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Groundwater Monitoring Event

Vopak Site B and B4A Terminals, 20 and 37 Friendship Road, Port Botany, NSW

Vopak Terminals Australia Pty Ltd (Site B and B4A)
18 Aug 2024

AU124080

Quality Management

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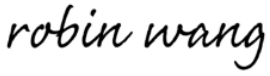
Signature	Draft		
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This report was prepared in accordance with the scope of services set out in the contract between Geosyntec Consultants Pty Ltd (ABN 23 154 745 525) and the client.

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Executive Summary

Geosyntec Consultants Pty Ltd (Geosyntec) was engaged by Vopak Terminals Australia Pty Ltd (the Client) to conduct a Groundwater Monitoring Event (GME) at Vopak Site B and B4A Terminals, 20 and 37 Friendship Road, Port Botany (the site).

The site is legally identified as Lot 10 in DP1126332, Lot 21 DP1045324 and Lot 20 DP 1272410, occupies an area of approximately 10.8 hectares (ha) and currently operates as a petroleum products storage terminal. The Site location is presented in Figure 1, Appendix A.

The site is used for petroleum products handling and storage since 1996. The Site layout plan is shown in Figure 2 in Appendix A. Given the site history of petroleum products handling and storage onsite, groundwater beneath the site may contain related contaminants, comprising petroleum hydrocarbons.

The site operates under Environment Protection Licence (EPL) No. 6007 for scheduled activities Chemical Storage, Petroleum Products and Fuel Production, Chemical Storage, Shipping in Bulk. The EPL includes three premises: 20 (Site B), 37 (Site B4A) and 49 (Vopak Bitumen Terminal located at B33) Friendship Road. Site B and B4A have requirements to monitor concentrations of pollutants in accordance with Sections P1.3 and M2.3 of the EPL. The objective of the GME was to assess the groundwater at the site in accordance with the EPL requirements.

Geosyntec carried out the GME in June 2024, involving gauging and sampling of twelve groundwater monitoring wells in ten (10) locations. Two locations comprise nested wells (two well screened at different depths). Based on the findings of this assessment, Geosyntec provides the following conclusions:

- Groundwater sampling and analysis were completed in accordance with the sites EPL (No. 6007).
- The groundwater analytical results were generally reported below the laboratory Limit of Reporting (LOR) except for lighter TRH fractions which were reported marginally above the LOR in MW1 and MW2.
- No exceedance of the adopted site screening criteria was detected.

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Appendices

1 Introduction

1.1 Background

This report, prepared by Geosyntec Consultants Pty Ltd (Geosyntec), documents a Groundwater Monitoring Event (GME) commissioned by Vopak Terminals Australia Pty Ltd (Vopak) at Vopak Site B and B4A Terminal, 20 and 37 Friendship Road, Port Botany (Site B and B4A) (the site).

The site is legally identified as Lot 10 in DP1126332, Lot 21 DP1045324 and Lot 20 DP 1272410, occupies an area of approximately 10.8 hectares (ha) and currently operates as a petroleum products storage terminal. The Site location is presented in Figure 1, Appendix A.

Based on the desktop review of previous reports, the site is known to have been used for petroleum products handling and storage since 1996. The Site layout plan is shown in Figure 2 in Appendix A.

1.2 Objective

The objective of the GME was to complete groundwater sampling and analysis in accordance with Conditions P1.3 and M2.3 of the sites EPL (No. 6007).

1.3 Scope of Work

The scope of works completed during this assessment included:

- Review of related documents.
- Preparation of a Job Hazard Assessment (JHA) and Safe Work Method Statement (SWMS) for the field works component of the investigation.
- Collection of twelve (12) groundwater samples from the 12 groundwater wells at monitoring locations nominated by the EPL, MW1-5 and MB01-05. MW4 and MW5 are nested wells.
- NATA accredited laboratory analysis of groundwater samples for Benzene, Toluene, Ethylbenzene and Xylenes (BTEX), Total Recoverable Hydrocarbons (TRH), and Polycyclic Aromatic Hydrocarbons (PAHs)
- Preparation of this report, in general accordance with the NSW EPA (2020) Consultants Reporting on Contaminated Land.

2 Site Identification and History

2.1 Site Identification

The site location is shown in Figure 1, with the site layout plan and the sampling locations shown in Figure 2, Appendix A.

Table 2.1: Site Identification

Title	Details
Street Address:	20 and 37 Friendship Road, Port Botany NSW (the site).
Property Description:	Lot 10 in DP1126332, Lot 21 DP1045324 and Lot 20 DP 1272410
Current Site Ownership:	Vopak Terminals Australia Pty Ltd (Vopak)
Geographical Coordinates: (approx. centre)	Lat: -33.978892° Long: 151.21237°
Property Size:	Approximately 10.8 ha
Local Government Area:	Randwick City Council
Zoning – Existing:	SP1 Special Activities (State Environmental Planning Policy (SEPP) (Three Ports) 2013

2.2 Surrounding Land Use

Land uses immediately adjoining the Site are described as follows:

Table 2.2: Immediate Site Surrounds

Title	Details
North:	Elgas Gas Storage Facility, followed by other port related industrial facilities.
East:	Port warehousing and container storage, Simblist Road, Prince of Wales Drive followed by Botany Bay.
South:	Port warehousing and container storage, followed by Botany Bay.
West:	Botany Bay.

2.3 Site Condition

2.3.1 General Site Conditions

The site condition based on published information, review of related documents and site observations made during fieldwork is presented in Table 2.3. At the time of the fieldwork, the site consisted of an active petroleum products terminal, including a front office building, storage tanks, and truck-loading facilities. Ground surfaces consisted of concrete hardstand, asphalt roadways and aggregate within storage tank areas.

Table 2.3: General Site Conditions

Title	Details
Topography and Drainage:	The Site lies at approximately 2 to 3m Australian Height Datum (AHD). The site is relatively flat. Excess surface water runoff is either expected to enter the existing onsite sump and drainage system, before eventually being discharged into Botany Bay. As the Site is primarily sealed, minimal surface water is expected to infiltrate into the soil beneath the site.

Title	Details
Boundary Condition:	The boundaries of the Site (consisting of security fences) are well maintained.
Visible Signs of Contamination	Not applicable. Warning sign for Asbestos Containing Material in Bunded Area of Concrete Tanks was noted.
Vegetation:	The entire site was sealed, except for aggregate covering in the tank bunds and immediate surrounds of the tank bunds.
Presence of Drums, Wastes and Fill Materials:	No drums were observed on site. Asbestos Containing Material (ACM) and Per- and Polyfluoroalkyl Substances (PFAS) signs were noted on site. Aggregate material was noted in the bunded storage tanks areas. The site likely contains fill material as much of the area is on reclaimed land.
Odours:	Hydrocarbon odour was noted at various locations across the site, which is expected at an operating hydrocarbon fuel storage facility.
Condition of Buildings & Roads:	Buildings and roads were well maintained.
Quality of Surface Water:	Surface water was observed to be contained within the existing sump and drainage systems. Water was generally observed to be clear, with no noticeable sheen or odour.
Relevant Local Sensitive Environments:	The local sensitive receiving environment is Botany Bay, located immediately to the west and approximately 160m east of the site.

3 Geology, Hydrogeology and Hydrology

The geology, hydrogeology and hydrology of the Site is summarised in this section. This information has been sourced from publicly available records and any previous reports issued for the site.

Table 3.1: Subsurface Conditions

Title	Details
Geological Map	The Sydney 1:100,000 scale Geological Series Sheet 9130 indicates that the Site is underlain by man-made fill (mf) potentially including dredged estuarine sands and demolition rubble.
Acid Sulfate Soils:	New South Wales Environment and Heritage soil mapping tool eSPADE 2.0 describes the Site as X2 - Disturbed Terrain - ASS material present below urban development. Acid Sulfate Soil (ASS) in such areas may be exposed during works below natural ground surface and works by which the water table is likely to be lowered.
Summary of Monitoring Wells:	According to the Bureau of Meteorology (BOM) Groundwater Explorer online tool, nine (9) offsite wells are located within a 500m radius of the site, which are used for monitoring purposes.
Depth to Groundwater:	Depth to the groundwater at the Site, as informed by related documents and fieldwork, indicated a standing water level (SWL) between 2.83m – 3.88m bgl for the site.
Direction and Rate of Groundwater Flow:	The direction of groundwater flow onsite as evidenced by previous studies, indicated a localised flow from east to west, consistent with the local topography and position of Botany Bay to the east and west of the site. Rate of groundwater flow has not been determined.
Use of Water Abstraction:	Nine (9) offsite wells are located within a 500m radius of the site to the north, which are used for monitoring purposes. The site falls within a Groundwater Exclusion Zone (Zone 4 – domestic ban).
Nearest Water Body:	The closest receiving water body from the Site is Botany Bay, located to the immediate west and 160m east of the site.

4 Conceptual Site Model

4.1 Known or Potential Sources of Contamination

The following table presents a summary of potentially contaminating activities relating to site contaminants regulated under the EPL that have/may have occurred at the Site, and which may potentially impact adjacent offsite areas:

Table 4.1: Summary of Potentially Contaminating Activities

Area	Activity	Potential Contaminants
Land within the site	Storage, usage, and leakage of petroleum products. Potential onsite migration of hydrocarbons contamination from neighbouring sites.	TRHs, BTEX and PAHs
Receiving surface waters of Botany Bay	Offsite migration of contaminants associated with petroleum products storage, usage, and leakage within the site.	As above.

4.2 Potentially Affected Media

Given the nature of the potentially contaminating activities discussed above, the following media could be potentially affected by contamination:

- Soil beneath the site.
- Soil vapour beneath the site.
- Groundwater beneath the site.
- Surface water / runoff to be discharged from the site.

4.3 Potential Human and Ecological Receptors

Potential human receptors may include the following:

- Workers involved with any excavation within the site.
- General workers onsite.
- Recreational users of surface waters within Botany Bay.

Potential ecological receptors may include the following:

- Offsite Marine Flora / Fauna within Botany Bay.
- Offsite Surface Waters and Sediments within Botany Bay.

4.4 Potential and Complete Exposure Pathways

Depth to groundwater within Site B and B4A ranged between 2.83m and 3.88m bgl, which indicates potential for groundwater incursion into deep onsite excavations, which may create a potential exposure pathway for excavation workers, if applicable.

