



# Groundwater Monitoring Event





Vopak Site B Terminal, Gate B47 – 20 Friendship  
Road, Port Botany, NSW

Vopak Terminals Australia Pty Ltd (Site B)  
1 August 2022

AU122136 R01

# Quality Management

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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.

# 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 Terminal, Gate B47 – 20 Friendship Road, Port Botany (Site B) (the site).

The site is legally identified as Lot 10 in DP1126332 and Lot 21 DP1045324, occupies an area of approximately 8.8 hectares (ha) and currently operates as a petroleum products storage terminal. The Site location is presented in Figure 1A and 1B, Appendix A.

Based on 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.

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 with Site B having specific requirements to monitor concentrations of pollutants in accordance with Section P1.3. The objective of the GME was to assess the groundwater at the site in consideration of the EPL compliance.

Geosyntec carried out the GME in June 2022, involving gauging and sampling seven wells. Based on the findings of this assessment, Geosyntec provides the following conclusions:

- Total Recoverable Hydrocarbons (TRHs) F1 compounds at low concentrations (28µg/L) were detected in the tested sample from well MW2 at the western site boundary.
- No exceedance of the adopted NEPM (2013) human health criteria (HSL-D) was recorded for the TRH F1 compounds at MW2 for vapour intrusion.
- All other results met adopted site criteria.
- All other results met adopted site criteria.
- The assessment methodology undertaken and the data obtained comply with the EPL 6007 considerations.

# Table of Contents

1	Introduction .....	1
2	Site Identification and History .....	2
3	Geology, Hydrogeology and Hydrology .....	4
4	Conceptual Site Model.....	5
5	Sampling Methodology .....	6
6	Assessment Criteria.....	8
7	Monitoring Results .....	10
8	Conclusions.....	12
9	References.....	13
10	Limitations .....	14

## Appendices

Appendix A	Figures
Appendix B	Result Summary Tables
Appendix C	Laboratory Certificates
Appendix D	Calibration Certificates
Appendix E	GME Field Logs
Appendix F	QA/QC Assessment



# 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 Terminal, Gate B47 – 20 Friendship Road, Port Botany (Site B) (the site).

The site is legally identified as Lot 10 in DP1126332 and Lot 21 DP1045324, occupies an area of approximately 8.8 hectares (ha) and currently operates as a petroleum products storage terminal. The Site location is presented in Figure 1A and 1B, Appendix A.

Based on 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 assess the groundwater at the site in consideration of the EPL compliance.

## 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 groundwater samples from EPL nominated locations across the site, MW1-5.
- NATA accredited laboratory analysis of groundwater samples for Total Recoverable Hydrocarbons (TRH), Benzene, Toluene, Ethylbenzene and Xylenes (BTEX) and Polycyclic Aromatic Hydrocarbons (PAHs).
- Preparation of this report, in general accordance with NSW OEH (2020) Guidelines for Consultants Reporting on Contaminated Sites.

## 2 Site Identification and History

### 2.1 Site Identification

The site location is shown in Figure 1A and 1B, with the site layout plan shown in Figure 2 and the site layout showing the sampling locations shown in Figure 3, Appendix A.

**Table 2.1: Site Identification**

Title	Details
Street Address:	47 Friendship Road, Port Botany NSW (the site).
Property Description:	Lot 10 in DP1126332 and Lot 21 DP1045324
Current Site Ownership:	Vopak Terminals Australia Pty Ltd (Vopak)
Geographical Coordinates: (approx. centre)	Lat: -33.978892° Long: 151.21237°
Property Size:	Approximately 8.8 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.
East:	Port warehousing and container storage, site B4, 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 inspection, 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 recycled 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 flow to the west, towards Botany, or would enter the existing onsite sump and drainage system, before eventually being discharged into Botany

Title	Details
	Bay. As the Site is primarily sealed, minimal surface water is expected to infiltrate into soil beneath the site.
Boundary Condition:	The boundaries of the Site (consisting of security fences) are well maintained.
Visible Signs of Contamination	Not applicable.
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:	A fire-water booster plant was observed near the northern boundary of the Site. This plant also stores firefighting foam. Large petroleum product storage tanks cover the majority of the site.
Odours:	Given that the facility is an active petroleum products storage terminal, hydrocarbon odour was noted at various locations across the site.
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.
Flood Potential:	The flood potential of the site is unknown
Relevant Local Sensitive Environments:	The only local sensitive receiving environment is considered to be Botany Bay, located immediately to the west 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**

<b>Title</b>	<b>Details</b>
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) wells are located within a 500m radius of the site, all of which are used for monitoring purposes.
Depth to Groundwater:	Depth to groundwater at the Site, as informed by related documents, indicated a standing water level between 3.0m – 5.0m 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 west of the site. Rate of groundwater flow has not been determined.
Use of Water Abstraction:	Nine (9) wells are located within a 500m radius of the site to the north, all of 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 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
- 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
- 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 ranged between 2.27m and 3.76m 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), 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 a trained and experienced Geosyntec Environmental Scientist 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.
- 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 (generally at least 3 well volumes). Given that the water quality meter was not intrinsically safe, water samples from each location were carried outside of the hazardous area where water quality parameters were recorded.
- 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 Esky to cool samples.
- Samples were transported to the primary laboratory, Envirolab Services in Sydney, immediately after the completion of 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 eastern boundary of the site. 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 the site. MW4-D / MW4-S consists of nested deep and shallow wells.
MW3	Groundwater well located in the centre of the site.

### **5.3 Analytical Schedule**

Primary: Seven 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**

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

#### **5.4.1 Duplicate and Triplicate Samples**

One duplicate and one triplicate sample were analysed as part of this investigation. The samples were formed by the laboratory, by splitting a primary sample. The QA/QC is further detailed in Appendix F.

#### **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 bulk earthworks.

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 the purpose of 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 <sup>1</sup> (µg/L)	NHMRC (2018) Recreational Water Quality / Aesthetics (µg/L)
<b>BTEXN</b>			
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	
<b>TRHs</b>			



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

<sup>1</sup> -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.

### 7.1 Field Observations

This section presents an overview of field observations of groundwater encountered during 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 2.27m bgl in MW3 and 3.76m bgl in MW5D.
- No phase separated hydrocarbon (PSH) or hydrocarbon sheen was observed during groundwater sampling. Table 7.1 lists recordings of the physiochemical measurements taken during the groundwater monitoring event including any 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 <sup>2</sup> (mV)	Observations
MW1	3.69	6.71	18.34	997	0.03	256.7	Clear, no odour, no sheen
MW2	3.68	6.91	14.05	833	3.86	221.2	Clear, no odour, no sheen
MW3	2.27	7.12	19.24	506	2.96	253.3	Clear, no odour, no sheen
MW4S	3.73	7.21	15.11	801	4.81	278.1	Clear, no odour, no sheen
MW4D	3.75	7.22	15.48	451	2.86	271.9	Clear, no odour, no sheen
MW5S	3.54	5.95	18.71	556	0.03	256.4	Clear, no odour, no sheen
MW5D	3.76	5.78	18.95	329	0.03	289.4	Slightly turbid, no odour, no sheen

<sup>2</sup> -The field redox potential (Eh) corrected for reporting as mV.

Groundwater conditions across the site were slightly acidic to neutral (pH 5.78 to 7.22). Oxidising conditions were recorded in groundwater. Groundwater conductivity varied across the Site, ranging between 329 uS/cm and 997 uS/cm, indicating fresh groundwater conditions. Conductivity generally increased towards the western boundary, indicating potential tidal influence in this area.

### 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.

#### 7.2.1 Laboratory Analytical Results

The groundwater analytical results were non detect for all analytes except for TRHs compounds which were marginally above the laboratory LORs in MW2 sample. There are no NEPM or ANZG criteria for TRH F1 and TRH F2, however, the TRH F1 concentration of 28 µg/L was well below the NEPM (2013) HSL-D guideline criteria for vapour intrusion of 6,000 µg/L.

## **7.3 Data Quality Assessment**

For this project the field QA/QC is considered to be acceptable, based on the following:

### **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 and a triplicate sample were analysed for the site. No non-conformances of Relative Percentage Differences (RPDs) were reported for the samples (refer to Table B, Appendix B).

No laboratory trip spike was taken during groundwater sampling, however a trip blank was taken. The BTEX concentrations in the trip blank were all below the laboratory limit of reporting (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 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:

- Total Recoverable Hydrocarbons (TRHs) F1 compounds at low concentrations (28µg/L) were detected in the tested sample from well MW2 at the western site boundary.
- No exceedance of the adopted NEPM (2013) human health criteria (HSL-D) was recorded for the TRH F1 compounds at MW2 for vapour intrusion.
- All other results met adopted site criteria.
- The assessment methodology undertaken and the data obtained comply with the EPL 6007 considerations.

