	1	Org-012	<1	1	<1	<1	0	72	90
Benzo(a)anthracene	µg/L	1	Org-012	<1	1	<1	<1	0	[NT]	[NT]
Chrysene	µg/L	1	Org-012	<1	1	<1	<1	0	70	90
Benzo(b,j+k)fluoranthene	µg/L	2	Org-012	<2	1	<2	<2	0	[NT]	[NT]
Benzo(a)pyrene	µg/L	1	Org-012	<1	1	<1	<1	0	70	86
Indeno(1,2,3-c,d)pyrene	µg/L	1	Org-012	<1	1	<1	<1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	µg/L	1	Org-012	<1	1	<1	<1	0	[NT]	[NT]
Benzo(g,h,i)perylene	µg/L	1	Org-012	<1	1	<1	<1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	70	1	99	74	29	78	93

QUALITY CONTROL: HM in water - dissolved						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date prepared	-			17/06/2019	[NT]	[NT]	[NT]	[NT]	17/06/2019	[NT]
Date analysed	-			17/06/2019	[NT]	[NT]	[NT]	[NT]	17/06/2019	[NT]
Arsenic-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	102	[NT]
Cadmium-Dissolved	µg/L	0.1	Metals-022	<0.1	[NT]	[NT]	[NT]	[NT]	102	[NT]
Chromium-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	95	[NT]
Copper-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	101	[NT]
Lead-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	103	[NT]
Mercury-Dissolved	µg/L	0.05	Metals-021	<0.05	[NT]	[NT]	[NT]	[NT]	111	[NT]
Nickel-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	102	[NT]
Zinc-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	102	[NT]

Result Definitions

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

Quality Control Definitions

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

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

Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

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

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

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

Report Comments

Organotins analysed by MPL. Report no. 228307

CHAIN OF CUSTODY - Client

ENVIROLAB SERVICES

Client:	Zoic Environmental	**Client Project Name and Number:**	18166 GME & Sediment
Project Mgr:	Tyler Creese		
Sampler:	Edward Munnings	**PO No.:**	18166
Address:	Suite 1, Level 9, 189 Kent Street, Sydney NSW 2000	**Envirolab Services Quote No. :**	
		Date results required:	
Email:	edward.munnings@zoic.com.au; tyler.creese@zoic.com.au	**Or choose:**	standard
Phone:	92518070 **Fax:**	*Note: Inform lab in advance if urgent turnaround is required -*	*surcharge applies*

Envirolab Services
12 Ashley St, Chatswood, NSW, 2067

Phone: 02 9910 6200
Fax: 02 9910 6201
E-mail: ahie@envirolabservices.com.au

Contact: Aileen Hie

Sample Information				Tests Required														Comments
Envirolab Sample ID	Client Sample ID	Date sampled	Type of sample	Combo 3 (water)	Combo 3 (soil)	Tributyl Tin	BTEX, volatile TRH				Please send to Eurofins for TRH, BTEX, PAH, 8 Heavy Metals							Provide as much information about the sample as you can
1	MW01	13.06.2019	W	X														
2	MW02	13.06.2019	W	X														
3	SD-1	13.06.2019	S		X	X												
4	SD-2	13.06.2019	S		X	X												
5	SD-3	13.06.2019	S		X	X												
6	DUP-2	13.06.2019	W	X														
7	TRIP-2	13.06.2019	W								X							
8 7	TB	13.06.2019	W				X											
9 8	TS	13.06.2019	W				X											

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

Job No: 219565
Date Received: 13/06/19
Time Received: 16:31
Received by: SB
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

Relinquished by (company):	Zoic Environmental	**Received by (company):**	ELS Sydney
Print Name:	Edward Munnings	**Print Name:**	Sarah Bolton
Date & Time:	13.06.2019 13.6.19 2:30 pm	**Date & Time:**	13/06/19 16:31
Signature:		**Signature:**	

Samples Received: Cool or Ambient (circle one)
Temperature Recieved at: 11.3 (If applicable)
Transported by: Hand delivered / courier
Page No:

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

SAMPLE RECEIPT ADVICE

Client Details

Client	Zoic Environmental
Attention	Tyler Creese

Sample Login Details

Your reference	18166 GME & Sediment
Envirolab Reference	219565
Date Sample Received	13/06/2019
Date Instructions Received	13/06/2019
Date Results Expected to be Reported	21/06/2019

Sample Condition

Samples received in appropriate condition for analysis	Yes
No. of Samples Provided	5 WATER, 3 SOIL
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	11.3
Cooling Method	Ice
Sampling Date Provided	YES

Comments

Nil

Please direct any queries to:

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

Analysis Underway, details on the following page:

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

Sample ID	vTRH(C6-C10)/BTEXN in Soil	svTRH (C10-C40) in Soil	PAHs in Soil	Acid Extractable metalsin soil	Organotin Compounds	vTRH(C6-C10)/BTEXN in Water	svTRH (C10-C40) in Water	PAHsin Water	HM in water - dissolved
MW01						✓	✓	✓	✓
MW02						✓	✓	✓	✓
SD-1	✓	✓	✓	✓	✓				
SD-2	✓	✓	✓	✓	✓				
SD-3	✓	✓	✓	✓	✓				
DUP-2						✓	✓	✓	✓
TB						✓			
TS						✓			

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

Additional Info

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

Zoic Environmental Pty Ltd
Suite 1, Level 9, 189 Kent Street
Sydney
NSW 2000

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: **Tyler Creese**

Report **661065-W**
Project name 18166 GME & SEDIMENT
Received Date Jun 14, 2019

Client Sample ID			**TRIP-2**
Sample Matrix			**Water**
Eurofins | mgt Sample No.			**S19-Jn17847**
Date Sampled			**Jun 13, 2019**
Test/Reference	LOR	Unit	
Total Recoverable Hydrocarbons - 1999 NEPM Fractions			
TRH C6-C9	0.02	mg/L	0.12
TRH C10-C14	0.05	mg/L	0.08
TRH C15-C28	0.1	mg/L	0.3
TRH C29-C36	0.1	mg/L	0.2
TRH C10-36 (Total)	0.1	mg/L	0.58
BTEX			
Benzene	0.001	mg/L	0.006
Toluene	0.001	mg/L	0.039
Ethylbenzene	0.001	mg/L	0.005
m&p-Xylenes	0.002	mg/L	0.025
o-Xylene	0.001	mg/L	0.016
Xylenes - Total	0.003	mg/L	0.041
4-Bromofluorobenzene (surr.)	1	%	117
Total Recoverable Hydrocarbons - 2013 NEPM Fractions			
Naphthalene[N02]	0.01	mg/L	< 0.01
TRH C6-C10	0.02	mg/L	0.15
TRH C6-C10 less BTEX (F1)[N04]	0.02	mg/L	0.06
TRH >C10-C16	0.05	mg/L	0.11
TRH >C10-C16 less Naphthalene (F2)[N01]	0.05	mg/L	0.11
TRH >C16-C34	0.1	mg/L	0.4
TRH >C34-C40	0.1	mg/L	0.1
TRH >C10-C40 (total)*	0.1	mg/L	0.61
Polycyclic Aromatic Hydrocarbons			
Acenaphthene	0.001	mg/L	< 0.001
Acenaphthylene	0.001	mg/L	0.001
Anthracene	0.001	mg/L	0.001
Benz(a)anthracene	0.001	mg/L	0.001
Benzo(a)pyrene	0.001	mg/L	0.002
Benzo(b&j)fluoranthene[N07]	0.001	mg/L	0.002
Benzo(g.h.i)perylene	0.001	mg/L	0.002
Benzo(k)fluoranthene	0.001	mg/L	< 0.001
Chrysene	0.001	mg/L	0.001
Dibenz(a.h)anthracene	0.001	mg/L	< 0.001
Fluoranthene	0.001	mg/L	0.002
Fluorene	0.001	mg/L	< 0.001
Indeno(1.2.3-cd)pyrene	0.001	mg/L	0.001

Client Sample ID			TRIP-2
Sample Matrix			**Water**
Eurofins | mgt Sample No.			**S19-Jn17847**
Date Sampled			**Jun 13, 2019**
Test/Reference	LOR	Unit	
Polycyclic Aromatic Hydrocarbons			
Naphthalene	0.001	mg/L	< 0.001
Phenanthrene	0.001	mg/L	0.002
Pyrene	0.001	mg/L	0.002
Total PAH*	0.001	mg/L	0.017
2-Fluorobiphenyl (surr.)	1	%	110
p-Terphenyl-d14 (surr.)	1	%	89
Heavy Metals			
Arsenic (filtered)	0.001	mg/L	0.007
Cadmium (filtered)	0.0002	mg/L	< 0.0002
Chromium (filtered)	0.001	mg/L	0.010
Copper (filtered)	0.001	mg/L	0.004
Lead (filtered)	0.001	mg/L	< 0.001
Mercury (filtered)	0.0001	mg/L	0.0005
Nickel (filtered)	0.001	mg/L	0.007
Zinc (filtered)	0.005	mg/L	< 0.005

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 (regarding both quality and NATA accreditation).

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
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Sydney	Jun 17, 2019	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
BTEX	Sydney	Jun 17, 2019	14 Days
- Method: LTM-ORG-2150 VOCs in Soils Liquid and other Aqueous Matrices			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Sydney	Jun 17, 2019	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Sydney	Jun 17, 2019	
- Method: LTM-ORG-2010 TRH C6-C40			
Polycyclic Aromatic Hydrocarbons	Sydney	Jun 17, 2019	7 Days
- Method: LTM-ORG-2130 PAH and Phenols in Soil and Water			
Metals M8 filtered	Sydney	Jun 17, 2019	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			

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

Company Name:	Zoic Environmental Pty Ltd	**Order No.:**	18166	**Received:**	Jun 14, 2019 4:36 PM
Address:	Suite 1, Level 9, 189 Kent Street Sydney NSW 2000	**Report #:**	661065	**Due:**	Jun 25, 2019
		Phone:	02 9251 8070	**Priority:**	7 Day
		Fax:		**Contact Name:**	Tyler Creese
Project Name:	18166 GME & SEDIMENT				

Eurofins | mgt Analytical Services Manager : Andrew Black

Sample Detail						Eurofins | mgt Suite B7 (filtered metals)
Melbourne Laboratory - NATA Site # 1254 & 14271						
Sydney Laboratory - NATA Site # 18217						X
Brisbane Laboratory - NATA Site # 20794						
Perth Laboratory - NATA Site # 23736						
External Laboratory						
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**	
1	TRIP-2	Jun 13, 2019		Water	S19-Jn17847	X
Test Counts						1

Internal Quality Control Review and Glossary

General

1. 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, April 2011 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
9. 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 5.2 2018
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	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 50-150%-Phenols & PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.2 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

1. 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.
2. 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.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. 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.
6. 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.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. 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							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	mg/L	< 0.02			0.02	Pass	
TRH C10-C14	mg/L	< 0.05			0.05	Pass	
TRH C15-C28	mg/L	< 0.1			0.1	Pass	
TRH C29-C36	mg/L	< 0.1			0.1	Pass	
Method Blank							
BTEX							
Benzene	mg/L	< 0.001			0.001	Pass	
Toluene	mg/L	< 0.001			0.001	Pass	
Ethylbenzene	mg/L	< 0.001			0.001	Pass	
m&p-Xylenes	mg/L	< 0.002			0.002	Pass	
o-Xylene	mg/L	< 0.001			0.001	Pass	
Xylenes - Total	mg/L	< 0.003			0.003	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	mg/L	< 0.01			0.01	Pass	
TRH C6-C10	mg/L	< 0.02			0.02	Pass	
TRH >C10-C16	mg/L	< 0.05			0.05	Pass	
TRH >C16-C34	mg/L	< 0.1			0.1	Pass	
TRH >C34-C40	mg/L	< 0.1			0.1	Pass	
Method Blank							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	mg/L	< 0.001			0.001	Pass	
Acenaphthylene	mg/L	< 0.001			0.001	Pass	
Anthracene	mg/L	< 0.001			0.001	Pass	
Benz(a)anthracene	mg/L	< 0.001			0.001	Pass	
Benzo(a)pyrene	mg/L	< 0.001			0.001	Pass	
Benzo(b&j)fluoranthene	mg/L	< 0.001			0.001	Pass	
Benzo(g.h.i)perylene	mg/L	< 0.001			0.001	Pass	
Benzo(k)fluoranthene	mg/L	< 0.001			0.001	Pass	
Chrysene	mg/L	< 0.001			0.001	Pass	
Dibenz(a.h)anthracene	mg/L	< 0.001			0.001	Pass	
Fluoranthene	mg/L	< 0.001			0.001	Pass	
Fluorene	mg/L	< 0.001			0.001	Pass	
Indeno(1.2.3-cd)pyrene	mg/L	< 0.001			0.001	Pass	
Naphthalene	mg/L	< 0.001			0.001	Pass	
Phenanthrene	mg/L	< 0.001			0.001	Pass	
Pyrene	mg/L	< 0.001			0.001	Pass	
Method Blank							
Heavy Metals							
Arsenic (filtered)	mg/L	< 0.001			0.001	Pass	
Cadmium (filtered)	mg/L	< 0.0002			0.0002	Pass	
Chromium (filtered)	mg/L	< 0.001			0.001	Pass	
Copper (filtered)	mg/L	< 0.001			0.001	Pass	
Lead (filtered)	mg/L	< 0.001			0.001	Pass	
Mercury (filtered)	mg/L	< 0.0001			0.0001	Pass	
Nickel (filtered)	mg/L	< 0.001			0.001	Pass	
Zinc (filtered)	mg/L	< 0.005			0.005	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	%	75			70-130	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
TRH C10-C14	%	84			70-130	Pass	
LCS - % Recovery							
BTEX							
Benzene	%	92			70-130	Pass	
Toluene	%	89			70-130	Pass	
Ethylbenzene	%	86			70-130	Pass	
m&p-Xylenes	%	86			70-130	Pass	
o-Xylene	%	89			70-130	Pass	
Xylenes - Total	%	87			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	%	85			70-130	Pass	
TRH C6-C10	%	76			70-130	Pass	
TRH >C10-C16	%	85			70-130	Pass	
LCS - % Recovery							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	%	71			70-130	Pass	
Acenaphthylene	%	77			70-130	Pass	
Anthracene	%	74			70-130	Pass	
Benz(a)anthracene	%	83			70-130	Pass	
Benzo(a)pyrene	%	83			70-130	Pass	
Benzo(b&j)fluoranthene	%	85			70-130	Pass	
Benzo(g.h.i)perylene	%	86			70-130	Pass	
Benzo(k)fluoranthene	%	80			70-130	Pass	
Chrysene	%	79			70-130	Pass	
Dibenz(a.h)anthracene	%	87			70-130	Pass	
Fluoranthene	%	77			70-130	Pass	
Fluorene	%	76			70-130	Pass	
Indeno(1.2.3-cd)pyrene	%	88			70-130	Pass	
Naphthalene	%	70			70-130	Pass	
Phenanthrene	%	74			70-130	Pass	
Pyrene	%	75			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Arsenic (filtered)	%	94			70-130	Pass	
Cadmium (filtered)	%	92			70-130	Pass	
Chromium (filtered)	%	92			70-130	Pass	
Copper (filtered)	%	92			70-130	Pass	
Lead (filtered)	%	94			70-130	Pass	
Mercury (filtered)	%	99			70-130	Pass	
Nickel (filtered)	%	94			70-130	Pass	
Zinc (filtered)	%	127			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C6-C9	S19-Jn13611	NCP	%	100			70-130	Pass	
Spike - % Recovery									
BTEX				Result 1					
Benzene	S19-Jn13611	NCP	%	100			70-130	Pass	
Toluene	S19-Jn13611	NCP	%	102			70-130	Pass	
Ethylbenzene	S19-Jn13611	NCP	%	100			70-130	Pass	
m&p-Xylenes	S19-Jn13611	NCP	%	98			70-130	Pass	
o-Xylene	S19-Jn13611	NCP	%	101			70-130	Pass	
Xylenes - Total	S19-Jn13611	NCP	%	99			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	S19-Jn13611	NCP	%	102			70-130	Pass	
TRH C6-C10	S19-Jn13611	NCP	%	96			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic (filtered)	S19-Jn16359	NCP	%	90			70-130	Pass	
Cadmium (filtered)	S19-Jn16359	NCP	%	91			70-130	Pass	
Chromium (filtered)	S19-Jn16359	NCP	%	91			70-130	Pass	
Copper (filtered)	S19-Jn16359	NCP	%	91			70-130	Pass	
Lead (filtered)	S19-Jn16359	NCP	%	93			70-130	Pass	
Mercury (filtered)	S19-Jn16359	NCP	%	95			70-130	Pass	
Nickel (filtered)	S19-Jn16359	NCP	%	93			70-130	Pass	
Zinc (filtered)	S19-Jn16359	NCP	%	93			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	S19-Jn23494	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	S19-Jn23494	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Toluene	S19-Jn23494	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Ethylbenzene	S19-Jn23494	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
m&p-Xylenes	S19-Jn23494	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
o-Xylene	S19-Jn23494	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Xylenes - Total	S19-Jn23494	NCP	mg/L	< 0.003	< 0.003	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	S19-Jn23494	NCP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
TRH C6-C10	S19-Jn23494	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic (filtered)	S19-Jn16352	NCP	mg/L	0.001	0.001	3.0	30%	Pass	
Cadmium (filtered)	S19-Jn16352	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Chromium (filtered)	S19-Jn16352	NCP	mg/L	0.001	0.001	7.0	30%	Pass	
Copper (filtered)	S19-Jn16352	NCP	mg/L	0.005	0.005	<1	30%	Pass	
Lead (filtered)	S19-Jn16352	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Mercury (filtered)	S19-Jn16352	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Nickel (filtered)	S19-Jn16352	NCP	mg/L	0.004	0.004	6.0	30%	Pass	
Zinc (filtered)	S19-Jn16352	NCP	mg/L	0.068	0.069	1.0	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

Authorised By

Andrew Black	Analytical Services Manager
Andrew Sullivan	Senior Analyst-Organic (NSW)
Gabriele Cordero	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.