Given the proximity of the site to Botany Bay, and the previously inferred groundwater flow direction to the west (towards Botany Bay), should contamination be detected in groundwater there may

exist a complete exposure pathway between groundwater beneath the site and receptors within Botany Bay, including recreational users, surface waters, sediments, marine flora and fauna.

5 Sampling Methodology

5.1 Groundwater Sampling Procedure

This section provides details of the adopted sampling and analysis plan, outlining methodologies adopted to ensure that the proposed groundwater investigation meets the requirements of guidelines made or approved by NSW Environment Protection Authority (EPA).

Groundwater sampling was conducted by trained and experienced Geosyntec Environmental Scientists in accordance with established Geosyntec Standard Operating Procedures as follows:

- Standing water levels and total well depth were measured using an interface probe (IP).
- Where the water column in a groundwater well was sufficient, individual sampling-suitable hydrasleeves were deployed and allowed to equilibrate for at least 48 hours and then sampled. Where the water column was not sufficient and because of the hazardous working environment, the well (one groundwater well – MW5S) was purged and sampled using a dedicated clear plastic bailer. This methodology was consistent with the previous round of sample collection.
- Water quality parameters were recorded using a YSI Quattro Pro Plus water quality meter that recorded pH, redox potential (Eh), electrical conductivity (EC), dissolved oxygen (DO) and temperature (calibration certificates presented in Attachment D).
- For the well which was bailed, sampling and recording of water quality parameters was carried out after purging was conducted (at least 3 well volumes). Water quality parameters were recorded immediately after collecting water samples from the location.
- Groundwater samples were placed into laboratory supplied suitable containers.
- Containers were labelled with the sample number, project number and date, with samples despatched under a chain of custody (COC).
- Samples were placed in an iced insulated container to cool.
- Samples were transported to the primary laboratory, Envirolab Services in Sydney, immediately after the completion of the groundwater sampling activities to allow technical holding times for analysis to be achieved.

5.2 Sampling Locations

Specific sampling locations and details are listed below in Table 5.1, with sampling locations displayed in Figure 3, Appendix A. All sampled wells were part of the existing well network within the site.

Table 5.1: Details of Sampling Locations

Location ID	Location within the site
MW5-D, MW5-S	Groundwater wells located along the north-eastern boundary of Site B. MW5-D / MW5-S consists of nested deep and shallow wells.
MW1, MW2, MW4-D, MW4-S	Groundwater wells located along the western boundary of Site B. MW4-D / MW4-S consists of nested deep and shallow wells.
MW3	Groundwater well located in the northern centre of Site B.
MB01, MB02	Groundwater wells located along the northern boundary of Site B4A.
MB04	Groundwater well located along the western boundary of Site B4A.

Location ID	Location within the site
MB03, MB05	Groundwater wells located along the southwestern and southeastern boundary of Site B4A.

5.3 Analytical Schedule

Primary: 12 groundwater samples were analysed for TRHs, BTEX and PAHs.

Results summary tables are presented in Appendix B, and laboratory certificates are presented in Appendix C.

5.4 Field Quality Assurance / Quality Control (QA/QC) Sampling

Quality Assurance and Quality Control procedures in accordance with Geosyntec Standard Operating Procedures and NEPM (2013) were implemented and are detailed in the following sections and Appendix F.

5.4.1 Duplicate and Triplicate Samples

One duplicate and one triplicate sample were analysed as part of this investigation. The samples were collected at one location, by splitting the recovered water sample into three sample container sets.

5.4.2 Trip Blank

One trip blank sample was collected for field QA/QC purposes.

6 Assessment Criteria

Geosyntec considers that potential human receptors include onsite workers and offsite recreational users of Botany Bay, and that potential ecological receptors include the sediments, surface waters, marine flora, and fauna of Botany Bay.

6.1 Human Health Assessment Criteria

As recommended by the NHMRC (2008) Managing Risks in Recreational Waters (NHMRC, 2008) guidelines, the health-based trigger values for drinking water should be multiplied by a factor of 10 to provide an assessment criterion for water recreational use (refer to Table 6.1). This criterion can also act as an alternate trigger value in the event of risk of dermal contact i.e. possible future site works which may encounter the local groundwater system during proposed bulk earthworks or trenching excavations and similar.

The Australian Drinking Water Guidelines 2011 (updated 2018 – NHMRC 2018) were multiplied by a factor of 10 to assess potential risks associated with incidental/recreational-type exposure to groundwater (e.g. within down-gradient water bodies).

HSLs for a 'commercial/industrial' exposure scenario (HSL-D) was adopted. HSLs were calculated based on the soil type and the observed depth to groundwater.

6.2 Ecological Assessment Criteria

For this assessment, the 95% species level of protection for marine water quality was adopted as groundwater from the site is ultimately expected to discharge into and / or via surface water-runoff into the local stormwater systems and eventually into Botany Bay or directly into Botany Bay. Where applicable, the most conservative guideline level has been adopted.

6.3 Adopted Site Assessment Criteria

The adopted site assessment criteria are detailed below in Table 6.1.

Table 6.1: Groundwater Site Assessment Criteria

Analyte	NEPM (2013) GILs Marine Water/HSL for Vapour Intrusion (µg/L)	ANZG (2018) Guidelines for Marine Water Quality[1] (µg/L)	NHMRC (2018) Recreational Water Quality / Aesthetics (µg/L)
BTEXN			
Benzene	500/5000	700	10
Toluene	-/NL	180	8000
Ethylbenzene	-/NL	80	3000
Xylene (O)			
Xylene (M + P)		75	
Xylene (Total)	-/NL		6000
Naphthalene	50/NL	70	

Analyte	NEPM (2013) GILs Marine Water/HSL for Vapour Intrusion (µg/L)	ANZG (2018) Guidelines for Marine Water Quality[1] (µg/L)	NHMRC (2018) Recreational Water Quality / Aesthetics (µg/L)
TRHs			
C6-C10 Fraction (F1)	-/6000		
C10-C16 Fraction (F2 minus Naphthalene)	-/NL		
PAHs			
Phenanthrene		0.6	
Anthracene		0.01	
Fluoranthene		1	
Benzo(a)pyrene		0.1	0.1

1 -Trigger values adopted (level of protection: 95% of species), ANZG (2018).

2.NL Not Limiting

7 Monitoring Results

This section presents the results of the sampling of EPL Compliance wells at Site B and B4A.

7.1 Field Observations

This section presents an overview of the field observations of the groundwater encountered during the groundwater sampling activities. Calibration certificates are provided in Appendix D. Copies of groundwater field observations sheets are provided in Appendix E.

- Standing water levels were measured between 2.83m bgl in MB01 and 3.88m bgl in MB04.
- No phase separated hydrocarbon (PSH), or hydrocarbon sheen was observed during groundwater sampling.
- No hydrocarbon odours were noted in the groundwater samples. Sulfuric odour was noted in MB03 and MB05.

Table 7.1 lists the recordings of the physiochemical measurements taken during the groundwater monitoring event including relevant observations.

Table 7.1: Field Physiochemical Parameters of Sampled Groundwater

Well ID	SWL (mTOC)	pH	Temp (°C)	Conductivity (uS/cm at 25 °C)	Dissolved Oxygen (ppm)	Redox / ORP[2] (mV)	Observations
MW1	3.60	6.89	19.8	748	1.51	72.2	Clear, slightly brown, no odour, no sheen, no turbidity
MW2	3.46	6.95	17.8	581	1.63	66.4	Clear, no odour, no sheen, no turbidity
MW3	3.49	7.27	18.0	661	1.90	101.0	Clear, no odour, no sheen, no turbidity
MW4S	3.52	6.81	16.7	318	5.05	93.6	Clear, no odour, no sheen, no turbidity
MW4D	3.39	6.70	17.9	42652	1.00	145.1	Clear, no odour, no sheen, brown sediments at bottom of hydrasleeve
MW5S	3.31	5.88	19.1	563	1.84	102.4	Clear, no odour, no sheen, no turbidity
MW5D	3.13	5.37	18.6	37801	0.82	143.6	Clear, no odour, no sheen, brown sediments at bottom of hydrasleeve
MB01	2.83	7.12	20.3	493	2.12	82.6	Clear, no odour, no sheen, no turbidity
MB02	2.89	7.18	20.5	517	0.85	64.6	Clear, no odour, no sheen, no turbidity
MB03	3.79	7.63	17.6	251	0.83	49.0	Clear, sulfuric odour, no sheen, no turbidity, minor turbidity
MB04	3.88	6.80	17.3	561	2.72	95.8	Clear, no odour, no sheen, no turbidity, minor turbidity

Well ID	SWL (mTOC)	pH	Temp (°C)	Conductivity (uS/cm at 25 °C)	Dissolved Oxygen (ppm)	Redox / ORP[2] (mV)	Observations
MB05	3.54	6.87	19.0	906	0.71	71.7	Clear, minor sulfuric odour, no sheen, no turbidity, minor turbidity

2 -The field redox potential (Eh) corrected for reporting as mV.

Groundwater conditions across the site were slightly acidic to neutral (pH 5.37 to 7.63). Oxidising conditions were recorded in the groundwater. Groundwater conductivity varied across the Site, ranging between 251 uS/cm and 906 uS/cm except for two deep wells, indicating generally fresh groundwater conditions. The measured conductivity of MW4D and MW5D are 42,652 µS/cm and 37,801 µS/cm, respectively, which are similar to the electrical conductivity of seawater. This suggests that seawater intrusion into the deeper aquifer is likely. Conductivity generally increased towards the western boundary.

7.2 Analytical Results

A result summary table of the analytical results is included in Appendix B with copies of laboratory certificates included in Appendix C.

Concentrations were generally not reported above the laboratory Limit of Reporting (LOR) except for lighter TRH fractions which were reported marginally above the LOR in MW1 (TRH Fraction 2 of 190 µg/L) and MW2 (TRH Fraction 1 and Fraction 2: 30 and 140 µg/L, respectively).

While these concentrations were detected, no exceedance of the adopted site assessment criteria were reported.

7.3 Data Quality Assessment

7.3.1 Field QA/QC

Groundwater samples were collected using clean dedicated sampling equipment (hydrasleeves or plastic bailer) at each location and clean disposable nitrile gloves to prevent any potential cross contamination. Samples were placed directly into laboratory supplied containers.