## 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.

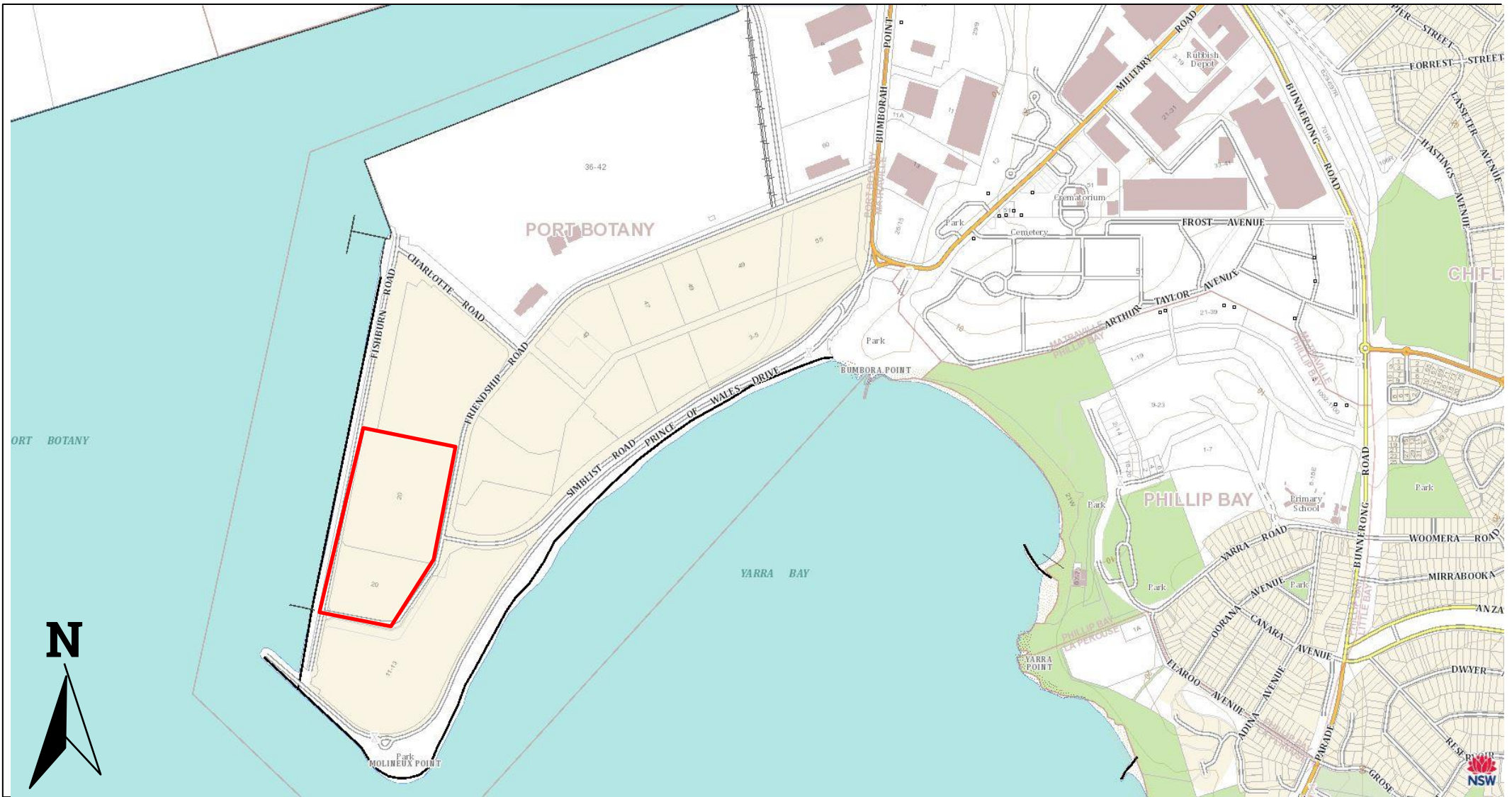
This report does not comment on any regulatory obligations based on the findings. This report relates only to the objectives stated and does not relate to any other work conducted for the Client.

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**

▬ Approximate site location

Figure 1: Site Location Plan

Address: Gate B47, 20 Friendship Road, Port Botany, NSW

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

Not to scale	Client: Vopak Terminals Sydney Pty Ltd	
Datum: GDA 1994 MGA Zone 56 - AHD	Job Number: AU122136	Date: June 2022





**LEGEND**

- ▬ Approximate site location
- ⊕ Monitoring Well\_EPL Compliance
- ⊕ Lost / Destroyed Monitoring Well

Figure 2: Site Layout Plan and Groundwater Monitoring Well Locations

Address: Gate B47, 20 Friendship Road, Port Botany, NSW

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Not to scale	Client: Vopak Terminals Sydney Pty Ltd	
Datum: GDA 1994 MGA Zone 56 - AHD	Job Number: AU122136	Date: June 2022

## Appendix B 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 - C16 less Naphthalene (F2)	TRH >C16-C34	TRH >C34-C40	Total +ve TRH (>C10-C40)	TRH C6 - C9	TRH C6 - C10	TRH C6 - C10 less BTEX (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		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NHMRC (2018) Recreational Water Quality/Aesthetics		-	5,000	-	-	-	-	-	-	-	-	NL	NL	NL	-	-	-	6,000
		-	10	8000	3000	-	-	-	-	-	-	-	-	-	-	-	-	-
Field ID	Date	<1	<1	<1	<1	<2	<1	<50	<100	<100	<50	<50	<100	<100	<50	<10	<10	<10
MW1	22/06/2022	<1	<1	<1	<1	<2	<1	84	<100	<100	74	74	<100	<100	70	13	28	28
MW2	23/06/2022	<1	<1	<1	<1	<2	<1	<50	<100	<100	<50	<50	<100	<100	<50	<10	<10	<10
MW3	23/06/2022	<1	<1	<1	<1	<2	<1	<50	<100	<100	<50	<50	<100	<100	<50	<10	<10	<10
MW4S	23/06/2022	<1	<1	<1	<1	<2	<1	<50	<100	<100	<50	<50	<100	<100	<50	<10	<10	<10
MW4D	23/06/2022	<1	<1	<1	<1	<2	<1	<50	<100	<100	<50	<50	<100	<100	<50	<10	<10	<10
MW5S	22/06/2022	<1	<1	<1	<1	<2	<1	<50	<100	<100	<50	<50	<100	<100	<50	<10	<10	<10
MW5D	22/06/2022	<1	<1	<1	<1	<2	<1	<50	<100	<100	<50	<50	<100	<100	<50	<10	<10	<10
DUP	23/06/2022	<1	<1	<1	<1	<2	<1	<50	<100	<100	<50	<50	<100	<100	<50	<10	<10	<10
TRIP	23/06/2022	<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	22/06/2022	<1	<1	<1	<1	<1	<1	<1	<1	<1	<2	<1	<1	<1	<1	<5	NIL (+)VE
MW2	23/06/2022	<1	<1	<1	<1	<1	<1	<1	<1	<1	<2	<1	<1	<1	<1	<5	NIL (+)VE
MW3	23/06/2022	<1	<1	<1	<1	<1	<1	<1	<1	<1	<2	<1	<1	<1	<1	<5	NIL (+)VE
MW4S	23/06/2022	<1	<1	<1	<1	<1	<1	<1	<1	<1	<2	<1	<1	<1	<1	<5	NIL (+)VE
MW4D	23/06/2022	<1	<1	<1	<1	<1	<1	<1	<1	<1	<2	<1	<1	<1	<1	<5	NIL (+)VE
MW5S	22/06/2022	<1	<1	<1	<1	<1	<1	<1	<1	<1	<2	<1	<1	<1	<1	<5	NIL (+)VE
MW5D	22/06/2022	<1	<1	<1	<1	<1	<1	<1	<1	<1	<2	<1	<1	<1	<1	<5	NIL (+)VE
DUP	23/06/2022	<1	<1	<1	<1	<1	<1	<1	<1	<1	<2	<1	<1	<1	<1	<5	NIL (+)VE
TRIP	23/06/2022	<1	<1	<1	<1	<1	<1	<1	<1	<1	<2	<1	<1	<1	<1	<5	NIL (+)VE

		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-C46 Fraction (F4)			
EQL		1	1	1	2	1	3	20	20	50	50	100	100			
Lab Report #	Field ID															
299069	MW2	<1	<1	<1	<2	<1	<3	28	28	74	74	<100	<100			
299069	DUP	<1	<1	<1	<2	<1	<3	<20	<20	<50	<50	<100	<100			
RPD		0	0	0	0	0	0	0	0	0	0	0	0			
299069	MW2	<1	<1	<1	<2	<1	<3	28	28	74	74	<100	<100			
901833	TRIP	<1	<1	<1	<2	<1	<3	<20	<20	<50	<50	<100	<100			
RPD		0	0	0	0	0	0	0	0	0	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
EQL		1	1	1	1	1	1	1	1	1	2	1	1	1	1	5
Lab Report #	Field ID															
299069	MW2	<1	<1	<1	<1	<1	<1	<1	<1	<2	<1	<1	<1	<1	<1	<1
299069	DUP	<1	<1	<1	<1	<1	<1	<1	<1	<2	<1	<1	<1	<1	<1	<1
RPD		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
299069	MW2	<1	<1	<1	<1	<1	<1	<1	<1	<2	<1	<1	<1	<1	<1	<1
901833	TRIP	<1	<1	<1	<1	<1	<1	<1	<1	<2	<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 been 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	22/06/2022	<1	<1	<1	<1	<2	<1