#661065

CHAIN OF CUSTODY - Client

ENVIROLAB SERVICES

Client:	Zoic Environmental	**Client Project Name and Number:**	18166 GME & Sediment
Project Mgr:	Tyler Creese		
Sampler:	Edward Munnings	**PO No.:**	18166
Address:	Suite 1, Level 9, 189 Kent Street, Sydney NSW 2000	**Envirolab Services Quote No. :**	
		Date results required:	
Email:	edward.munnings@zoic.com.au; tyler.creese@zoic.com.au	**Or choose:** standard	
Phone:	92518070 **Fax:**	*Note: Inform lab in advance if urgent turnaround is required -*	*surcharge applies*

Envirolab Services
12 Ashley St, Chatswood, NSW, 2067

Phone: 02 9910 6200
Fax: 02 9910 6201
E-mail: ahie@envirolabservices.com.au

Contact: Aileen Hie

Sample information				Tests Required														Comments
Envirolab Sample ID	Client Sample ID	Date sampled	Type of sample	Combo 3 (water)	Combo 3 (soil)	Tributyl Tin	BTEX, volatile TRH				Please send to Eurofins for TRH, BTEX, PAH, 8 Heavy Metals							Provide as much information about the sample as you can
1	MW01	13.06.2019	W	X														
2	MW02	13.06.2019	W	X														
3	SD-1	13.06.2019	S		X	X												
4	SD-2	13.06.2019	S		X	X												
5	SD-3	13.06.2019	S		X	X												
6	DUP-2	13.06.2019	W	X														
7	TRIP-2	13.06.2019	W								X							
~~8~~ 7	TB	13.06.2019	W				X											
9 8	TS	13.06.2019	W				X											

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

Job No: 219565
Date Received: 13/06/19
Time Received: 16:31
Received by: SIS
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

Relinquished by (company):	ZLS	**Received by (company):**	ELS Sydney
Print Name:	Kevin Wang	**Print Name:**	Sarah Bolton
Date & Time:	13.06.2019 13.6.19 2:30 pm	**Date & Time:**	13/06/19 6:31
Signature:	14/6/19	**Signature:**	

Zoic Environmental
Edward Munnings

Samples Received: Cool or Ambient (circle one)
Temperature Recieved at: 11.3 (if applicable)
Transported by: Hand delivered / courier

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

ABN – 50 005 085 521 e.mail : EnviroSales@eurofins.com web : www.eurofins.com.au

Sample Receipt Advice

Company name:	**Zoic Environmental Pty Ltd**
Contact name:	Tyler Creese
Project name:	18166 GME & SEDIMENT
COC number:	Not provided
Turn around time:	7 Day
Date/Time received:	Jun 14, 2019 4:36 PM
Eurofins | mgt reference:	**661065**

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).

Contact notes

If you have any questions with respect to these samples please contact:

Andrew Black on Phone : (+61) 2 9900 8490 or by e.mail: AndrewBlack@eurofins.com

Results will be delivered electronically via e.mail to Tyler Creese - tyler.creese@zoic.com.au.

Appendix D Enviro-Screen Report

ENVIRO-SCREEN

Property Details

380 Victoria Place, Drummoyne NSW

Search Date: 22 May 2019

Understanding your Report

Your Report has been produced by Land Insight and Resources (LI Resources).

Your Report is based on information available from public databases and sources at the date of reporting. The information gathered relates to land that is within a 200 to 2000 m radius (buffer zone) from the boundaries of the Property. A smaller or larger radius may be applied for certain records (as listed under records and as shown in report maps).

While every effort is made to ensure the details in your Report are correct, LI Resources cannot guarantee the accuracy or completeness of the information or data provided.

The report provided by LI Resources includes data listed on page 3 (table of contents). All sources of data and definitions are provided on the report maps and as listed in the Product Guide (Attached). For a full list of references, metadata, publications or additional information not provided in this report, please contact LI Resources at info@liresources.com.au.

The report does not include title searches; dangerous good searches or; property certificates (unless requested); or information derived from a physical inspection, such as hazardous building materials, areas of infilling or dumping/spilling of potentially contaminated materials. It is important to note that these documents and an inspection can contain information relevant to contamination that may not be identified by this Report.

This Report, and your use of it, is regulated by LI Resources Terms and Conditions (See LIR Product Guide).

Land Insight and Resources

ABN 70 167 080 837

phone: + 61 2 9979 1720

e-mail: info@liresources.com.au

https://liresources.com.au/

INDEX

Section 1 - Property Setting

1.1 SITE LOCATION MAP AND SENSITIVE RECEPTORS

Map 1 (500m Buffer)

Sensitive receptor	Category	Distance (m)*	Direction
Wharf	Wharf	5	north-east
Gladesville Bridge Marina	Marina	6	north-west
Wharf	Wharf	38	north-east
Howley Park	Park	48	north-west
Wharf	Wharf	107	north-east
Wharf	Wharf	111	north-east
Chiswick Wharf	Wharf	367	south-west
Huntleys Point Wharf	Wharf	373	north-west
Blackwall Point Reserve	Park	381	south-west
Swimming Pool	Swimming Pool	387	south-west
Wharf	Wharf	390	south-west
Five Dock Bay	Bay / Inlet / Basin	415	south
Chambers Park	Park	431	south-west
Betts Park	Park	458	north-west
Bob Smith Reserve	Park	482	south-east
Chiswick Park	Park	487	south-west

*Distance from the sensitive receptor point feature to the site boundary centroid.

1.2 PLANNING CONTROLS

Map 2 (onsite)

Zoning	R3	Medium Density Residential
Environmental Planning Instruments	Not identified	

1.3 SOIL LANDSCAPE

Map 3a (onsite)

Soil Landscape	ERIa	LAMBERT	**Soil Group**	EROSIONAL
Description	**Landscape-** undulating to rolling rises and low hills on Hawkesbury Sandstone. Local relief 20-120 m, slopes 20%. Rock outcrop >50%. Broad ridges, gently to moderately inclined slopes, wide rock benches with low broken scarps, small hanging valleys and areas of poor drainage. Open and closed heathland, scrub and occasional low eucalypt open-woodland. **Soils-** shallow (<50 cm) discontinuous Earthy Sands (Uc5.11, Uc5.22) and Yellow Earths (Gn2.2) on crests and insides of benches; shallow (<20 cm) Siliceous Sands/Lithosols (Uc1.2) on leading edges; shallow to moderately deep (<150 cm) Leached Sands (Uc2.21), Grey Earths (Gn2.81) and Gleyed Podzolic Soils (Dg4.21) in poorly drained areas; localised Yellow Podzolic Soils (Dy4.1, Dy5.2) associated with shale lenses. **Limitations-** very high soil erosion hazard, rock outcrop, seasonally perched watertables, shallow, highly permeable soil, very low soil fertility.			

1.4 ACID SULFATE SOIL

Map 3a (onsite)

	On the Property?	Within Record Search Buffer?
Acid Sulfate Soil Risk Maps (ASS) *(Table 1.5.1)*	Class 5	Class 5, Class 2

1.5 ATLAS OF AUSTRALIAN ACID SULFATE SOIL AND SALINITY

Map 3b (onsite)

ASRIS Atlas of Australian Sulfate Soils *(Table 1.5.2)*	Aa(p-)	ASS in subtidal marine environments	**Probability of Occurrence**	High Probability of occurrence
Hydrologic Soil Group *(Table 1.5.3)*	A - high			
Salinity Hazard	Not identified			

Table 1.5.1. Classification scheme in the ASS Planning Maps

Class of Land as shown on ASS Planning Maps	
1	Any works
2	Works below natural ground surface Works by which the watertable is likely to be lowered
3	Works beyond 1m below natural ground surface Works by which the watertable is likely to be lowered beyond 1m below natural ground surface
4	Works beyond 2m below natural ground surface Works by which the watertable is likely to be lowered beyond 2m below natural ground surface
5	Works within 500m of adjacent Class 1, 2, 3, or 4 land which are likely to lower the watertable below 1m AHD on adjacent Class 1, 2, 3 or 4 land.

For each class of land, the maps identify the type of works likely to present an environmental risk if undertaken in the particular class of land. If these types of works are proposed, further investigation is required to determine if ASS are actually present and whether they are present in such concentrations as to pose a risk to the environment.

Table 1.5.2. Australian Atlas of Acid Sulfate Soils[1] (ASS) map (CSIRO/NatCASS)

Code	Distinguishing soil/sediment properties, vegetation, landforms, or other characteristics
	Probability of Occurrence of ASS[1]
A	**High Probability of occurrence -** (>70% chance of occurrence in mapping unit)
B	**Low Probability of occurrence** - (6-70% chance of occurrence in mapping unit)
C	**Extremely low probability of occurrence** - (1-5% chance of occurrence in mapping unit)
D	**No probability of occurrence** - (<1% chance of occurrence in mapping unit)
x	**Disturbed ASS[1] terrain -** (ASS[1] material present below urban development).
u	**Unclassified** - (Insufficient information to classify map unit)
	Zones
a	Potential acid sulfate soil material and/or Monosulfidic Black Ooze (MBO).
b, c	Potential acid sulfate soil generally within upper 1 m.
c, d, e	ASS[1] generally within upper 1 m.
f	ASS[1] generally below 1 m from the surface
g	ASS[1], generally below 3 m from the surface.
h	ASS[1] generally within 1 m of the surface.
i, j	ASS[1] generally below 1 m of the surface.
k	ASS[1] material and/or Monosulfidic Black Ooze (MBO).
l, m, n, o, p, q	ASS[1] generally within upper 1 m in wet / riparian areas.

Subscripts to codes	
(a)	Actual acid sulfate soil (AASS) = sulfuric material.
(p)	Potential acid sulfate soil (PASS) = sulfidic material.
(q)	Monosulfidic Black Ooze (MBO) is organic ooze enriched by iron monosulfides.
Confidence levels	
(1)	All necessary analytical and morphological data are available
(2)	Analytical data are incomplete but are sufficient to classify the soil with a reasonable degree of confidence
(3)	No necessary analytical data are available, but confidence is fair, based on a knowledge of similar soils in similar environments
(4)	No necessary analytical data are available, and classifier has little knowledge or experience with ASS, hence classification is provisional

[1]Acid Sulfate Soils (ASS) are all those soils in which sulfuric acid may be produced, is being produced, or has been produced in amounts that have a lasting effect on main soil characteristics (Pons 1973). Acid sulfate soil (ASS) may include PASS or AASS + PASS. Potential acid sulfate soil (PASS) = sulfidic material. Actual acid sulfate soil (AASS) = sulfuric material.

Table 1.5.3. Hydrologic Soil Group

Code	Soil Group Characteristics
A	Soils having high infiltration rates, even when thoroughly wetted and consisting chiefly of deep, well to excessively-drained sands or gravels. These soils have a high rate of water transmission.
B	Soils having moderate infiltration rates when thoroughly wetted and consisting chiefly of moderately deep to deep, moderately fine to moderately coarse textures. These soils have a moderate rate of water transmission.
C	Soils having slow infiltration rates when thoroughly wetted and consisting chiefly of soils with a layer that impedes downward movement of water, or soils with moderately fine to fine texture. These soils have a slow rate of water transmission.
D	Soils having very slow infiltration rates when thoroughly wetted and consisting chiefly of clay soils with a high swelling potential, soils with a permanent high water table, soils with a claypan or clay layer at or near the surface, and shallow soils over nearly impervious material. These soils have a very slow rate of water transmission.

1.6 GEOLOGY AND TOPOGRAPHY

Map 4 (onsite)

Geology

Map Sheet	Symbol	Formation	Group	Era	Period	Description
Sydney 1:100,000 Geological Map	Rh	-	-	Mesozoic	Triassic	Medium to coarse grained quartz sandstone, very minor shale and laminite lenses

Topography

Topography	2-6mAHD

1.7 HYDROGEOLOGY AND GROUNDWATER BORES

Map 5a (500m - 2000m Buffer)

	On the Property?	Within Record Search Buffer?
Aquifer Type	Porous, extensive aquifers of low to moderate productivity	Porous, extensive aquifers of low to moderate productivity Porous, extensive highly productive aquifers
Drinking Water Catchments	Not identified	Not identified
Protected Riparian Corridor	Not identified	Not identified
UPSS Environmentally sensitive zone	Southern NSW area UPSS	Southern NSW area UPSS

	On the Property?	Within Record Search Buffer?
Wetlands	Not identified	Parramatta River / Lane Cove River
Groundwater Bores	Not identified	Yes, see 1.7.1

Table 1.7.1. Groundwater Bore Details

Groundwater Bore ID	Authorised Purpose	Completion Date	Drilled Depth (m)	Final Depth (m)	SWL[1] (m)	Salinity[1]	Yield[1] (L/s)	Distance (m)	Direction
GW106427	Household	01-01-50	3.00	3.00	3.00	-	10.00	560.00	north-east
GW107688	Unknown	21-12-06	-	-	-	-	-	1037.00	north-east

[1]The most recent data available from NSW Department of Industry – Lands & Water Division.

Table 1.7.2. Groundwater Bore Driller Lithology Details

Groundwater Bore ID	From Depth (m)	To Depth (m)	Lithology	Description	Distance (m)	Direction
Not identified	-	-	-	-	-	-

1.8 HYDROGEOLOGY AND OTHER BOREHOLES

Map 5b (2000m Buffer)

	On the Property?	Within Record Search Buffer?
Groundwater Vulnerability	Not identified	Not identified
Groundwater Exclusion Zones (Botany GMZ [1])	Not identified	Not identified
Hydrogeologic Unit	Not identified	Late Permian/Triassic sediments (porous media - consolidated)
Other known borehole investigations (500m buffer)	Not identified	Yes, see 1.8.1

1 - Botany Groundwater Management Zones (BGMZ): Zone 1 – the use of groundwater remains banned; Zones 2 to 4 – domestic groundwater use is banned, especially for drinking water, watering gardens, washing windows and cars, bathing, or to fill swimming pools

Groundwater Dependent Ecosystems

Name	On the Property?	Within Record Search Buffer?
Ecosystems that rely on the Surface expression of Groundwater	Not identified	Not identified
Ecosystems that rely on Subsurface presence of Groundwater	Not identified	High to Low potential for GW interaction

Table 1.8.1. Other known borehole investigations (Coal Seam Gas (CSG), Petroleum Wells and Other Boreholes) (500m buffer)

Borehole ID	Purpose	Project	Client/License	Date Drilled	Depth (m)	Distance (m)	Direction
BH261	Borehole	NWRL_R219 Sydney Metro Line 1 Contamination Assessment Report	North West Metro	06-11-08	18.41	138.78	north-west
BH264	Borehole			03-11-08	26.66	168.54	north-west
BH228	Borehole			14-11-08	64.2	252.51	north-west
BH229	Borehole			18-09-08	60.36	324.44	north-west
BH265	Borehole			30-10-08	11.45	395.78	north-west
BH4	Borehole	NWRL_R219 Sydney_Metro_line_1 Arup NorthWest Metro	North West Metro Team	23-10-00	0	411.46	south-west
BH4	Borehole				12	411.46	south-west
BH3	Borehole			23-10-00	7.92	423.16	south-west
BH3	Borehole				11.8	423.51	south-west
BH1	Borehole			13-09-00	1.7	426.49	south-west
BH1	Borehole				1.7	426.65	south-west
BH2	Borehole				6.1	431.09	south-west
BH2	Borehole			13-09-00	6.1	450.64	south-west

Section 2 Environmental Records Summary – Contamination and Potentially Contaminating Activities

2.1 PFAS INVESTIGATION PROGRAM

Map 5b (2000m Buffer)

Site	Address	Distance (m)	Direction
Not identified	-	-	-

2.2 CONTAMINATED LAND RECORD OF NOTICES ISSUED UNDER THE CLM ACT 1997

Map 6 (1000m Buffer)

Site Name[2]	Site ID	Address[1]	Notices	Distance (m)	Direction
Not identified	-	-	-	-	-

1. Some addresses do not contain specific street numbers. Records identified as being in the surrounding area have been added for information.
2. Former NSW EPA sites. These sites have been removed from the Record of Notices and/or the Sites Notified lists and are kept here for information purposes only.