A duplicate (DUP 1) and a triplicate (TRIP1) sample were analysed for the site from the primary sample of MW2. Relative Percentage Differences (RPDs) were reported above the acceptable limits for TRH F1 and TRH F2 for TRIP1 (refer to Table B, Appendix B). This is considered attributable to heterogeneity of the samples and differing handling and analytical processes used in the separate laboratories. This is considered not to impact the data useability and the overall outcome of the assessment.

No laboratory trip spike was taken during the groundwater sampling; however, a trip blank was taken. The BTEX concentrations in the trip blank were below the LOR, indicating unlikely occurrence of cross-contamination during the fieldwork (refer to Table C, Appendix B).

Detailed field QA/QC results are presented in Table F-1 in Appendix F.

Based on the information referenced above, it was concluded that the collected data is of an acceptable quality to achieve the objectives of this study.

7.3.2 Laboratory QA/QC

Samples were received and analysed by the primary laboratory, stored with ice and within the sample holding times.

Laboratory duplicate RPDs were within the accepted range. Detailed QA/QC results are presented on the laboratory testing certificates presented in Appendix C and summarised in Table F-1 in Appendix F.

8 Conclusions

Based on the findings of this assessment, Geosyntec provides the following conclusions:

- Groundwater sampling and analysis were completed in accordance with the sites EPL (No. 6007).
- The groundwater analytical results were generally reported below the laboratory Limit of Reporting (LOR) except for lighter TRH fractions which were reported marginally above the LOR in MW1 and MW2.
- No exceedance of the adopted site screening criteria was detected.

9 References

ANZG (2018) Australian and New Zealand Guidelines for Fresh and Marine Water Quality.

HEPA (2020) PFAS National Environmental Management Plan, Version 2.0, January 2020 [NEMP 2.0].

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

NHMRC/NRMMC (2011) Australian Drinking Water Guidelines. National Health and Medical Research Council and National Resource Management Ministerial Council of Australia and New Zealand.

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

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

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

10 Limitations

This report has been prepared by Geosyntec Consultants Pty Ltd (“Geosyntec”) 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 1. The report has been prepared specifically for the Client for the purposes of the commission and use by any explicitly nominated third party in the agreement between Geosyntec 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 written approval by Geosyntec.

Geosyntec’s assessment was limited strictly to identifying environmental conditions associated with the subject property area as identified in the scope of work 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.

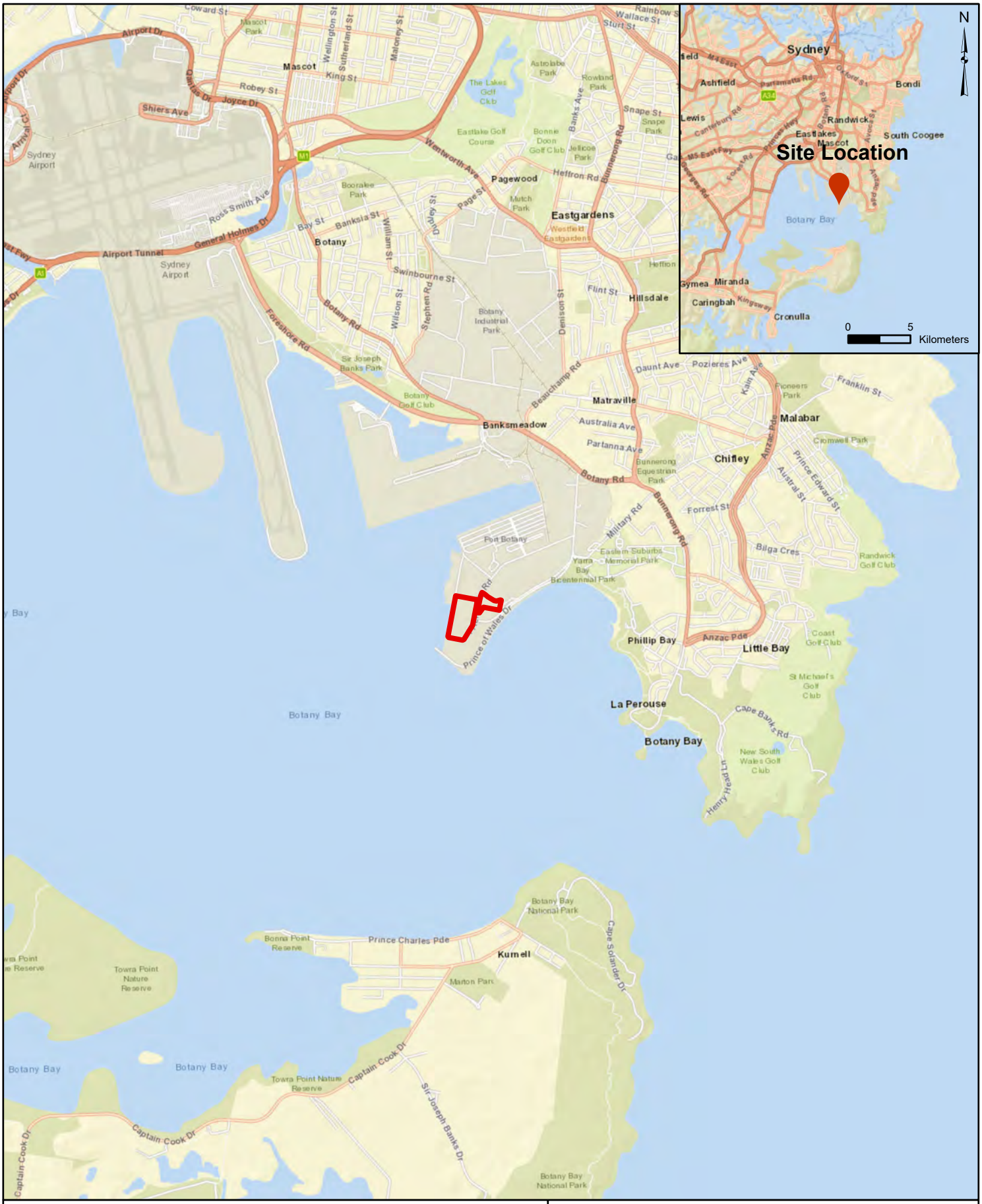
This report does not comment on any regulatory obligations based on the findings. This report relates only to the objectives stated and does not relate to any other work conducted for the Client.

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 Geosyntec personnel involved with the project, subject to the qualifications made above. While normal assessments of data reliability have been made, Geosyntec has not independently verified and assumes no responsibility or liability for errors in any data obtained from regulatory agencies, statements from sources outside of Geosyntec, or developments resulting from situations outside the scope of this project.

Geosyntec 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

Site Boundary

N

0 1 Kilometers

Site Location Map

20 & 37 Friendship Road
Port Botany, NSW

Geosyntec consultants

AU124080 | July 2024

Figure 1

World Street Map: Esri, HERE, Garmin, NGA, USGS

Legend

- Site Boundary
- EPL Compliance Monitoring Well
- Lost/Destroyed Monitoring Well

N

0 50 Meters

Site Layout Plan and Groundwater Monitoring Well Locations

20 & 37 Friendship Road
Port Botany, NSW

Geosyntec consultants

AU124080	July 2024

Figure 2

Nearmap (7 April 2024).

Appendix B1 Result Summary Tables

		BTEX						TRH										
		Naphthalene (VOC)	Benzene	Toluene	Ethylbenzene	Xylene (m & p)	Xylene (o)	TRH C10 - C14	TRH C15 - C28	TRH C29 - C36	TRH >C10-C16	TRH >C10 - C16less Naphthalene (F2)	TRH >C16-C34	TRH >C34-C40	Total +ve TRH (>C10-C40)	TRH C6 - C9	TRH C6 - C10	TRH C6 - C10 lessBTEX (F1)
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL		0.001	1	1	1	2	1	50	100	100	50	50	100	100	50	10	10	10
ANZG (2018) Marine Water 95% LOSP Toxicant DGVs		70	700	180	80	75	-	-	-	-	-	-	-	-	-	-	-	-
NEPM 2013 Table 1C GILs, Marine Waters		50	500	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NEPM 2013 Table 1A(4) Comm/Ind HSL D GW for Vapour Intrusion, Sand		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
>=2m, <4m		-	5,000	-	-	-	-	-	-	-	-	NL	NL	NL	-	-	-	6,000
NHMRC (2018) Recreational Water Quality/Aesthetics		-	10	8000	3000	-	-	-	-	-	-	-	-	-	-	-	-	-
Field ID	**Date**																	
MW1	**6/17/2024**	<1	<1	<1	<1	<2	<1	190	200	160	190	190	340	<100	530	<10	<10	<10
MW2	**6/17/2024**	<1	<1	<1	<1	<2	<1	140	<100	<100	140	140	<100	<100	140	18	30	30
MW3	**6/17/2024**	<1	<1	<1	<1	<2	<1	<50	<100	<100	<50	<50	<100	<100	<50	<10	<10	<10
MW4S	**6/17/2024**	<1	<1	<1	<1	<2	<1	<50	<100	<100	<50	<50	<100	<100	<50	<10	<10	<10
MW4D	**6/17/2024**	<1	<1	<1	<1	<2	<1	<50	<100	<100	<50	<50	<100	<100	<50	<10	<10	<10
MW5S	**6/17/2024**	<1	<1	<1	<1	<2	<1	<50	<100	<100	<50	<50	<100	<100	<50	<10	<10	<10
MW5D	**6/17/2024**	<1	<1	<1	<1	<2	<1	<50	<100	<100	<50	<50	<100	<100	<50	<10	<10	<10
MB01	**6/17/2024**	<1	<1	<1	<1	<2	<1	<50	<100	<100	<50	<50	<100	<100	<50	<10	<10	<10
MB02	**6/17/2024**	<1	<1	<1	<1	<2	<1	<50	<100	<100	<50	<50	<100	<100	<50	<10	<10	<10
MB03	**6/17/2024**	<1	<1	<1	<1	<2	<1	<50	<100	<100	<50	<50	<100	<100	<50	<10	<10	<10
MB04	**6/17/2024**	<1	<1	<1	<1	<2	<1	<50	<100	<100	<50	<50	<100	<100	<50	<10	<10	<10
MB05	**6/17/2024**	<1	<1	<1	<1	<2	<1	<50	<100	<100	<50	<50	<100	<100	<50	<10	<10	<10

