St Marys Fire Station

Detailed Site Investigation 2022/2023

South Australian Metropolitan Fire Service

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→ **The Power of Commitment**

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GHD Pty Ltd | ABN 39 008 488 373

211 Victoria Square, Level 4

Adelaide, South Australia 5000, Australia

T +61 8 8111 6600 | **F** +61 8 8111 6699 | **E** adlmail@ghd.com | **ghd.com**

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Executive Summary

Background

The SA Metropolitan Fire Service (MFS) engaged GHD Pty Ltd to complete a Detailed Site Investigation (DSI) at the MFS St Marys Station located at 1125 South Road, St Marys, South Australia (the site). This DSI is limited to potential impacts from the use of aqueous film-forming foams (AFFF) containing per- and poly-fluoroalkyl substances (PFAS) in accordance with the Voluntary Site Contamination Assessment Proposal (VSCAP) dated 23 June 2022 (GHD 2022a).

The St Marys Fire Station has been in operation since 1965, staffed by fulltime firefighters who provide 24-hour emergency response, 365 days of the year. Historically, the MFS have used AFFF containing PFAS at the site during training activities. SA MFS replaced all firefighting foam in 2016 to ensure that only products designated fluorine-free were in use.

Following the detection of elevated PFAS concentrations in groundwater beneath the site (T2D 2021), the South Australian Department for Infrastructure and Transport submitted a Section 83A notification to the South Australian Environment Protection Authority (SA EPA) pursuant to section 83A of the Environment Protection Act 1993 (Gov SA 1993), informing them of the presence of groundwater contamination. The SA EPA reviewed the available information and deemed the site a Level 1 regulatory priority in accordance with the SA EPA Site Contamination Regulatory and Orphan Site Management Framework (2017a).

Objectives

This report is subject to, and must be read in conjunction with, the limitations set out in section 1.2 and the assumptions and qualifications contained throughout the Report.

The objectives of the DSI were as follows:

– To assess the nature and extent of PFAS site contamination, both on- and off-site.
– To assess the potential risks to human health and the environment associated with identified PFAS contamination on-site, in the context of continued industrial use.
– To assess the potential risks to human health and the environment associated with PFAS contamination migrating off-site, in the context of the relevant land uses and environments.

Scope

To complete the objectives, GHD undertook the following:

– Drilling and soil sampling of 15 on-site soil bores.
– Installation of four on-site groundwater monitoring wells and two off-site groundwater monitoring wells.
– Two groundwater monitoring events (GME) comprising seven on-site wells and a combination of five on-site and three off-site wells.

Conclusions

The following conclusions were made based on the works undertaken as part of this DSI:

– PFAS contamination is present across the site in on-site soils, bitumen, concrete and groundwater, which can be attributed to historical use of PFAS containing AFFF.
– No exceedances of human health criteria have been identified in soil at the site for a commercial /industrial setting (HIL-D). PFAS impacts in soil were identified to a maximum depth of 2.6 m bgl.
– An exceedance of human health criteria for a residential setting with minimal soil access (HIL-B) was identified at location BH14 at a depth of 0.2 to 0.4 (4.1 mg/kg) and again at 1.1 to 1.2 (3.4 mg/kg) metres for PFOS. Residential B guidelines have been adopted at MFS sites in agreement with the United Fire Fighters Union of South Australia as a more conservative “trigger” for further engagement and do not necessarily represent a human health risk. In this instance the sample is 0.2 m below ground surface, with the

surface sample above being below HIL-B criteria. The exceedances are also significantly below the commercial/industrial criteria that are appropriate for the sites land use under the NEPM.

- Given the site's low ecological value, the CCME criteria of 0.14 mg/kg was adopted and while exceedances were identified, the criteria is for protection of more sensitive ecological receptors (surface water or adjacent high value ecological areas) via migration which are not considered relevant for the site.
- It is considered likely that impacted concrete and bitumen, as well as the shallow soils beneath the site are an ongoing source of PFAS impacts to groundwater although the amount of infiltration through surface materials (bitumen / concrete hardstand) and potential flux to groundwater is unknown.
- Standing water levels in the Q1 aquifer ranged from 1.743 m bgl at on-site well GW7003 in October 2022 to 3.108 m bgl at on-site well MW02 in March 2023. The inferred groundwater flow direction in the Q1 aquifer was to the north-west.
- The SWL in the Q2 aquifer ranged from 2.171 m bgl in October 2022 to 2.638 m bgl in March 2023 in on-site well GW201b. Due to the presence of several meters of clay between the Q1 and Q2, as well as the identified hydraulic head difference, the Q2 is considered a confined aquifer.
- The SWL in the T1 aquifer ranged from 17.375 m bgl in October 2022 to 24.867 m bgl in March 2023 in on-site well GW8001b. Groundwater in the well dropped approximately 7 m in five months, which indicates groundwater abstraction in addition to seasonal fluctuations.
- On-site groundwater monitoring wells reported exceedances of the adopted drinking water and recreational criteria in the Q1 aquifer and the drinking water criteria in the Q2 aquifer.
- Following a review of drilling methods and historical development and sampling data, on-site well GW8001b (T1) was redeveloped using a surge-block method and resampled. Historically identified PFAS concentrations in the T1 aquifer decreased by an order of magnitude to levels below the adopted assessment criteria. It was considered unlikely that the presence of PFAS in well GW8001b can be attributed to historical site activities but has likely been introduced via fluids/muds during the drilling process. It should be noted that this would not represent a significant or ongoing source of PFAS contamination in the T1 and can likely be remedied through further development of the well.
- PFAS impacted groundwater has migrated off-site, generally in the inferred north-westerly groundwater flow direction and exceeded the adopted drinking water and recreational use criteria at Q1 monitoring well location MW05 (approximately 125 m down-gradient to the west) and the drinking water criteria at Q1 well MW07 (approximately 370 m down-gradient to the north-west). The lateral extent of PFAS contamination in the Q1 aquifer has not been delineated.
- The vertical extent of PFAS impacts to groundwater (the Q2) has not been confirmed.
- PFAS contamination in groundwater is unlikely to impact human health via drinking water given the presence of a reticulated water supply. However, it cannot be ruled out as 49 registered bores within a 2 km radius of the site have groundwater suitable for human consumption (measured TDS < 1200 mg/L) and groundwater extraction bores for domestic and industrial purposes are located cross and down-gradient from the site.
- A significant groundwater prohibition area (GPA) exists, down-hydraulic gradient of the site which prevents the abstraction of groundwater from the upper quaternary aquifers. The presence of the GPA presents an effective administrative control that prevents a linkage between source (MFS site), pathway (lateral migration in groundwater) and the receptor (abstraction of groundwater for drinking and/or irrigation) within this area. The GPA however does not extend south of Daws Road where off-site impacts have been identified along with registered groundwater bores for domestic use. The bores appear to be installed in the Q2 aquifer where the presence of PFAS contamination needs to be confirmed.
- The consumption of fruits and vegetables which utilise groundwater for irrigation / watering or have deep roots that may come into contact with contaminated groundwater is considered a potential exposure pathway, based on historical confirmed impacts to on-site biota (since removed).

Recommendations

The following are recommended actions to address remaining data gaps at the site:

- Community consultation, including a letter drop to confirm the presence and potential use of any groundwater wells and fruit trees whose roots may intercept groundwater.
- Additional off-site drilling to the west of the site and south of Daws Road (extent of GPA) to delineate impacts in the Q1 to below the adopted criteria.
- Additional drilling to the east of the site to confirm the potential for up-gradient impacts in the Q1.

- Drilling and installation of a Q2 well within the site using sonic drilling methods and casing off the upper Q1 to confirm vertical migration.
- Collection of core samples of the aquitard to establish permeability.
- Resampling of all new and existing on-site wells.
- Eventual decommissioning of existing Q2 (GW201b) and T1 (GW8001b) wells at the site.

Table of Abbreviations

Abbreviation	Full form
AFAC	Australasian Fire and Emergency Service Authorities Council
AFFF	Aqueous Film-Forming Foam
AHD	Australian Height Datum
COC	Chain of Custody
COPC	Chemicals of Potential Concern
CSM	Conceptual Site Model
DO	Dissolved Oxygen
DQIs	Data Quality Indicators
DQOs	Data Quality Objectives
EC	Electrical Conductivity
GAR	South Australian *Guidelines for the Assessment and Remediation of Site Contamination 2019*
GHD	GHD Pty Ltd
HEPA	Heads of Environment Protection Authorities Australia
HDPE	High-Density Polyethylene
HIL	Human Health Investigation Level
IP	Interface Probe
JSEA	Job Safety and Environment Analysis
LDPE	Low-Density Polyethylene
LOR	Limit of Reporting
m bgl	Metres Below Ground Level
MFS	South Australian Metropolitan Fire Service
mg/L	Milligrams / Litre
MW	Monitoring Well
NATA	National Association of Testing Authorities
NEMP	PFAS National Environmental Management Plan Version 2.0 - January 2020
NEPC	National Environmental Protection Council
NHMRC	National Health and Medical Research Council
ORP	Oxidation-Reduction Potential
PFAS	Per- and Poly-Fluoroalkyl Substances
PFHxS	Perfluorohexane Sulfonate
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctane Sulfonate
PFPeA	Perfluoropentanoic acid
PVC	Polyvinyl Chloride
QA/QC	Quality Assurance and Quality Control
RPD	Relative Percentage Difference
SA EPA	South Australian Environment Protection Authority

Abbreviation	Full form
SAQP	Sampling and Analysis Quality Plan
SOP	Standard Operating Procedure
SPR	Source-Pathway-Receptor
SWL	Standing Water Level
TDS	Total Dissolved Solids
TOC	Top of Casing
VSCAP	Voluntary Site Contamination Assessment Proposal
WQEPP	South Australian *Environmental Protection (Water Quality) Policy* 2015
µg/L	Micrograms / litre
µS/cm	Microsiemens / centimetre

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1. Introduction

The SA Metropolitan Fire Service (MFS) engaged GHD Pty Ltd to complete a Detailed Site Investigation (DSI) at the MFS St Marys Station located at 1125 South Road, St Marys, South Australia (the site). This DSI is limited to potential impacts from the use of aqueous film-forming foams (AFFF) containing per- and poly-fluoroalkyl substances (PFAS) in accordance with the Voluntary Site Contamination Assessment Proposal (VSCAP) dated 23 June 2022 (GHD 2022a). Other potential contaminating activities and related contaminants of concern are not included in this assessment. The site location and layout are shown in Figure 1 (attached).

1.1 Background

The St Marys Fire Station has been in operation since 1965, staffed by fulltime firefighters who provide 24-hour emergency response, 365 days of the year. Historically, the MFS have used AFFF containing PFAS at the site during training activities. It is understood that the MFS commenced phasing out the use of firefighting foams containing perfluorooctane sulfonate (PFOS) in 2007 and perfluorooctanoic acid (PFOA) in 2014, after conducting consultation and liaison with the Australasian Fire and Emergency Service Authorities Council (AFAC) and the South Australian Environment Protection Authority (SA EPA).The MFS replaced all firefighting foam in 2016 to ensure that only products designated fluorine-free were in use. During 2017/2018, the MFS removed all fire extinguishers containing PFAS from their inventory.

Following the detection of elevated PFAS concentrations in groundwater beneath the site (T2D 2021), the South Australian Department for Infrastructure and Transport submitted a Section 83A notification to the SA EPA pursuant to section 83A of the Environment Protection Act 1993 (Gov SA 1993), informing them of the presence of groundwater contamination.

The SA EPA reviewed the available information and deemed the site a Level 1 regulatory priority in accordance with the SA EPA Site Contamination Regulatory and Orphan Site Management Framework (2017). This priority level assists the SA EPA to select the appropriate regulatory approach and reporting timeframe to ensure that site contamination is managed effectively.

In a letter dated 21 October 2021, the SA EPA requested the preparation and submission of a VSCAP for the effective regulation of the site. The VSCAP dated 23 June 2022 (GHD 2022a) was accepted by the SA EPA in a letter dated 29 June 2022. Copies of the SA EPA letters are provided in Appendix A.

1.2 Objectives

The objective of this investigation is to address the VSCAP requirement to undertake a DSI in order to:

– To assess the nature and extent of PFAS site contamination, both on- and off-site.
– To assess the potential risks to human health and the environment associated with identified PFAS contamination on-site, in the context of continued industrial use.
– To assess the potential risks to human health and the environment associated with PFAS contamination migrating off-site, in the context of the relevant land uses and environments.

1.3 Limitations

This report: has been prepared by GHD for South Australian Metropolitan Fire Service and may only be used and relied on by South Australian Metropolitan Fire Service for the purpose agreed between GHD and South Australian Metropolitan Fire Service as set out in section 1.2 of this report.

GHD otherwise disclaims responsibility to any person other than South Australian Metropolitan Fire Service arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report (refer section(s) 1.6 of this report). GHD disclaims liability arising from any of the assumptions being incorrect.

The opinions, conclusions and any recommendations in this report are based on information obtained from, and testing undertaken at or in connection with, specific sample points. Site conditions at other parts of the site may be different from the site conditions found at the specific sample points.

Investigations undertaken in respect of this report are constrained by the particular site conditions, such as the location of buildings, services and vegetation. As a result, not all relevant site features and conditions may have been identified in this report.

GHD has prepared this report on the basis of information provided by South Australian Metropolitan Fire Service and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

If this report is required to be accessible in any other format, this can be provided by GHD upon request and at an additional cost if necessary.

1.4 Scope of works

The following scope of works was undertaken generally in accordance with the Sampling and Analysis Quality Plan (SAQP, GHD 2022c):

- Advancement of 15 soil bores across the site and associated soil sampling and analysis for PFAS.
- Installation and development of six groundwater monitoring wells over two drilling programs (four on-site and two off-site).
- Development of one existing groundwater monitoring well (GW8001b) using a surge block.
- Two groundwater monitoring events (GME) of four newly installed and four existing on-site groundwater monitoring wells.
- One GME of two newly installed and one existing off-site groundwater monitoring well.
- Disposal of waste soil and groundwater by a licenced contractor.
- Preparation of this DSI report.

2. Site description

The information provided in this section is based on the preliminary site investigation (GHD 2022b), the SAQP (GHD 2022c) and Lotsearch Report Reference Number LS035821 EP (Lotsearch 2022).

2.1 Site details

Site information details are summarised in Table 2.1. The site location is presented in Figure 1 (attached).

Table 2.1 Summary of General Site Identification Information

Item	Detail
Site Address:	1125 South Road, St Marys, SA 5042
Certificate of Title:	CT 5808/746
Legal Description:	Allotment 68, Filed Plan 12879 in the Area Named St Marys, Hundred of Adelaide
Local Government Authority:	City of Mitcham
Current Zoning:	Employment
Property Owner:	South Australian Metropolitan Fire Service
Current Site Use:	Operational Fire Station
Area:	4,569 m^2
Site Elevation:	32 m Australian Height Datum (AHD)

Copies of the current certificate of title and excerpts from the South Australia Property and Planning Atlas (SAPPA 2022) including zoning information are provided in Appendix B.

2.2 Surrounding land use

A summary of the uses of the land surrounding the site is provided in Table 2.2.

Table 2.2 Summary of Surrounding Land Use

Orientation	Description of Land Use	Zoning (Municipal Council)
North	Used car dealership (Paul Middleton Auto Brokers) immediately north of site. Recreational vehicle (RV) dealer further north from Paul Middleton Auto Brokers and then Daws Road with commercial businesses including auto parts / accessory store, communication technology business and kitchen cabinet maker beyond. A powder coating service is located immediately to the north-east of site.	Employment
East	Pinn St immediately east of site with a caravan repair and servicing shop (Dario Caravans & Repairs), auto parts store (All Clutch & Brake Service) and a manufacturer of plastic food packaging and laboratory plastic ware (Techno Plas) beyond.	Strategic Employment
South	A petrol station (Ampol Foodary St Marys) is located immediately south of the site on South Rd. A caravan repair and servicing shop (Dario Caravans & Repairs) is located south of the site on Pinn St. Further south is Southern Ave with various businesses such as gyms, dental practice, retail stores, a signage/signwriting company and a paint store beyond. A metal heat treating service is located south-east of the site.	Employment
West	South Road is located immediately west of site with various businesses such as a hair salon, a medical clinic and a commercial printing company beyond. Further west are largely residential areas.	Employment

It is noted that historically, a wrecking yard was located on the land immediately south of the site, now occupied by Dario Caravans & Repairs.

2.3 Topography and hydrology

The topography of the site and surrounding land is relatively flat and forms part of the Adelaide Plains, between Gulf St Vincent to the west, and the Mount Lofty Ranges to the east. The site sits at an elevation of approximately 32 metres above Australian Height Datum (mAHD). The eastern portion of the site slopes gently towards a central gutter running east to west. The western lawn area slopes gently down towards the north-western corner of the site.

Approximately two thirds of the site is comprised of sealed surfaces (buildings, concrete hardstand, bitumen, etc.) with the majority of stormwater discharging to off-site underground stormwater drains via stormwater drainage pipes throughout the site. Stormwater drains are located along the northern site boundaries and along South Road to the west, with stormwater nodes at the north-western and north-eastern site corners (Gov SA 2022).

2.4 Surface water

The nearest natural surface water bodies from the site are the Sturt River, located approximately 2.5 km south-west of the site, and the Oaklands wetland, located approximately 2.5 km west of the site. The Sturt River flows in a north-westerly direction and discharges into Patawalonga Creek, approximately 6.6 km north-west of the site.

An old, approximately 700 m long, open stormwater drain located between the north-western corner of the Centennial Park Cemetery and the corner of Comaum Street and Benjamin Street, approximately 130 m to the east of the site (Lotsearch 2022) appears to have been backfilled and replaced with underground pipes (Gov SA 2022).

2.5 Geology and soils

The site is located within the Golden Grove – Adelaide Embayment, a geological subarea of the St Vincent Basin between the Para Fault to the west and the Eden – Burnside Fault to the east (Gerges 2006).

The Lotsearch (2022) report indicated that the site is characterised by Keswick Clay, consisting of smectite-rich clay and rare sand lenses.

Most common soil classification orders were identified to be predominantly Chromosols, which are characterised by outwash plains with hard alkaline red soils, small areas cracking clay soils and various alluvial soils in the stream valleys.

The site lies within a region of extremely low probability of potential acid sulphate soil (PASS) occurrence.

The geology encountered on-site during intrusive investigations (T2D 2021 and this investigation) was generally consistent with the regional geology and has been summarised in Table 2.3.

Table 2.3 Summary of subsurface geology encountered during intrusive site investigations

Depth (m bgl)	Soil type	Soil composition
0.0 – 1.0	Fill (inferred reworked natural material used for bedding under concrete slabs)	– Sand, fine to coarse grained, orange-brown; sandy gravel, fine to coarse grained, brown; and sandy clay, low to medium plasticity, brown and dark-brown mottled or – Sandy clay, low plasticity, dark brown, fine to coarse grained sand, trace fine to coarse grained gravel; or – Clayey sand, fine to coarse grained, dark-brown, medium plasticity clay, with fine to medium grained gravel
0.5 – 5.0	Clay	– Alluvial Pooraka clay or sandy clay; low, low to medium, medium or medium to high plasticity; brown, pale brown or red-brown; (with) fine to medium or coarse grained sand and in cases trace fine grained or fine to medium grained gravel between 0.5-1.0 m and 4.0-5.0 m bgl

Depth (m bgl)	Soil type	Soil composition
5.0 – 38.3	Hindmarsh Clay (clay or sandy clay underlain with inferred interbedded gravel and clay layers between 11.0 m and 15.0 m bgl)	– Clay or sandy clay, medium, medium to high or high plasticity, pale grey mottled brown and/or orange or orange-brown and grey, (with/trace) fine to medium or coarse grained sand, in some cases with/trace fine or fine to medium grained gravel – Clayey gravel or sandy clayey gravel, fine or fine to medium grained, red-brown or orange-brown and grey, medium to high plasticity clay, (with) fine to coarse grained sand, approximately 1.0 m thick layer at 5.0-14.0 m to 6.0-15.0 m bgl, underlain by – Sandy gravelly clay, medium to high plasticity, orange-brown and grey, fine grained gravel, fine to coarse grained sand, 12.0 m to 14.0 m bgl, underlain by – Gravel, fine to medium grained, sub-rounded to sub-angular, red-brown and grey, with fine to coarse grained sand, with medium to high plasticity clay, 14.0 m to 15.0 m bgl, underlain by – Clay or sandy clay; medium to high or high plasticity; orange-brown or red-brown and grey; (with/trace) fine to coarse grained sand; in some cases with/trace fine to medium grained, in one case calcareous gravel, 6.0-15.0 m to 11.0-35.0 m bgl, inferred transition zone between Quaternary and Tertiary at 35.0-38.3 m bgl
38.3 – 38.5	Hallett Cove Sandstone	– Calcareous sandstone, fine to coarse grained, white

2.6 Hydrogeology

2.6.1 Regional hydrogeology and groundwater use

According to the Department of Water, Land and Biodiversity Conservation (DWLBC) Report (Gerges 2006), the site lies within ‘hydrogeological zone 2’, which covers the area between Brown Hill Creek and Gulf St Vincent. It contains from two to four Quaternary aquifers and from two to four Tertiary aquifers. Only the first Tertiary aquifer (T1) is used significantly as it consists mainly of highly permeable formations (sandy limestone) and contains water of low salinity with a median groundwater salinity of 1,284 mg/L reported for the Central Adelaide T1 aquifer (DEWa 2022). Major pumping occurs from this aquifer and significant seasonal fluctuations are noted due to extraction for irrigation in summer months.

The first Quaternary aquifer (Q1) in the vicinity of the site has brackish water with a salinity range of 3,500 mg/L to 5,000 mg/L TDS, while the second Quaternary aquifer (Q2) has brackish salinity in the range of 1,500 mg/L to 2,500 mg/L TDS (Gerges 2006). The regional groundwater flow in the Q1 and Q2 aquifers is in north-westerly direction towards the Gulf St Vincent (Gerges 2006).

A search of the South Australian Resources Information Gateway (SARIG) database reported shallow groundwater in the vicinity of the site with standing water levels (SWL) of 5-10 m bgl, producing yields in the range of 0.5-2.5 litres/second. Groundwater salinity ranged from 1,500-3,000 mg/L TDS, indicating brackish water.

SA EPA (2017b) provides a summary of specific aquifer conditions for the Tertiary aquifer in the area which is interpreted at the site as being the Hallett Cove Sandstone (T1) encountered at a depth of 38.5 metres at monitoring well location GW8001b (T2D 2021). The SA EPA report concludes that, based on the presence of massive clay beds between the Quaternary aquifers and the underlying Tertiary aquifers, there is unlikely to be any contaminant impact on the Tertiary aquifers and that the confinement of the Tertiary aquifers is implied by the presence of a 15 to 20 m head difference that has been measured between the Q1 and the first Tertiary aquifer (T1). Based on this information it is likely that there is an upward hydraulic gradient from the Tertiary aquifer to the overlying Quaternary aquifers. This data is widely supported by a hydrographical study undertaken by Dr Nabil Gerges and presented in a Department of Water, Land and Biodiversity Conservation report in 2006. This is also supported by the geology presented on borehole logs and reported hydraulic head differences between the Q1 (GW8002b), Q2 (GW201b) and T1 (GW8001b) monitoring wells installed at the site (T2D 2021).

The hydrogeology of the Melrose Park EPA assessment area to the north of the site has been characterised by Senversa (2023) and is summarised in Table 2.4. The Q1 aquifer was interpreted as a semi-confined aquifer.

Table 2.4 Aquifer Hydraulics Summary Table

Aquifer	Inferred flow direction	Groundwater elevation (range in m AHD)	Hydraulic conductivity (m/day)	Hydraulic gradient (m/m)	Seepage velocity (m/year)	TDS (range in mg/L)
Q1	West-north-west	27.526 – 31.555	0.29	0.004	11	1,398 – 6,209
Q2	North-west	27.573 – 31.550	0.14	0.004	4	1,901 – 4.066
Q3	North-west	27.615 – 30.325	0.5	0.006	22	2,388 – 3,101

The four existing on-site groundwater monitoring wells reported SWL between 2.6 m bgl (GW8002b / 6628-31029) and 27.1 m bgl (GW8001b / 6628-31028) and brackish salinities between 2,702 mg/L (GW201B / 6628-31030, Q2 aquifer) and 4,474 mg/L (GW8002b / 6628-31028, Q1 aquifer) (T2D 2021) that were consistent with Gerges (2006).

The Lotsearch (2022) report included a search of the South Australian WaterConnect database (DEW 2022b) for registered groundwater wells located within a 2 km radius of the site. The results are summarised as follows:

– There were 768 registered wells within a 2 km radius.
– Of these registered wells, 40 were listed as operational, seven were listed as abandoned, 170 were listed as backfilled, 33 were listed as dry, two were listed as not located, 17 were listed as having an unknown status and no status was listed for 499 wells.
– Of the 40 registered operational wells, 20 were listed as domestic, 10 were listed as drainage, six were listed as industrial and four were listed as irrigation.
– Of the 516 wells with unknown or no registered status, 302 were for investigation purposes, 38 were for domestic purposes, 36 for monitoring, 17 for environmental purposes, 10 were for drainage purposes, five for observation, four for irrigation, three for environmental / recreational purposes, one for recreational purposes and 100 had no purpose listed.
– Four on-site wells were registered for investigation purposes.

TDS data was available for 182 wells within the 2 km radius from the site and ranged between 297 mg/L and 15,249 mg/L, indicating fresh to saline water. Of this groundwater well locations, 66 wells had recorded TDS values below 1,200 mg/L. The lowest TDS value of 297 mg/L was reported in 1984 for well number 6628-13206, located approximately 1.7 km north-west of the site.

A groundwater prohibition area exists to the north-west of the site which is detailed in SA EPA (2017b). The GPA is present to the north-west of the intersection of Daws and South Roads and extends approximately 2.3 km north and 2 km west of the intersection, covering an area of approximately 450 hectares (ha). The extent is shown on Figure 2 (attached). The GPA is in place as an administrative control to prevent abstraction of groundwater from within the area due to identified contamination, specifically; chlorinated hydrocarbons including tetrachloroethene (PCE), TCE, cis-1,2 dichloroethene (DCE) and vinyl chloride (VC).

The GPA extent relates to specific aquifers and is summarised as follows:

– Q1 aquifer: The groundwater prohibition area extends approximately 1,500 m north-west of South Road.
– Q2 aquifer: The groundwater prohibition area extends approximately 300 m laterally to the north-west across South Road from a former plastics facility in Melrose Park.
– Q3 aquifer: The groundwater prohibition area extends approximately 50 m laterally north-west of a former automotive site and former plastics site.

Three registered domestic use groundwater bores are present to the west of the site and within approximately 250 metres. Two of these wells fall outside the existing GPA and are likely screened within the Q2 aquifer. The third well is installed in the T1 and is associated with industrial use. A summary of the well details is provided below, and locations are shown on Figure 2 (attached).

Table 2.5 Registered Domestic Use Wells

Well ID	Drill Date	Depth to water	Screen Depth mbgl)	Total Depth (mbgl)	Use	TDS
6628-18490	14/02/1997	15 (1997)	13	24	Domestic	5749
6628-18543	9/02/1997	11 (1997)	12	24	Domestic	-
6628-7965	09/08/1934	20.73 (1969)	-	67	Domestic	849 (1979)

2.6.2 Local hydrogeology

The local hydrogeology beneath the site is summarised in Table 2.6. this is based on subsurface information collected in October 2022, gauging data recorded during GMEs in October 2022 and March 2023, and hydrogeological data for the Melrose Park EPA Assessment Area (Senversa 2023).

Table 2.6 Summary of site-specific hydrogeology

Feature	Details
Groundwater occurrence and depth to groundwater	In October 2022, SWL for the Q1 aquifer across the site ranged between 1.743 m bgl at well GW7003 and 2.673 m bgl at well MW02. The groundwater elevations ranged from 29.268 m AHD at well MW04 to 29.784 m AHD at well GW8002b. In March 2023, SWL for the Q1 aquifer across the investigation area ranged between 2.265 m bgl at off-site well MW05 and 3.108 m bgl at on-site well MW02. The groundwater elevations ranged from 28.002 m AHD at well MW05 to 29.305 m AHD at well MW01. The SWL for the Q2 aquifer at well GW201b were 2.171 m bgl and 2.638 m bgl in October 2022 and March 2023, respectively. The corresponding groundwater elevations were 29.359 m AHD and 28.892 m AHD. The SWL for the T1 aquifer at well GW8001b were 17.375 m bgl and 24.867 m bgl in October 2022 and March 2023, respectively. The corresponding groundwater elevations were 14.408 m AHD and 6.916 m AHD.
Groundwater flow direction	Groundwater regional flow in the Q1 aquifer was inferred to be towards the north-west.
Groundwater gradient	In October 2022, the groundwater hydraulic gradient in the Q1 aquifer between well GW8002b and well MW04 was 0.031. In March 2023, the groundwater gradient in the Q1 aquifer between well MW01 and well MW04 was 0.007.
Effective porosity	The effective porosity of the clay lithology was assumed to be 6% (McWhorter and Sunada 1977).
Hydraulic conductivity	The hydraulic conductivity of the Q1 aquifer, based on site data for the Melrose Park EPA Assessment Area to the north of the site, was assumed to be in the order of 0.29 m/day (Senversa 2023). The hydraulic conductivity, based on literature values for clay lithology was assumed to range between 8.6×10^{-7} m/day and 4.06×10^{-4} m/day (arithmetic mean 7.78×10^{-5} m/day, McWhorter and Sunada 1977).
Seepage velocity	The seepage velocity of the Q1 aquifer beneath the investigation area was calculated based on the effective porosities and hydraulic conductivities listed above. Typical seepage velocities ranged between: 55 m/year (field data); 1.6×10^{-4} m/year and 7.7×10^{-2} m/year (literature data) in October 2022 12 m/year (field data); 3.7×10^{-5} m/year and 1.7×10^{-2} m/year (literature data) in March 2023:
Groundwater salinity	Total dissolved solids (TDS) in groundwater within a 2 km radius of the site have been reported at concentrations below 1,200 mg/L. Within the assessment area TDS in the Q1 aquifer ranged between 1,826 mg/L and 13,941 mg/L.

2.7 Historical investigations

Previous PFAS investigations at the St Marys Fire Station have been carried out by GHD in 2019 and more recently in 2020/2021 by T2D Geoventure (2021) as part of the North-South Corridor (Torrens to Darlington) Contamination Investigations. These investigations are documented in the following reports:

– GHD (2019) *MFS State-wide Appliance and Station Sampling*, Report for South Australian Metropolitan Fire Service, May 2019.
– T2D Geoventure (2021) *North-South Corridor (Torrens to Darlington) Stage 1, 1a and 1b Ground Investigation Contamination Factual Report*, Report for Department of Infrastructure and Transport, 3 June 2021.
– GHD (2022) MFS St Marys Fire Station Preliminary Site Investigation, Report for South Australian Metropolitan Fire Service, 6 October 2022

2.7.1 GHD (2019) MFS State-wide Appliance and Station Sampling

GHD (2019) reported that the St Marys Fire Station was part of the 2019 environmental investigations carried out at 35 fire stations across South Australia to assess PFAS concentrations that may remain in firefighting appliances, accessible soil and any biota (fruit, vegetables, herbs and poultry) if present.

It is noted that the 2018 PFAS NEMP guidelines were used in this report, which were superseded by the 2020 PFAS NEMP Version 2.0.

The report stated that AFFF was historically used during training drills across the entire concrete area of the fire station.

During the GHD (2019) investigation, the following samples were collected and tested for PFAS:

– Two soil samples (STMARYS_1 and STMARYS_2) collected from the central eastern portion and the northern boundary of the site (respectively) from surface soils in garden areas reported detectable PFAS concentrations below the adopted guidelines. The soil sampling locations are shown in Figure 3.
– Three biota fruit samples collected from the lemon tree, nectarine tree and orange tree growing at the northern boundary of the site detected PFAS concentrations. The orange and lemon samples were above the adopted criteria (FSANZ 2017) for all fruit of 0.0006 mg/kg for PFHxS plus PFOS.
– One peach tree could not be sampled as it was not fruiting at the time.

2.7.2 T2D Geoventure (2021) North South Corridor Investigation

Based on the results of the T2D Geoventure (2021) investigation, the following findings were noted:

Soil

Soil samples were collected from six soil bores drilled across the site, including the following locations: BH7003/GW7003, BH7026, BH7027, BH7028, BH7029b and GW8001b. Two of these (GW8001b and BH7003/GW7003) were progressed to groundwater monitoring wells. The soil sampling locations are shown in Figure 3 and the on-site groundwater monitoring wells in Figure 4. Borehole logs are included in Appendix E.

– Five out of six locations reported detectable PFAS concentrations to a maximum depth of 6.35 m bgl at GW8001b. Location BH7027 was the only location with no detectable PFAS.
– Soil samples were collected and analysed to a depth of 30 m bgl at location GW8001b. PFAS was note detected in the six samples between 6.35 and 30 m bgl.
– The reported PFAS concentrations were below the PFAS NEMP 2020 industrial / commercial human health investigation levels (HIL D).
– Samples from locations BH7026, BH7028, BH7029 and GW8001b exceeded the PFAS NEMP 2020 ecological indirect exposure criterion of 0.01 mg/kg for PFOS, with one sample from location BH7026 also exceeding the ecological direct exposure criterion of 1 mg/kg PFOS.

Groundwater

Four groundwater wells were installed on site in 2020 by T2D (GW8001b, GW8002b, GW201b and GW7003) into various aquifers using mud rotary drilling methods from surface. A summary of the wells and their installation details is provided in below. Well construction details, gauging results and field parameters are provided on attached Tables 3,4 and 5, respectively.

Table 2.7 Existing groundwater wells at St Marys Fire Station

Well ID	Date Installed	Total Depth (m bTOC)	SWL (m bgl)	Screened Interval (m bgl)	Aquifer	PFAS NEMP criteria Exceedance
GW7003 (6628-31306)	12/7/2020 (26/11/2020)	6.0	2.74 (Jan 2021)	3.0-6.0	Q1	– Ecol. Freshwater – Drinking Water – Recreational Water
GW201b (6628-31030)	07/12/2020	17.0	3.2 (Jan 2021)	11.0 -15.0	Q2	– Ecol. Freshwater – Drinking Water
GW8001b (6628-31028)	03/12/2020	38.5	24.163 (Dec 2020) 27.066 (Mar 2021)	36.5-38.5	T1 (interpreted)	– Ecol. Freshwater – Drinking Water
GW8002b (6628-31029)	04/12/2020	6.0 (22.0)	2.594 (Dec 2020)	5.0-6.0	Q1	– Ecol. Freshwater – Drinking Water – Recreational Water

– The Q1 aquifer wells GW8002b and GW7003 were sampled in December 2020 and January 2021, respectively, and reported PFAS concentrations above the adopted PFAS NEMP 2020 human health criteria for drinking water and recreational water as well as the ecological criteria for freshwater.
– The 17 m deep Q2 aquifer well GW201b was sampled in January 2021 and reported concentrations of PFAS that exceeded the adopted PFAS NEMP 2020 human health drinking water and ecological freshwater criteria.
– The 38.5 m deep well GW8001b, which was interpreted as a T1 aquifer well, was sampled in December 2020 and March 2021. Both sampling events reported PFAS concentrations above the adopted PFAS NEMP 2020 human health drinking water and ecological freshwater criteria. Sampling sheets noted a pH of 12.26 and conductivity of 5,666.1 µS/cm (approximately 2,833 ppm TDS) in December 2020 and a pH of 13.2 and conductivity of 5,696 µS/cm (approximately 2,848 ppm TDS) in March 2021.
– Consistent PFAS species were identified all three aquifers, indicating they were likely from the same source. Concentrations in the Q2 and T1 aquifers were of the same order of magnitude.

Due to the PFAS concentrations reported in groundwater beneath the site, a Section 83A notification was submitted to the SA EPA by the Department for Infrastructure and Transport to notify the presence of contamination that affects or threatens underground water pursuant to section 83A of the *Environment Protection Act 1993*. A copy of the Section 83A notification is provided in Appendix A.

2.7.3 GHD (2022b) Preliminary Site Investigation

A Preliminary Site Investigation (PSI) was undertaken by GHD (2022b) to investigate the impacts from us of AFFF containing PFAS at St Mary's Fire Station, in accordance with the Voluntary Site Contamination Assessment Proposal (VSCAP, GHD 2022a). From the investigation, the following conclusions were made:

– Soil site contamination was determined to exist by previous investigations by (T2D 2021) which reported PFAS concentrations in on-site soils above the adopted interim ecological criteria.
– Groundwater site contamination was determined to exist by previous investigations (T2D 2021) which reported PFAS concentrations in groundwater beneath the site above the adopted human health criteria.

– PFAS contamination was deemed to be caused by the historical use of AFFF containing PFAS during on-site training activities. These activities ceased in 2016, when fluorine containing foams were phased out.
– The Conceptual Site Model (CSM) identified the following potentially complete exposure pathways and human health and / or ecological receptors:
    - Consumption of contaminated groundwater extracted off-site for domestic / drinking purposes.
    - Consumption of fruit and vegetables grown off-site where plants were irrigated with contaminated groundwater or where plant roots accessed shallow contaminated groundwater.
    - Incidental ingestion of contaminated groundwater extracted off-site for recreational purposes such as filling of swimming pools.
    - Exposure of site users, visitors, maintenance and construction workers to PFAS via direct dermal contact with contaminated soil, incidental ingestion of contaminated soil or inhalation of contaminated soil / dust from disturbed soils.
    - Exposure of site users, visitors, maintenance and construction workers to PFAS via direct dermal contact with PFAS impacted concrete / bitumen surfaces or inhalation of contaminated dust from such surfaces.
    - Exposure of terrestrial fauna and flora to PFAS via direct contact with contaminated soil, ingestion of contaminated soil or bioaccumulation through indirect contact.
    - Leaching of PFAS from contaminated soils or concrete / bitumen surfaces followed by migration through porous media into groundwater.

GHD recommended:

– further intrusive investigations be undertaken to delineate PFAS impacts in on-site soils, concrete and bitumen surfaces and in on- and off-site groundwater.
– preliminary groundwater assessment to assess if existing off-site groundwater wells are available for gauging and sampling to confirm the groundwater flow direction, the hydraulic gradient and determine the presence of off-site impacts or potential off-site sources.

The objectives of further investigations, in accordance with the VSCAP, are to assess the nature and extent of on- and off-site PFAS contamination associated with historical activities at the site and to identify and assess any potential risks to human health and the environment from PFAS site contamination in the context of relevant land uses for any affected off-site properties.

3. Assessment criteria

PFAS are the key contaminants of concern being address by this environmental investigation. As such, the assessment criteria for this investigation were adopted from the following documents:

– HEPA 2020, PFAS National Environmental Management Plan (Version 2.0), Heads of Environment Protection Authorities Australia and New Zealand, January 2020, (PFAS NEMP).

– NHMRC 2011, Australian Drinking Water Guidelines 6 (ADWG), Version 3.7, National Water Quality Management Strategy, National Health and Medical Research Council and Natural Resources Management Ministerial Council, Commonwealth of Australia, updated January 2022.

3.1 Soil, concrete and bitumen

In accordance with the PFAS NEMP 2020, the PFAS assessment criteria listed in Table 3.1 have been adopted for the assessment of soil samples. There are no criteria specific to concrete and bitumen and application of the soil criteria to these media is not considered appropriate as the exposure scenarios are quite different.

Table 3.1 Adopted PFAS Assessment Criteria – Soil

Exposure Scenario	PFHxS [1]	PFOS [2]	Sum of PFOS and PFHxS	PFOA [3]	Reference Document
Human health investigation level D commercial / industrial	20 mg/kg	20 mg/kg	20 mg/kg	50 mg/kg	PFAS NEMP (HEPA 2020)
Human health investigation level B residential with limited soil contact	2 mg/kg	2 mg/kg	2 mg/kg	20 mg/kg	PFAS NEMP (HEPA 2020)
Ecological indirect exposure	-	0.14 mg/kg		-	PFAS NEMP (HEPA 2020)
Ecological direct exposure	-	1 mg/kg	-	10 mg/kg	PFAS NEMP (HEPA 2020)

Notes:
[1] PFHxS – perfluorohexane sulfonate
[2] PFOS – perfluorooctane sulfonate
[3] PFOA – perfluorooctanoic acid

The PFAS NEMP (Section 8, 2020) provides nationally agreed guideline values that are to be used to inform site investigations. The guidelines have been derived based on existing nationally agreed long standing Australian processes.

The PFAS NEMP provides generic health investigation levels (HILs) for PFOS, PFOA and perfluorohexane sulfonate (PFHxS) in soil in four land use settings. The land use settings considered in the PFAS NEMP are consistent with those that underpin the HILs presented for a variety of contaminants within the ASC NEPM. The site has been defined as commercial/industrial as per the following definition:

– Commercial and/or industrial settings where the outdoor areas are largely (80%) covered by hardstand, possibly with some limited areas of landscaping or lawns.

– Site users are adult employees that spend up to 8 hours a day indoors and 1 hour a day outdoors for up to 240 days per year.

– There are minimal opportunities for direct access to soil. There is the potential for employees to inhale, ingest or come into direct contact with dust particulates derived from the soil on the site.

GHD understands that MFS, in consultation with the United Fire Fighters Union of South Australia, have agreed to also adopt a more stringent health investigation level (residential with limited soil access) as a “trigger” for further engagement which has been included for comparison purposes only. For reference, the residential with limited soil access health investigation levels (HIL-B) are defined as follows:

– High-density residential settings, such as unit blocks, where communal outdoor spaces are largely covered by permanent paving and with some small areas of landscaping or lawns.

– Assumes that there are minimal opportunities for direct access to soil by residents. There may be some potential for residents to inhale, ingest or come into direct dermal contact with dust particulates derived from the on-site soil.
– Assumes no use of soil to produce vegetables, fruit or poultry.
– Site users are adults, children and infants who spend most of their time indoors with limited use of communal outdoor areas on site. This scenario assumes 20 hours a day spent indoors and 1 hour a day spent outdoors in direct contact with soil.
– Children are the most sensitive human receptors.

The PFAS NEMP provides the following guidance in regard to ecological risk for soils:

– "for intensively developed sites with no secondary consumers and minimal potential for indirect ecological exposure, a higher criterion of up to 0.14 mg/kg may be appropriate "
– "the indirect exposure value may be over-protective if the area of exposed soil is too small to have any material impact on food chain transfer to secondary consumers such as invertivores and carnivores. In this situation, considering site-specific characteristics may justify the use of a higher value (up to 0.14 mg/kg) as the trigger for a detailed site specific investigation of risk".

The PFAS NEMP does not provide a rationale for the selection of the 0.14 mg/kg value, but GHD notes that this value was sourced from the same document as the other ecological criteria, namely Environment and Climate Change Canada (ECCC, 2017) *Federal Environmental Quality Guidelines Perfluorooctane Sulfonate (PFOS)* (attached to this email). This document provides 0.14 mg/kg as the soil guideline for PFOS in two circumstances:

– Soil Quality Guideline to Protect Freshwater Life under all land uses.
– Soil Quality Guideline for Offsite migration under commercial/industrial land uses.

The soil quality guideline to protect freshwater aquatic life is the concentration in soil that is expected to protect against potential impacts on freshwater aquatic life from PFOS originating in soil that may enter the groundwater and subsequently discharge to a surface water body. The calculation of this value was made on the basis of the Canadian aquatic screening criteria for PFOS in surface water (6.8 ug/L) and a reverse fate and transport modelling process that assumes a minimum of 10 m lateral separation between the source and the surface water body and incorporates default parameters describing partitioning from soil to leachate, leaching to groundwater, mixing with groundwater and plume migration. The protection of freshwater aquatic life is not considered a complete pathway at the site due to the distance (> 2 km) to a freshwater receptor.

The soil quality guideline for offsite migration under commercial/industrial land uses considers the potential that wind and water erosion of soil can move PFOS contaminated soil from one site to another. The endpoint used to calculate this guideline is the soil quality guideline protective of ecological receptors in residential and agricultural land uses settings (0.01 mg/kg – the ecological indirect criteria). A model was then used to predict the movement of soil, including the Universal Soil Loss Equation and the Wind Erosion Equation. CCME (2017) specifically states that this approach is imprecise and that the derived values should be used a check mechanism only, with professional judgement used to assess whether this is likely to be migration pathway of concern for an individual site. Given the site is largely sealed and remining areas grassed there is unlikely to be significant erosion/migration of contaminated soil form the site. Any soil that was eroded from the site would also not likely be deposited in an area of significant ecological value given the presence of surrounding commercial/industrial properties.

The CCME (2017) guidelines have been superseded. The more recent guidelines (Scientific Criteria Document for the Development of the Canadian Soil and Groundwater Quality Guidelines for the Protection of Environmental and Human Health - Perfluorooctane Sulfonate (PFOS) (ccme.ca)**)** use a similar approach and derive similar values.

3.2 Groundwater

To assess the contamination status of groundwater at a site, the Guidelines for the assessment and remediation of site contamination (SA EPA 2019a) provide a four-step process to determine the environmental values of groundwater and to determine if actual or potential harm to groundwater that is not trivial has occurred. The four-step process provided in the GAR is described in Table 3.2.

Table 3.2 Four-step process for determining environmental values of groundwater

Process	Assessment
Step 1: Apply Table 3 of Schedule 1 of the WQEPP (Gov SA 2015) based on TDS ranges	WaterConnect (DEW 2022) listed 768 registered bores located within a 2 km radius of the site. A total of 182 registered bores within the survey area had documented TDS data, ranging from 297 mg/L to 15,249 mg/L, indicating fresh to saline water. TDS within groundwater beneath the investigation area were calculated based on field measurements of electrical conductivity (EC). Calculated TDS values in the Q1 aquifer ranged from 673 mg/L to 6,519 mg/L, indicating fresh/brackish to saline water. In the Q2 aquifer calculated TDS values ranged from 2,309 mg/L to 2,702 mg/L indicating brackish water. In the T1 aquifer calculated TDS values ranged from 1,153 mg/L to 3,702 mg/L indicating fresh brackish water.
Step 2: Assess and identify surface water bodies within a 2 km buffer of the site	There was no surface water receptor within 2 km of the site. A watercourse shown on maps approximately 130 m to the east of the site (Gov SA 2022, SAPPA 2022) was identified as a former open stormwater drain that has been backfilled and replaced with underground stormwater pipes. The nearest natural surface water bodies are the Sturt River, located approximately 2.5 km south-west of the site, and the Oaklands wetland, located approximately 2.5 km west of the site.
Step 3: Review registered groundwater users in the WaterConnect database	WaterConnect (DEW 2022) identified a total of 768 registered bores within a 2 km radius of the site. The identified uses of the bores with operational or unknown status were investigation (302), domestic (58), monitoring/observation (41), drainage (30), environmental (17) and recreational (4).
Step 4: Application of the SA EPA recognised criteria for the most sensitive environmental value	The most sensitive environmental values to be applied to the site are PFAS NEMP 2020 Drinking Water.

Based on the assessment outlined in Table 3.2, the groundwater criteria have been selected to protect the relevant environmental values identified for groundwater underlying the area of investigation.

For the purpose of this assessment, criteria have been included to:

– Assess the potential risk to people using groundwater for domestic and drinking purposes, (i.e., potable use).
– Assess the potential risk to people using groundwater for recreational purposes (i.e., filling of swimming pools).
– Assess the potential risk to users of groundwater for irrigation of fruit trees and vegetable gardens.

The adopted groundwater screening/ investigation levels, which are considered to protect potentially complete source receptor linkages, are summarised in Table 3.3.

Table 3.3 Adopted PFAS Interim Screening Criteria for Groundwater

Exposure Scenario	PFOS[1]	PFHxS[2]	Sum of PFOS and PFHxS	PFOA[3]	Source
Human Health – Recreational Water (domestic) [4]	0.7 µg/L	0.7 µg/L	0.7 µg/L	5.6 µg/L	NHMRC 2008 ADWG (NHMRC 2011) [5]
Human Health – Drinking Water	0.07 µg/L	0.07 µg/L	0.07 µg/L	0.56 µg/L	PFAS NEMP (HEPA 2020) ADWG (NHMRC 2011)

Notes:
[1] PFOS – perfluorooctane sulfonate
[2] PFHxS – perfluorohexane sulfonate
[3] PFOA – perfluorooctanoic acid
[4] The NHMRC 2008 Guidelines for Managing Risks in Recreational Water recommend health guideline values for recreational water that correspond to 10 times the current drinking water guideline value. These guideline values apply in a domestic setting where groundwater is used for recreational purposes such as the filling of swimming pools.
[5] Australian Drinking Water Guidelines 6, Version 3.7, updated January 2022

4. Assessment methodology

The assessment was undertaken in general accordance with the following guidelines and policy documents:

– HEPA 2020, PFAS National Environmental Management Plan (Version 2.0), Heads of Environment Protection Authorities Australia and New Zealand, January 2020, (PFAS NEMP).
– ANZG 2018, Australian and New Zealand Guidelines for Fresh and Marine Water Quality, online resource www.waterquality.gov.au/anz-guidelines, Australian and New Zealand Governments, updated 26 July 2021, (AWQG).
– Gov SA 2015, Environment Protection (Water Quality) Policy 2015 (WQEPP), Version 1.7.2020, Government of South Australia, updated 2020.
– NHMRC 2008, Guidelines for Managing Risks in Recreational Water, National Health and Medical Research Council and Natural Resources Management Ministerial Council, Commonwealth of Australia, updated with the recent changes in the ADWG – V3.7 – January 2022.
– SA EPA 2019a, Guidelines for the Assessment and Remediation (GAR) of Site Contamination, Environment Protection Authority, South Australia, November 2019.
– SA EPA 2019b, Guidelines for Regulatory Monitoring and Testing – Groundwater Sampling, Environment Protection Authority, South Australia, 2019.