2.3 SITES NOTIFIED AS CONTAMINATED TO THE NSW EPA

Map 6 (1000m Buffer)

Site Name[2]	Address[1]	Activity that caused Contamination	EPA Site Management Class[3]	Distance (m)	Direction
Former Sydney Wiremills (BHP) site	Blackwall Point ROAD CHISWICK	Other Industry	Regulation under CLM Act not required	944	South-west

1. Some addresses do not contain specific street numbers. Records identified as being in the surrounding area have been added for information.
2. Former NSW EPA sites. These sites have been removed from the Record of Notices and/or the Sites Notified lists and are kept here for information purposes only.
3. The EPA maintains a record of sites that have been notified to the EPA by owners or occupiers as contaminated land. The sites notified to the EPA and recorded on the register are at various stages of the assessment and/or remediation process. Table 5 outlines the possible management status that can be attributed to a registered contaminated site.

Table 2.3.1. EPA Site Management Class Explanation

EPA Site Management Class	
Under Assessment	The contamination is being assessed by the EPA to determine whether regulation is required. The EPA may require further information to complete the assessment. For example, the completion of management actions regulated under the planning process or Protection of the Environment Operations Act 1997. Alternatively, the EPA may require information via a notice issued under s77 of the Contaminated Land Management Act 1997 or issue a Preliminary Investigation Order.
Regulation under the CLM Act not required	The EPA has completed an assessment of the contamination and decided that regulation under the Contaminated Land Management Act 1997 is not required.
Regulation being finalised	The EPA has completed an assessment of the contamination and decided that the contamination is significant enough to warrant regulation under the Contaminated Land Management Act 1997. A regulatory approach is being finalised.
Contamination currently regulated under the CLM Act	The EPA has completed an assessment of the contamination and decided that the contamination is significant enough to warrant regulation under the Contaminated Land Management Act 1997 (CLM Act). Management of the contamination is regulated by the EPA under the CLM Act. Regulatory notices are available on the EPA's Contaminated Land Public Record.
Contamination currently regulated under the POEO Act	The EPA has completed an assessment of the contamination and decided that the contamination is significant enough to warrant regulation. Management of the contamination is regulated under the Protection of the Environment Operations Act 1997 (POEO Act). The EPA's regulatory actions under the POEO Act are available on the POEO public register.

EPA Site Management Class	
Contamination being managed via the planning process (EP&A Act)	The EPA has completed an assessment of the contamination and decided that the contamination is significant enough to warrant regulation. The contamination of this site is managed by the consent authority under the Environmental Planning and Assessment Act 1979 (EP&A Act) planning approval process, with EPA involvement as necessary to ensure significant contamination is adequately addressed. The consent authority is typically a local council or the Department of Planning and Environment.
Contamination formerly regulated under the CLM Act	The EPA has determined that the contamination is no longer significant enough to warrant regulation under the Contaminated Land Management Act 1997 (CLM Act). The contamination was addressed under the CLM Act.
Contamination formerly regulated under the POEO Act	The EPA has determined that the contamination is no longer significant enough to warrant regulation. The contamination was addressed by the appropriate consent authority via the planning process under the Environmental Planning and Assessment Act 1979 (EP&A Act).
Contamination was addressed via the planning process (EP&A Act)	The EPA has determined that the contamination is no longer significant enough to warrant regulation. The contamination was addressed by the appropriate consent authority via the planning process under the Environmental Planning and Assessment Act 1979 (EP&A Act).
Ongoing maintenance required to manage residual contamination (CLM Act)	The EPA has determined that ongoing maintenance, under the Contaminated Land Management Act 1997 (CLM Act), is required to manage the residual contamination. Regulatory notices under the CLM Act are available on the EPA's Contaminated Land Public Record.

2.4 OTHER CONTAMINATION ISSUES

Map 6 (1000m Buffer)

James Hardie Asbestos Waste Contamination Legacy

Site	Location	Type	Distance (m)	Direction
Not identified	-	-	-	-

Former Uranium Processing Site at Hunters Hill (NSW)

Site	Location	Distance (m)	Direction
Not identified	-	-	-

Former Gasworks Sites

Site	Location	Distance (m)	Direction
Not identified	-	-	-

Military Facilities

Site name	Defence code	Description	RCIP*	Distance (m)	Direction
Not identified	-		-	-	-

*RCIP (Regional Contamination Investigation Program)

2.5 POTENTIALLY CONTAMINATING ACTIVITIES

Map 7a (500m Buffer)

Aviation Fuel Depots/Terminals

Site name	Description	Status	Distance (m)	Direction
Not identified	-	-	-	-

Aviation Rescue Fire Fighting Facilities (ARFF)

Site name	Class	Status	Distance (m)	Direction
Not identified	-	-	-	-

Derelict Mines and Quarries

Deposit Name	Method	Description	Status	Distance (m)	Direction
Not identified	-	-	-	-	-

Dry Cleaners

Site name	Location	Status	Distance (m)	Direction
Not identified	-	-	-	-

Historical (Legacy) Landfills

Site name	Description	Distance (m)	Direction
Not identified	- -	-	-

Note: This is not an exhaustive list of all legacy landfills.

Liquid Fuel Depots/Terminals

Site name	Owner	Location	Status	Distance (m)	Direction
Not identified	-	-	-	-	-

Power Stations

Site name	Owner	Primary Fuel Type	Status	Distance (m)	Direction
Not identified	-	-	-	-	-

Service Stations

Site name	Owner	Location	Status	Distance (m)	Direction
Not identified	-	-	-	-	-

Substation / Switching Stations

Site name	Owner	Location	Status	Distance (m)	Direction
Not identified	-	-	-	-	-

Telephone Exchanges

Site name	Location	Status	Distance (m)	Direction
Not identified	-	-	-	-

Waste Management Facilities

Site name	Owner	Class	Status	Distance (m)	Direction
Not identified	-	-	-	-	-

Wastewater Treatment Facilities

Site name	Operator	Class	Status	Distance (m)	Direction
Not identified	-	-	-	-	-

Unexploded Ordnance (UXO) Sites - Department of Defence (DoD)

Site name	Site ID	Category	Description	Distance (m)	Direction
Not identified	-		-	-	-

2.6 OTHER CURRENT POTENTIALLY CONTAMINATING ACTIVITIES

Map 7b (200m Buffer)

Current Commercial and Trade Data

Site name	Category	Location	Status*	Distance (m)	Direction
Superior Marine Services	Boat repair shop	380 Victoria Pl, Drummoyne NSW 2047	Current	0	onsite
X-Yachts Australia	Boat Dealer Importer	380 Victoria Pl, Drummoyne NSW 2047	Current	0	onsite
Drummoyne Auto Care	Repair Facility	364 Victoria Pl, Drummoyne NSW 2047	Former	62	South-east

*Data is current as when this report was created. However due to the turnover of business locations, some addresses may be former.

Underground Storage Tank (UST)

Premises	Tank type	Status*	Distance (m)	Direction
Not identified	-	-	-	-

Note: This is not an exhaustive list of all UST's.

Parramatta River Catchment Land Use Areas – Zoning Changes

Land Use 1943	Land Use 2005	Distance (m)	Direction
Not identified	-	-	-

Parramatta River Catchment Land Use Areas – Reclamation Areas

	On the Property?	Within Record Search Buffer?
Reclamation Area	Yes	Yes

*Many areas of Parramatta river have been reclaimed, often being used as rubbish dumps.

2.7 NPI INDUSTRIAL FACILITIES

Map 8 (500m Buffer)

Facility name	Address	Primary ANZSIC Class	Latest report	Distance (m)	Direction
Not identified	-	-	-	-	-

2.8 LICENSING UNDER THE POEO ACT 1997

Map 8 (500m Buffer)

Licences

Licence holder	Nº	Location Name	Premise Address	Fee Based Activity	Distance (m)	Direction
Not identified		-	-	-	-	-

Delicensed Premises still Regulated by EPA, Licences Surrendered, Clean Up and Penalty Notices

Licence holder	Nº	Name	Premise Address	Fee Based Activity	Status	Distance (m)	Direction
Not identified		-	-	-	-	-	-

2.9 PUBLIC REGISTER OF PROPERTIES AFFECTED BY LOOSE-FILL ASBESTOS INSULATION

Map 8 (onsite)

Address	Match Found
Not identified	-

HISTORICAL COMMERCIAL & TRADE DIRECTORY DATA

1932 HISTORICAL COMMERCIAL & TRADE DIRECTORY DATA (200m Buffer)

Activity	Name	Address	Positional accuracy	Distance (m) *	Direction
Motor Engineers and Repairers	Carnemolia F	364 Victoria Road, Drummoyne	Address	47m	East
Motor Engineers and Repairers	Vincen HE	352 Victoria Road, Drummoyne	Address	98m	East
Motor Engineers and Repairers	Johnson PE	340 Victoria Road, Drummoyne	Address	149m	East
Motor Cars, Lorries & Garages	Drummoyne Motories	336 Victoria Road, Drummoyne	Address	165m	East
Motor Engineers and Repairers	Drummoyne Motories	336 Victoria Road, Drummoyne	Address	165m	East

* If no distance is provided, address no longer exists.

1940 HISTORICAL COMMERCIAL & TRADE DIRECTORY DATA (200m Buffer)

Activity	Name	Address	Positional accuracy	Distance (m) *	Direction
Motor Garages	Carnemolla F	364 Victoria, Drummoyne	Address	47m	East

* If no distance is provided, address no longer exists.

1950 HISTORICAL COMMERCIAL & TRADE DIRECTORY DATA (200m Buffer)

Activity	Name	Address	Positional accuracy	Distance (m) *	Direction
Boats & Launches - Builders &/or For Sale	Lucas J F & Sons	380 Victoria Road, Drummoyne	Address	On Site	
Boats & Launches - For Hire	Lucas J F&Sons	380 Victoria Road, Drummoyne	Address	On Site	
Fishing Nets	Netmakers & Co	364 Victoria Road, Drummoyne	Address	47m	East
Motor Garages	Carnemolla F	364 Victoria Road, Drummoyne	Address	47m	East
Ship Repairs	Drummoyne Marine Service	342 Victoria Road, Drummoyne	Address	118m	East
Boats & Launches - Builders &/or For Sale	Drummoyne Marine Service	342-344 Victoria Road, Drummoyne	Address	118m	East
Motor Engineers & Repairers	Couch H L	336 Victoria Road, Drummoyne	Address	165m	East
Motor Garages	Brown's Central Motors	Victoria Road, Drummoyne	Street		
Motor Service Stations	Brown's Central Motors	Victoria Road, Drummoyne	Street		

* If no distance is provided, address no longer exists.

1965 HISTORICAL COMMERCIAL & TRADE DIRECTORY DATA (200m Buffer)

Activity	Name	Address	Positional accuracy	Distance (m) *	Direction
Boats & Launches—Builders &/or For Sale	LUCAS J F & SONS	378-380 VictoriaRd, Drummoyne	Address	On Site	
Fishing Nets	NETMAKERS& CO	364 VictoriaRd, Drummoyne	Address	47m	East
Motor Garages	Carnemolla Frank&Sons	364 VictoriaRd, Drummoyne	Address	47m	East
Builders & Contractors	Cleaver C J	353 VictoriaRd, Drummoyne	Address	49m	South
Taxis	Askew J H	342 VictoriaRd, Drummoyne	Address	118m	East
Engineers—Manufacturing	Eudio Pty Ltd	347a VictoriaRd, Drummoyne	Address	142m	South
Motor Engineers & Repairers	Couch H L	336 VictoriaRd, Drummoyne	Address	165m	East
Chemists—Pharmaceutical	Pinerua F G	VictoriaRd, Drummoyne	Street		
Motor Cars & Trucks—New	Browns' Central Motors Pty Ltd	VictoriaRd, Drummoyne	Street		

* If no distance is provided, address no longer exists.

1970 HISTORICAL COMMERCIAL & TRADE DIRECTORY DATA (200m Buffer)

Activity	Name	Address	Positional accuracy	Distance (m) *	Direction
BOAT, LAUNCH & YACHT BUILDERS &/OR REPAIRERS	Lucas, J. F. & Sons,	380 Victoria Road, Drummoyne	Address	On Site	
BOAT, LAUNCH & YACHT SALES & SERVICE	Lucas, J. F. & Sons,	380 Victoria Road, Drummoyne	Address	On Site	
BOATS, LAUNCHES & YACHTS—FOR HIRE	Lucas, J. F. & Sons,	380 Victoria Road, Drummoyne	Address	On Site	
SLIPWAYS	Lucas, J. F. & Sons,	380 Victoria Road, Drummoyne	Address	On Site	
MOTOR GARAGES/ENGINEERS	Carnemolla, Frank Pty. Ltd.,	364 Victoria Pl., Drummoyne	Address	47m	East
NET MAKERS—GENERAL	Netmakers & Co.,	364 Victoria Pl., Drummoyne	Address	47m	East
MOTOR SERVICE STATIONS—PETROL, OIL, Etc. DRUMMOYNE	Carnemolla, F.&Son,	364 Victoria Rd., Drummoyne	Address	47m	East
SHIP BUILDERS/REPAIRERS	Drummoyne Marine Service,	344 Victoria Road, Drummoyne	Address	118m	East
SLIPWAYS	Drummoyne Marine Service,	344 Victoria Road, Drummoyne	Address	118m	East

WELDERS—ELECTRIC &/OR OXY	Drummoyne Marine Service,	344 Victoria Road, Drummoyne	Address	118m	East
ENGINEERS—MARINE	Couch, H. L.,	336 Victoria Road, Drummoyne	Address	165m	East
MOTOR ELECTRICIANS	Couch, Howard L.,	336 Victoria Road, Drummoyne	Address	165m	East
MOTOR GARAGES/ENGINEERS	Couch, H. L.,	336 Victoria Rd., Drummoyne	Address	165m	East
WELDERS—ELECTRIC &/OR OXY	Couch, Howard L.,	336 Victoria Road, Drummoyne	Address	165m	East

* If no distance is provided, address no longer exists.

1974 HISTORICAL COMMERCIAL & TRADE DIRECTORY DATA (200m Buffer)

Activity	Name	Address	Positional accuracy	Distance (m) *	Direction
Boats (All Types) - Builders &/or Repairers	Lucas Marina Pty Ltd	378 Victoria Place, Drummoyne	Address	On Site	
Marinas	Lucas Marina Pty Ltd	378 Victoria Place, Drummoyne	Address	On Site	
Motor Cars - Used	Easy Credit Car Sales	359 Victoria Place, Drummoyne	Address	21m	South
Motor Garages	Carnemolla Frank & Sons	364 Victoria Road, Drummoyne	Address	47m	East
Cosmetic - Mfrs &/or W'salers	Muron Enterprises	332 Victoria Place, Drummoyne	Address	185m	East

* If no distance is provided, address no longer exists.

1980 HISTORICAL COMMERCIAL & TRADE DIRECTORY DATA (200m Buffer)

Activity	Name	Address	Positional accuracy	Distance (m) *	Direction
Boats - Builders &/or Repairers	Lucas Marina Pty Ltd	380 Victoria Place, Drummoyne	Address	On Site	
Boats - Builders &/or Repairers	Sportcruisers Pty Ltd	380 Victoria Place, Drummoyne	Address	On Site	
Marinas	Lucas Marina Pty Ltd	380 Victoria Place, Drummoyne	Address	On Site	
Motor Cars - Used	Easy Credit Car Sales	359 Victoria Place, Drummoyne	Address	21m	South
Fishing Nets	Netmakers & Co	364 Victoria Place, Drummoyne	Address	47m	East
Motor Service Stations & Garages	B P Aust Ltd	364 Victoria Place, Drummoyne	Address	47m	East
Motor Service Stations & Garages	Carnemolia Frank & Sons	364 Victoria Place, Drummoyne	Address	47m	East

* If no distance is provided, address no longer exists.

1990 HISTORICAL COMMERCIAL & TRADE DIRECTORY DATA (200m Buffer)

Activity	Name	Address	Positional accuracy	Distance (m) *	Direction
Air Conditioning - Commercial & Industrial	Technoffice	380 Victoria Place, Drummoyne	Address	On Site	
Boat & Yacht Builders &/or Repairers	Gladesville Bridge Marina	380 Victoria Place, Drummoyne	Address	On Site	
Boat Hire - Drive Yourself	Party Boats	380 Victoria Place, Drummoyne	Address	On Site	
Boat & Yacht Sales	Gladesville Bridge Yacht Sales	380 Victoria Place, Drummoyne	Address	On Site	
Boat & Yacht Sales	Sydney Boat Auctions	380 Victoria Place, Drummoyne	Address	On Site	
Cleaning Contractors-Commercial & Industrial	Window Cleaning Co Pty Ltd The	355 Victoria Place, Drummoyne	Address	33m	South
Fishing Net	Netmakers & Co	364 Victoria Road, Drummoyne	Address	47m	East
Motor Service Stations & Garages	Carnemolla Frank & Sons	364 Victoria Place, Drummoyne	Address	47m	East
Motor Service Stations & Garages	Gentex Racing Division	364 Victoria Place, Drummoyne	Address	47m	East
Importers &/Or Imported Products	Inter Hanno Pty Ltd	334 Victoria Place, Drummoyne	Address	165m	East
Boat Charter Services	B & J Yacht Charter	334 Victoria Place, Drummoyne	Address	165m	East
Boat Hire - Drive Yourself	B & J Yacht Charter	334 Victoria Place, Drummoyne	Address	165m	East

* If no distance is provided, address no longer exists.