		PAHs															
		Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo(a)anthracene	Chrysene	Benzo(b,j+k)fluoranthene	Benzo(a)pyrene	Indeno(1,2,3-c,d)pyrene	Dibenzo(a,h)anthracene	Benzo(g,h,i)perylene	Benzo(a)pyrene TEQ	Total +vePAH's
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL		1	1	1	1	1	1	1	1	1	2	1	1	1	1	5	-
ANZG (2018) Marine Water 95% LOSP Toxicant DGVs		-	-	-	0.6	0.01	1	-	-	-	-	0.1	-	-	-	-	-
NEPM 2013 Table 1C GILs, Marine Waters		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NEPM 2013 Table 1A(4) Comm/Ind HSL D GW for Vapour Intrusion, Sand		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
>=2m, <4m		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NHMRC (2018) Recreational Water Quality/Aesthetics		-	-	-	-	-	-	-	-	-	-	0.1	-	-	-	-	-
Field ID	**Date**																
MW1	**6/17/2024**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1
MW2	**6/17/2024**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.5	0.21
MW3	**6/17/2024**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1
MW4S	**6/17/2024**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1
MW4D	**6/17/2024**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1
MW5S	**6/17/2024**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1
MW5D	**6/17/2024**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1
MB01	**6/17/2024**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1
MB02	**6/17/2024**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1
MB03	**6/17/2024**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1
MB04	**6/17/2024**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1
MB05	**6/17/2024**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1

		BTEX						TRH					
		Benzene	Toluene	Ethylbenzene	Xylene (m & p)	Xylene (o)	Xylene Total	C6-C10 Fraction (F1)	C6-C10 (F1 minus BTEX)	>C10-C16 Fraction (F2)	>C10-C16 Fraction (F2 minus Naphthalene)	>C16-C34 Fraction (F3)	>C34-C40 Fraction (F4)
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL		1	1	1	2	1	3	20	20	50	50	100	100
Lab Report #	**Field ID**												
354219	**MW2**	<1	<1	<1	<2	<1	<3	30	30	140	140	<100	<100
354219	**DUP1**	<1	<1	<1	<2	<1	<3	<10	<10	120	120	<100	<100
RPD		0	0	0	0	0	0	0	0	15.4	15.4	0	0
354219	**MW2**	<1	<1	<1	<2	<1	<3	30	30	140	140	<100	<100
1110090	**TRIP1**	<1	<1	<1	<2	<1	<3	<20	50	50	<50	<100	<100
RPD		0	0	0	0	0	0	0	50.0	94.7	0	0	0

		PAHs														
		Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo(a)anthracene	Chrysene	Benzo(b,j+k)fluoranthene	Benzo(a)pyrene	Indeno(1,2,3-c,d)pyrene	Dibenzo(a,h)anthracene	Benzo(g,h,i)perylene	Benzo(a)pyrene TEQ
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.5
Lab Report #	**Field ID**															
354219	**MW2**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.5
354219	**DUP1**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.5
RPD		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
354219	**MW2**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.5
1110090	**TRIP1**	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
RPD		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

***RPDs have only been considered where a concentration is greater than 5 times the EQL. 50% of LOR has bee used for non-detects.**

****RPDs above 30% have been highlighted**

*****Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory**

		BTEX					
		Naphthalene (VOC)	Benzene	Toluene	Ethylbenzene	Xylene (m & p)	Xylene (o)
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL		0.001	1	1	1	2	1
Field ID	**Date**						
Tripblank1	**6/17/2024**	<1	<1	<1	<1	<2	<1

Appendix B2 Summary EPL Results

Geosyntec consultants

AU124080 - ESA Vopak Port Botany
MW1 Results Summary

Site B B4A, Gate B47
20 37 Friendship Road, Port Botany, NSW

EPA Identification Number: 3

Pollutant	Unit of Measure	Number of Samples Required	Number of Samples Collected and Analysed	Lowest Sample Value	Mean of Sample	Highest Sample Value
Benzene	micrograms per litre	1	1	<1	<1	<1
Ethylbenzene	micrograms per litre	1	1	<1	<1	<1
Polycyclic Aromatic Hydrocarbons	micrograms per litre	1	1	<0.1	<0.1	<0.1
Toluene	micrograms per litre	1	1	<1	<1	<1
Total Petroleum Hydrocarbons	micrograms per litre	1	1	530	530	530
Xylene*	micrograms per litre	1	1	<3	<3	<3

*Results for xylene combine the detection limits of both m+p-xylene (<2 ug/L) and o-xylene (<1 µg/L).

Geosyntec consultants

AU124080 - ESA Vopak Port Botany
MW2 Results Summary

Site B B4A, Gate B47
20 37 Friendship Road, Port Botany, NSW

EPA Identification Number: 4

Pollutant	Unit of Measure	Number of Samples Required	Number of Samples Collected and Analysed	Lowest Sample Value	Mean of Sample	Highest Sample Value
Benzene	micrograms per litre	1	1	<1	<1	<1
Ethylbenzene	micrograms per litre	1	1	<1	<1	<1
Polycyclic Aromatic Hydrocarbons	micrograms per litre	1	1	0.21	0.21	0.21
Toluene	micrograms per litre	1	1	<1	<1	<1
Total Petroleum Hydrocarbons	micrograms per litre	1	1	140	140	140
Xylene*	micrograms per litre	1	1	<3	<3	<3

*Results for xylene combine the detection limits of both m+p-xylene (<2 ug/L) and o-xylene (<1 µg/L).

Geosyntec consultants

AU124080 - ESA Vopak Port Botany
MW3 Results Summary

Site B B4A, Gate B47
20 37 Friendship Road, Port Botany, NSW

EPA Identification Number: 5

Pollutant	Unit of Measure	Number of Samples Required	Number of Samples Collected and Analysed	Lowest Sample Value	Mean of Sample	Highest Sample Value
Benzene	micrograms per litre	1	1	<1	<1	<1
Ethylbenzene	micrograms per litre	1	1	<1	<1	<1
Polycyclic Aromatic Hydrocarbons	micrograms per litre	1	1	<0.1	<0.1	<0.1
Toluene	micrograms per litre	1	1	<1	<1	<1
Total Petroleum Hydrocarbons	micrograms per litre	1	1	<50	<50	<50
Xylene*	micrograms per litre	1	1	<3	<3	<3

*Results for xylene combine the detection limits of both m+p-xylene (<2 ug/L) and o-xylene (<1 µg/L).

Geosyntec consultants

AU124080 - ESA Vopak Port Botany
MW4S Results Summary

Site B B4A, Gate B47
20 37 Friendship Road, Port Botany, NSW

EPA Identification Number: 6

Pollutant	Unit of Measure	Number of Samples Required	Number of Samples Collected and Analysed	Lowest Sample Value	Mean of Sample	Highest Sample Value
Benzene	micrograms per litre	1	1	<1	<1	<1
Ethylbenzene	micrograms per litre	1	1	<1	<1	<1
Polycyclic Aromatic Hydrocarbons	micrograms per litre	1	1	<0.1	<0.1	<0.1
Toluene	micrograms per litre	1	1	<1	<1	<1
Total Petroleum Hydrocarbons	micrograms per litre	1	1	<50	<50	<50
Xylene*	micrograms per litre	1	1	<3	<3	<3

*Results for xylene combine the detection limits of both m+p-xylene (<2 ug/L) and o-xylene (<1 µg/L).

Geosyntec consultants

AU124080 - ESA Vopak Port Botany
MW4D Results Summary

Site B B4A, Gate B47
20 37 Friendship Road, Port Botany, NSW

EPA Identification Number: 6

Pollutant	Unit of Measure	Number of Samples Required	Number of Samples Collected and Analysed	Lowest Sample Value	Mean of Sample	Highest Sample Value
Benzene	micrograms per litre	1	1	<1	<1	<1
Ethylbenzene	micrograms per litre	1	1	<1	<1	<1
Polycyclic Aromatic Hydrocarbons	micrograms per litre	1	1	<0.1	<0.1	<0.1
Toluene	micrograms per litre	1	1	<1	<1	<1
Total Petroleum Hydrocarbons	micrograms per litre	1	1	<50	<50	<50
Xylene*	micrograms per litre	1	1	<3	<3	<3

*Results for xylene combine the detection limits of both m+p-xylene (<2 ug/L) and o-xylene (<1 µg/L).

Geosyntec consultants

AU124080 - ESA Vopak Port Botany
MW5S Results Summary

Site B B4A, Gate B47
20 37 Friendship Road, Port Botany, NSW

EPA Identification Number: 7

Pollutant	Unit of Measure	Number of Samples Required	Number of Samples Collected and Analysed	Lowest Sample Value	Mean of Sample	Highest Sample Value
Benzene	micrograms per litre	1	1	<1	<1	<1
Ethylbenzene	micrograms per litre	1	1	<1	<1	<1
Polycyclic Aromatic Hydrocarbons	micrograms per litre	1	1	<0.1	<0.1	<0.1
Toluene	micrograms per litre	1	1	<1	<1	<1
Total Petroleum Hydrocarbons	micrograms per litre	1	1	<50	<50	<50
Xylene*	micrograms per litre	1	1	<3	<3	<3

*Results for xylene combine the detection limits of both m+p-xylene (<2 ug/L) and o-xylene (<1 µg/L).

Geosyntec consultants

AU124080 - ESA Vopak Port Botany
MW5D Results Summary

Site B B4A, Gate B47
20 37 Friendship Road, Port Botany, NSW

EPA Identification Number: 7

Pollutant	Unit of Measure	Number of Samples Required	Number of Samples Collected and Analysed	Lowest Sample Value	Mean of Sample	Highest Sample Value
Benzene	micrograms per litre	1	1	<1	<1	<1
Ethylbenzene	micrograms per litre	1	1	<1	<1	<1
Polycyclic Aromatic Hydrocarbons	micrograms per litre	1	1	<0.1	<0.1	<0.1
Toluene	micrograms per litre	1	1	<1	<1	<1
Total Petroleum Hydrocarbons	micrograms per litre	1	1	<50	<50	<50
Xylene*	micrograms per litre	1	1	<3	<3	<3

*Results for xylene combine the detection limits of both m+p-xylene (<2 ug/L) and o-xylene (<1 µg/L).