The investigation rationale, methodology and scope were generally in accordance with the SAQP (GHD 2022c). Any departures from the SAQP have been listed in Section 4.3.

4.1 Field methodology

The investigation methodology for the various stages of the DSI field program is summarised in Table 4.1.

Table 4.1 DSI Field Investigation Methodology

Task	Methodology
General	Design and implementation of site-and-task-specific Job Safety and Environmental Assessments (JSEAs) for each field mobilisation. These include identifying site-specific hazards. A Health, Safety and Environmental Management Plan (HSEMP) was produced prior to off-site works for groundwater well installation and sampling. Logistical organisation including obtaining the relevant permits and access requirements with MFS and other parties (i.e. Marion City Council for proposed off-site groundwater monitoring well installation works and subsequent sampling). Engagement of appropriate service locating, drilling, traffic management, surveying, and waste disposal contractors as required to undertake the works.
Intrusive Soil Investigations	GHD completed intrusive soil investigations in accordance with the following: – Requirements of the JSEA and any permits. – Liaison and coordination of fieldwork with MFS and engaged subcontractors. – Clearance of all sample locations by an accredited service locator. – Soil bores drilled / advanced via a combination of concrete coring, hand auger and direct push drilling methodologies. – Where the direct push drilling methodology was used, high density polyethylene (HDPE) core liners were used to minimise the risk of PFAS cross-contamination. – Soil samples were collected from extracted soil cores by hand with a pair of clean nitrile gloves and using a stainless-steel spoon or spatula. – Discrete soil samples were collected at each soil bore location from surface (immediately under hardstand) (0.0-0.2 m bgl), near-surface (0.3-0.5 m bgl) and at 1.0 m intervals thereafter, or where lithological changes were observed or vertical delineation of previously identified impacts was required. – Logging of the soil bores was undertaken and recorded by an environmental scientist to assess the underlying geology and contaminant indicators in accordance with AS 1726:2017. – Soil samples were placed in laboratory-supplied jars and placed immediately in a chilled cooler and

Task	Methodology
	transported to the analytical laboratories under chain of custody documentation protocols. – Drilling spoil was either returned to the bore or placed in drums, sealed and stored at an on-site location agreed with MFS until off-site disposal to a suitably licenced facility could be arranged. – Collection of QA/QC samples including intra-laboratory duplicate, inter-laboratory duplicate (split) samples, and rinsate blanks.
Concrete and Bitumen Sampling	The following was undertaken for the concrete and bitumen sampling program: – Concrete core and bitumen samples were collected from extracted cores by hand with a pair of clean nitrile gloves. – The samples were placed into laboratory-supplied sampling jars or bags suitable for PFAS and placed immediately in a chilled cooler and transported to the analytical laboratories under chain of custody documentation protocol. – Collection of QA/QC samples including intra-laboratory duplicate samples and inter-laboratory duplicate (split) samples was completed.
Groundwater Monitoring Well Installation	Installation and development of groundwater monitoring wells installed as part of the DSI scope was undertaken in accordance with the following: – Drilling locations were assessed and cleared by an accredited service locator prior to the commencement of works. – Non-destructive digging (i.e. hand auger methodology) was used to a depth of 1.0 m bgl to ensure safe initial borehole advancement in the vicinity of potential underground services. – Four on-site and two off-site wells were installed to a maximum depth of 5.5 m bgl using a combination of pushtube and solid flight auger methodologies. Clean augers were used to drill each well. – The wells were constructed using 50 mm Class 18 PVC casing, with a 3 m long machine slotted (0.4 mm) screened interval installed at the target depth. – Graded and washed filter sand was installed around and slightly above (0.3 m) the screened interval. Monitoring wells were completed to surface with bentonite and grout. Wells were completed at the surface with flush mounted gatic covers. – Soils encountered at each well installation location were logged based on field interpretation, consistent with the AS 1726:2017 and recorded by an environmental scientist using GHD specific Data Collection Software on a field tablet. – The groundwater wells were developed via pumping or bailing after construction (where appropriate), with the well casing pumped out to remove loose sediment created by the drilling and construction process. Where possible, water physio-chemical parameters [pH, electrical conductivity (EC), dissolved oxygen (DO), temperature, and turbidity] were measured and recorded in the field to confirm decreasing turbidity and stabilisation of other parameters. – The existing T1 aquifer well GW8001b was redeveloped on 15 March using a Waterra pump system with dedicated tubing, foot valve and surge block. The well was developed using a surge block across the full screen interval to remove any residual drilling muds that may be present within the well annulus. Approximately 5 bore volumes of groundwater was then purged prior to sampling. – A licensed surveyor surveyed the location of each of the installed groundwater monitoring wells to Australian Map Grid (AMG) coordinates to within 0.01 m. The elevation of the measuring point marked at the top of the well casing (TOC) as well as the adjacent ground surface were also surveyed to Australian Height Datum (AHD) to within 0.001 m. For consolidation of location data, the TOC of the four existing on-site groundwater monitoring wells was also re-surveyed. – Drilling spoil, development and purge water were collected in 200 litre waste soil and wastewater drums for disposal at a suitably licenced facility.

Task	Methodology
Groundwater Sampling	Groundwater sampling was undertaken in accordance with the following: – Groundwater sampling was completed at least seven days after monitoring well development. – Gauging and inspection of newly installed, and existing monitoring wells using an oil/water interface probe (IP) to measure standing water levels (SWL) and total well depths. The measurements were taken from the TOC and recorded on field sheets. – Different sampling methods were used to collect groundwater samples due to the range of depths requiring different pumps and, in some instances, (i.e. no-purge) to confirm previous sampling results. – In October 2022, no-purge dedicated HDPE sleeve samplers suitable for PFAS sampling were used to sample all on-site wells to confirm the findings of the T2D (2021) report using the same sampling method. – Low-flow sampling techniques were used for the second GME for on- and off-site wells, using a bladder pump in March 2023 for Q1 and Q2 wells. In April 2023, a peristaltic pump was used for the Q1 wells and a Waterra pump with dedicated foot valve for the 38.5 m deep T1 well GW8001b. – Dedicated tubing was used for each well. One primary sample was collected from each monitoring well directly into laboratory-supplied bottles with the appropriate preservative (as required). – The groundwater samples were placed immediately in a chilled cooler and transported to the analytical laboratories under chain of custody documentation protocols and chilled conditions. – In October 2022, field groundwater quality parameters, including pH, EC, DO, ORP (corrected where required) and temperature, were measured by pouring water from the sleeve sampler into a cup after the laboratory samples had been collected as the cable of the water quality meter was too short for down-hole readings. In some instances there was not enough water left to determine the field parameters. – In March/April 2023, field groundwater quality parameters, including pH, EC, DO, ORP (corrected where required) and temperature, were measured using a flow cell and recorded on field sheets once the parameters had stabilised as per GHD standard operating procedures (SOP) and SA EPA (2019b) guidelines. – Collection of QA/QC samples including intra-laboratory duplicate samples, inter-laboratory duplicate (split) samples, field blanks and rinsate blanks was completed.
Decontamination	**General guidance** Samples can be contaminated with PFAS from a range of products, including new clothing, footwear, PPE and treated fabrics stain and water- resistant products, sunscreen, moisturisers, cosmetics, fast food wrappers, polytetrafluoroethylene (PTFE) materials (such as Teflon©), sampling containers with PTFE-lined lids, foil, glazed ceramics, stickers and labels, inks, sticky notes, waterproof papers, drilling fluids, decontamination solutions and reusable freezer blocks. These items were not be worn or used during any stage of sampling (at site, during transport etc.). If information confirming that field consumables and decontamination detergents is PFAS free was not available, the consumable was not used until the supplier confirmed it was PFAS-free. If this information was not available, the product was tested for the presence of PFAS, and only used where it was demonstrated to be PFAS-free. Where possible field sampling was undertaken by completing monitoring in areas where low concentrations of PFAS are likely and then moving toward wells of higher concentration to reduce the chance of cross-contamination. **Handling** The following applied to the sampling program: – Sampling personnel washed their hands with plain soap and rinse thoroughly in tap water. – Laboratory supplied sample containers suitable for the requested analysis LOR requirements were used, typically polypropylene or HDPE. – Sampling and monitoring equipment that may contain PTFE (PTFE based compositions include Teflon®) were avoided during the sampling. – Teflon®-coated materials and aluminium foil did not come into contact with the samples. – Chemical or gel-based coolant products to keep samples cool were not used. – Recommended equipment for groundwater sampling were utilised. – Consumable sampling equipment was not reused. – Decontamination techniques employed for this testing were carried out in accordance with GHD's SOP.

4.2 Laboratory analysis program

The laboratory analytical program for the scope of works is summarised in Table 4.2.

In accordance with the SAQP, multiple samples were collected at each soil sampling location and selected samples were submitted for laboratory analysis.

Table 4.2 Analytical schedule

Sampling locations	Primary samples analysed	Analysis schedule
Bitumen		
3 locations (BH08 [#1], BH09, BH13)	2	2 x PFAS – short suite standard LOR
Concrete		
3 locations (BH05, BH07, MW01)	3	3 x PFAS – short suite standard LOR
Soil		
15 boreholes (MW01-MW04, BH05-BH15)	31	31 x PFAS – short suite, standard LOR
Groundwater – GME 20 October 2022		
7 on-site wells (MW02-MW04, GW201b, GW7003b, GW8001b, GW8002b)	7	4 x PFAS – long suite 3 x PFAS – short suite (MW02-MW04) 3 x TRH[#2] / BTEXN[#3] 1 x TRH[#2] with silica gel cleanup 2 x major cations and anions
Groundwater – GME 28 March / 26 April 2023		
5 on-site wells (MW01, MW03, GW201b, GW8001b, GW8002b) 3 off-site wells (MW05, MW07, EPA_GW07)	8	7 x PFAS – long suite 1 x PFAS – short suite (GW8002b) 2 x TRH[#2] / BTEXN[#3] 1 x TRH[#2] silica gel cleanup 2 x metals (As, Cd, Cr, Cu, Pb, Hg, Ni, Zn) 3 x major cations and anions 2 x total dissolved solids
Quality control samples	**QA/QC samples analysed**	**Analysis schedule**
Intra-laboratory duplicates	3 x soil	3 x PFAS – short suite
	3 x water	3 x PFAS – long suite 2 x TRH[#2] / BTEXN[#3] 2 x TRH[#2] silica gel cleanup 1 x major cations and anions
Inter-laboratory duplicates	3 x soil	3 x PFAS – short suite
	2 x water	2 x PFAS – long suite 1 x TRH[#2] / BTEXN[#3] 1 x major cations and anions
Field blanks	4	3 x PFAS – short suite 1 x PFAS – long suite
Rinsate blanks	5	4 x PFAS – short suite 1 x PFAS – long suite

Notes: [#1] Not analaysed
[#2] TRH – total recoverable hydrocarbons
[#2] BTEXN – benzene, toluene, ethylbenzene, xylenes, and naphthalene

4.3 Departures from the SAQP

The investigation rationale, methodology and scope were in accordance with the SAQP (GHD 2022c) with the following exceptions:

– Soil sampling location BH06 was located in a garden bed so that concrete coring and sampling was not required.
– The bitumen surface was not sampled at soil sampling location BH12 due to a lack of sample return.
– With the exception of initial sampling of the existing wells using “no-purge” methods, groundwater samples were collected using low-flow sampling methodology in accordance with SA EPA guidelines (SA EPA 2019b). Due to the clay lithology some of the new groundwater monitoring wells had very low yields and could not be purged without draw down of SWL into the screened interval. In these cases, groundwater samples were collected as grab samples after the well had recharged to above the screen and without stabilisation of field parameters.
– The results of the GME in October 2020 confirmed the presence of PFAS impacts in the first Quaternary aquifer near the down hydraulic gradient site boundaries and therefore the need to determine the off-site extent of the impacts. The six existing off-site groundwater monitoring wells listed in the SAQP (GHD 2022c) had either been backfilled or could not be accessed for sampling. In lieu of these six wells, two new off-site groundwater monitoring wells were installed. The two new off-site monitoring wells and one existing off-site monitoring well, which was accessible, were sampled in a second GME as summarised in Table 4.3 and shown in Figure 5 (attached).

Table 4.3 Revised off-site groundwater sampling locations

Well ID (DEW well ID)	Status	Location description	Rationale
EPA_GW07 (6628-31512)	Existing Q1 aquifer	1095 South Rd, Melrose Pk (access off Bennet Ave) Approximately 310 m north of site	Replace GW6003B (6628-31161) Confirm presence of down hydraulic gradient off-site PFAS impacts and determine if PFAS originated from MFS site (via long suite analysis for “fingerprinting”).
MW05 (6628-32336)	New Q1 aquifer	4 Wingfield St, Clovelly Park Approximately 125 m west of site	Replace BH7024b (6628-31076) and BH2025b (6628-31075) Determine extent of down hydraulic gradient off-site PFAS impacts and assess if PFAS originated from MFS site (via long suite analysis for “fingerprinting”).
MW07 (6628-32335)	New Q1 aquifer	14 Konando Tce corner Lagunta Ave, Edwardstown Approximately 370 m north-west of site	Replace 6628-28303, 6628-20804, GWEX01 / GW6002 Determine extent of down hydraulic gradient off-site PFAS impacts and assess if PFAS originated from MFS site (via long suite analysis for “fingerprinting”).

– The results of the GME in 2020/2021 (refer Section 5.2) identified the presence of PFAS impacts in the Q1, Q2 and T1 aquifers. Considering the thickness of the clay units between Q2 and the T1 (T2D 2021) and differences in hydraulic head, the presence of PFAS in the T1 aquifer required further investigation to determine the source. Additional works included the following:
    - Resampling the monitoring wells using the same sampling technique (no-flow) to confirm results.
    - Redeveloping GW001b using a surge block and purge method to remove any residual drilling muds that may be present within the well annulus.
    - Resampling using low-flow sampling technique (Waterra) and collection of field parameters.
– The analytical program was extended for selected on-site groundwater samples to include total recoverable hydrocarbons (TRH), the aromatic hydrocarbons benzene, toluene, ethylbenzene, xylenes and naphthalene (BTEXN), major cations, major anions and total dissolved solids in addition to PFAS. The additional analytes were included in the scope for comparison due to the presence of petroleum hydrocarbon impacts in previous sampling events (T2D 2021) and to assess the hydrochemistry of the groundwater from each aquifer to determine the possibility of either hydraulic connection or isolation.

5. Results

5.1 Soil, concrete and bitumen

5.1.1 Field observations

The on-site lithology encountered during drilling of on-site 11 soil bores (BH05-BH15) and four on-site groundwater wells (MW01-MW04) is summarised in Table 5.1. Copies of the field notes are provided in Appendix D, the soil borehole logs are presented in Appendix E and site photographs are shown in Appendix F.

Table 5.1 Summary of lithology encountered on-site

Soil Type	Depth Range (m bgl)	Description
Hardstand/surface	0 – 0.15 / 0 – 0.04 / 0 – 0.1	Concrete / bitumen / grassmat
Fill	0.1 – 0.6	Gravelly SAND; pale brown, grey-brown, Medium to coarse No odour, no staining
Natural Unit 1	0.6 – 1.2	CLAY; brown to mottled orange-brown medium plasticity, slightly moist, firm. No odour, no staining
Natural Unit 2	1.2 – 2.6	CLAY; dark brown to red-brown medium to high plasticity, slightly moist, stiff No odour, no staining

5.1.2 Concrete and bitumen analytical results

Tabulated analytical results for three concrete and two bitumen samples are provided in Table 1 (attached). Copies of the laboratory certificates are provided in Appendix G. The sampling locations are shown in Figure 3 (attached). As discussed in Section 3.1, there are no available guidelines appropriate for assessing contamination in concrete or bitumen samples for potential human health or ecological risks. All samples identified PFAS impacts with totals ranging from 0.11 to 0.0024 mg/kg. PFOS were generally the highest concentrations identified and 6:2 FTS was identified in 3 out of 5 samples.

5.1.3 Soil analytical results

Tabulated soil analytical results are provided in Table 2 (attached). Copies of the laboratory certificates are provided in Appendix G. Soil sampling locations are presented in Figure 3 (attached). Soil samples that exceeded the adopted assessment criteria are summarised in Table 5.2 and shown in Figure 6 (attached).

Table 5.2 Soil exceedances of adopted assessment criteria

Analyte	Location	Sample depths reporting exceedances (m bgl)	Criteria exceeded	Sample concentration range (mg/kg)
PFOS	BH14	0.2 – 0.4 1.1 – 1.2	PFAS NEMP 2.0 2020 Residential (HIL B) (2.0 mg/kg)	4.1 3.4
PFOS	BH14	0.2 – 0.4 1.1 – 1.2	PFAS NEMP 2.0 2020 Ecological direct exposure (1.0 mg/kg)	4.1 3.4
	BH05	0.3 – 0.5	PFAS NEMP 2.0 2020 Ecological indirect exposure (0.14 mg/kg)	0.61
	BH09	0.1 – 0.3		0.17
	BH10	0.0 – 0.1 0.3 – 0.5		0.15 – 0.16
	BH11	0.2 – 0.4		0.30

Analyte	Location	Sample depths reporting exceedances (m bgl)	Criteria exceeded	Sample concentration range (mg/kg)
	BH12	0.5 – 0.6	PFAS NEMP 2.0 2020 Ecological indirect exposure (0.14 mg/kg)	0.82
	BH14	0.0 – 0.1 0.2 – 0.4 1.1 – 1.2		0.61 – 4.1
	MW01	0.1 – 0.3		0.60
	MW02	0.3 – 0.5 1.0 – 1.2		0.15 – 0.78
	MW04	0.0 – 0.1 0.3 – 0.5		0.19 – 0.45

5.2 Groundwater

5.2.1 Monitoring well installation details

Four on-site groundwater monitoring wells were installed on 06 and 07 October 2022 and two off-site groundwater monitoring wells were installed on 15 March 2023 following the methodology provided in Section 4. The well construction details are provided in Table 3 (attached) and summarised in Table 5.3. The monitoring well locations are shown in Figure 4 and Figure 5 (attached). The corresponding DEW well construction permits and borehole logs are provided in Appendix H and Appendix E, respectively. The six new monitoring wells and four existing on-site wells were surveyed by a licenced surveyor. The well survey report is provided in Appendix I.

Table 5.3 Monitoring well installation details

Well ID	Easting (MGA20 Z54)	Northing (MGA20 Z54)	Ground level (m AHD)	Top of casing (m AHD)	Well depth (m bgl)	Screen interval (m bgl)	Location	Aquifer
GW201b [#1]	278700.338	6124961.159	31.530	31.469	17.0	11.0–15.0	On-site	Q2
GW7003 [#1]	278690.367	6124914.632	31.544	31.436	6.0	3.0 – 6.0	On-site	Q1
GW8001b [#1]	278706.958	6124952.792	31.783	31.708	38.5	36.5–38.5	On-site	T1
GW8002b [#1]	278701.151	6124952.805	31.621	31.534	6.0	5.0 – 6.0	On-site	Q1
MW01	278750.396	6124923.553	31.858	31.787	4.0	1.0 – 4.0	On-site	Q1
MW02	278728.359	6124974.907	32.194	32.071	5.0	2.0 – 5.0	On-site	Q1
MW03	278705.145	6124972.395	31.676	31.597	4.0	1.0 – 4.0	On-site	Q1
MW04	278688.686	6124963.288	31.352	31.218	4.0	1.0 – 4.0	On-site	Q1
MW05	278558.742	6124973.732	30.267	30.162	4.7	1.7 – 4.7	Off-site	Q1
MW07	278431.973	6125245.162	28.437	28.313	5.5	2.5 – 5.5	Off-site	Q1
EPA_GW07 [#2]	278684.616	6125284.313	30.555	30.438	6.0	3.0 – 6.0	Off-site	Q1

Notes: [#1] T2D Geoventure 2021
[#2] Senversa 2023

5.2.2 Field observations

Well development

Newly installed monitoring wells were developed using the methodology outlined in Section 4. Existing monitoring well GW8001b was redeveloped after first being sampled to confirm the results obtained during the initial sampling in 2020/2021 (T2D 2021).

Redeveloping GW8001b using a Waterra pump and surge block was undertaken by GHD on the 15 March 2023. Development records are provided in Appendix D. The surge block was placed at the bottom of the monitoring well

initially and its depth alternated periodically within the screen interval to achieve agitation of water across the entire well screen and annulus to remove any residual drilling muds. The well was developed over approximately three hours with a total of approximately 111 litres of water removed. The pH of the purged water was noted as 11.14 at the beginning of the development process and 7.91 at the end. Other parameters (turbidity, temperature, conductivity, TDS etc.) remained relatively constant throughout the development process. The change in pH during the first half of the well development followed by stabilisation at a level more expected of groundwater suggests that the monitoring well was appropriately developed.

Groundwater Gauging

The groundwater monitoring wells were gauged prior to sampling during the GMEs on 20 October 2022, 28 March 2023 and 26 April 2023. The gauging results are summarised in Table 5.4. Current and historical gauging results are provided in Table 4 (attached). The field gauging data are provided in Appendix D and the calibration certificates are provided in Appendix J.

Table 5.4 Summary of groundwater gauging results

Aquifer	Date	Depth to groundwater (m bgl)		Groundwater elevation (m AHD)	
		Minimum (well)	Maximum (well)	Minimum (well)	Maximum (well)
Q1	20/10/2022	1.743 (GW7003)	2.673 (MW02)	29.268 (MW04)	29.784 (GW8002b)
	28/03/2023	2.265 (MW05)	3.108 (MW02)	28.002 (MW05)	29.305 (MW01)
	26/04/2023	2.325 (MW07)	2.747 (EPA_GW07)	26.112 (MW07)	29.315 (MW01)
Q2	05/10/2022 [#1]	2.081 (GW201b)		29.449 (GW201b)	
	20/10/2022	2.171 (GW201b)		29.359 (GW201b)	
	28/03/2023	2.638 (GW201b)		28.892 (GW201b)	
T1	05/10/2022 [#1]	17.121 (GW8001b)		14.662 (GW8001b)	
	20/10/2022	17.375 (GW8001b)		14.408 (GW8001b)	
	28/03/2023	24.867 (GW8001b)		6.916 (GW8001b)	
	26/4/2023	24.172 (GW8001b)		7.536 (GW8001b)	

Notes: [#1] Department of Infrastructure and Transport data logger in well

The groundwater flow direction in the Q1 was inferred to be in a north-westerly direction. The site-specific hydrogeology for October 2022 and March 2023 is summarised in Table 2.6. Groundwater contour maps showing the interpreted groundwater contours and the inferred groundwater flow direction for October 2022 and March 2023 are presented in Figure 7 and Figure 8, respectively (attached).

SWLs in T1 (as measured in GW8001b) dropped by approximately 7m between October 2022 and March 2023 sampling events. It is likely this was caused artificially i.e. through abstraction of groundwater in the local vicinity. Potential sources of this abstraction are local industrial and/or irrigation uses. As noted in Section 2.6.1, the T1 aquifer is used extensively for irrigation and significant seasonal fluctuations occur as a result. It is noted that the drop in groundwater levels was identified in March (after summer) and further gaging is required to confirm whether this is related to seasonal pumping (irrigation) vs abstraction for an industrial purpose which is more likely to be a consistent drawdown.

Water quality parameters

Groundwater quality field parameters as measured and recorded during the GMEs are summarised in Table 5.5. Current and historical groundwater field parameters and observations are presented in Table 5 (attached). The field record sheets are provided in Appendix D.

In October 2022, groundwater samples were collected using no-purge samplers to confirm previous results using the same method. The volume of water required for sampling resulted in insufficient water to collect field parameters. In-situ reads were not attempted due to limitation of the equipment.

Table 5.5 Summary of groundwater quality field parameters

Parameter	Aquifer	Date	Range (minimum – maximum)	Comments
pH	Q1	Oct 2022 Mar/Apr 2023	7.33 (MW03) – 7.57 (GW8002b) 6.93 (EPA_GW07) – 7.84 (MW03)	Neutral to slightly alkaline Neutral to slightly alkaline
	Q2	March 2023	8.19 (GW201b)	Slightly alkaline
	T1	April 2023	8.27 (GW8001b)	Slightly alkaline
EC (µS/cm)	Q1	Oct 2022 Mar/Apr 2023	1,036 (GW8002b) – 10,029 (MW03) 4,693 (MW07) – 7,903 (MW03)	Fresh to saline Brackish to saline
	Q2	March 2023	3,553 (GW201b)	Fresh to brackish
	T1	April 2023	1,774 (GW8001b)	Fresh to brackish
DO (mg/L)	Q1	Oct 2022 Mar/Apr 2023	0.50 (MW02) – 2.60 (MW03) 0.97 (MW01) – 3.91 (MW03)	Low Low to moderate
	Q2	March 2023	6.05 (GW201b)	Moderate to high
	T1	April 2023	0.71 (GW8001b)	Low
Redox potential (mV)	Q1	Oct 2022 Mar/Apr 2023	215 (GW8002b) – 231 (MW03, MW04) 85 (GW8002b) – 310 (MW07)	Oxidising conditions Oxidising conditions
	Q2	March 2023	20 (GW201b)	Slightly oxidising
	T1	April 2023	-8 (GW8001b)	Slightly reducing
TDS (mg/L)	Q1	Oct 2022 Mar/Apr 2023	673 (GW8002b) – 6,519 (MW03) 3,325 (GW8002b) – 5,137 (MW03)	Fresh to saline Brackish to saline
	Q2	March 2023	2,309 (GW201b)	Fresh to brackish
	T1	April 2023	1,153 (GW8001b)	Fresh to brackish
Tempera-ture (°C)	Q1	Oct 2022 Mar/Apr 2023	18.9 (MW04) – 23.1 (MW02) 19.8 (GW8002b) – 28.8[#3] (MW03)	Normal to high for spring Normal to high for autumn
	Q2	March 2023	20.0 (GW201b)	Normal for autumn
	T1	April 2023	28.5[#3] (GW8001b)	High for autumn

Notes: [#1] Redox potential relative to the standard hydrogen electrode (SHE). Redox potential (SHE) = field redox potential (Ag/AgCl electrode with saturated KCl solution) + 204 mV

[#2] TDS values were calculated by multiplying the electrical conductivity values with a conversion factor of 0.65

[#3] Likely instrument error

Purged groundwater from the Q1 aquifer had predominantly low to moderate turbidity and low sediment load, while the colour varied from clear, pale yellow, orange to grey/brown with no sheen and no odour.

Purged groundwater from the Q2 aquifer was clear with low turbidity, low sediment load, no sheen and a slight sulfuric odour.

Purged groundwater from the T1 aquifer was yellow/grey with medium turbidity and medium sediment load. During purging some sheen and hydrogen sulfide odour was observed as well as the presence of PVC shavings. The odour dissipated during sampling and the sheen and PVC shavings were absent from the collected sample.

5.2.3 Groundwater analytical results

Analytical results for groundwater are provided as Table 6 (attached). Historical results are provided in Table 7 (attached). Laboratory reports are provided in Appendix G. Groundwater samples that exceeded the adopted assessment criteria are summarised in Table 5.6 and shown in Figure 9 and Figure 10 (attached).

Table 5.6 Groundwater exceedances of adopted assessment criteria

Analyte	Concentration range (µg/L)	Health Drinking Water [1]	Wells exceeding Drinking Water	NHMRC 2008 / ADWG 2011 Recreational[3]	Wells exceeding Recreational
Q1					
Perfluorohexane sulfonic acid (PFHxS)	**0.028 – 240**	**0.07**	**GW7003b, GW8002b, MW01, MW02, MW03, MW04, MW05, MW07, EPA_GW07**	**0.7**	**GW7003b, GW8002b, MW01, MW02, MW03, MW04, MW05**
Perfluorooctane sulfonic acid (PFOS)	**0.06 – 122**	**0.07**	**GW7003b, GW8002b, MW01, MW02, MW03, MW04, MW05, EPA_GW07**	**0.7**	**GW7003b, GW8002b, MW01, MW02, MW03, MW04, MW05**
Perfluorooctanoic acid (PFOA)	**<0.01 – 14**	**0.56**	**GW8002b, MW01, MW02, MW03, MW04**	**5.6**	**MW01, MW03**
Sum of PFHxS and PFOS	**0.14 – 260**	**0.07**	**GW7003b, GW8002b, MW01, MW02, MW03, MW04, MW05, MW07, EPA_GW07**	**0.7**	**GW7003b, GW8002b, MW01, MW02, MW03, MW04, MW05**
Arsenic	**0.023**	**0.01**	**MW01**	**0.1**	**-**
Q2					
PFHxS	**0.446 – 0.604**	**0.07**	**GW201b**	**0.7**	**-**
PFOS	**0.002-2.87**	**0.07**		**0.7**	**-**
Sum of PFHxS and PFOS	**0.659 – 1.02**	**0.07**		**0.7**	**-**
T1					
PFHxS	**0.028 – 0.55**	**0.07**	**GW8001b [4]**	**0.7**	**-**
PFOS	**0.035 – 0.31**	**0.07**		**0.7**	**-**
Sum of PFHxS and PFOS	**0.061 – 0.86**	**0.07**		**0.7**	**GW8001b [4]**
Arsenic	**0.065**	**0.01**	**GW8001b**	**0.1**	**-**
Lead	**0.115**	**0.01**	**GW8001b**	**0.1**	**GW8001b**
Nickel	**0.043**	**0.02**	**GW8001b**	**0.2**	**-**

Notes:

[1] Health Drinking Water – PFAS NEMP 2.0 2020 and ADWG 2011 Health (v3.7 updated 2022
[3] Recreational (10x drinking water guideline values) for domestic settings (e.g. private residential bores) only. NHMRC 2008 and PFAS NEMP 2.0 2020 / ADWG 2011 Recreational (v3.7 updated 2022)
[4] T1 well GW8001b exceeded PFAS criteria in October 2022 but not after re-development in April 2023.
NA indicates no guideline value for this analyte

5.2.4 Section 83A notification

The reported concentrations of PFAS in the on-site groundwater bores sampled in October 2022 were considered to constitute harm to groundwater and a Section 83A notification form was submitted in accordance with the South Australian Environment Protection Act 1993 (Gov SA 1993) to the SA Environment Protection Authority via email

on 12 December 2022 for five Q1 on-site groundwater monitoring wells (MW02, MW03, MW04, GW7003b and GW8002b), one Q2 well (GW201b) and one T1 well (GW8001b).

In March/April 2023, PFAS concentrations reported for the off-site groundwater monitoring wells were considered to constitute harm to groundwater and a Section 83A notification was submitted via email on 27 April 2023 to the SA EPA in accordance with the SA EP Act for off-site Q1 well MW05.

Copies of the Section 83A notification forms are provided in Appendix B.

6. Quality assurance and quality control

A detailed Quality Assurance and Quality Control (QA/QC) assessment was completed for the analytical sample data, in order to determine whether it is of suitable quality on which to base the site assessment. Field quality control was assessed by collecting and analysing inter- and intra-laboratory duplicates, rinsate blank, and trip blank samples. The assessment of these field quality control samples is discussed in Appendix K.

Calibration certificates for field equipment used are provided in Appendix J.

Laboratory quality control and quality assurance was assessed by reviewing the laboratory provided quality assessment reports.

The QA/QC assessment found that the majority of GHD QA/QC Data Quality Indicators (DQIs) were within the specified requirements. The data are, therefore considered to be valid and of sufficient quality to rely on for the purpose and objectives of this assessment. A copy of the detailed QA/QC report is provided in Appendix K.

7. Discussion

7.1 Concrete and Bitumen

The conceptual site model (CSM) in the SAQP (GHD 2022c) identified that there was insufficient information to understand the nature and extent of PFAS impacts in concrete and bitumen surfaces at the site. As discussed in Section 3.1, there are no available guidelines appropriate for assessing contamination in concrete or bitumen samples for potential human health or ecological risks. Any risk associated with exposure to these materials would be significantly less than exposure to contaminated soils due to the reduced potential for ingestion and inhalation and dermal contact (less surface area). PFAS impacted concrete and bitumen can however act as an ongoing secondary source via leaching to the environment. Given the soils have also been assessed, it is more appropriate to use this data to determine potential human health and ecological risks via ingestion, inhalation or dermal contact from PFAS absorbed onto solid media. PFAS were detected in all three concrete core samples collected during the investigation.

7.2 Soil

The conceptual site model in the SAQP (GHD 2022c) identified that there was insufficient information to understand the nature and extent of PFAS impacts in soil at the site. The potentially complete source-pathway-receptor (SPR) linkages identified for on-site soils included:

- MFS workers, site visitors or maintenance and construction workers coming into direct contact with impacted soil or dust.
- Ecosystems at and immediately surrounding the site via direct contact with or ingestions of contaminated soil, or via bioaccumulation through indirect contact.
- Soil impacts leaching and impacting groundwater, with potential implications for off-site users of extracted groundwater.

7.2.1 Nature and extent of PFAS impacts in soil

PFAS were detected at all 15 soil sampling locations, with 14 out of 31 reported PFOS concentrations exceeding the adopted PFAS NEMP 2.0 2020 ecological criterion for indirect exposure. The highest concentrations with two samples exceeding the adopted ecological criteria for direct exposure were reported for borehole BH14, located on the grassed training area in the north-western part of the site, at depths between 0.2 m bgl and 1.2 m bgl. However, there was no apparent correlation between the borehole locations and the reported total PFAS concentrations. Elevated PFAS concentrations were encountered under the concrete slab near the southern site boundary (locations BH05 and MW01), under bitumen near the north-eastern site corner (location BH12) and in the garden beds near the northern (location MW02) and western (location MW04) site boundaries. The presence of PFAS in soils across the site is consistent with widespread historical use of PFAS containing AFFF at the site.

There was no clear trend for the vertical distribution of PFAS in soil. At many locations (e.g. BH09, BH12, BH14 and MW02) total PFAS concentrations increased from the surface to depths between 0.2 m bgl and 0.6 m bgl before decreasing again at greater depths. However, at some locations the highest total PFAS concentrations were reported near the surface (e.g. BH06, BH10, BH13 and MW03).

PFHxS concentrations were found to increase with depth relative to the PFOS concentrations. In samples from depths greater than 0.9 m bgl PFHxS contributed on average 69% to the sum of PFHxS and PFOS concentration, while PFHxS only contributed on average 5% for samples between the surface and 0.9 m bgl.

All reported PFAS concentrations were below the adopted PFAS NEMP 2.0 2020 health investigation levels for industrial / commercial land use.

7.2.2 Assessment of potential human health risk

An exceedance of human health criteria for a residential setting with minimal soil access (HIL-B) was identified at location BH14 at a depth of 0.2 to 0.4 (4.1 mg/kg) and again at 1.1 to 1.2 (3.4 mg/kg) meters for PFOS. Residential B guidelines have also been adopted at MFS sites in agreement with the United Fire Fighters Union of South Australia as a more conservative “trigger” for further engagement and do not necessarily represent a human health risk. In this instance the sample is 0.2 m below ground surface, with the surface sample above being below HIL-B criteria. The exceedances are also significantly below the commercial/industrial criteria that are appropriate for the sites land use under the NEPM.

Given that approximately two thirds of the area not covered by the station building are sealed with either bitumen or concrete MFS workers and site visitors are expected to have little to no direct contact with on-site soils. As the site has been adequately assessed in terms of potential source areas and areas of exposed soil, and all reported PFAS concentrations were below the HIL D (commercial industrial) with the exception of one location detailed above, the potential risk to human health at the site due to PFAS impacted soils is considered low and acceptable.

7.2.3 Assessment of potential ecological risk

Given the site is located in along a major arterial road in an intensively developed business/industrial district, which is considered a highly disturbed system and of low ecological value. About two thirds of the surface area of the site are sealed and there are only a few larger trees along the western and southern site boundaries with some smaller ornamental shrubs along the northern and eastern site boundaries. The nearest parks or reserves are located approximately 340 m to the west and approximately 495 m to the south-east, while a cemetery is located approximately 200 m to the south. Overall, it is considered unlikely that significant ecological receptors other than common birds, rodents and insects would be present at the site and in the surrounding area. Under the present conditions with the site being used as a fire station, the risk posed by PFAS contamination in on-site soils to ecological receptors is considered low and acceptable. Given the site's low ecological value, the CCME criteria of 0.14 mg/kg was adopted and while exceedances were identified, the criteria is for protection of more sensitive ecological receptors (surface water or adjacent high value ecological areas) via migration which are not considered relevant for the site.

7.3 Groundwater

The conceptual site model in the SAQP (GHD 2022c) identified that the nature and extent of PFAS contamination in groundwater beneath and down hydraulic gradient of the site has not been determined. The potentially complete source-pathway-receptor (SPR) linkages identified for groundwater included:

– People living and/or working in the area down hydraulic gradient of the site using extracted groundwater for domestic purposes including recreation and/or drinking.
– People living down hydraulic gradient of the site using extracted groundwater for the irrigation of vegetable gardens and/or fruit trees to grow produce for consumption.

The implications of the groundwater dataset collected during this investigation for these SPR linkages are discussed below.

7.3.1 Groundwater levels

Groundwater was encountered during drilling within a moist clay, gravelly clay, or sandy clay layer between 2.4 and 3.9 m bgl for the newly installed groundwater monitoring wells (MW02 – MW05 and MW07). On-site standing water levels measured for the Q1 aquifer ranged between 1.7 m bgl and 2.7 m bgl in October 2022, and between 2.4 m bgl and 3.1 m bgl in March 2023, while the off-site SWL ranged from 2.3 m bgl to 2.7 m bgl in March/April 2023. The Q1 aquifer is considered to be semi-confined by a layer of clay overlying the gravelly/sandy clay aquifer.

Based on the observed groundwater elevations, groundwater flow of the Q1 aquifer was inferred to be in a north-westerly direction towards the coast of St Vincent Gulf. This is consistent with the topography of the area and the groundwater flow direction reported previously for the surrounding area (T2D 2021, Senversa 2023).

The SWL in the on-site Q1 wells decreased by 0.5-0.9 m between spring (October 2022) and autumn (March 2023). This observation is consistent with seasonal fluctuations between wetter winter periods and drier summer periods in the Adelaide Plains with groundwater fluctuations generally less than one metre.

The SWL in the on-site Q2 well GW201b, ranging from 2.1 m bgl in October 2022 to 2.7 m bgl in March 2023, were comparable to those in the Q1 aquifer however approximately 0.5 m of hydraulic head difference was noted indicating a small downwards hydraulic gradient which is consistent with Senversa 2023.A review of the well construction details showed that the Q2 well (similar to the T1 well) was installed using mud rotary drilling methodology from surface (T2D 2021).

The SWL in the on-site T1 well GW8001b decreased by 7.5 m from 17.4 m bgl in October 2022 to 24.8 m bgl in March 2023. Fluctuations of this magnitude are likely due to extraction from the T1 for industrial or irrigation purposes. The Water Connect data base (DEW 2022) lists 46 registered T1 wells within a 2 km radius of the site, of which 13 wells have been backfilled while 11 wells are listed as operational. Down hydraulic gradient of the site, one operational T1 well (6628-7965) located approximately 240 m to the north-west of the site is registered for domestic purposes and three operational T1 wells (6628-12678, 6628-13175 and 6628-15138) located approximately 470-500 m to the north-west of the site are registered for industrial purposes (DEW 2022). The recorded yields for these four wells range from 4.38 L/s to 18.95 L/s. Groundwater extraction from these wells could explain the high fluctuation of standing water levels observed in the on-site T1 well GW8001b although more monitoring is required to determine if this is seasonal in nature (irrigation) vs a more permanent year-round drawdown.

7.3.2 Nature and extent of PFAS impacts in groundwater

First Quaternary aquifer

PFAS was detected in all monitoring wells on-site. Concentrations in on-site wells exceeded the adopted human health assessment criteria for recreational water and drinking water for PFHxS, PFOS and the sum of PFHxS and PFOS. It is noted however, that groundwater is not extracted on-site for potable or recreational purposes.

PFAS was also detected in off-site Q1 monitoring wells located down hydraulic gradient of the site, where concentrations were reported up to 3.44 µg/L at MW05. The PFAS concentrations in MW05, located approximately 125 m west of the site, were above the adopted recreational water and drinking water criteria for PFHxS, PFOS and the sum of both. In well MW07, which is located further down hydraulic gradient, approximately 370 m to the north-west of the site, the PFAS concentrations were an order of magnitude lower, but the PFHxS and the sum of PFHxS and PFOS concentrations still exceeded the adopted criteria for drinking water.

The highest on-site total PFAS concentrations were observed in Q1 monitoring well MW01 (332 µg/L), located up hydraulic gradient and near the former AFFF storage shed in the south-eastern corner of the site. Q1 well MW03 located at the northern site boundary also had elevated PFAS (280 µg/L). MW03 is located down hydraulic gradient of soil bore BH14, which had the highest reported PFAS concentrations in soil. Total PFAS concentrations above 100 µg/L were also reported for on-site wells GW8002b and MW04, which are located down hydraulic gradient of where training with AFFF historically occurred.

Based on the available hydrological data (this investigation and Senversa 2023), off-site well EPA_GW07 is located cross gradient from the site, so that the PFAS concentrations above the adopted drinking water criteria observed in this well are unlikely to have originated from the St Marys Fire Station. This is supported by the fact that samples collected from well EPA_GW07 between 2021 and 2023 had a different ratio of perfluoropentanoic acid (PFPeA) to perfluorohexanoic acid (PFHxA) than samples collected from the on-site well and off-site wells located down hydraulic gradient of the site. The former had similar concentrations of PFPeA and PFHxA or slightly more PFPeA than PFHxA while the latter had a least twice as much PFHxA than PFPeA.

A review of the available historical data showed some temporal variability of the PFAS concentrations in the on-site Q1 wells. The sum of PFHxS and PFOS concentrations reported for on-site well GW8002b almost doubled from 45 µg/L in December 2020 to 86 µg/L in October 2023, while the concentrations observed in on-site well GW7003b only increased by about 24% from 2.59 µg/L to 3.2 µg/L. Between October 2022 and March / April 2023, the sum of PFHxS and PFOS concentrations decreased between 14% (GW8002b) and 72% (MW03). It remains unclear if this was due to the change from no-flow sampling to low-flow sampling or the lower SWL in autumn. In contrast to the on-site wells, the cross-gradient off-site well EPA_GW07 has reported basically constant

concentrations of 0.2 µg/L for the sum of PFHxS and PFOS over four consecutive monitoring rounds between September 2021 and April 2023.

PFOS was the principal PFAS compound in the first generation of AFFF, while 6:2 FTS replaced PFOS in the second generation of AFFF. The composition of the groundwater beneath the site indicates historical use of first and second generation AFFF. The highest 6:2 FTS concentrations were observed in the Q1 wells GW8002b and MW04.

It is not possible to determine if the high PFAS concentrations reported for on-site well MW01 were caused by historical on-site activities or by an off-site source located up hydraulic gradient. Due to the extremely low yield of the clay lithology, the well took several months to make water and could not be properly developed before collection of a grab sample in April 2023. Therefore, the analytical results for MW01 should be confirmed.

Overall, the results indicate that impacted on-site soils has leached into the Q1 aquifer beneath the site and are migrating off-site in a down hydraulic gradient direction (NW). The lateral extent of PFAS impacts in the Q1 aquifer has not been delineated laterally or vertically.

Second Quaternary aquifer

From January 2021 to October 2022 PFAS concentrations in the on-site Q2 monitoring well GW201b exceeded the adopted human health assessment criteria for recreational water and drinking water. The reported concentrations for the sum of PFHxS and PFOS in GW201b followed a similar trend as those in the Q1 aquifer but were at least 60% lower. The sum of PFHxS and PFOS concentrations increased by approximately 20% from 0.82 µg/L in January 2021 to 1.02 µg/L in October 2022 before it decreased by approximately 35% to 0.659 µg/L, i.e. to below the health recreational assessment criteria, in March 2023. The PFOS concentrations decreased by 49% but remained above the assessment criteria for drinking water.

A review of the well construction details and the borehole logs (T2D 2021) and the findings noted below for the T1 aquifer monitoring well (GW8001b) suggest that the presence of PFAS impacts identified in monitoring well GW201b may also require confirmation through redevelopment and sampling or installation of another Q2 well using a different drilling methodology (e.g. sonic with pre-collar).

First Tertiary aquifer

The presence of PFAS in the T1 aquifer well GW8001b above health drinking water criteria was identified in December 2020 (T2D 2021). A GME conducted in October 2022 using the same sampling technology, i.e. no-flow sleeve samplers, found that total PFAS concentrations in GW8001b had increased by a factor of three, to 2.2 µg/L, which was higher than the total PFAS concentration of 1.58 µg/L in the Q2 well GW201b µg/L reported at the same time. The samples collected in October 2022 from GW8001b and GW201b identified the same suite of PFAS species with the same order of magnitude concentrations, with the exception of the PFOS pre-cursor 6:2 fluorotelomer sulfonate (6:2 FTS), which was more than one order of magnitude higher in GW8001b than in GW201b.

There are three possible explanations for the presence of PFAS in the T1 aquifer:

1. downward migration of contamination identified in the Q1 aquifer;
2. ambient non-point source contamination present on a regional scale in the T1; and
3. introduction of PFAS into the T1 aquifer during the installation of well GW8001b.

It is considered unlikely that PFAS migrated vertically from the surface under natural processes (i.e. gravity) into the T1 aquifer given the presence of close to 20 m of clay aquitard between the Quaternary aquifers and the T1. This aquitard presents a significant barrier to vertical migration. The following is also noted:

– The highest concentrations and mass of PFAS impacts have been identified in the Q1 aquifer, with comparatively minor concentrations identified in the underlying Q2 aquifer. This is consistent with the source being from surface dispersion of AFFF. A major component of PFAS migration via dispersion and dissolution would be horizontally in the Q1 aquifer in a downgradient direction (NW), rather than vertically. The existence of several meters of clay between the Q1 and Q2 and the hydraulic head in the Q2 suggests this aquifer is also confined, or semi-confined and under pressure resulting in a very limited downward hydraulic gradient (approximately 0.5 m). The T1 aquifer is also confined with a significant overlying aquitard, presented by 15 to

20 metres of clay. The upward hydraulic gradient within the T1presents a further limiting factor to potential downward migration of impacts.

– Fractures or preferential flow paths are unlikely to propagate through overlying aquifers and down 30+m to the T1.
– The catchment for the T1 is the Adelaide Hills and significant contamination would have to present in this area to cause regional scale “ambient” PFAS contamination. Other sources nearby would have to overcome similar hydraulic barriers as those note on-site.
– Assuming that PFAS containing AFFF was first used at the site in 1970 and that no preferential vertical flow paths exist beneath the site, PFAS migrating from the surface with a mean vertical hydraulic conductivity of 0.11 m/year (Bresciani et al. 2015) would have reached a depth of 6 m bgl.
– The soil data reported for GW8001b identified the presence of PFAS to a depth of 6.5 m bgl with no PFAS detected in the 6 additional soil samples collected between 6.5 m and 30 m bgl (T2D 2021).

The similarity of PFAS species present in the source zone, Q1, Q2 and T1 aquifers suggest the impacts are likely all sourced from the site. A regional or ambient non-point source might be expected to have less PFAS species present, particularly the precursor species such as 6:2 FTS, that can break down in the environment to short chain length species.

Based on the EPA study (EPA 2017b), the T1 aquifer is considered a confined aquifer with hydraulic heads generally higher than that in the Quaternary aquifers. Although the hydraulic heads identified on-site are below the Q1 and Q2 aquifers, the T1 is still confined and under pressure based on the clay aquitard present, depth of water strike/screened interval and the observed water levels.

The aquitard barrier could be overcome somewhat by breaching. This could be achieved through tectonic processes such as faulting (although the area is considered tectonically quiescent), desiccation cracking (although the aquitard is too deep to be affected by drying) or artificially through drilling.

The rotary mud drilling method used for GW8001b, uses drilling mud (mixes of water, bentonite clays, polymers, and additives) as the circulation medium. As the bit penetrates the formation material, the drilling fluid circulates continuously and removes the cuttings. The mud fluid then flows upwards in the annular space around the drill pipe to the surface, carrying the cuttings with it in suspension. At the surface, the drilling fluid is conditioned before being recirculated down the hole (NUDLC 2020). Natural minerals, including bentonite clays used in mud rotary drilling have been demonstrated to effectively absorb PFAS through combined adsorption mechanisms due to the complexity of the mineral structures (Wang, Darling and Chen 2021).