Land Insight and Resources use a number of different address georeferencing methods and characterised them according to the following criteria: completeness (match rates) and positional accuracy. When address do not contain specific street numbers or a match is not found, records identified as being in the surrounding areas are included for reference.

Historical dataset positional accuracy and georeferencing results explanation

Positional accuracy	Georeferenced	Description
Address	Located to the address level	*When street address and names fully matched.*
Street	Located to the street centroid	*When street names match but no exact address was found. Location is approximate.*
Place	Located to the structure, building or complex	*When building, residential complex or structure name match but no exact address was found. Location is approximate.*
Suburb	Located to the suburb area	*When suburb name match but no exact address was found. Location is approximate.*
Not georeferenced	Not found	*When it was not georeferenced, and address could not be found.*

Section 3 - Other Environmental Constraints

3.1 FEDERAL, STATE AND LOCAL HERITAGE

Map 9 (200m Buffer)

Local Environment Plan (LEP) Heritage

Site Name	Site ID	Significance	Type	Distance (m)*	Direction
Howley Park, Five Dock Point	I475	Local	Item - General	0	North-west
Abutments Gladesville Bridge, Five Dock Point	I474	Local	Item - General	75	North-west
House	I473	Local	Item - General	98	South-east
Boatshed	I472	Local	Item - General	108	South-east
House	I469	Local	Item - General	139	South-east
House	I470	Local	Item - General	139	South-east
House	I471	Local	Item - General	139	South-east

National Heritage List (NHL)

Site Name	Site ID	Class	Status	Distance (m)	Direction
Not identified	-	-	-	-	-

Register of the National Estate (RNE)

Site Name	Site ID	Class	Status	Distance (m)	Direction
Parramatta and Lane Cove Rivers Landscapes	14309	Natural	Indicative Place	0	onsite

Non-Aboriginal heritage item (Local)

Site Name	Site ID	Class	Status	Distance (m)	Direction
Not identified	-	-	-	-	-

Non-Aboriginal heritage item (SHR)*

Site Name	Site ID	Listing nº	Plan nº	Distance (m)	Direction
Not identified	-	-	-	-	-

*State Heritage Register

Commonwealth Heritage List (CHL)

Site Name	Site ID	Class	Status	Distance (m)	Direction
Not identified	-	-	-	-	-

World Heritage Area (WHA)

Site Name	Site ID	IUCN	Status	Distance (m)	Direction
Not identified	-	-	-	-	-

3.2 NATURAL HAZARDS & COASTAL MANAGEMENT

Map 10 (500m Buffer)

Bush Fire Prone Land (BPL)

Category	On the Property?	Within Record Search Buffer?
Not identified	-	-

Fire History (Wildfires and Prescribed Burns)

Category	On the Property?	Within Record Search Buffer?
Not identified	-	-

Flood Hazard Area

Name	On the Property?	Within Record Search Buffer?
Not identified	-	-

3.3 STATE ENVIRONMENTAL PLANNING POLICY (COASTAL MANAGEMENT)

Map 10 (500m Buffer)

Type	On the Property?	Within Record Search Buffer?
Coastal Wetlands Proximity Area	Not identified	Yes
Coastal Wetlands	Not identified	Yes
Coastal Environment Area Map	Yes	Yes
Coastal Use Area Map	Yes	Yes

LAND INSIGHT & RESOURCES

A 4307/4 Daydream Street, Warriewood NSW 2102
T 02 9979 1720
E info@liresources.com.au
W www.liresources.com.au