Geosyntec consultants

AU124080 - ESA Vopak Port Botany
MB01 Results Summary

Site B B4A, Gate B47
20 37 Friendship Road, Port Botany, NSW

EPA Identification Number: 11

Pollutant	Unit of Measure	Number of Samples Required	Number of Samples Collected and Analysed	Lowest Sample Value	Mean of Sample	Highest Sample Value
Benzene	micrograms per litre	1	1	<1	<1	<1
Ethylbenzene	micrograms per litre	1	1	<1	<1	<1
Polycyclic Aromatic Hydrocarbons	micrograms per litre	1	1	<0.1	<0.1	<0.1
Toluene	micrograms per litre	1	1	<1	<1	<1
Total Petroleum Hydrocarbons	micrograms per litre	1	1	<50	<50	<50
Xylene*	micrograms per litre	1	1	<3	<3	<3

*Results for xylene combine the detection limits of both m+p-xylene (<2 ug/L) and o-xylene (<1 µg/L).

Geosyntec consultants

AU124080 - ESA Vopak Port Botany
MB02 Results Summary

Site B B4A, Gate B47
20 37 Friendship Road, Port Botany, NSW

EPA Identification Number: 12

Pollutant	Unit of Measure	Number of Samples Required	Number of Samples Collected and Analysed	Lowest Sample Value	Mean of Sample	Highest Sample Value
Benzene	micrograms per litre	1	1	<1	<1	<1
Ethylbenzene	micrograms per litre	1	1	<1	<1	<1
Polycyclic Aromatic Hydrocarbons	micrograms per litre	1	1	<0.1	<0.1	<0.1
Toluene	micrograms per litre	1	1	<1	<1	<1
Total Petroleum Hydrocarbons	micrograms per litre	1	1	<50	<50	<50
Xylene*	micrograms per litre	1	1	<3	<3	<3

*Results for xylene combine the detection limits of both m+p-xylene (<2 ug/L) and o-xylene (<1 µg/L).

Geosyntec consultants

AU124080 - ESA Vopak Port Botany
MB03 Results Summary

Site B B4A, Gate B47
20 37 Friendship Road, Port Botany, NSW

EPA Identification Number: 13

Pollutant	Unit of Measure	Number of Samples Required	Number of Samples Collected and Analysed	Lowest Sample Value	Mean of Sample	Highest Sample Value
Benzene	micrograms per litre	1	1	<1	<1	<1
Ethylbenzene	micrograms per litre	1	1	<1	<1	<1
Polycyclic Aromatic Hydrocarbons	micrograms per litre	1	1	<0.1	<0.1	<0.1
Toluene	micrograms per litre	1	1	<1	<1	<1
Total Petroleum Hydrocarbons	micrograms per litre	1	1	<50	<50	<50
Xylene*	micrograms per litre	1	1	<3	<3	<3

*Results for xylene combine the detection limits of both m+p-xylene (<2 ug/L) and o-xylene (<1 µg/L).

Geosyntec consultants

AU124080 - ESA Vopak Port Botany
MB04 Results Summary

Site B B4A, Gate B47
20 37 Friendship Road, Port Botany, NSW

EPA Identification Number: 14

Pollutant	Unit of Measure	Number of Samples Required	Number of Samples Collected and Analysed	Lowest Sample Value	Mean of Sample	Highest Sample Value
Benzene	micrograms per litre	1	1	<1	<1	<1
Ethylbenzene	micrograms per litre	1	1	<1	<1	<1
Polycyclic Aromatic Hydrocarbons	micrograms per litre	1	1	<0.1	<0.1	<0.1
Toluene	micrograms per litre	1	1	<1	<1	<1
Total Petroleum Hydrocarbons	micrograms per litre	1	1	<50	<50	<50
Xylene*	micrograms per litre	1	1	<3	<3	<3

*Results for xylene combine the detection limits of both m+p-xylene (<2 ug/L) and o-xylene (<1 µg/L).

Geosyntec consultants

AU124080 - ESA Vopak Port Botany
MB05 Results Summary

Site B B4A, Gate B47
20 37 Friendship Road, Port Botany, NSW

EPA Identification Number: 15

Pollutant	Unit of Measure	Number of Samples Required	Number of Samples Collected and Analysed	Lowest Sample Value	Mean of Sample	Highest Sample Value
Benzene	micrograms per litre	1	1	<1	<1	<1
Ethylbenzene	micrograms per litre	1	1	<1	<1	<1
Polycyclic Aromatic Hydrocarbons	micrograms per litre	1	1	<0.1	<0.1	<0.1
Toluene	micrograms per litre	1	1	<1	<1	<1
Total Petroleum Hydrocarbons	micrograms per litre	1	1	<50	<50	<50
Xylene*	micrograms per litre	1	1	<3	<3	<3

*Results for xylene combine the detection limits of both m+p-xylene (<2 ug/L) and o-xylene (<1 µg/L).

Appendix C Laboratory Certificates

CHAIN OF CUSTODY FORM - Client

ENVIROLAB GROUP
National phone number 1300 424 344

Sydney Lab - Envirolab Services
12 Ashley St, Chatswood, NSW 2067
ph: 02 9910 6200 | e: sydney@envirolab.com.au

Perth Lab - MPL Laboratories
16-18 Hayden Crt, Myaree, WA 6154
ph: 08 9317 2505 | e: lab@mpl.com.au

Melbourne Lab - Envirolab Services
25 Research Drive, Croydon South, VIC 3136
ph: 03 9763 2500 | e: melbourne@envirolab.com.au

Adelaide Office - Envirolab Services
7a The Parade, Norwood, SA 5067
ph: 08 7087 6800 | e: adelaide@envirolab.com.au

Brisbane Office - Envirolab Services
20a, 10-20 Depot St, Banyo, QLD 4014
ph: 07 3266 9532 | e: brisbane@envirolab.com.au

Darwin Office - Envirolab Services
Unit 20/119 Reichardt Road, Winnellie, NT 0820
ph: 08 8967 1201 | e: darwin@envirolab.com.au

Company:	Geosyntec
Contact Person:	Dylan Barclay
Project Mgr:	Priya Dass
Sampler:	Dylan Barclay, Robin Wang
Address:	Suite 3.04, 1 York Street, Sydney NSW 2000
Phone:	NA
Mob:	0420400304
Email Results to:	dylan.barclay@geosyntec.com, robin.wang@geosyntec.com, priya.dass@geosyntec.com
Email Invoice to:	priya.dass@geosyntec.com admin@geosyntec.com

Client Project Name/Number/Site etc (ie report title): AU124080 -Vopak

PO No. (if applicable):

Envirolab Quote No.:

Date results required:

Or choose: ☑ Standard ☐ Same Day ☐ 1 day ☐ 2 day ☐ 3 day

Note: inform lab in advance if urgent turnaround is required - surcharges apply

Additional report format: ☑ Esdat ☐ Equis

Lab Comments:

Envirolab Sample ID (Lab use only)	Client Sample ID or Information	Depth	Date Sampled	Type of Sample	Heavy Metals (8)	Total Petroleum Hydrocarbons (C10-C36)	BTEX	PAHs	pH	Electrical Conductivity	Asbestos 60g (presence/absence)	Foreign Materials (Y2/N)	On Hold								Provide as much information about the sample as you can
1	MW1		17&18/6	Water		X	X	X													
2	MW2					X	X	X													
3	MW3					X	X	X													
4	MW4S					X	X	X		Not tested											
5	MW4D					X	X	X													
6	MW5S					X	X	X													
7	MW5D					X	X	X													
8	MB01					X	X	X													
9	MB02					X	X	X													
10	MB03					X	X	X													
11	MB04					X	X	X													
12	MB05					X	X	X													

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

Job No: 354219

Date Received: 18/6/24
Time Received: 13:40
Received By: UW
Temp: Cool / Ambient 4°C
Cooling: Ice / Icepack
Security: Intact / Broken / None

☐ Please tick the box if observed settled sediment present in water samples is to be included in the extraction and/or analysis

Relinquished by (Company):	Geosyntec	Received by (Company):	
Print Name:	Robin Wang	Print Name:	
Date & Time:	14/06/2024 0:00	Date & Time:	
Signature:		Signature:	

Lab Use Only

Job number:	Cooling: Ice / Ice pack / None
Temperature:	Security seal: Intact / Broken / None
TAT Req - SAME day / 1 / 2 / 3 / 4 / STD	

354219 Updated COC

CHAIN OF CUSTODY FORM - Client

ENVIROLAB GROUP
National phone number 1300 424 344

Sydney Lab - Envirolab Services
12 Ashley St, Chatswood, NSW 2067
02 9910 6200 | sydney@envirolab.com.au

Perth Lab - MPL Laboratories
16-18 Hayden Crt, Myaree, WA 6154
08 9317 2505 | lab@mpl.com.au

Melbourne Lab - Envirolab Services
25 Research Drive, Croydon South, VIC 3136
03 9763 2500 | melbourne@envirolab.com.au

Adelaide Office - Envirolab Services
7a The Parade, Norwood, SA 5067
08 7087 6800 | adelaide@envirolab.com.au

Brisbane Office - Envirolab Services
20a, 10-20 Depot St, Banyo, QLD 4014
07 3266 9532 | brisbane@envirolab.com.au

Darwin Office - Envirolab Services
Unit 20/119 Reichardt Road, Winnellie, NT 0820
08 8967 1201 | darwin@envirolab.com.au

Company:	Geosyntec	Client Project Name/Number/Site etc (ie report title):	AU124080 -Vopak
Contact Person:	Dylan Barclay	PO No. (if applicable):	
Project Mgr:	Priya Dass	Envirolab Quote No. :	
Sampler:	Dylan Barclay, Robin Wang	Date results required:	
Address:	Suite 3.04, 1 York Street, Sydney NSW 2000	Or choose:	✓ Standard / Same Day / 1 day / 2 day / 3 day
Phone:	424837400 Mob: 0420400304	Note: Inform lab in advance if urgent turnaround is required - surcharges apply	
Email Results to:	dylan.barclay@geosyntec.com, robin.wang@geosyntec.com, priya.dass@geosyntec.com	Additional report format:	✓Esdat Equis
Email Invoice to:	priya.dass@geosyntec.com admin@geosyntec.com	Lab Comments:	