GW8001b was sampled in December 2020 and March 2021 with both sampling events reporting detectable PFAS. Sampling sheets also noted a pH of 12.26 and conductivity of 5,666.1 µS/cm (3,682 mg/L TDS using 0.65 conversion) in December 2020 and a pH of 13.2 and conductivity of 5696 µS/cm (3702 mg/L TDS using 0.65 conversion) in March 2021. The development record provided in T2D 2021 for GW8001b, notes a pH of 11.89 and conductivity of 6798 µs/cm (4418 mg/L TDS using 0.65 conversion) on the 24 February 2021. The salinity recorded during the development and initial sampling of GW8001b are not consistent with the expected conditions of the T1 aquifer as outlined in Section 2.6 above and Gerges 2006. Furthermore, the pH is noted as being highly alkaline. Both of these observations suggest the possible presence of residual drilling muds and potentially cement grout in the well annulus, and potentially the localised T1 aquifer. Information regarding the composition and characteristics (pH and TDS) of the drilling mud used at GW8001b were not available, however, Bentonite clay drilling muds are typically used which require a pH above 8.5 to be effective and have additional products such as Soda Ash added to achieve this. Saline waters or chlorides are also often added to help stabilise clays.

Figure 7.1 below (NUDLC 2020) shows the drilling mud characteristics in an undeveloped well and surrounding aquifer. Well development, including agitation and extraction of fluids (purging) is required to remove the residual drilling fluids.

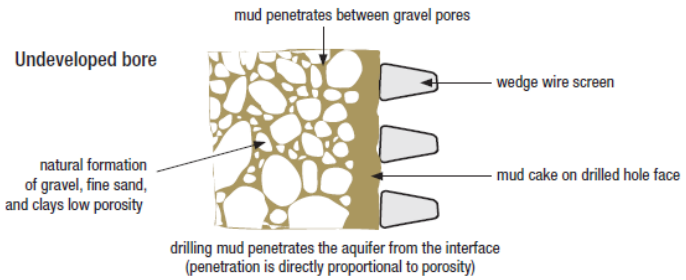

Figure 7.1 Drilling Mud Characteristics

Given the use of mud rotary drilling methods from surface with no casing installed across the upper aquifer initially to isolate any contamination prior to proceeding to deep aquifers, the likely recycling of drilling muds, the presence of significant concentrations of PFAS in the Q1 aquifer and the tendency of PFAS to absorb to bentonite clay particles which are present in drilling muds, it is considered likely that the drilling muds became contaminated by the Q1 aquifer and where recycled within the well annulus for the total well depth. This is further supported by the water parameters (pH) noted from GW8001b during initial development and sampling, described above and in Section 5.2.2. This hypothesis was tested by re-developing well GW8001b using a foot valve with surge block to agitate and remove as much residual drilling muds as possible before conducting a second GME in April 2023.

The April 2023 results showed that, in comparison to October 2022, the total PFAS concentration in well GW8001b decreased by 93% to 0.176 µg/L, with all PFAS concentrations below the adopted assessment criteria. At the same time the total PFAS concentrations in the Q1 well GW8002b and Q2 well GW201b decreased by 28% and 34%, respectively. Compared to March 2021, the pH in well GW8001b decreased from 13.2 to 8.3. These findings indicate that the water quality reported in 2020 and 2021 was not representative of local conditions in the T1 aquifer, but more likely due to the presence of residual PFAS contaminated drilling muds within the well annulus. It should be noted that this would not represent a significant or ongoing source of PFAS contamination in the T1 and can likely be remedied through further development of the well.

In April 2023, metal concentrations in T1 well GW8001b exceeded the Tier 1 assessment criteria for recreational water (lead) and drinking water (lead and nickel), while no metal exceedances were reported for on-site Q1 well MW01. In addition to metals, petroleum hydrocarbons were also detected in the GW8001b sample. The total recoverable hydrocarbon concentration reported for GW8001b following silica gel cleanup was 1,150 µg/L, while no hydrocarbons were detected in the Q2 well GW201b or the Q1 well GW8002b (after silica gel cleanup) in October 2022. All hydrocarbon concentrations were below the NEPM ASC Tier 1 assessment criteria. The source of the identified metals and hydrocarbons in the T1 aquifer are unknown and beyond the scope of this assessment.

Overall, the results indicate no hydraulic connectivity between the T1 and upper (Q1 and Q2) aquifers beneath the site.

7.3.3 Assessment of potential human health risk

All on-site Q1 wells reported exceedances of the adopted assessment criteria for health drinking water and recreational water. While off-site monitoring wells reported PFAS concentrations orders of magnitude lower than the on-site monitoring wells, the concentrations in the down hydraulic gradient off-site wells were still above the drinking water criteria and in one instance above the recreational water criteria as well (MW05).

Although it is considered unlikely that groundwater would currently be used for potable purposes due to the availability of a reticulated water supply and the salinity of the water, some domestic bores have been identified within a 2 km radius of the site and potable use cannot be ruled out. Similarly, the consumption of fruits and vegetables which utilise groundwater for irrigation / watering is considered possible, based on historical confirmed impacts to on-site biota (since removed).

Potentially impacted bores for domestic use located cross/down hydraulic gradient of the site are shown on Figure 5 (attached) and include:

– Well 6628-18490 located at 3 Finchley Street, Clovelly Park, approximately 190 m west of the site, installed into the Q2 aquifer to a depth of 24 m bgl with a reported TDS of 5,749 mg/L in February 1997.
– Well 6628-18543 located at 4A Finchley Street, Clovelly Park, approximately 250 m west of the site, installed into the Q2 aquifer to a depth of 24 m bgl in February 1997.
– Well 6628-7965 located at 1104-1106 South Rd, Edwardstown, approximately 240 m north-west of the site, installed into the T1 aquifer to a depth of 67 m bgl with a reported TDS of 849 mg/L in May 1979.

A significant GPA exists, down-hydraulic gradient of the site which prevents the abstraction of groundwater from the upper quaternary aquifers. The presence of the GPA presents an effective administrative control that prevents a linkage between source (MFS site), pathway (lateral migration in groundwater) and the receptor (abstraction of groundwater for drinking water and/or irrigation) within this area. The GPA however does not extend south of Daws Road so the first two monitoring wells identified above (6628-18490 and 6628-18543) fall outside of this area and their status, including potential use need to be confirmed. Well 6628-7965 is installed in the T1 aquifer which did not exceed the adopted criteria at the site.

Since the groundwater is shallow, with SWL as low as 1.7 m bgl, it is considered likely that trees growing on-site, and down hydraulic gradient of the site are taking up contaminated groundwater with their roots. It is possible that there may be an uptake of PFAS compounds into the biota. Biota sampling was not undertaken as part of the current investigation however samples collected in GHD 2019, included on-site fruit tree which identified PFAS exceeding the adopted criteria for consumption. While these trees were present within the source area and may have received runoff from the site as well as potential uptake of PFAS from impacted groundwater via their root systems, the potential for off-site fruit trees to contain PFAS cannot be ruled out.

7.3.4 Assessment of potential ecological risk

There are no surface water bodies located within 2.0 km of the site. Therefore, the exposure pathway for freshwater ecological receptors via discharge of contaminated groundwater to surface water bodies is considered incomplete and no ecological assessment criteria for PFAS in groundwater were adopted.

Since the groundwater is shallow, with SWL as low as 1.7 m bgl, it is considered likely that trees growing on-site, and down hydraulic gradient of the site are taking up contaminated groundwater with their roots. It is possible that there may be an uptake of PFAS compounds into the biota. Biota sampling was not undertaken as part of the current investigation however samples collected in GHD 2019, included on-site fruit tree which identified PFAS impacts. Given the sites location in a highly disturbed urban environment it is not considered of high ecological value and the presence of PFAS contamination in biota is not likely to present a significant ecological risk.

8. Conceptual site model

A conceptual site model (CSM) is a qualitative analysis tool which identifies the contamination sources, transport mechanisms, exposure pathways and receptors considered in a site-specific risk assessment. For an identifiable risk to exist, an exposure pathway must be present which requires each of the following to be identified:

– Presence of substances that may cause harm (SOURCE).
– Presence of a receptor which may be harmed (RECEPTOR).
– Existence of a means of exposing a receptor to the source (EXPOSURE PATHWAY) and whether exposure pathways are complete or incomplete.

A site-specific CSM has been developed based on GHD's understanding of the site setting, including geology, hydrogeology and surrounding land use in order to identify potentially significant source-pathway-receptor (SPR) linkages with respect to the potential risks in relation to the PFAS impacts at the site.

A tabular Conceptual Site Model (CSM) for the site, reviewed and updated based on the results of this investigation, is presented in Table 8.1 below. A graphic conceptual site model is shown in Figure 11 (attached).

Table 8.1 Conceptual Site Model

Potential source	Receptor	Pathway	Pathway present?
On-site PFAS impacted soils	Site users, visitors, maintenance and construction workers	Direct dermal contact with contaminated soil	**No** PFAS concentrations detected to date in on-site soils were below the adopted Tier 1 HIL D for industrial/commercial land use. It is considered unlikely that site users, visitors, maintenance or construction workers would be exposed to PFAS quantities detrimental to their health.
		Incidental ingestion of contaminated soil	
		Inhalation of contaminated soil or dust from disturbed soils	
	Ecosystem at, and immediately surrounding, the site	Direct contact with contaminated soil Ingestion of contaminated soil Bioaccumulation through indirect contact	**Unlikely** PFAS concentrations detected to date in soil on-site exceeded the adopted Tier 1 interim ecological criteria for indirect and/or direct exposure. The site is located in a commercial precinct and is considered highly disturbed. The presence of ecological receptors at the site has not been confirmed.
	Groundwater beneath the site	Rainwater/surface runoff leaching impacted soil followed by migration through porous media into groundwater	**Yes** PFAS impacts to groundwater have been confirmed along with soil impacts to the depth of saturated soils. PFAS concentrations detected in groundwater beneath and down hydraulic gradient of the site exceeded the adopted Tier 1 human health assessment criteria.
On-site PFAS impacted concrete and bitumen surfaces	Groundwater beneath the site and surface/storm water runoff	Rainwater/surface leaching PFAS impacted concrete/bitumen and runoff into the environment	**Yes** The potential of PFAS leaching from contaminated concrete or bitumen on-site into the groundwater has not been tested. However, PFAS has been identified in these materials and they are considered an ongoing source.
PFAS-impacted groundwater	People using groundwater for: domestic and drinking purposes	Consumption of contaminated groundwater	**Possible** PFAS above Tier 1 drinking water criteria have been detected in groundwater up to 370 m down hydraulic gradient of the site. However, the lateral and vertical extent of PFAS in groundwater down hydraulic gradient of the site has not been delineated. Within a 2 km radius of the site, 66 registered wells had TDS values in groundwater below 1,200 mg/L, which is considered suitable for domestic and primary irrigation purposes (Gov SA 2015), and 58 registered wells had domestic purposes. Therefore, potable use of groundwater cannot be ruled out. A GPA exists downgradient from the site which precludes groundwater use in the upper quaternary aquifers, however impacts have been identified outside this area.

Potential source	Receptor	Pathway	Pathway present?
	People using groundwater for irrigation of vegetable gardens and/or fruit trees with which they grow produce for consumption	Consumption of fruit and vegetables irrigated by contaminated groundwater	**Possible** The median TDS value of groundwater within 2 km of the site was 1,451 mg/L, which is considered suitable for domestic and primary irrigation purposes (Gov SA 2015). Eight registered wells within a 2 km radius of the site had irrigation purposes. The extent of PFAS in groundwater down hydraulic gradient of the site has not been delineated and residential properties with gardens where fruit and/or vegetables could be grown are present within 2 km of the site. A GPA exists downgradient from the site which precludes groundwater use in the upper quaternary aquifers, however impacts have been identified outside this area.
	People growing fruit and/ or vegetables in open soil which may interact with groundwater	Consumption of PFAS impacted fruit and or vegetables	**On-site: No** While limited testing of fruit grown on-site reported PFAS concentrations above the adopted guidelines (GHD 2019). All fruit trees have since been removed from the site.
			Off-site: Possible Limited testing of fruit grown on-site reported PFAS concentrations above the adopted guidelines (GHD 2019The extent of PFAS in groundwater down hydraulic gradient of the site has not been delineated and residential properties with gardens where fruit and/or vegetables could be grown are present within 2 km of the site.
	People using groundwater for recreational purposes such as filling of swimming pools	Incidental ingestion of contaminated groundwater	**Possible** The extent of PFAS in groundwater down hydraulic gradient of the site has not been delineated and three wells within a 2 km radius of the site were identified as having a recreational purpose. Groundwater in the Q1 has identified exceedances of recreational guidelines both on-site and off-site
	Down gradient off-site maintenance and sub-surface construction workers that contact PFAS contaminated groundwater	Direct dermal contact or incidental ingestion of contaminated groundwater	**Unlikely** Whilst it is possible that off-site maintenance or sub-surface construction workers could incidentally ingest contaminated groundwater, it is unlikely that they will ingest quantities detrimental to their health.
	Freshwater ecosystems downgradient from the site	Migration and discharge of contaminated groundwater to surface water bodies	**No** No surface water bodies have been identified within 2 km of the site that might receive groundwater
PFAS impacted surface waters (off-site)	Surface water bodies receiving stormwater discharge	Incidental ingestion of contaminated groundwater or Consumption of PFAS contaminated biota (fishing)	**No** No surface water bodies have been identified within 2 km of the site that might receive stormwater runoff.

Potential source	Receptor	Pathway	Pathway present?
	Marine or freshwater ecosystems downstream form the site	Ingestion/absorption of PFAS impacted water/biota and bioaccumulation within the food chain	**No** No surface water bodies have been identified within 2 km of the site that might receive stormwater runoff.

9. Conclusions and Recommendations

The objectives of the DSI are as follows:

– To assess the nature and extent of PFAS site contamination, both on- and off-site.
– To assess the potential risks to human health and the environment associated with identified PFAS contamination on-site, in the context of continued industrial use.
– To assess the potential risks to human health and the environment associated with PFAS contamination migrating off-site, in the context of the relevant land uses and environments.

To complete the objectives, GHD undertook the following:

– Drilling and soil sampling of 15 on-site soil bores.
– Installation of four on-site groundwater monitoring wells and two off-site groundwater monitoring wells.
– Two GMEs comprising seven on-site wells and a combination of five on-site and three off-site wells.

The following conclusions were made following the DSI:

– PFAS contamination is present across the site in on-site soils, bitumen, concrete and groundwater, which can be attributed to historical use of PFAS containing AFFF.
– No exceedances of human health guidelines have been identified in soil at the site for a commercial /industrial setting. PFAS impacts in soil were identified to a maximum depth of 2.6 m bgl.
– An exceedance of human health criteria for a residential setting with minimal soil access (HIL-B) was identified at location BH14 at a depth of 0.2 to 0.4 (4.1 mg/kg) and again at 1.1 to 1.2 (3.4 mg/kg) metres for PFOS. Residential B guidelines have been adopted at MFS sites in agreement with the United Fire Fighters Union of South Australia as a more conservative “trigger” for further engagement and do not necessarily represent a human health risk. In this instance the sample is 0.2 m below ground surface, with the surface sample above being below HIL-B criteria. The exceedances are also significantly below the commercial/industrial criteria that are appropriate for the sites land use under the NEPM.
– Given the site's low ecological value, the CCME criteria of 0.14 mg/kg was adopted and while exceedances were identified, the criteria is for protection of more sensitive ecological receptors (surface water or adjacent high value ecological areas) via migration which are not considered relevant for the site.
– It is considered likely that impacted concrete and bitumen, as well as the shallow soils beneath the site are an ongoing source of PFAS impacts to groundwater although the amount of infiltration through surface materials (bitumen / concrete hardstand) and potential flux to groundwater is unknown.
– Standing water levels in the Q1 aquifer ranged from 1.743 m bgl at on-site well GW7003 in October 2022 to 3.108 m bgl at on-site well MW02 in March 2023. The groundwater elevation in the Q1 aquifer ranged from 28.002 m AHD at off-site well MW05 in March 2023 to 29.784 m AHD at on-site well GW8002b in October 2022. The observed variations were consistent with expected seasonal fluctuations, i.e. higher SWL in spring and lower water levels in autumn. The inferred groundwater flow direction in the Q1 aquifer was to the north-west.
– The SWL in the Q2 aquifer ranged from 2.171 m bgl in October 2022 to 2.638 m bgl in March 2023 in on-site well GW201b. The corresponding groundwater elevations were 29.359 m AHD and 28.892 m AHD. The range was consistent with seasonal fluctuations. Due to the presence of several meters of clay between the Q1 and Q2, as well as the identified hydraulic head difference, the Q2 is considered a confined aquifer.
– The SWL in the T1 aquifer ranged from 17.375 m bgl in October 2022 to 24.867 m bgl in March 2023 in on-site well GW8001b. The corresponding groundwater elevations were 14.408 m AHD and 6.916 m AHD. The water level dropped by more than 7 m in five months, which indicates groundwater abstraction in addition to seasonal fluctuations.
– On-site groundwater monitoring wells reported exceedances of the adopted drinking water and recreational Tier 1 assessment criteria in the Q1 aquifer and the drinking water criteria in the Q2 aquifer.

- Following a review of drilling methods and historical development and sampling data, on-site well GW8001b (T1) was redeveloped using a surge-block method and resampled. Historically identified PFAS concentrations in the T1 aquifer decreased by an order of magnitude to levels below the adopted assessment criteria. It was considered unlikely that the presence of PFAS in well GW8001b can be attributed to historical site activities but has likely been introduced via fluids/muds during the drilling process. It should be noted that this would not represent a significant or ongoing source of PFAS contamination in the T1 and can likely be remedied through further development of the well.
- PFAS impacted groundwater has migrated off-site, generally in the inferred north-westerly groundwater flow direction and exceeded the adopted drinking water and recreational water guidelines at Q1 monitoring well location MW05 (approximately 125 m down-gradient to the west) and the drinking water guidelines at Q1 well MW07 (approximately 370 m down-gradient to the north-west). The concentrations in well MW05 were comparable to those near the south-western site boundary at well GW7003b but more than one order of magnitude lower than in the other on-site wells. The PFAS concentrations in well MW07 were one to three orders of magnitude lower than those on-site indicating attenuation of concentrations with distance from the site (source area). The lateral extent of PFAS contamination in the Q1 aquifer has not been delineated.
- The vertical extent of PFAS impacts to groundwater (the Q2) has not been confirmed.
- PFAS contamination in groundwater is unlikely to impact human health via drinking water given the presence of a reticulated water supply. However, it cannot be ruled out as 49 registered bores within a 2 km radius of the site have groundwater suitable for human consumption (measured TDS < 1200 mg/L) and groundwater extraction bores for domestic and industrial purposes are located down-gradient from the site.
- A significant GPA exists, down-hydraulic gradient of the site which prevents the abstraction of groundwater from the upper quaternary aquifers. The presence of the GPA presents an effective administrative control that prevents a linkage between source (MFS site), pathway (lateral migration in groundwater) and the receptor (abstraction of groundwater for drinking water and/or irrigation) within this area. The GPA however does not extent south of Daws Road where off-site impacts have been identified along with registered groundwater bores for domestic use. The bores appear to be installed in the Q2 aquifer where the presence of PFAS contamination need to be confirmed.
- The consumption of fruits and vegetables which utilise groundwater for irrigation / watering or have deep roots that may come into contact with contaminated groundwater is considered a potential exposure pathway, based on historical confirmed impacts to on-site biota (since removed).

Recommendations

The following are recommended action to address remaining data gaps at the site:

- Community consultation, including a letter drop to confirm the presence and potential use of any groundwater wells and fruit trees whose roots may intercept groundwater.
- Additional off-site drilling to the west of the site and south of Daws Road (extent of GPA) to delineate impacts in the Q1 to below the adopted criteria.
- Additional drilling to the east of the site to confirm the potential for up-gradient impacts in the Q1.
- Drilling an installation of a Q2 well within the site using sonic drilling methods and casing off the upper Q1 to confirm vertical migration.
- Sampling of core from the aquitard to determine permeability.
- Resampling of all new and existing on-site wells.
- Eventual decommissioning of existing Q2 (GW201b) and T1 (GW8001b) wells at the site.

10. References

ANZG 2018, Australian and New Zealand Guidelines for Fresh and Marine Water Quality, online resource www.waterquality.gov.au/anz-guidelines, Australian and New Zealand Governments, updated 26 July 2021, (AWQG)

Australian Standard, 2017, Geotechnical site investigations, AS 1726:2017, Standards Australia

Bresciani E., Batelaan O., Banks E.W., Barnett S.R., Batlle-Aguilar J., Cook P.G., Costar A., Cranswick R.H., Doherty J., Green G., Kozuskanich J., Partington D., Pool M., Post V.E.A., Simmons C.T., Smerdon B.D., Smith S.D., Turnadge C., Villeneuve S., Werner A.D., White N. and Xie Y., 2015, Assessment of Adelaide Plains Groundwater Resources: Summary Report, Goyder Institute for Water Research Technical Report Series No. 15/31, Adelaide, South Australia

DEW 2022a, Adelaide Plains Prescribed Wells Areas 2020–21 water resources assessment, DEW Technical Note 2022/17, Department for Environment and Water December, 2022

DEW 2022b, WaterConnect online data base for groundwater and surface water, Department for Environment and Water, South Australia, accessed September 2022 and June 2023via **www.waterconnect.sa.gov.au**.

Gerges, N. 2006, Overview of the hydrogeology of the Adelaide metropolitan area, Department of Water, Land and Biodiversity Conservation, South Australia, DWLBC Report 2006/10, June 2006

GHD 2019, MFS Statewide Appliance and Station Sampling, Report prepared for the South Australian Metropolitan Fire Service by GHD Pty Ltd, May 2019

GHD 2022a, MFS St Marys Fire Station, Voluntary Site Contamination Assessment Proposal (VSCAP), Rev. 1, prepared for South Australian Metropolitan Fire Service by GHD Pty Ltd, 23 June 2022.

GHD 2022b, MFS St Marys Fire Station Preliminary Site Investigation, Rev. 0, Report prepared for South Australian Metropolitan Fire Service by GHD Pty Ltd, 6 October 2022

GHD 2022c, MFS St Marys Fire Station Sampling and Analysis Quality Plan (SAQP), Rev. 0, Report prepared for South Australian Metropolitan Fire Service by GHD Pty Ltd, 30 September 2022

Gov SA 1993, Environment Protection Act 1993, Version 9.9.2021, Government of South Australia, updated 2021.

Gov SA 2015, Environment Protection (Water Quality) Policy 2015 (WQEPP), Version 1.7.2020, Government of South Australia, updated 2020

Gov SA 2022, Location SA Map Viewer, Government of South Australia, accessed September 2022 and June 2023 via https://location.sa.gov.au/viewer/

HEPA 2020, PFAS National Environmental Management Plan (Version 2.0), Heads of Environment Protection Authorities Australia and New Zealand, January 2020. (PFAS NEMP)

Lotsearch 2022, 1125 South Road, St Marys, SA 5042, Reference number LS035821 EP, prepared by Lotsearch Enviro Professional, 31 August 2022

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

NHMRC 2008, Guidelines for Managing Risks in Recreational Water, National Health and Medical Research Council and Natural Resources Management Ministerial Council, Commonwealth of Australia, updated with the recent changes in the ADWG – V3.7 – January 2022

NHMRC 2011, Australian Drinking Water Guidelines 6 (ADWG), Version 3.7, National Water Quality Management Strategy, National Health and Medical Research Council and Natural Resources Management Ministerial Council, Commonwealth of Australia, updated January 2022

NUDLC (2020) Minimum Construction Requirements for Water Bores in Australia, Forth Edition, National Uniform Drillers Licensing Committee, 2020

SA EPA 2017a, Site Contamination Regulatory and Orphan Site Management Framework, Environment Protection Authority, South Australia, July 2017.

SA EPA 2017b, Proposed Groundwater Prohibition Area – Portions of Edwardstown, South Plympton, Plympton Park, Ascot Park, Park Holme and Melrose Park, EPA Determination Report, December 2017 EPA Ref: 61556; 05/22784, August 2017.

SA EPA 2019a, Guidelines for the assessment and remediation (GAR) of site contamination, Environment Protection Authority, South Australia, November 2019

SA EPA 2019b, Guidelines for Regulatory Monitoring and Testing – Groundwater Sampling, Environment Protection Authority, South Australia, 2019

SA EPA 2021a, Site contamination – Section 83a notification form, Environmental Protection Authority, South Australia, 19 Janurary 2021

SA EPA 2021b, Review of Site Contamination Request Letter, Environmental Protection Authority, South Australia, 21 October 2021

SAPPA 2022, South Australian Property and Planning Atlas Government map index, accessed September 2022 via **https://sappa**.plan.sa.gov.au/

SARIG 2022, South Australian Resources Information Gateway, accessed September 2022 via **https://map**.sarig.sa.gov.au/

Senversa (2021) Stage 2 Environmental Site Assessment, Melrose Park EPA Assessment Area, Report for South Australian Environmental Protection Agency, 21 December 2021

Senversa (2022) Stage 3 Environmental Site Assessment, Melrose Park EPA Assessment Area, Report for South Australian Environmental Protection Agency, 27 July 2022

Senversa (2023) Stage 4 Environmental Site Assessment, Melrose Park EPA Assessment Area, Rev. 1, Report for South Australian Environmental Protection Agency, 23 February 2023

T2D Geoventure 2021, North South Corridor (Torrens to Darlington) Stage 1, 1a and 1b Ground Investigation Contamination Factual Report, prepared for Department of Infrastructure and Transport by T2D Geoventure, dated 3 June 2021

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						PFAS - Perfluoroalkyl Sulfonic Acids		PFAS - Perfluoroalkyl Carboxylic Acids	PFAS - Fluorotelomer Sulfonic Acids		PFAS - Sums		
						Perfluorohexane sulfonic acid (PFHxS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorooctanoic acid (PFOA)	6:2 Fluorotelomer Sulfonate (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	Sum of PFHxS and PFOS	Sum of US EPA PFAS (PFOS + PFOA)*	PFAS (Sum of Total)
						mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL						0.0001	0.0001	0.0001	0.0001	0.0002	0.0001	0.0001	0.0001
Location Code	**Date**	**Field ID**	**Matrix Type**	**Lab Report**	**Depth**								
BH05	06/10/2022	BH05_0-0.1	Concrete	33940	0 - 0.1	0.0007	0.0034	0.0002	0.0038	0.0003	0.0041	0.0036	0.0084
BH07	06/10/2022	BH07_0-0.15	Concrete	33940	0 - 0.15	0.0002	0.0009	<0.0001	0.0003	0.001	0.0011	0.0009	0.0024
BH09	05/10/2022	BH09_0.0	Bitumen	33940	0 - 0.04	0.010	0.100	0.0012	<0.0005	<0.001	0.11	0.100	0.11
BH13	05/10/2022	BH13_0.0	Bitumen	33940	0 - 0.04	0.0072	0.071	0.0005	<0.0001	<0.0002	0.078	0.071	0.079
MW01	06/10/2022	MW01_0-0.01	Concrete	33940	0 - 0.1	0.011	0.021	0.0005	0.0001	<0.0002	0.032	0.022	0.033

	PFAS - Perfluoroalkyl Sulfonic Acids		PFAS - Perfluoroalkyl Carboxylic Acids	PFAS - Fluorotelomer Sulfonic Acids		PFAS - Sums		
	Perfluorohexane sulfonic acid (PFHxS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorooctanoic acid (PFOA)	6:2 Fluorotelomer Sulfonate (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	Sum of PFHxS and PFOS	Sum of US EPA PFAS (PFOS + PFOA)*	PFAS (Sum of Total)
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL	0.0001	0.0001	0.0001	0.0001	0.0002	0.0001	0.0001	0.0001
PFAS NEMP 2.0 2020 Industrial/ commercial (HIL D)	20	20	50			20		
PFAS NEMP 2.0 2020 Residential (HIL B)	2	2	20			2		
PFAS NEMP 2.0 2020 Ecological indirect exposure		**0.14**						
PFAS NEMP 2.0 2020 Ecological direct exposure		1	10					

Location Code	Monitoring zone	Date	Field ID	Lab Report	Depth							
BH05	Concrete (SE)	06/10/2022	BH05_0.3-0.5	33940	0.3 - 0.5	0.056	**0.61**	0.0052	<0.0001	<0.0002	0.67	0.62	0.67
BH06	Garden (SE)	06/10/2022	BH06_0-0.1	33940	0 - 0.1	0.0070	0.062	0.0031	0.0007	0.001	0.069	0.065	0.074
	Garden (SE)		BH06_0.2-0.4	33940	0.2 - 0.4	0.0047	0.048	0.0024	<0.0001	<0.0002	0.052	0.050	0.055
BH07	Concrete (SE)	06/10/2022	BH07_0.3-0.5	33940	0.3 - 0.5	0.0014	0.14	0.0009	0.0098	0.028	0.14	0.14	0.18
BH08	Bitumen (NE)	05/10/2022	BH08_0.1-0.2	33940	0.1 - 0.2	0.0006	0.012	0.0001	0.0009	0.032	0.013	0.012	0.046
	Bitumen (NE)		BH08_0.9-1.0	33940	0.9 - 1	0.17	0.066	0.020	0.0003	<0.0002	0.24	0.087	0.26
BH09	Bitumen (NE)	05/10/2022	BH09_0.1-0.3	33940	0.1 - 0.3	0.0096	**0.17**	0.0036	0.0001	0.0004	0.18	0.18	0.19
	Bitumen (NE)		BH09_1.0-1.2	33940-A	1 - 1.2	0.0023[#1]	0.0002[#1]	0.0042	<0.0001	<0.0002	0.0023[#1]	0.0044	0.0094[#1]
BH10	Grass (NW)	05/10/2022	BH10_0-0.1	33940	0 - 0.1	0.0033	**0.16**	0.0046	0.0014	0.001	0.16	0.16	0.17
	Grass (NW)		BH10_0.3-0.5	33940	0.3 - 0.5	0.0017	**0.15**	0.0013	0.0013	0.0008	0.16	0.16	0.16
BH11	Grass (NW)	05/10/2022	BH11_0-0.1	33940	0 - 0.1	0.0045	0.11	0.0014	0.0004	0.0004	0.12	0.12	0.12
	Grass (NW)		BH11_0.2-0.4	33940	0.2 - 0.4	0.0036	**0.30**	0.0012	0.0012	0.0020	0.31	0.30	0.31
BH12	Bitumen (NE)	05/10/2022	BH12_0.1-0.2	33940	0.1 - 0.2	0.0009	0.0026	0.0001	0.0002	<0.0002	0.0034	0.0027	0.0038
	Bitumen (NE)		BH12_0.5-0.6	33940	0.5 - 0.6	0.064	**0.82**	0.0057	0.0021	0.0004	0.89	0.83	0.90
	Bitumen (NE)		BH12_0.9-1.0	33940-A	0.9 - 1	0.26	0.0009	0.019	0.0001	<0.0002	0.26	0.020	0.28
BH13	Bitumen (NE)	05/10/2022	BH13_0.1-0.3	33940	0.1 - 0.3	0.0012	0.035	0.0001	<0.0001	<0.0002	0.036	0.035	0.036
BH14	Grass (NW)	05/10/2022	BH14_0-0.1	33940	0 - 0.1	0.021	**0.67**	0.0017	<0.0001	0.0002	0.69	0.68	0.70
	Grass (NW)		BH14_0.2-0.4	33940	0.2 - 0.4	0.0126[#1]	**4.1**	0.0015	<0.0001	0.0064[#1]	4.1	4.1	4.1
	Grass (NW)		BH14_1.1-1.2	33940-A	1.1 - 1.2	0.034	**3.4**	0.0041	0.0001	<0.0002	3.4	3.4	3.5
	Grass (NW)		BH14_2.0-2.1	33940-A	2 - 2.1	0.80	0.058	0.057	0.0005	<0.0002	0.86	0.12	0.92
	Grass (NW)		BH14_2.5-2.6	33940-A	2.5 - 2.6	0.53	0.036	0.035	0.0010	<0.0002	0.57	0.071	0.60
BH15	Grass (NW)	05/10/2022	BH15_0-0.1	33940	0 - 0.1	0.0014	0.030	0.0020	0.0018	0.0030	0.032	0.032	0.039
	Grass (NW)		BH15_0.2-0.4	33940	0.2 - 0.4	0.0011	0.10	0.0018	0.0038	0.0095	0.10	0.10	0.12
MW01	Concrete (SE)	06/10/2022	MW01_0.1-0.3	33940	0.1 - 0.3	0.098	**0.60**	0.0067	0.0017	0.0004	0.70	0.61	0.71
MW02	Garden (N)	07/10/2022	MW02_0-0.1	33940	0 - 0.1	0.0072	0.14	0.0006	<0.0001	<0.0002	0.15	0.14	0.15
	Garden (N)		MW02_0.3-0.5	33940	0.3 - 0.5	0.029	**0.78**	0.0016	<0.0001	<0.0002	0.81	0.79	0.82
	Garden (N)		MW02_1.0-1.2	33940-A	1 - 1.2	0.060	**0.15**	0.0058	<0.0001	<0.0002	0.21	0.16	0.22
MW03	Garden (N)	07/10/2022	MW03_0-0.1	33940	0 - 0.1	0.0009	0.049	0.0004	<0.0001	<0.0002	0.050	0.050	0.051
	Garden (N)		MW03_0.3-0.5	33940	0.3 - 0.5	0.0003	0.030	0.0001	<0.0001	<0.0002	0.030	0.030	0.030
MW04	Grass (NW)	06/10/2022	MW04_0-0.1	33940	0 - 0.1	0.0039	**0.19**	0.0049	0.0077	0.012	0.20	0.20	0.22
	Grass (NW)		MW04_0.3-0.5	33940	0.3 - 0.5	0.0020	**0.45**	0.0019	0.0036	0.0079	0.45	0.45	0.47

Comments
#1 Higher value adopted from QA/QC analysis

Environmental Standards
HEPA, Jan 2020, PFAS NEMP 2.0 2020 Industrial/ commercial (HIL D)
HEPA, Jan 2020, PFAS NEMP 2.0 2020 Residential (HIL B)
HEPA, Jan 2020, PFAS NEMP 2.0 2020 Ecological direct exposure
HEPA, Jan 2020, PFAS NEMP 2.0 2020 Ecological indirect exposure

Well ID	DEW #1 well no.	Well construction permit no.	Monitoring zone	Installation date	Installation depth (m bgl)	Aquifer	Screen interval (m bgl)	Well finish	Well diameter (mm)	Coordinates (MGA20 Z54)		Ground level (m AHD)	TOC (m AHD)	Sceened strata	Location description
										Easting	Northing				
GW201b #2	6628-31030	389534	on-site	07/12/2020	17.0	Q2	11.0-15.0	Gatic	177	278700.338	6124961.159	31.530	31.469	(Clayey) GRAVEL / sandy gravelly CLAY	Lawn (NW quadrant)
GW7003 #2	6628-31306	389763	on-site	26/11/2020	6.0	Q1	3.0-6.0	Gatic	50	278690.367	6124914.632	31.544	31.436	Sandy CLAY / CLAY	South-wetern site boundary
GW8001b #2	6628-31028	389532	on-site	03/12/2020	38.5	T1	36.5-38.5	Gatic	50	278706.958	6124952.792	31.783	31.708	Sandy CLAY	Lawn (NW quadrant)
GW8002b #2	6628-31029	389533	on-site	04/12/2020	6.0	Q1	5.0-6.0	Gatic	50	278701.151	6124952.805	31.621	31.534	Sandy clayey GRAVEL	Lawn (NW quadrant)
MW01	6628-32034	428620	on-site	06/10/2022	4.0	Q1	1.0-4.0	Gatic	50	278750.396	6124923.553	31.858	31.787	CLAY	South-eastern site boundary
MW02	6628-32033	428622	on-site	06/10/2022	5.0	Q1	2.0-5.0	Gatic	50	278728.359	6124974.907	32.194	32.071	CLAY	Nothern site boundary
MW03	6628-32035	428623	on-site	07/10/2022	4.0	Q1	1.0-4.0	Gatic	50	278705.145	6124972.395	31.676	31.597	Gravelly CLAY / CLAY	Nothern site boundary
MW04	6628-32036	428621	on-site	07/10/2022	4.0	Q1	1.0-4.0	Gatic	50	278688.686	6124963.288	31.352	31.218	CLAY	Western site boundary
MW05	6628-32336	432309	off-site	15/03/2023	4.7	Q1	1.7-4.7	Gatic	50	278558.742	6124973.732	30.267	30.162	Sandy CLAY / CLAY	4 Wingfield St
MW07	6628-32335	432310	off-site	15/03/2023	5.5	Q1	2.5-5.5	Gatic	50	278431.973	6125245.162	28.437	28.313	CLAY	Konando Tce / Lagunata Ave
EPA_GW07#3	6628-31512	403627	off-site	08/09/2021	6.0	Q1	3.0-6.0	Gatic	50	278684.616	6125284.313	30.555	30.438	-	Bennet Ave (west)

#1 DEW - SA Department of Environment and Water
#2 T2D Geoventure 2021, North South Corridor (Torrens to Darlington) Stage 1, 1a and 1b Ground Investigation Contamination Factual Report
#3 Senversa 2023, Stage 4 Environmental Site Assessment, Melrose Park EPA Assessment Area

Location	Monitoring zone	Aquifer	Ground level (m AHD)	TOC (m AHD)	Date	Well depth (m bTOC)	Depth to water (m bTOC)	Depth to water (m bgl)	Groundwater elevation (m AHD)	Comment
GW7003	on-site	Q1	-	31.423[#1]	29/01/2021	5.67	2.740	2.848	28.683	-
			31.544	31.436	20/10/2022	-	1.635	1.743	29.801	-
					28/03/2023	5.874	2.312	2.420	29.124	-
GW8002b	on-site	Q1	-	31.55[#1]	23/12/2020	-	2.594	2.681	28.956	-
			31.621	31.534	05/10/2022	-	1.616	1.703	29.918	DIT Data logger in well
					07/10/2022	-	1.632	1.719	29.902	DIT Data logger in well
					20/10/2022	-	1.750	1.837	29.784	-
					28/03/2023	5.302	2.489	2.576	29.045	-
MW01	on-site	Q1	31.858	31.787	12/10/2022	3.975	dry	-	-	-
					20/10/2022	-	dry	-	-	-
					28/03/2023	3.970	2.482	2.553	29.305	-
					26/04/2023	3.984	2.472	2.543	29.315	-
MW02	on-site	Q1	32.194	32.071	12/10/2022	4.96	2.493	2.616	29.578	-
					20/10/2022	-	2.550	2.673	29.521	-
					28/03/2023	4.970	2.985	3.108	29.086	-
MW03	on-site	Q1	31.676	31.597	12/10/2022	4.007	2.183	2.262	29.414	-
					20/10/2022	-	2.240	2.319	29.357	-
					28/03/2023	4.028	2.680	2.759	28.917	-
					26/04/2023	4.19	2.638	2.717	28.959	-
MW04	on-site	Q1	31.352	31.218	12/10/2022	4.06	1.878	2.012	29.340	-
					20/10/2022	-	1.950	2.084	29.268	-
					28/03/2023	4.010	2.407	2.541	28.811	-
MW05	off-site	Q1	30.267	30.162	28/03/2023	4.640	2.160	2.265	28.002	-
MW07	off-site	Q1	28.437	28.313	26/04/2023	5.50	2.201	2.325	26.112	-
EPA_GW07[#2]	off-site	Q1	30.555	30.438	15/09/2021	5.71	2.539	2.656	27.899	-
					28/04/2022	5.69	2.747	2.864	27.691	-
					30/11/2022	5.67	2.418	2.535	28.020	-
					26/04/2023	5.70	2.630	2.747	27.808	-
GW201b	on-site	Q2	-	31.462[#1]	21/01/2021	-	3.200	3.261	28.262	-
			31.530	31.469	05/10/2022	-	2.020	2.081	29.449	DIT Data logger in well
					07/10/2022	-	2.010	2.071	29.459	DIT Data logger in well
					20/10/2022	15.80	2.110	2.171	29.359	-
					28/03/2023	16.80	2.577	2.638	28.892	-
GW8001b	on-site	T1	-	31.692[#1]	23/12/2020	39.250	24.163	24.238	7.529	-
					10/03/2021	-	27.066	27.141	4.626	SWL after HS removal
			31.783	31.708	05/10/2022	-	17.046	17.121	14.662	DIT Data logger in well
					07/10/2022	-	17.061	17.136	14.647	DIT Data logger in well
					20/10/2022	-	17.300	17.375	14.408	-
					15/03/2023	38.00	24.755	24.830	6.953	-
					28/03/2023	38.60	24.792	24.867	6.916	-
					26/04/2023	38.596	24.172	24.247	7.536	-

#1 T2D Geoventure 2021, North South Corridor (Torrens to Darlington) Stage 1, 1a and 1b Ground Investigation Contamination Factual Report
#2 Senversa 2023, Stage 4 Environmental Site Assessment, Melrose Park EPA Assessment Area

Location	Monitoring Zone	Aquifer	Date	Depth	Field Parameters						Calculated Parameters		Sample comments
					pH (Field)	Electrical conductivity (field)	Dissolved Oxygen (Field)	Redox (Field)	Temperature (Field)	TDS (Field)	Redox (SHE) #1	TDS (calculated) #2	
				(m bTOC)	pH units	µS/cm	mg/L	mV	°C	mg/L	mV	mg/L	
GW7003 #3	On-site	Q1	29/01/2021	4.5	8.55	4,780	3.54	43	22.3	-	247	3,107	clear, low turbidity, no sheen, no odour
GW8002b #3	On-site	Q1	23/12/2020	5.8	8.23	6,884	-	67	21.43	-	271	4,474	-
GW8002b			20/10/2022	-	7.57	1,036	0.60	11	21.2	-	215	673	data logger removed for sampling, grab sample due to draw down
			28/03/2023	-	7.65	5,116	1.25	-120	19.8	3,328	85	3,325	grey/brown, high turbidity, high sediment load, no sheen, no odour
MW01	On-site	Q1	26/04/2023	-	7.43	6,573	0.97	-42	24.0	-	162	4,272	clear, low turbidity, low sediment load, no sheen, no odour
MW02	On-site	Q1	20/10/2022	2.63	7.37	5,152	0.50	21	23.1	-	225	3,349	clear/orange, low turbidity, low sediment load, no sheen, no odour
MW03	On-site	Q1	20/10/2022	2.42	7.33	10,029	2.60	27	19.4	-	231	6,519	grab sample due to draw down, medium turbidity, low sediment load, no sheen, no odour
MW03	On-site	Q1	26/04/2023	-	7.84	7,903	3.91	39	28.8	-	243	5,137	clear/pale yellow, low turbidity, low sediment load, no sheen, no odour, grab sample
MW04	On-site	Q1	20/10/2022	2.09	7.39	8,454	1.95	27	18.9	-	231	5,495	clear/orange, low turbidity, low sediment load, no sheen, no odour
EPA_GW07 #4	Off-site	Q1	16/09/2021	-	7.06	7,801	2.83	174	20.8	-	378	5,071	brown, slightly turbid, no sheen, no odour
			03/05/2022	-	6.99	4,815	0.40	231	21.7	-	435	3,130	colourless, non-turbid, no sheen, no odour
			01/12/2022	-	6.55	7,282	2.40	95	20.2	-	299	4,733	brown, slightly turbid, no sheen, no odour
EPA_GW07			26/04/2023	-	6.93	7,876	1.67	96	24.9	-	300	5,119	clear, low turbidity, low sediment load, no sheen, no odour
MW05	Off-site	Q1	28/03/2023	-	7.64	7,282	1.74	-28	23.9	4,732	176	4,733	clear/pale yellow, low turbidity, low sediment load, no sheen, no odour
MW07	Off-site	Q1	26/04/2023	-	7.40	4,693	2.87	106	25.2	-	310	3,050	clear, low turbidity, low sediment load, no sheen, no odour
GW201b #3	On-site	Q2	21/01/2021	-	7.98	4,157	2.71	-	-	-	-	2,702	-
GW201b			28/03/2023	-	8.19	3,553	6.05	-184	20.0	2,334	20	2,309	clear, low turbidity, no sheen, slight sulfur odour (H2S?)
GW8001b #3	On-site	T1	23/12/2020	30	12.26	5,666	0.10	-315	21.2	-	-111	3,683	clear, low turbidity, no sheen, sight sulfur/hydrocarbon odour
			10/03/2021	-	13.20	5,696	1.06	-64	20.7	-	140	3,702	clear, no sheen, slight sulfur odour
GW8001b			15/03/2023	35.50	7.74	1,824	2.26	-119	28.0	1,183	85	1,186	purging with surge block, no sampling, pale grey/brown, high turbidity
			26/04/2023	-	8.27	1,774	0.71	-212	28.5	-	-8	1,153	yellow/grey milky, medium turbidity, medium sediment load, PVC shavings in purge water

#1 Redox potential relative to the standard hydrogen electrode (SHE). Redox potential (SHE) = field redox potential (Ag/AgCl electrode with saturated KCl solution) + 204 mV
#2 TDS values were calculated by multiplying the electrical conductivity values with a conversion factor of 0.65
#3 T2D Geoventure 2021, North South Corridor (Torrens to Darlington) Stage 1, 1a and 1b Ground Investigation Contamination Factual Report
#4 Senversa 2023, Stage 4 Environmental Site Assessment, Melrose Park EPA Assessment Area

					PFAS - Perfluoroalkyl Sulfonic Acids						PFAS - Perfluoroalkyl Carboxylic Acids										
					Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecanesulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)
					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					0.0004	0.001	0.0002	0.001	0.0002	0.001	0.002	0.001	0.0004	0.0004	0.0002	0.001	0.001	0.001	0.001	0.001	0.001
NEPM 2013 Table 1A(4) HSL D Comm/Ind GW for Vapour Intrusion, Clay, 2-4 mbgl																					
NEPM 2013 Table 1A(4) HSL D Comm/Ind GW for Vapour Intrusion, Clay, >8 mbgl																					
NHMRC 2008 / ADWG 2011 Recreational Water - domestic setting only							0.7		0.7						5.6						
ADWG 2011 Health (v3.7 updated 2022)															**0.56**						
PFAS NEMP 2.0 2020 Health Drinking Water							**0.07**		**0.07**						**0.56**						
Location	**Monitoring Zone**	**Aquifer**	**Date**	**Lab Report**																	
GW7003b	On-site	Q1	20/10/2022	308730	0.090	0.11	**1.2**	0.074	**2.0**	<0.002	0.048	0.021	0.067	0.016	0.051	0.027	<0.002	<0.002	<0.005	<0.01	<0.05
			21/10/2022	308746	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW8002b	On-site	Q1	20/10/2022	308730	4.6	5.7	**44**	2.0	**42**	<0.020	1.6	5.1	42	1.9	**2.2**	4.3	<0.020	<0.020	<0.050	<0.10	<0.50
			21/10/2022	308746	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			28/03/2023	EM2305704	4.38*	4.96*	**39.4***	1.79*	**34.6***	0.004*	0.70	5.47	12.2*	1.77*	**2.10***	2.96*	0.006*	<0.02*	<0.004*	<0.004*	<0.010*
MW01	On-site	Q1	26/04/2023	EM2307449 / EM2308182	10.2	17.2	**99.6**	6.74	**122**	<0.02	1.2	11.0	39.2	5.71	**7.09**	11.3	0.09	0.04	<0.02	<0.02	<0.05
MW02	On-site	Q1	20/10/2022	308730	-	-	**49**	-	**19**	-	-	-	-	-	**2.0**	-	-	-	-	-	-
MW03	On-site	Q1	20/10/2022	308730	-	-	**240**	-	**26**	-	-	-	-	-	**14**	-	-	-	-	-	-
			26/04/2023	EM2307449	7.93	8.68	**60.2**	1.14	**12.9**	<0.02	1.1	2.13	9.96	3.31	**3.57**	11.9	<0.02	<0.02	<0.02	<0.02	<0.05
MW04	On-site	Q1	20/10/2022	308730	-	-	**86**	-	**30**	-	-	-	-	-	**3.2**	-	-	-	-	-	-
GW201b	On-site	Q2	20/10/2022	308730	0.061*	0.097	**0.64**	0.021	**0.31***	<0.002	0.01	0.034	0.11	0.019	0.023	0.077	<0.002	<0.002	<0.005	<0.01	<0.05
			21/10/2022	308746	0.074	0.085	**0.604**	0.022	**0.419**	<0.002	0.02	0.046	0.131	0.024	0.037	0.084	<0.002	<0.002	<0.002	<0.002	<0.005
			28/03/2023	EM2305704	0.048	0.072	**0.446**	0.017	**0.213**	<0.002	0.01	0.028	0.096	0.017	0.024	0.049	<0.002	<0.002	<0.002	<0.002	<0.005
GW8001b	On-site	T1	20/10/2022	308730	0.058	0.096	**0.55**	0.017	**0.31**	<0.002	0.047	0.12	0.20	0.036	0.026	0.092	<0.002	<0.002	<0.005	<0.01	<0.05
			26/04/2023	EM2307449 / EM2308182	0.004*	0.003	0.028	0.001*	0.035*	<0.002	<0.01	0.007	0.011	0.003	0.003	0.008	<0.002	<0.002	<0.002	<0.002	<0.005
MW05	Off-site	Q1	28/03/2023	EM2305704	0.113	0.135	**1.08**	0.045	**1.33**	<0.002	0.05	0.107	0.339	0.052	0.073	0.102	<0.002	<0.002	<0.002	<0.002	<0.005
MW07	Off-site	Q1	26/04/2023	EM2307449	<0.02	<0.02	**0.08**	<0.02	0.06	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05
EPA_GW07	Off-site	Q1	26/04/2023	EM2307449	<0.02	<0.02	**0.13**	<0.02	**0.08**	<0.02	<0.1	0.04	0.03	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05