# Appendix C Laboratory Certificates



10/1

COC 2416 10:14 pm

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# CHAIN OF CUSTODY - Client



**ENVIROLAB GROUP - National phone number 1300 424 344**

**Sydney Lab - Envirolab Services**  
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Ph: 02 9910 6200 / sydney@envirolab.com.au

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

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

**Adelaide Office - Envirolab Services**  
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**Brisbane Office - Envirolab Services**  
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Ph: 07 3266 9532 / brisbane@envirolab.com.au

**Darwin Office - Envirolab Services**  
Unit 7, 17 Willes Rd, Berrimah, NT 0820  
Ph: 08 8967 1201 / darwin@envirolab.com.au

**Client:** Geosyntec  
**Contact Person:** Hayden Davies  
**Project Mgr:** Priya Dass  
**Sampler:** Hayden Davies  
**Address:** Suite 1, level 9, 189 Kent street, Sydney 2000  
**Phone:** 92518070 **Mob:** 0451021512  
**Email:** hayden.davies@geosyntec.com Priya.dass@geosyntec.com

**Client Project Name / Number / Site etc (ie report title):**  
122136 - Vopak  
**PO No.:**  
**Envirolab Quote No. :**  
**Date results required:** Standard  
**Or choose: standard**  
*Note: Inform lab in advance if urgent turnaround is required - surcharges apply*  
**Additional report format:** esdat / equis /  
**Lab Comments:**

Sample information				Tests Required												Comments		
Envirolab Sample ID	Client Sample ID or information	Depth	Date sampled	PAHs	BTEX	TPH												Provide as much information about the sample as you can
1	MW1		22/06/2022	X	X	X												
2	MW2		23/06/2022	X	X	X												
3	MW3		23/06/2022	X	X	X												
4	MW4S		23/06/2022	X	X	X												
5	MW4D		23/06/2022	X	X	X												
6	MW5S		22/06/2022	X	X	X												
7	MW5D		22/06/2022	X	X	X												
8	Tripblank1		22/06/2022		X													

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

<b>Relinquished by (Company):</b> Geosyntec	<b>Received by (Company):</b> <i>CSJYD</i> <b>Lab Use Only</b>
<b>Print Name:</b> Hayden Davies	<b>Print Name:</b> <i>Christine</i>
<b>Date &amp; Time:</b> 24/06/2022	<b>Date &amp; Time:</b> <i>24/06/22</i> <i>16:35</i>
<b>Signature:</b>	<b>Signature:</b> <i>[Signature]</i>
	<b>Job number:</b> <i>299 068</i>
	<b>Temperature:</b> <i>4°C</i>
	<b>TAT Req - SAME day / 1 / 2 / 3 / 4 / (STD)</b>
	<b>Cooling:</b> <i>Ice / Ice pack / None</i>
	<b>Security seal:</b> <i>Intact / Broken / None</i>



## SAMPLE RECEIPT ADVICE

### Client Details

<b>Client</b>	Geosyntec
<b>Attention</b>	Priya Dass

### Sample Login Details

<b>Your reference</b>	122136-Vopak
<b>Envirolab Reference</b>	299068
<b>Date Sample Received</b>	24/06/2022
<b>Date Instructions Received</b>	24/06/2022
<b>Date Results Expected to be Reported</b>	04/07/2022

### Sample Condition

<b>Samples received in appropriate condition for analysis</b>	
<b>No. of Samples Provided</b>	8 Water
<b>Turnaround Time Requested</b>	Standard
<b>Temperature on Receipt (°C)</b>	4
<b>Cooling Method</b>	Ice
<b>Sampling Date Provided</b>	YES

### Comments

Nil

Please direct any queries to:

#### Aileen Hie

**Phone:** 02 9910 6200  
**Fax:** 02 9910 6201  
**Email:** ahie@envirolab.com.au

#### Jacinta Hurst

**Phone:** 02 9910 6200  
**Fax:** 02 9910 6201  
**Email:** jhurst@envirolab.com.au

*Analysis Underway, details on the following page:*



Sample ID	vTRH(C6-C10)/BTEXN in Water	svTRH (C10-C40) in Water	PAHs in Water
MW1	✓	✓	✓
MW2	✓	✓	✓
MW3	✓	✓	✓
MW4S	✓	✓	✓
MW4D	✓	✓	✓
MW5S	✓	✓	✓
MW5D	✓	✓	✓
Tripblank1	✓		

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

### Additional Info

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

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

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

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



Envirolab Services Pty Ltd

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## CERTIFICATE OF ANALYSIS 299068

### Client Details

<b>Client</b>	Geosyntec
<b>Attention</b>	Priya Dass
<b>Address</b>	Suite 1, Level 9, 189 Kent Street, Sydney, NSW, 2000

### Sample Details

<b>Your Reference</b>	<u>122136-Vopak</u>
<b>Number of Samples</b>	8 Water
<b>Date samples received</b>	24/06/2022
<b>Date completed instructions received</b>	24/06/2022

### 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** 04/07/2022

**Date of Issue** 04/07/2022

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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

Kyle Gavrily, Senior Chemist

#### Authorised By

Nancy Zhang, Laboratory Manager

vTRH(C6-C10)/BTEXN in Water						
Our Reference		299068-1	299068-2	299068-3	299068-4	299068-5
Your Reference	UNITS	MW1	MW2	MW3	MW4S	MW4D
Date Sampled		22/06/2022	23/06/2022	23/06/2022	23/06/2022	23/06/2022
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	29/06/2022	29/06/2022	29/06/2022	29/06/2022	29/06/2022
Date analysed	-	29/06/2022	29/06/2022	29/06/2022	29/06/2022	29/06/2022
TRH C <sub>6</sub> - C <sub>9</sub>	µg/L	<10	13	<10	<10	<10
TRH C <sub>6</sub> - C <sub>10</sub>	µg/L	<10	28	<10	<10	<10
TRH C <sub>6</sub> - C <sub>10</sub> less BTEX (F1)	µg/L	<10	28	<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	%	109	110	109	102	102
Surrogate toluene-d8	%	97	97	98	97	97
Surrogate 4-BFB	%	99	99	98	98	97

vTRH(C6-C10)/BTEXN in Water				
Our Reference		299068-6	299068-7	299068-8
Your Reference	UNITS	MW5S	MW5D	Tripblank1
Date Sampled		22/06/2022	22/06/2022	22/06/2022
Type of sample		Water	Water	Water
Date extracted	-	29/06/2022	29/06/2022	29/06/2022
Date analysed	-	29/06/2022	29/06/2022	29/06/2022
TRH C <sub>6</sub> - C <sub>9</sub>	µg/L	<10	<10	[NA]
TRH C <sub>6</sub> - C <sub>10</sub>	µg/L	<10	<10	[NA]
TRH C <sub>6</sub> - C <sub>10</sub> less BTEX (F1)	µg/L	<10	<10	[NA]
Benzene	µg/L	<1	<1	<1
Toluene	µg/L	<1	<1	<1
Ethylbenzene	µg/L	<1	<1	<1
m+p-xylene	µg/L	<2	<2	<2
o-xylene	µg/L	<1	<1	<1
Naphthalene	µg/L	<1	<1	<1
Surrogate Dibromofluoromethane	%	104	103	101
Surrogate toluene-d8	%	98	97	96
Surrogate 4-BFB	%	100	98	99

svTRH (C10-C40) in Water						
Our Reference		299068-1	299068-2	299068-3	299068-4	299068-5
Your Reference	UNITS	MW1	MW2	MW3	MW4S	MW4D
Date Sampled		22/06/2022	23/06/2022	23/06/2022	23/06/2022	23/06/2022
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	01/07/2022	01/07/2022	01/07/2022	01/07/2022	01/07/2022
Date analysed	-	02/07/2022	02/07/2022	02/07/2022	02/07/2022	02/07/2022
TRH C <sub>10</sub> - C <sub>14</sub>	µg/L	<50	84	<50	<50	<50
TRH C <sub>15</sub> - C <sub>28</sub>	µg/L	<100	<100	<100	<100	<100
TRH C <sub>29</sub> - C <sub>36</sub>	µg/L	<100	<100	<100	<100	<100
Total +ve TRH (C10-C36)	µg/L	<50	80	<50	<50	<50
TRH >C <sub>10</sub> - C <sub>16</sub>	µg/L	<50	74	<50	<50	<50
TRH >C <sub>10</sub> - C <sub>16</sub> less Naphthalene (F2)	µg/L	<50	74	<50	<50	<50
TRH >C <sub>16</sub> - C <sub>34</sub>	µg/L	<100	<100	<100	<100	<100
TRH >C <sub>34</sub> - C <sub>40</sub>	µg/L	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	µg/L	<50	70	<50	<50	<50
Surrogate o-Terphenyl	%	95	96	98	102	102

svTRH (C10-C40) in Water			
Our Reference		299068-6	299068-7
Your Reference	UNITS	MW5S	MW5D
Date Sampled		22/06/2022	22/06/2022
Type of sample		Water	Water
Date extracted	-	01/07/2022	01/07/2022
Date analysed	-	02/07/2022	02/07/2022
TRH C <sub>10</sub> - C <sub>14</sub>	µg/L	<50	<50
TRH C <sub>15</sub> - C <sub>28</sub>	µg/L	<100	<100
TRH C <sub>29</sub> - C <sub>36</sub>	µg/L	<100	<100
Total +ve TRH (C10-C36)	µg/L	<50	<50
TRH >C <sub>10</sub> - C <sub>16</sub>	µg/L	<50	<50
TRH >C <sub>10</sub> - C <sub>16</sub> less Naphthalene (F2)	µg/L	<50	<50
TRH >C <sub>16</sub> - C <sub>34</sub>	µg/L	<100	<100
TRH >C <sub>34</sub> - C <sub>40</sub>	µg/L	<100	<100
Total +ve TRH (>C10-C40)	µg/L	<50	<50
Surrogate o-Terphenyl	%	103	90