ATTACHMENT A

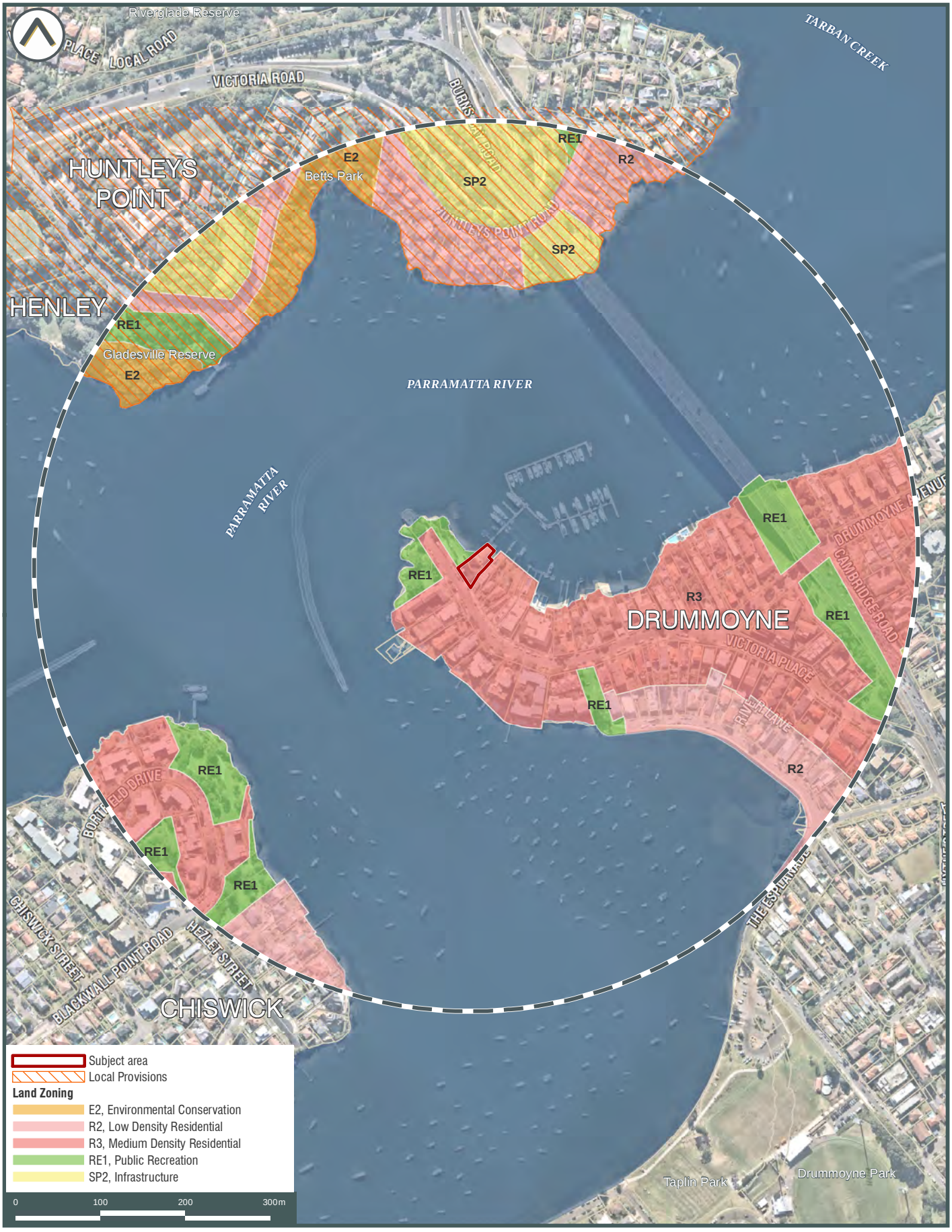
Report Maps

SUBJECT AREA AND SENSITIVE RECEPTORS

LAND INSIGHT & RESOURCES

MAP 1

Enviro-Screen

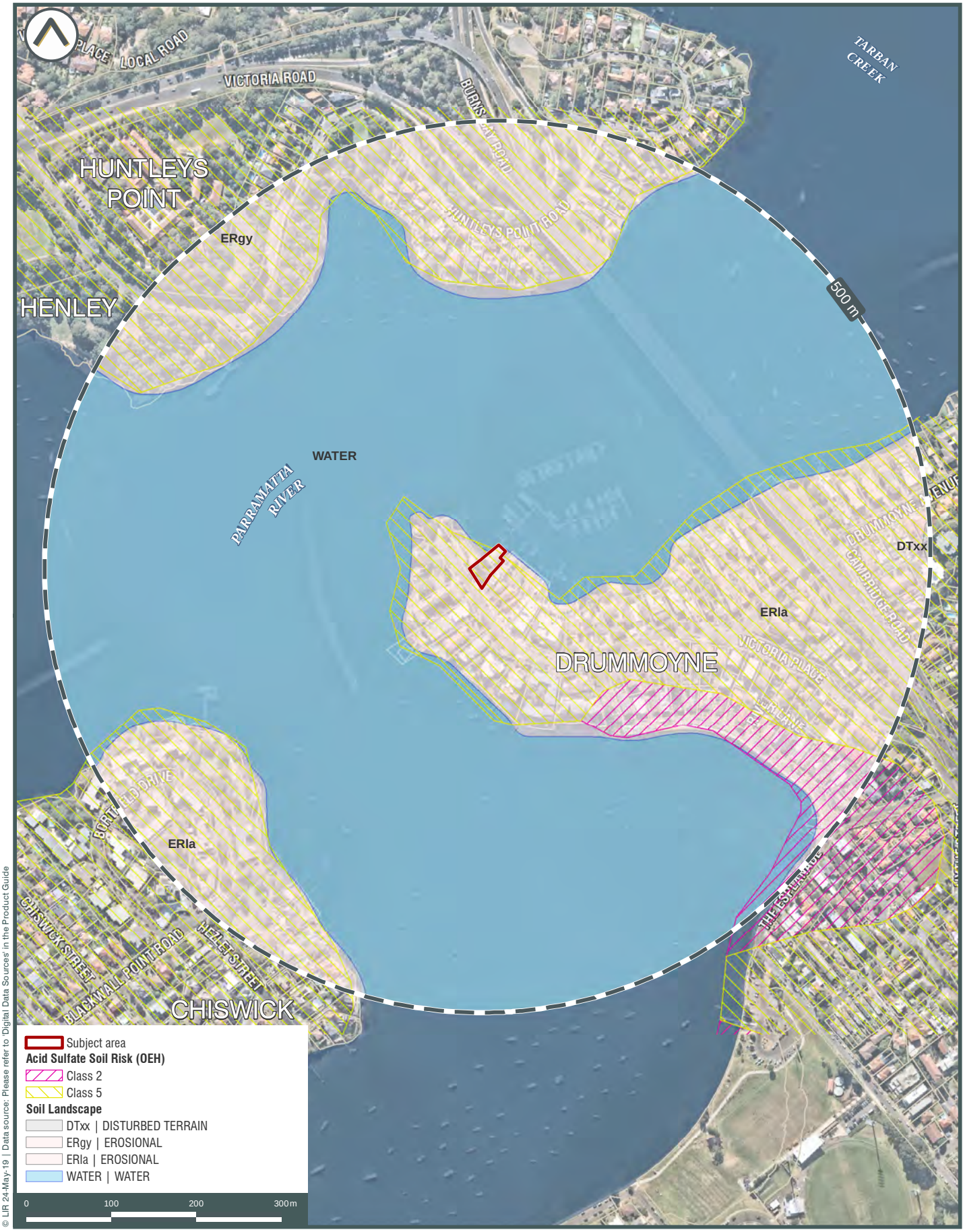


PLANNING CONTROLS

LAND INSIGHT & RESOURCES

MAP 2

Enviro-Screen

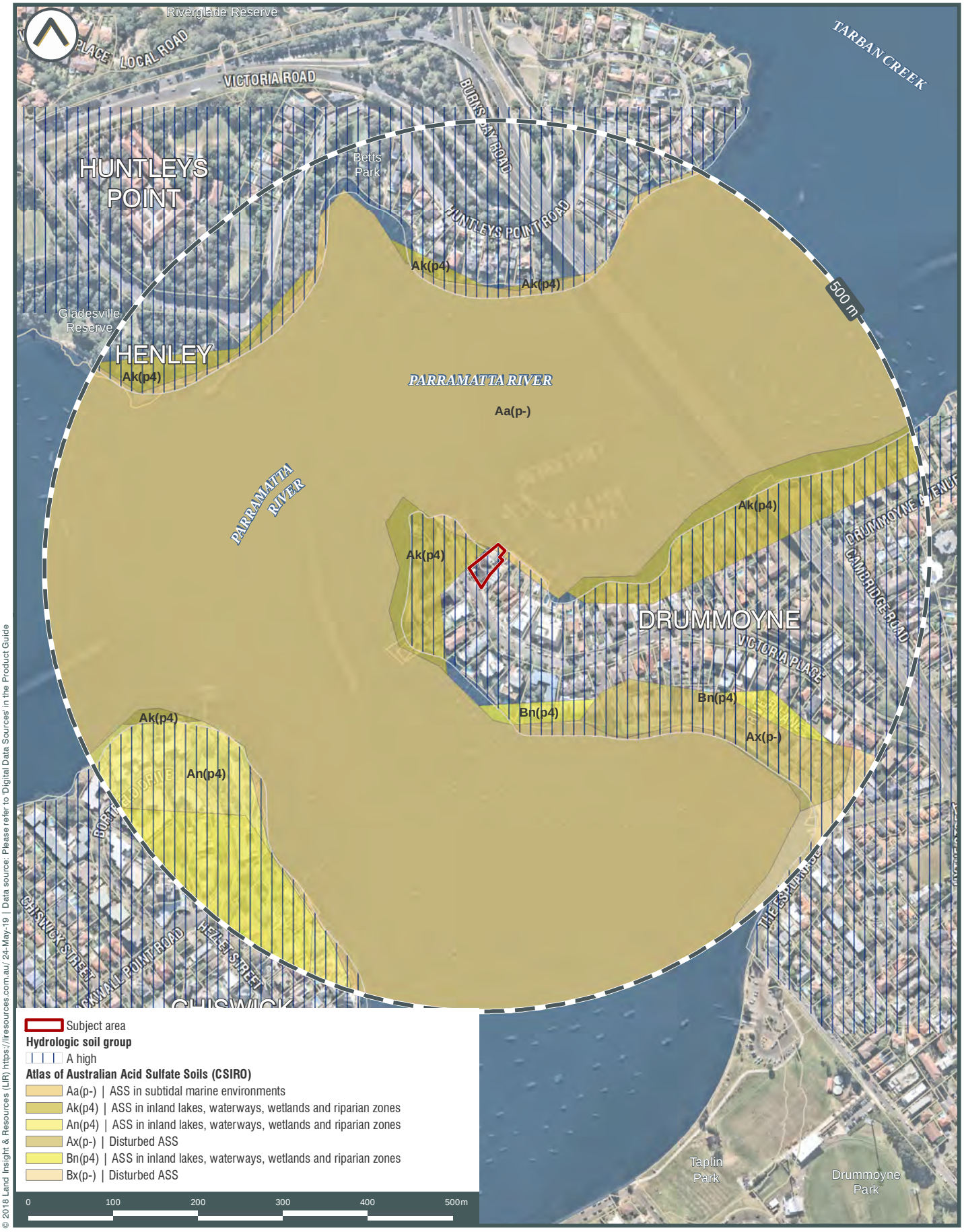


SOIL LANDSCAPES AND ACID SULFATE SOIL RISK

LAND INSIGHT & RESOURCES

MAP 3a

Enviro-Screen



ATLAS OF AUSTRALIAN ACID SULFATE SOILS AND SALINITY

LAND INSIGHT & RESOURCES

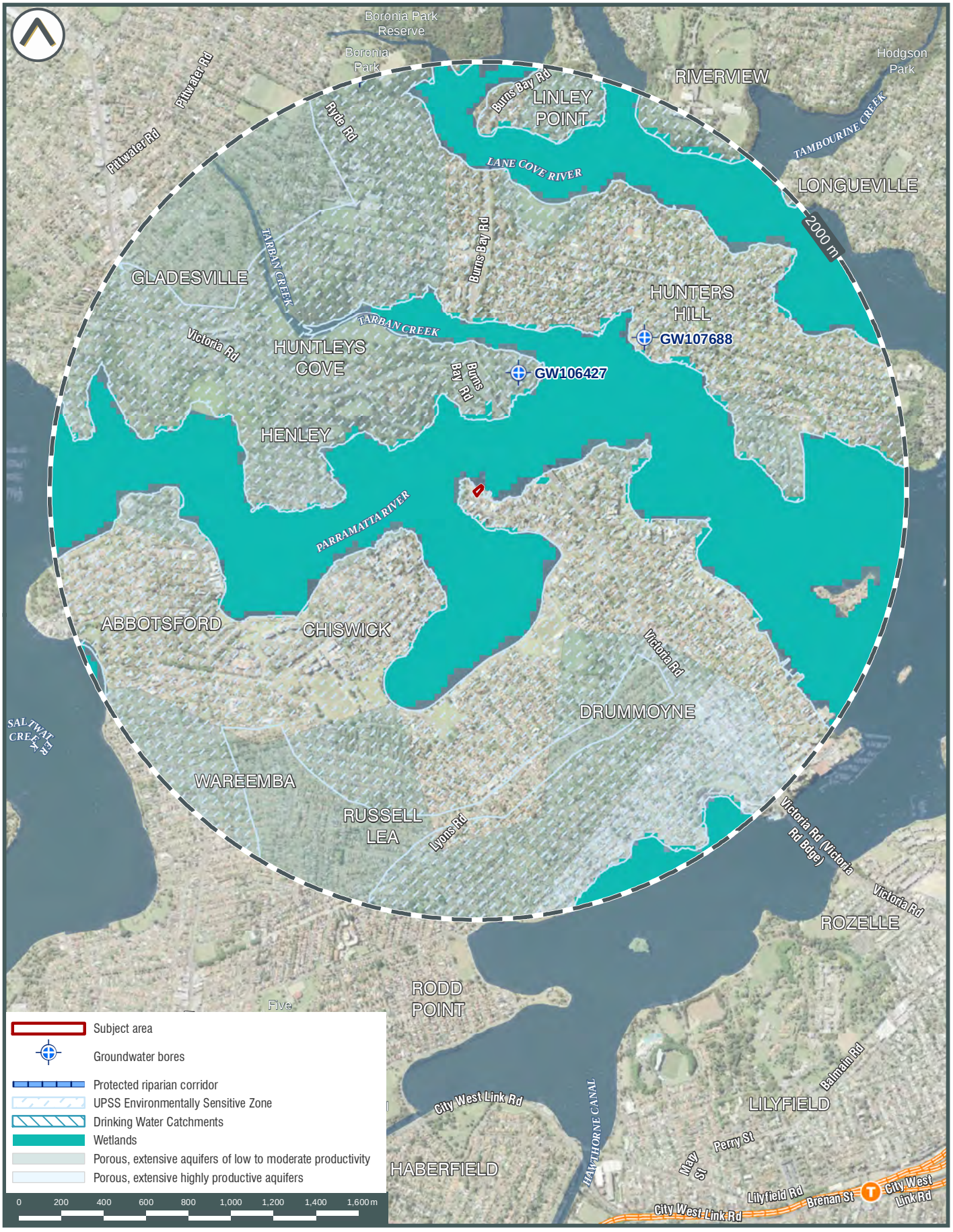
MAP 3b

Enviro-Screen

GEOLOGY AND TOPOGRAPHY

LAND INSIGHT & RESOURCES

MAP 4 Enviro-Screen

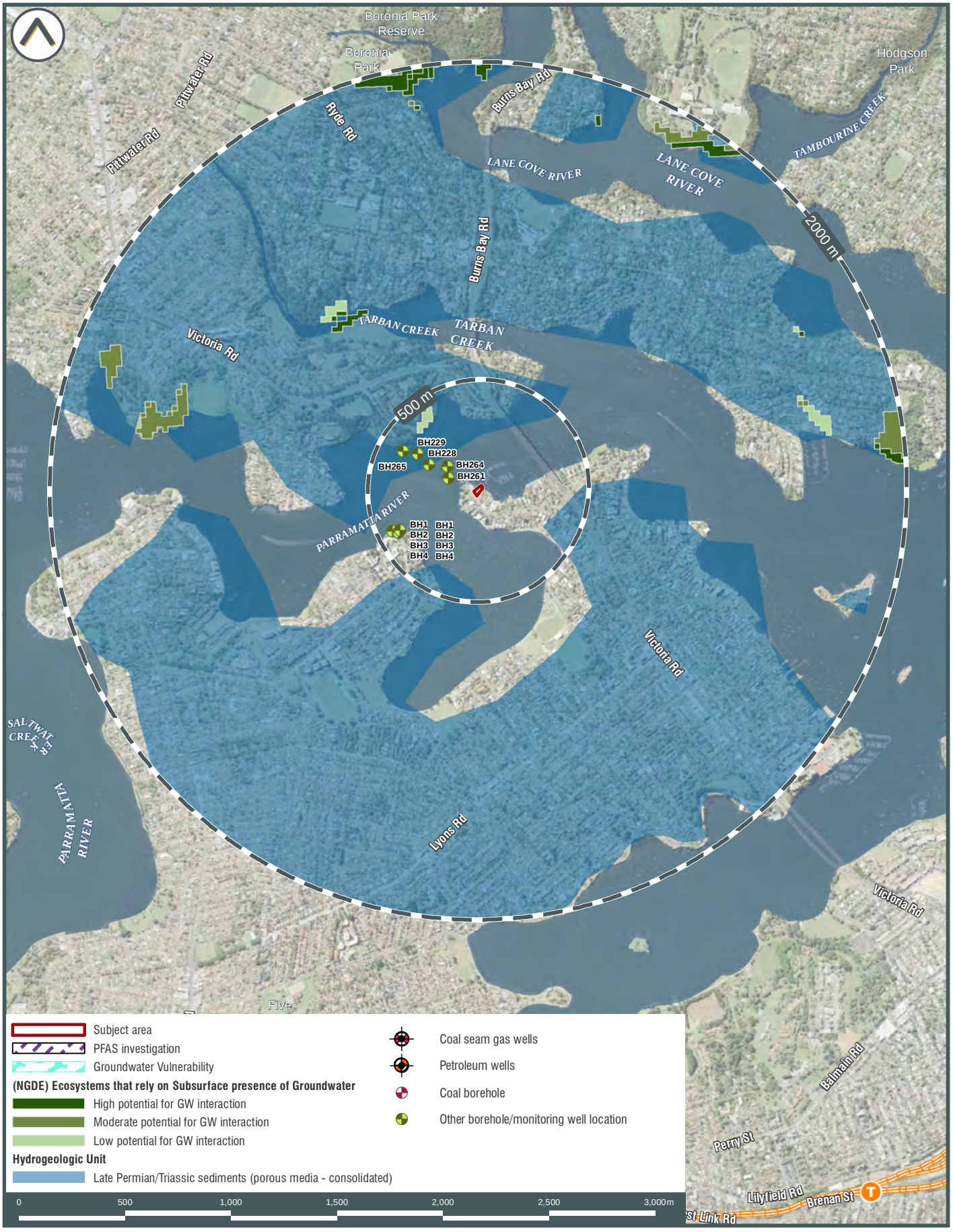


HYDROGEOLOGY AND GROUNDWATER BORES

LAND INSIGHT & RESOURCES

MAP 5a

Enviro-Screen



HYDROGEOLOGY AND OTHER BOREHOLES

LAND INSIGHT & RESOURCES

MAP 5b

Enviro-Screen

EPA RECORDS AND OTHER REGULATORY CONTAMINATION ISSUES

LAND INSIGHT & RESOURCES

MAP 6

Enviro-Screen

POTENTIALLY CONTAMINATING ACTIVITIES

LAND INSIGHT & RESOURCES

MAP 7a

Enviro-Screen

CURRENT COMMERCIAL AND TRADE DATA

LAND INSIGHT & RESOURCES

MAP 7

LICENSING UNDER THE POEO ACT 1997 AND NPI FACILITIES

LAND INSIGHT & RESOURCES

MAP 8

Enviro-Screen

HERITAGE

LAND INSIGHT & RESOURCES

MAP 9

Enviro-Screen

NATURAL HAZARD AND COASTAL MANAGEMENT

LAND INSIGHT & RESOURCES

MAP 10

Enviro-Screen

ATTACHMENT B

Historical Imagery

LIR-00678 Aerial Photograph 1930 23 05 2019. Data source: Please refer to 'Digital Data Sources' in the Product Guide

HISTORIC AERIAL PHOTOGRAPH - 1930

LAND INSIGHT & RESOURCES

MAP 11

LIR-00678 Aerial Photograph 1943 23 05 2019. Data source: Please refer to 'Digital Data Sources' in the Product Guide

HISTORIC AERIAL PHOTOGRAPH - 1943

LAND INSIGHT & RESOURCES

MAP 12

LIR-00678 Aerial Photograph 1961 23 05 2019. Data source: Please refer to 'Digital Data Sources' in the Product Guide

HISTORIC AERIAL PHOTOGRAPH - 1961

LAND INSIGHT & RESOURCES

MAP 13

LIR-00678 Aerial Photograph 1965 23 05 2019. Data source: Please refer to 'Digital Data Sources' in the Product Guide

HISTORIC AERIAL PHOTOGRAPH - 1965

LAND INSIGHT & RESOURCES

MAP 14

LIR-00678 Aerial Photograph 1971 23 05 2019. Data source: Please refer to 'Digital Data Sources' in the Product Guide

HISTORIC AERIAL PHOTOGRAPH - 1971

LAND INSIGHT & RESOURCES

MAP 15

LIR-00678 Aerial Photograph 1975 23 05 2019. Data source: Please refer to 'Digital Data Sources' in the Product Guide

HISTORIC AERIAL PHOTOGRAPH - 1975

LAND INSIGHT & RESOURCES

MAP 16

LIR-00678 Aerial Photograph 1986 23 05 2019. Data source: Please refer to 'Digital Data Sources' in the Product Guide

HISTORIC AERIAL PHOTOGRAPH - 1986

LAND INSIGHT & RESOURCES

MAP 17

LIR-00678 Aerial Photograph 1991 23 05 2019. Data source: Please refer to 'Digital Data Sources' in the Product Guide

HISTORIC AERIAL PHOTOGRAPH - 1991

LAND INSIGHT & RESOURCES

MAP 18

LIR-00678 Aerial Photograph 2002 23 05 2019. Data source: Please refer to 'Digital Data Sources' in the Product Guide

HISTORIC AERIAL PHOTOGRAPH - 2002

LAND INSIGHT & RESOURCES

MAP 19

LIR-00678 Aerial Photograph 2004 23 05 2019. Data source: Please refer to 'Digital Data Sources' in the Product Guide

HISTORIC AERIAL PHOTOGRAPH - 2004

LAND INSIGHT & RESOURCES

MAP 20

LIR-00678 Aerial Photograph 2007 23 05 2019. Data source: Please refer to 'Digital Data Sources' in the Product Guide

HISTORIC AERIAL PHOTOGRAPH - 2007

LAND INSIGHT & RESOURCES

MAP 21

LIR-00678 Aerial Photograph 2010 23 05 2019. Data source: Please refer to 'Digital Data Sources' in the Product Guide

HISTORIC AERIAL PHOTOGRAPH - 2010

LAND INSIGHT & RESOURCES

MAP 22

LIR-00678 Aerial Photograph 2012 23 05 2019. Data source: Please refer to 'Digital Data Sources' in the Product Guide

HISTORIC AERIAL PHOTOGRAPH - 2012

LAND INSIGHT & RESOURCES

MAP 23

LIR-00678 Aerial Photograph 2014 23 05 2019. Data source: Please refer to 'Digital Data Sources' in the Product Guide

HISTORIC AERIAL PHOTOGRAPH - 2014

LAND INSIGHT & RESOURCES

MAP 24

LIR-00678 Aerial Photograph 2017 23 05 2019. Data source: Please refer to 'Digital Data Sources' in the Product Guide

HISTORIC AERIAL PHOTOGRAPH - 2017

LAND INSIGHT & RESOURCES

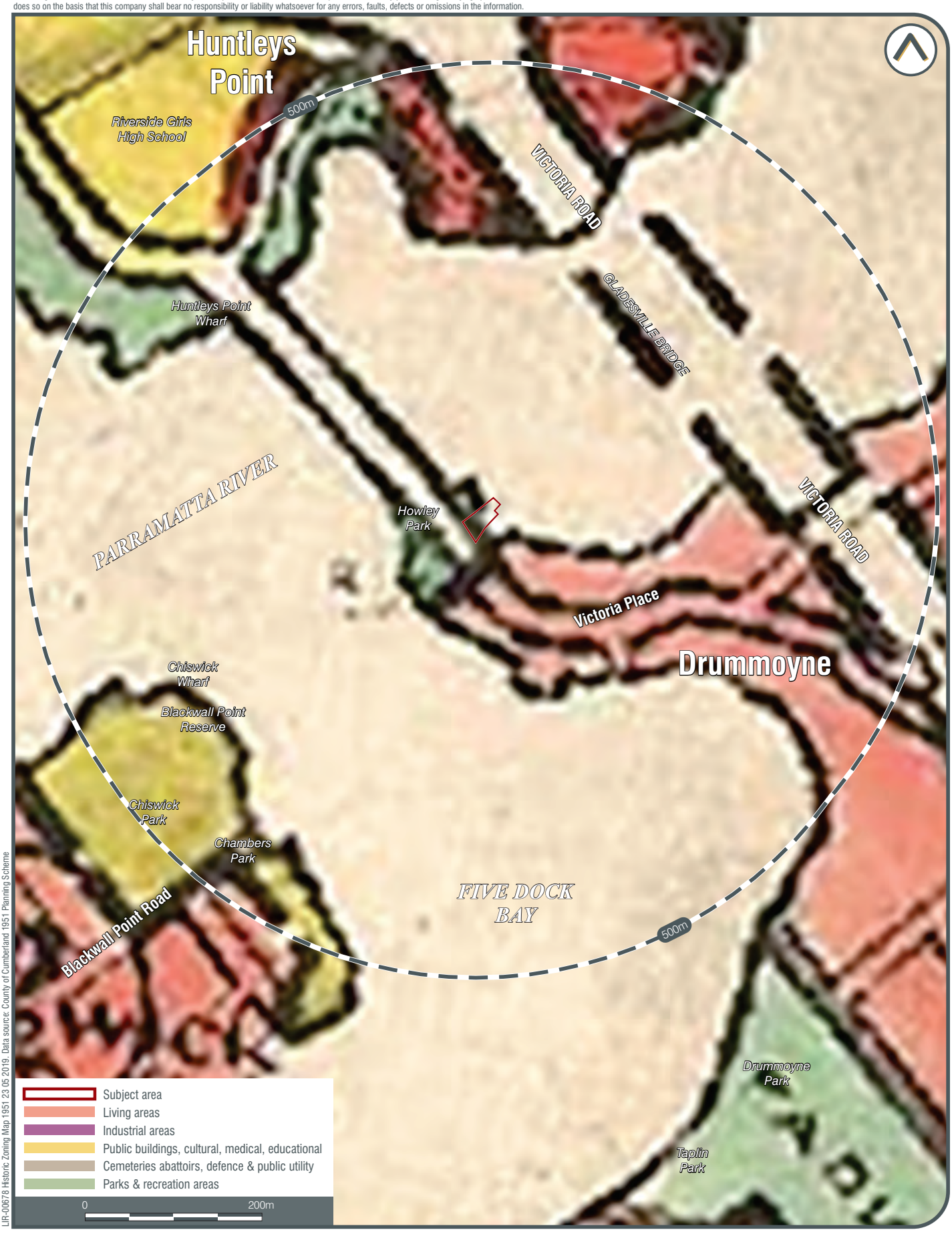
MAP 25

LIR-00678 Aerial Photograph 2019 23 05 2019. Data source: Please refer to 'Digital Data Sources' in the Product Guide

HISTORIC AERIAL PHOTOGRAPH - 2019

LAND INSIGHT & RESOURCES

MAP 26



LIR-00678 Historic Zoning Map 1951 23 05 2019. Data source: County of Cumberland 1951 Planning Scheme

HISTORIC ZONING MAP - 1951

LAND INSIGHT & RESOURCES

MAP 27

LIR-00678 Aerial Photograph 2019 23 05 2019. Data source: Please refer to 'Digital Data Sources' in the Product Guide

SYDWAYS STREET MAP - 2004

LAND INSIGHT & RESOURCES

MAP 28

Appendix E Calibration Certificates

PID Calibration Certificate

Instrument **PhoCheck Tiger**
Serial No. **T-107189**

airmet

Air-Met Scientific Pty Ltd
1300 137 067

Item	Test	Pass	Comments			
Battery	Charge Condition	✓				
	Fuses	✓				
	Capacity	✓				
	Recharge OK?	✓				
Switch/keypad	Operation	✓				
Display	Intensity	✓				
	Operation (segments)	✓				
Grill Filter	Condition	✓				
	Seal	✓				
Pump	Operation	✓				
	Filter	✓				
	Flow	✓				
	Valves, Diaphragm	✓				
PCB	Condition	✓				
Connectors	Condition	✓				
Sensor	PID	✓	10.6 ev			
Alarms	Beeper	✓	**Low**	**High**	**TWA**	**STEL**
	Settings	✓	50ppm	100ppm		
Software	Version	✓				
Data logger	Operation	✓				
Download	Operation	✓				
Other tests:						

Certificate of Calibration

This is to certify that the above instrument has been calibrated to the following specifications:

Diffusion mode Aspirated mode

Sensor	Serial no	Calibration gas and concentration	Certified	Gas bottle No		Instrument Reading
PID Lamp		98ppm Isobutylene	NATA	SY137		97.8ppm

Calibrated by: Sarah Lian **Sarah Lian**

Calibration date: **3/06/2019**

Next calibration due: **30/11/2019**

Multi Parameter Water Meter

Instrument **YSI Quatro Pro Plus**
Serial No. **18L102024**

airmet
Air-Met Scientific Pty Ltd
1300 137 067

Item	Test	Pass	Comments
Battery	Charge Condition	✓	
	Fuses	✓	
	Capacity	✓	
Switch/keypad	Operation	✓	
Display	Intensity	✓	
	Operation (segments)	✓	
Grill Filter	Condition	✓	
	Seal	✓	
PCB	Condition	✓	
Connectors	Condition	✓	
Sensor	1. pH	✓	
	2. mV	✓	
	3. EC	✓	
	4. D.O	✓	
	5. Temp	✓	
Alarms	Beeper		
	Settings		
Software	Version		
Data logger	Operation		
Download	Operation		
Other tests:			

Certificate of Calibration

This is to certify that the above instrument has been calibrated to the following specifications:

Sensor	Serial no	Standard Solutions	Certified	Solution Bottle Number	Instrument Reading
1. pH 7.00		pH 7.00		330737	pH 6.96
2. pH 4.00		pH 4.00		324985	pH 3.97
3. pH 10.00		pH 10.00		324189	pH 9.75
3. mV		231.8mV		324355/325421	233mV
4. EC		2.76mS		322349	2.74mS
5. D.O		0.00ppm		329994	0.01ppm
6. Temp		20.6°C		MultiTherm	21°C

Calibrated by: Sarah Lian **Sarah Lian**

Calibration date: **12/06/2019**

Next calibration due: **12/07/2019**

Oil / Water Interface Meter

Instrument **Geotech Interface Meter (30M)**
Serial No. **4063**

airmet
Air-Met Scientific Pty Ltd
1300 137 067

Item	Test	Pass	Comments
Battery	Compartment	✓	
	Capacity	✓	
Probe	Cleaned/Decon.	✓	
	Operation	✓	
Connectors	Condition	✓	
		✓	
Tape Check	Cleaned	✓	
Connectors	Checked for cuts	✓	
Instrument Test	At surface level	✓	

Certificate of Calibration

This is to certify that the above instrument has been cleaned and tested.