Comments
* Higher value adopted from QA/QC analysis
#1 NL - not limiting; derived water HSL exceeds water solubility limit

Environmental Standards
National Health and Medical Research Council, January 2022, ADWG 2011 Health (v3.7 updated 2022)
National Health and Medical Research Council 2008 and ADWG 2011 Recreational (10x ADWG 2011 drinking water guideline values) apply to domestic settings (e.g. private residential bores) only.
HEPA, Jan 2020, PFAS NEMP 2.0 2020 Health Drinking Water

					PFAS - Perfluoroalkyl Sulfonamide				PFAS - Perfluoroalkyl Sulfonamide			PFAS - Fluorotelomer Sulfonic Acids				PFAS - Sums			
					Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-Methyl perfluorooctane sulfonamidoethanol (MEFOSE)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer Sulfonate (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Sum of PFHxS and PFOS	Sum of US EPA PFAS (PFOS + PFOA)*	PFAS (Sum of Total)	PFAS (Sum of Total)(WA DER List)
					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					0.002	0.005	0.005	0.002	0.005	0.005	0.002	0.001	0.0004	0.0004	0.001	0.0002	0.0002	0.0002	0.002
NEPM 2013 Table 1A(4) HSL D Comm/Ind GW for Vapour Intrusion, Clay, 2-4 mbgl																			
NEPM 2013 Table 1A(4) HSL D Comm/Ind GW for Vapour Intrusion, Clay, >8 mbgl																			
NHMRC 2008 / ADWG 2011 Recreational Water - domestic setting only																0.7			
ADWG 2011 Health (v3.7 updated 2022)																**0.07**			
PFAS NEMP 2.0 2020 Health Drinking Water																**0.07**			
Location	**Monitoring Zone**	**Aquifer**	**Date**	**Lab Report**															
GW7003b	On-site	Q1	20/10/2022	308730	<0.01	<0.05	<0.1	<0.002	<0.05	<0.5	<0.002	<0.001	0.0067	<0.0004	<0.002	**3.2**	2.0	3.7	-
			21/10/2022	308746	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW8002b	On-site	Q1	20/10/2022	308730	<0.10	<0.50	<1.0	<0.020	<0.50	<5.0	<0.020	<0.010	11	<0.020	<0.02	**86**	44	170	-
			21/10/2022	308746	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			28/03/2023	EM2305704	0.016*	<0.010*	<0.010*	<0.005*	<0.010*	<0.010*	<0.005*	0.003*	12.0*	0.009*	<0.005*	**74.0***	27.8*	122*	112*
MW01	On-site	Q1	26/04/2023	EM2307449 / EM2308182	<0.02	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.70	<0.05	<0.05	**222**	-	332	297
MW02	On-site	Q1	20/10/2022	308730	-	-	-	-	-	-	-	-	0.06	<0.02	-	**68**	21	70	-
MW03	On-site	Q1	20/10/2022	308730	-	-	-	-	-	-	-	-	0.67	<0.02	-	**260**	40	280	-
			26/04/2023	EM2307449	<0.02	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.12	<0.05	<0.05	**73.1**	-	123	101
MW04	On-site	Q1	20/10/2022	308730	-	-	-	-	-	-	-	-	6.9	<0.02	-	**120**	33	130	-
GW201b	On-site	Q2	20/10/2022	308730	<0.01	<0.05	<0.1	<0.002	<0.05	<0.5	<0.002	<0.001	0.022	0.0007	<0.002	**0.95**	0.34*	1.4	-
			21/10/2022	308746	<0.002	<0.005	<0.005	<0.002	<0.005	<0.005	<0.002	<0.005	0.029	<0.005	<0.005	**1.02**	-	1.58	1.38
			28/03/2023	EM2305704	<0.002	<0.005	<0.005	<0.002	<0.005	<0.005	<0.002	<0.005	0.022	<0.005	<0.005	**0.659**	-	1.04	0.904
GW8001b	On-site	T1	20/10/2022	308730	<0.01	<0.05	<0.1	<0.002	<0.05	<0.5	<0.002	<0.001	0.68	0.002	<0.002	**0.86**	0.34	2.2	-
			26/04/2023	EM2307449 / EM2308182	<0.005*	<0.005	<0.005	<0.005*	<0.005	<0.005	<0.005*	<0.005	0.081	<0.005	<0.005	0.061*	0.038	0.176	0.165
MW05	Off-site	Q1	28/03/2023	EM2305704	<0.002	<0.005	<0.005	<0.002	<0.005	<0.005	<0.002	<0.005	0.018	<0.005	<0.005	**2.41**	-	3.44	3.16
MW07	Off-site	Q1	26/04/2023	EM2307449	<0.02	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.05	<0.05	<0.05	**0.14**	-	0.14	0.14
EPA_GW07	Off-site	Q1	26/04/2023	EM2307449	<0.02	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.05	<0.05	<0.05	**0.21**	-	0.28	0.28

Comments
* Higher value adopted from QA/QC analysis
#1 NL - not limiting; derived water HSL exceeds water solubility limit

Environmental Standards
National Health and Medical Research Council, January 2022, ADWG 2011 Health (v3.7 updated 2022)
National Health and Medical Research Council 2008 and ADWG 2011 Recreational (10x ADWG 2011 drinking water guideline values) apply to domestic settings (e.g. private residential bores) only.
HEPA, Jan 2020, PFAS NEMP 2.0 2020 Health Drinking Water

					BTEXN							TRH - NEPM 2013							TRH - NEPM 2013 - SG Cleanup				Metals	
					Benzene	Toluene	Ethylbenzene	Xylene (o)	Xylene (m & p)	Xylene Total	BTEX (Sum of Total) - Lab Calc	Naphthalene	F1 (C6-C10 minus BTEX)	C6-C10 Fraction	F2 (>C10-C16 minus Naphthalene)	>C10-C16 Fraction	F3 (>C16-C34 Fraction)	F4 (>C34-C40 Fraction)	>C10-C40 (Sum of Total)	>C10-C16 SG Cleanup	>C16-C34 SG Cleanup	>C34-C40 SG Cleanup	>C10-C40 (sum) SG Cleanup	Arsenic	Cadmium
					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	µg/L	µg/L	mg/L	mg/L
EQL					1	1	1	1	2	2	1	1	10	10	50	50	100	100	50	50	100	100	100	0.001	0.0001
NEPM 2013 Table 1A(4) HSL D Comm/Ind GW for Vapour Intrusion, Clay, 2-4 mbgl					30,000	NL #1	NL #1			NL #1		NL #1	NL #1		NL #1										
NEPM 2013 Table 1A(4) HSL D Comm/Ind GW for Vapour Intrusion, Clay, >8 mbgl					35,000	NL #1	NL #1			NL #1		NL #1	NL #1		NL #1										
NHMRC 2008 / ADWG 2011 Recreational Water - domestic setting only					10	8,000	3,000			6,000														0.1	0.02
ADWG 2011 Health (v3.7 updated 2022)					**1**	**800**	**300**			**600**														**0.01**	**0.002**
PFAS NEMP 2.0 2020 Health Drinking Water																									
Location	**Monitoring Zone**	**Aquifer**	**Date**	**Lab Report**																					
GW7003b	On-site	Q1	20/10/2022	308730	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			21/10/2022	308746	<1	<1	<1	<1	<2	-	-	<1	<10	<10	<50	<50	<100	<100	<50	-	-	-	-	-	-
GW8002b	On-site	Q1	20/10/2022	308730	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			21/10/2022	308746	<1	<1	<1	<1	<2	-	-	<1	<10	<10	<50	<50	190	<100	190	<50	<100	<100	-	-	-
			28/03/2023	EM2305704	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW01	On-site	Q1	26/04/2023	EM2307449 / EM2308182	<1	<2	<2	<2	<2	<2	<1	<5	<20	<20	<100	<100	130	<100	130	-	-	-	-	**0.023**	<0.0001
MW02	On-site	Q1	20/10/2022	308730	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW03	On-site	Q1	20/10/2022	308730	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			26/04/2023	EM2307449	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW04	On-site	Q1	20/10/2022	308730	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW201b	On-site	Q2	20/10/2022	308730	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			21/10/2022	308746	<1	<1	<1	<1	<2	-	-	<1	71	71	<50	<50	<100	<100	<50	-	-	-	-	-	-
			28/03/2023	EM2305704	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW8001b	On-site	T1	20/10/2022	308730	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			26/04/2023	EM2307449 / EM2308182	<1	<2	<2	<2	<2	<2	<1	<10*	<20	<20	<100	<100	1,080*	430*	1,510*	<100	850	300	1,150	**0.065**	0.0002
MW05	Off-site	Q1	28/03/2023	EM2305704	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW07	Off-site	Q1	26/04/2023	EM2307449	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EPA_GW07	Off-site	Q1	26/04/2023	EM2307449	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Comments
* Higher value adopted from QA/QC analysis
#1 NL - not limiting; derived water HSL exceeds water solubility limit

Environmental Standards
National Health and Medical Research Council, January 2022, ADWG 2011 Health (v3.7 updated 2022)
National Health and Medical Research Council 2008 and ADWG 2011 Recreational (10x ADWG 2011 drinking water guideline values) apply to domestic settings (e.g. private residential bores) only.
HEPA, Jan 2020, PFAS NEMP 2.0 2020 Health Drinking Water

					Metals						Inorganics	Major Ions									Acidity & Alkalinity				
					Chromium (III+VI)	Copper	Lead	Mercury	Nickel	Zinc	Total Dissolved Solids	Calcium (filtered)	Magnesium (filtered)	Potassium (filtered)	Sodium (filtered)	Chloride	Cations Total	Anions Total	Ionic Balance	Hardness (filtered)	Alkalinity (Carbonate as CaCO3)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Hydroxide as CaCO3)	Alkalinity (total as CaCO3)
					mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	%	mg/L	mg/L	mg/L	mg/L	mg/L
EQL					0.001	0.001	0.001	0.0001	0.001	0.005	10	0.5	0.5	0.5	0.5	1	0.01	0.01	0.01	3	1	1	1	1
NEPM 2013 Table 1A(4) HSL D Comm/Ind GW for Vapour Intrusion, Clay, 2-4 mbgl																								
NEPM 2013 Table 1A(4) HSL D Comm/Ind GW for Vapour Intrusion, Clay, >8 mbgl																								
NHMRC 2008 / ADWG 2011 Recreational Water - domestic setting only						20	0.1	0.01	0.2															
ADWG 2011 Health (v3.7 updated 2022)						**2**	**0.01**	**0.001**	**0.02**															
PFAS NEMP 2.0 2020 Health Drinking Water																								
Location	**Monitoring Zone**	**Aquifer**	**Date**	**Lab Report**																				
GW7003b	On-site	Q1	20/10/2022	308730	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			21/10/2022	308746	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW8002b	On-site	Q1	20/10/2022	308730	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			21/10/2022	308746	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			28/03/2023	EM2305704	-	-	-	-	-	-	-	20	33	9.0	1,290	932	60.0	64.7	3.73	-	37	1,420	<1	1,460
MW01	On-site	Q1	26/04/2023	EM2307449 / EM2308182	0.001	0.001	<0.001	<0.0001	0.006	<0.005	4,580	-	-	-	-	-	-	-	-	-	-	-	-	-
MW02	On-site	Q1	20/10/2022	308730	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW03	On-site	Q1	20/10/2022	308730	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			26/04/2023	EM2307449	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW04	On-site	Q1	20/10/2022	308730	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW201b	On-site	Q2	20/10/2022	308730	-	-	-	-	-	-	-	13	20	9.5	740	800	-	-	-6.00	120	<5	720	<5	720
			21/10/2022	308746	-	-	-	-	-	-	-	13	21	9.0	911	961	42.2	44.8	2.97	-	24	728	<1	752
			28/03/2023	EM2305704	-	-	-	-	-	-	-	11	20	11	805	906	37.5	41.9	5.51	-	38	650	<1	689
GW8001b	On-site	T1	20/10/2022	308730	-	-	-	-	-	-	-	37	<0.5	19	240	220	-	-	-3.0	92	100	<5	100	200
			26/04/2023	EM2307449 / EM2308182	0.109	0.053	**0.115**	<0.0001	**0.043**	0.160	1,770	21	20	20	342	364	18.1	21.1	7.67	-	22	383	<1	405
MW05	Off-site	Q1	28/03/2023	EM2305704	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW07	Off-site	Q1	26/04/2023	EM2307449	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EPA_GW07	Off-site	Q1	26/04/2023	EM2307449	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Comments
* Higher value adopted from QA/QC analysis
#1 NL - not limiting; derived water HSL exceeds water solubility limit

Environmental Standards
National Health and Medical Research Council, January 2022, ADWG 2011 Health (v3.7 updated 2022)
National Health and Medical Research Council 2008 and ADWG 2011 Recreational (10x ADWG 2011 drinking water guideline values) apply to domestic settings (e.g. private residential bores) only.
HEPA, Jan 2020, PFAS NEMP 2.0 2020 Health Drinking Water

						PFAS - Perfluoroalkyl Sulfonic Acids						PFAS - Perfluoroalkyl Carboxylic Acids										
						Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecanesulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)
						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						0.0004	0.001	0.0002	0.001	0.0002	0.001	0.002	0.001	0.0004	0.0004	0.0002	0.001	0.001	0.001	0.001	0.001	0.001
NEPM 2013 Table 1A(4) HSL D Comm/Ind GW for Vapour Intrusion, Clay, 2-4 mbgl																						
NEPM 2013 Table 1A(4) HSL D Comm/Ind GW for Vapour Intrusion, Clay, >8 mbgl																						
NHMRC 2008 / ADWG 2011 Recreational Water - domestic setting only								0.7		0.7						5.6						
ADWG 2011 Health (v3.7 updated 2022)																**0.56**						
PFAS NEMP 2.0 2020 Health Drinking Water								**0.07**		**0.07**						**0.56**						
Location	**Monitoring Zone**	**Aquifer**	**Methodology**	**Date**	**Lab Report**																	
GW7003b #4	On-site	Q1	Hydrasleeve	29/01/2021	T2D 771124	-	-	**0.99**	-	**1.6**	-	-	-	-	-	0.11	-	-	-	-	-	-
GW7003b	On-site	Q1	Hydrasleeve	20/10/2022	308730	0.090	0.11	**1.2**	0.074	**2.0**	<0.002	0.048	0.021	0.067	0.016	0.051	0.027	<0.002	<0.002	<0.005	<0.01	<0.05
				21/10/2022	308746	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW8002b #4	On-site	Q1	Hydrasleeve	23/12/2020	T2D 765628	-	-	**23**	-	**22**	-	-	-	-	-	**0.88**	-	-	-	-	-	-
GW8002b	On-site	Q1	Hydrasleeve	20/10/2022	308730	4.6	5.7	**44**	2	**42**	<0.020	1.6	5.1	42	1.9	**2.2**	4.3	<0.020	<0.020	<0.050	<0.10	<0.50
				21/10/2022	308746	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			Low-flow	28/03/2023	EM2305704	4.38*	4.96*	**39.4***	1.79*	**34.6***	0.004*	0.7	5.47	12.2*	1.77*	**2.10***	2.96*	0.006*	<0.02*	<0.004*	<0.004*	<0.010*
MW01	On-site	Q1	Low-flow	26/04/2023	EM2307449 / EM2308182	10.2	17.2	**99.6**	6.74	**122**	<0.02	1.2	11	39.2	5.71	**7.09**	11.3	0.09	0.04	<0.02	<0.02	<0.05
MW02	On-site	Q1	Hydrasleeve	20/10/2022	308730	-	-	**49**	-	**19**	-	-	-	-	-	**2**	-	-	-	-	-	-
MW03	On-site	Q1	Hydrasleeve	20/10/2022	308730	-	-	**240**	-	**26**	-	-	-	-	-	**14**	-	-	-	-	-	-
			Low-flow	26/04/2023	EM2307449	7.93	8.68	**60.2**	1.14	**12.9**	<0.02	1.1	2.13	9.96	3.31	**3.57**	11.9	<0.02	<0.02	<0.02	<0.02	<0.05
MW04	On-site	Q1	Hydrasleeve	20/10/2022	308730	-	-	**86**	-	**30**	-	-	-	-	-	**3.2**	-	-	-	-	-	-
GW201b #2	On-site	Q2	Hydrasleeve	21/01/2021	T2D 769562	-	-	**0.51**	-	**0.32**	-	-	-	-	-	**0.018**	-	-	-	-	-	-
GW201b	On-site	Q2	Hydrasleeve	20/10/2022	308730	0.061*	0.097	**0.64**	0.021	**0.31***	<0.002	0.01	0.034	0.11	0.019	0.023	0.077	<0.002	<0.002	<0.005	<0.01	<0.05
				21/10/2022	308746	0.074	0.085	**0.604**	0.022	**0.419**	<0.002	0.02	0.046	0.131	0.024	0.037	0.084	<0.002	<0.002	<0.002	<0.002	<0.005
			Low-flow	28/03/2023	EM2305704	0.048	0.072	**0.446**	0.017	**0.213**	<0.002	0.01	0.028	0.096	0.017	0.024	0.049	<0.002	<0.002	<0.002	<0.002	<0.005
GW8001b #2	On-site	T1	Hydrasleeve	23/12/2020	T2D 765628	-	-	**0.15**	-	**0.16**	-	-	-	-	-	0.027	-	-	-	-	-	-
GW8001b	On-site	T1	Hydrasleeve	20/10/2022	308730	0.058	0.096	**0.55**	0.017	**0.31**	<0.002	0.047	0.12	0.20	0.036	0.026	0.092	<0.002	<0.002	<0.005	<0.01	<0.05
			Low-flow	26/04/2023	EM2307449 / EM2308182	0.004*	0.003	0.028	0.001*	0.035*	<0.002	<0.01	0.007	0.011	0.003	0.003	0.008	<0.002	<0.002	<0.002	<0.002	<0.005
MW05	Off-site	Q1	Low-flow	28/03/2023	EM2305704	0.113	0.135	**1.08**	0.045	**1.33**	<0.002	0.05	0.107	0.339	0.052	0.073	0.102	<0.002	<0.002	<0.002	<0.002	<0.005
MW07	Off-site	Q1	Low-flow	26/04/2023	EM2307449	<0.02	<0.02	**0.08**	<0.02	0.06	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05
EPA_GW07 #3	Off-site	Q1	Low-flow	16/09/2021	EM2118630	<0.02	<0.02	**0.13**	<0.02	**0.09**	<0.02	<0.1	0.03	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05
				03/05/2022	EM2208328	0.02	-	**0.11**	-	0.07	-	<0.1	0.02	<0.02	<0.02	<0.01	-	-	-	-	-	-
			Hydrasleeve	03/05/2022	EM2208328	0.02	-	**0.1**	-	0.06	-	<0.1	0.02	<0.02	<0.02	<0.01	-	-	-	-	-	-
			Low-flow	01/12/2022	EM2224053	<0.02	-	**0.11**	-	**0.08**	-	<0.1	0.02	<0.02	<0.02	<0.01	-	-	-	-	-	-
EPA_GW07	Off-site	Q1	Low-flow	26/04/2023	EM2307449	<0.02	<0.02	**0.13**	<0.02	**0.08**	<0.02	<0.1	0.04	0.03	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05

Comments
* Higher value adopted from QA/QC analysis
#1 NL - not limiting; derived water HSL exceeds water solubility limit
#2 T2D Geoventure 2021, North South Corridor (Torrens to Darlington) Stage 1, 1a and 1b Ground Investigation Contamination Factual Report
#3 Senversa 2023, Stage 4 Environmental Site Assessment, Melrose Park EPA Assessment Area

Environmental Standards
National Health and Medical Research Council, January 2022, ADWG 2011 Health (v3.7 updated 2022)
National Health and Medical Research Council 2008 and ADWG 2011 Recreational (10x ADWG 2011 drinking water guideline values) apply to domestic settings (e.g. private residential bores) only.
HEPA, Jan 2020, PFAS NEMP 2.0 2020 Health Drinking Water

						PFAS - Perfluoroalkyl Sulfonamide							PFAS - Fluorotelomer Sulfonic Acids				PFAS - Sums			
						Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-Methyl perfluorooctane sulfonamidoethanol (MEFOSE)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer Sulfonate (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Sum of PFHxS and PFOS	Sum of US EPA PFAS (PFOS + PFOA)*	PFAS (Sum of Total)	PFAS (Sum of Total)(WA DER List)
						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						0.002	0.005	0.005	0.002	0.005	0.005	0.002	0.001	0.0004	0.0004	0.001	0.0002	0.0002	0.0002	0.002
NEPM 2013 Table 1A(4) HSL D Comm/Ind GW for Vapour Intrusion, Clay, 2-4 mbgl																				
NEPM 2013 Table 1A(4) HSL D Comm/Ind GW for Vapour Intrusion, Clay, >8 mbgl																				
NHMRC 2008 / ADWG 2011 Recreational Water - domestic setting only																	0.7			
ADWG 2011 Health (v3.7 updated 2022)																	**0.07**			
PFAS NEMP 2.0 2020 Health Drinking Water																	**0.07**			
Location	**Monitoring Zone**	**Aquifer**	**Methodology**	**Date**	**Lab Report**															
GW7003b #4	On-site	Q1	Hydrasleeve	29/01/2021	T2D 771124	-	-	-	-	-	-	-	-	0.022	-	-	**2.59**	1.71	2.7	-
GW7003b	On-site	Q1	Hydrasleeve	20/10/2022	308730	<0.01	<0.05	<0.1	<0.002	<0.05	<0.5	<0.002	<0.001	0.0067	<0.0004	<0.002	**3.2**	2.0	3.7	-
				21/10/2022	308746	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW8002b #4	On-site	Q1	Hydrasleeve	23/12/2020	T2D 765628	-	-	-	-	-	-	-	-	0.16	-	-	**45**	22.88	46	-
GW8002b	On-site	Q1	Hydrasleeve	20/10/2022	308730	<0.10	<0.50	<1.0	<0.020	<0.50	<5.0	<0.020	<0.010	11	<0.020	<0.02	**86**	44	170	-
				21/10/2022	308746	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			Low-flow	28/03/2023	EM2305704	0.016*	<0.010*	<0.010*	<0.005*	<0.010*	<0.010*	<0.005*	0.003*	12.0*	0.009*	<0.005*	**74.0***	27.8*	122*	112*
MW01	On-site	Q1	Low-flow	26/04/2023	EM2307449 / EM2308182	<0.02	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.70	<0.05	<0.05	**222**	-	332	297
MW02	On-site	Q1	Hydrasleeve	20/10/2022	308730	-	-	-	-	-	-	-	-	0.06	<0.02	-	**68**	21	70	-
MW03	On-site	Q1	Hydrasleeve	20/10/2022	308730	-	-	-	-	-	-	-	-	0.67	<0.02	-	**260**	40	280	-
			Low-flow	26/04/2023	EM2307449	<0.02	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.12	<0.05	<0.05	**73.1**	-	123	101
MW04	On-site	Q1	Hydrasleeve	20/10/2022	308730	-	-	-	-	-	-	-	-	6.9	<0.02	-	**120**	33	130	-
GW201b [#2]	On-site	Q2	Hydrasleeve	21/01/2021	T2D 769562	-	-	-	-	-	-	-	-	0.010	-	-	**0.83**	0.338	-	-
GW201b	On-site	Q2	Hydrasleeve	20/10/2022	308730	<0.01	<0.05	<0.1	<0.002	<0.05	<0.5	<0.002	<0.001	0.022	0.0007	<0.002	**0.95**	0.34*	1.4	-
				21/10/2022	308746	<0.002	<0.005	<0.005	<0.002	<0.005	<0.005	<0.002	<0.005	0.029	<0.005	<0.005	**1.02**	-	1.58	1.38
			Low-flow	28/03/2023	EM2305704	<0.002	<0.005	<0.005	<0.002	<0.005	<0.005	<0.002	<0.005	0.022	<0.005	<0.005	**0.659**	-	1.04	0.904
GW8001b [#2]	On-site	T1	Hydrasleeve	23/12/2020	T2D 765628	-	-	-	-	-	-	-	-	0.39	-	-	**0.31**	0.187	0.73	-
GW8001b	On-site	T1	Hydrasleeve	20/10/2022	308730	<0.01	<0.05	<0.1	<0.002	<0.05	<0.5	<0.002	<0.001	0.68	0.002	<0.002	**0.86**	0.34	2.2	-
			Low-flow	26/04/2023	EM2307449 / EM2308182	<0.005*	<0.005	<0.005	<0.005*	<0.005	<0.005	<0.005*	<0.005	0.081	<0.005	<0.005	0.061*	0.038	0.176	0.165
MW05	Off-site	Q1	Low-flow	28/03/2023	EM2305704	<0.002	<0.005	<0.005	<0.002	<0.005	<0.005	<0.002	<0.005	0.018	<0.005	<0.005	**2.41**	-	3.44	3.16
MW07	Off-site	Q1	Low-flow	26/04/2023	EM2307449	<0.02	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.05	<0.05	<0.05	**0.14**	-	0.14	0.14
EPA_GW07 [#3]	Off-site	Q1	Low-flow	16/09/2021	EM2118630	<0.02	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.05	<0.05	<0.05	**0.22**	-	0.25	-
				03/05/2022	EM2208328	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	<0.05	**0.18**	-	-	-
			Hydrasleeve	03/05/2022	EM2208328	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	<0.05	**0.16**	-	-	-
			Low-flow	01/12/2022	EM2224053	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	<0.05	**0.19**	-	-	-
EPA_GW07	Off-site	Q1	Low-flow	26/04/2023	EM2307449	<0.02	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.05	<0.05	<0.05	**0.21**	-	0.28	0.28

Comments
* Higher value adopted from QA/QC analysis
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#2 T2D Geoventure 2021, North South Corridor (Torrens to Darlington) Stage 1, 1a and 1b Ground Investigation Contamination Factual Report
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HEPA, Jan 2020, PFAS NEMP 2.0 2020 Health Drinking Water

						BTEXN								TRH - NEPM 2013							TRH - NEPM 2013 - SG Cleanup			
						Benzene	Toluene	Ethylbenzene	Xylene (o)	Xylene (m & p)	Xylene Total	BTEX (Sum of Total) - Lab Calc	Naphthalene	F1 (C6-C10 minus BTEX)	C6-C10 Fraction	F2 (>C10-C16 minus Naphthalene)	>C10-C16 Fraction	F3 (>C16-C34 Fraction)	F4 (>C34-C40 Fraction)	>C10-C40 (Sum of Total)	>C10-C16 SG Cleanup	>C16-C34 SG Cleanup	>C34-C40 SG Cleanup	>C10-C40 (sum) SG Cleanup
						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	µg/L	µg/L
EQL						1	1	1	1	2	2	1	1	10	10	50	50	100	100	50	50	100	100	100
NEPM 2013 Table 1A(4) HSL D Comm/Ind GW for Vapour Intrusion, Clay, 2-4 mbgl						30,000	NL #1	NL #1			NL #1		NL #1	NL #1		NL #1								
NEPM 2013 Table 1A(4) HSL D Comm/Ind GW for Vapour Intrusion, Clay, >8 mbgl						35,000	NL #1	NL #1			NL #1		NL #1	NL #1		NL #1								
NHMRC 2008 / ADWG 2011 Recreational Water - domestic setting only						10	8,000	3,000			6,000													
ADWG 2011 Health (v3.7 updated 2022)						**1**	**800**	**300**			**600**													
PFAS NEMP 2.0 2020 Health Drinking Water																								
Location	**Monitoring Zone**	**Aquifer**	**Methodology**	**Date**	**Lab Report**																			
GW7003b #4	On-site	Q1	Hydrasleeve	29/01/2021	T2D 771124	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW7003b	On-site	Q1	Hydrasleeve	20/10/2022	308730	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				21/10/2022	308746	<1	<1	<1	<1	<2	-	-	<1	<10	<10	<50	<50	<100	<100	<50	-	-	-	-
GW8002b #4	On-site	Q1	Hydrasleeve	23/12/2020	T2D 765628	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW8002b	On-site	Q1	Hydrasleeve	20/10/2022	308730	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				21/10/2022	308746	<1	<1	<1	<1	<2	-	-	<1	<10	<10	<50	<50	190	<100	190	<50	<100	<100	-
			Low-flow	28/03/2023	EM2305704	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW01	On-site	Q1	Low-flow	26/04/2023	EM2307449 / EM2308182	<1	<2	<2	<2	<2	<2	<1	<5	<20	<20	<100	<100	130	<100	130	-	-	-	-
MW02	On-site	Q1	Hydrasleeve	20/10/2022	308730	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW03	On-site	Q1	Hydrasleeve	20/10/2022	308730	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			Low-flow	26/04/2023	EM2307449	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW04	On-site	Q1	Hydrasleeve	20/10/2022	308730	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW201b #2	On-site	Q2	Hydrasleeve	21/01/2021	T2D 769562	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW201b	On-site	Q2	Hydrasleeve	20/10/2022	308730	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				21/10/2022	308746	<1	<1	<1	<1	<2	-	-	<1	71	71	<50	<50	<100	<100	<50	-	-	-	-
			Low-flow	28/03/2023	EM2305704	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW8001b #2	On-site	T1	Hydrasleeve	23/12/2020	T2D 765628	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW8001b	On-site	T1	Hydrasleeve	20/10/2022	308730	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			Low-flow	26/04/2023	EM2307449 / EM2308182	<1	<2	<2	<2	<2	<2	<1	<10*	<20	<20	<100	<100	1,080*	430*	1,510*	<100	850	300	1,150
MW05	Off-site	Q1	Low-flow	28/03/2023	EM2305704	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW07	Off-site	Q1	Low-flow	26/04/2023	EM2307449	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EPA_GW07 #3	Off-site	Q1	Low-flow	16/09/2021	EM2118630	<1	<2	<2	<2	<2	<2	<1	<5	<20	<20	<100	<100	<100	<100	<100	-	-	-	-
				03/05/2022	EM2208328	-	-	-	-	-	-	-	<5	-	-	-	-	-	-	-	-	-	-	-
			Hydrasleeve	03/05/2022	EM2208328	-	-	-	-	-	-	-	<5	-	-	-	-	-	-	-	-	-	-	-
			Low-flow	01/12/2022	EM2224053	-	-	-	-	-	-	-	<5	-	-	-	-	-	-	-	-	-	-	-
EPA_GW07	Off-site	Q1	Low-flow	26/04/2023	EM2307449	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Comments
* Higher value adopted from QA/QC analysis
#1 NL - not limiting; derived water HSL exceeds water solubility limit
#2 T2D Geoventure 2021, North South Corridor (Torrens to Darlington) Stage 1, 1a and 1b Ground Investigation Contamination Factual Report
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Environmental Standards
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National Health and Medical Research Council 2008 and ADWG 2011 Recreational (10x ADWG 2011 drinking water guideline values) apply to domestic settings (e.g. private residential bores) only.
HEPA, Jan 2020, PFAS NEMP 2.0 2020 Health Drinking Water

						Metals		Metals						Inorga-nics	Major Ions									Acidity & Alkalinity				
						Arsenic	Cadmium	Chromium (III+VI)	Copper	Lead	Mercury	Nickel	Zinc	Total Dissolved Solids	Calcium (filtered)	Magnesium (filtered)	Potassium (filtered)	Sodium (filtered)	Chloride	Cations Total	Anions Total	Ionic Balance	Hardness (filtered)	Alkalinity (Carbonate as CaCO3)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Hydroxide as CaCO3)	Alkalinity (total as CaCO3)
						mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	%	mg/L	mg/L	mg/L	mg/L	mg/L
EQL						0.001	0.0001	0.001	0.001	0.001	0.0001	0.001	0.005	10	0.5	0.5	0.5	0.5	1	0.01	0.01	0.01	3	1	1	1	1
NEPM 2013 Table 1A(4) HSL D Comm/Ind GW for Vapour Intrusion, Clay, 2-4 mbgl																												
NEPM 2013 Table 1A(4) HSL D Comm/Ind GW for Vapour Intrusion, Clay, >8 mbgl																												
NHMRC 2008 / ADWG 2011 Recreational Water - domestic setting only						0.1	0.02		20	0.1	0.01	0.2																
ADWG 2011 Health (v3.7 updated 2022)						**0.01**	**0.002**		**2**	**0.01**	**0.001**	**0.02**																
PFAS NEMP 2.0 2020 Health Drinking Water																												
Location	**Monitoring Zone**	**Aquifer**	**Methodology**	**Date**	**Lab Report**																							
GW7003b #4	On-site	Q1	Hydrasleeve	29/01/2021	T2D 771124	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW7003b	On-site	Q1	Hydrasleeve	20/10/2022	308730	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				21/10/2022	308746	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW8002b #4	On-site	Q1	Hydrasleeve	23/12/2020	T2D 765628	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW8002b	On-site	Q1	Hydrasleeve	20/10/2022	308730	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				21/10/2022	308746	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			Low-flow	28/03/2023	EM2305704	-	-	-	-	-	-	-	-	-	20	33	9.0	1,290	932	60.0	64.7	3.73	-	37	1,420	<1	1,460
MW01	On-site	Q1	Low-flow	26/04/2023	EM2307449 / EM2308182	**0.023**	<0.0001	0.001	0.001	<0.001	<0.0001	0.006	<0.005	4,580	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW02	On-site	Q1	Hydrasleeve	20/10/2022	308730	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW03	On-site	Q1	Hydrasleeve	20/10/2022	308730	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			Low-flow	26/04/2023	EM2307449	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW04	On-site	Q1	Hydrasleeve	20/10/2022	308730	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW201b #2	On-site	Q2	Hydrasleeve	21/01/2021	T2D 769562	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW201b	On-site	Q2	Hydrasleeve	20/10/2022	308730	-	-	-	-	-	-	-	-	-	13	20	9.5	740	800	-	-	-6.00	120	<5	720	<5	720
				21/10/2022	308746	-	-	-	-	-	-	-	-	-	13	21	9.0	911	961	42.2	44.8	2.97	-	24	728	<1	752
			Low-flow	28/03/2023	EM2305704	-	-	-	-	-	-	-	-	-	11	20	11	805	906	37.5	41.9	5.51	-	38	650	<1	689
GW8001b #2	On-site	T1	Hydrasleeve	23/12/2020	T2D 765628	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW8001b	On-site	T1	Hydrasleeve	20/10/2022	308730	-	-	-	-	-	-	-	-	-	37	<0.5	19	240	220	-	-	-3.0	92	100	<5	100	200
			Low-flow	26/04/2023	EM2307449 / EM2308182	**0.065**	0.0002	0.109	0.053	**0.115**	<0.0001	**0.043**	0.160	1,770	21	20	20	342	364	18.1	21.1	7.67	-	22	383	<1	405
MW05	Off-site	Q1	Low-flow	28/03/2023	EM2305704	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW07	Off-site	Q1	Low-flow	26/04/2023	EM2307449	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EPA_GW07 #3	Off-site	Q1	Low-flow	16/09/2021	EM2118630	<0.001	<0.0001	0.053	0.004	<0.001	<0.0001	0.008	0.005	4,850	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				03/05/2022	EM2208328	-	-	-	-	-	-	-	-	4,760	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			Hydrasleeve	03/05/2022	EM2208328	-	-	-	-	-	-	-	-	4,730	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			Low-flow	01/12/2022	EM2224053	-	-	-	-	-	-	-	-	4,870	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EPA_GW07	Off-site	Q1	Low-flow	26/04/2023	EM2307449	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Comments
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#2 T2D Geoventure 2021, North South Corridor (Torrens to Darlington) Stage 1, 1a and 1b Ground Investigation Contamination Factual Report
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HEPA, Jan 2020, PFAS NEMP 2.0 2020 Health Drinking Water

Tabulated Analytical Results
Table 8
QA/QC RPD Results - Soil

SA Metropolitan Fire Service
12566684
St Marys Fire Station DSI

Field or Interlab Duplicates

Lab Report Number			33940-A	33940		33940-A	EM2219930		33940	33940		33940	EM2219930		33940	33940		33940	EM2219930	
Field ID			BH09_1.0-1.2	FD02		BH09_1.0-1.2	FS02		BH14_0.2-0.4	FD03		BH14_0.2-0.4	FS03		BH06_0.2-0.4	FD06		BH06_0.2-0.4	FS06	
Matrix Type			Soil	Soil		Soil	Soil		Soil	Soil		Soil	Soil		Soil	Soil		Soil	Soil	
Date			05/10/2022	05/10/2022	RPD	05/10/2022	05/10/2022	RPD	05/10/2022	05/10/2022	RPD	05/10/2022	05/10/2022	RPD	06/10/2022	06/10/2022	RPD	06/10/2022	06/10/2022	RPD
Analyte	Unit	EQL																		
Inorganics																				
Moisture (%)	%	0.1	20	19	5	20	15.6	25	10	10	0	10	11.0	10	13	11	17	13	11.3	14
PFAS - Perfluoroalkyl Sulfonic Acids																				
Perfluorohexane sulfonic acid (PFHxS)	mg/kg	0.0001	0.0021	0.0008	**90**	0.0021	0.0023	9	0.012	0.011	9	0.012	0.0126	5	0.0047	0.0039	19	0.0047	0.0036	27
Perfluorooctane sulfonic acid (PFOS)	mg/kg	0.0001	0.0001	0.0002	**67**	0.0001	<0.0002	-	4.1	4.1	0	4.1	3.24	23	0.048	0.037	26	0.048	0.0302	**46**
PFAS - Perfluoroalkyl Carboxylic Acids																				
Perfluorooctanoic acid (PFOA)	mg/kg	0.0001	0.0042	0.0015	**95**	0.0042	0.0027	**43**	0.0015	0.0014	7	0.0015	0.0013	14	0.0024	0.0016	**40**	0.0024	0.0012	**67**
PFAS - Fluorotelomer Sulfonic Acids																				
6:2 Fluorotelomer Sulfonate (6:2 FTS)	mg/kg	0.0001	<0.0001	<0.0001	-	<0.0001	<0.0005	-	<0.0001	<0.0001	-	<0.0001	<0.0005	-	<0.0001	<0.0001	-	<0.0001	<0.0005	-
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	mg/kg	0.0002	<0.0002	<0.0002	-	<0.0002	<0.0005	-	0.0051	0.0058	13	0.0051	0.0064	23	<0.0002	<0.0002	-	<0.0002	<0.0005	-
PFAS - Sums																				
Sum of PFHxS and PFOS	mg/kg	0.0001	0.0022	0.0009	**84**	0.0022	0.0023	4	4.1	4.1	0	4.1	3.25	23	0.052	0.041	24	0.052	0.0338	**42**
Sum of US EPA PFAS (PFOS + PFOA)*	mg/kg	0.0001	0.0044	0.0017	**89**	0.0044	0.0027	**48**	4.1	4.1	0	4.1	-	-	0.050	0.039	25	0.050	-	-
PFAS (Sum of Total)	mg/kg	0.0001	0.0065	0.0025	**89**	0.0065	0.0050	26	4.1	4.1	0	4.1	-	-	0.055	0.043	24	0.055	-	-

*RPDs have only been considered where a concentration is greater than 1 times the EQL.
**Elevated RPDs are highlighted as per QAQC Profile settings (Acceptable RPDs for each EQL multiplier range are: 1000 (1 - 10 x EQL); 30 (> 10 x EQL))
***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

Tabulated Analytical Results
Table 9
QA/QC RPD Results - Groundwater

SA Metropolitan Fire Service
12566684
St Marys Fire Station DSI

Field or Interlab Duplicates

Analyte	Unit	EQL	Lab Report Number	308730		308730	ES2238073		308746	308746		EM2305704	EM2305704		EM2307449	EM2307449		EM2307449	985539	
			Field ID	GW201b	FD01		GW201b	FT01		GW201b	FD01		GW8002b	FD10		GW8001b	FD01		GW8001b	FS01	
			Matrix Type	Water	Water		Water	Water		Water	Water		Water	Water		Water	Water		Water	Water	
			Date	20/10/2022	20/10/2022	RPD	20/10/2022	21/10/2022	RPD	21/10/2022	21/10/2022	RPD	28/03/2023	28/03/2023	RPD	26/04/2023	26/04/2023	RPD	26/04/2023	26/04/2023	RPD
PFAS - Perfluoroalkyl Sulfonic Acids																				
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.0004		0.060	0.061	2	0.060	0.074	21	-	-	-	4.18	4.38	5	0.003	0.003	0	0.003	0.004	29
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.001		0.097	0.094	3	0.097	0.085	13	-	-	-	-	4.96	-	0.003	0.002	**40**	0.003	0.003	0
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.0002		0.64	0.60	6	0.64	0.604	6	-	-	-	37.0	39.4	6	0.028	0.027	4	0.028	0.023	20
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.001		0.021	0.020	5	0.021	0.022	5	-	-	-	-	1.79	-	<0.002	<0.002	-	<0.002	0.001	-
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.0002		0.30	0.31	3	0.30	0.419	**33**	-	-	-	34.4	34.6	1	0.029	0.034	16	0.029	0.035	19
Perfluorodecanesulfonic acid (PFDS)	µg/L	0.001		<0.002	<0.002	-	<0.002	<0.002	-	-	-	-	-	0.004	-	<0.002	<0.002	-	<0.002	<0.001	-
PFAS - Perfluoroalkyl Carboxylic Acids																				
Perfluorobutanoic acid (PFBA)	µg/L	0.002		0.01	0.01	0	0.01	0.02	**67**	-	-	-	0.7	0.65	7	<0.01	<0.01	-	<0.01	<0.005	-
Perfluoropentanoic acid (PFPeA)	µg/L	0.001		0.034	0.033	3	0.034	0.046	30	-	-	-	5.47	5.31	3	0.007	0.005	**33**	0.007	0.007	0
Perfluorohexanoic acid (PFHxA)	µg/L	0.0004		0.11	0.10	10	0.11	0.131	17	-	-	-	11.3	12.2	8	0.011	0.010	10	0.011	0.011	0
Perfluoroheptanoic acid (PFHpA)	µg/L	0.0004		0.019	0.019	0	0.019	0.024	23	-	-	-	1.74	1.77	2	0.003	0.002	**40**	0.003	0.002	**40**
Perfluorooctanoic acid (PFOA)	µg/L	0.0002		0.023	0.022	4	0.023	0.037	**47**	-	-	-	1.94	2.10	8	0.003	0.003	0	0.003	0.003	0
Perfluorononanoic acid (PFNA)	µg/L	0.001		0.077	0.070	10	0.077	0.084	9	-	-	-	-	2.96	-	0.008	0.007	13	0.008	0.008	0
Perfluorodecanoic acid (PFDA)	µg/L	0.001		<0.002	<0.002	-	<0.002	<0.002	-	-	-	-	-	0.006	-	<0.002	<0.002	-	<0.002	<0.001	-
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.001		<0.002	<0.002	-	<0.002	<0.002	-	-	-	-	-	<0.004	-	<0.002	<0.002	-	<0.002	<0.001	-
Perfluorododecanoic acid (PFDoDA)	µg/L	0.001		<0.005	<0.005	-	<0.005	<0.002	-	-	-	-	-	<0.004	-	<0.002	<0.002	-	<0.002	<0.001	-
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.001		<0.01	<0.01	-	<0.01	<0.002	-	-	-	-	-	<0.004	-	<0.002	<0.002	-	<0.002	<0.001	-
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.001		<0.05	<0.05	-	<0.05	<0.005	-	-	-	-	-	<0.010	-	<0.005	<0.005	-	<0.005	<0.001	-
Perfluoro-n-hexadecanoic acid (PFHxDA)	µg/L	0.005		-	-	-	-	<0.005	-	-	-	-	-	<0.010	-	<0.005	<0.005	-	<0.005	-	-
PFAS - Perfluoroalkyl Sulfonamide																				
Perfluorooctane sulfonamide (FOSA)	µg/L	0.002		<0.01	<0.01	-	<0.01	<0.002	-	-	-	-	-	0.009	-	<0.002	<0.002	-	<0.002	<0.005	-
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.005		<0.05	<0.05	-	<0.05	<0.005	-	-	-	-	-	<0.010	-	<0.005	<0.005	-	<0.005	<0.005	-
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.005		<0.1	<0.1	-	<0.1	<0.005	-	-	-	-	-	<0.010	-	<0.005	<0.005	-	<0.005	<0.005	-
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.002		<0.002	<0.002	-	<0.002	<0.002	-	-	-	-	-	<0.004	-	<0.002	<0.002	-	<0.002	<0.005	-
N-Methyl perfluorooctane sulfonamidoethanol (MEFOSE)	µg/L	0.005		<0.05	<0.05	-	<0.05	<0.005	-	-	-	-	-	<0.010	-	<0.005	<0.005	-	<0.005	<0.005	-
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.005		<0.5	<0.5	-	<0.5	<0.005	-	-	-	-	-	<0.010	-	<0.005	<0.005	-	<0.005	<0.005	-
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.002		<0.002	<0.002	-	<0.002	<0.002	-	-	-	-	-	<0.004	-	<0.002	<0.002	-	<0.002	<0.005	-
PFAS - Fluorotelomer Sulfonic Acids																				
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.001		<0.001	<0.001	-	<0.001	<0.005	-	-	-	-	<0.05	<0.005	-	<0.005	<0.005	-	<0.005	<0.001	-
6:2 Fluorotelomer Sulfonate (6:2 FTS)	µg/L	0.0004		0.022	0.019	15	0.022	0.029	27	-	-	-	11.1	12.0	8	0.081	0.065	22	0.081	0.070	15
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.0004		0.0007	0.0007	0	0.0007	<0.005	-	-	-	-	<0.05	0.008	0	<0.005	<0.005	-	<0.005	<0.001	-
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.001		<0.002	<0.002	-	<0.002	<0.005	-	-	-	-	<0.05	<0.005	-	<0.005	<0.005	-	<0.005	<0.001	-
PFAS - Sums																				
Sum of PFHxS and PFOS	µg/L	0.0002		0.95	0.91	4	0.95	1.02	7	-	-	-	71.4	74.0	4	0.057	0.061	7	0.057	0.058	2
Sum of US EPA PFAS (PFOS + PFOA)*	µg/L	0.0002		0.33	0.34	3	0.33	-	-	-	-	-	-	-	-	-	-	-	-	0.038	-
PFAS (Sum of Total)	µg/L	0.0002		1.4	1.4	0	1.4	1.58	12	-	-	-	-	122	-	0.176	0.158	11	0.176	0.168	5
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	µg/L	0.001		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.061	-
PFAS (Sum of Total)(WA DER List)	µg/L	0.002		-	-	-	-	1.38	-	-	-	-	108	112	4	0.165	0.149	10	0.165	0.155	6
BTEXN																				
Benzene	µg/L	1		-	-	-	-	-	-	<1	<1	-	-	-	-	<1	<1	-	<1	<1	-
Toluene	µg/L	1		-	-	-	-	-	-	<1	<1	-	-	-	-	<2	<2	-	<2	<1	-
Ethylbenzene	µg/L	1		-	-	-	-	-	-	<1	<1	-	-	-	-	<2	<2	-	<2	<1	-
Xylene (o)	µg/L	1		-	-	-	-	-	-	<1	<1	-	-	-	-	<2	<2	-	<2	<1	-
Xylene (m & p)	µg/L	2		-	-	-	-	-	-	<2	<2	-	-	-	-	<2	<2	-	<2	<2	-
Xylene Total	µg/L	2		-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	-	<2	<3	-
BTEX (Sum of Total) - Lab Calc	µg/L	1		-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	<1		
Naphthalene (value used in F2 calc)	mg/L	0.001		-	-	-	-	-	-	<0.001	<0.001	-	-	-	-	<0.005	<0.005	-	<0.005	<0.01	-
TRH - NEPM 2013																				
F1 (C6-C10 minus BTEX)	µg/L	10		-	-	-	-	-	-	71	65	9	-	-	-	<20	<20	-	<20	<20	-
C6-C10 Fraction	µg/L	10		-	-	-	-	-	-	71	65	9	-	-	-	<20	<20	-	<20	<20	-
F2 (>C10-C16 minus Naphthalene)	µg/L	50		-	-	-	-	-	-	<50	<50	-	-	-	-	<100	<100	-	<100	<50	-
>C10-C16 Fraction	µg/L	50		-	-	-	-	-	-	<50	<50	-	-	-	-	<100	<100	-	<100	<50	-
F3 (>C16-C34 Fraction)	µg/L	100		-	-	-	-	-	-	<100	<100	-	-	-	-	990	1,080	9	990	<100	-
F4 (>C34-C40 Fraction)	µg/L	100		-	-	-	-	-	-	<100	<100	-	-	-	-	390	430	10	390	<100	-
>C10-C40 (Sum of Total)	µg/L	50		-	-	-	-	-	-	<50	<50	-	-	-	-	1,380	1,510	9	1,380	<100	-
Major Ions																				
Calcium (filtered)	mg/L	1		13	14	7	13	13	0	-	-	-	20	-	-	21	-	-	21	-	-
Magnesium (filtered)	mg/L	0.5		20	20	0	20	21	5	-	-	-	33	-	-	20	-	-	20	-	-
Potassium (filtered)	mg/L	0.5		9.5	9.6	1	9.5	9	5	-	-	-	9	-	-	20	-	-	20	-	-
Sodium (filtered)	mg/L	0.5		740	730	1	740	911	21	-	-	-	1,290	-	-	342	-	-	342	-	-
Chloride	mg/L	1		800	780	3	800	961	18	-	-	-	932	-	-	364	-	-	364	-	-
Cations Total	meq/L	0.01		-	-	-	-	42.2	-	-	-	-	60.0	-	-	18.1	-	-	18.1	-	-
Anions Total	meq/L	0.01		-	-	-	-	44.8	-	-	-	-	64.7	-	-	21.1	-	-	21.1	-	-
Ionic Balance	%	0.01		-6.0	-5.0	18	-6.0	2.97	**592**	-	-	-	3.73	-	-	7.67	-	-	7.67	-	-