PAHs in Water						
Our Reference		299068-1	299068-2	299068-3	299068-4	299068-5
Your Reference	UNITS	MW1	MW2	MW3	MW4S	MW4D
Date Sampled		22/06/2022	23/06/2022	23/06/2022	23/06/2022	23/06/2022
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	01/07/2022	01/07/2022	01/07/2022	01/07/2022	01/07/2022
Date analysed	-	01/07/2022	01/07/2022	01/07/2022	01/07/2022	01/07/2022
Naphthalene	µg/L	<1	<1	<1	<1	<1
Acenaphthylene	µg/L	<1	<1	<1	<1	<1
Acenaphthene	µg/L	<1	<1	<1	<1	<1
Fluorene	µg/L	<1	<1	<1	<1	<1
Phenanthrene	µg/L	<1	<1	<1	<1	<1
Anthracene	µg/L	<1	<1	<1	<1	<1
Fluoranthene	µg/L	<1	<1	<1	<1	<1
Pyrene	µg/L	<1	<1	<1	<1	<1
Benzo(a)anthracene	µg/L	<1	<1	<1	<1	<1
Chrysene	µg/L	<1	<1	<1	<1	<1
Benzo(b,j+k)fluoranthene	µg/L	<2	<2	<2	<2	<2
Benzo(a)pyrene	µg/L	<1	<1	<1	<1	<1
Indeno(1,2,3-c,d)pyrene	µg/L	<1	<1	<1	<1	<1
Dibenzo(a,h)anthracene	µg/L	<1	<1	<1	<1	<1
Benzo(g,h,i)perylene	µg/L	<1	<1	<1	<1	<1
Benzo(a)pyrene TEQ	µg/L	<5	<5	<5	<5	<5
Total +ve PAH's	µg/L	NIL (+)VE	NIL (+)VE	NIL (+)VE	NIL (+)VE	NIL (+)VE
Surrogate <i>p</i> -Terphenyl-d14	%	88	82	90	91	86

PAHs in Water			
Our Reference		299068-6	299068-7
Your Reference	UNITS	MW5S	MW5D
Date Sampled		22/06/2022	22/06/2022
Type of sample		Water	Water
Date extracted	-	01/07/2022	01/07/2022
Date analysed	-	01/07/2022	01/07/2022
Naphthalene	µg/L	<1	<1
Acenaphthylene	µg/L	<1	<1
Acenaphthene	µg/L	<1	<1
Fluorene	µg/L	<1	<1
Phenanthrene	µg/L	<1	<1
Anthracene	µg/L	<1	<1
Fluoranthene	µg/L	<1	<1
Pyrene	µg/L	<1	<1
Benzo(a)anthracene	µg/L	<1	<1
Chrysene	µg/L	<1	<1
Benzo(b,j+k)fluoranthene	µg/L	<2	<2
Benzo(a)pyrene	µg/L	<1	<1
Indeno(1,2,3-c,d)pyrene	µg/L	<1	<1
Dibenzo(a,h)anthracene	µg/L	<1	<1
Benzo(g,h,i)perylene	µg/L	<1	<1
Benzo(a)pyrene TEQ	µg/L	<5	<5
Total +ve PAH's	µg/L	NIL (+)VE	NIL (+)VE
Surrogate <i>p</i> -Terphenyl-d14	%	86	77

Method ID	Methodology Summary
<b>Org-020</b>	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.
<b>Org-022/025</b>	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.
<b>Org-023</b>	Water samples are analysed directly by purge and trap GC-MS.
<b>Org-023</b>	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.



Client Reference: 122136-Vopak

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	-			29/06/2022	1	29/06/2022	01/07/2022		29/06/2022	[NT]
Date analysed	-			29/06/2022	1	29/06/2022	02/07/2022		29/06/2022	[NT]
TRH C <sub>6</sub> - C <sub>9</sub>	µg/L	10	Org-023	<10	1	<10	<10	0	110	[NT]
TRH C <sub>6</sub> - C <sub>10</sub>	µg/L	10	Org-023	<10	1	<10	<10	0	110	[NT]
Benzene	µg/L	1	Org-023	<1	1	<1	<1	0	109	[NT]
Toluene	µg/L	1	Org-023	<1	1	<1	<1	0	110	[NT]
Ethylbenzene	µg/L	1	Org-023	<1	1	<1	<1	0	115	[NT]
m+p-xylene	µg/L	2	Org-023	<2	1	<2	<2	0	107	[NT]
o-xylene	µg/L	1	Org-023	<1	1	<1	<1	0	106	[NT]
Naphthalene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-023	100	1	109	114	4	104	[NT]
Surrogate toluene-d8	%		Org-023	97	1	97	99	2	101	[NT]
Surrogate 4-BFB	%		Org-023	100	1	99	86	14	98	[NT]

Client Reference: 122136-Vopak

QUALITY CONTROL: svTRH (C10-C40) in Water					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W4	[NT]
Date extracted	-			01/07/2022	[NT]	[NT]	[NT]	[NT]	01/07/2022	[NT]
Date analysed	-			02/07/2022	[NT]	[NT]	[NT]	[NT]	02/07/2022	[NT]
TRH C <sub>10</sub> - C <sub>14</sub>	µg/L	50	Org-020	<50	[NT]	[NT]	[NT]	[NT]	100	[NT]
TRH C <sub>15</sub> - C <sub>28</sub>	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	101	[NT]
TRH C <sub>29</sub> - C <sub>36</sub>	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	125	[NT]
TRH >C <sub>10</sub> - C <sub>16</sub>	µg/L	50	Org-020	<50	[NT]	[NT]	[NT]	[NT]	100	[NT]
TRH >C <sub>16</sub> - C <sub>34</sub>	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	101	[NT]
TRH >C <sub>34</sub> - C <sub>40</sub>	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	125	[NT]
Surrogate o-Terphenyl	%		Org-020	91	[NT]	[NT]	[NT]	[NT]	88	[NT]

Client Reference: 122136-Vopak

QUALITY CONTROL: PAHs in Water				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W4	[NT]
Date extracted	-			01/07/2022	[NT]	[NT]	[NT]	[NT]	01/07/2022	[NT]
Date analysed	-			01/07/2022	[NT]	[NT]	[NT]	[NT]	01/07/2022	[NT]
Naphthalene	µg/L	1	Org-022/025	<1	[NT]	[NT]	[NT]	[NT]	99	[NT]
Acenaphthylene	µg/L	1	Org-022/025	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Acenaphthene	µg/L	1	Org-022/025	<1	[NT]	[NT]	[NT]	[NT]	97	[NT]
Fluorene	µg/L	1	Org-022/025	<1	[NT]	[NT]	[NT]	[NT]	101	[NT]
Phenanthrene	µg/L	1	Org-022/025	<1	[NT]	[NT]	[NT]	[NT]	112	[NT]
Anthracene	µg/L	1	Org-022/025	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluoranthene	µg/L	1	Org-022/025	<1	[NT]	[NT]	[NT]	[NT]	104	[NT]
Pyrene	µg/L	1	Org-022/025	<1	[NT]	[NT]	[NT]	[NT]	113	[NT]
Benzo(a)anthracene	µg/L	1	Org-022/025	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chrysene	µg/L	1	Org-022/025	<1	[NT]	[NT]	[NT]	[NT]	89	[NT]
Benzo(b,j+k)fluoranthene	µg/L	2	Org-022/025	<2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(a)pyrene	µg/L	1	Org-022/025	<1	[NT]	[NT]	[NT]	[NT]	102	[NT]
Indeno(1,2,3-c,d)pyrene	µg/L	1	Org-022/025	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dibenzo(a,h)anthracene	µg/L	1	Org-022/025	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(g,h,i)perylene	µg/L	1	Org-022/025	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-022/025	92	[NT]	[NT]	[NT]	[NT]	93	[NT]

**Result Definitions**

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

## Quality Control Definitions

<b>Blank</b>	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.
<b>Duplicate</b>	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.
<b>Matrix Spike</b>	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.
<b>LCS (Laboratory Control Sample)</b>	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.
<b>Surrogate Spike</b>	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.
Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.	
The recommended maximums for analytes in urine are taken from "2018 TLVs and BEIs", as published by ACGIH (where available). Limit provided for Nickel is a precautionary guideline as per Position Paper prepared by AIOH Exposure Standards Committee, 2016.	
Guideline limits for Rinse Water Quality reported as per analytical requirements and specifications of AS 4187, Amdt 2 2019, Table 7.2	

## Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

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

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

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

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

COC 2416 10:14

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# CHAIN OF CUSTODY - Client



ENVIROLAB GROUP - National phone number 1300 424 344

Sydney Lab - EnviroLab Services  
12 Ashley St, Chatswood, NSW 2067  
Ph: 02 9910 6200 / sydney@envirolab.com.au

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

Melbourne Lab - EnviroLab Services  
25 Research Drive, Croydon South, VIC 3136  
Ph: 03 9763 2500 / melbourne@envirolab.com.au

Adelaide Office - EnviroLab Services  
7a The Parade, Norwood, SA 5067  
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Brisbane Office - EnviroLab Services  
20a, 10-20 Depot St, Banyo, QLD 4014  
Ph: 07 3266 9532 / brisbane@envirolab.com.au

Darwin Office - EnviroLab Services  
Unit 7, 17 Willes Rd, Berrimah, NT 0820  
Ph: 08 8967 1201 / darwin@envirolab.com.au

Client: Geosyntec  
 Contact Person: Hayden Davies  
 Project Mgr: Priya Dass  
 Sampler: Hayden Davies  
 Address: Suite 1, level 9, 189 Kent street, Sydney 2000  
 Phone: 92518070 Mob: 0451021512  
 Email: hayden.davies@geosyntec.com Priya.dass@geosyntec.com

Client Project Name / Number / Site etc (ie report title):  
122136 - Vopak  
 PO No.:  
 Envirolab Quote No.:  
 Date results required: Standard  
 Or choose: standard  
 Note: Inform lab in advance if urgent turnaround is required - surcharges apply  
 Additional report format: esdat / equis /  
 Lab Comments:

Sample Information				Tests Required												Comments			
Envirolab Sample ID	Client Sample ID or information	Depth	Date sampled	PAHs	BTEX	TPH													Provide as much information about the sample as you can
1	MW1		22/06/2022	X	X	X													
2	MW2		23/06/2022	X	X	X													
3	MW3		23/06/2022	X	X	X													
4	MW4S		23/06/2022	X	X	X													
5	MW4D		23/06/2022	X	X	X													
6	MW5S		22/06/2022	X	X	X													
7	MW5D		22/06/2022	X	X	X													
8	Tripblank1		22/06/2022		X														
19	DUP			X	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): <i>225 JYP</i> Lab Use Only		
Print Name: Hayden Davies	Print Name: <i>Christine</i>	Job number: <i>299068</i>	Cooling: <u>Ice</u> / Ice pack / None
Date & Time: 24/06/2022	Date & Time: <i>24/06/22</i> <i>16:35</i>	Temperature: <i>4°C</i>	Security seal: <u>Intact</u> / Broken / None
Signature:	Signature: <i>[Signature]</i>	TAT Req - SAME day / 1 / 2 / 3 / 4 / <u>STD</u>	

TRIP (FOR EIS - VIC) *w* X X X

299068 - A

## SAMPLE RECEIPT ADVICE

### Client Details

<b>Client</b>	Geosyntec
<b>Attention</b>	Priya Dass

### Sample Login Details

<b>Your reference</b>	122136-Vopak
<b>Envirolab Reference</b>	299068-A
<b>Date Sample Received</b>	24/06/2022
<b>Date Instructions Received</b>	11/07/2022
<b>Date Results Expected to be Reported</b>	12/07/2022

### Sample Condition

<b>Samples received in appropriate condition for analysis</b>	Holding time exceedance
<b>No. of Samples Provided</b>	9 Water
<b>Turnaround Time Requested</b>	1 day
<b>Temperature on Receipt (°C)</b>	4
<b>Cooling Method</b>	Ice
<b>Sampling Date Provided</b>	YES

### Comments

Holding time exceedance.

Please contact the laboratory within 24 hours if you wish to cancel the aforementioned testing. Otherwise testing will proceed as per the COC and hence invoiced accordingly.

Please direct any queries to:

#### Aileen Hie

**Phone:** 02 9910 6200  
**Fax:** 02 9910 6201  
**Email:** ahie@envirolab.com.au

#### Jacinta Hurst

**Phone:** 02 9910 6200  
**Fax:** 02 9910 6201  
**Email:** jhurst@envirolab.com.au

*Analysis Underway, details on the following page:*



Sample ID	vTRH(C6-C10)/BTEXN in Water	svTRH (C10-C40) in Water	PAHsin Water	On Hold
MW1				✓
MW2				✓
MW3				✓
MW4S				✓
MW4D				✓
MW5S				✓
MW5D				✓
Tripblank1				✓
MW1 - [TRIPLICATE]				✓
MW2 Duplicate	✓	✓	✓	

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

### Additional Info

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

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

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

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





Envirolab Services Pty Ltd

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12 Ashley St Chatswood NSW 2067

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## CERTIFICATE OF ANALYSIS 299068-A

### Client Details

<b>Client</b>	Geosyntec
<b>Attention</b>	Priya Dass
<b>Address</b>	Suite 1, Level 9, 189 Kent Street, Sydney, NSW, 2000

### Sample Details

<b>Your Reference</b>	<b>122136-Vopak</b>
<b>Number of Samples</b>	10 Water
<b>Date samples received</b>	24/06/2022
<b>Date completed instructions received</b>	11/07/2022

### 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

<b>Date results requested by</b>	12/07/2022
<b>Date of Issue</b>	13/07/2022
<b>Reissue Details</b>	This report replaces R00 created on 12/07/2022 due to: Sample ID Amended (Client Request)

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

#### Results Approved By

Liam Timmins, Organic Instruments Team Leader

#### Authorised By

Nancy Zhang, Laboratory Manager

vTRH(C6-C10)/BTEXN in Water		
Our Reference		299068-A-10
Your Reference	UNITS	DUP
Date Sampled		23/06/2022
Type of sample		Water
Date extracted	-	11/07/2022
Date analysed	-	12/07/2022
TRH C <sub>6</sub> - C <sub>9</sub>	µg/L	<10
TRH C <sub>6</sub> - C <sub>10</sub>	µg/L	<10
TRH C <sub>6</sub> - C <sub>10</sub> less BTEX (F1)	µg/L	<10
Benzene	µg/L	<1
Toluene	µg/L	<1
Ethylbenzene	µg/L	<1
m+p-xylene	µg/L	<2
o-xylene	µg/L	<1
Naphthalene	µg/L	<1
Surrogate Dibromofluoromethane	%	96
Surrogate toluene-d8	%	96
Surrogate 4-BFB	%	92

svTRH (C10-C40) in Water		
Our Reference		299068-A-10
Your Reference	UNITS	DUP
Date Sampled		23/06/2022
Type of sample		Water
Date extracted	-	12/07/2022
Date analysed	-	12/07/2022
TRH C <sub>10</sub> - C <sub>14</sub>	µg/L	<50
TRH C <sub>15</sub> - C <sub>28</sub>	µg/L	<100
TRH C <sub>29</sub> - C <sub>36</sub>	µg/L	<100
Total +ve TRH (C10-C36)	µg/L	<50
TRH >C <sub>10</sub> - C <sub>16</sub>	µg/L	<50
TRH >C <sub>10</sub> - C <sub>16</sub> less Naphthalene (F2)	µg/L	<50
TRH >C <sub>16</sub> - C <sub>34</sub>	µg/L	<100
TRH >C <sub>34</sub> - C <sub>40</sub>	µg/L	<100
Total +ve TRH (>C10-C40)	µg/L	<50
Surrogate o-Terphenyl	%	93

PAHs in Water		
Our Reference		299068-A-10
Your Reference	UNITS	DUP
Date Sampled		23/06/2022
Type of sample		Water
Date extracted	-	12/07/2022
Date analysed	-	12/07/2022
Naphthalene	µg/L	<1
Acenaphthylene	µg/L	<1
Acenaphthene	µg/L	<1
Fluorene	µg/L	<1
Phenanthrene	µg/L	<1
Anthracene	µg/L	<1
Fluoranthene	µg/L	<1
Pyrene	µg/L	<1
Benzo(a)anthracene	µg/L	<1
Chrysene	µg/L	<1
Benzo(b,j+k)fluoranthene	µg/L	<2
Benzo(a)pyrene	µg/L	<1
Indeno(1,2,3-c,d)pyrene	µg/L	<1
Dibenzo(a,h)anthracene	µg/L	<1
Benzo(g,h,i)perylene	µg/L	<1
Benzo(a)pyrene TEQ	µg/L	<5
Total +ve PAH's	µg/L	NIL (+)VE
Surrogate <i>p</i> -Terphenyl-d14	%	85

Method ID	Methodology Summary
<b>Org-020</b>	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.
<b>Org-022/025</b>	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.
<b>Org-023</b>	Water samples are analysed directly by purge and trap GC-MS.
<b>Org-023</b>	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.