Calibrated by: K. Boardman **Kylie Boardman**

Calibration date: **12/06/2019**

Next calibration due: **11/08/2019**

Appendix F RPD Tables

			BTEX				TRH	PAH			Metals								
			Benzene	Toluene	Ethylbenzene	Xylene Total	C6-C10 (F1 minus BTEX)	Benzo(a)pyrene	Naphthalene	Total PAH	As	Cd	Cr	Cu	Ni	Pb	Hg	Zn	TBT
			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL			0.2	0.5	1	3	25	0.5	1	0.5	4	0.4	1	1	1	1	0.1	1	1
Field ID	**Matrix Type**	**Date**																	
BH02 (1.9)	Soil	4/06/2019	0.10	0.25	0.50	1.50	12.50	0.20	0.50	0.51	2.00	0.20	15.0	38.0	9.0	25.0	0.05	46.0	0.0046
DUP-1	Soil	4/06/2019	0.10	0.25	0.50	1.50	12.50	0.02	0.50	0.03	2.00	0.20	9.0	25.0	4.0	15.0	0.05	22.0	0.0018
			0	0	0	0	0	172	0	181	0	0	50	41	77	50	0	71	88
BH02 (1.9)	Soil	4/06/2019	0.10	0.25	0.50	1.50	12.50	0.20	0.50	0.51	2.00	0.20	15.0	38.0	9.0	25.0	0.05	46.0	0.0046
TRIP-1	Soil	4/06/2019	0.05	0.30	0.05	0.15	10.00	0.25	0.25	0.25	2.30	0.20	17.0	34.0	8.8	36.0	0.05	60.0	0.0011
			67	18	164	164	22	22	67	68	14	0	13	11	2	36	0	26	123

			BTEX				TRH	PAH		Metals							
			Benzene	Toluene	Ethylbenzene	Xylene Total	C6-C10 (F1 minus BTEX)	Benzo(a)pyrene	Naphthalene	As	Cd	Cr	Cu	Ni	Pb	Hg	Zn
			ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
EQL			1	1	1	3	10	1	1	1	0.1	1	1	1	1	0.05	1
Field ID	**Matrix Type**	**Date**															
MW02	Water	13/06/2019	7.0	43.0	6.0	30.0	70.0	0.5	0.5	7.0	0.1	7.0	4.0	6.0	0.5	0.40	5.0
DUP-1	Water	13/06/2019	7.0	40.0	6.0	27.0	74.0	0.5	0.5	7.0	0.1	7.0	6.0	8.0	0.5	0.40	22.0
			0	7	0	11	6	0	0	0	0	0	40	29	0	0	126
MW02	Water	13/06/2019	7.0	43.0	6.0	30.0	70.0	0.5	0.5	7.0	0.1	7.0	4.0	6.0	0.5	0.40	5.0
TRIP-1	Water	13/06/2019	6.0	39.0	5.0	25.0	60.0	2.0	5.0	7.0	0.2	10.0	4.0	7.0	1.0	0.50	5.0
			15	10	18	18	15	120	164	0	120	35	0	15	67	22	0

Appendix G QA/QC Assessment

Table G-1 QA/QC Assessment

Data Quality Objective	Sampling Frequency	Frequency Achieved?	DQI	DQI Met?
Precision				
Intra-Laboratory Field Duplicates	1/20 samples	Yes	>5xLOR: 50% RPD	Yes, noting that some PAHs (soil) and metals (soil and groundwater) exceeded RPDs (71-181%) due to sample heterogeneity.
Inter-Laboratory Field Duplicates	1/20 samples	Yes	>5xLOR: 50% RPD	Yes, noting that some hydrocarbons (soil), PAHs (soil and groundwater) and metals (soil and groundwater) exceeded RPDs (67-164%) due to sample heterogeneity.
Laboratory duplicates	1/20 samples	Yes	>5xLOR: 50% RPD	Yes
Laboratory method blanks	1/10 samples	Yes	< LOR Not required for asbestos	Yes
Accuracy				
Matrix spikes	1/10 samples	Yes	Acceptable recoveries: 70 to 130% for metals and inorganics 60-140% for organics 10-140% for sVOC and speciated phenols Not required for asbestos	Yes.
Laboratory control spike	1/10 samples	Yes	As Matrix spikes Not required for asbestos	Yes.
Surrogate spike	1/10 samples	Yes	As Matrix spikes Not required for asbestos	Yes.
Representativeness				
Sampling handling storage and	All	Yes	Received by laboratory	Yes

Data Quality Objective	Sampling Frequency	Frequency Achieved?	DQI	DQI Met?
transport appropriate for media and analytes			cooled and with container in good condition	
Rinsate blanks	NA	NA	<LOR	NA
Trip Spike and Trip Blank	1/event 1/event	Yes Yes	>89% <LOR	Yes Yes
Samples extracted and analysed within holding times.	All	Yes	Hold Times: 7 days - organics 6 months – inorganics	Yes
Comparability				
Standard operating procedures used for sample collection and handling (including decontamination)	All Samples	Yes	Yes	Yes
Standard analytical methods used for all analyses	All Samples	Yes	Yes	Yes
Consistent field conditions, sampling staff and laboratory analysis	All Samples	Yes	Yes	Yes
Limits of reporting appropriate and consistent	All Samples	Yes	Yes	Yes
Completeness				
Soil description and COCs completed and appropriate	All Samples	Yes	Yes	Yes, borehole logs and laboratory certificates are presented in Appendices H and C, respectively.
Appropriate documentation for testing	All Samples	Yes	Yes	Yes
Data set to be 95% complete after validation	All Samples	Yes	Yes	Yes

Appendix H Borehole Logs

PROJECT NUMBER 18166
PROJECT NAME Gladesville Bay Marina
CLIENT Gladesville Bay Marina Pty Ltd
ADDRESS 380 Victoria Place Drummoyne NSW

DRILLING COMPANY BG Drilling
DRILLING METHOD Solid Flight Auger (SFA)
TOTAL DEPTH 1.4m bgs
DRILLING DATE 04/06/19

COORDINATES -
COORD SYS -
SURFACE ELEVATION -
LOGGED BY TC
CHECKED BY DT

COMMENTS O = Odour, S = Staining, ACM = Asbestos Containing Material

Depth (m)	PID	Samples	Water	Well Installation	Graphic Log	Material Description	Additional Observations
0.2	0.1	BH01 (0.1)				Fill: Clayey sand, light brown with inclusions of sandstone.	No O, S, ACM
0.4	0.5	BH01 (0.5)	▽				
0.6						As above, wet.	No O, S, ACM
1.4	1.4	BH01 (1.4)				End of hole at 1.4 m bgs (refusal on sandstone bedrock)	

Disclaimer This bore log is intended for environmental not geotechnical purposes.

produced by ESlog.ESdat.net on 02 Jul 2019

PROJECT NUMBER 18166
PROJECT NAME Gladesville Bay Marina
CLIENT Gladesville Bay Marina Pty Ltd
ADDRESS 380 Victoria Place Drummoyne NSW

DRILLING COMPANY BG Drilling
DRILLING METHOD SFA
TOTAL DEPTH 2.0m bgs
DRILLING DATE 04/06/19

COORDINATES -
COORD SYS -
SURFACE ELEVATION -
LOGGED BY TC
CHECKED BY DT

COMMENTS O = Odour, S = Staining, ACM = Asbestos Containing Material

Depth (m)	PID	Samples	Water	Well Installation	Graphic Log	Material Description	Additional Observations
0.2	14	BH02 (0.1)				Fill: Clayey gravel, brown to light brown.	No O, S, ACM
0.4							
0.6							
0.8			▽				
1						As above, saturated.	No O, S, ACM Poor retrieval of material due to saturated, gravelly nature. Sample collected from base of auger (1.9m), but likely a combination of saturated materials ranging from 1-2m bgs. Well extent to 1.4m bgs, as borehole collapsed with removal of auger.
1.2							
1.4							
1.6							
1.8	15	BH02 (1.9)					
2						End of hole at 2.0 m bgs (refusal on sandstone bedrock)	
2.2							
2.4							
2.6							
2.8							
3							
3.2							
3.4							
3.6							
3.8							

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PROJECT NUMBER 18166
PROJECT NAME Gladesville Bay Marina
CLIENT Gladesville Bay Marina Pty Ltd
ADDRESS 380 Victoria Place Drummoyne NSW

DRILLING COMPANY BG Drilling
DRILLING METHOD SFA
TOTAL DEPTH 0.2m bgs
DRILLING DATE 04/06/19

COORDINATES -
COORD SYS -
SURFACE ELEVATION -
LOGGED BY TC
CHECKED BY DT

COMMENTS O = Odour, S = Staining, ACM = Asbestos Containing Material

Depth (m)	PID	Samples	Water	Well Installation	Graphic Log	Material Description	Additional Observations
0.2	0.3	BH03 (0.2)	▽			Fill: Gravelly clay, brown, wet, with inclusions of sandstone	No O, S, ACM
						End of hole at 0.2 m bgs (refusal on sandstone bedrock)	

0.4 0.6 0.8 1 1.2 1.4 1.6 1.8 2 2.2 2.4 2.6 2.8 3 3.2 3.4 3.6 3.8

produced by ESlog.ESdat.net on 02 Jul 2019

PROJECT NUMBER 18166
PROJECT NAME Gladesville Bay Marina
CLIENT Gladesville Bay Marina Pty Ltd
ADDRESS 380 Victoria Place Drummoyne NSW

DRILLING COMPANY BG Drilling
DRILLING METHOD SFA
TOTAL DEPTH 0.5m bgs
DRILLING DATE 04/06/19

COORDINATES -
COORD SYS -
SURFACE ELEVATION -
LOGGED BY TC
CHECKED BY DT

COMMENTS O = Odour, S = Staining, ACM = Asbestos Containing Material

Depth (m)	PID	Samples	Water	Well Installation	Graphic Log	Material Description	Additional Observations
0.2	0.3	BH04 (0.1)				Fill: Gravelly clay, grey to dark grey, damp.	No O, S, ACM Inclusions of wood.
0.4	0.3	BH04 (0.5)					
0.6						End of hole at 0.5 m bgs (refusal on sandstone bedrock)	
0.8							
1							
1.2							
1.4							
1.6							
1.8							
2							
2.2							
2.4							
2.6							
2.8							
3							
3.2							
3.4							
3.6							
3.8							

produced by ESlog.ESdat.net on 02 Jul 2019

Appendix I Field GME Logs

Groundwater Well Sampling Data Form

Job Information	
Date: 13.6.19	
Project Name: Gladstonville Marina	Project Number: 8166
Site Location:	Operator: E.M
Well ID: MW02	Weather: overcast.

Equipment						
Water quality equipment description:						
Interface probe description:						
Purging equipment:	Bailer type:	Plastic	Teflon			
(please cirlce)	Pump type:	Peristaltic	Submersible	Micro-purge	Amazon	Other:
Depth of installed tubing (mTOC):						

Well Gauging and Purge Volume Calculations

Casing Diameter	25mm	50mm	100mm	125mm	150mm	200mm	250mm	300mm
Conversion Factor (volume in factor L/m)	0.98	1.96	7.85	31.4	49.1	70.7	125.7	196.3

Total Well Depth (-) Water level (=) Water Column
1.12 m (-) 0.37 m (=) 0.75 m

Depth to Product (if present)
— m

r = radius in cm
h = height of water column in cm

Water Column (x) Conversion Factor (=) Litres per 1 Well Volume
0.75 m (x) 1.96 (=) 1.47 L

Water Quality Parameters

Beginning purge time: 10:10 Ending purge time:

Litres	Time	pH	Temp °C	Cond mS/cm	DO ppm	Redox mV	SWL mTOC	Comments / observations
0.25	10:13	11.20	17.1	1.207	6.31	-12.4	0.66	slightly turbid, no odour, no sheen
0.5	10:17	11.22	17.1	1.207	6.92	-92.5	0.78	" " slow recharge noted
0.75	10:20	11.24	17.1	1.217	7.01	-236.0	0.88	" "
1.0	10:23	11.25	17.1	1.224	6.62	-259.5	1.04	" "
1.25	10:26	11.24	17.2	1.215	8.16	-301.0	1.11	" " increasing turbidity
1.5	10:30	11.24	17.2	1.226	8.94	-295.0	1.09	" "
								DRY - sampled.
Stabilisation Criteria		+/- 0.05	+/- 10%	+/- 3%	+/- 10%	+/- 10%		Example: clear / slightly cloudy / turbid / very turbid / no odour / slight odour / odour / strong odour, and changes in pumping rate

Total Well Volume
Actual amount of water prior to sampling

*pH, temp, cond readings not necessary if well is purged dry

Did field parameters stabilise? Y N NA Was the well dry purged? Y N

Field QC Checks

Was pre-cleaning sampling equipment used for these samples?	Y	N		
Was pre-cleaning sampling equipment properly protected from contamination?	Y	N		
Was documentation of equipment conducted?	Y	N	NA	
Were air bubbles present in vials at time of collection?	Y	N	NA	
Was sample for metals field filtered prior to preservations?	Y	N	NA	
Duplicate sample collected?	Y	N	Duplicate sample ID	DUP-2, TRIP-2

Groundwater Well Sampling Data Form

Job Information

Date: 13.6.19	
Project Name: Gladesville Marina GME	Project Number: 18166
Site Location:	Operator: E.M
Well ID: MW01	Weather: Overcast

Equipment

Water quality equipment description:

Interface probe description:

Purging equipment: Bailer type: Plastic Teflon

(please cirlce) Pump type: Peristaltic Submersible Micro-purge Amazon Other:

Depth of installed tubing (mTOC):

Well Gauging and Purge Volume Calculations

Casing Diameter	25mm	50mm	100mm	125mm	150mm	200mm	250mm	300mm
Conversion Factor (volume in factor L/m)	0.98	1.96	7.85	31.4	49.1	70.7	125.7	196.3

Total Well Depth (-) Water level (=) Water Column

1.21 m (-) 0.89 m (=) _____ m

Depth to Product (if present)

_____ m

r = radius in cm

h = height of water column in cm

Water Column (x) Conversion Factor (=) Litres per 1 Well Volume

_____ m (x) _____ (=) _____ L

Water Quality Parameters

Beginning purge time: 9:20

Ending purge time:

Litres	Time	pH	Temp °C	Cond mS/cm	DO ppm	Redox mV	SWL mTOC	Comments / observations
0.25	9:23	7.23	19.2	49.16	7.07	179.7	1.04	v. slow recharge
								turbid, no odour · no sheen
0.5	9:27	7.26	19.2	48.61	7.02	178.1	1.16	" "
								purged dry - sampled
	9:40							
Stabilisation Criteria		+/- 0.05	+/- 10%	+/- 3%	+/- 10%	+/- 10%		Example: clear / slightly cloudy / turbid / very turbid / no odour / slight odour / odour / strong odour, and changes in pumping rate

*pH, temp, cond readings not necessary if well is purged dry

Total Well Volume

Actual amount of water prior to sampling

Did field parameters stabilise? Y N NA Was the well dry purged? Y N

Field QC Checks

Was pre-cleaning sampling equipment used for these samples?	Y	N		
Was pre-cleaning sampling equipment properly protected from contamination?	Y	N		
Was documentation of equipment conducted?	Y	N	NA	
Were air bubbles present in vials at time of collection?	Y	N	NA	DUP-1 TRIP-1
Was sample for metals field filtered prior to preservations?	Y	N	NA	
Duplicate sample collected?	Y	N	Duplicate sample ID	

Appendix J Dangerous Goods Search

KNIGHT'S SYNDICATE PTY. LTD.