Field or Interlab Duplicates

Lab Report Number			308730	308730		308730	ES2238073		308746	308746		EM2305704	EM2305704		EM2307449	EM2307449		EM2307449	985539	
Field ID			GW201b	FD01		GW201b	FT01		GW201b	FD01		GW8002b	FD10		GW8001b	FD01		GW8001b	FS01	
Matrix Type			Water	Water		Water	Water		Water	Water		Water	Water		Water	Water		Water	Water	
Date			20/10/2022	20/10/2022	RPD	20/10/2022	21/10/2022	RPD	21/10/2022	21/10/2022	RPD	28/03/2023	28/03/2023	RPD	26/04/2023	26/04/2023	RPD	26/04/2023	26/04/2023	RPD
Analyte	Unit	EQL																		
Acidity & Alkalinity																				
Hardness (filtered)	mg/L	3	120	120	0	120	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Alkalinity (Carbonate as CaCO3)	mg/L	1	<5	<5	-	<5	24	-	-	-	-	37			22	-	-	22	-	-
Alkalinity (Bicarbonate as CaCO3)	mg/L	1	720	700	3	720	728	1	-	-	-	1,420	-	-	383	-	-	383	-	-
Alkalinity (Hydroxide as CaCO3)	mg/L	1	<5	<5	-	<5	<1	-	-	-	-	<1	-	-	<1	-	-	<1	-	-
Alkalinity (total as CaCO3)	mg/L	1	720	700	3	720	752	4	-	-	-	1,460	-	-	405	-	-	405	-	-

*RPDs have only been considered where a concentration is greater than 1 times the EQL.
**Elevated RPDs are highlighted as per QAQC Profile settings (Acceptable RPDs for each EQL multiplier range are: 1000 (1 - 10 x EQL); 30 (> 10 x EQL))
***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

Lab Report Number			33940	33940	33940	33940	33940	33940	EM2305704	EM2305704	EM2307449
Field ID			FB01	RB01	FB02	RB02	FB03	RB03	FB01	RB01	RB01
Matrix Type			Water	Water	Water	Water	Water	Water	Water	Water	Water
Date			05/10/2022	05/10/2022	06/10/2022	06/10/2022	07/10/2022	07/10/2022	28/03/2023	28/03/2023	26/04/2023
	Unit	EQL									
PFAS - Perfluoroalkyl Sulfonic Acids											
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.002	-	-	-	-	-	-	<0.02	<0.02	<0.002
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.002	-	-	-	-	-	-	-	-	<0.002
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.002	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.002
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.002	-	-	-	-	-	-	-	-	<0.002
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.002	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.002
Perfluorodecanesulfonic acid (PFDS)	µg/L	0.002	-	-	-	-	-	-	-	-	<0.002
PFAS - Perfluoroalkyl Carboxylic Acids											
Perfluorobutanoic acid (PFBA)	µg/L	0.010	-	-	-	-	-	-	<0.10	<0.10	<0.01
Perfluoropentanoic acid (PFPeA)	µg/L	0.002	-	-	-	-	-	-	<0.02	<0.02	<0.002
Perfluorohexanoic acid (PFHxA)	µg/L	0.002	-	-	-	-	-	-	<0.02	<0.02	<0.002
Perfluoroheptanoic acid (PFHpA)	µg/L	0.002	-	-	-	-	-	-	<0.02	<0.02	<0.002
Perfluorooctanoic acid (PFOA)	µg/L	0.002	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.002
Perfluorononanoic acid (PFNA)	µg/L	0.002	-	-	-	-	-	-	-	-	<0.002
Perfluorodecanoic acid (PFDA)	µg/L	0.002	-	-	-	-	-	-	-	-	<0.002
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.002	-	-	-	-	-	-	-	-	<0.002
Perfluorododecanoic acid (PFDoDA)	µg/L	0.002	-	-	-	-	-	-	-	-	<0.002
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.002	-	-	-	-	-	-	-	-	<0.002
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.005	-	-	-	-	-	-	-	-	<0.005
Perfluoro-n-hexadecanoic acid (PFHxDA)	µg/L	0.005	-	-	-	-	-	-	-	-	<0.005
PFAS - Perfluoroalkyl Sulfonamide											
Perfluorooctane sulfonamide (FOSA)	µg/L	0.002	-	-	-	-	-	-	-	-	<0.002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.005	-	-	-	-	-	-	-	-	<0.005
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.005	-	-	-	-	-	-	-	-	<0.005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.002	-	-	-	-	-	-	-	-	<0.002
N-Methyl perfluorooctane sulfonamidoethanol (MEFOSE)	µg/L	0.005	-	-	-	-	-	-	-	-	<0.005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.005	-	-	-	-	-	-	-	-	<0.005
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.002	-	-	-	-	-	-	-	-	<0.002
PFAS - Fluorotelomer Sulfonic Acids											
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.005	-	-	-	-	-	-	<0.05	<0.05	<0.005
6:2 Fluorotelomer Sulfonate (6:2 FTS)	µg/L	0.005	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.05	<0.005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.005	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.005	-	-	-	-	-	-	<0.05	<0.05	<0.005
PFAS - Sums											
Sum of PFHxS and PFOS	µg/L	0.002	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.002
Sum of US EPA PFAS (PFOS + PFOA)*	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-
PFAS (Sum of Total)	µg/L	0.002	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	<0.002
PFAS (Sum of Total)(WA DER List)	µg/L	0.002	-	-	-	-	-	-	<0.01	<0.01	<0.002

Figures

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Figure 2 – Groundwater Prohibition Area and Section 83A Notifications
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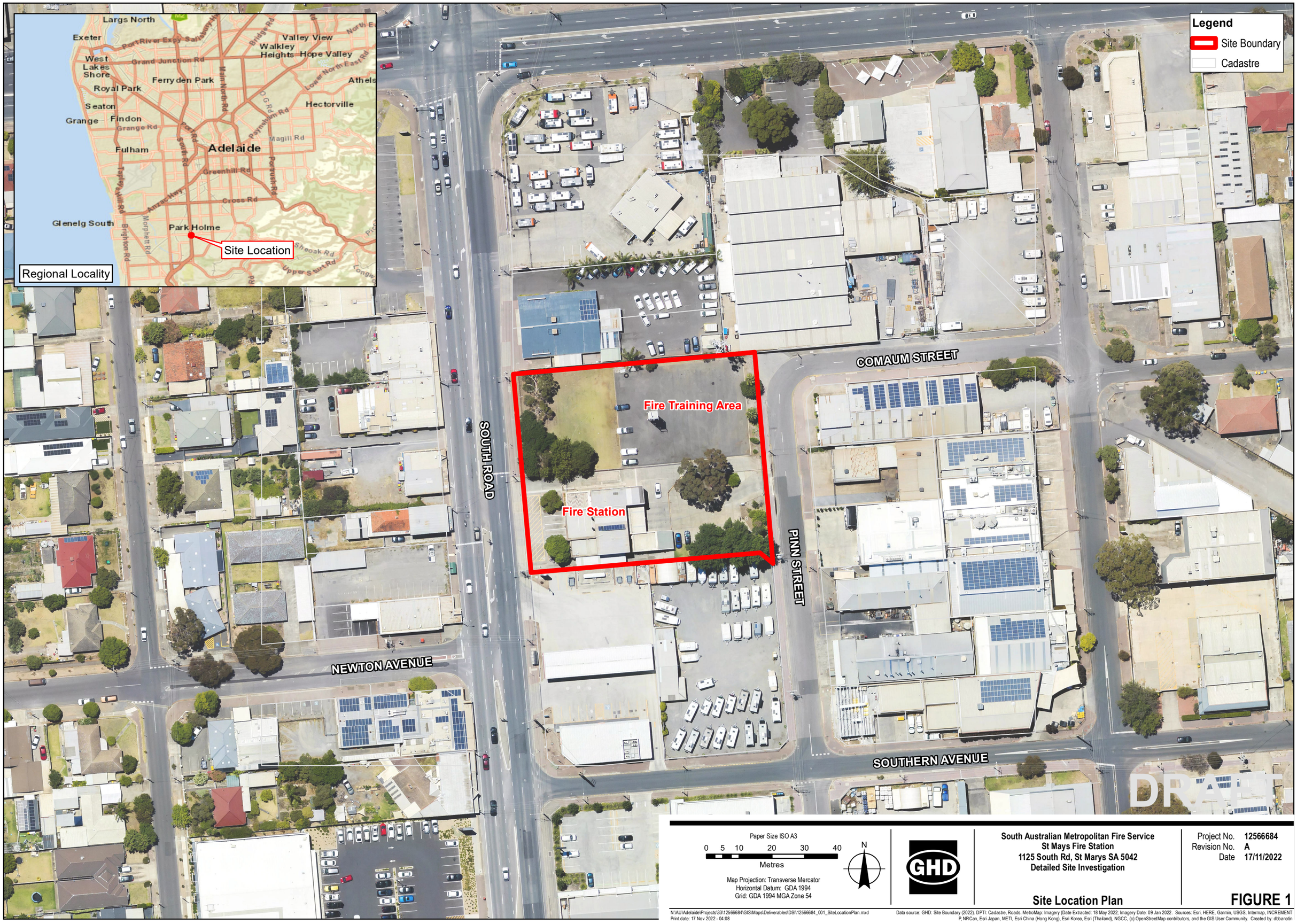
Figure 4 – On-site Groundwater Monitoring Well Locations
Figure 5 – Off-site Groundwater Monitoring Well Locations
Figure 6 – Soil, Concrete and Bitumen Exceedances of Adopted Criteria
Figure 7 – Groundwater Contours and Inferred Flow Direction – Q1 Aquifer (October 2022)
Figure 8 – Groundwater Contours and Inferred Flow Direction – Q1 Aquifer (March 2023)
Figure 9 – On-site Groundwater Exceedances
Figure 10 – Off-site Groundwater Exceedances
Figure 11 – Conceptual Site Model



Paper Size ISO A3

0 5 10 20 30 40

Metres

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 54

GHD

South Australian Metropolitan Fire Service
St Mays Fire Station
1125 South Rd, St Marys SA 5042
Detailed Site Investigation

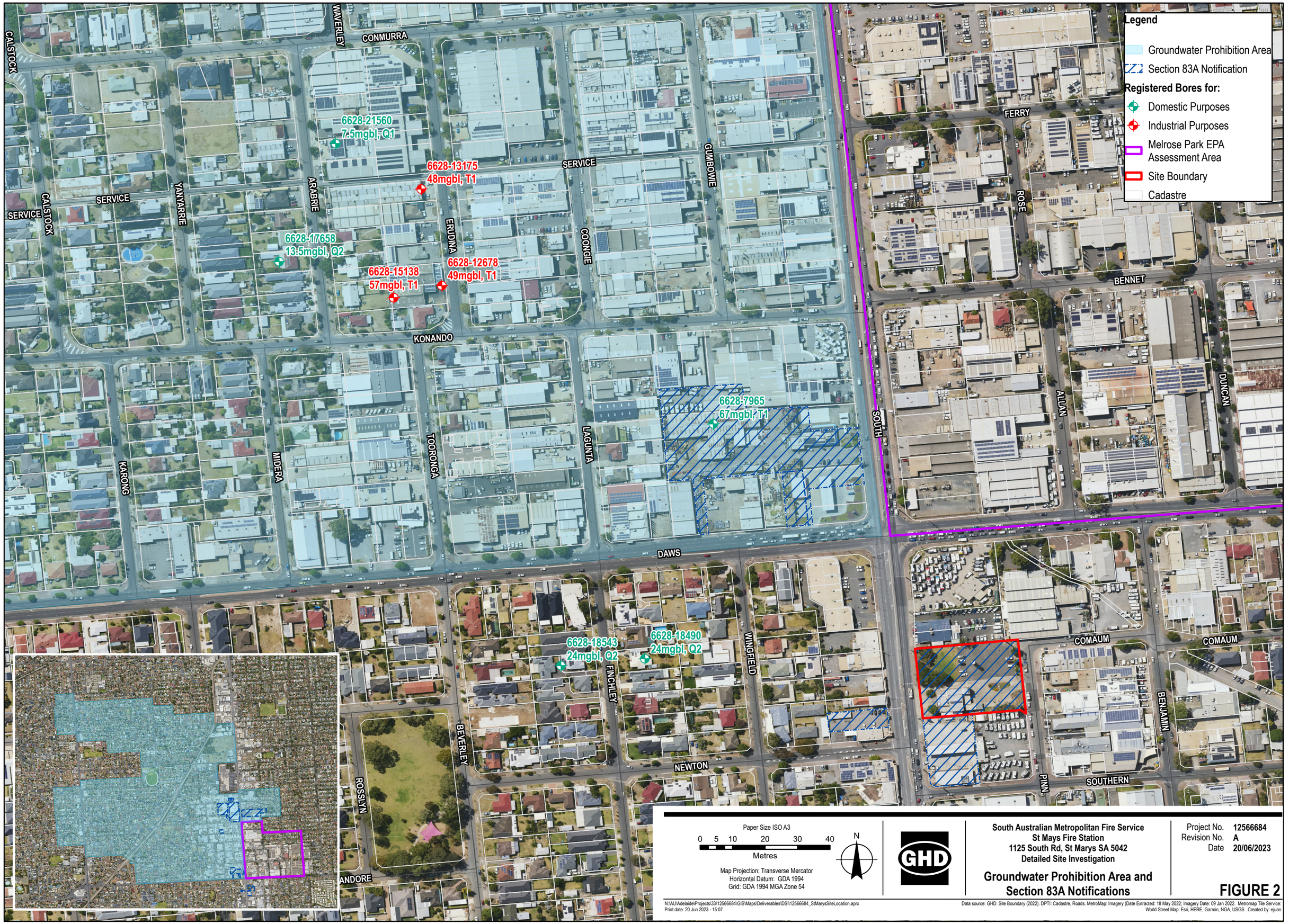
Site Location Plan

Project No. **12566684**
Revision No. **A**
Date **17/11/2022**

FIGURE 1

N:\AU\Adelaide\Projects\33\12566684\GIS\Maps\Deliverables\DSI\12566684_001_SiteLocationPlan.mxd
Print date: 17 Nov 2022 - 04:08

Data source: GHD: Site Boundary (2022). DPTI: Cadastre, Roads. MetroMap: Imagery (Date Extracted: 18 May 2022, Imagery Date: 09 Jan 2022. Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community. Created by: dbbanatin



Paper Size ISO A3

0 5 10 20 30 40

Metres

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 54

GHD

South Australian Metropolitan Fire Service
St Mays Fire Station
1125 South Rd, St Marys SA 5042
Detailed Site Investigation

Groundwater Prohibition Area and Section 83A Notifications

Project No. **12566684**
Revision No. **A**
Date **20/06/2023**

FIGURE 2

N:\AU\Adelaide\Projects\33\12566684\GIS\Maps\Deliverables\DSI\12566684_StMarysSiteLocation.aprx
Print date: 20 Jun 2023 - 15:07

Data source: GHD: Site Boundary (2022). DPTI: Cadastre, Roads. MetroMap: Imagery (Date Extracted: 18 May 2022; Imagery Date: 09 Jan 2022. Metromap Tile Service: World Street Map: Esri, HERE, Garmin, NGA, USGS. Created by: ejuan

Paper Size ISO A3

0 2.5 5 10 15

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 54

N

GHD

South Australian Metropolitan Fire Service
St Mays Fire Station
1125 South Rd, St Marys SA 5042
Detailed Site Investigation

Project No. **12566684**
Revision No. **0**
Date **20/06/2023**

Soil Investigation Locations

FIGURE 3

N:\AU\Adelaide\Projects\33\12566684\GIS\Maps\Deliverables\DSI\12566684_StMarysSiteLocation.aprx
Print date: 20 Jun 2023 - 22:27

Data source: GHD: Site Boundary (2022). DPTI: Cadastre, Roads. MetroMap: Imagery (Date Extracted: 18 May 2022; Imagery Date: 09 Jan 2022. . Created by: ejuan

Paper Size ISO A3

0 2.5 5 10 15

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 54

N

GHD

South Australian Metropolitan Fire Service
St Mays Fire Station
1125 South Rd, St Marys SA 5042
Detailed Site Investigation

Onsite Groundwater Monitoring Well Locations

Project No. **12566684**
Revision No. **0**
Date **20/06/2023**

FIGURE 4

N:\AU\Adelaide\Projects\33\12566684\GIS\Maps\Deliverables\DSI\12566684_StMarysSiteLocation.aprx
Print date: 20 Jun 2023 - 16:18

Data source: GHD: Site Boundary (2022). DPTI: Cadastre, Roads. MetroMap: Imagery (Date Extracted: 18 May 2022; Imagery Date: 09 Jan 2022. . Created by: ejuan

Paper Size ISO A3

0 20 40 80 120

Metres

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 54

GHD

South Australian Metropolitan Fire Service
St Mays Fire Station
1125 South Rd, St Marys SA 5042
Detailed Site Investigation

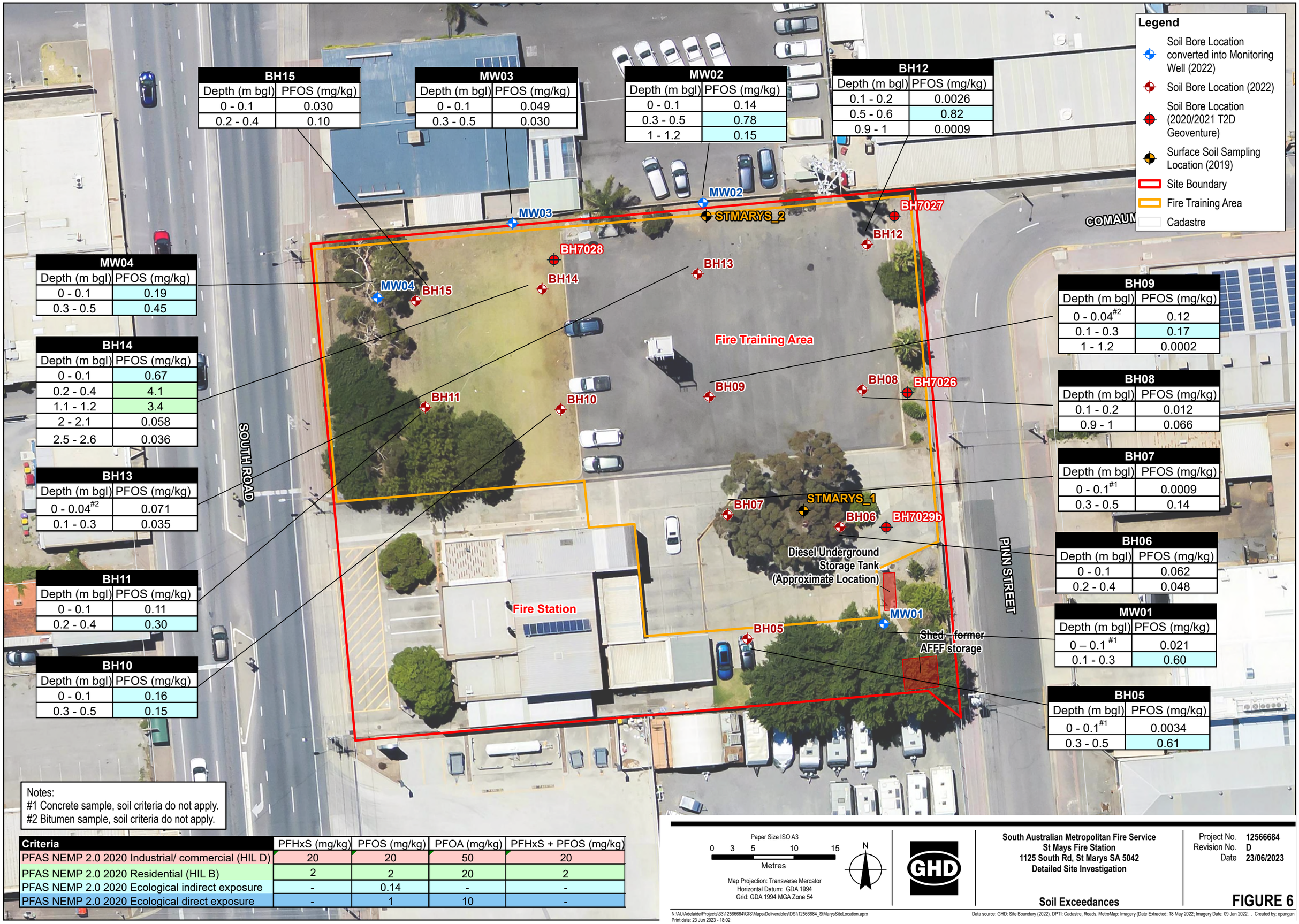
Offsite Groundwater Monitoring Well Locations

Project No. **12566684**
Revision No. **0**
Date **20/06/2023**

FIGURE 5

\\ghdnet\ghd\AU\Adelaide\Projects\33\12566684\GIS\Maps\Deliverables\DSI\12566684_StMarysSiteLocation2.aprx
Print date: 20 Jun 2023 - 20:20

Data source: GHD: Site Boundary (2022). DPTI: Cadastre, Roads. MetroMap: Imagery (Date Extracted: 18 May 2022; Imagery Date: 09 Jan 2022. Metromap Tile Service: . Created by: rbermudez



BH15	
Depth (m bgl)	PFOS (mg/kg)
0 - 0.1	0.030
0.2 - 0.4	0.10

MW03	
Depth (m bgl)	PFOS (mg/kg)
0 - 0.1	0.049
0.3 - 0.5	0.030

MW02	
Depth (m bgl)	PFOS (mg/kg)
0 - 0.1	0.14
0.3 - 0.5	0.78
1 - 1.2	0.15

BH12	
Depth (m bgl)	PFOS (mg/kg)
0.1 - 0.2	0.0026
0.5 - 0.6	0.82
0.9 - 1	0.0009

MW04	
Depth (m bgl)	PFOS (mg/kg)
0 - 0.1	0.19
0.3 - 0.5	0.45

BH14	
Depth (m bgl)	PFOS (mg/kg)
0 - 0.1	0.67
0.2 - 0.4	4.1
1.1 - 1.2	3.4
2 - 2.1	0.058
2.5 - 2.6	0.036

BH13	
Depth (m bgl)	PFOS (mg/kg)
0 - 0.04[#2]	0.071
0.1 - 0.3	0.035

BH11	
Depth (m bgl)	PFOS (mg/kg)
0 - 0.1	0.11
0.2 - 0.4	0.30

BH10	
Depth (m bgl)	PFOS (mg/kg)
0 - 0.1	0.16
0.3 - 0.5	0.15

BH09	
Depth (m bgl)	PFOS (mg/kg)
0 - 0.04[#2]	0.12
0.1 - 0.3	0.17
1 - 1.2	0.0002

BH08	
Depth (m bgl)	PFOS (mg/kg)
0.1 - 0.2	0.012
0.9 - 1	0.066

BH07	
Depth (m bgl)	PFOS (mg/kg)
0 - 0.1[#1]	0.0009
0.3 - 0.5	0.14

BH06	
Depth (m bgl)	PFOS (mg/kg)
0 - 0.1	0.062
0.2 - 0.4	0.048

MW01	
Depth (m bgl)	PFOS (mg/kg)
0 – 0.1 [#1]	0.021
0.1 - 0.3	0.60

BH05	
Depth (m bgl)	PFOS (mg/kg)
0 - 0.1[#1]	0.0034
0.3 - 0.5	0.61

Notes:
#1 Concrete sample, soil criteria do not apply.
#2 Bitumen sample, soil criteria do not apply.

Criteria	PFHxS (mg/kg)	PFOS (mg/kg)	PFOA (mg/kg)	PFHxS + PFOS (mg/kg)
PFAS NEMP 2.0 2020 Industrial/ commercial (HIL D)	20	20	50	20
PFAS NEMP 2.0 2020 Residential (HIL B)	2	2	20	2
PFAS NEMP 2.0 2020 Ecological indirect exposure	-	0.14	-	-
PFAS NEMP 2.0 2020 Ecological direct exposure	-	1	10	-

Paper Size ISO A3
0 3 5 10 15
Metres
Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 54

N

GHD

South Australian Metropolitan Fire Service
St Mays Fire Station
1125 South Rd, St Marys SA 5042
Detailed Site Investigation

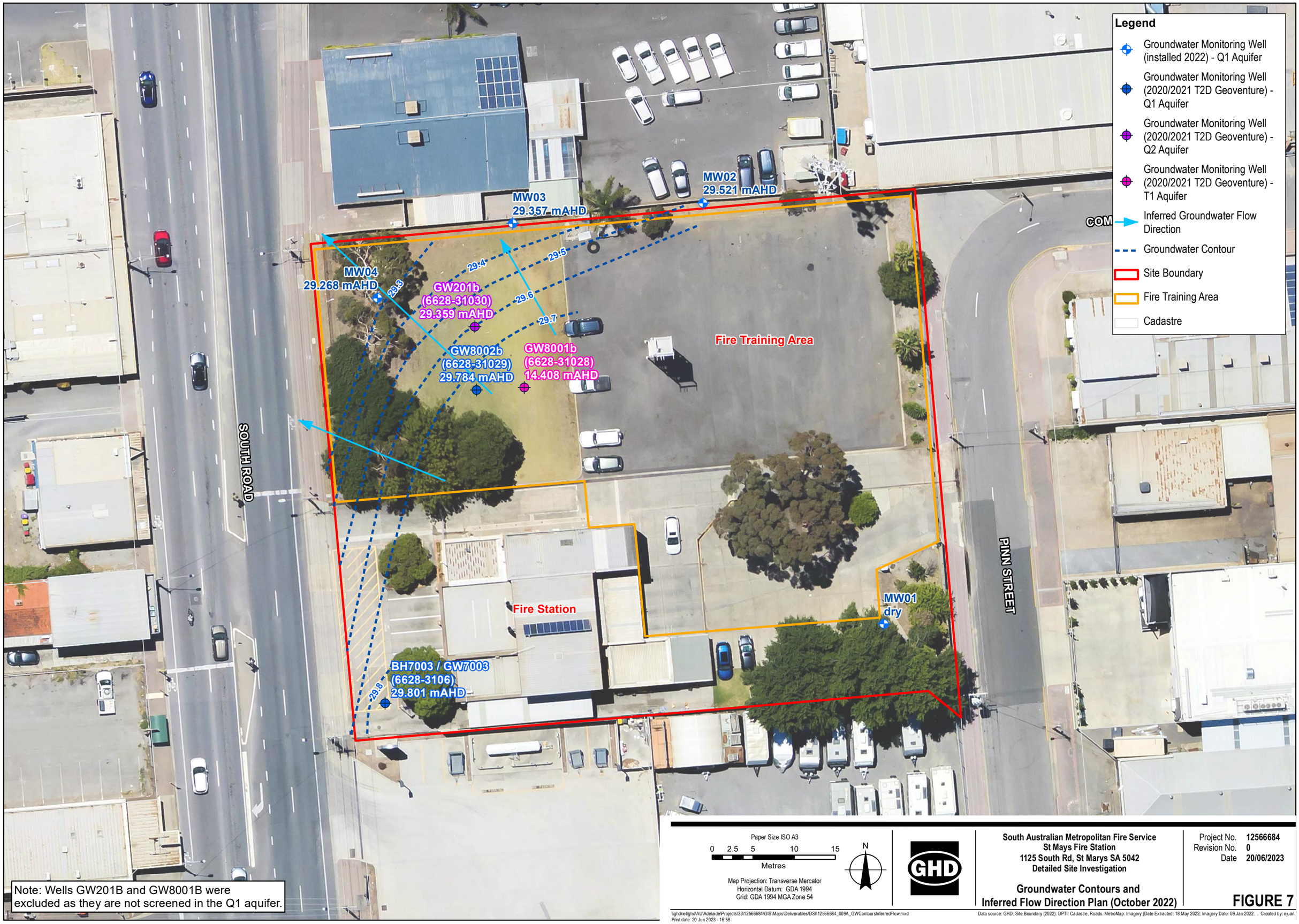
Soil Exceedances

Project No. 12566684
Revision No. D
Date 23/06/2023

FIGURE 6

N:\AU\Adelaide\Projects\33\12566684\GIS\Maps\Deliverables\DSI\12566684_StMarysSiteLocation.aprx
Print date: 23 Jun 2023 - 18:02

Data source: GHD: Site Boundary (2022). DPTI: Cadastre, Roads. MetroMap: Imagery (Date Extracted: 18 May 2022; Imagery Date: 09 Jan 2022. . Created by: epangan



Note: Wells GW201B and GW8001B were excluded as they are not screened in the Q1 aquifer.

Paper Size ISO A3

0 2.5 5 10 15

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 54

N

GHD

South Australian Metropolitan Fire Service
St Mays Fire Station
1125 South Rd, St Marys SA 5042
Detailed Site Investigation

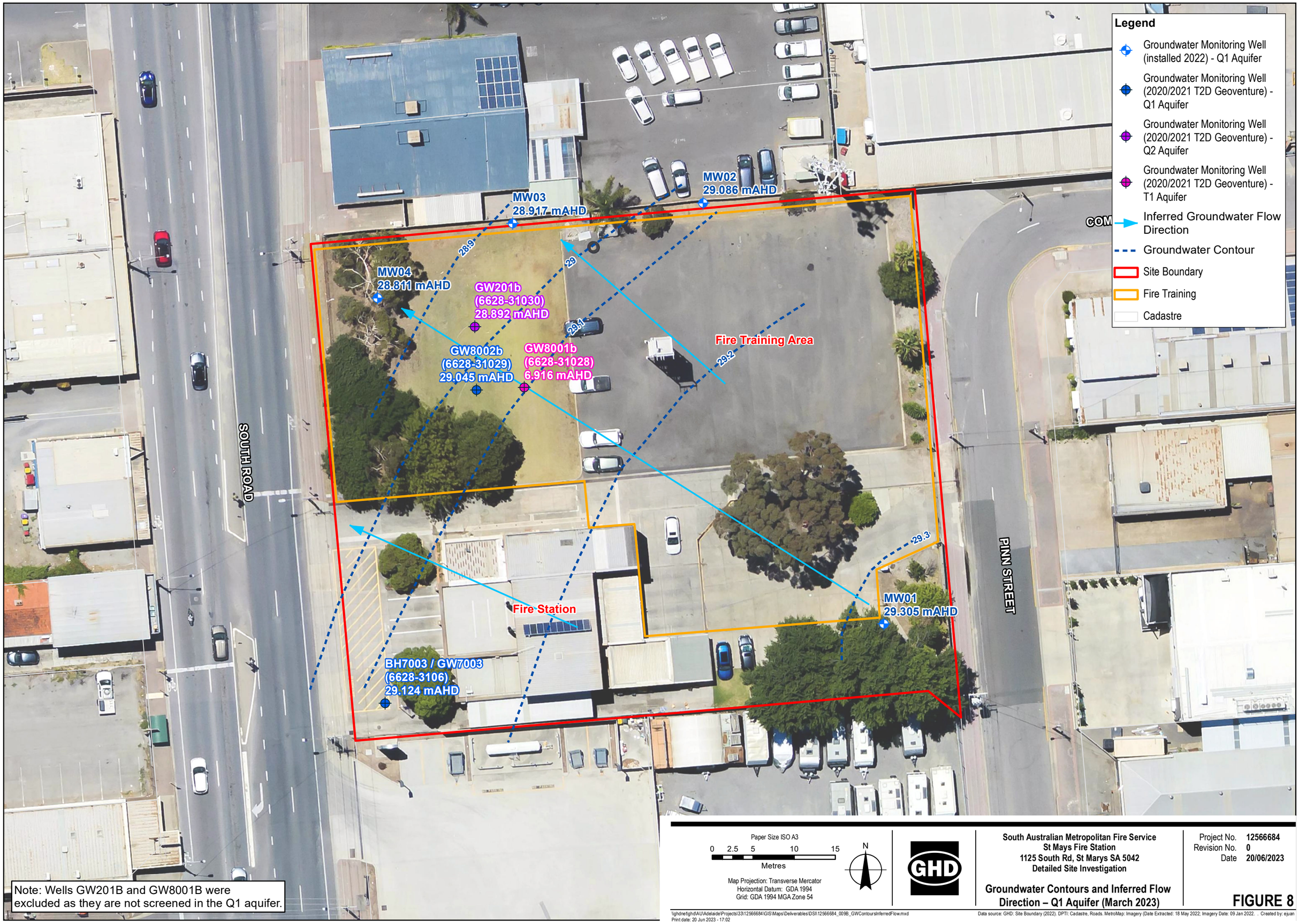
Groundwater Contours and Inferred Flow Direction Plan (October 2022)

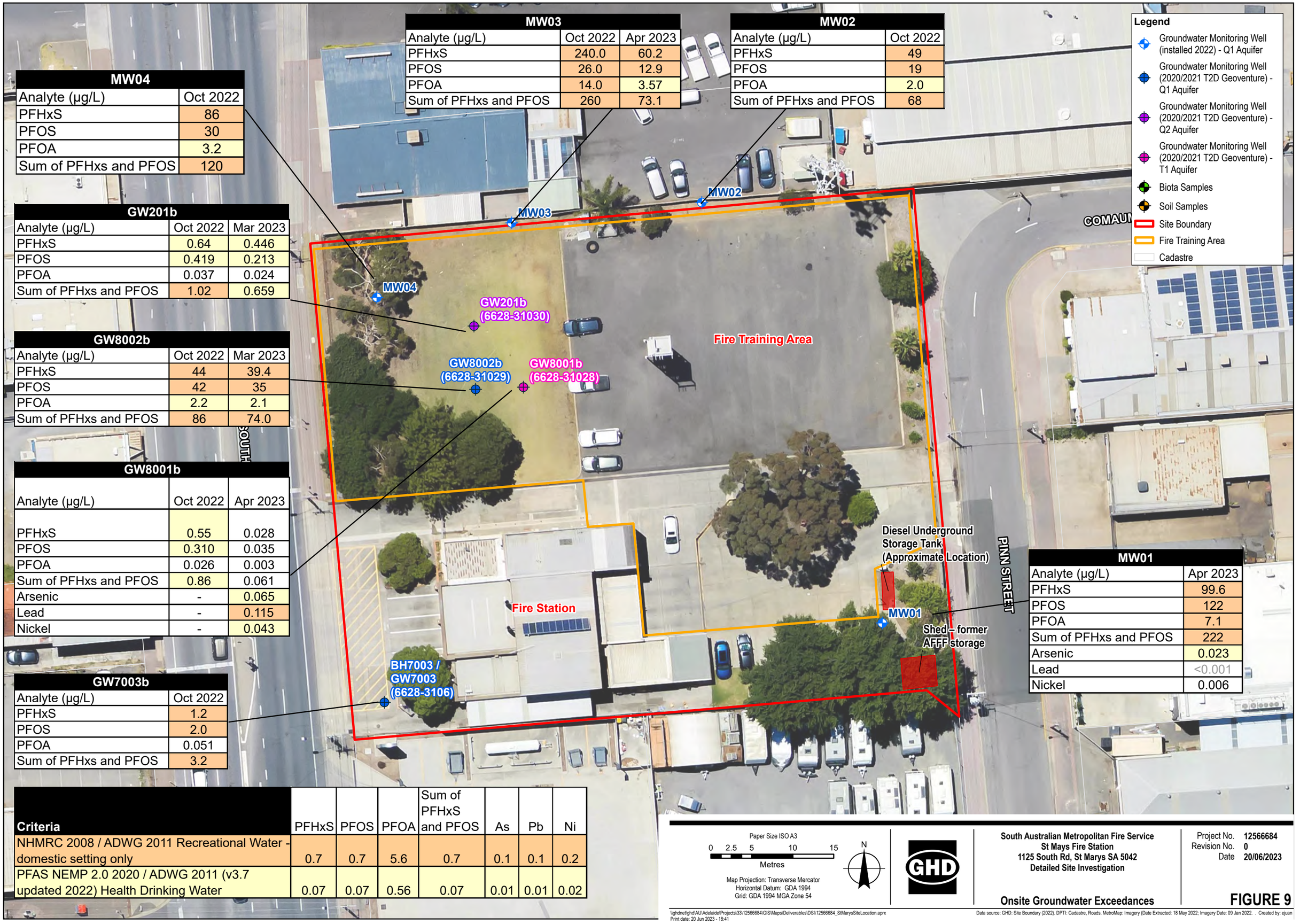
Project No. **12566684**
Revision No. **0**
Date **20/06/2023**

FIGURE 7

\\ghdnetghd\AU\Adelaide\Projects\33\12566684\GIS\Maps\Deliverables\DSI\12566684_009A_GWContoursInferredFlow.mxd
Print date: 20 Jun 2023 - 16:58

Data source: GHD: Site Boundary (2022). DPTI: Cadastre, Roads. MetroMap: Imagery (Date Extracted: 18 May 2022; Imagery Date: 09 Jan 2022. . Created by: ejuan


Legend
Groundwater Monitoring Well (installed 2022) - Q1 Aquifer
Groundwater Monitoring Well (2020/2021 T2D Geoventure) - Q1 Aquifer
Groundwater Monitoring Well (2020/2021 T2D Geoventure) - Q2 Aquifer
Groundwater Monitoring Well (2020/2021 T2D Geoventure) - T1 Aquifer
Inferred Groundwater Flow Direction
Groundwater Contour
Site Boundary
Fire Training
Cadastre
MW02
29.086 mAHD
MW03
28.917 mAHD
MW04
28.811 mAHD
GW201b
(6628-31030)
28.892 mAHD
GW8002b
(6628-31029)
29.045 mAHD
GW8001b
(6628-31028)
6.916 mAHD
BH7003 / GW7003
(6628-3106)
29.124 mAHD
MW01
29.305 mAHD
Fire Training Area
Fire Station
28.9
29
29.1
29.2
29.3
SOUTH ROAD
PINN STREET
COM
Note: Wells GW201B and GW8001B were excluded as they are not screened in the Q1 aquifer.
Paper Size ISO A3
0 2.5 5 10 15
Metres
Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 54
N
GHD
South Australian Metropolitan Fire Service
St Mays Fire Station
1125 South Rd, St Marys SA 5042
Detailed Site Investigation
Groundwater Contours and Inferred Flow Direction – Q1 Aquifer (March 2023)
Project No. 12566684
Revision No. 0
Date 20/06/2023
FIGURE 8
\\ghdnetghd\AU\Adelaide\Projects\33\12566684\GIS\Maps\Deliverables\DSI\12566684_009B_GWContoursInferredFlow.mxd
Print date: 20 Jun 2023 - 17:02
Data source: GHD: Site Boundary (2022). DPTI: Cadastre, Roads. MetroMap: Imagery (Date Extracted: 18 May 2022; Imagery Date: 09 Jan 2022. . Created by: ejuan



MW03		
Analyte (µg/L)	Oct 2022	Apr 2023
PFHxS	240.0	60.2
PFOS	26.0	12.9
PFOA	14.0	3.57
Sum of PFHxs and PFOS	260	73.1

MW02	
Analyte (µg/L)	Oct 2022
PFHxS	49
PFOS	19
PFOA	2.0
Sum of PFHxs and PFOS	68

MW04	
Analyte (µg/L)	Oct 2022
PFHxS	86
PFOS	30
PFOA	3.2
Sum of PFHxs and PFOS	120

GW201b		
Analyte (µg/L)	Oct 2022	Mar 2023
PFHxS	0.64	0.446
PFOS	0.419	0.213
PFOA	0.037	0.024
Sum of PFHxs and PFOS	1.02	0.659

GW8002b		
Analyte (µg/L)	Oct 2022	Mar 2023
PFHxS	44	39.4
PFOS	42	35
PFOA	2.2	2.1
Sum of PFHxs and PFOS	86	74.0

GW8001b		
Analyte (µg/L)	Oct 2022	Apr 2023
PFHxS	0.55	0.028
PFOS	0.310	0.035
PFOA	0.026	0.003
Sum of PFHxs and PFOS	0.86	0.061
Arsenic	-	0.065
Lead	-	0.115
Nickel	-	0.043

MW01	
Analyte (µg/L)	Apr 2023
PFHxS	99.6
PFOS	122
PFOA	7.1
Sum of PFHxs and PFOS	222
Arsenic	0.023
Lead	<0.001
Nickel	0.006

GW7003b	
Analyte (µg/L)	Oct 2022
PFHxS	1.2
PFOS	2.0
PFOA	0.051
Sum of PFHxs and PFOS	3.2

Criteria	PFHxS	PFOS	PFOA	Sum of PFHxS and PFOS	As	Pb	Ni
NHMRC 2008 / ADWG 2011 Recreational Water - domestic setting only	0.7	0.7	5.6	0.7	0.1	0.1	0.2
PFAS NEMP 2.0 2020 / ADWG 2011 (v3.7 updated 2022) Health Drinking Water	0.07	0.07	0.56	0.07	0.01	0.01	0.02

Paper Size ISO A3

0 2.5 5 10 15

Metres

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 54

GHD

South Australian Metropolitan Fire Service
St Mays Fire Station
1125 South Rd, St Marys SA 5042
Detailed Site Investigation

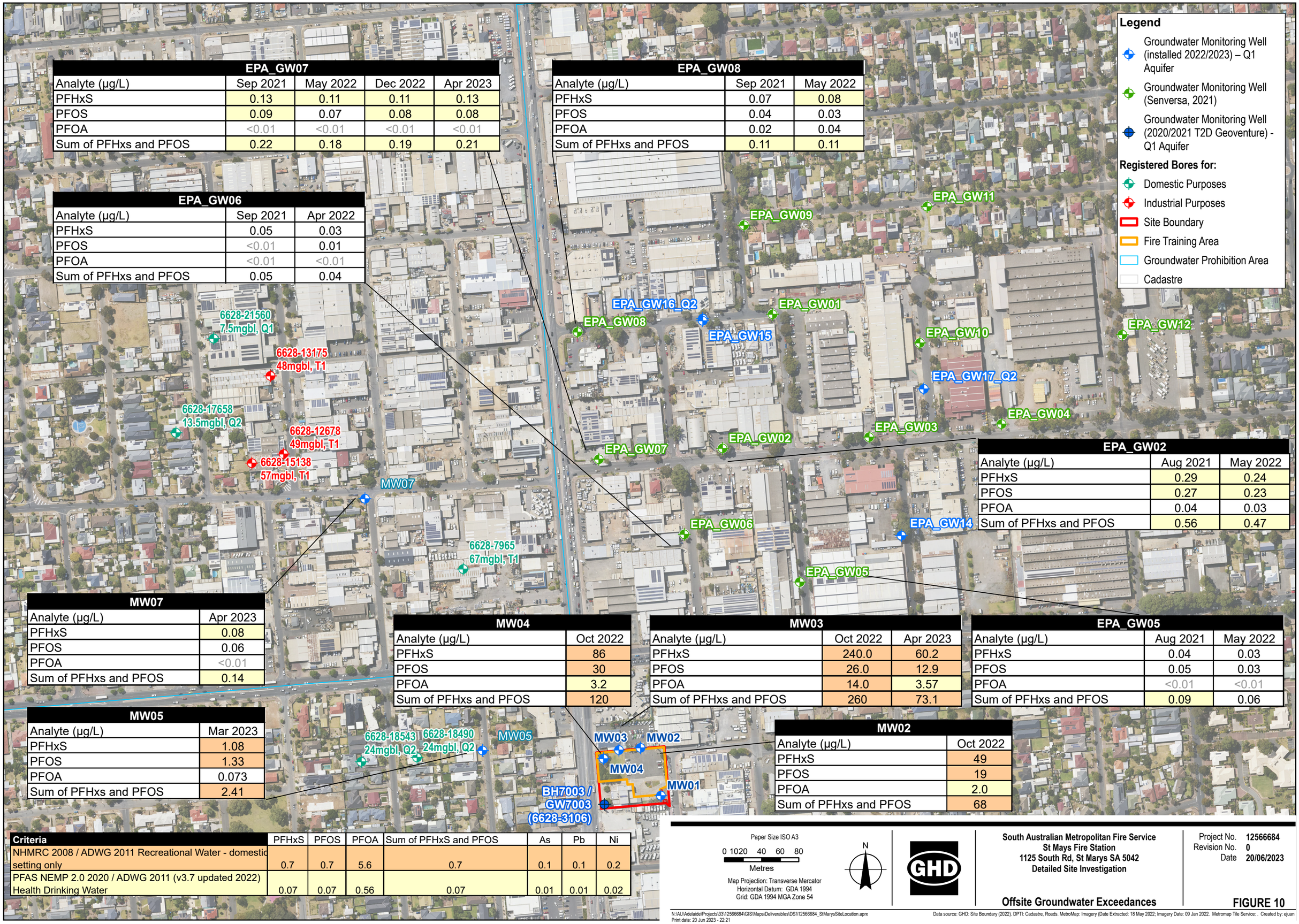
Onsite Groundwater Exceedances

Project No. 12566684
Revision No. 0
Date 20/06/2023

FIGURE 9

\\ghdnet\ghd\AU\Adelaide\Projects\33\12566684\GIS\Maps\Deliverables\DSI\12566684_StMarysSiteLocation.aprx
Print date: 20 Jun 2023 - 18:41

Data source: GHD: Site Boundary (2022). DPTI: Cadastre, Roads. MetroMap: Imagery (Date Extracted: 18 May 2022; Imagery Date: 09 Jan 2022. . Created by: ejuan



EPA_GW07				
Analyte (µg/L)	Sep 2021	May 2022	Dec 2022	Apr 2023
PFHxS	0.13	0.11	0.11	0.13
PFOS	0.09	0.07	0.08	0.08
PFOA	<0.01	<0.01	<0.01	<0.01
Sum of PFHxs and PFOS	0.22	0.18	0.19	0.21

EPA_GW08		
Analyte (µg/L)	Sep 2021	May 2022
PFHxS	0.07	0.08
PFOS	0.04	0.03
PFOA	0.02	0.04
Sum of PFHxs and PFOS	0.11	0.11

EPA_GW06		
Analyte (µg/L)	Sep 2021	Apr 2022
PFHxS	0.05	0.03
PFOS	<0.01	0.01
PFOA	<0.01	<0.01
Sum of PFHxs and PFOS	0.05	0.04

EPA_GW02		
Analyte (µg/L)	Aug 2021	May 2022
PFHxS	0.29	0.24
PFOS	0.27	0.23
PFOA	0.04	0.03
Sum of PFHxs and PFOS	0.56	0.47

MW07	
Analyte (µg/L)	Apr 2023
PFHxS	0.08
PFOS	0.06
PFOA	<0.01
Sum of PFHxs and PFOS	0.14

MW04	
Analyte (µg/L)	Oct 2022
PFHxS	86
PFOS	30
PFOA	3.2
Sum of PFHxs and PFOS	120

MW03		
Analyte (µg/L)	Oct 2022	Apr 2023
PFHxS	240.0	60.2
PFOS	26.0	12.9
PFOA	14.0	3.57
Sum of PFHxs and PFOS	260	73.1

EPA_GW05		
Analyte (µg/L)	Aug 2021	May 2022
PFHxS	0.04	0.03
PFOS	0.05	0.03
PFOA	<0.01	<0.01
Sum of PFHxs and PFOS	0.09	0.06

MW05	
Analyte (µg/L)	Mar 2023
PFHxS	1.08
PFOS	1.33
PFOA	0.073
Sum of PFHxs and PFOS	2.41

MW02	
Analyte (µg/L)	Oct 2022
PFHxS	49
PFOS	19
PFOA	2.0
Sum of PFHxs and PFOS	68

Criteria	PFHxS	PFOS	PFOA	Sum of PFHxS and PFOS	As	Pb	Ni
NHMRC 2008 / ADWG 2011 Recreational Water - domestic setting only	0.7	0.7	5.6	0.7	0.1	0.1	0.2
PFAS NEMP 2.0 2020 / ADWG 2011 (v3.7 updated 2022) Health Drinking Water	0.07	0.07	0.56	0.07	0.01	0.01	0.02

Paper Size ISO A3

0 10 20 40 60 80

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 54

N

GHD

South Australian Metropolitan Fire Service
St Mays Fire Station
1125 South Rd, St Marys SA 5042
Detailed Site Investigation

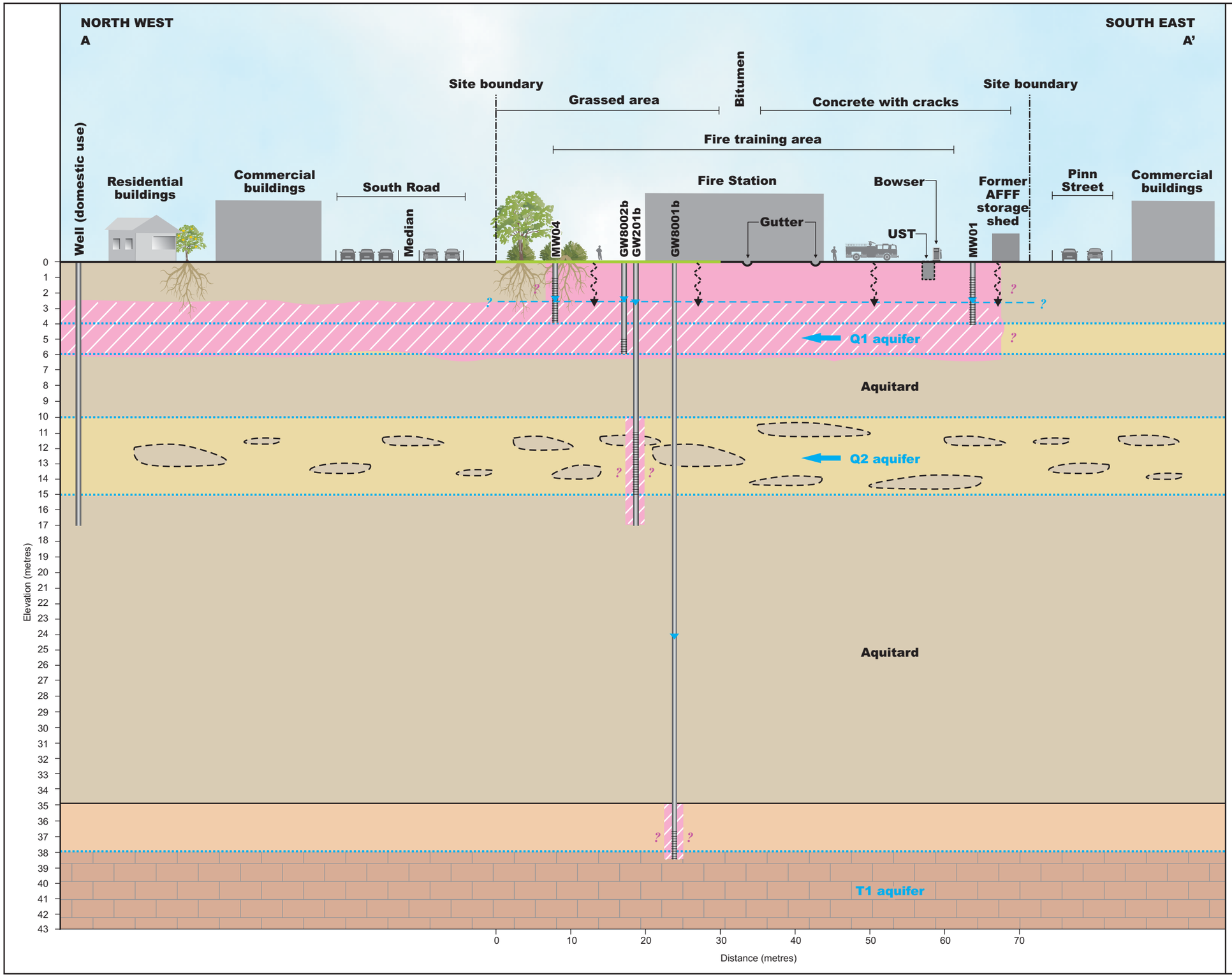
Project No. 12566684
Revision No. 0
Date 20/06/2023

Offsite Groundwater Exceedances

FIGURE 10

N:\AU\Adelaide\Projects\33\12566684\GIS\Maps\Deliverables\DSI\12566684_StMarysSiteLocation.aprx
Print date: 20 Jun 2023 - 22:21

Data source: GHD: Site Boundary (2022). DPTI: Cadastre, Roads. MetroMap: Imagery (Date Extracted: 18 May 2022; Imagery Date: 09 Jan 2022. Metromap Tile Service: . Created by: ejuan



PFAS SOUCES AT THE SITE

1. Historical training using AFFF across the site (soils, concrete and bitumen areas)
2. Historical washdown of appliances that had used AFFF
3. Leakage from stored AFFF concentrate
4. Potential off-site sources in groundwater

PFAS TRANSPORT PATHWAYS

1. Leaching from impacted surface soils, concrete and bitumen into underlying groundwater
2. Leaching from impacted surface soils, concrete and bitumen into surface and stormwater and runoff from the site into stormwater systems
3. Preferential surface water flow via monitoring well annulus, cracking clays and underground services
4. Migration in groundwater via dissolution and dispersion
5. Potential cross contamination between aquifers during installation of Q2 and T1 monitoring wells

POTENTIALLY COMPLETE ON-SITE EXPOSURE PATHWAYS AND RECEPTORS

1. Direct human contact (ingestion, inhalation) with contaminated soils (maintenance workers)
2. Direct ecological contact with contaminated soils and bioaccumulation in the food chain (indirect)
3. Groundwater uptake via deep rooted vegetation and bioaccumulation in the food chain

POTENTIALLY COMPLETE OFF-SITE EXPOSURE PATHWAYS AND RECEPTORS

4. Groundwater abstraction for potable use (ingestion)
5. Groundwater abstraction for recreational use (ingestion)
6. Groundwater abstraction for irrigation purposes (consumption of contaminated food/bioaccumulation)

PFAS EXTENT

- On-site soils: exceeds direct and indirect ecological criteria
- Concrete and bitumen: on-going secondary source via leaching into the environment
- Q1 aquifer: exceeds health drinking water and recreational use criteria
- Q2 aquifer: exceeds health drinking water criteria
- T1 aquifer: below applied criteria

LINE OF SECTION

GEOLOGY
- Regolith (clay)
- Sandy clay / sandy clayey gravel
- Sandy clay
- Bedrock (sandstone)

LEGEND
- PFAS impacted soil
- PFAS impacted groundwater
- Groundwater flow direction
- Standing water level
- Migration of PFAS

Conceptual diagram only - scale is approximate

GHD

South Australian Metropolitan Fire Service
St Marys Fire Station
Detailed Site Investigation

Conceptual site model

Project No. 12566684
Revision No. 0
Date 14/06/2023

FIGURE 11

Level 4, 211 Victoria Square Adelaide SA 5000 T 61 8 8111 6600 F 61 8 8111 6699 E ademail@ghd.com W www.ghd.com

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Appendices

Appendix A

Letters from SA EPA

Environment Protection Authority
GPO Box 2607 Adelaide SA 5001
211 Victoria Square Adelaide SA 5000
T (08) 8204 2004
Country areas 1800 623 445

EPA GENI 62485

Ms Krystle Mitchell
Senior Scientific and Environmental Officer
South Australian Metropolitan Fire Service
By Email: Krystle.Mitchell@sa.gov.au

Dear Ms Mitchell,

RE: REVIEW OF SITE CONTAMINATION REPORT – ACTION REQUIRED

Site: St Marys Fire Station (CT 5808/746) and other South Australian Metropolitan Fire Service Stations

The Environment Protection Authority (EPA) has reviewed the following information:

- Section 83A Notification of site contamination of underground water, St Marys Fire Station, 1125 South Road, St Marys, prepared by Department for Infrastructure and Transport, dated 19 January 2021.
- *North South Corridor (Torrens to Darlington Stage 1), 1a and 1b Ground Investigation Contamination Factual Report*, prepared by T2D Geoventure, dated 3 June 2021.
- *South Australian Metropolitan Fire Service, MFS State Wide Appliance and Station Sampling*, prepared by GHD, dated May 2019.