Client Reference: 122136-Vopak

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	-			11/07/2022	[NT]	[NT]	[NT]	[NT]	11/07/2022	[NT]
Date analysed	-			12/07/2022	[NT]	[NT]	[NT]	[NT]	12/07/2022	[NT]
TRH C <sub>6</sub> - C <sub>9</sub>	µg/L	10	Org-023	<10	[NT]	[NT]	[NT]	[NT]	108	[NT]
TRH C <sub>6</sub> - C <sub>10</sub>	µg/L	10	Org-023	<10	[NT]	[NT]	[NT]	[NT]	108	[NT]
Benzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	108	[NT]
Toluene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	106	[NT]
Ethylbenzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	107	[NT]
m+p-xylene	µg/L	2	Org-023	<2	[NT]	[NT]	[NT]	[NT]	109	[NT]
o-xylene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	107	[NT]
Naphthalene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-023	97	[NT]	[NT]	[NT]	[NT]	103	[NT]
Surrogate toluene-d8	%		Org-023	97	[NT]	[NT]	[NT]	[NT]	100	[NT]
Surrogate 4-BFB	%		Org-023	92	[NT]	[NT]	[NT]	[NT]	94	[NT]

Client Reference: 122136-Vopak

QUALITY CONTROL: svTRH (C10-C40) in Water					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			12/07/2022	[NT]	[NT]	[NT]	[NT]	12/07/2022	[NT]
Date analysed	-			12/07/2022	[NT]	[NT]	[NT]	[NT]	12/07/2022	[NT]
TRH C <sub>10</sub> - C <sub>14</sub>	µg/L	50	Org-020	<50	[NT]	[NT]	[NT]	[NT]	95	[NT]
TRH C <sub>15</sub> - C <sub>28</sub>	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	102	[NT]
TRH C <sub>29</sub> - C <sub>36</sub>	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	86	[NT]
TRH >C <sub>10</sub> - C <sub>16</sub>	µg/L	50	Org-020	<50	[NT]	[NT]	[NT]	[NT]	95	[NT]
TRH >C <sub>16</sub> - C <sub>34</sub>	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	102	[NT]
TRH >C <sub>34</sub> - C <sub>40</sub>	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	86	[NT]
Surrogate o-Terphenyl	%		Org-020	89	[NT]	[NT]	[NT]	[NT]	87	[NT]

Client Reference: 122136-Vopak

QUALITY CONTROL: PAHs in Water					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			12/07/2022	[NT]	[NT]	[NT]	[NT]	12/07/2022	[NT]
Date analysed	-			12/07/2022	[NT]	[NT]	[NT]	[NT]	12/07/2022	[NT]
Naphthalene	µg/L	1	Org-022/025	<1	[NT]	[NT]	[NT]	[NT]	82	[NT]
Acenaphthylene	µg/L	1	Org-022/025	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Acenaphthene	µg/L	1	Org-022/025	<1	[NT]	[NT]	[NT]	[NT]	79	[NT]
Fluorene	µg/L	1	Org-022/025	<1	[NT]	[NT]	[NT]	[NT]	82	[NT]
Phenanthrene	µg/L	1	Org-022/025	<1	[NT]	[NT]	[NT]	[NT]	79	[NT]
Anthracene	µg/L	1	Org-022/025	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluoranthene	µg/L	1	Org-022/025	<1	[NT]	[NT]	[NT]	[NT]	80	[NT]
Pyrene	µg/L	1	Org-022/025	<1	[NT]	[NT]	[NT]	[NT]	85	[NT]
Benzo(a)anthracene	µg/L	1	Org-022/025	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chrysene	µg/L	1	Org-022/025	<1	[NT]	[NT]	[NT]	[NT]	77	[NT]
Benzo(b,j+k)fluoranthene	µg/L	2	Org-022/025	<2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(a)pyrene	µg/L	1	Org-022/025	<1	[NT]	[NT]	[NT]	[NT]	84	[NT]
Indeno(1,2,3-c,d)pyrene	µg/L	1	Org-022/025	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dibenzo(a,h)anthracene	µg/L	1	Org-022/025	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(g,h,i)perylene	µg/L	1	Org-022/025	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-022/025	85	[NT]	[NT]	[NT]	[NT]	87	[NT]



**Result Definitions**

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

## Quality Control Definitions

<b>Blank</b>	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.
<b>Duplicate</b>	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
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<b>LCS (Laboratory Control Sample)</b>	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.
<b>Surrogate Spike</b>	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.
Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.	
The recommended maximums for analytes in urine are taken from "2018 TLVs and BEIs", as published by ACGIH (where available). Limit provided for Nickel is a precautionary guideline as per Position Paper prepared by AIOH Exposure Standards Committee, 2016.	
Guideline limits for Rinse Water Quality reported as per analytical requirements and specifications of AS 4187, Amdt 2 2019, Table 7.2	

## Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

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

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

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

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

COC 2416 10:14

**CHAIN OF CUSTODY - Client**

**ENVIROLAB GROUP - National phone number 1300 424 344**

**Client: Geosyntec**      **Client Project Name / Number / Site etc (ie report title):**  
**Contact Person: Hayden Davies**      **122136 - Vopak**

**Project Mgr: Priya Dass**      **PO No.:**

**Sampler: Hayden Davies**      **Envirolab Quote No.:**

**Address:** Suite 1, level 9, 189 Kent street, Sydney 2000      **Date results required:** Standard

**Phone:** 92518070 Mob: 0451021512      **Or choose: standard**  
**Note: Inform lab in advance if urgent turnaround is required - surcharges apply**

**Email:**      **Additional report format: esdat / equis /**

**Lab Comments:**

hayden.davies@geosyntec.com Priya.dass@geosyntec.com

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

**Perth Lab - MPL Laboratories**  
 16-18 Hayden Cr, Myaree, WA 6154  
 Ph: 08 9317 2505 / lab@mpl.com.au

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

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

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

**Darwin Office - Envirolab Services**  
 Unit 7, 17 Willes Rd, Berrimah, NT 0820  
 Ph: 08 8967 1201 / darwin@envirolab.com.au

Sample Information				Tests Required												Comments	
Envirolab Sample ID	Client Sample ID or information	Depth	Date sampled	PAHs	BTEX	TPH											Provide as much information about the sample as you can
1	MW1		22/06/2022	X	X	X											Envirolab Services 25 Research Drive Croydon South VIC 3136 Ph: (03) 9763 2500
2	MW2		23/06/2022	X	X	X											Lab No: 32475
3	MW3		23/06/2022	X	X	X											Date Received: 13/7/22
4	MW4S		23/06/2022	X	X	X											Time Received: 12-20pm
5	MW4D		23/06/2022	X	X	X											Temp: 6.4°C
6	MW5S		22/06/2022	X	X	X											Contaminated: Blank
7	MW5D		22/06/2022	X	X	X											Security: Intact
8	Tripblank1		22/06/2022		X												Broken/None
9	DUP			X	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      **ELS SAU**      Received by (Company): **ELSYD**      **Lab Use Only**

Print Name: Hayden Davies      **EMC/DMP**      Print Name: **Christine**      Job number: **299 dtd**      Cooling: **Ice / Ice pack / None**

Date & Time: 24/06/2022      **12/7/22**      Date & Time: **24/06/22**      **1635**      Temperature: **4°C**      Security seal: **Intact / Broken / None**

Signature: **HM**      Signature: **[Signature]**      TAT Req - SAME day / 1 / 2 / 3 / 4 / **STD**

- (1) TRIP (FOR ELS -VIC) w      X X X



**Envirolab Services Pty Ltd**  
ABN 37 112 535 645 - 002  
25 Research Drive Croydon South VIC 3136  
ph 03 9763 2500 fax 03 9763 2633  
melbourne@envirolab.com.au  
www.envirolab.com.au

## SAMPLE RECEIPT ADVICE

### Client Details

<b>Client</b>	Geosyntec
<b>Attention</b>	Priya Dass

### Sample Login Details

<b>Your reference</b>	122136 - Vopak
<b>Envirolab Reference</b>	32475
<b>Date Sample Received</b>	13/07/2022
<b>Date Instructions Received</b>	13/07/2022
<b>Date Results Expected to be Reported</b>	14/07/2022

### Sample Condition

<b>Samples received in appropriate condition for analysis</b>	Yes
<b>No. of Samples Provided</b>	1 Water
<b>Turnaround Time Requested</b>	24hr
<b>Temperature on Receipt (°C)</b>	6.4
<b>Cooling Method</b>	Icepack
<b>Sampling Date Provided</b>	YES

### Comments

Nil

Please direct any queries to:

#### Pamela Adams

**Phone: 03 9763 2500**

**Fax: 03 9763 2633**

**Email: padams@envirolab.com.au**

#### Chris De Luca

**Phone: 03 9763 2500**

**Fax: 03 9763 2633**

**Email: cdeluca@envirolab.com.au**

*Invoice will be emailed separately. Results will be reported only if payment has been made. Details of analysis on the following page:*



**Envirolab Services Pty Ltd**  
 ABN 37 112 535 645 - 002  
 25 Research Drive Croydon South VIC 3136  
 ph 03 9763 2500 fax 03 9763 2633  
 melbourne@envirolab.com.au  
 www.envirolab.com.au

Sample ID	VTRH(C6-C10)/BTEXN in Water	TRH Water(C10-C40) NEPM	PAHs in Water
TRIP	✓	✓	✓

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.