Sample information					Tests Required																	Comments
Envirolab Sample ID (Lab use only)	Client Sample ID or Information	Depth	Date Sampled	Type of Sample	Heavy Metals (8)	Total Petroleum Hydrocarbons (TPH)	BTEX	PAHs	pH	Electrical Conductivity	Asbestos 65g (presence/absence)	Foreign Materials (T276)	On Hold									Provide as much information about the sample as you can
1	MW1		17-18/06/24	Water		X	X	X														
2	MW2		17-18/06/24	Water		X	X	X														
3	MW3		17-18/06/24	Water		X	X	X														
4	MW4S		17-18/06/24	Water		X	X	X														
5	MW4D		17-18/06/24	Water		X	X	X														
6	MW5S		17-18/06/24	Water		X	X	X														
7	MW5D		17-18/06/24	Water		X	X	X														
8	MB01		17-18/06/24	Water		X	X	X														
9	MB02		17-18/06/24	Water		X	X	X														
10	MB03		17-18/06/24	Water		X	X	X														
11	MB04		17-18/06/24	Water		X	X	X														
12	MB05		17-18/06/24	Water		X	X	X														
13	DUP1		17-18/06/24	Water		X	X	X														
510	TRIP1		17-18/06/24	Water		X	X	X														Send to Eurofins
14	TB		17-18/06/24	Water		X	X															

☐ *Please tick the box if observed settled sediment present in water samples is to be included in the extraction and/or analysis*

Relinquished by (Company):	Geosyntec	Received by (Company):		Lab Use Only	
Print Name:	Dylan Barclay	Print Name:		Job number:	Cooling: Ice / Ice pack / None
Date & Time:	6/18/2024 13:15	Date & Time:		Temperature:	Security seal: Intact / Broken / None
Signature:		Signature:		TAT Req - SAME day / 1 / 2 / 3 / 4 / STD	

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	Geosyntec
Attention	Dylan Barclay, Priya Dass

Sample Login Details

Your reference	AU124080 - Vopak
Envirolab Reference	354219
Date Sample Received	18/06/2024
Date Instructions Received	18/06/2024
Date Results Expected to be Reported	25/06/2024

Sample Condition

Samples received in appropriate condition for analysis	Yes
No. of Samples Provided	12 Water
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	4
Cooling Method	Ice
Sampling Date Provided	YES

Comments

Nil

Please direct any queries to:

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

Analysis Underway, details on the following page:

Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
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Sample ID	vTRH(C6-C10)/BTEXN in Water	svTRH (C10-C40) in Water	PAHs in Water
MW1	✓	✓	✓
MW2	✓	✓	✓
MW3	✓	✓	✓
MW4S	✓	✓	✓
MW4D	✓	✓	✓
MW5S	✓	✓	✓
MW5D	✓	✓	✓
MB01	✓	✓	✓
MB02	✓	✓	✓
MB03	✓	✓	✓
MB04	✓	✓	✓
MB05	✓	✓	✓

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 354219

Client Details

Client	Geosyntec
Attention	Dylan Barclay, Priya Dass
Address	Suite 3.04, 1 York Street, Sydney, NSW, 2000

Sample Details

Your Reference	**AU124080 - Vopak**
Number of Samples	14 Water
Date samples received	18/06/2024
Date completed instructions received	18/06/2024

Analysis Details

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

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

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

Report Details

Date results requested by	25/06/2024
Date of Issue	25/06/2024

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

Results Approved By
Dragana Tomas, Senior Chemist
Liam Timmins, Organics Supervisor

Authorised By
Nancy Zhang, Laboratory Manager

vTRH(C6-C10)/BTEXN in Water						
Our Reference		354219-1	354219-2	354219-3	354219-4	354219-5
Your Reference	UNITS	MW1	MW2	MW3	MW4S	MW4D
Date Sampled		17/06/2024	17/06/2024	17/06/2024	17/06/2024	17/06/2024
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	19/06/2024	19/06/2024	19/06/2024	19/06/2024	19/06/2024
Date analysed	-	20/06/2024	20/06/2024	20/06/2024	20/06/2024	20/06/2024
TRH C_6 - C_9	µg/L	<10	18	<10	<10	<10
TRH C_6 - C_{10}	µg/L	<10	30	<10	<10	<10
TRH C_6 - C_{10} less BTEX (F1)	µg/L	<10	30	<10	<10	<10
Benzene	µg/L	<1	<1	<1	<1	<1
Toluene	µg/L	<1	<1	<1	<1	<1
Ethylbenzene	µg/L	<1	<1	<1	<1	<1
m+p-xylene	µg/L	<2	<2	<2	<2	<2
o-xylene	µg/L	<1	<1	<1	<1	<1
Naphthalene	µg/L	<1	<1	<1	<1	<1
Surrogate Dibromofluoromethane	%	111	112	112	110	111
Surrogate Toluene-d8	%	97	98	96	97	96
Surrogate 4-Bromofluorobenzene	%	88	90	89	88	88

vTRH(C6-C10)/BTEXN in Water						
Our Reference		354219-6	354219-7	354219-8	354219-9	354219-10
Your Reference	UNITS	MW5S	MW5D	MB01	MB02	MB03
Date Sampled		17/06/2024	17/06/2024	17/06/2024	17/06/2024	17/06/2024
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	19/06/2024	19/06/2024	19/06/2024	19/06/2024	19/06/2024
Date analysed	-	20/06/2024	20/06/2024	20/06/2024	20/06/2024	20/06/2024
TRH C_6 - C_9	µg/L	<10	<10	<10	<10	<10
TRH C_6 - C_{10}	µg/L	<10	<10	<10	<10	<10
TRH C_6 - C_{10} less BTEX (F1)	µg/L	<10	<10	<10	<10	<10
Benzene	µg/L	<1	<1	<1	<1	<1
Toluene	µg/L	<1	<1	<1	<1	<1
Ethylbenzene	µg/L	<1	<1	<1	<1	<1
m+p-xylene	µg/L	<2	<2	<2	<2	<2
o-xylene	µg/L	<1	<1	<1	<1	<1
Naphthalene	µg/L	<1	<1	<1	<1	<1
Surrogate Dibromofluoromethane	%	112	114	113	112	114
Surrogate Toluene-d8	%	98	95	97	97	97
Surrogate 4-Bromofluorobenzene	%	88	89	89	88	87

vTRH(C6-C10)/BTEXN in Water					
Our Reference	UNITS	354219-11	354219-12	354219-13	354219-14
Your Reference		MB04	MB05	DUP1	TB
Date Sampled		17/06/2024	17/06/2024	17/06/2024	17/06/2024
Type of sample		Water	Water	Water	Water
Date extracted	-	19/06/2024	19/06/2024	20/06/2024	24/06/2024
Date analysed	-	20/06/2024	20/06/2024	21/06/2024	26/06/2024
TRH C_6 - C_9	µg/L	<10	<10	<10	<10
TRH C_6 - C_{10}	µg/L	<10	<10	<10	<10
TRH C_6 - C_{10} less BTEX (F1)	µg/L	<10	<10	<10	<10
Benzene	µg/L	<1	<1	<1	<1
Toluene	µg/L	<1	<1	<1	<1
Ethylbenzene	µg/L	<1	<1	<1	<1
m+p-xylene	µg/L	<2	<2	<2	<2
o-xylene	µg/L	<1	<1	<1	<1
Naphthalene	µg/L	<1	<1	<1	<1
Surrogate Dibromofluoromethane	%	113	115	109	108
Surrogate Toluene-d8	%	97	97	99	100
Surrogate 4-Bromofluorobenzene	%	87	87	94	95

svTRH (C10-C40) in Water						
Our Reference		354219-1	354219-2	354219-3	354219-4	354219-5
Your Reference	UNITS	MW1	MW2	MW3	MW4S	MW4D
Date Sampled		17/06/2024	17/06/2024	17/06/2024	17/06/2024	17/06/2024
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	19/06/2024	19/06/2024	19/06/2024	19/06/2024	19/06/2024
Date analysed	-	20/06/2024	20/06/2024	20/06/2024	19/06/2024	20/06/2024
TRH C_{10} - C_{14}	µg/L	190	140	<50	<50	<50
TRH C_{15} - C_{28}	µg/L	200	<100	<100	<100	<100
TRH C_{29} - C_{36}	µg/L	160	<100	<100	<100	<100
Total +ve TRH (C10-C36)	µg/L	550	140	<50	<50	<50
TRH >C_{10} - C_{16}	µg/L	190	140	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	µg/L	190	140	<50	<50	<50
TRH >C_{16} - C_{34}	µg/L	340	<100	<100	<100	<100
TRH >C_{34} - C_{40}	µg/L	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	µg/L	530	140	<50	<50	<50
Surrogate o-Terphenyl	%	96	102	88	71	86

svTRH (C10-C40) in Water						
Our Reference		354219-6	354219-7	354219-8	354219-9	354219-10
Your Reference	UNITS	MW5S	MW5D	MB01	MB02	MB03
Date Sampled		17/06/2024	17/06/2024	17/06/2024	17/06/2024	17/06/2024
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	19/06/2024	19/06/2024	19/06/2024	19/06/2024	19/06/2024
Date analysed	-	20/06/2024	20/06/2024	20/06/2024	20/06/2024	20/06/2024
TRH C_{10} - C_{14}	µg/L	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	µg/L	<100	<100	<100	<100	<100
TRH C_{29} - C_{36}	µg/L	<100	<100	<100	<100	<100
Total +ve TRH (C10-C36)	µg/L	<50	<50	<50	<50	<50
TRH >C_{10} - C_{16}	µg/L	<50	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	µg/L	<50	<50	<50	<50	<50
TRH >C_{16} - C_{34}	µg/L	<100	<100	<100	<100	<100
TRH >C_{34} - C_{40}	µg/L	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	µg/L	<50	<50	<50	<50	<50
Surrogate o-Terphenyl	%	101	101	99	96	71

svTRH (C10-C40) in Water					
Our Reference	UNITS	354219-11	354219-12	354219-13	354219-14
Your Reference		MB04	MB05	DUP1	TB
Date Sampled		17/06/2024	17/06/2024	17/06/2024	17/06/2024
Type of sample		Water	Water	Water	Water
Date extracted	-	19/06/2024	19/06/2024	19/06/2024	19/06/2024
Date analysed	-	20/06/2024	20/06/2024	20/06/2024	20/06/2024
TRH C_{10} - C_{14}	µg/L	<50	<50	120	<50
TRH C_{15} - C_{28}	µg/L	<100	<100	<100	<100
TRH C_{29} - C_{36}	µg/L	<100	<100	<100	<100
Total +ve TRH (C10-C36)	µg/L	<50	<50	120	<50
TRH >C_{10} - C_{16}	µg/L	<50	<50	120	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	µg/L	<50	<50	120	<50
TRH >C_{16} - C_{34}	µg/L	<100	<100	<100	<100
TRH >C_{34} - C_{40}	µg/L	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	µg/L	<50	<50	120	<50
Surrogate o-Terphenyl	%	82	99	92	95