St Marys Fire Station

Based on the reviewed information, the St Marys MFS station has been deemed to be a Level 1 regulatory priority in accordance with the EPA Site Contamination Regulatory and Orphan Site Management Framework (2017). This priority level assists the EPA in selecting the appropriate regulatory approach and reporting timeframe to ensure that site contamination is managed effectively.

As such, it has been deemed that a Voluntary Site Contamination Assessment Proposal (VSCAP) is necessary for effective regulation of the site. The *Environment Protection Act 1993* allows persons to prepare and submit voluntary site contamination assessment proposals and voluntary site remediation proposals[1] to the EPA for consideration. Proposals provide the EPA with assurance that any risks to human health and/or the environment will be addressed appropriately while also offering liable persons regulatory certainty. The provisions of the VSCAP should specifically address the following EPA assessment goals:

- Goal 2: Determine nature and extent of site contamination,
- Goal 3: Identify and assess any potential risks to human health or the environment.

The EPA requests that you engage a suitably qualified consultant to prepare and submit a VSCAP that includes provision to meet the above goals at the St Marys MFS station.

Please provide a copy of this letter to your engaged consultant and/or certified site contamination practitioner to assist them in the drafting the voluntary proposal.

Various other fire stations

[1] Sections 103 I and K of the *Environment Protection Act 1993*

The EPA has determined that the information contained in the GHD (2019) report constitutes information that must be placed in the EPA Public Register under the provisions of section 109(3)(h) of the *Environment Protection Act 1993*. The key outcome of this determination is that this information will be identified by the EPA when responding to enquiries under the *Land and Business (Sale & Conveyancing) Act 1994* for the following MFS stations, following the detection of PFAS above the PFAS NEMP (2020) ecological investigation levels protective of indirect PFAS exposures to ecological receptors:

- Angle Park Training Centre (CT 6005/338)
- Brooklyn Park MFS Station (CT 5202/341)
- Camden Park MFS Station (CT 5413/751)
- Christie Downs MFS Station (CT 5534/85)
- Kapunda MFS Station (CT 5856/347)
- Loxton MFS Station (CT 5191/414)
- Moonta MFS Station (CT 5690/145)
- Mount Gambier MFS Station (CT 5714/676)
- Murray Bridge MFS Station (CT 5494/672)
- Oakden MFS Station (CR 5759/678)
- O'Halloran Hill MFS Station (CT 5500/291)
- Peterborough MFS Station (CT 5815/109)
- Port Adelaide MFS Station (CT 5450/700)
- Port Augusta MFS Station (CT 5759/680)
- Port Pirie MFS Station (CT 5800/269)
- St Marys MFS Station (CT 5808/746)
- Whyalla MFS Station (CT 5212/286)
- Woodville MFS Station (CT 5773/270)

It is noted that while the reviewed reports did not discuss the Oakden fire station, the tabulated data appended to the GHD (2019) report included data for the Oakden MFS station that indicated exceedances of relevant criteria, hence, this site has been included in the titles flagged.

The details of this information will also be available to any interested person on specific enquiry to the EPA Public Register.

Review of the limited soil and biota assessment results presented in the GHD (2019) report suggests that further assessment of PFAS contamination at a large number of MFS sites across the state is required. As such, consideration should be given to risk profiling the sites and prioritising assessment at higher risk sites. The EPA recommends that risk profiling include consideration of:

- sensitive land uses and bore users within the vicinity of the sites
- ecological receptors in the vicinity of the sites
- historic use of firefighting foams on-site
- available soil and produce data presented in the GHD (2019) report detailed above (and any other internal information held)

Further information on PFAS contaminated site prioritisation can be found in Section 7 of the PFAS National Environmental Management Plan Version 2.0 (Heads of EPA 2020).

If you agree to undertake the above listed works it is requested that you submit written acknowledgement to the EPA stating as such. If you wish to discuss potential alterations to the recommended works or report delivery

date please contact the EPA as soon as possible. Alternatively, please contact the EPA to arrange a meeting time to discuss any of the above.

Please provide a copy of this letter to your engaged consultant to assist them in developing a scope of works for the site.

Fact sheets relating to your obligations under the *Environment Protection Act 1993* and how to engage a site contamination consultant be found at www.epa.sa.gov.au.

If you would like further assistance on this matter please contact Brooke Ryan on (08) 8204 8525 or at brooke.ryan2@sa.gov.au.

Yours sincerely

Rebecca Hughes

A/MANAGER SITE CONTAMINATION

ENVIRONMENT PROTECTION AUTHORITY

Date: 21 October 2021

Environment Protection Authority
GPO Box 2607 Adelaide SA 5001
211 Victoria Square Adelaide SA 5000
T (08) 8204 2004
Country areas 1800 623 445

EPA GENI 62795

Mr Jeff Swann
A/ACFO
South Australian Metropolitan Fire Service
99 Wakefield Street
ADELAIDE SA 5001
By Email: jeff.swann@sa.gov.au

Dear Mr Swann,

RE: VOLUNTARY SITE CONTAMINATION ASSESSMENT PROPOSAL

SITE: St Marys Fire Station, 1125 South Road, ST MARYS SA 5042

I refer you to the following Voluntary Site Contamination Assessment Proposal (VSCAP) received by the Environment Protection Authority (EPA) on 24 June 2022, prepared in relation to the above mentioned site;

- *'MFS St Marys Fire Station Voluntary Site Contamination Assessment Proposal'* prepared by GHD, on behalf of South Australian Metropolitan Fire Service, dated 23 June 2022.

The EPA has reviewed the VSCAP and is satisfied that the terms of the VSCAP are appropriate for the site, the EPA therefore approves the VSCAP pursuant to section 103I(3) of the *Environment Protection Act 1993* (EP Act).

Please keep the EPA advised of your progress in completing the agreed deliverables by the timeframes in the VSCAP. If at any stage during the site contamination assessment the MFS will be unable to meet the timeframes proposed in the VSCAP, please inform the EPA as soon as possible using the mechanisms proposed in the agreement.

The details of the agreement have been recorded in the EPA Public Register[1]. In addition to this, details of each environment assessment report carried out in relation to land for the purposes of an approved VSCAP will also be recorded in the Public Register[2].

Please note that if the MFS does not meet the agreed deliverables described in the VSCAP (Attachment 1), the EPA may require the work to be undertaken using further regulatory action.

If you would like further assistance on this matter please contact Brooke Ryan on (08) 8204 8525 or at brooke.ryan2@sa.gov.au.

[1] In accordance with section 109(3)(ic)(i) of the *Environment Protection Act 1993*
[2] In accordance with regulation 16(1)(e)(i) of the *Environment Protection Regulations 2009*.

Yours sincerely

Rebecca Hughes

MANAGER SITE CONTAMINATION

ENVIRONMENT PROTECTION AUTHORITY

Date: 29 June 2022

Cc: Krystle Mitchell, SA MFS (by email: krystle.mitchell@sa.gov.au)

Cc: Dilara Valiff, GHD (by email: Dilara.valiff@ghd.com)

Attachment 1:

MFS St Marys Fire Station Voluntary Site Contamination Assessment Proposal prepared by GHD, on behalf of SA MFS, dated 23 June 2022.

SERVICE OF AGREEMENT OF VOLUNTARY PROPOSAL

To: .....at: .....

Time and Date: .....

Personal/post/facsimile: .....

Signed:.....

Name: ..... of the Environment Protection Authority

.

Environment Protection Authority
GPO Box 2607 Adelaide SA 5001
T (08) 8204 2004
Country areas 1800 623 445

EPA GENI 62485

Mr Jeff Swann
A/ACFO
South Australian Metropolitan Fire Service
99 Wakefield Street
ADELAIDE SA 5000
By Email: Jeff.Swann@eso.sa.gov.au

Dear Mr Swann,

RE: NOTIFICATION OF SITE CONTAMINATION OF UNDERGROUND WATER

Site: St Marys MFS Station, 1125 South Road, ST MARYS 5042 (CT 5808/746)

Your representative has provided the Environment Protection Authority (EPA) with a 'Notification of site contamination of underground water[1]', dated 19 December 2022, for the above site.

The notification has been deemed to be complying and its details have been recorded in the EPA Public Register[2]. The information will also be available to all prospective purchasers of the site in the Form 1 of the Regulations under the *Land and Business (Sale and Conveyancing) Act 1994* (refer to the 'Particulars Relating To Environment Protection'), and through Section 7 statements. Relevant government bodies and utilities have also been informed of the presence of site contamination at the site, primarily for the protection of worker safety.

You are reminded that the EPA expects a Detailed Site Investigation report to be provided by 3 February 2023, as outlined in the current Voluntary Site Contamination Assessment Proposal (VSCAP) in effect at the site. If you believe that this can no longer be reasonably achieved please contact the EPA as soon as possible.

If you do not submit a report or contact the EPA within this timeframe you may be deemed to be non-complying.

If at any stage a change in the nature and extent of site contamination of underground water at the site is identified from new information, or this notification no longer accurately describes the nature and extent of the site contamination of the underground water, an updated section 83A notification is required to be provided to the EPA as soon as reasonably practicable. Please note that this requirement extends to an owner, occupier, site contamination auditor or site contamination consultant (pursuant to section 83A(1)(a) and (b) of the Act). You should discuss this duty with your consultant to ensure that there is no confusion in reporting obligations.

Fact sheets relating to your obligations under the *Environment Protection Act 1993*, the section 83A review process and the EPA Public Register can be found at www.epa.sa.gov.au.

[1] In accordance with section 83A of the *Environment Protection Act 1993*
[2] In accordance with section 109(3)(i) of the *Environment Protection Act 1993*

If you would like further assistance on this matter please contact Brooke Ryan on (08) 8204 8525 or at brooke.ryan2@sa.gov.au.

Yours sincerely

HCustance

Hannah Custance

PRINCIPAL ADVISER, SITE CONTAMINATION

ENVIRONMENT PROTECTION AUTHORITY

Date: 23 January 2023

cc: Krystle Mitchell, Senior Scientific Officer, SA MFS (by email: krystle.mitchell@eso.sa.gov.au)

cc: Ben Petticrew, Technical/Project Director – Contamination Assessment and Remediation, GHD (by email: ben.petticrew@ghd.com)

cc: Dilara Valiff, Senior Environmental Consultant, GHD (by email: dilara.valiff@ghd.com)

Appendix B

Certificates of Title and SAPPA Information

Product	Register Search Plus (CT 5808/746)
Date/Time	02/09/2022 02:07PM
Customer Reference	12566684
Order ID	20220902005711

REAL PROPERTY ACT, 1886
South Australia

The Registrar-General certifies that this Title Register Search displays the records maintained in the Register Book and other notations at the time of searching.

Certificate of Title - Volume 5808 Folio 746

Parent Title(s) CT 3080/170

Creating Dealing(s) CONVERTED TITLE

Title Issued 20/09/2000 **Edition** 1 **Edition Issued** 20/09/2000

Estate Type

FEE SIMPLE

Registered Proprietor

SOUTH AUSTRALIAN METROPOLITAN FIRE SERVICE
OF 99 WAKEFIELD STREET ADELAIDE SA 5000

Description of Land

ALLOTMENT 68 FILED PLAN 12879
IN THE AREA NAMED ST MARYS
HUNDRED OF ADELAIDE

Easements

NIL

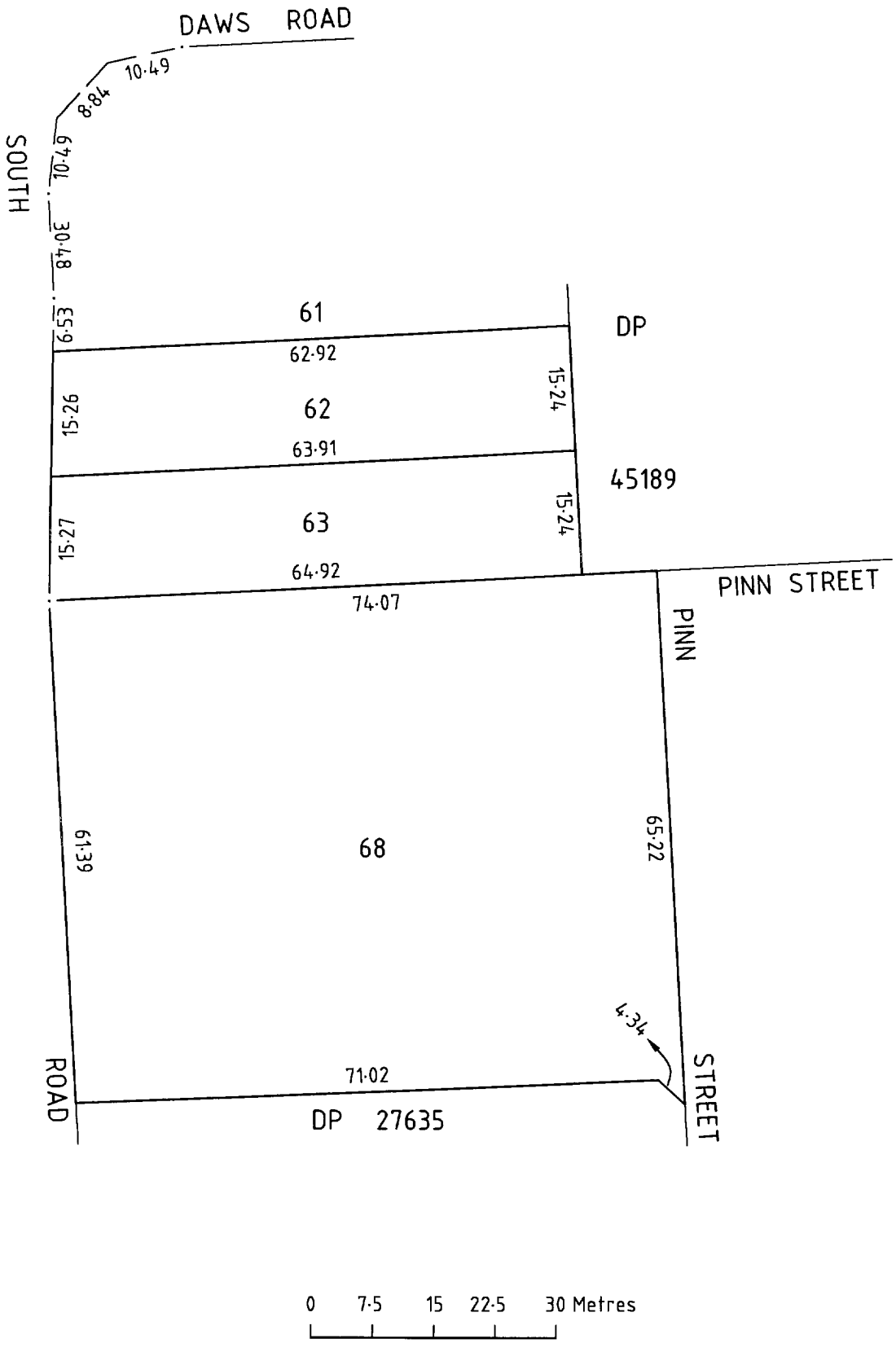
Schedule of Dealings

NIL

Notations

Dealings Affecting Title	NIL
Priority Notices	NIL
Notations on Plan	NIL
Registrar-General's Notes	NIL
Administrative Interests	NIL

Copyright: www.landservices.com.au/copyright | Privacy: www.landservices.com.au/privacy | Terms of Use: www.landservices.com.au/sailis-terms-of-use



Copyright: www.landservices.com.au/copyright | Privacy: www.landservices.com.au/privacy | Terms of Use: www.landservices.com.au/sailis-terms-of-use

Product	Historical Search
Date/Time	02/09/2022 02:07PM
Customer Reference	12566684
Order ID	20220902005711

Certificate of Title

Title Reference:	CT 5808/746
Status:	CURRENT
Parent Title(s):	CT 3080/170
Dealing(s) Creating Title:	CONVERTED TITLE
Title Issued:	20/09/2000
Edition:	1

Dealings

No lodged Dealings found.

Copyright: www.landservices.com.au/copyright | Privacy: www.landservices.com.au/privacy | Terms of Use: www.landservices.com.au/sailis-terms-of-use

FILED PLAN NUMBER **FP 12879**

ACCEPTED FOR FILING
Pro Registrar-General
27/ 2 /1981

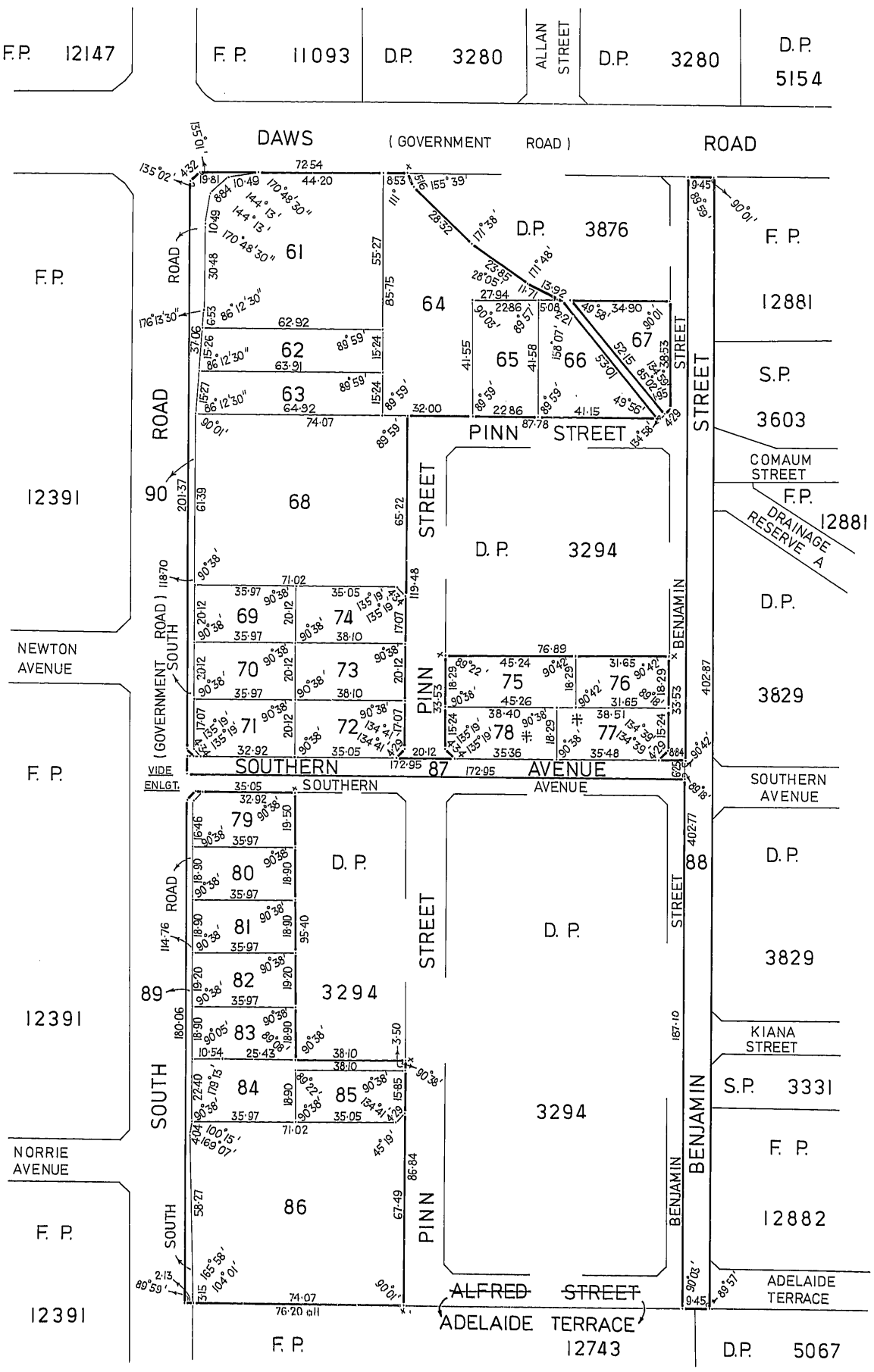
Reference Map No. 6628-50-p/h

COUNCIL
CITY OF MITCHAM

NARRATIVE FILE P T 4670603

COMPILED PLAN

ALLOTMENTS 7 TO 16 INCL. 22, 23, 24, 35, 36, 55 AND 56 IN D.P. 3294
ALLOTMENTS 1, 6, 25 TO 29 INCL. IN D.P. 3876
ALLOTMENTS 64, 67, SOUTHERN AVENUE AND BENJAMIN STREET IN G.P. 270/1855
OF PORTIONS OF SECTION 41
HUNDRED OF ADELAIDE IN THE AREA NAMED ST. MARYS


F.P. 12147
F.P. 11093
D.P. 3280
ALLAN STREET
D.P. 3280
D.P. 5154
DAWS ROAD (GOVERNMENT ROAD)
D.P. 3876
F.P. 12881
S.P. 3603
COMAUM STREET
F.P. 12881
DRAINAGE RESERVE A
D.P. 3829
PINN STREET
STREET
BENJAMIN STREET
D.P. 3294
SOUTHERN AVENUE
D.P. 3829
KIANA STREET
S.P. 3331
F.P. 12882
ADELAIDE TERRACE
D.P. 5067
ALFRED STREET
ADELAIDE TERRACE 12743
NEWTON AVENUE
NORRIE AVENUE
F.P. 12391
SOUTH ROAD (GOVERNMENT ROAD)
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F.P. 12391
F.P. 12391
F.P.
F.P.
F.P.

South Australia

(CERTIFICATE OF TITLE)

Register Book,

Vol. 3080 *Folio* 170

Balance Certificate of Title from Vol.2303 Folio 18

THE FIRE BRIGADES BOARD of Wakefield Street Adelaide

is the proprietor of an estate in fee simple

subject nevertheless to such encumbrances liens and interests as are notified by memorial underwritten or endorsed hereon in

THAT piece of land situate in the HUNDRED of ADELAIDE COUNTY of ADELAIDE

being PORTION OF ALLOTMENT 64 containing one acre and twenty two perches or thereabouts of the subdivision of portion of Section 41 laid out as ST. MARYS and more particularly delineated and bounded as appears in the plan in the margin hereof and therein colored green WHICH said Allotment is bounded as appears in the plan deposited in the General Registry Office No.270 of 1855

Which said Section is delineated in the public map of the said Hundred deposited in the Land Office at Adelaide.

In witness whereof I have hereunto signed my name and affixed my seal this 27th. day of June 19 62

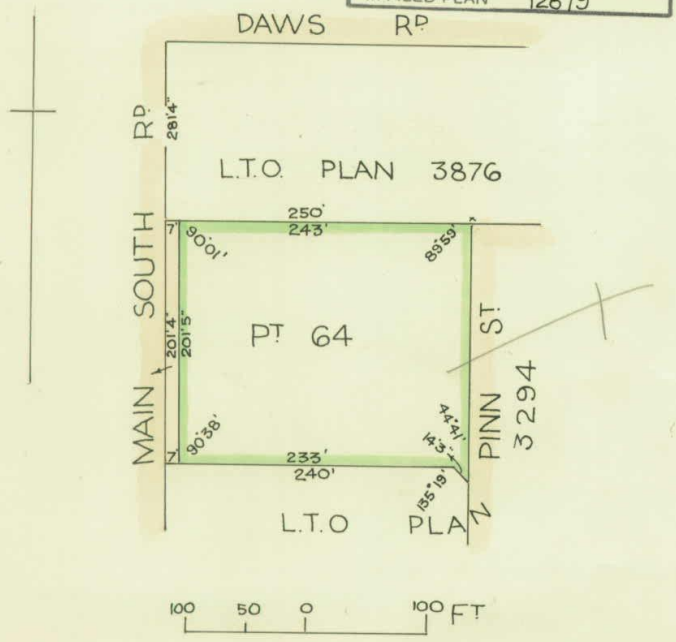
Signed the 27th. day of June 1962, in the presence of R.L.Wood

G.E. Dowell

Acting Registrar-General.

REGISTRAR-GENERAL * SOUTH AUSTRALIA *

The land in this Certificate is REDESIGNATED as ALLOTMENT(S) 68 in FILED PLAN 12879



CANCELLED

CONVERTED TO A COMPUTERISED TITLE

REGISTRAR-GENERAL SOUTH AUSTRALIA

South Australia.

(CERTIFICATE OF TITLE.)

Register Book,

Vol. 2303 *Folio* 18

New Certificate of Title for the whole of the Land in Vol.2093 Folio 180 and issued pursuant to Section 20a of the Roads (Opening and Closing) Act 1932-1946

THE FIRE BRIGADES BOARD of Wakefield Street Adelaide ——

is the proprietor of an estate in fee simple

subject nevertheless to such encumbrances liens and interests as are notified by memorial underwritten or endorsed hereon in

THAT piece of land situate in the HUNDRED of ADELAIDE COUNTY of ADELAIDE being the ALLOTMENT 64 containing one acre and twenty seven perches or thereabouts of the subdivision of portion of Section 41 laid out as ST.MARYS and ——

more particularly delineated and bounded as appears in the plan in the margin hereof and therein coloured green which said Allotment is bounded as appears in the plan deposited in the General Registry Office No.270 of 1855 Which said section is delineated in the public map of the said Hundred deposited in the Land Office at Adelaide.

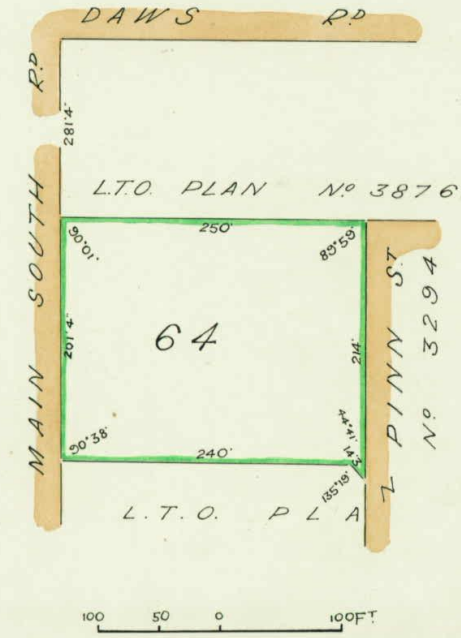
In witness whereof I have hereunto signed my name and affixed my seal this sixth day of January 1957

Signed the 6th day of January 1957, in the presence of M Rohde

Registrar-General.

REGISTRAR-GENERAL SOUTH AUSTRALIA

A.D.



T2359907

TRANSFER No. 2359907

to HER MAJESTY QUEEN ELIZABETH THE SECOND of portion OF THE WITHIN LAND. PRODUCED 14/6/1962 AT 11.5 a.m.

B. Nelson Hayles for DEP. REG. GEN.

CANCELLED AS REGARDS LAND IN TRANSFER No. 2359907 THE SAID LAND HAVING BEEN ACQUIRED BY THE CROWN FOR ROAD PURPOSES.

B. Nelson Hayles for DEP. REG. GEN.

CANCELLED

AND Balance CERTIFICATE OF TITLE

ISSUED VIDE VOL. 3080 FOL. 170

DEP. REG. GENL.

South Australia.

(CERTIFICATE OF TITLE.)

Register Book,

Vol. 2093 *Folio* 180

Pursuant to Memorandum of Transfer No.1632781 Registered on Vol.1503 Folio 35

THE FIRE BRIGADES BOARD of Wakefield Street Adelaide

is the proprietor of an estate in fee simple

subject nevertheless to such encumbrances liens and interests as are notified by memorial underwritten or endorsed hereon in

THAT piece of land situate in the HUNDRED of ADELAIDE COUNTY of ADELAIDE

being the ALLOTMENT 64 containing one acre and three perches or thereabouts of the subdivision of portion of Section 41 laid out as ST.MARYS and

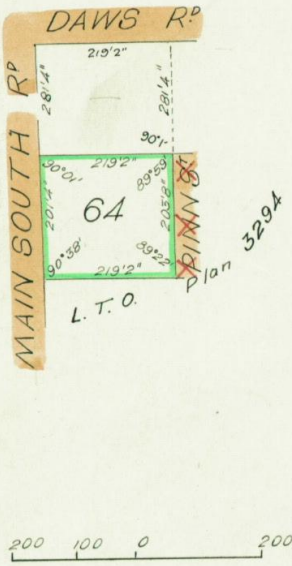
more particularly delineated and bounded as appears in the plan in the margin hereof and therein coloured green which said Allotment is bounded as appears in the plan deposited in the General Registry Office No.270 of 1855 Which said section is delineated in the public map of the said Hundred deposited in the Land Office at Adelaide.

In witness whereof I have hereunto signed my name and affixed my seal this 22nd day of August 1950

Signed the 3rd. day of August 1950, in the presence of G.Lamman

Registrar-General.

REGISTRAR-GENERAL SOUTH AUSTRALIA



Penn Street adjoining the within land on the east has been closed vide confirmation of Road Order in Gazette of 23rd November 1950. (Tracing No. 3716).

Dep. Reg. Genl.

CANCELLED

AND New CERTIFICATE OF TITLE ISSUED VIDE T.T.B. Letter 2156/1953 VOL. 2303 FOL. 18.

DEP. REG. GENL.

South Australia. (CERTIFICATE OF TITLE.)

Register Book,

Vol. 1503 Folio 35

Pursuant to Application No 27479

Arthur Nutter Thomas of North Adelaide Bishop of Adelaide and Whitmore Blake Carr Sharebroker and Percy Emerson Johnstone Solicitor both of Adelaide are the proprietors of an estate in fee simple subject nevertheless to such incumbrances liens and interests as are notified by memorial underwritten or endorsed hereon in those pieces of land situated in the HUNDRED of Adelaide COUNTY of Adelaide being the ALLOTMENTS 64 containing one acre and three perches or thereabouts and 67 containing one acre and thirteen perches or thereabouts of the subdivision of portion of Section 141 laid out as St Marys and

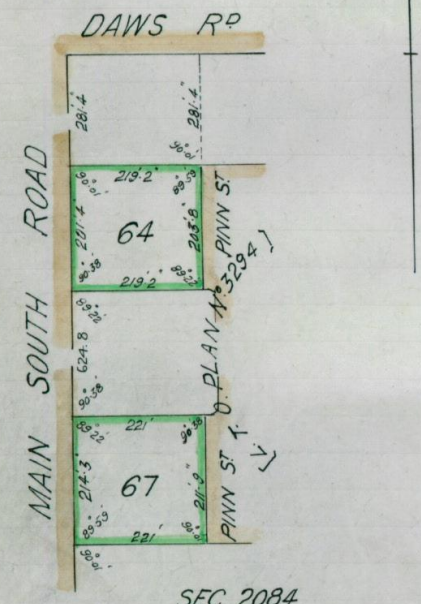
more particularly delineated and bounded as appears in the plan in the margin hereof and therein colored green and in the plan deposited in the General Registry Office No 270 of 1856 Which said Section is delineated in the public map of the said Hundred deposited in the Lands and Survey Office at Adelaide.

In witness whereof I have hereunto signed my name and affixed my seal this fourteenth day of March 1928

Signed the 14th day of March 1928, in the presence of Heggdinze

W H Salter

Registrar-General.



A1329211

Memorandum of Appointment No 1329211 Whereby the within land is now vested in the within named Whitmore Blake Carr and Percy Emerson Johnstone and The Very Reverend George Herbert Jose of Brougham Place North Adelaide Dean of Adelaide for an estate in fee simple Pursuant to The Trustee Act 1936 Produced for registration the 21 day of October 1940 at 2.45 pm

A Kellears Dep Reg Gen

A1377141

Memorandum of Appointment No 1377141 Whereby the within land is now vested in the within named Whitmore Blake Carr of Exchange Buildings Pirie Street Adelaide Sharebroker Percy Emerson Johnstone and The Very Reverend George Herbert Jose and The Right Reverend Bryan Percival Robin of Bishop's Court North Adelaide Late Bishop of Adelaide for an estate in fee simple Pursuant to The Trustees Act 1936-1941 Produced for registration the 22 day of October 1942 at 2.25 pm

A Kellears Dep Reg Gen

over

A/D 1632780 ~~T/632781~~

DEATH. The within named Whitmore Blake Barr died on the 26 day of August 1943 as appears by Certificate Copy of Certificate of Death No. 1632780 Produced for registration the 24 day of July 1950 at 11a m.

Dep. Reg. Gen.

TRANSFER No. 1632781 FROM Percy Emerson Johnstone The Very Reverend George Herbert Rose and The Right Reverend Bryan Percival Robin to The Fire Brigades Board OF THE WITHIN Lot 64

PRODUCED FOR REGISTRATION THE 24 DAY OF July 1950 AT 11 a.m.

DEP. REG. GEN.

CANCELLED AS REGARDS LAND IN TRANSFER No. 1632781 AND NEW CERTIFICATE OF TITLE ISSUED VOL. 2093 FOLIO 180

Dep. Reg. Gen.

CANCELLED

AND balance CERTIFICATE OF TITLE ISSUED VIDE VOL. 2093 FOL. 181

DEP. REG. GEN.

SAPPA Parcel Report

Date Created: May 11, 2022

The South Australian Property and Planning Atlas is available at the Plan SA website https://sappa.plan.sa.gov.au/

Address Details

Unit Number:	
Street Number:	1125
Street Name:	SOUTH
Street Type:	RD
Suburb:	ST MARYS
Postcode:	5042

Property Details:

Council:	CITY OF MITCHAM
State Electorate:	WAITE (2014), ELDER (2018), ELDER (2022)
Federal Electorate:	BOOTHBY (2013), BOOTHBY (2016), BOOTHBY (2019)
Hundred:	ADELAIDE
Valuation Number:	081206400*
Title Reference:	CT5808/746
Plan No. Parcel No.:	F12879A68

Zoning details next page

Scale ≈ 1:1128 (on A4 page)

50 metres≈

The information provided, is not represented to be accurate, current or complete at the time of printing this report.

The Government of South Australia accepts no liability for the use of this data, or any reliance placed on it.

This report and its contents are (c) copyright Government of South Australia.

Government of South Australia
Attorney-General's Department

Zone Details

Zones

Employment (Z1501) - E

Overlays

Airport Building Heights (Regulated) (O0303) - All structures over 45 metres

The Airport Building Heights (Regulated) Overlay seeks to ensure building height does not pose a hazard to the operation and safety requirements of commercial and military airfields.

Advertising Near Signalised Intersections (O0305)

The Advertising Near Signalised Intersections Overlay seeks to ensure advertising near signalised intersections does not pose an unacceptable risk to pedestrian or road safety.

Future Road Widening (O1801)

The Future Road Widening Overlay seeks to ensure development will not compromise efficient delivery of future road widening requirements.

Hazards (Flooding - General) (O2414)

The Hazards (Flooding - General) Overlay seeks to minimise impacts of general flood risk through appropriate siting and design of development.

Major Urban Transport Routes (O3907)

The Major Urban Transport Routes Overlay seeks to ensure safe and efficient vehicle movement and access along major urban transport routes.

Prescribed Wells Area (O4804)

The Prescribed Wells Area Overlay seeks to ensure sustainable water use in prescribed wells areas.

Regulated and Significant Tree (O5404)

The Regulated and Significant Tree Overlay seeks to mitigate the loss of regulated trees through appropriate development and redevelopment.

Traffic Generating Development (O6001)

The Traffic Generating Development Overlay aims to ensure safe and efficient vehicle movement and access along urban transport routes and major urban transport routes.

Urban Transport Routes (O6301)

The Urban Transport Routes Overlay seeks to ensure safe and efficient vehicle movement and access along urban transport routes.

Variations

Maximum Building Height (Metres) (V0002) - 10

Maximum building height is 10m

Maximum Building Height (Levels) (V0008) - 2

Maximum building height is 2 levels

Appendix C

Section 83A Notifications

Site contamination – Section 83A notification form

EPA South Australia

Site contamination that affects or threatens underground water notification form pursuant to section 83A of the *Environment Protection Act 1993*

Notifier details

Name: ELAINE SPENCE	Telephone: 0417 582 652
Company: Department for Infrastructure and Transport	Email: northsouthcorridor@sa.gov.au / elaine.spence@s
Address: 77 Grenfell St, ADELAIDE SA 5000	elaine.spence@sa.gov.au ◯ the site owner ◯ the site occupier ◯ the site contamination consultant ◯ the site contamination auditor

Site details

Site or establishment name (if appropriate): St Marys Fire Station

Owner(s) (please include contact details where known): Metropolitan Fire Service	Occupier(s) (where different to owner):
Street address(es) (include lot or street number): 1125 South Road, ST MARYS	Certificate(s) of title (current): 5808 / 746

Location, nature and extent

Has a potentially contaminating activity been undertaken at the site, please describe..Firefighting Training.....

Does this notification relate to a change in the location, nature or extent of site contamination that has previously been notified to the EPA? ◯ Yes ◉ No

If yes, please provide the date(s) of previous notification(s):.....

Which group(s) do the chemical substance(s), identified as site contamination that affects or threatens groundwater, belong to?

☐ Metals & metalloids	☐ Non-metallic inorganics	☐ Organic alcohols/other organics
☐ Petroleum hydrocarbons	☐ Anilines	☐ Chlorinated alkanes
☐ Chlorinated alkenes	☐ Chlorinated benzenes	☐ Polychlorinated biphenyls
☐ Other chlorinated compounds	☐ Monocyclic aromatic compounds	☐ Polycyclic aromatic compounds
☐ Phenols	☐ Phthalates	☐ Pesticides/herbicides/fungicides
☐ Surfactants	☑ Other (please specify):.PFOA, PFOS and PFHxS.....	

Has an assessment of the environmental values of groundwater been undertaken? ○ Yes ◉ No

If yes, what is the TDS range in mg/L (lowest concentration for the site)? .....

What are the environmental values of groundwater for the site?

- ☐ Drinking water
- ☐ Primary industries (irrigation and general water uses)
- ☐ Recreation and aesthetics
- ☐ Aquatic ecosystems (marine)
- ☐ Aquatic ecosystems (fresh)
- ☐ Primary industries (aquaculture)
- ☐ Primary industries (agriculture)

Where has the site contamination that affects or threatens groundwater been identified?

- ☑ Soil/soil vapour
- ☑ Groundwater

Maximum depth: 5.2 .....m bgl Targeted aquifer(s): Q1 and Q3 .....

What is the depth to groundwater (where known)? 5 .....m bgl

Has a non-aqueous phase liquid been identified or inferred? ○ Yes ◉ No

If yes, please provide details of measured thickness (in metres):.....

Has site contamination that affects or threatens groundwater been identified[1] offsite? ○ Yes ◉ No

If yes, please specify offsite certificate(s) of title or address(es):.....

An accurate scaled site plan showing sampling locations has been included. ☑

This notification provides the following information to determine the existence of site contamination and the support notification of site contamination that affects or threatens groundwater at the site?

Monitoring well data[2]	○ Yes ◉ No	Soil lithological data	○ Yes ◉ No
Groundwater field data	○ Yes ◉ No	Soil vapour bore data	○ Yes ◉ No
Analytical laboratory data	◉ Yes ○ No		
Quality assurance data	○ Yes ◉ No		

Has the electronic data been assessed as reliable in meeting the objectives of the assessment? ◉ Yes ○ No

1 Using direct evidence and not inferred information

2 Not required where electronic information has previously been provided to the EPA and the data has not changed

Further assessment details	
Have chemical substances been identified that may represent background concentrations? ◯ Yes ◉ No	
If yes, will a background concentration[3] assessment be undertaken within the next 3 months? ◯ Yes ◉ No	
Is any further assessment being undertaken? ☐ Preliminary site investigation ☐ Detailed site investigation ☑ Groundwater monitoring event ☑ Other: Further soil samples to be analysed	Is the site subject to a current site contamination audit? ◯ Yes ◉ No If yes, please specify the EPA reference number for the audit: .....
Declaration	
It is an offence to provide false or misleading information to the Authority. Maximum penalties range from $30,000 for a natural person, to $60,000 for a body corporate, pursuant to section 119 of the Environment Protection Act 1993.	
I/We declare that the information provided in this form and any accompanying documents is not false or misleading in any material particular:	
Name: ELAINE SPENCE	Name:
Position: Technical Lead Contamination - NSC Team	Position:
Signature: Elaine Spence	Signature:
Date: 19/01/2021	Date:

[3] Carried out in accordance with the *EPA Guideline for the assessment of background concentrations (2018)*

Results Summary
PFAS Detected in Groundwater
January 2021

						PFAS			
						Sum of PFHxS and PFOS	Sum of enHealth PFAS (PFHxS + PFOS + PFOA)	Sum of PFAS (PFOS + PFOA)	Perfluorooctanoic acid (PFOA)
						µg/L	µg/L	µg/L	µg/L
EQL						0.001	0.001	0.001	0.001
NEPM 2013 Table 1A(4) Comm/Ind HSL D GW for Vapour Intrusion, Sand									
PFAS NEMP 2020 Table 1 Health Drinking Water						**0.07**			**0.56**
PFAS NEMP 2020 Table 1 Health Recreational Water						2			10
Well ID	**Location**	**Water Depth (m bgl)**	**Coordinates**		**Date**				
			MGA	**Easting and Northing**					
GW8001b	**St Marys Fire Station**	**25**	**94 46/2**	**278706.0m E 6124949.0m N**	**23/12/2020**	**0.31**	0.337	0.187	0.027
GW8002b		**5**	**94 56/2**	**278701.0m E 6124950.0m N**	**23/12/2020**	**45**	45.88	22.88	**0.88**

8001

Soil results Summary PFAS in soil 19.01.2021		PFAS		
		Sum of PFHxS and PFOS	Sum of enHealth PFAS (PFHxS + PFOS + PFOA)	Sum of PFAS (PFOS + PFOA)
		mg/kg	mg/kg	mg/kg
EQL		0.0002	0.005	0.005
PFAS NEMP 2020 Table 2 Health Industrial/Commercial		20		
PFAS NEMP 2020 Table 2 Health Public open space		1		
PFAS NEMP 2020 Table 2 Health Residential accessible soil		*0.01*		
PFAS NEMP 2020 Table 2 Health Residential min soil access		**2**		
Field ID	**Date**			
BH7028-Env-004-J-0.3-0.35	**18/12/2020**	*0.853*	0.853	0.84
BH7028-Env-006-J-1.0-1.05	**18/12/2020**	*0.052*	0.052	0.023
BH7028-Env-014-J-5.6-5.65	**18/12/2020**	*0.101*	0.101	0.07
BH7029-ENV-001-J-1.5-2	**8/12/2020**	*0.077*	0.077	0.077
BH7029-ENV-003-J-3.8-4	**8/12/2020**	*0.028*	0.028	0.028
BH7029-ENV-004-J-4.8-5.2	**8/12/2020**	*0.0322*	0.0322	0.026

Comments

#1 Quantification of linear and branched isomers has been conducted as a single total response using the relative response factor for the corresponding linear/branched standard.