## CERTIFICATE OF ANALYSIS 32475

### Client Details

Client	Geosyntec
Attention	Priya Dass
Address	Suite 1, level 9, 189 Kent street, Sydney, NSW, 2000

### Sample Details

Your Reference	<b>122136 - Vopak</b>
Number of Samples	1 Water
Date samples received	13/07/2022
Date completed instructions received	13/07/2022

### 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	14/07/2022
Date of Issue	14/07/2022

NATA Accreditation Number 2901. This document shall not be reproduced except in full.  
Accredited for compliance with ISO/IEC 17025 - Testing. **Tests not covered by NATA are denoted with \***

#### Results Approved By

Chris De Luca, Operations Manager

#### Authorised By

Pamela Adams, Laboratory Manager

vTRH(C6-C10)/BTEXN in Water		
Our Reference		32475-1
Your Reference	UNITS	TRIP
Date Sampled		22/06/2022
Type of sample		Water
Date extracted	-	13/07/2022
Date analysed	-	13/07/2022
TRH C <sub>6</sub> - C <sub>9</sub>	µg/L	<10
TRH C <sub>6</sub> - C <sub>10</sub>	µg/L	<10
TRH C <sub>6</sub> -C <sub>10</sub> less BTEX (F1)	µg/L	<10
Benzene	µg/L	<1
Toluene	µg/L	<1
Ethylbenzene	µg/L	<1
m+p-xylene	µg/L	<2
o-xylene	µg/L	<1
Naphthalene	µg/L	<1
Total +ve Xylenes	µg/L	<1
Total BTEX in water	µg/L	<1
Surrogate Dibromofluoromethane	%	102
Surrogate toluene-d8	%	106
Surrogate 4-BFB	%	96

TRH Water(C10-C40) NEPM		
Our Reference		32475-1
Your Reference	UNITS	TRIP
Date Sampled		22/06/2022
Type of sample		Water
Date extracted	-	13/07/2022
Date analysed	-	14/07/2022
TRH C <sub>10</sub> - C <sub>14</sub>	µg/L	<50
TRH C <sub>15</sub> - C <sub>28</sub>	µg/L	<100
TRH C <sub>29</sub> - C <sub>36</sub>	µg/L	<100
Total +ve TRH (C10-C36)	µg/L	<50
TRH >C <sub>10</sub> - C <sub>16</sub>	µg/L	<50
TRH >C <sub>10</sub> - C <sub>16</sub> less Naphthalene (F2)	µg/L	<50
TRH >C <sub>16</sub> - C <sub>34</sub>	µg/L	<100
TRH >C <sub>34</sub> - C <sub>40</sub>	µg/L	<100
Total +ve TRH (>C10-C40)	µg/L	<50
Surrogate o-Terphenyl	%	85



PAHs in Water		
Our Reference		32475-1
Your Reference	UNITS	TRIP
Date Sampled		22/06/2022
Type of sample		Water
Date extracted	-	13/07/2022
Date analysed	-	13/07/2022
Naphthalene	µg/L	<1
Acenaphthylene	µg/L	<1
Acenaphthene	µg/L	<1
Fluorene	µg/L	<1
Phenanthrene	µg/L	<1
Anthracene	µg/L	<1
Fluoranthene	µg/L	<1
Pyrene	µg/L	<1
Benzo(a)anthracene	µg/L	<1
Chrysene	µg/L	<1
Benzo(b,j&k)fluoranthene	µg/L	<2
Benzo(a)pyrene	µg/L	<1
Indeno(1,2,3-c,d)pyrene	µg/L	<1
Dibenzo(a,h)anthracene	µg/L	<1
Benzo(g,h,i)perylene	µg/L	<1
Total +ve PAH's	µg/L	<1
Benzo(a)pyrene TEQ	µg/L	<5
Surrogate <i>p</i> -Terphenyl-d <sub>14</sub>	%	96

Method ID	Methodology Summary
<b>Org-020</b>	<p>Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID.</p> <p>F2 = (&gt;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.</p> <p>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 (&gt;C10-C40).</p>
<b>Org-022</b>	<p>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.</p>
<b>Org-023</b>	<p>Water samples are analysed directly by purge and trap GC-MS.</p>
<b>Org-023</b>	<p>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.</p> <p>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.</p>

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Water					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			13/07/2022	[NT]	[NT]	[NT]	[NT]	13/07/2022	[NT]
Date analysed	-			13/07/2022	[NT]	[NT]	[NT]	[NT]	13/07/2022	[NT]
TRH C <sub>6</sub> - C <sub>9</sub>	µg/L	10	Org-023	<10	[NT]	[NT]	[NT]	[NT]	101	[NT]
TRH C <sub>6</sub> - C <sub>10</sub>	µg/L	10	Org-023	<10	[NT]	[NT]	[NT]	[NT]	101	[NT]
Benzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	97	[NT]
Toluene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	95	[NT]
Ethylbenzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	101	[NT]
m+p-xylene	µg/L	2	Org-023	<2	[NT]	[NT]	[NT]	[NT]	106	[NT]
o-xylene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	103	[NT]
Naphthalene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	107	[NT]
Surrogate Dibromofluoromethane	%		Org-023	105	[NT]	[NT]	[NT]	[NT]	94	[NT]
Surrogate toluene-d8	%		Org-023	106	[NT]	[NT]	[NT]	[NT]	101	[NT]
Surrogate 4-BFB	%		Org-023	95	[NT]	[NT]	[NT]	[NT]	95	[NT]

Client Reference: 122136 - Vopak

QUALITY CONTROL: TRH Water(C10-C40) NEPM					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			13/07/2022	[NT]	[NT]	[NT]	[NT]	13/07/2022	[NT]
Date analysed	-			14/07/2022	[NT]	[NT]	[NT]	[NT]	14/07/2022	[NT]
TRH C <sub>10</sub> - C <sub>14</sub>	µg/L	50	Org-020	<50	[NT]	[NT]	[NT]	[NT]	106	[NT]
TRH C <sub>15</sub> - C <sub>28</sub>	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	133	[NT]
TRH C <sub>29</sub> - C <sub>36</sub>	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	133	[NT]
TRH >C <sub>10</sub> - C <sub>16</sub>	µg/L	50	Org-020	<50	[NT]	[NT]	[NT]	[NT]	106	[NT]
TRH >C <sub>16</sub> - C <sub>34</sub>	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	133	[NT]
TRH >C <sub>34</sub> - C <sub>40</sub>	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	133	[NT]
Surrogate o-Terphenyl	%		Org-020	81	[NT]	[NT]	[NT]	[NT]	85	[NT]

Client Reference: 122136 - Vopak

QUALITY CONTROL: PAHs in Water					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			13/07/2022	[NT]	[NT]	[NT]	[NT]	13/07/2022	[NT]
Date analysed	-			13/07/2022	[NT]	[NT]	[NT]	[NT]	13/07/2022	[NT]
Naphthalene	µg/L	1	Org-022	<1	[NT]	[NT]	[NT]	[NT]	80	[NT]
Acenaphthylene	µg/L	1	Org-022	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Acenaphthene	µg/L	1	Org-022	<1	[NT]	[NT]	[NT]	[NT]	90	[NT]
Fluorene	µg/L	1	Org-022	<1	[NT]	[NT]	[NT]	[NT]	102	[NT]
Phenanthrene	µg/L	1	Org-022	<1	[NT]	[NT]	[NT]	[NT]	96	[NT]
Anthracene	µg/L	1	Org-022	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluoranthene	µg/L	1	Org-022	<1	[NT]	[NT]	[NT]	[NT]	98	[NT]
Pyrene	µg/L	1	Org-022	<1	[NT]	[NT]	[NT]	[NT]	96	[NT]
Benzo(a)anthracene	µg/L	1	Org-022	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chrysene	µg/L	1	Org-022	<1	[NT]	[NT]	[NT]	[NT]	98	[NT]
Benzo(b,j&k)fluoranthene	µg/L	2	Org-022	<2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(a)pyrene	µg/L	1	Org-022	<1	[NT]	[NT]	[NT]	[NT]	100	[NT]
Indeno(1,2,3-c,d)pyrene	µg/L	1	Org-022	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dibenzo(a,h)anthracene	µg/L	1	Org-022	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(g,h,i)perylene	µg/L	1	Org-022	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate p-Terphenyl-d <sub>14</sub>	%		Org-022	80	[NT]	[NT]	[NT]	[NT]	78	[NT]

**Result Definitions**

<b>NT</b>	Not tested
<b>NA</b>	Test not required
<b>INS</b>	Insufficient sample for this test
<b>PQL</b>	Practical Quantitation Limit
<b>&lt;</b>	Less than
<b>&gt;</b>	Greater than
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<b>NEPM</b>	National Environmental Protection Measure
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## Quality Control Definitions

<b>Blank</b>	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.
<b>Duplicate</b>	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
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<b>LCS (Laboratory Control Sample)</b>	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.
<b>Surrogate Spike</b>	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	

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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.