PAHs in Water						
Our Reference		354219-1	354219-2	354219-3	354219-4	354219-5
Your Reference	UNITS	MW1	MW2	MW3	MW4S	MW4D
Date Sampled		17/06/2024	17/06/2024	17/06/2024	17/06/2024	17/06/2024
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	19/06/2024	19/06/2024	19/06/2024	19/06/2024	19/06/2024
Date analysed	-	19/06/2024	19/06/2024	19/06/2024	19/06/2024	19/06/2024
Naphthalene	µg/L	<0.1	0.2	<0.1	<0.1	<0.1
Acenaphthylene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Indeno(1,2,3-c,d)pyrene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene TEQ	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Total +ve PAH's	µg/L	<0.1	0.21	<0.1	<0.1	<0.1
Surrogate p-Terphenyl-d14	%	106	106	98	91	96

PAHs in Water						
Our Reference		354219-6	354219-7	354219-8	354219-9	354219-10
Your Reference	UNITS	MW5S	MW5D	MB01	MB02	MB03
Date Sampled		17/06/2024	17/06/2024	17/06/2024	17/06/2024	17/06/2024
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	19/06/2024	19/06/2024	19/06/2024	19/06/2024	19/06/2024
Date analysed	-	19/06/2024	19/06/2024	19/06/2024	19/06/2024	19/06/2024
Naphthalene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Indeno(1,2,3-c,d)pyrene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene TEQ	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Total +ve PAH's	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate p-Terphenyl-d14	%	104	96	98	98	85

PAHs in Water				
Our Reference		354219-11	354219-12	354219-13
Your Reference	UNITS	MB04	MB05	DUP1
Date Sampled		17/06/2024	17/06/2024	17/06/2024
Type of sample		Water	Water	Water
Date extracted	-	19/06/2024	19/06/2024	19/06/2024
Date analysed	-	19/06/2024	19/06/2024	19/06/2024
Naphthalene	µg/L	<0.1	<0.1	<0.1
Acenaphthylene	µg/L	<0.1	<0.1	<0.1
Acenaphthene	µg/L	<0.1	<0.1	<0.1
Fluorene	µg/L	<0.1	<0.1	<0.1
Phenanthrene	µg/L	<0.1	<0.1	<0.1
Anthracene	µg/L	<0.1	<0.1	<0.1
Fluoranthene	µg/L	<0.1	<0.1	<0.1
Pyrene	µg/L	<0.1	<0.1	<0.1
Benzo(a)anthracene	µg/L	<0.1	<0.1	<0.1
Chrysene	µg/L	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	µg/L	<0.2	<0.2	<0.2
Benzo(a)pyrene	µg/L	<0.1	<0.1	<0.1
Indeno(1,2,3-c,d)pyrene	µg/L	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	µg/L	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	µg/L	<0.1	<0.1	<0.1
Benzo(a)pyrene TEQ	µg/L	<0.5	<0.5	<0.5
Total +ve PAH's	µg/L	<0.1	<0.1	<0.1
Surrogate p-Terphenyl-d14	%	100	101	83

Method ID	Methodology Summary
Org-020	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-022/025	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS/GC-MSMS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013.
Org-023	Water samples are analysed directly by purge and trap GC-MS.
Org-023	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.

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	-			19/06/2024	2	19/06/2024	20/06/2024		19/06/2024	[NT]
Date analysed	-			20/06/2024	2	20/06/2024	21/06/2024		20/06/2024	[NT]
TRH C_6 - C_9	µg/L	10	Org-023	<10	2	18	25	33	99	[NT]
TRH C_6 - C_{10}	µg/L	10	Org-023	<10	2	30	63	71	99	[NT]
Benzene	µg/L	1	Org-023	<1	2	<1	<1	0	106	[NT]
Toluene	µg/L	1	Org-023	<1	2	<1	<1	0	97	[NT]
Ethylbenzene	µg/L	1	Org-023	<1	2	<1	<1	0	99	[NT]
m+p-xylene	µg/L	2	Org-023	<2	2	<2	<2	0	96	[NT]
o-xylene	µg/L	1	Org-023	<1	2	<1	<1	0	95	[NT]
Naphthalene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-023	110	2	112	104	7	110	[NT]
Surrogate Toluene-d8	%		Org-023	97	2	98	100	2	99	[NT]
Surrogate 4-Bromofluorobenzene	%		Org-023	89	2	90	101	12	100	[NT]

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Water					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	11	19/06/2024	20/06/2024		[NT]	[NT]
Date analysed	-			[NT]	11	20/06/2024	21/06/2024		[NT]	[NT]
TRH C_6 - C_9	µg/L	10	Org-023	[NT]	11	<10	<10	0	[NT]	[NT]
TRH C_6 - C_{10}	µg/L	10	Org-023	[NT]	11	<10	<10	0	[NT]	[NT]
Benzene	µg/L	1	Org-023	[NT]	11	<1	<1	0	[NT]	[NT]
Toluene	µg/L	1	Org-023	[NT]	11	<1	<1	0	[NT]	[NT]
Ethylbenzene	µg/L	1	Org-023	[NT]	11	<1	<1	0	[NT]	[NT]
m+p-xylene	µg/L	2	Org-023	[NT]	11	<2	<2	0	[NT]	[NT]
o-xylene	µg/L	1	Org-023	[NT]	11	<1	<1	0	[NT]	[NT]
Naphthalene	µg/L	1	Org-023	[NT]	11	<1	<1	0	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-023	[NT]	11	113	106	6	[NT]	[NT]
Surrogate Toluene-d8	%		Org-023	[NT]	11	97	99	2	[NT]	[NT]
Surrogate 4-Bromofluorobenzene	%		Org-023	[NT]	11	87	94	8	[NT]	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	354219-2
Date extracted	-			19/06/2024	1	19/06/2024	19/06/2024		19/06/2024	19/06/2024
Date analysed	-			20/06/2024	1	20/06/2024	20/06/2024		20/06/2024	20/06/2024
TRH C_{10} - C_{14}	µg/L	50	Org-020	<50	1	190	190	0	119	112
TRH C_{15} - C_{28}	µg/L	100	Org-020	<100	1	200	200	0	114	117
TRH C_{29} - C_{36}	µg/L	100	Org-020	<100	1	160	180	12	114	99
TRH >C_{10} - C_{16}	µg/L	50	Org-020	<50	1	190	190	0	119	112
TRH >C_{16} - C_{34}	µg/L	100	Org-020	<100	1	340	350	3	114	117
TRH >C_{34} - C_{40}	µg/L	100	Org-020	<100	1	<100	<100	0	114	99
Surrogate o-Terphenyl	%		Org-020	95	1	96	99	3	107	119

QUALITY CONTROL: svTRH (C10-C40) in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date extracted	-			[NT]	11	19/06/2024	19/06/2024		19/06/2024	[NT]
Date analysed	-			[NT]	11	20/06/2024	20/06/2024		20/06/2024	[NT]
TRH C_{10} - C_{14}	µg/L	50	Org-020	[NT]	11	<50	<50	0	104	[NT]
TRH C_{15} - C_{28}	µg/L	100	Org-020	[NT]	11	<100	<100	0	108	[NT]
TRH C_{29} - C_{36}	µg/L	100	Org-020	[NT]	11	<100	<100	0	86	[NT]
TRH >C_{10} - C_{16}	µg/L	50	Org-020	[NT]	11	<50	<50	0	104	[NT]
TRH >C_{16} - C_{34}	µg/L	100	Org-020	[NT]	11	<100	<100	0	108	[NT]
TRH >C_{34} - C_{40}	µg/L	100	Org-020	[NT]	11	<100	<100	0	86	[NT]
Surrogate o-Terphenyl	%		Org-020	[NT]	11	82	90	9	106	[NT]

QUALITY CONTROL: PAHs in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	354219-2
Date extracted	-			19/06/2024	1	19/06/2024	19/06/2024		19/06/2024	19/06/2024
Date analysed	-			19/06/2024	1	19/06/2024	19/06/2024		19/06/2024	19/06/2024
Naphthalene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	88	104
Acenaphthylene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	84	96
Fluorene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	84	97
Phenanthrene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	85	84
Anthracene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	85	88
Pyrene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	82	88
Benzo(a)anthracene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Chrysene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	74	73
Benzo(b,j+k)fluoranthene	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	73	84
Indeno(1,2,3-c,d)pyrene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-022/025	95	1	106	105	1	95	100

QUALITY CONTROL: PAHs in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	11	19/06/2024	19/06/2024		[NT]	[NT]
Date analysed	-			[NT]	11	19/06/2024	19/06/2024		[NT]	[NT]
Naphthalene	µg/L	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Acenaphthylene	µg/L	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	µg/L	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Fluorene	µg/L	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Phenanthrene	µg/L	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Anthracene	µg/L	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	µg/L	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Pyrene	µg/L	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Benzo(a)anthracene	µg/L	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Chrysene	µg/L	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Benzo(b,j+k)fluoranthene	µg/L	0.2	Org-022/025	[NT]	11	<0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	µg/L	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Indeno(1,2,3-c,d)pyrene	µg/L	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	µg/L	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	µg/L	0.1	Org-022/025	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-022/025	[NT]	11	100	111	10	[NT]	[NT]

Result Definitions

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

Quality Control Definitions

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

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

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

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

Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

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

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

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

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

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

Appendix D Calibration Certificates

Oil / Water Interface Meter

Instrument Interface Meter (100M)
Serial No. 348900

Air-Met Scientific Pty Ltd
1300 137 067

Item	Test	Pass	Comments
Battery	Compartment	✓	
	Capacity	✓	
Probe	Cleaned/Decon.	✓	
	Operation	✓	
Connectors	Condition	✓	
		✓	
Tape Check	Cleaned	✓	
	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: **Amanda Neale**

Calibration date: **11/06/2024**

Next calibration due: **11/07/2024**

Multi Parameter Water Meter

Instrument YSI Quatro Pro Plus
Serial No. 09K100887

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)		pH 7.00		419529	7.02
2. pH 4.00 (pH)		pH 4.00		414104	3.97
3. ORP (mV)		247.48		420151/398193	248.2
4. EC (µS/cm)		2760		424499	2760
5. D.O		0.0%		12265	-0.1%
6. Temp (°C)		16.6		MultiTherm	16.3