Site contamination – Section 83A notification form

Site contamination that affects or threatens underground water notification form pursuant to section 83A of the *Environment Protection Act 1993*

Notifier details

Name: Dilara Valiff	Telephone: (08) 8111 6527
Company: GHD Pty Ltd.	Email: Dilara.Valiff@ghd.com
Address: Level 4, 211 Victoria Square ADELAIDE SA 5000	◯ the site owner ◯ the site occupier ◯ the site contamination consultant ◯ the site contamination auditor

Site details

Site or establishment name (if appropriate): South Australian Metropolitan Fire Service - St Mary's Fire Station

Owner(s) (please include contact details where known): South Australian Metropolitan Fire Service	Occupier(s) (where different to owner):
Street address(es) (include lot or street number): 1125 South Road, St Marys, SA 5042	Certificate(s) of title (current): CT 5808/746

Location, nature and extent

Has a potentially contaminating activity been undertaken at the site, please describe: AFFF use

Does this notification relate to a change in the location, nature or extent of site contamination that has previously been notified to the EPA? ◯ Yes ◯ No

If yes, please provide the date(s) of previous notification(s): 19/01/2021

Which group(s) do the chemical substance(s), identified as site contamination that affects or threatens groundwater, belong to?

☐ Metals & metalloids	☐ Non-metallic inorganics	☐ Organic alcohols/other organics
☐ Petroleum hydrocarbons	☐ Anilines	☐ Chlorinated alkanes
☐ Chlorinated alkenes	☐ Chlorinated benzenes	☐ Polychlorinated biphenyls
☐ Other chlorinated compounds	☐ Monocyclic aromatic compounds	☐ Polycyclic aromatic compounds
☐ Phenols	☐ Phthalates	☐ Pesticides/herbicides/fungicides
☐ Surfactants	☑ Other (please specify): PFAS	

Has an assessment of the environmental values of groundwater been undertaken? (●) Yes ( ) No

If yes, what is the TDS range in mg/L (lowest concentration for the site)? 2,702 mg/L in Q1

What are the environmental values of groundwater for the site?

- [x] Drinking water
- [x] Primary industries (irrigation and general water uses)
- [x] Recreation and aesthetics
- [ ] Aquatic ecosystems (marine)
- [x] Aquatic ecosystems (fresh)
- [ ] Primary industries (aquaculture)
- [ ] Primary industries (agriculture)

Where has the site contamination that affects or threatens groundwater been identified?

- [ ] Soil/soil vapour
- [x] Groundwater

Maximum depth: 5 ……m bgl Targeted aquifer(s): Q1 ……

What is the depth to groundwater (where known)? 1.75 to 2.55 …m bgl

Has a non-aqueous phase liquid been identified or inferred? ( ) Yes ( ) No

If yes, please provide details of measured thickness (in metres):……..

Has site contamination that affects or threatens groundwater been identified[1] offsite? ( ) Yes ( ) No

If yes, please specify offsite certificate(s) of title or address(es):……

An accurate scaled site plan showing sampling locations has been included. [x]

This notification provides the following information to determine the existence of site contamination and the support notification of site contamination that affects or threatens groundwater at the site?

Monitoring well data[2]	( ) Yes	( ) No	Soil lithological data	( ) Yes	( ) No
Groundwater field data	( ) Yes	( ) No	Soil vapour bore data	( ) Yes	( ) No
Analytical laboratory data	( ) Yes	( ) No			
Quality assurance data	( ) Yes	( ) No			

Has the electronic data been assessed as reliable in meeting the objectives of the assessment? ( ) Yes ( ) No

[1] Using direct evidence and not inferred information

[2] Not required where electronic information has previously been provided to the EPA and the data has not changed

Further assessment details	
Have chemical substances been identified that may represent background concentrations? ◯ Yes ◉ No	
If yes, will a background concentration[3] assessment be undertaken within the next 3 months? ◯ Yes ◉ No	
Is any further assessment being undertaken? ☐ Preliminary site investigation ☑ Detailed site investigation ☑ Groundwater monitoring event ☑ Other: Risk assessment	Is the site subject to a current site contamination audit? ◯ Yes ◉ No If yes, please specify the EPA reference number for the audit: ……..
Declaration	
It is an offence to provide false or misleading information to the Authority. Maximum penalties range from $30,000 for a natural person, to $60,000 for a body corporate, pursuant to section 119 of the Environment Protection Act 1993.	
I/We declare that the information provided in this form and any accompanying documents is not false or misleading in any material particular:	
Name: Dilara Valiff	Name:
Position: Senior Environmental Consultant	Position:
Signature: Dilara Valiff Digitally signed by Dilara Valiff Date: 2022.12.19 11:53:12 +10'30'	Signature:
Date: 19/12/2022	Date:

[3] Carried out in accordance with the *EPA Guideline for the assessment of background concentrations (2018)*

Table 1
Groundwater Results Summary

SA Metropolitan Fire Service
MFS St Marys Station PFAS investigation

					PFAS - Perfluoroalkyl Sulfonic Acids						PFAS - Perfluoroalkyl Carboxylic Acids											PFAS - Perfluoroalkyl Sulfonamide					
					Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecanesulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-Methyl perfluorooctane sulfonamidoethanol (MEFOSE)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)
					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	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL					0.0004	0.001	0.0002	0.001	0.0002	0.002	0.002	0.002	0.0004	0.0004	0.0002	0.001	0.002	0.002	0.005	0.01	0.05	0.01	0.05	0.1	0.002	0.05	0.5
ADWG 2011 Health (v3.7 updated 2022)															0.56												
NHMRC 2019 Recreational Water PFAS Guidelines															10												
PFAS NEMP 2.0 2020 Freshwater - 95% - slightly to moderately disturbed systems									0.13						220												
PFAS NEMP 2.0 2020 Freshwater - 99% - high conservation value systems									**0.00023**						**19**												
PFAS NEMP 2.0 2020 Health Drinking Water							0.07		0.07						0.56												
PFAS NEMP 2.0 2020 Recreational Water							2		2						10												
Location Code	**Date**	**Field ID**	**Lab Report Number**	**Depth**																								
GW201b	20/10/2022	GW201b	308730		0.060	0.097	0.64	0.021	**0.30**	<0.002	0.01	0.034	0.11	0.019	0.023	0.077	<0.002	<0.002	<0.005	<0.01	<0.05	<0.01	<0.05	<0.1	<0.002	<0.05	<0.5
	21/10/2022	GW201b	308746		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW7003b	20/10/2022	GW7003b	308730		0.090	0.11	1.2	0.074	**2.0**	<0.002	0.048	0.021	0.067	0.016	0.051	0.027	<0.002	<0.002	<0.005	<0.01	<0.05	<0.01	<0.05	<0.1	<0.002	<0.05	<0.5
	21/10/2022	GW7003b	308746		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW8001b	20/10/2022	GW8001b	308730		0.058	0.096	0.55	0.017	**0.31**	<0.002	0.047	0.12	0.20	0.036	0.026	0.092	<0.002	<0.002	<0.005	<0.01	<0.05	<0.01	<0.05	<0.1	<0.002	<0.05	<0.5
GW8002b	20/10/2022	GW8002b	308730		4.6	5.7	44	2.0	**42**	<0.020	1.6	5.1	42	1.9	2.2	4.3	<0.020	<0.020	<0.050	<0.10	<0.50	<0.10	<0.50	<1.0	<0.020	<0.50	<5.0
	21/10/2022	GW8002b	308746		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW02	20/10/2022	MW02	308730		-	-	49	-	**19**	-	-	-	-	-	2.0	-	-	-	-	-	-	-	-	-	-	-	-	-
MW03	20/10/2022	MW03	308730		-	-	240	-	**26**	-	-	-	-	-	14	-	-	-	-	-	-	-	-	-	-	-	-	-
MW04	20/10/2022	MW04	308730		-	-	86	-	**30**	-	-	-	-	-	3.2	-	-	-	-	-	-	-	-	-	-	-	-	-

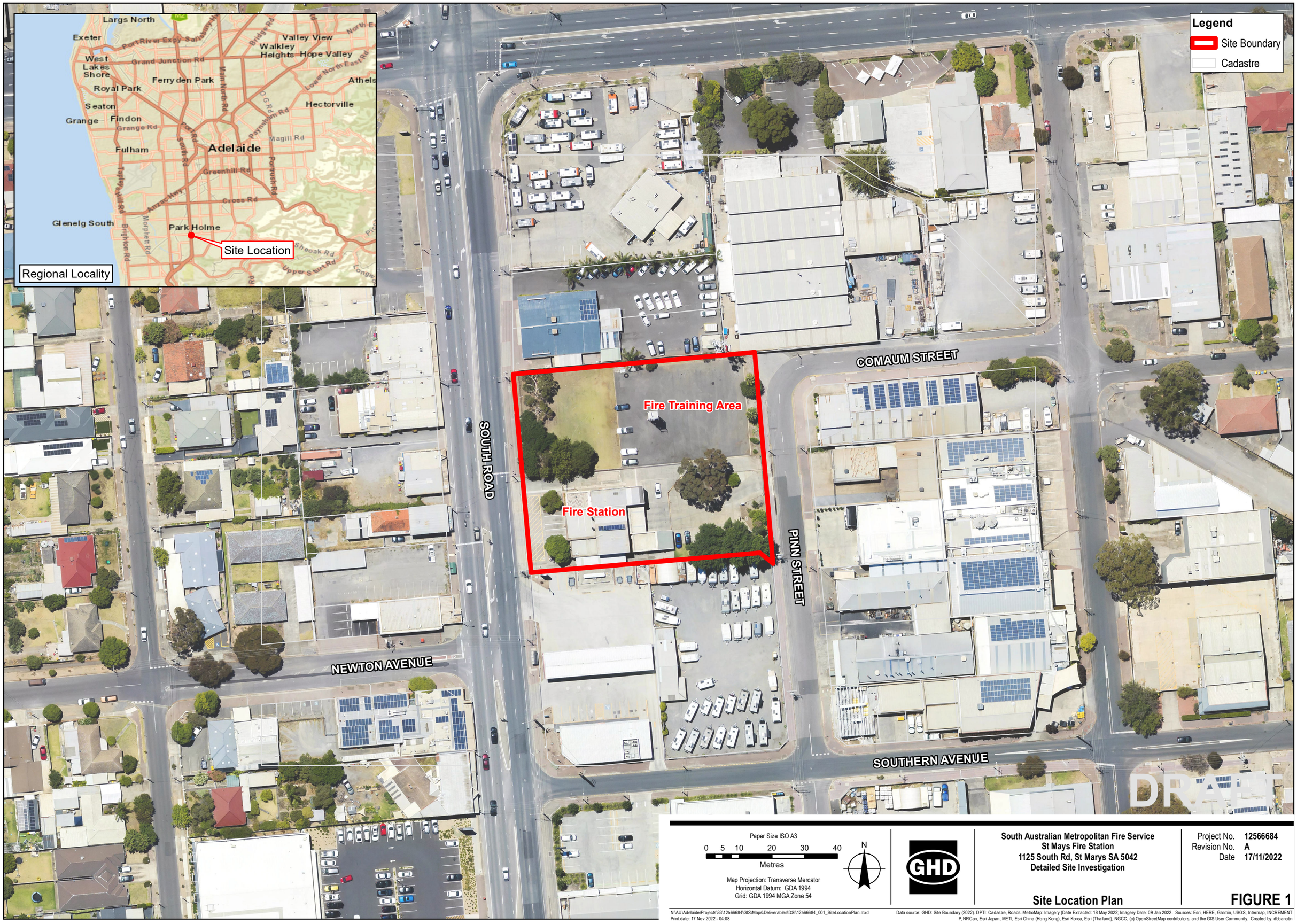
Environmental Standards
National Health and Medical Research Council, January 2022, ADWG 2011 Health (v3.7 updated 2022)
HEPA, Jan 2020, PFAS NEMP 2.0 2020 Freshwater - 95% - slightly to moderately disturbed systems
HEPA, January 2020, PFAS NEMP 2.0 2020 Freshwater - 99% - high conservation value systems
HEPA, Jan 2020, PFAS NEMP 2.0 2020 Health Drinking Water
HEPA, Jan 2020, PFAS NEMP 2.0 2020 Recreational Water

Table 1
Groundwater Results Summary

SA Metropolitan Fire Service
MFS St Marys Station PFAS investigation

		PFAS - Fluorotelomer Sulfonic Acids				PFAS - Sums		
	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer Sulfonate (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Sum of PFHxS and PFOS	Sum of US EPA PFAS (PFOS + PFOA)*	PFAS (Sum of Total)
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL	0.002	0.001	0.0004	0.0004	0.002	0.0002	0.0002	0.0002
ADWG 2011 Health (v3.7 updated 2022)						0.07		
NHMRC 2019 Recreational Water PFAS Guidelines						2		
PFAS NEMP 2.0 2020 Freshwater - 95% - slightly to moderately disturbed systems								
PFAS NEMP 2.0 2020 Freshwater - 99% - high conservation value systems								
PFAS NEMP 2.0 2020 Health Drinking Water						0.07		
PFAS NEMP 2.0 2020 Recreational Water						2		
Location Code **Date** **Field ID** **Lab Report Number** **Depth**								
GW201b 20/10/2022 GW201b 308730	<0.002	<0.001	0.022	0.0007	<0.002	0.95	0.33	1.4
21/10/2022 GW201b 308746	-	-	-	-	-	-	-	-
GW7003b 20/10/2022 GW7003b 308730	<0.002	<0.001	0.0067	<0.0004	<0.002	3.2	2.0	3.7
21/10/2022 GW7003b 308746	-	-	-	-	-	-	-	-
GW8001b 20/10/2022 GW8001b 308730	<0.002	<0.001	0.68	0.002	<0.002	0.86	0.34	2.2
GW8002b 20/10/2022 GW8002b 308730	<0.020	<0.010	11	<0.020	<0.02	86	44	170
21/10/2022 GW8002b 308746	-	-	-	-	-	-	-	-
MW02 20/10/2022 MW02 308730	-	-	0.06	<0.02	-	68	21	70
MW03 20/10/2022 MW03 308730	-	-	0.67	<0.02	-	260	40	280
MW04 20/10/2022 MW04 308730	-	-	6.9	<0.02	-	120	33	130

Environmental Standards
National Health and Medical Research Council, January 2022, ADWG 2011 Health (v
HEPA, Jan 2020, PFAS NEMP 2.0 2020 Freshwater - 95% - slightly to moderately dis
HEPA, January 2020, PFAS NEMP 2.0 2020 Freshwater - 99% - high conservation v
HEPA, Jan 2020, PFAS NEMP 2.0 2020 Health Drinking Water
HEPA, Jan 2020, PFAS NEMP 2.0 2020 Recreational Water



Paper Size ISO A3

0 5 10 20 30 40

Metres

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 54

GHD

South Australian Metropolitan Fire Service
St Mays Fire Station
1125 South Rd, St Marys SA 5042
Detailed Site Investigation

Site Location Plan

Project No. **12566684**
Revision No. **A**
Date **17/11/2022**

FIGURE 1

N:\AU\Adelaide\Projects\33\12566684\GIS\Maps\Deliverables\DSI\12566684_001_SiteLocationPlan.mxd
Print date: 17 Nov 2022 - 04:08

Data source: GHD: Site Boundary (2022). DPTI: Cadastre, Roads. MetroMap: Imagery (Date Extracted: 18 May 2022, Imagery Date: 09 Jan 2022. Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community. Created by: dbbanatin

Paper Size ISO A3

0 2.5 5 10 15

Metres

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 54

GHD

South Australian Metropolitan Fire Service
St Mays Fire Station
1125 South Rd, St Marys SA 5042
Detailed Site Investigation

Groundwater Monitoring Well Locations

Project No. **12566684**
Revision No. **0**
Date **17/11/2022**

FIGURE 4

N:\AU\Adelaide\Projects\33\12566684\GIS\Maps\Deliverables\DSI\12566684_004_GWWellLoc.mxd
Print date: 17 Nov 2022 - 04:05

Data source: GHD: Site Boundary (2022). DPTI: Cadastre, Roads. MetroMap: Imagery (Date Extracted: 18 May 2022; Imagery Date: 09 Jan 2022. . Created by: dbbanatin

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

CERTIFICATE OF ANALYSIS 308730

Client Details

Client	GHD Pty Ltd
Attention	Ben Petticrew
Address	GPO Box 2052, Adelaide, SA, 5001

Sample Details

Your Reference	**12566684-MFS St Marys Station VSCAP, PSI & SAQP**
Number of Samples	9 Water
Date samples received	24/10/2022
Date completed instructions received	24/10/2022

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	01/11/2022
Date of Issue	01/11/2022

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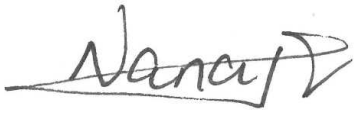
Accredited for compliance with ISO/IEC 17025 - Testing. **Tests not covered by NATA are denoted with ***

Results Approved By
Alexander Mitchell Maclean, Senior Chemist
Diego Bigolin, Inorganics Supervisor
Phalak Inthakesone, Organics Development Manager, Sydney

Authorised By



Nancy Zhang, Laboratory Manager

Ion Balance				
Our Reference		308730-4	308730-6	308730-8
Your Reference	UNITS	GW8001b	GW201b	FD01
Type of sample		Water	Water	Water
Date Sampled		21/10/2022	21/10/2022	21/10/2022
Date prepared	-	24/10/2022	24/10/2022	24/10/2022
Date analysed	-	24/10/2022	24/10/2022	24/10/2022
Calcium - Dissolved	mg/L	37	13	14
Potassium - Dissolved	mg/L	19	9.5	9.6
Sodium - Dissolved	mg/L	240	740	730
Magnesium - Dissolved	mg/L	<0.5	20	20
Hardness	mgCaCO 3 /L	92	120	120
Hydroxide Alkalinity (OH^-) as $CaCO_3$	mg/L	100	<5	<5
Bicarbonate Alkalinity as $CaCO_3$	mg/L	<5	720	700
Carbonate Alkalinity as $CaCO_3$	mg/L	100	<5	<5
Total Alkalinity as $CaCO_3$	mg/L	200	720	700
Sulphate, SO4	mg/L	160	120	110
Chloride, Cl	mg/L	220	800	780
Ionic Balance	%	-3.0	-6.0	-5.0

PFAS in Waters Short				
Our Reference		308730-1	308730-2	308730-3
Your Reference	UNITS	MW02	MW03	MW04
Type of sample		Water	Water	Water
Date Sampled		20/10/2022	20/10/2022	20/10/2022
Date prepared	-	25/10/2022	25/10/2022	25/10/2022
Date analysed	-	25/10/2022	25/10/2022	25/10/2022
Perfluorohexanesulfonic acid - PFHxS	µg/L	49	240	86
Perfluorooctanesulfonic acid PFOS	µg/L	19	26	30
Perfluorooctanoic acid PFOA	µg/L	2.0	14	3.2
6:2 FTS	µg/L	0.06	0.67	6.9
8:2 FTS	µg/L	<0.02	<0.02	<0.02
Surrogate $^{13}C_8$ *PFOS*	%	96	92	94
Surrogate $^{13}C_2$ *PFOA*	%	111	106	105
Extracted ISTD $^{18}O_2$ *PFHxS*	%	93	94	89
Extracted ISTD $^{13}C_4$ *PFOS*	%	101	101	105
Extracted ISTD $^{13}C_4$ *PFOA*	%	95	100	89
Extracted ISTD $^{13}C_2$ *6:2FTS*	%	62	38	56
Extracted ISTD $^{13}C_2$ *8:2FTS*	%	82	55	67
Total Positive PFHxS & PFOS	µg/L	68	260	120
Total Positive PFOA & PFOS	µg/L	21	40	33
Total Positive PFAS	µg/L	70	280	130

PFAS in Waters Trace Extended						
Our Reference		308730-4	308730-5	308730-6	308730-7	308730-8
Your Reference	UNITS	GW8001b	GW8002b	GW201b	GW7003b	FD01
Type of sample		Water	Water	Water	Water	Water
Date Sampled		21/10/2022	21/10/2022	21/10/2022	21/10/2022	21/10/2022
Date prepared	-	27/10/2022	25/10/2022	27/10/2022	27/10/2022	27/10/2022
Date analysed	-	27/10/2022	25/10/2022	27/10/2022	27/10/2022	27/10/2022
Perfluorobutanesulfonic acid	µg/L	0.058	4.6	0.060	0.090	0.061
Perfluoropentanesulfonic acid	µg/L	0.096	5.7	0.097	0.11	0.094
Perfluorohexanesulfonic acid - PFHxS	µg/L	0.55	44	0.64	1.2	0.60
Perfluoroheptanesulfonic acid	µg/L	0.017	2.0	0.021	0.074	0.020
Perfluorooctanesulfonic acid PFOS	µg/L	0.31	42	0.30	2.0	0.31
Perfluorodecanesulfonic acid	µg/L	<0.002	<0.02	<0.002	<0.002	<0.002
Perfluorobutanoic acid	µg/L	0.047	1.6	0.01	0.048	0.01
Perfluoropentanoic acid	µg/L	0.12	5.1	0.034	0.021	0.033
Perfluorohexanoic acid	µg/L	0.20	42	0.11	0.067	0.10
Perfluoroheptanoic acid	µg/L	0.036	1.9	0.019	0.016	0.019
Perfluorooctanoic acid PFOA	µg/L	0.026	2.2	0.023	0.051	0.022
Perfluorononanoic acid	µg/L	0.092	4.3	0.077	0.027	0.070
Perfluorodecanoic acid	µg/L	<0.002	<0.02	<0.002	<0.002	<0.002
Perfluoroundecanoic acid	µg/L	<0.002	<0.02	<0.002	<0.002	<0.002
Perfluorododecanoic acid	µg/L	<0.005	<0.05	<0.005	<0.005	<0.005
Perfluorotridecanoic acid	µg/L	<0.01	<0.1	<0.01	<0.01	<0.01
Perfluorotetradecanoic acid	µg/L	<0.05	<0.5	<0.05	<0.05	<0.05
4:2 FTS	µg/L	<0.001	<0.01	<0.001	<0.001	<0.001
6:2 FTS	µg/L	0.68	11	0.022	0.0067	0.019
8:2 FTS	µg/L	0.002	<0.02	0.0007	<0.0004	0.0007
10:2 FTS	µg/L	<0.002	<0.02	<0.002	<0.002	<0.002
Perfluorooctane sulfonamide	µg/L	<0.01	<0.1	<0.01	<0.01	<0.01
N-Methyl perfluorooctane sulfonamide	µg/L	<0.05	<0.5	<0.05	<0.05	<0.05
N-Ethyl perfluorooctanesulfon amide	µg/L	<0.1	<1	<0.1	<0.1	<0.1
N-Me perfluorooctanesulfonamid oethanol	µg/L	<0.05	<0.5	<0.05	<0.05	<0.05
N-Et perfluorooctanesulfonamid oethanol	µg/L	<0.5	<5	<0.5	<0.5	<0.5
MePerfluorooctanesulf- amid oacetic acid	µg/L	<0.002	<0.02	<0.002	<0.002	<0.002
EtPerfluorooctanesulf- amid oacetic acid	µg/L	<0.002	<0.02	<0.002	<0.002	<0.002
Surrogate $^{13}C_8$ *PFOS*	%	92	95	93	90	90
Surrogate $^{13}C_2$ *PFOA*	%	108	100	117	115	115
Extracted ISTD $^{13}C_3$ *PFBS*	%	109	100	88	85	90
Extracted ISTD $^{18}O_2$ *PFHxS*	%	92	93	95	92	93
Extracted ISTD $^{13}C_4$ *PFOS*	%	102	109	101	102	103
Extracted ISTD $^{13}C_4$ *PFBA*	%	95	61	40	79	40

PFAS in Waters Trace Extended						
Our Reference		308730-4	308730-5	308730-6	308730-7	308730-8
Your Reference	UNITS	GW8001b	GW8002b	GW201b	GW7003b	FD01
Type of sample		Water	Water	Water	Water	Water
Date Sampled		21/10/2022	21/10/2022	21/10/2022	21/10/2022	21/10/2022
Extracted ISTD $^{13}C_3$ *PFPeA*	%	112	82	59	20	60
Extracted ISTD $^{13}C_2$ *PFHxA*	%	106	105	96	44	93
Extracted ISTD $^{13}C_4$ *PFHpA*	%	60	80	84	48	89
Extracted ISTD $^{13}C_4$ *PFOA*	%	74	100	96	69	102
Extracted ISTD $^{13}C_5$ *PFNA*	%	75	69	85	44	97
Extracted ISTD $^{13}C_2$ *PFDA*	%	92	92	100	85	114
Extracted ISTD $^{13}C_2$ *PFUnDA*	%	116	102	110	103	112
Extracted ISTD $^{13}C_2$ *PFDoDA*	%	74	104	95	91	106
Extracted ISTD $^{13}C_2$ *PFTeDA*	%	78	83	86	77	91
Extracted ISTD $^{13}C_2$ *4:2FTS*	%	#	75	143	107	155
Extracted ISTD $^{13}C_2$ *6:2FTS*	%	103	101	129	110	144
Extracted ISTD $^{13}C_2$ *8:2FTS*	%	#	80	177	150	192
Extracted ISTD $^{13}C_8$ *FOSA*	%	28	106	60	46	60
Extracted ISTD d_3 *N MeFOSA*	%	114	113	116	116	114
Extracted ISTD d_5 *N EtFOSA*	%	115	118	114	116	111
Extracted ISTD d_7 *N MeFOSE*	%	97	98	99	101	101
Extracted ISTD d_9 *N EtFOSE*	%	100	102	102	106	106
Extracted ISTD d_3 *N MeFOSAA*	%	80	87	119	83	127
Extracted ISTD d_5 *N EtFOSAA*	%	103	80	112	80	117
Total Positive PFHxS & PFOS	µg/L	0.86	86	0.95	3.2	0.91
Total Positive PFOS & PFOA	µg/L	0.34	44	0.33	2.0	0.34
Total Positive PFAS	µg/L	2.2	170	1.4	3.7	1.4

PFAS in Water TRACE Short		
Our Reference		308730-9
Your Reference	UNITS	RB01
Type of sample		Water
Date Sampled		.
Date prepared	-	28/10/2022
Date analysed	-	28/10/2022
Perfluorohexanesulfonic acid - PFHxS	µg/L	0.001
Perfluorooctanesulfonic acid PFOS	µg/L	0.002
Perfluorooctanoic acid PFOA	µg/L	<0.0002
6:2 FTS	µg/L	<0.0004
8:2 FTS	µg/L	<0.0004
Surrogate $^{13}C_8$ *PFOS*	%	93
Surrogate $^{13}C_2$ *PFOA*	%	104
Extracted ISTD $^{18}O_2$ *PFHxS*	%	93
Extracted ISTD $^{13}C_4$ *PFOS*	%	89
Extracted ISTD $^{13}C_4$ *PFOA*	%	101
Extracted ISTD $^{13}C_2$ *6:2FTS*	%	129
Extracted ISTD $^{13}C_2$ *8:2FTS*	%	155
Total Positive PFHxS & PFOS	µg/L	0.0028
Total Positive PFOS & PFOA	µg/L	0.002
Total Positive PFAS	µg/L	0.0028

Method ID	Methodology Summary
Inorg-006	Alkalinity - determined titrimetrically in accordance with APHA latest edition, 2320-B.
Inorg-040	The concentrations of the major ions (mg/L) are converted to milliequivalents and summed. The ionic balance should be within +/- 15% ie total anions = total cations +/-15%.
Inorg-081	Anions - a range of Anions are determined by Ion Chromatography, in accordance with APHA latest edition, 4110-B. Waters samples are filtered on receipt prior to analysis. Alternatively determined by colourimetry/turbidity using Discrete Analyser.
Metals-020	Determination of various metals by ICP-AES.
Org-029	Soil samples are extracted with basified Methanol. Waters and soil extracts are directly injected and/or concentrated/extracted using SPE. TCLPs/ASLP leachates are centrifuged, the supernatant is then analysed (including amendment with solvent) - as per the option in AS4439.3. Analysis is undertaken with LC-MS/MS. PFAS results include the sum of branched and linear isomers where applicable. Please note that PFAS results are corrected for Extracted Internal Standards (QSM 5.4 Table B-15 terminology), which are mass labelled analytes added prior to sample preparation to assess matrix effects and verify processing of the sample. PFAS analytes without a commercially available mass labelled analogue are corrected vs a closely eluting mass labelled PFAS compound. Surrogates are also reported, in this context they are mass labelled PFAS compounds added prior to extraction but are used as monitoring compounds only (not used for result correction). Envicarb (or similar) is used discretionally to remove interfering matrix components. Please contact the laboratory if estimates of Measurement Uncertainty are required as per WA DER.

QUALITY CONTROL: Ion Balance						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date prepared	-			24/10/2022	4	24/10/2022	24/10/2022		24/10/2022	[NT]
Date analysed	-			24/10/2022	4	24/10/2022	24/10/2022		24/10/2022	[NT]
Calcium - Dissolved	mg/L	0.5	Metals-020	<0.5	4	37	37	0	91	[NT]
Potassium - Dissolved	mg/L	0.5	Metals-020	<0.5	4	19	19	0	94	[NT]
Sodium - Dissolved	mg/L	0.5	Metals-020	<0.5	4	240	240	0	90	[NT]
Magnesium - Dissolved	mg/L	0.5	Metals-020	<0.5	4	<0.5	<0.5	0	104	[NT]
Hardness	mgCaCO 3 /L	3	Metals-020	[NT]	4	92	91	1	[NT]	[NT]
Hydroxide Alkalinity (OH^-) as $CaCO_3$	mg/L	5	Inorg-006	<5	4	100	[NT]		[NT]	[NT]
Bicarbonate Alkalinity as $CaCO_3$	mg/L	5	Inorg-006	<5	4	<5	[NT]		[NT]	[NT]
Carbonate Alkalinity as $CaCO_3$	mg/L	5	Inorg-006	<5	4	100	[NT]		[NT]	[NT]
Total Alkalinity as $CaCO_3$	mg/L	5	Inorg-006	<5	4	200	[NT]		91	[NT]
Sulphate, SO4	mg/L	1	Inorg-081	<1	4	160	[NT]		102	[NT]
Chloride, Cl	mg/L	1	Inorg-081	<1	4	220	[NT]		101	[NT]
Ionic Balance	%		Inorg-040	[NT]	4	-3.0	[NT]		[NT]	[NT]

QUALITY CONTROL: PFAS in Waters Short						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date prepared	-			25/10/2022	[NT]	[NT]	[NT]	[NT]	25/10/2022	[NT]
Date analysed	-			25/10/2022	[NT]	[NT]	[NT]	[NT]	25/10/2022	[NT]
Perfluorohexanesulfonic acid - PFHxS	µg/L	0.01	Org-029	<0.01	[NT]	[NT]	[NT]	[NT]	110	[NT]
Perfluorooctanesulfonic acid PFOS	µg/L	0.01	Org-029	<0.01	[NT]	[NT]	[NT]	[NT]	104	[NT]
Perfluorooctanoic acid PFOA	µg/L	0.01	Org-029	<0.01	[NT]	[NT]	[NT]	[NT]	101	[NT]
6:2 FTS	µg/L	0.01	Org-029	<0.01	[NT]	[NT]	[NT]	[NT]	103	[NT]
8:2 FTS	µg/L	0.02	Org-029	<0.02	[NT]	[NT]	[NT]	[NT]	107	[NT]
Surrogate $^{13}C_8$ *PFOS*	%		Org-029	99	[NT]	[NT]	[NT]	[NT]	97	[NT]
Surrogate $^{13}C_2$ *PFOA*	%		Org-029	102	[NT]	[NT]	[NT]	[NT]	98	[NT]
Extracted ISTD $^{18}O_2$ *PFHxS*	%		Org-029	100	[NT]	[NT]	[NT]	[NT]	95	[NT]
Extracted ISTD $^{13}C_4$ *PFOS*	%		Org-029	103	[NT]	[NT]	[NT]	[NT]	98	[NT]
Extracted ISTD $^{13}C_4$ *PFOA*	%		Org-029	105	[NT]	[NT]	[NT]	[NT]	103	[NT]
Extracted ISTD $^{13}C_2$ *6:2FTS*	%		Org-029	114	[NT]	[NT]	[NT]	[NT]	104	[NT]
Extracted ISTD $^{13}C_2$ *8:2FTS*	%		Org-029	114	[NT]	[NT]	[NT]	[NT]	114	[NT]

QUALITY CONTROL: PFAS in Waters Trace Extended						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	308730-5
Date prepared	-			27/10/2022	4	27/10/2022	27/10/2022		27/10/2022	27/10/2022
Date analysed	-			27/10/2022	4	27/10/2022	27/10/2022		27/10/2022	27/10/2022
Perfluorobutanesulfonic acid	µg/L	0.0004	Org-029	<0.0004	4	0.058	0.057	2	102	102
Perfluoropentanesulfonic acid	µg/L	0.001	Org-029	<0.001	4	0.096	0.094	2	112	129
Perfluorohexanesulfonic acid - PFHxS	µg/L	0.0002	Org-029	<0.0002	4	0.55	0.51	8	93	##
Perfluoroheptanesulfonic acid	µg/L	0.001	Org-029	<0.001	4	0.017	0.017	0	97	101
Perfluorooctanesulfonic acid PFOS	µg/L	0.0002	Org-029	<0.0002	4	0.31	0.28	10	92	##
Perfluorodecanesulfonic acid	µg/L	0.002	Org-029	<0.002	4	<0.002	<0.002	0	74	101
Perfluorobutanoic acid	µg/L	0.002	Org-029	<0.002	4	0.047	0.041	14	89	97
Perfluoropentanoic acid	µg/L	0.002	Org-029	<0.002	4	0.12	0.11	9	91	94
Perfluorohexanoic acid	µg/L	0.0004	Org-029	<0.0004	4	0.20	0.19	5	89	##
Perfluoroheptanoic acid	µg/L	0.0004	Org-029	<0.0004	4	0.036	0.035	3	97	107
Perfluorooctanoic acid PFOA	µg/L	0.0002	Org-029	<0.0002	4	0.026	0.027	4	82	91
Perfluorononanoic acid	µg/L	0.001	Org-029	<0.001	4	0.092	0.097	5	107	134
Perfluorodecanoic acid	µg/L	0.002	Org-029	<0.002	4	<0.002	<0.002	0	103	109
Perfluoroundecanoic acid	µg/L	0.002	Org-029	<0.002	4	<0.002	<0.002	0	92	85
Perfluorododecanoic acid	µg/L	0.005	Org-029	<0.005	4	<0.005	<0.005	0	99	98
Perfluorotridecanoic acid	µg/L	0.01	Org-029	<0.01	4	<0.01	<0.01	0	71	90
Perfluorotetradecanoic acid	µg/L	0.05	Org-029	<0.05	4	<0.05	<0.05	0	87	104
4:2 FTS	µg/L	0.001	Org-029	<0.001	4	<0.001	<0.001	0	97	103
6:2 FTS	µg/L	0.0004	Org-029	<0.0004	4	0.68	0.63	8	90	##
8:2 FTS	µg/L	0.0004	Org-029	<0.0004	4	0.002	0.002	0	89	100
10:2 FTS	µg/L	0.002	Org-029	<0.002	4	<0.002	<0.002	0	95	90
Perfluorooctane sulfonamide	µg/L	0.01	Org-029	<0.01	4	<0.01	<0.01	0	96	96
N-Methyl perfluorooctane sulfonamide	µg/L	0.05	Org-029	<0.05	4	<0.05	<0.05	0	118	99
N-Ethyl perfluorooctanesulfon amide	µg/L	0.1	Org-029	<0.1	4	<0.1	<0.1	0	116	94
N-Me perfluorooctanesulfonamid oethanol	µg/L	0.05	Org-029	<0.05	4	<0.05	<0.05	0	106	93
N-Et perfluorooctanesulfonamid oethanol	µg/L	0.5	Org-029	<0.5	4	<0.5	<0.5	0	93	92
MePerfluorooctanesulf- amid oacetic acid	µg/L	0.002	Org-029	<0.002	4	<0.002	<0.002	0	99	100
EtPerfluorooctanesulf- amid oacetic acid	µg/L	0.002	Org-029	<0.002	4	<0.002	<0.002	0	101	111
Surrogate $^{13}C_8$ *PFOS*	%		Org-029	92	4	92	92	0	92	95
Surrogate $^{13}C_2$ *PFOA*	%		Org-029	106	4	108	112	4	103	105

QUALITY CONTROL: PFAS in Waters Trace Extended						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	308730-5
Extracted ISTD $^{13}C_3$ *PFBS*	%		Org-029	90	4	109	111	2	93	98
Extracted ISTD $^{18}O_2$ *PFHxS*	%		Org-029	81	4	92	95	3	89	82
Extracted ISTD $^{13}C_4$ *PFOS*	%		Org-029	91	4	102	105	3	101	89
Extracted ISTD $^{13}C_4$ *PFBA*	%		Org-029	111	4	95	96	1	122	61
Extracted ISTD $^{13}C_3$ *PFPeA*	%		Org-029	88	4	112	115	3	98	81
Extracted ISTD $^{13}C_2$ *PFHxA*	%		Org-029	101	4	106	107	1	115	91
Extracted ISTD $^{13}C_4$ *PFHpA*	%		Org-029	93	4	60	62	3	103	77
Extracted ISTD $^{13}C_4$ *PFOA*	%		Org-029	94	4	74	72	3	106	97
Extracted ISTD $^{13}C_5$ *PFNA*	%		Org-029	94	4	75	72	4	105	64
Extracted ISTD $^{13}C_2$ *PFDA*	%		Org-029	100	4	92	96	4	112	92
Extracted ISTD $^{13}C_2$ *PFUnDA*	%		Org-029	100	4	116	111	4	111	102
Extracted ISTD $^{13}C_2$ *PFDoDA*	%		Org-029	106	4	74	70	6	117	102
Extracted ISTD $^{13}C_2$ *PFTeDA*	%		Org-029	65	4	78	73	7	66	88
Extracted ISTD $^{13}C_2$ *4:2FTS*	%		Org-029	132	4	#	#		145	72
Extracted ISTD$^{13}C_2$ *6:2FTS*	%		Org-029	122	4	103	113	9	138	68
Extracted ISTD $^{13}C_2$ *8:2FTS*	%		Org-029	147	4	#	#		163	85
Extracted ISTD $^{13}C_8$ *FOSA*	%		Org-029	74	4	28	28	0	75	103
Extracted ISTD d_3 *N MeFOSA*	%		Org-029	112	4	114	115	1	104	113
Extracted ISTD d_5 *N EtFOSA*	%		Org-029	112	4	115	119	3	104	118
Extracted ISTD d_7 *N MeFOSE*	%		Org-029	102	4	97	102	5	96	99

QUALITY CONTROL: PFAS in Waters Trace Extended						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	308730-5
Extracted ISTD d_9 *N EtFOSE*	%		Org-029	103	4	100	101	1	98	101
Extracted ISTD d_3 *N MeFOSAA*	%		Org-029	106	4	80	81	1	108	85
Extracted ISTD d_5 *N EtFOSAA*	%		Org-029	100	4	103	101	2	113	75

QUALITY CONTROL: PFAS in Waters Trace Extended						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	8	27/10/2022	27/10/2022		[NT]	[NT]
Date analysed	-			[NT]	8	27/10/2022	27/10/2022		[NT]	[NT]
Perfluorobutanesulfonic acid	µg/L	0.0004	Org-029	[NT]	8	0.061	0.059	3	[NT]	[NT]
Perfluoropentanesulfonic acid	µg/L	0.001	Org-029	[NT]	8	0.094	0.091	3	[NT]	[NT]
Perfluorohexanesulfonic acid - PFHxS	µg/L	0.0002	Org-029	[NT]	8	0.60	0.56	7	[NT]	[NT]
Perfluoroheptanesulfonic acid	µg/L	0.001	Org-029	[NT]	8	0.020	0.020	0	[NT]	[NT]
Perfluorooctanesulfonic acid PFOS	µg/L	0.0002	Org-029	[NT]	8	0.31	0.31	0	[NT]	[NT]
Perfluorodecanesulfonic acid	µg/L	0.002	Org-029	[NT]	8	<0.002	<0.002	0	[NT]	[NT]
Perfluorobutanoic acid	µg/L	0.002	Org-029	[NT]	8	0.01	0.01	0	[NT]	[NT]
Perfluoropentanoic acid	µg/L	0.002	Org-029	[NT]	8	0.033	0.033	0	[NT]	[NT]
Perfluorohexanoic acid	µg/L	0.0004	Org-029	[NT]	8	0.10	0.10	0	[NT]	[NT]
Perfluoroheptanoic acid	µg/L	0.0004	Org-029	[NT]	8	0.019	0.018	5	[NT]	[NT]
Perfluorooctanoic acid PFOA	µg/L	0.0002	Org-029	[NT]	8	0.022	0.022	0	[NT]	[NT]
Perfluorononanoic acid	µg/L	0.001	Org-029	[NT]	8	0.070	0.070	0	[NT]	[NT]
Perfluorodecanoic acid	µg/L	0.002	Org-029	[NT]	8	<0.002	<0.002	0	[NT]	[NT]
Perfluoroundecanoic acid	µg/L	0.002	Org-029	[NT]	8	<0.002	<0.002	0	[NT]	[NT]
Perfluorododecanoic acid	µg/L	0.005	Org-029	[NT]	8	<0.005	<0.005	0	[NT]	[NT]
Perfluorotridecanoic acid	µg/L	0.01	Org-029	[NT]	8	<0.01	<0.01	0	[NT]	[NT]
Perfluorotetradecanoic acid	µg/L	0.05	Org-029	[NT]	8	<0.05	<0.05	0	[NT]	[NT]
4:2 FTS	µg/L	0.001	Org-029	[NT]	8	<0.001	<0.001	0	[NT]	[NT]
6:2 FTS	µg/L	0.0004	Org-029	[NT]	8	0.019	0.020	5	[NT]	[NT]
8:2 FTS	µg/L	0.0004	Org-029	[NT]	8	0.0007	0.0007	0	[NT]	[NT]
10:2 FTS	µg/L	0.002	Org-029	[NT]	8	<0.002	<0.002	0	[NT]	[NT]
Perfluorooctane sulfonamide	µg/L	0.01	Org-029	[NT]	8	<0.01	<0.01	0	[NT]	[NT]
N-Methyl perfluorooctane sulfonamide	µg/L	0.05	Org-029	[NT]	8	<0.05	<0.05	0	[NT]	[NT]
N-Ethyl perfluorooctanesulfon amide	µg/L	0.1	Org-029	[NT]	8	<0.1	<0.1	0	[NT]	[NT]
N-Me perfluorooctanesulfonamid oethanol	µg/L	0.05	Org-029	[NT]	8	<0.05	<0.05	0	[NT]	[NT]
N-Et perfluorooctanesulfonamid oethanol	µg/L	0.5	Org-029	[NT]	8	<0.5	<0.5	0	[NT]	[NT]
MePerfluorooctanesulf- amid oacetic acid	µg/L	0.002	Org-029	[NT]	8	<0.002	<0.002	0	[NT]	[NT]
EtPerfluorooctanesulf- amid oacetic acid	µg/L	0.002	Org-029	[NT]	8	<0.002	<0.002	0	[NT]	[NT]
Surrogate $^{13}C_8$ *PFOS*	%		Org-029	[NT]	8	90	89	1	[NT]	[NT]
Surrogate $^{13}C_2$ *PFOA*	%		Org-029	[NT]	8	115	113	2	[NT]	[NT]

QUALITY CONTROL: PFAS in Waters Trace Extended						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Extracted ISTD $^{13}C_3$ PFBS	%		Org-029	[NT]	8	90	92	2	[NT]	[NT]
Extracted ISTD $^{18}O_2$ PFHxS	%		Org-029	[NT]	8	93	100	7	[NT]	[NT]
Extracted ISTD $^{13}C_4$ PFOS	%		Org-029	[NT]	8	103	107	4	[NT]	[NT]
Extracted ISTD $^{13}C_4$ PFBA	%		Org-029	[NT]	8	40	41	2	[NT]	[NT]
Extracted ISTD $^{13}C_3$ PFPeA	%		Org-029	[NT]	8	60	62	3	[NT]	[NT]
Extracted ISTD $^{13}C_2$ PFHxA	%		Org-029	[NT]	8	93	94	1	[NT]	[NT]
Extracted ISTD $^{13}C_4$ PFHpA	%		Org-029	[NT]	8	89	90	1	[NT]	[NT]
Extracted ISTD $^{13}C_4$ PFOA	%		Org-029	[NT]	8	102	100	2	[NT]	[NT]
Extracted ISTD $^{13}C_5$ PFNA	%		Org-029	[NT]	8	97	96	1	[NT]	[NT]
Extracted ISTD $^{13}C_2$ PFDA	%		Org-029	[NT]	8	114	107	6	[NT]	[NT]
Extracted ISTD $^{13}C_2$ PFUnDA	%		Org-029	[NT]	8	112	108	4	[NT]	[NT]
Extracted ISTD $^{13}C_2$ PFDoDA	%		Org-029	[NT]	8	106	99	7	[NT]	[NT]
Extracted ISTD $^{13}C_2$ PFTeDA	%		Org-029	[NT]	8	91	86	6	[NT]	[NT]
Extracted ISTD $^{13}C_2$ 4:2FTS	%		Org-029	[NT]	8	155	155	0	[NT]	[NT]
Extracted ISTD$^{13}C_2$ 6:2FTS	%		Org-029	[NT]	8	144	138	4	[NT]	[NT]
Extracted ISTD $^{13}C_2$ 8:2FTS	%		Org-029	[NT]	8	192	188	2	[NT]	[NT]
Extracted ISTD $^{13}C_8$ FOSA	%		Org-029	[NT]	8	60	66	10	[NT]	[NT]
Extracted ISTD d_3 N MeFOSA	%		Org-029	[NT]	8	114	118	3	[NT]	[NT]
Extracted ISTD d_5 N EtFOSA	%		Org-029	[NT]	8	111	115	4	[NT]	[NT]
Extracted ISTD d_7 N MeFOSE	%		Org-029	[NT]	8	101	102	1	[NT]	[NT]

QUALITY CONTROL: PFAS in Waters Trace Extended						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Extracted ISTD d_9 *N EtFOSE*	%		Org-029	[NT]	8	106	107	1	[NT]	[NT]
Extracted ISTD d_3 *N MeFOSAA*	%		Org-029	[NT]	8	127	120	6	[NT]	[NT]
Extracted ISTD d_5 *N EtFOSAA*	%		Org-029	[NT]	8	117	117	0	[NT]	[NT]

QUALITY CONTROL: PFAS in Water TRACE Short						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date prepared	-			28/10/2022	9	28/10/2022	31/10/2022		28/10/2022	[NT]
Date analysed	-			28/10/2022	9	28/10/2022	31/10/2022		28/10/2022	[NT]
Perfluorohexanesulfonic acid - PFHxS	µg/L	0.0002	Org-029	<0.0002	9	0.001	0.001	0	98	[NT]
Perfluorooctanesulfonic acid PFOS	µg/L	0.0002	Org-029	<0.0002	9	0.002	0.002	0	96	[NT]
Perfluorooctanoic acid PFOA	µg/L	0.0002	Org-029	<0.0002	9	<0.0002	<0.0002	0	96	[NT]
6:2 FTS	µg/L	0.0004	Org-029	<0.0004	9	<0.0004	<0.0004	0	95	[NT]
8:2 FTS	µg/L	0.0004	Org-029	<0.0004	9	<0.0004	<0.0004	0	93	[NT]
Surrogate $^{13}C_8$ *PFOS*	%		Org-029	95	9	93	87	7	101	[NT]
Surrogate $^{13}C_2$ *PFOA*	%		Org-029	102	9	104	107	3	104	[NT]
Extracted ISTD $^{18}O_2$ *PFHxS*	%		Org-029	90	9	93	102	9	91	[NT]
Extracted ISTD $^{13}C_4$ *PFOS*	%		Org-029	91	9	89	111	22	85	[NT]
Extracted ISTD $^{13}C_4$ *PFOA*	%		Org-029	98	9	101	112	10	96	[NT]
Extracted ISTD $^{13}C_2$ *6:2FTS*	%		Org-029	108	9	129	168	26	106	[NT]
Extracted ISTD $^{13}C_2$ *8:2FTS*	%		Org-029	129	9	155	179	14	121	[NT]

Result Definitions

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

Quality Control Definitions

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

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

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

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

Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

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

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

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

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

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

Report Comments

Dissolved Metals: no filtered, preserved sample was received, therefore the unpreserved sample was filtered through 0.45µm filter at the lab.
Note: there is a possibility some elements may be underestimated.

For PFAS Extracted Internal Standards denoted with # or outside the 50-150% acceptance range, the respective target analyte results may be unaffected, in other circumstances the PQL has been raised to accommodate the outlier(s).

PFAS in Water:
Percent recovery is not applicable due to the high concentration of the analytes in the sample. However an acceptable recovery was obtained for the LCS.