A.B.N. 66 320 664 665

37 Blackbutt Avenue
Pennant Hills, N.S.W. 2120

Telephone: (02) 9629 5564
Facsimile: (02) 9629 5554

3rd February 2004

KNIGHT'S SYNDICATE PTY. LTD., 37 BLACKBUTT AVENUE, PENNANT HILLS 2120
ABN 66 320 664 665 (**THE COMPANY**) acknowledges and agrees to

GLADESVILLE BRIDGE MARINA
that all risks and title in the 2 x 500gallon ug tanks
ex GLADESVILLE BRIDGE MARINA VICTORIA PL DRUMMOYNE
passes to (THE COMPANY) from

GLADESVILLE BRIDGE MARINA

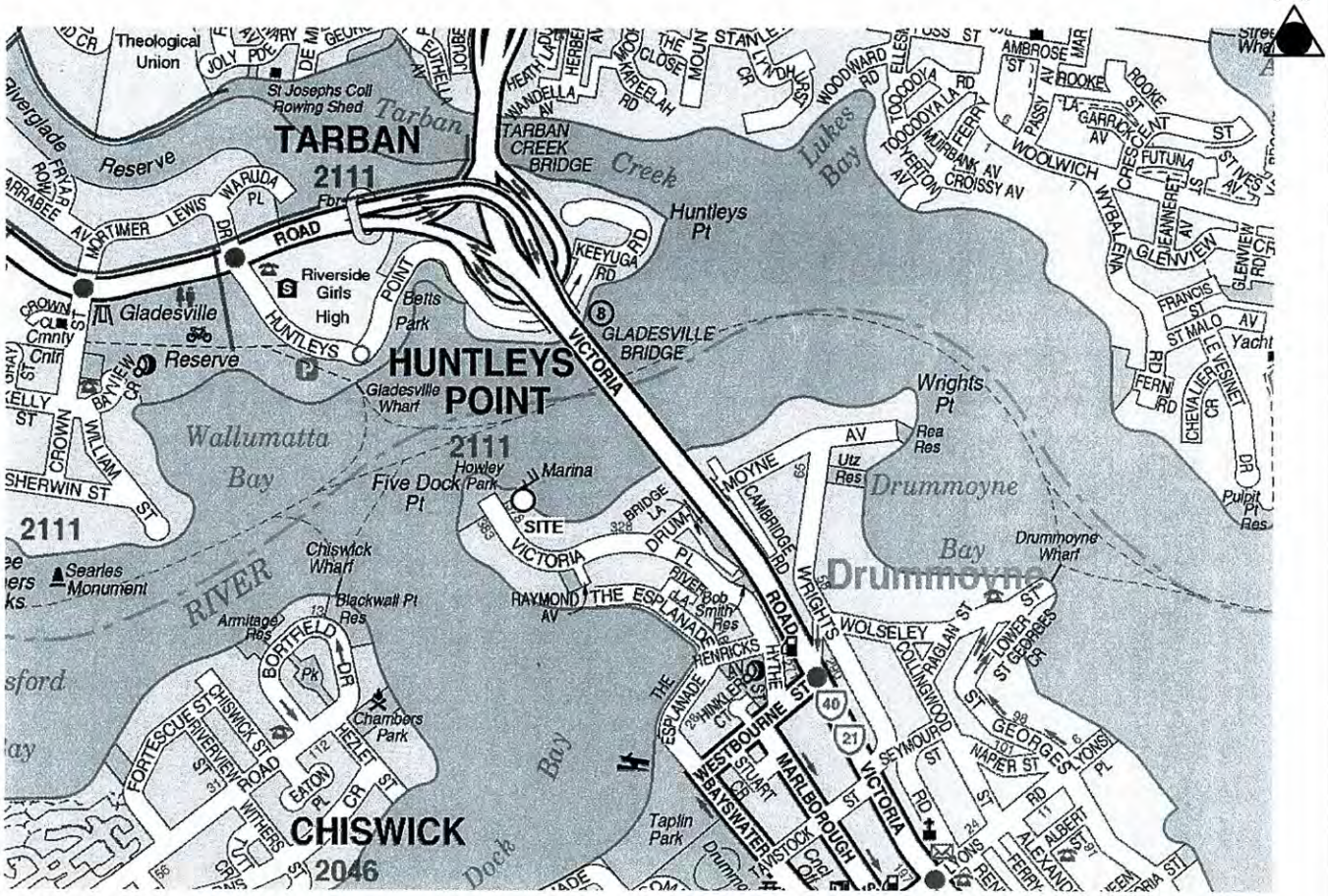
The tanks were transported by us/~~you~~ for a safe and legal disposal at our quarry, 105 SCHOFIELDS ROAD, ROUSE HILL.
They will not be sold for any purpose.

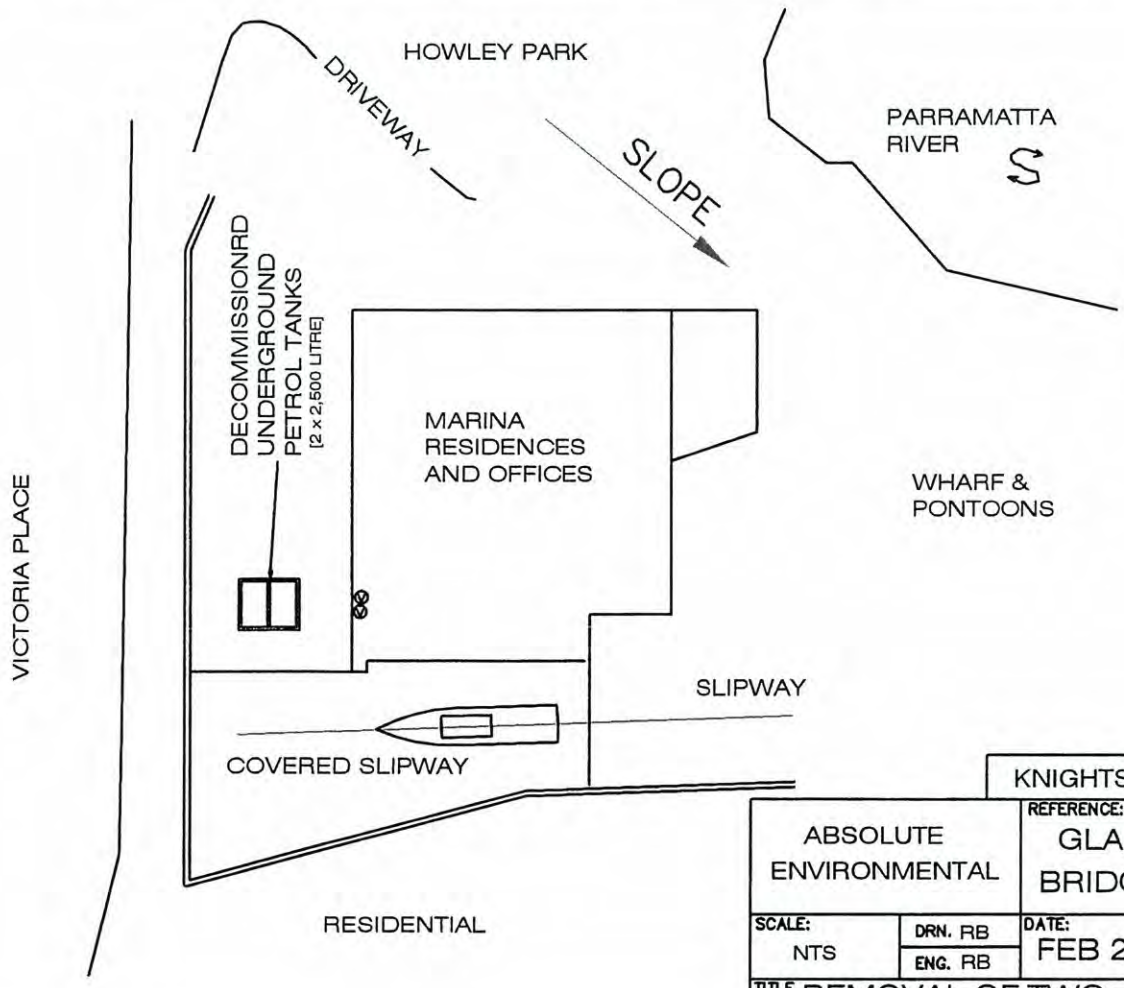
Common
Knight's Syndicate
Pty. Ltd.
A.C.N. 002 947 588
Seal

the company seal of
KNIGHT'S SYNDICATE PTY. LTD.
was hereunto affixed by
J. A. KNIGHT
in the presence of
J. T. KNIGHT
on 3rd February 2004

J A Knight

J T Knight





KNIGHTS SYNDICATE

ABSOLUTE ENVIRONMENTAL		REFERENCE: GLADESVILLE BRIDGE MARINA	
SCALE: NTS	DRN. RB / ENG. RB	DATE: FEB 2004	PROJECT No. W014
TITLE REMOVAL OF TWO DECOMMISSIONED TANKS			FIG No. 1

WORKCOVER NEW SOUTH WALES

DETAILS OF LICENCE FOR KEEPING DANGEROUS GOODS ON 1 December 2003

Licence Number 35/007680 **Expiry Date** 15/08/1993 **No of Depots.** 2

Licensee Details

Licensee GLADESVILLE BRIDGE MARINA P/L

Trading name

Postal Address 380 VICTORIA PL DRUMMOYNE NSW 2047

Licensee Contact Ph. 81 2014 Fax.

Site Details

Premises Licensed to Keep Dangerous Goods
GLADESVILLE BRIDGE MARINA P/L
380 VICTORIA PL DRUMMOYNE 2047

Nature of Site PRIVATE DWELLING

Major Supplier of Dangerous Goods NOT APPLICABLE

Emergency Contact for this Site

Site staffing

Details of Depots

Depot No.	Depot Type	Goods Stored in Depot	Qty
1	UNDERGROUND TANK	Class 3	2300 L
2	UNDERGROUND TANK	Class 3	2300 L

Printed by Scientific Services Branch, 400 Kent St, Sydney 2000 ph(02) 9370 5187

to cancel bundle

Status: **CANCELLED**

35-007680

Comments:

- [x] U/G tanks filled with sand/concrete/earth and sealed off
- [ ] All dgoods removed from site
- [ ] Only exempt quantities of dgoods at site
- [ ] U/G tanks now used for storing diesel
- [ ] U/G tanks removed from site
- [ ] Duplicate of licence
- [ ] U/G tank abandoned (method unknown)

M 7/1/97

- [ ] .....

MANUALS\CANCEL.FRM

KNIGHT'S SYNDICATE PTY. LTD.

A.C.N. 002 947 588

37 Blackbutt Avenue
Pennant Hills, N.S.W. 2120

Telephone: (02) ~~481 9097~~
Facsimile: (02) ~~875 1508~~

new telephone 96295564
new facsimile 96295554

19th December, 1996

THE DANGEROUS GOODS LICENCING SECTION
WORKCOVER AUTHORITY
LOCKED BAG 10
POST OFFICE CLARENCE STREET
SYDNEY 2000

CERTIFICATE OF ABANDONMENT WITH DRY AMBER SAND OF 2x500 GALLON UNDERGROUND STORAGE TANKS AS PER AUSTRALIAN STANDARDS AS1940-1993

1. dangerous goods licence number 35-007680
2. 380 Victoria Place, Drummoyne
3. GLADESVILLE BRIDGE MARINA
4. 2x500 gallon
5. via the dip between the retaining wall for road and existing marina wall (5m3 gap)
6. fill with dry amber sand
7. sealed vent lines with concrete plug (dip/bowser lines previously removed)
8. KNIGHT'S SYNDICATE PTY.LTD
9. PAUL GOODWIN 96293864

yours faithfully
KNIGHT'S SYNDICATE PTY.LTD
J.T.KNIGHT

c.c.to GLADESVILLE BRIDGE MARINA

RECEIVED
20 DEC 1996
SCIENTIFIC SERVICES
BRANCH

WorkCover New South Wales

Details of Licence for Keeping Dangerous Goods on 23 January 1997

Licence Number 35/007680 **Expiry Date** 15/08/93

Licensee Details

Licensee GLADESVILLE BRIDGE MARINA P/L

Trading name

Postal Address 380 VICTORIA PL, DRUMMOYNE 2047

Licensee Contact Ph. 81 2014

Site Details

Premises Licensed to Keep Dangerous Goods
380 VICTORIA PL
DRUMMOYNE 2047

Nature of Site PRIVATE DWELLING **Supplier** NOT APPLICABLE

Emergency Contact ph.

Site staffing

Details of Depots

Depot No.	Depot Type	Goods Stored in Depot	Qty
1	UNDERGROUND TANK	Class 3	2300 L
2	UNDERGROUND TANK	Class 3	2300 L

Printed by Scientific Services Branch, 400 Kent St, Sydney 2000 (02) 370 5187

Form DGI

WORKCOVER AUTHORITY
DANGEROUS GOODS ACT, 1975

LICENCE No. 35- 007680

APPLICATION FOR LICENCE (or AMENDMENT or TRANSFER of LICENCE)*
FOR THE KEEPING OF DANGEROUS GOODS

Aug

(* Delete whichever is not required)

Name of Applicant in full (see Item 1 - Explanatory notes - page 4)	P. B. & E. M. SOUTHCOMBE. (PHILLIP) (EVA).
Trading name or occupier's name (if any) NF	GLADESVILLE BRIDGE MARINA PTY. LTD.
Postal Address	380 VICTORIA PLACE, DRUMMOYNE. Postcode 2047.
Address of the premises to be licensed. (Including Street No.)	380 VICTORIA PLACE, DRUMMOYNE. Postcode 2047.
Nature of premises (See Item 2 - Explanatory notes - page 4)	MARINA.
Telephone number of applicant	STD Code (02) Number 812014.

Particulars of type of depots and maximum quantities of dangerous goods to be kept at any one time.

Depot number	Type of depot (See item 3 - Explanatory notes - page 4)	Storage capacity	Dangerous goods: Product being stored DD	C & C Office use only 002 020
1	U/G TANK	2,250 LTRS	PETROL 3:1	2 020 22X2
2	U/G TANK	2,250 LTRS.	PETROL 3:1.	2 020 22X2
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				

D/E 11 OCT 1991

Has site plan been approved by the Dangerous Goods Branch? Yes / No

If yes, no plans required.
If no, please attach site plan, or provide sketch plan overleaf. which has been checked by an accredited consultant

Have premises previously been licensed? (Yes) / No

If, yes, state name of previous occupier, and licence No. (If known)
LUCAS MARINA UP TO 1982; GLADESVILLE BRIDGE MARINA FROM 1982. ONWARD

Name of oil company supplying flammable liquid (if applicable).

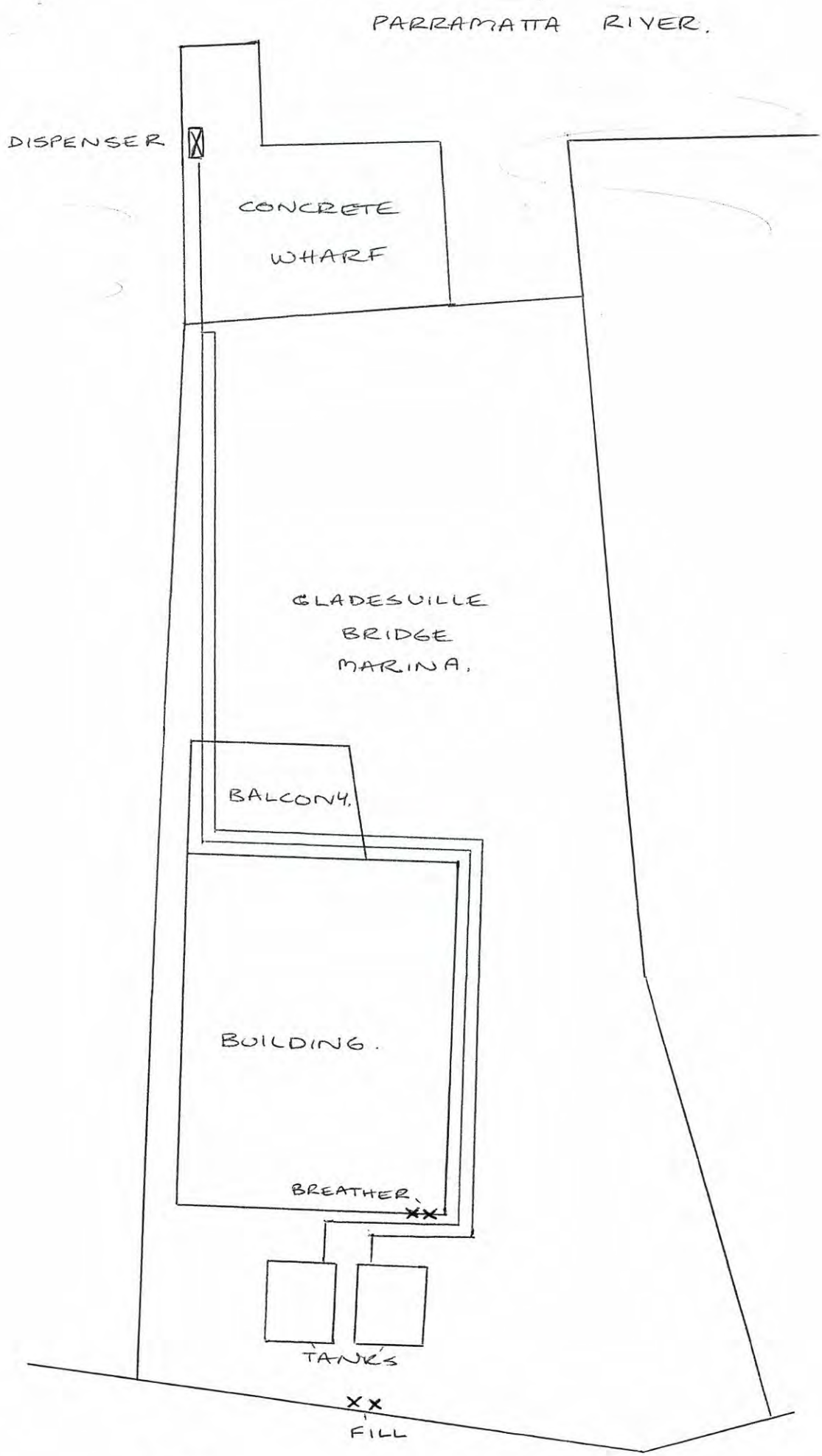
Signature of applicant E Southcombe Date 26/7/91.