Calibrated by: Christopher Nicdao

Calibration date: 06/06/2024

Next calibration due: 06/07/2024

Appendix E GME Field Logs

Hydrosleeve Deployment Data Form

Geosyntec consultants

Job Information			
Date:	13/06/2023	Client:	Vopak
Project Name:	Vopak	Project Number:	AV124080
Site Location:		Operator:	DB + RV

Equipment

Water quality equipment description:

Interface probe description:

Purging equipment: Bailer type: Plastic Teflon Metal

Type of hydrosleeve installed: PFAS (950cm/1L) Normal (950cm/ 1L) Slim (650cm/600mL)

Well Parameters

Well ID	SWL mTOC	Well Depth (WD)	Available water column	Colour	Turbidity	Odour	Comments / observations
MW3	1.92m	4.84					
MW15	2.12	4.12					
MB05	3.54	6.19					
MB03	3.89	7.38					
MB02	2.89	7.00					
MB01	2.83	6.72					
MB04	3.88	7.53					
MW23	3.92	5.89					
MW22	3.71	5.99					
MW21	3.72	5.96					
MW20	3.98	5.58					
MW9	3.37	5.27					
MW2	3.46	7.33					
MW10	3.47	8.14					Hydrosleeve stuck at 4.7m (Top of HS)
MW26	3.47	4.30					Not enough WC, bailer
MW19	3.42	5.98					
MW35	3.31	4.68					Bailer needed
MW30	3.13	4.10					
MW17	3.40	5.73					

Field Notes

Can't locate: [redacted] Have to pull up HS several times to dislodge (MW10)

Client open → MW45, MW40: Unable to open, gate cover with hole in middle

MW1 unable to open (hammered many times)

Hydrosleeve Deployment Data Form

Geosyntec consultants

Job Information			
Date:	14/06/2024	Client:	Vopak
Project Name:	Vopak	Project Number:	AU124080.
Site Location:	Vopak Botany	Operator:	Robin Wang Dylan Barclay

Equipment

Water quality equipment description:

Interface probe description:

Purging equipment: Bailer type: Plastic Teflon Metal

Type of hydrosleeve installed: PFAS (950cm/1L) Normal (950cm/ 1L) Slim (650cm/600mL)

Well Parameters

Well ID	SWL mTOC	Well Depth (WD)	Available water column	Colour	Turbidity	Odour	Comments / observations
MW18	3.35	5.65					Oily well cap
MW3	3.49	5.89					
MW8	3.44	7.45					Oily well cap
MW13	3.43	6.65					
MW27	3.42	5.69					
MW11	3.66	7.20					Orange algae
MW12	3.58	7.07					
MW16	3.46	4.08					Bailer needed
MW45	3.52	7.44					Heavy rain
MW40	3.39	22.15	~22.15				Heavy rain
MW1	3.60	7.25					Heavy rain

Field Notes

MW8: HS stuck at 4.3m (top of HS)
MW7: Rusted - could not open
MW11 ; MW12, M16 location change on map, Wells may not be the same as shown on map as per client direction

Hydrosleeve Sampling Data Form

Geosyntec consultants

Job Information	
Date: 17/8	
Project Name: Vopack	Project Number: Au 124080
Site Location: Vopack Botany	Operator: RW
	Weather: Cloudy

Water Quality Parameters

Well ID	SWL mTOC	pH	Temp °C	Cond mS/cm	DO ppm	Redox mV	Comments / observations
MW23		7.75	17.8	665	4.07	100.3	NO, pale yellow, minor algae NT
MW22		6.72	16.0	651	3.34	106.8	NO, clear, recent slight brown, NT
MW21		6.95	18.7	1170	3.52	123.1	NO slight yellow/brown NT
MW20		7.07	19.1	742	3.32	123.1	NO, light yellow/brown, mor particulate matter
MW9		6.94	18.1	874	3.28	121.2	Bitter odor Red brown, major algae (red) turbid
MW2		6.95	17.8	581	1.63	66.4	NO, clear, NT DUP1, TRIP1
MW10		6.81	16.6	672	4.42	57.7	NO, clear, Red algae NT
MW26		6.83	19.0	374.4	2.35	76.6	NO, clear, red algae, NT Dup 2 Trip 2
MW4S		6.81	16.7	317.9	5.05	93.6	NO, clear, NT
MW4D		6.70	17.9	42652	1.00	145.1	NO, clear, NT, brown sediment at bottom of tip

Example: clear / slightly cloudy / turbid / very turbid / no odour / slight odour / odour / strong odour

Esky 1 fragrance

Dup2, TRIP2

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

Field Notes

MW23, 22, 21, 9

had to be put back in for EC, TDS bottle

Hydrosleeve Sampling Data Form

Geosyntec consultants

Job Information			
Date:	17/6/2024		
Project Name:	Vopak	Project Number:	Au124080
Site Location:	Vopak Bontang	Operator:	Dylan Bardsley Robbie Wang
		Weather:	Cloudy

Water Quality Parameters

Well ID	SWL mTOC	pH	Temp °C	Cond mS/cm	DO ppm	Redox mV	Comments / observations
MB04		6.80	17.3	561	2.72	95.8	NO Clear NT, minor sediment
MB05		6.87	19.0	906	0.71	77.7	Sulfur Smell, clear, NT, minor sediment
MB03		7.63	17.6	251.4	0.83	49.0	Sulfuric odour, clear, NT, minor sediment
MB02		7.18	20.5	517	0.95	64.6	NO, clear, NT
MB01		7.12	20.3	493	2.12	82.6	NO, clear, NT
BS MW3		6.53	18.2	4865	0.64	75.4	Minor hydrocarbon odour, clear, minor sediment, algae, particulates
BS MW5		7.31	16.2	437.3	1.29	73.1	Very minor hydrocarbon odour, clear, NT, minor sediment

Example: clear / slightly cloudy / turbid / very turbid / no odour / slight odour / odour / strong odour

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

Field Notes

BS MW5, HS used to collect more sample for large EC, TDS test bottle

Hydrosleeve Sampling Data Form

Geosyntec consultants

Job Information	
Date: 17/6	
Project Name: RW126080	Project Number:
Site Location:	Operator:
	Weather:

Water Quality Parameters

Well ID	SWL mTOC	pH	Temp °C	Cond mS/cm	DO ppm	Redox mV	Comments / observations
MW1		6.99	19.8	748	1.51	72.2	NO, clear / slightly brown, NT
MW19		7.76	19.6	476.9	2.59	95.8	NO clear / brown at bottom of HS / NT / some sediments
MW5S		5.88	19.1	563	1.84	102.4	NO, clear, NT
MW5D		5.37	18.6	37801	0.82	143.6	NO, clear, major sediments at bottom of HS
MW17		7.11	18.1	415.1	3.98	77.5	NO, clear, cloudy at bottom, NT
	18/6/24						

EQ Esky 2
Esky 1

Example: clear / slightly cloudy / turbid / very turbid / no odour / slight odour / odour / strong odour

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

Field Notes

Hydrosleeve Sampling Data Form

Geosyntec consultants

Job Information	
Date: 18/6/24	
Project Name:	Project Number: AU124016
Site Location:	Operator:
	Weather:

Water Quality Parameters

Well ID	SWL mTOC	pH	Temp °C	Cond mS/cm	DO ppm	Redox mV	Comments / observations
MW3		7.27	18.0	661	1.90	101.0	NO, clear, NT
MW27		6.99	18.7	560	1.60	33.4	Sulfuric odor, major black sediment, major orange algae, Low turbidity clear
MW13		6.89	18.4	444.2	0.74	16.0	Hydrocarbon odor, clear/very pale yellow NT minor sulfur
MW8		7.14	18.3	578	1.37	45.8	Hydrocarbon odor algae slight yellow NT
MW11		6.88	19.6	605	0.91	56.1	Strong hydrocarbon odor, major orange algae, slightly yellow
MW12		6.98	20.0	598	1.03	17.0	Strong hydrocarbon odor, orange algae clear
MW16	7.15	[illegible]	13.8	116.2	6.46	25.2	NO, clear w light brown sediment
MW18		6.88	20.0	656	1.76	100.5	Minor hydrocarbon odor, clear, NT - minor to non sediment

Example: clear / slightly cloudy / turbid / very turbid / no odour / slight odour / odour / strong odour

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

Field Notes

Appendix F QA/QC Assessment

Table F-1: QA/QC Assessment

Data Quality Objective	Sampling Frequency	Frequency Achieved	DQI	DQI Met?
Precision				
Intra-Laboratory Field Duplicates	1/20 samples	Yes. 1 intra-laboratory duplicates for 7 primary groundwater samples	>5xLOR: 30% RPD	Yes
Inter-Laboratory Field Duplicates	1/20 samples	Yes. 1 intra-laboratory duplicates for 7 primary groundwater samples	>5xLOR: 30% RPD	No. RPD of TRH F1 and TRH F2 above the acceptable limit. Attributed to sample heterogeneity and separate processes of the two different laboratories. Data considered useable for this assessment.
Laboratory duplicates	1/20 samples	Yes	>5xLOR: 50% RPD	Yes
Laboratory method blanks	1/10 samples	Yes	< LOR	Yes
Accuracy				
Matrix spikes	1/10 samples	Yes	Acceptable recoveries: 60-140% for organics	Yes.
Laboratory control spike	1/10 samples	Yes	As Matrix spikes	Yes.
Surrogate spike	1/10 samples	Yes	As Matrix spikes	Yes.
Representativeness				
Sampling handling storage and transport appropriate for media and analytes	All	Yes	Received by laboratory cooled and with container in good condition	Yes
Rinsate blanks	NA	NA	<LOR	NA – no rinsate sample collected due to general use of dedicated sampling equipment and limited opportunity for cross contamination between groundwater sampling locations
Trip Spike	NA	NA	<LOR/as specified by laboratory	NA- no trip spike was taken during sampling.
Trip Blank	1/batch	Yes	<LOR/as specified by laboratory	Yes.
Samples extracted and analysed within holding times.	All	Yes	Hold Times: 7 days - organics 6 months – inorganics	Yes.

Data Quality Objective	Sampling Frequency	Frequency Achieved	DQI	DQI Met?
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				
GME logs and COCs completed and appropriate	All Samples	Yes	Yes	Yes, GME logs and laboratory certificates are presented in Appendices E 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

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