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

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

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

## Report Comments

TRH/BTEX and PAHs have exceeded the recommended technical holding times, Envirolab Group Form 347 "Recommended Preservation and Holding Times" can be provided on request (available on the Envirolab website)



# Appendix D Calibration Certificates

# WATER QUALITY METER CALIBRATION WORKSHEET

Instrument Description: HANNA Instruments Multiparameter Meter Date: 12/7/22

Serial Number: K3414441


Location Calibrated: Geosyntec

Instrument visibly clean: Yes

Probes cleaned with Decon and DI water prior to calibration: Yes

Sensor	Solution Bottle Number	Standard Solutions	Measurement	Within Calibration Y/N
pH	ACR	4.01	4.0	$\pm 0.2$ - Yes
pH	ACR	7	7.0	$\pm 0.2$ - Yes
pH	ACR	10	10.04	$\pm 0.05$ Yes
EC	ACR	2856 $\mu$ /cm	2861	$\pm 12$ Yes

Calibrated by: Hayden Davies

Signature: 

# Appendix E GME Field Logs



# Hydrosleeve Deployment Data Form

## Job Information

Date: 20/6/22	Client: Jopah
Project Name: GME	Project Nurr 122136
Site Location: Jopah Botany	Operator: 4p

## 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)

## Well Parameters

Well ID	SWL mTOC	Well Depth (WD)	Available water column	Colour	Turbidity	Odour	Comments / observations
MW9	3.64	5.27	_____				bailer needed
MW20	4.13	5.42	_____				"
MW2	3.68	7.28	_____				Sleeve deployed
MW <sup>10</sup>	3.71	8.07	_____				"
MW26	3.72	4.29	_____				bailer needed
MW45	3.73	7.39	_____				Sleeve deployed
MW4D	3.75	22.06	_____				"
MW11	3.79	7.26	_____				"
MW12	3.70	7.06	_____				"
B5 MW15	2.21	4.62	_____				"
B5 MW3	2.27	4.07	_____				"
MW8	3.52	7.14	_____				"

## Field Notes

MW.14/15/16/24 could not be located.

MW 16/14/15 are within the bundal area, wells appear to have been covered with recycled aggregate that has ACM.

MW16 on the road could not be opened

MW24 could not be located on the roadway

an additional well was located North of MW13



# Hydrosleeve Deployment Data Form

## Job Information

Date: 20/6/22	Client: Vopak
Project Name: GME Vopak	Project Nurr: H-01221-36
Site Location: Vopak Boteny	Operator:

## 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)

## Well Parameters

Well ID	SWL mTOC	Well Depth (WD)	Available water column	Colour	Turbidity	Odour	Comments / observations
MW1	3.69	7.01	_____				sleeved deployed
MW19	3.61	5.92	_____				PFAS sleeve deployed
MW50	3.76	15.73	_____				"
MW55	3.54	4.61	_____				no sleeve deployed bailer needed
MW17	3.60	5.73	_____				Sleeve deployed
MW18	3.51	5.90	_____				"
MW16	_____		_____				cont open lid (rusted)
MW3	3.67	5.81	_____				PFAS sleeve deployed
MW28	3.52	5.98	_____			HC odour	sleeve deployed
MW3	3.58	6.55	_____			HC odour	"
MW8	3.64	<del>7.14</del> 8.09	_____			HC odour	"
MW24	_____		_____				
MW23	4.18	5.86	_____				bailer needed
MW22	4.15	5.95	_____				Sleeve deployed
MW21	3.96	5.98	_____				"

## Field Notes



# Hydrosleeve Sampling Data Form

Job Information	
Date: 22/6/22	
Project Name: 1	Project Number: 122136
Site Location: Vopok	Operator: HD
	Weather: fine

Water Quality Parameters							
Well ID	SWL mTOC	pH	Temp °C	Cond mS/cm	DO ppm	Redox mV	Comments / observations
MW1	3.87	6.71	18.34	997	0.03	51.7	clear, No, No sleet
MW19	3.76	6.40	18.97	728	0.03	48.5	very turbid/brown, No, No sleet
MW50	3.77	5.71	18.95	329	0.03	84.4	Slightly turbid, No, No sleet
MW55	3.79	5.95	18.71	556	0.03	51.4	clear, NO, No sleet
MW17	3.66	7.31	19.99	667	0.55	26.5	clear, No, No sleet
MW18	3.54	7.52	20.22	452	0.56	23.3	clear, No, No sleet
MW23	4.23	8.50	20.14	794	1.25	17.5	clear, slight yellow colour, No, No sleet
MW22	4.09	8.00	20.45	1114	1.28	40	clear, No, No sleet.
MW21	4.012	7.02	20.34	1561	1.22	42.5	c "
MW20	4.15	7.21	19.96	1157	1.23	37.5	"

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?	<input checked="" type="radio"/> Y	<input type="radio"/> N
Was pre-cleaning sampling equipment properly protected from contamination?	<input checked="" type="radio"/> Y	<input type="radio"/> N
Was documentation of equipment conducted?	<input checked="" type="radio"/> Y	<input type="radio"/> N <input type="radio"/> NA
Were air bubbles present in vials at time of collection?	<input type="radio"/> Y	<input checked="" type="radio"/> N <input type="radio"/> NA
Was sample for metals field filtered prior to preservations?	<input checked="" type="radio"/> Y	<input type="radio"/> N <input type="radio"/> NA

re-trip - MW20

**Field Notes**

On site at 7:15, Al. didn't arrive on site until 8:15. SWMS needed to be checked before a work permit could be written. didn't get onto site until 9:30 am



# Hydrosleeve Sampling Data Form

Job Information	
Date: 23/6/22	
Project Name: GME Vopak	Project Number: 122136
Site Location: Botery	Operator: H.D
	Weather: fine

Water Quality Parameters							
Well ID	SWL mTOC	pH	Temp °C	Cond mS/cm	DO ppm	Redox mV	Comments / observations
MW9	3.62	6.99	13.94	614	4.01	48.5	clear, orange particles, No, No sleet
MW2	3.77	6.91	14.05	833	3.86	16.2	clear, NO, No sleet
MW10	3.77	6.81	14.21	989	4.41	54.1	"
MW26	3.79	6.76	15.21	1124	4.89	32.2	"
MW45	3.87	7.21	15.11	801	4.81	73.1	"
MW40	3.89	7.22	15.49	451	2.86	66.9	"
MW3	3.67	7.12	19.24	506	2.96	48.3	"
MW27	3.60	6.92	19.06	633	2.15	-7.3	clear, black particles, HC odour, No sleet
MW13	3.73	6.66	19.47	618	2.84	15.9	clear, HC odour, No sleet
MW7	3.82	6.72	19.42	642	2.91	21.6	"

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?	<input checked="" type="radio"/> Y	<input type="radio"/> N
Was pre-cleaning sampling equipment properly protected from contamination?	<input checked="" type="radio"/> Y	<input type="radio"/> N
Was documentation of equipment conducted?	<input checked="" type="radio"/> Y	<input type="radio"/> N <input type="radio"/> NA
Were air bubbles present in vials at time of collection?	<input type="radio"/> Y <input checked="" type="radio"/> N	<input type="radio"/> NA
Was sample for metals field filtered prior to preservations?	<input checked="" type="radio"/> Y <input type="radio"/> N	<input type="radio"/> NA

Field Notes
<p>arrived onsite @ 6:30, got into the field @ 7:30.</p> <p>finished onsite after hand in @ 3:15 pm.</p> <p>no issues onsite</p>



# Hydrosleeve Sampling Data Form

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Job Information	
Date: 23/6/22	
Project Name: GMS Vopak	Project Number: 122136
Site Location: Botany	Operator: H.D
	Weather: fine

Water Quality Parameters							
Well ID	SWL mTOC	pH	Temp °C	Cond mS/cm	DO ppm	Redox mV	Comments / observations
MW11	3.85	6.62	20.60	1082	2.75	-7.5	clear, black particles, HC odour / steel
MW12	3.83	6.74	19.79	833	2.09	-16.3	"
65 MW3	2.07	6.49	19.97	754	2.81	28.8	clear, NO, No steel
65 MW5	2.17	7.10	20.18	797	3.31	19.3	"
MW8	3.52	6.82	20.14	271	2.34	30.7	clear, black particles, No, No steel

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?	<input checked="" type="radio"/>	<input type="radio"/>	
Was pre-cleaning sampling equipment properly protected from contamination?	<input checked="" type="radio"/>	<input type="radio"/>	
Was documentation of equipment conducted?	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Were air bubbles present in vials at time of collection?	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Was sample for metals field filtered prior to preservations?	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>

Field Notes



## Appendix F QA/QC Assessment

**Table F-1: QA/QC Assessment**

<b>Data Quality Objective</b>	<b>Sampling Frequency</b>	<b>Frequency Achieved</b>	<b>DQI</b>	<b>DQI Met?</b>
<b>Precision</b>				
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	Yes
Laboratory duplicates	1/20 samples	Yes	>5xLOR: 50% RPD	Yes
Laboratory method blanks	1/10 samples	Yes	< LOR	Yes
<b>Accuracy</b>				
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.
<b>Representativeness</b>				
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	Partial – the field duplicate DUP and triplicate TRIP were analysed out of holding time. All other samples were analysed within the holding times	Hold Times: 7 days - organics 6 months – inorganics	Yes, noting that the analysis of DUP and TRIP outside of the holding times does not impact the overall useability of the data, as no analytes exceeded the adopted criteria or majority of the analytes were reported below the laboratory LOR.

<b>Data Quality Objective</b>	<b>Sampling Frequency</b>	<b>Frequency Achieved</b>	<b>DQI</b>	<b>DQI Met?</b>
<b>Comparability</b>				
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
<b>Completeness</b>				
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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