For external explosives magazine(s), please fill in page 3. Southcombe

FOR OFFICE USE ONLY

CERTIFICATE OF INSPECTION

I, being an Inspector under the Dangerous Goods Act, 1975, do hereby certify



380 VICTORIA PLACE.

DRUMMOYNE MUNICIPAL COUNCIL

CIVIC CENTRE DRUMMOYNE

ALL CORRESPONDENCE TO
THE TOWN CLERK
P.O. BOX 117
DRUMMOYNE 2047
TELEPHONE: 819 6555
FAX: 819 6803
DX 8598 BURWOOD
IN REPLY AND FOR PERSONAL
CONTACT PLEASE QUOTE

Attention: Ms J Fielding
Industrial Relations Services
FAX 744 3648

SK/JS 143.28
– Mr Kourepis

15 May, 1991

valves on foot path

Dear Madam,

PREMISES 380 VICTORIA PLACE, DRUMMOYNE

Could you please advise Council if the abovementioned premises has a licence to store flammable and combustible liquids (petrol or diesel), the licensee, the number of litres stored on site, the location of the storage tanks, the method of unloading and the location of the tanker discharge point.

Also, could you advise if the delivery and discharging of flammable and combustible liquids (petrol or diesel) from a local roadway over the footpath into a residential/commercial premises is allowable under the Act, or would it require consent and which authority would consent have to be obtained from.

Were there previous alterations or any increase in size of the fuel storage tanks at the subject premises and if tankers delivering fuel negotiate the access track over Howley Park.

Should you have any enquiries please do not hesitate to contact Mr S Kourepis of Council's Town Planning Department on 819 6555.

Your early response would be most appreciated.

Yours faithfully,

T. DESMOND DOVER
TOWN CLERK

alterates from 82-7
for full front on
council footpath

FORM DG1

LICENCE No. 3500768O-4

DANGEROUS GOODS ACT, 1975

APPLICATION FOR ~~LICENCE (or AMENDMENT or~~ TRANSFER of LICENCE) FOR THE KEEPING OF DANGEROUS GOODS

DG 8208

Application is hereby made for—~~*a licence (or amendment of the licence)~~ *the transfer of the licence for the keeping of dangerous goods in or on the premises described below.

(*delete whichever is not required)

FEE: $10.00 per Depot

$10.00 — 4

Name of Applicant in full (see over)	NF Surname SOUTHCOMBE Given Names PHILLIP BARRY & SOUTHCOMBE EVA MARIA.
Trading name or occupier's name (if any)	P & E SOUTHCOMBE - Gladesville Bridge
Postal address	380 VICTORIA PLACE DRUMMOYNE Postcode 2047
Telephone number of applicant	STD Code Number 812014.
Address of the premises in or on which the depot or depots are situated (including street number, if any)	380 VICTORIA PLACE DRUMMOYNE Postcode 2047.
Nature of premises (see over).	MARINA.

PLEASE ATTACH SITE PLAN

Particulars of type of depots and maximum quantities of dangerous goods to be kept at any one time.

Depot number	Type of depot (see over)	Storage capacity	Dangerous goods	
			Product being stored	C & C Office use only
1	Underground ✓	2,200	PETROL	
2		2,200	✓	
3				
4		checked	10.7.91	
5				
6				
7				
8	(Cylinders	200L	LPG)	
9				
10				
11				
12				

Name of company supplying flammable liquid (if any)

Have premises previously been licensed? YES (PHOTOCOPY ATTACHED).

If known, state name of previous occupier LUCAS MARINA. Licence No. 7680-4

Signature of applicant P Southcombe. Date 26.10.82.

E Southcombe

For external explosives magazine(s), please fill in side 2.

LICENCE No.

FOR OFFICE USE ONLY

CERTIFICATE OF INSPECTION

ME 37
FORM B
Page 1

Register No. 7680.

INFLAMMABLE LIQUID ACT, 1915 (AS AMENDED)

Application for Registration of Premises or Store Licence under Division A or for the transfer alteration or amendment of any such Registration or Licence, for the keeping of Inflammable Liquid and/or Dangerous Goods, in accordance with the provisions of the Inflammable Liquid Act, 1915 (as amended), for the ensuing year.

DIRECTIONS

1. Applications must be forwarded to the Chief Inspector of Inflammable Liquid, Explosives Department, Box R.216, Royal Exchange Sydney. N.S.W. 2000 and must be accompanied by the prescribed fee, as set out hereunder:

Registration of Premises (Fee $4.50 p.a.) – For quantities not exceeding 300 gallons of mineral oil and 100 gallons of mineral spirit, if kept together; or 800 gallons of mineral oil and 100 gallons of mineral spirit, if kept in separate depots; or 500 gallons of mineral spirit, if kept in an underground tank depot; or 800 gallons of mineral oil and 500 gallons of mineral spirit, if mineral spirit is kept in an underground tank depot.

In addition to, or in lieu of the above, similar quantities of Dangerous Goods of Classes 1 and 2 may be kept under the like conditions; reading Dangerous Goods of Class 1 for the words Mineral Spirit and Dangerous Goods of Class 2 for the words Mineral Oil

Store Licence, Div. A (Fee, $9.00 p.a.) – For quantities in excess of those stated above, but not exceeding 4,000 gallons mineral oil and/or mineral spirit, and/or Dangerous Goods of Classes 1, 2 and 9.

Store Licence, Div. B (Fee, See Regulation 7) – For quantities exceeding 4,000 gallons of mineral spirit, and/or dangerous goods of Classes 1 and 2, and/or dangerous goods of Class 3.
For the keeping of Dangerous Goods of Classes 3 and/or 4. ($18.00 p.a.).

Fees for the keeping of inflammable liquid and dangerous goods in excess of the above stated quantities and also for Liquid Petroleum Gas storage are set out in Regulation 7.

1. Name of occupier including full christian names. Cheque $4.50 Rct 9766	John Francis Lucas
2. Trading Name (if any)	J.F Lucas & Son
3. Locality of the premises in which the depot or depots are situated	No. or Name 380 Street Victoria Place Town Drummoyne
4. Postal address	as above Postcode 2047
5. Occupation	Boat Builder
6. Nature of premises (dwelling, garage etc.)	Boat Shed & Slipway

7. Particulars of construction of depots and maximum quantities of inflammable liquid and/or Dangerous Goods to be kept at any one time.

PLEASE ATTACH PLAN OF PREMISES

Depot No.	Construction of depots*			Inflammable liquid		Dangerous goods					
	Walls	Roof	Floor	Mineral spirit gallons	Mineral oil gallons	Class 1 gallons	Class 2 gallons	Class 3 lb	Class 4 cu ft	Class 5A water gal	Class 9 gallons
1	Underground		tank	500							
2	/		/	500							
3											
4											
5											
6											
7						PUBLIC REVENUE A/c					
8						Cheq $4.50					
9						22/5/73					
10						(Date) Receipt No.		0811		4754	

* If product is kept in tanks describe depots as underground or aboveground tanks.

Signature of applicant R J Lucas

Date of application _____, 19___

INSPECTION RECORD

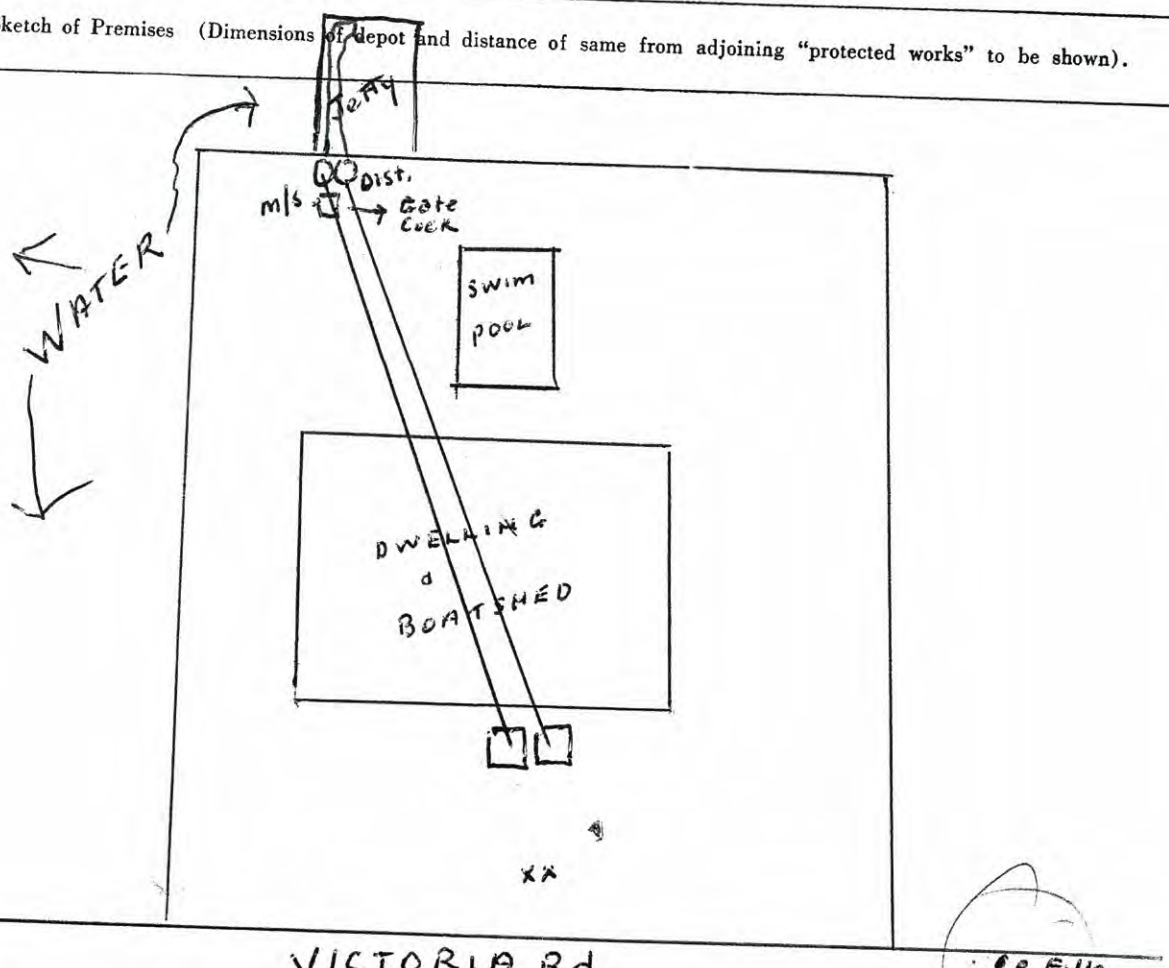
Licence No A7680

Licensee: J. Lucas & Sons

Address: Victoria Rd, Drummoyne.

Storage licensed: 1/500 Shell.

Sketch of Premises (Dimensions of depot and distance of same from adjoining "protected works" to be shown).



Inspected	Initials	Requisitions made or state of depot
30/8/60	RCC	Sat, Gate valve situated near pumps on shore extended hose onto jetty for petrol & distillate.

Appendix K Hazardous Materials List

Poisons Info Line 13 11 26

	HAZARDOUS MATERIALS LIST			Last update	Nov-18
	Manufacturer	**Name**	**Colour**	**Non Hazardous**	**Infosafe or Product No.**
	Altex Coatings	No. 5 Antifouling			9-40672
1. Antifouling	Akzo Nobel	Ultra Dover white	White		YBA303
		Ultra Blue	Blue		YBA333
		Ultra Black	Black		YBA393
		VC Offshore Part A	Grey		YBA764
		VC Offshore Part B			YBA780
	Jotun	Seaguardian	RD, BLK, BL		MM00000356
		SeaAlu	RD, BLK, BL		MM00001088
	Wattyl	Seapro CU120			8073-10
		Seapro Plus 100			5104-09
	Oceanmax	Propspeed Etching Primer Hardener			782BC
		Propspeed Etching Primer			782BC
		Propspeed Clear Coat			782D
2. Thinners	Akzo Nobel	Antifouling Thinner #3			346006
	Jotun	Thinner #7			MM00000561
	Septone	Acetone			K1H18
3. Primers	Akzo Nobel	Interseal 670 HC	Black		EGZ999
		Interseal 670 HS Curing Agent			EGA245
		PA 10 Red Primer	Red		YPA320A
	PPG	Amercoat 771	Brown		0771 Black
		Propspeed Etching Primer	Red		348003
	Jotun	Safeguard Part A			MM00001055
		Safeguard Part B			MM00001063
		Penguard HB Part A			MM00000613
		Penguard HB Part B			MM00000612
		Vinyguard	Silver		MM00000765
	Sigma	Sigma EP Tiecoat Part A			55671
		Sigma EP Tiecoat Part B			55672
		Sigma Marine 28	Grey		Sigmarine28
4. Other	Castrol	Super Outboard 4- Stroke oil			15412
	Mobil	Unleaded Petrol		Non Hazardous	CAS5S
		Organic Peroxide			29033
	Pool Clear	Pool Acid			1HH06
	FGI	Catalyst			1866
		Pigment			3105
		Styrene			1HKOB
	Septone	Hull Cleaner & Stain Remover	Clear		SEPCL
		Timber deck cleaner & Rust Remover			MCTD20
		Drifter Hull Cleaner & Stain Remover			SEPD3
		Citra Scrub			KIH4E
		Marine Clene			KIH4F
		Premium Glass Cleaner			KIH3V
	3M	Marine Fibreglass Restorer & Wax			KIH4H
		One step Cleaner & Wax			P/N38221
	Top Gear	Versatile	Clear		Non Allocated
		Gelcoat Rejuvenator Part A			
		Gelcoat Rejuvenator Part B			
	Omicron	Supergloss			
		Ultimate Sheen			
		Tuff Wash H/D Laundry Powder			
		Clear View			
	Sun Marine	Inflatable Boat Cleaner			
		Ocean Breeze			
		Royal Wash & Wax			
	Blue Sky	Enduragleam			
		Sodium Hypochloride (Bleach)			
		Deodoriser & Cleaner (Antiseptic)			
	Orica	Polyaluminium Chlorinde Solution	Clear		15710
	Genesis	Tenax			Carpet Powder
	Clean Plus	Handwash Pink	Pink		
		Vuplex			
	Global Spill	Ardrox 6120	Clear Amber		Ardrox 6120

Appendix L Background Sediment Data

Marine Pollution Research - Gladesville Bridge Marina Sediment Sampling Results 15/05/2019																				
Analyte	LOR	Units	ANZECC ISQG		1S	1B	2S	2B	3S	3B	4S	4B	5S	5B	6S	6B	7S	7B	8S	8B
			Low	High																
Fines (<75 Âµm)	1	%			44	52	19	26	----	----	34	24	----	----	19	14	----	----	15	13
Sand (>75 Âµm)	1	%			19	17	77	64	----	----	53	45	----	----	79	67	----	----	81	67
Gravel (>2mm)	1	%			37	31	4	11	----	----	13	31	----	----	2	19	----	----	4	20
Cobbles (>6cm)	1	%			<1	<1	<1	<1	----	----	<1	<1	----	----	<1	<1	----	----	<1	<1
Antimony	1	mg/kg	2	25	<1.0	11.1	3	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Arsenic	1	mg/kg	20	70	5.4	3.2	2.0	2.2	3.8	2.6	4.7	3.2	3.0	3.1	3.1	2.2	2.9	3.0	3.2	3.6
Cadmium	0.1	mg/kg	1.5	10	0.3	0.3	0.2	0.3	0.2	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium	1	mg/kg	80	370	38.6	28.9	20.4	22.0	20.0	21.1	30.2	19.4	17.9	13.7	18.0	18.4	13.3	12.0	10.9	9.8
Copper	1	mg/kg	65	270	65.9	39.7	84.0	66.6	56.5	41.0	81.1	61.0	46.5	33.8	45.6	36.4	29.3	28.8	27.9	27.0
Lead	1	mg/kg	50	220	191.0	240.0	117.0	162.0	141.0	133.0	163.0	128.0	91.6	74.0	93.3	95.6	68.6	70.3	64.4	59.8
Nickel	1	mg/kg	21	52	3.0	3.4	2.4	2.8	2.5	2.2	3.6	2.9	1.9	1.7	2.0	2.0	1.6	1.4	1.3	1.2
Silver	1	mg/kg	1	3.7	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Zinc	1	mg/kg	200	410	331	378	346	436	353	262	282	183	167	124	166	168	124	115	110	90
Mercury	0.1	mg/kg	0.15	1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.16	<0.1	<0.1	<0.1	0.11	<0.1	0.16	<0.1	0.17	<0.1
Total Organic Carbon	0.02	%			1.4	3.4	1.4	1.8	----	----	5.0	6.7	----	----	0.8	0.7	----	----	0.5	0.3

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