CHAIN OF CUSTODY FORM - Client

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ENVIROLAB GROUP
National phone number 1300 424 344

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

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

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

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

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

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

Client: GHD Pty Ltd	Client Project Name/Number/Site etc (ie report title): 12566684- MFS St Marys station VSCAP, PSI & SAQP
Contact Person: Ben Petticrew	
Project Mgr: Vera Biermann	PO No.:
Sampler: Ben Petticrew, Ally Kirkman	Envirolab Quote No. :
Address: Level 4, 211 Victoria Square, Adelaide, 5000	Date results required: Or choose: standard / same day / 1 day / 2 day / 3 day *Note: Inform lab in advance if urgent turnaround is required - surcharges apply*
Phone: (08) 8111 6544 Mob:	Additional report format: esdat / equis /
Email: GHDLabReports@ghd.com, ben.petticrew@ghd.com, vera.biermann@ghd.com, ally.kirkman@ghd.com	Lab Comments:

Sample information					Tests Required									Comments
Envirolab Sample ID	Client Sample ID or information	Container type	Date sampled	Type of sample	PFAS (Short)	PFAS (Long Suite and Trace)	Major Cations/Anions	Major Cations/Anions					Envirolab Services 12 Ashley St Chatswood NSW 2067 Ph: (02) 9910 6200	Provide as much information about the sample as you can
1	MW02	2B	20/10/2022	water	X								Job No: 308730	
2	MW03	2B	20/10/2022	"	X								Date Received: 21/10/22	
3	MW04	2B	20/10/2022	"	X								Time Received: 0800	
4	GW8001b	2B	21/10/2022	"		X	X	X					Received By: TJH AM/AD	
5	GW8002b	6B	21/10/2022	"		X							Temp: Cool/Ambient	
6	GW201b	2B	21/10/2022	"		X	X	X					Cooling: Ice/Icepack	
7	GW7003b	2B	21/10/2022	"		X							Security: Intact/Broken/None	
8	FD01	2B	21/10/2022	"		X	X	X						
—	FT01 (ALS)	2B	21/10/2022	"		X	X	X						Forward to ALS
9	QB01													

☐ *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): GHD Pty Ltd	Received by (Company): ECS ADL	**Lab Use Only**
Print Name: Ally Kirkman	Print Name: KSpone	Job number: 308730 — Cooling: Ice / Ice pack / None
Date & Time: 21/10/2022	Date & Time: 21/10/22 7:45pm	Temperature: 14 — Security seal: Intact / Broken / None
Signature: AK	Signature: AD/ECS 12.1°C icepack.	TAT Req - SAME day / 1 / 2 / 3 / 4 / STD

Site contamination – Section 83A notification form

Site contamination that affects or threatens underground water notification form pursuant to section 83A of the *Environment Protection Act 1993*

Notifier details

Name: Vera Biermann	Telephone: (08) 81116958
Company: GHD Pty Ltd.	Email: vera.biermann@ghd.com
Address: 211 Victoria Square, Level 4, Adelaide SA 5000	○ the site owner ○ the site occupier ◉ the site contamination consultant ○ the site contamination auditor

Site details

Site or establishment name (if appropriate): South Australian Metropolitan Fire Service - St Marys Fire Station

Owner(s) (please include contact details where known): South Australian Metropolitan Fire Service	Occupier(s) (where different to owner):
Street address(es) (include lot or street number): 1125 South Road, St Marys SA 5042	Certificate(s) of title (current): CT 5808/746

Location, nature and extent

Has a potentially contaminating activity been undertaken at the site, please describe..AFFF use.....

Does this notification relate to a change in the location, nature or extent of site contamination that has previously been notified to the EPA? ◉ Yes ○ No

If yes, please provide the date(s) of previous notification(s):..19/12/2022.....

Which group(s) do the chemical substance(s), identified as site contamination that affects or threatens groundwater, belong to?

☐ Metals & metalloids	☐ Non-metallic inorganics	☐ Organic alcohols/other organics
☐ Petroleum hydrocarbons	☐ Anilines	☐ Chlorinated alkanes
☐ Chlorinated alkenes	☐ Chlorinated benzenes	☐ Polychlorinated biphenyls
☐ Other chlorinated compounds	☐ Monocyclic aromatic compounds	☐ Polycyclic aromatic compounds
☐ Phenols	☐ Phthalates	☐ Pesticides/herbicides/fungicides
☐ Surfactants	☑ Other (please specify):..PFAS.....	

Has an assessment of the environmental values of groundwater been undertaken? (●) Yes ( ) No

If yes, what is the TDS range in mg/L (lowest concentration for the site)? 4618

What are the environmental values of groundwater for the site?

- [x] Drinking water
- [ ] Primary industries (irrigation and general water uses)
- [x] Recreation and aesthetics
- [ ] Aquatic ecosystems (marine)
- [x] Aquatic ecosystems (fresh)
- [ ] Primary industries (aquaculture)
- [ ] Primary industries (agriculture)

Where has the site contamination that affects or threatens groundwater been identified?

- [ ] Soil/soil vapour
- [x] Groundwater

Maximum depth: 5 m bgl Targeted aquifer(s): Q1

What is the depth to groundwater (where known)? 2.16 m bgl

Has a non-aqueous phase liquid been identified or inferred? ( ) Yes (●) No

If yes, please provide details of measured thickness (in metres):

Has site contamination that affects or threatens groundwater been identified[1] offsite? (●) Yes ( ) No

If yes, please specify offsite certificate(s) of title or address(es): ~~4 Wingfield St, Clovelly Pk SA 5042; CT5302/255~~
… 14 Konando Terrace, Edwardstown SA 5039, CT5013/525

An accurate scaled site plan showing sampling locations has been included. [x]

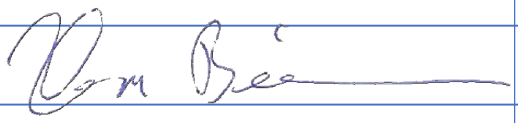
This notification provides the following information to determine the existence of site contamination and the support notification of site contamination that affects or threatens groundwater at the site?

Monitoring well data[2]	(●) Yes	( ) No	Soil lithological data	( ) Yes	(●) No
Groundwater field data	(●) Yes	( ) No	Soil vapour bore data	( ) Yes	(●) No
Analytical laboratory data	(●) Yes	( ) No			
Quality assurance data	(●) Yes	( ) No			

Has the electronic data been assessed as reliable in meeting the objectives of the assessment? (●) Yes ( ) No

[1] Using direct evidence and not inferred information

[2] Not required where electronic information has previously been provided to the EPA and the data has not changed

Further assessment details	
Have chemical substances been identified that may represent background concentrations? ◯ Yes ◯ No If yes, will a background concentration[3] assessment be undertaken within the next 3 months? ◯ Yes ◯ No	
Is any further assessment being undertaken? ☐ Preliminary site investigation ☑ Detailed site investigation ☑ Groundwater monitoring event ☐ Other:----------	Is the site subject to a current site contamination audit? ◯ Yes ◯ No If yes, please specify the EPA reference number for the audit: ……..
Declaration	
It is an offence to provide false or misleading information to the Authority. Maximum penalties range from $30,000 for a natural person, to $60,000 for a body corporate, pursuant to section 119 of the Environment Protection Act 1993.	
I/We declare that the information provided in this form and any accompanying documents is not false or misleading in any material particular:	
Name: Vera Biermann	Name:
Position: Environmental Scientist	Position:
Signature: 	Signature:
Date: 21/04/2023	Date:

[3] Carried out in accordance with the *EPA Guideline for the assessment of background concentrations (2018)*

							Field Parameters					PFAS - Perfluoroalkyl Sulfonic Acids						PFAS - Perfluoroalkyl Carboxylic Acids								
							pH (Field)	Electrical conductivity (field)	Dissolved Oxygen (Field) (filtered)	Redox (Field)	Temperature (Field)	Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecanesulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)
							pH units	µS/cm	mg/L	mV	°C	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												0.0004	0.001	0.0002	0.001	0.0002	0.001	0.002	0.001	0.0004	0.0004	0.0002	0.001	0.001	0.001	0.001
ADWG 2011 Health (v3.7 updated 2022)																						**0.56**				
ADWG 2011 Recreational (v3.7 updated 2022)																						5.6				
ANZG (2018) - FW - 95% (updated 26 July 2021)																										
PFAS NEMP 2.0 2020 Freshwater - 95% - slightly to moderately disturbed systems																*0.13*						*220*				
PFAS NEMP 2.0 2020 Freshwater - 99% - high conservation value systems																0.00023						19				
PFAS NEMP 2.0 2020 Health Drinking Water														**0.07**		**0.07**						**0.56**				
PFAS NEMP 2.0 2020 Recreational Water														2		2						10				
Well	**Location**	**Date**	**Field ID**	**Lab Report Number**																						
GW201b	On-site	20 Oct 2022	FD01	308730	-	-	-	-	-	0.061	0.094	**0.60**	0.020	***0.31***	<0.002	0.01	0.033	0.10	0.019	0.022	0.070	<0.002	<0.002	<0.005
			GW201b	308730	-	-	-	-	-	0.060	0.097	**0.64**	0.021	***0.30***	<0.002	0.01	0.034	0.11	0.019	0.023	0.077	<0.002	<0.002	<0.005
		21 Oct 2022	FD01	308746	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			FT01	ES2238073	-	-	-	-	-	0.074	0.085	**0.604**	0.022	***0.419***	<0.002	0.02	0.046	0.131	0.024	0.037	0.084	<0.002	<0.002	<0.002
			GW201b	308746	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		28 Mar 2023	GW201b	EM2305704	-	-	-	-	-	0.048	0.072	**0.446**	0.017	***0.213***	<0.002	0.01	0.028	0.096	0.017	0.024	0.049	<0.002	<0.002	<0.002
GW7003b	On-site	20 Oct 2022	GW7003b	308730	-	-	-	-	-	0.090	0.11	**1.2**	0.074	***2.0***	<0.002	0.048	0.021	0.067	0.016	0.051	0.027	<0.002	<0.002	<0.005
		21 Oct 2022	GW7003b	308746	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW8001b	On-site	20 Oct 2022	GW8001b	308730	-	-	-	-	-	0.058	0.096	**0.55**	0.017	***0.31***	<0.002	0.047	0.12	0.20	0.036	0.026	0.092	<0.002	<0.002	<0.005
GW8002b	On-site	20 Oct 2022	GW8002b	308730	7.57	1,036	0.6	10.7	21.2	4.6	5.7	**44**	2.0	***42***	<0.020	1.6	5.1	42	1.9	**2.2**	4.3	<0.020	<0.020	<0.050
		21 Oct 2022	GW8002b	308746	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		28 Mar 2023	FD10	EM2305704	-	-	-	-	-	4.38	4.96	**39.4**	1.79	***34.6***	0.004	0.65	5.31	12.2	1.77	**2.10**	2.96	0.006	<0.004	<0.004
			FS10	977846	-	-	-	-	-	3.9	4.0	**35**	1.2	***26***	<0.02	0.53	5.0	10	1.5	**1.8**	2.0	<0.02	<0.02	<0.001
			GW8002b	EM2305704	-	-	-	-	-	4.18	-	**37.0**	-	***34.4***	-	0.7	5.47	11.3	1.74	**1.94**	-	-	-	-
MW02	On-site	20 Oct 2022	MW02	308730	7.37	5,152	0.5	21.4	23.1	-	-	**49**	-	***19***	-	-	-	-	-	**2.0**	-	-	-	-
MW03	On-site	20 Oct 2022	MW03	308730	7.33	10,029	2.6	26.7	19.4	-	-	**240**	-	***26***	-	-	-	-	-	**14**	-	-	-	-
MW04	On-site	20 Oct 2022	MW04	308730	7.39	8,454	1.95	26.7	18.9	-	-	**86**	-	***30***	-	-	-	-	-	**3.2**	-	-	-	-
MW05	Off-site	28 Mar 2023	MW05	EM2305704	7.64	7,282	1.74	-27.8	23.9	0.113	0.135	**1.08**	0.045	***1.33***	<0.002	0.05	0.107	0.339	0.052	0.073	0.102	<0.002	<0.002	<0.002

Environmental Standards
National Health and Medical Research Council, January 2022, ADWG 2011 Health (v3.7 updated 2022)
National Health and Medical Research Council, January 2022, ADWG 2011 Recreational (v3.7 updated 2022)
Department of Agriculture and Water Resources, 2018 updated July 2021, ANZG (2018) - FW - 95% (updated 26 July 2021)
HEPA, Jan 2020, PFAS NEMP 2.0 2020 Freshwater - 95% - slightly to moderately disturbed systems
HEPA, January 2020, PFAS NEMP 2.0 2020 Freshwater - 99% - high conservation value systems
HEPA, Jan 2020, PFAS NEMP 2.0 2020 Health Drinking Water
HEPA, Jan 2020, PFAS NEMP 2.0 2020 Recreational Water

				PFAS - Perfluoroalkyl Sulfonamide							PFAS - Fluorotelomer Sulfonic Acids				PFAS - Sums				
				Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluoro-n-hexadecanoic acid (PFHxDA)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-Methyl perfluorooctane sulfonamidoethanol (MEFOSE)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer Sulfonate (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Sum of PFHxS and PFOS	Sum of US EPA PFAS (PFOS + PFOA)*	PFAS (Sum of Total)	Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	PFAS (Sum of Total)(WA DER List)
				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	µg/L
EQL				0.001	0.001	0.005	0.002	0.005	0.005	0.002	0.005	0.005	0.002	0.001	0.0004	0.0004	0.001	0.0002	0.0002	0.0002	0.001	0.002
ADWG 2011 Health (v3.7 updated 2022)																		**0.07**				
ADWG 2011 Recreational (v3.7 updated 2022)																		0.7				
ANZG (2018) - FW - 95% (updated 26 July 2021)																						
PFAS NEMP 2.0 2020 Freshwater - 95% - slightly to																						
PFAS NEMP 2.0 2020 Freshwater - 99% - high cons																						
PFAS NEMP 2.0 2020 Health Drinking Water																		**0.07**				
PFAS NEMP 2.0 2020 Recreational Water																		2				
Well	**Location**	**Date**	**Field ID**																			
GW201b	On-site	20 Oct 2022	FD01	<0.01	<0.05	-	<0.01	<0.05	<0.1	<0.002	<0.05	<0.5	<0.002	<0.001	0.019	0.0007	<0.002	**0.91**	0.34	1.4	-	-
			GW201b	<0.01	<0.05	-	<0.01	<0.05	<0.1	<0.002	<0.05	<0.5	<0.002	<0.001	0.022	0.0007	<0.002	**0.95**	0.33	1.4	-	-
		21 Oct 2022	FD01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			FT01	<0.002	<0.005	<0.005	<0.002	<0.005	<0.005	<0.002	<0.005	<0.005	<0.002	<0.005	0.029	<0.005	<0.005	**1.02**	-	1.58	-	1.38
			GW201b	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		28 Mar 2023	GW201b	<0.002	<0.005	<0.005	<0.002	<0.005	<0.005	<0.002	<0.005	<0.005	<0.002	<0.005	0.022	<0.005	<0.005	**0.659**	-	1.04	-	0.904
GW7003b	On-site	20 Oct 2022	GW7003b	<0.01	<0.05	-	<0.01	<0.05	<0.1	<0.002	<0.05	<0.5	<0.002	<0.001	0.0067	<0.0004	<0.002	**3.2**	2.0	3.7	-	-
		21 Oct 2022	GW7003b	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW8001b	On-site	20 Oct 2022	GW8001b	<0.01	<0.05	-	<0.01	<0.05	<0.1	<0.002	<0.05	<0.5	<0.002	<0.001	0.68	0.002	<0.002	**0.86**	0.34	2.2	-	-
GW8002b	On-site	20 Oct 2022	GW8002b	<0.10	<0.50	-	<0.10	<0.50	<1.0	<0.020	<0.50	<5.0	<0.020	<0.010	11	<0.020	<0.02	**86**	44	170	-	-
		21 Oct 2022	GW8002b	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		28 Mar 2023	FD10	<0.004	<0.010	<0.010	0.009	<0.010	<0.010	<0.004	<0.010	<0.010	<0.004	<0.005	12.0	0.008	<0.005	**74.0**	-	122	-	112
			FS10	<0.001	<0.001	-	0.016	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.003	8.5	0.009	<0.001	**61**	27.8	101.058	62.8	92.239
			GW8002b	-	-	-	-	-	-	-	-	-	-	<0.05	11.1	<0.05	<0.05	**71.4**	-	-	-	108
MW02	On-site	20 Oct 2022	MW02	-	-	-	-	-	-	-	-	-	-	-	0.06	<0.02	-	**68**	21	70	-	-
MW03	On-site	20 Oct 2022	MW03	-	-	-	-	-	-	-	-	-	-	-	0.67	<0.02	-	**260**	40	280	-	-
MW04	On-site	20 Oct 2022	MW04	-	-	-	-	-	-	-	-	-	-	-	6.9	<0.02	-	**120**	33	130	-	-
MW05	Off-site	28 Mar 2023	MW05	<0.002	<0.005	<0.005	<0.002	<0.005	<0.005	<0.002	<0.005	<0.005	<0.002	<0.005	0.018	<0.005	<0.005	**2.41**	-	3.44	-	3.16

Environmental Standards
National Health and Medical Research Council, January 2022, ADWG 2011 Health (v3.7 updated 2022)
National Health and Medical Research Council, January 2022, ADWG 2011 Recreational (v3.7 updated 2022)
Department of Agriculture and Water Resources, 2018 updated July 2021, ANZG (2018) - FW - 95% (updated 26 July 2021)
HEPA, Jan 2020, PFAS NEMP 2.0 2020 Freshwater - 95% - slightly to moderately disturbed systems
HEPA, January 2020, PFAS NEMP 2.0 2020 Freshwater - 99% - high conservation value systems
HEPA, Jan 2020, PFAS NEMP 2.0 2020 Health Drinking Water
HEPA, Jan 2020, PFAS NEMP 2.0 2020 Recreational Water

				Acidity & Alkalinity					Major Ions								BTEXN						TRH - NEPM 2013						
				Hardness (filtered)	Alkalinity (Carbonate as CaCO3)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Hydroxide as CaCO3)	Alkalinity (total as CaCO3)	Calcium (filtered)	Magnesium (filtered)	Potassium (filtered)	Sodium (filtered)	Chloride	Cations Total	Anions Total	Ionic Balance	Benzene	Toluene	Ethylbenzene	Xylene (o)	Xylene (m & p)	Naphthalene (value used in F2 calc)	F1 (C6-C10 minus BTEX)	C6-C10 Fraction	F2 (>C10-C16 minus Naphthalene)	>C10-C16 Fraction	F3 (>C16-C34 Fraction)	F4 (>C34-C40 Fraction)	>C10-C40 (Sum of Total)
				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	%	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL				3	1	1	1	1	0.5	0.5	0.5	0.5	1	0.01	0.01	0.01	1	1	1	1	2	0.001	10	10	50	50	100	100	50
ADWG 2011 Health (v3.7 updated 2022)																	**1**	**800**	**300**										
ADWG 2011 Recreational (v3.7 updated 2022)																	10	8,000	3,000										
ANZG (2018) - FW - 95% (updated 26 July 2021)																	*950*	*180*	*80*	*350*									
PFAS NEMP 2.0 2020 Freshwater - 95% - slightly to																													
PFAS NEMP 2.0 2020 Freshwater - 99% - high cons																													
PFAS NEMP 2.0 2020 Health Drinking Water																													
PFAS NEMP 2.0 2020 Recreational Water																													
Well	**Location**	**Date**	**Field ID**																										
GW201b	On-site	20 Oct 2022	FD01	120	<5	700	<5	700	14	20	9.6	730	780	-	-	-5.0	-	-	-	-	-	-	-	-	-	-	-	-	-
			GW201b	120	<5	720	<5	720	13	20	9.5	740	800	-	-	-6.0	-	-	-	-	-	-	-	-	-	-	-	-	-
		21 Oct 2022	FD01	-	-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	<1	<1	<2	<0.001	65	65	<50	<50	<100	<100	<50
			FT01	-	24	728	<1	752	13	21	9	911	961	42.2	44.8	2.97	-	-	-	-	-	-	-	-	-	-	-	-	-
			GW201b	-	-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	<1	<1	<2	<0.001	71	71	<50	<50	<100	<100	<50
		28 Mar 2023	GW201b	-	38	650	<1	689	11	20	11	805	906	37.5	41.9	5.51	-	-	-	-	-	-	-	-	-	-	-	-	-
GW7003b	On-site	20 Oct 2022	GW7003b	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		21 Oct 2022	GW7003b	-	-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	<1	<1	<2	<0.001	<10	<10	<50	<50	<100	<100	<50
GW8001b	On-site	20 Oct 2022	GW8001b	92	100	<5	100	200	37	<0.5	19	240	220	-	-	-3.0	-	-	-	-	-	-	-	-	-	-	-	-	-
GW8002b	On-site	20 Oct 2022	GW8002b	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		21 Oct 2022	GW8002b	-	-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	<1	<1	<2	<0.001	<10	<10	<50	<50	190	<100	190
		28 Mar 2023	FD10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			FS10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			GW8002b	-	37	1,420	<1	1,460	20	33	9	1,290	932	60.0	64.7	3.73	-	-	-	-	-	-	-	-	-	-	-	-	-
MW02	On-site	20 Oct 2022	MW02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW03	On-site	20 Oct 2022	MW03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW04	On-site	20 Oct 2022	MW04	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW05	Off-site	28 Mar 2023	MW05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Environmental Standards
National Health and Medical Research Council, January 2022, ADWG 2011 Health (v3.7 updated 2022)
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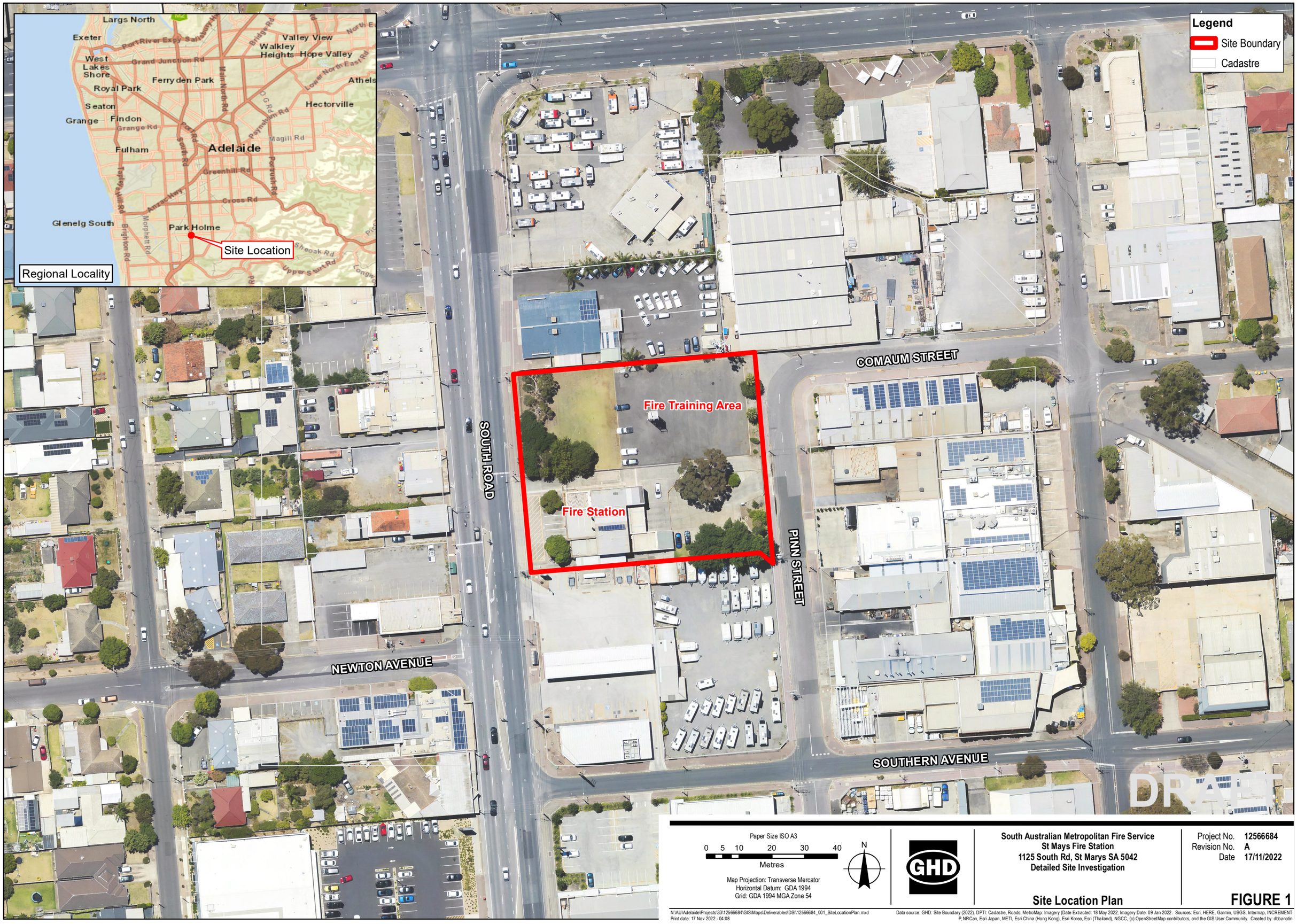
HEPA, Jan 2020, PFAS NEMP 2.0 2020 Health Drinking Water
HEPA, Jan 2020, PFAS NEMP 2.0 2020 Recreational Water



Paper Size ISO A3

0 5 10 20 30 40

Metres

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 54

GHD

South Australian Metropolitan Fire Service
St Mays Fire Station
1125 South Rd, St Marys SA 5042
Detailed Site Investigation

Site Location Plan

Project No. **12566684**
Revision No. **A**
Date **17/11/2022**

FIGURE 1

N:\AU\Adelaide\Projects\33\12566684\GIS\Maps\Deliverables\DSI\12566684_001_SiteLocationPlan.mxd
Print date: 17 Nov 2022 - 04:08

Data source: GHD: Site Boundary (2022). DPTI: Cadastre, Roads. MetroMap: Imagery (Date Extracted: 18 May 2022, Imagery Date: 09 Jan 2022. Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community. Created by: dbbanatin

Paper Size ISO A3

0 2.5 5 10 15

Metres

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 54

GHD

South Australian Metropolitan Fire Service
St Mays Fire Station
1125 South Rd, St Marys SA 5042
Detailed Site Investigation

Groundwater Monitoring Well Locations

Project No. **12566684**
Revision No. **0**
Date **17/11/2022**

FIGURE 4

N:\AU\Adelaide\Projects\33\12566684\GIS\Maps\Deliverables\DSI\12566684_004_GWWellLoc.mxd
Print date: 17 Nov 2022 - 04:05

Data source: GHD: Site Boundary (2022). DPTI: Cadastre, Roads. MetroMap: Imagery (Date Extracted: 18 May 2022; Imagery Date: 09 Jan 2022. . Created by: dbbanatin

Location of MW05 in relation to St Marys Fire Station
60 m
Legend
MW05
St Marys Fire Station
N
MW05

BOREHOLE LOG

ENVIRONMENTAL-GROUNDWATER

MONITORING WELL MW05

Client SA Metropolitan Fire Service
Project MFS St Marys Station PFAS investigation
Project No. 12566684
Site MFS St Marys Station, 1125 South Rd, St Marys SA 5042
Location 4 Wingfield St, Clovelly Pk, SA 5042
Date Drilled 15/03/2023

Drill Co. WB Drilling Pty Ltd
Driller David and Ian Watt
Rig Type Eziprobe
Drill Method Pushtube and Solid Flight Auger
Total Depth (m) 4.70
Casing Diameter (mm) 50

Easting, Northing 278559, 6124974
Grid Ref GDA94_MGA_zone_54
Elevation
TOC mAHD
Logged By A Kirkman / T Wilson
Checked By V Biermann

B.C.L No. 432309 **Casing** 50 mm PVC (Class 18) **Screen** 0.5mm Slotted PVC (Class 18) **Surface Completion** Gatic

Depth (m)	Drilling Method	PID (ppm)	Sample ID	Water	Well Details	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials,separate phase liquids, imported fill, ash.	Elevation (m)
0	HA						TOPSOIL/GRASSMAT				0
0.2							Gravelly CLAY medium to high plasticity, brown, trace fine to coarse sand, angular to subangular, fine to medium gravel	SM	S		-0.2
0.4					Grout		(Reworked NATURAL)	SM	VST		-0.4
0.6							CLAY medium plasticity, mottled red-brown, trace fine to medium gravel (NATURAL - SOIL)				-0.6
0.8											-0.8
1					Bentonite						-1
1.2	PT										-1.2
1.4											-1.4
1.6											-1.6
1.8											-1.8
2							CLAY high plasticity, brown (NATURAL - SOIL)	SM	ST	Slightly moist - moist	-2
2.2											-2.2
2.4											-2.4
2.6							Sandy CLAY medium plasticity, brown (NATURAL - SOIL)	M	F		-2.6
2.8				▽							-2.8
3					Sand		CLAY high plasticity, brown (NATURAL - SOIL)	M	F	Firm - stiff	-3
3.2											-3.2
3.4											-3.4
3.6											-3.6
3.8							CLAY medium plasticity, mottled orange-brown and mottled grey- brown (NATURAL - SOIL)	SM	VST	Firm - stiff	-3.8
4	SFA										-4
4.2											-4.2
4.4											-4.4
4.6											-4.6
4.8							Termination Depth at: 4.70 m. Target depth achieved.				-4.8
5											-5
5.2											-5.2
5.4											-5.4
5.6											-5.6

Notes

This log is not intended for geotechnical purposes. Hollow triangle symbolises water strike, solid triangle symbolises recovered water level.

Drilling Abbreviations	Moisture Abbreviations	Consistency Abbreviations	
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, MR-Mud Rotary, NDD-Non Destructive Drilling, PT-Pushtube, RB-Rotary Blade, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	**Granular Soils** VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense,VD - Very Dense	**Cohesive Soils** VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard

Purging and Sampling Record

Bore ID: MW05

Job Information	Sampling Information	Bore Information
Client: MES	**Purge Method:**	**SWL(mbTOC):** 2.16 m **Logic Check:**
Project:	**Sample Method:**	**Screen:** From: to m **Stick Up:** m
Proj. No.: 12588684	**WQ Meter Type:**	**NAPL Check:** **Bore Diam.:** mm
Sampler: AK/SQ	**Flow Cell:** Y / N **Pump Depth:** 3 m	**Ref.datum:** **Well Cap Secure?**
Date: 28/3/23	**WLevel Meter Type:** Dip / Fox / Int.Fce / Gge	**Bore Depth:** 4.64 m
Round	**Field Filtered?** Y / N (filter vessel, disposable filter/syringe)	

Time (.....)	Volume (L)		Temp (°C)	pH (pH units)	Elec.Cond (.....)	Dis.Oxygen (.....)	Ox-Red Pt. (± mV)	SWL (m TOC)	(TDS)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable when (3 consecutive readings):			-	*+/- 0.05 pH*	*+/- 3%*	*+/- 10%*	*+/- 10 mV*	*stable*		
0										
16.04	1	1	23.8	7.78	7182	1.83	-22	2.268	4667	clear/pale yellow, low turb/sed load, no odour/sheen
16.08	1	2	23.9	7.70	7296	1.63	-30.5	2.41	4745	"
16.10	1	3	24.0	7.60	7272	1.79	-33.4	2.50	4725	"
16.13	1	4	24.1	7.63	7196	1.84	-31.6	2.66	4618	"
16.19	1.5	5.5	23.9	7.64	7282	1.74	-27.8	2.67	4732	" sample taken

Field QA Checks:

Air bubbles in vials? Y / N Any violent reactions? Y / N
Decontamination as per GHD procedure? Y / N
Was sampling equipment pre-cleaned? Y / N
COC updated? Y / N

Parameters	BTEX	TPH	PAH	CHC	PCB	OCP	OPP	Tot. Metal	Biol.				
Preservatives													

Comment: Duplicate samples collected, bottles used, access, condition of headworks etc

Purge Volumes

Casing Int. Dia (mm)	50	100	150
Vol (L/m of casing)	2.0	7.9	17.7

*Double for gravel pack

CHAIN OF CUSTODY RECORD

GHD

Turnaround Requirement:
X STANDARD
☐ NON-STANDARD

Page _____ of _____

FREIGHT 18.92

Job Number	GHD Office	Relinquished By:	Received By:	Relinquished By:	Received By:
12566684	Adelaide	Date/Time:	Date/Time: 29/3/23	Date/Time: 29/3/23	Date/Time:

Project: MFS St Marys PFAS investigation

GHD Project Manager: Vera Biermann 043598781

GHD Contact: Ally Kirkman 0412625108; Chelsie Davies 0424267548

Email Reports to: ghdlabreports@ghd.com; vera.biermann@ghd.com; chelsie.davies@ghd.com; Ally.kirkman@ghd.com

Quote Number

SEND TO:

X **ALS Laboratories**
Suite D, 32 West Thebarton Rd, Thebarton SA 5031
Ph: 08 8162 5130
Contact: Kieren Burns

☐ **Envirolab Services**
7a The Parade, NORWOOD SA 5067
Ph: 08 7087 6800
Contact: Alex Stenta

☐ **Eurofins | Environment Testing**
6 Monterey Rd, DANDENONG SOUTH VIC 3175
Ph: 03 8564 5006
Contact: Rhonda Chouman

☐
Ph:
Contact:

	Sample I.D.	Date	Time	Sample Matrix S: Soil SL: Sludge W: Water A: Air	Container Type J: Jar; B: Bag; V: Vial; G: Glass bottle; P: Plastic bottle	PFAS (Short)	PFAS (Long Suite and Trace)	Major Cations/Anions	SA WASTE SCREEN	Remarks
1	MW05	28/03/2023					X			
2	GW8002b	28/03/2023				X		X		
3	GW201b	28/03/2023					X	X		
4	FD10	28/03/2023		w			X			
	FS10	28/03/2023		w			X			Please forward to Eurofins
5	RB01	28/03/2023		w		X				
6	FB01	28/03/2023		w		X				
7	WWD-01	28/03/2023		w		X				
8	WWD-02	28/03/2023		w		X				
9	SWD-02	28/03/2023		s		X			X	
10	MW01	28/03/2023		w			X			
11	swd-03	28/03/2023		s		X			X	

Remarks: esdat report format

NR

Environmental Division
Melbourne
Work Order Reference
EM2305704

Telephone : +61-3-8549 9600

30/3, 1200

CERTIFICATE OF ANALYSIS

Work Order	: **EM2305704**	Page	: 1 of 14
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: VERA BIERMANN	Contact	: Peter Ravlic
Address	: Level 4, 211 VICTORIA SQUARE ADELAIDE SA, AUSTRALIA 5000	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: ----	Telephone	: +6138549 9645
Project	: 12566684	Date Samples Received	: 30-Mar-2023 11:30
Order number	: 12566684	Date Analysis Commenced	: 31-Mar-2023
C-O-C number	: ----	Issue Date	: 06-Apr-2023 21:29
Sampler	: ----		
Site	:		
Quote number	: EN/005		
No. of samples received	: 10		
No. of samples analysed	: 10		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Dilani Fernando	Laboratory Coordinator	Melbourne Inorganics, Springvale, VIC
Xing Lin	Senior Organic Chemist	Melbourne Inorganics, Springvale, VIC
Xing Lin	Senior Organic Chemist	Melbourne Organics, Springvale, VIC

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EP068: Where reported, Total Chlordane (sum) is the sum of the reported concentrations of cis-Chlordane and trans-Chlordane at or above the LOR.
- EP068: Where reported, Total OCP is the sum of the reported concentrations of all Organochlorine Pesticides at or above LOR.
- EP075(SIM): Where reported, Total Cresol is the sum of the reported concentrations of 2-Methylphenol and 3- & 4-Methylphenol at or above the LOR.
- As per QWI – EN55-3 Data Interpreting Procedures, Ionic balances are typically calculated using Major Anions - Chloride, Alkalinity and Sulfate; and Major Cations - Calcium, Magnesium, Potassium and Sodium. Where applicable and dependent upon sample matrix, the Ionic Balance may also include the additional contribution of Ammonia, Dissolved Metals by ICPMS and H+ to the Cations and Nitrate, SiO2 and Fluoride to the Anions.
- EP231X-LL: Sample EM2305704-004 required dilution due to matrix interferences. LOR values have been adjusted accordingly.
- EG005-T : EM2305630 #17 Poor duplicate precision for total Iron due to sample matrix. Confirmed by re-digestion and re-analysis.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.
- EP231X-INJ: The direct injection LCMSMS method may be used where the sample matrix is not suitable for Solid Phase Extraction (e.g. significant particulate load) or where only a single sample container is received.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	SWD-02	SWD-03	----	----	----
			Sampling date / time	28-Mar-2023 00:00	28-Mar-2023 00:00	----	----	----
Compound	CAS Number	LOR	Unit	EM2305704-009	EM2305704-011	--------	--------	--------
				Result	Result	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	**26.5**	**23.0**	----	----	----
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	<5	----	----	----
Barium	7440-39-3	10	mg/kg	**180**	**100**	----	----	----
Beryllium	7440-41-7	1	mg/kg	<1	<1	----	----	----
Cadmium	7440-43-9	1	mg/kg	<1	<1	----	----	----
Chromium	7440-47-3	2	mg/kg	**35**	**39**	----	----	----
Cobalt	7440-48-4	2	mg/kg	**19**	**10**	----	----	----
Copper	7440-50-8	5	mg/kg	**15**	**15**	----	----	----
Iron	7439-89-6	50	mg/kg	**32200**	**37300**	----	----	----
Lead	7439-92-1	5	mg/kg	**26**	**21**	----	----	----
Manganese	7439-96-5	5	mg/kg	**937**	**240**	----	----	----
Nickel	7440-02-0	2	mg/kg	**22**	**22**	----	----	----
Silver	7440-22-4	2	mg/kg	<2	<2	----	----	----
Zinc	7440-66-6	5	mg/kg	**41**	**39**	----	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	----	----	----
EG048: Hexavalent Chromium (Alkaline Digest)								
Hexavalent Chromium	18540-29-9	0.5	mg/kg	<0.5	<0.5	----	----	----
EK026SF: Total CN by Segmented Flow Analyser								
Total Cyanide	57-12-5	1	mg/kg	<1	<1	----	----	----
EP066: Polychlorinated Biphenyls (PCB)								
Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	----	----	----
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	----	----	----
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	----	----	----
beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	----	----	----
gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	----	----	----
delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	----	----	----
Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	----	----	----
Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	----	----	----
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	----	----	----
^ Total Chlordane (sum)	----	0.05	mg/kg	<0.05	<0.05	----	----	----
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	SWD-02	SWD-03	----	----	----
				Sampling date / time	28-Mar-2023 00:00	28-Mar-2023 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EM2305704-009	EM2305704-011	--------	--------	--------
					Result	Result	----	----	----
EP068A: Organochlorine Pesticides (OC) - Continued									
alpha-Endosulfan	959-98-8	0.05	mg/kg		<0.05	<0.05	----	----	----
cis-Chlordane	5103-71-9	0.05	mg/kg		<0.05	<0.05	----	----	----
Dieldrin	60-57-1	0.05	mg/kg		<0.05	<0.05	----	----	----
4.4`-DDE	72-55-9	0.05	mg/kg		<0.05	<0.05	----	----	----
Endrin	72-20-8	0.05	mg/kg		<0.05	<0.05	----	----	----
beta-Endosulfan	33213-65-9	0.05	mg/kg		<0.05	<0.05	----	----	----
^ **Endosulfan (sum)**	115-29-7	0.05	mg/kg		<0.05	<0.05	----	----	----
4.4`-DDD	72-54-8	0.05	mg/kg		<0.05	<0.05	----	----	----
Endrin aldehyde	7421-93-4	0.05	mg/kg		<0.05	<0.05	----	----	----
Endosulfan sulfate	1031-07-8	0.05	mg/kg		<0.05	<0.05	----	----	----
4.4`-DDT	50-29-3	0.2	mg/kg		<0.2	<0.2	----	----	----
Endrin ketone	53494-70-5	0.05	mg/kg		<0.05	<0.05	----	----	----
Methoxychlor	72-43-5	0.2	mg/kg		<0.2	<0.2	----	----	----
^ **Sum of Aldrin + Dieldrin**	309-00-2/60-57-1	0.05	mg/kg		<0.05	<0.05	----	----	----
^ **Sum of DDD + DDE + DDT**	72-54-8/72-55-9/50-29-3	0.05	mg/kg		<0.05	<0.05	----	----	----
EP075(SIM)A: Phenolic Compounds									
Phenol	108-95-2	0.5	mg/kg		<0.5	<0.5	----	----	----
2-Chlorophenol	95-57-8	0.5	mg/kg		<0.5	<0.5	----	----	----
2-Methylphenol	95-48-7	0.5	mg/kg		<0.5	<0.5	----	----	----
3- & 4-Methylphenol	1319-77-3	1	mg/kg		<1	<1	----	----	----
2-Nitrophenol	88-75-5	0.5	mg/kg		<0.5	<0.5	----	----	----
2.4-Dimethylphenol	105-67-9	0.5	mg/kg		<0.5	<0.5	----	----	----
2.4-Dichlorophenol	120-83-2	0.5	mg/kg		<0.5	<0.5	----	----	----
2.6-Dichlorophenol	87-65-0	0.5	mg/kg		<0.5	<0.5	----	----	----
4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg		<0.5	<0.5	----	----	----
2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg		<0.5	<0.5	----	----	----
2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg		<0.5	<0.5	----	----	----
Pentachlorophenol	87-86-5	2	mg/kg		<2	<2	----	----	----
^ **Sum of Phenols**	----	0.5	mg/kg		<0.5	<0.5	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	<0.5	----	----	----
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	<0.5	----	----	----
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	<0.5	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	SWD-02	SWD-03	----	----	----
				Sampling date / time	28-Mar-2023 00:00	28-Mar-2023 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EM2305704-009	EM2305704-011	--------	--------	--------
					Result	Result	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Fluorene	86-73-7	0.5	mg/kg		<0.5	<0.5	----	----	----
Phenanthrene	85-01-8	0.5	mg/kg		<0.5	<0.5	----	----	----
Anthracene	120-12-7	0.5	mg/kg		<0.5	<0.5	----	----	----
Fluoranthene	206-44-0	0.5	mg/kg		<0.5	<0.5	----	----	----
Pyrene	129-00-0	0.5	mg/kg		<0.5	<0.5	----	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg		<0.5	<0.5	----	----	----
Chrysene	218-01-9	0.5	mg/kg		<0.5	<0.5	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		<0.5	<0.5	----	----	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	<0.5	----	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	<0.5	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	<0.5	----	----	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	<0.5	----	----	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		<0.5	<0.5	----	----	----
^ **Sum of polycyclic aromatic hydrocarbons**	----	0.5	mg/kg		<0.5	<0.5	----	----	----
^ **Benzo(a)pyrene TEQ (zero)**	----	0.5	mg/kg		<0.5	<0.5	----	----	----
^ **Benzo(a)pyrene TEQ (half LOR)**	----	0.5	mg/kg		**0.6**	**0.6**	----	----	----
^ **Benzo(a)pyrene TEQ (LOR)**	----	0.5	mg/kg		**1.2**	**1.2**	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	----	----	----
C10 - C14 Fraction	----	50	mg/kg		<50	<50	----	----	----
C15 - C28 Fraction	----	100	mg/kg		<100	<100	----	----	----
C29 - C36 Fraction	----	100	mg/kg		<100	<100	----	----	----
^ **C10 - C36 Fraction (sum)**	----	50	mg/kg		<50	<50	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	----	----	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	10	mg/kg		<10	<10	----	----	----
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	----	----	----
>C16 - C34 Fraction	----	100	mg/kg		<100	<100	----	----	----
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	----	----	----
^ **>C10 - C40 Fraction (sum)**	----	50	mg/kg		<50	<50	----	----	----
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	50	mg/kg		<50	<50	----	----	----
EP080: BTEXN									

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	SWD-02	SWD-03	----	----	----
				Sampling date / time	28-Mar-2023 00:00	28-Mar-2023 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EM2305704-009	EM2305704-011	--------	--------	--------
					Result	Result	----	----	----
EP080: BTEXN - Continued									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	----	----	----
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	----	----	----
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	----	----	----
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	----	----	----
^ **Sum of BTEX**	----	0.2	mg/kg		<0.2	<0.2	----	----	----
^ **Total Xylenes**	----	0.5	mg/kg		<0.5	<0.5	----	----	----
Naphthalene	91-20-3	1	mg/kg		<1	<1	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg		<0.0002	<0.0002	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg		**0.0011**	<0.0002	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg		**0.0081**	<0.0002	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg		<0.001	<0.001	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg		<0.0002	<0.0002	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg		<0.0002	<0.0002	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg		<0.0002	<0.0002	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg		<0.0002	<0.0002	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	<0.0005	----	----	----
EP231P: PFAS Sums									
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		**0.0092**	<0.0002	----	----	----
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		**0.0092**	<0.0002	----	----	----
EP066S: PCB Surrogate									

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	SWD-02	SWD-03	----	----	----
				Sampling date / time	28-Mar-2023 00:00	28-Mar-2023 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EM2305704-009	EM2305704-011	--------	--------	--------
					Result	Result	----	----	----
EP066S: PCB Surrogate - Continued									
Decachlorobiphenyl	2051-24-3	0.1	%		**67.4**	**82.8**	**----**	**----**	**----**
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	%		**85.7**	**95.6**	**----**	**----**	**----**
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.05	%		**81.6**	**68.1**	**----**	**----**	**----**
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		**74.7**	**91.4**	**----**	**----**	**----**
2-Chlorophenol-D4	93951-73-6	0.5	%		**96.8**	**111**	**----**	**----**	**----**
2.4.6-Tribromophenol	118-79-6	0.5	%		**77.3**	**96.8**	**----**	**----**	**----**
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		**82.1**	**90.9**	**----**	**----**	**----**
Anthracene-d10	1719-06-8	0.5	%		**83.8**	**96.4**	**----**	**----**	**----**
4-Terphenyl-d14	1718-51-0	0.5	%		**87.9**	**95.0**	**----**	**----**	**----**
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		**102**	**87.2**	**----**	**----**	**----**
Toluene-D8	2037-26-5	0.2	%		**109**	**94.6**	**----**	**----**	**----**
4-Bromofluorobenzene	460-00-4	0.2	%		**111**	**96.5**	**----**	**----**	**----**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**122**	**92.2**	**----**	**----**	**----**
13C8-PFOA	----	0.0002	%		**85.2**	**106**	**----**	**----**	**----**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	MW05	GW8002b	GW201b	FD10	RB01
				Sampling date / time	28-Mar-2023 00:00	28-Mar-2023 00:00	28-Mar-2023 00:00	28-Mar-2023 00:00	28-Mar-2023 00:00
Compound	CAS Number	LOR	Unit		EM2305704-001	EM2305704-002	EM2305704-003	EM2305704-004	EM2305704-005
					Result	Result	Result	Result	Result
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		----	<1	<1	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		----	**37**	**38**	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		----	**1420**	**650**	----	----
Total Alkalinity as CaCO3	----	1	mg/L		----	**1460**	**689**	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		----	**444**	**122**	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		----	**932**	**906**	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		----	**20**	**11**	----	----
Magnesium	7439-95-4	1	mg/L		----	**33**	**20**	----	----
Sodium	7440-23-5	1	mg/L		----	**1290**	**805**	----	----
Potassium	7440-09-7	1	mg/L		----	**9**	**11**	----	----
EN055: Ionic Balance									
ø **Total Anions**	----	0.01	meq/L		----	**64.7**	**41.9**	----	----
ø **Total Cations**	----	0.01	meq/L		----	**60.0**	**37.5**	----	----
ø **Ionic Balance**	----	0.01	%		----	**3.73**	**5.51**	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.002	µg/L		**0.113**	----	**0.048**	**4.38**	----
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		----	**4.18**	----	----	----
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		----	----	----	----	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.002	µg/L		**0.135**	----	**0.072**	**4.96**	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.002	µg/L		**1.08**	----	**0.446**	**39.4**	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L		----	**37.0**	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L		----	----	----	----	<0.01
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.002	µg/L		**0.045**	----	**0.017**	**1.79**	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	MW05	GW8002b	GW201b	FD10	RB01
				Sampling date / time	28-Mar-2023 00:00	28-Mar-2023 00:00	28-Mar-2023 00:00	28-Mar-2023 00:00	28-Mar-2023 00:00
Compound	CAS Number	LOR	Unit		EM2305704-001	EM2305704-002	EM2305704-003	EM2305704-004	EM2305704-005
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.002	µg/L		**1.33**	----	**0.213**	**34.6**	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.002	µg/L		<0.002	----	<0.002	**0.004**	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		----	**34.4**	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		----	----	----	----	<0.01
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.01	µg/L		**0.05**	----	**0.01**	**0.65**	----
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		----	**0.7**	----	----	----
Perfluorobutanoic acid (PFBA)	375-22-4	0.10	µg/L		----	----	----	----	<0.10
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.002	µg/L		**0.107**	----	**0.028**	**5.31**	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		----	**5.47**	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		----	----	----	----	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.002	µg/L		**0.339**	----	**0.096**	**12.2**	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		----	**11.3**	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		----	----	----	----	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.002	µg/L		**0.052**	----	**0.017**	**1.77**	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		----	**1.74**	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		----	----	----	----	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.002	µg/L		**0.073**	----	**0.024**	**2.10**	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		----	**1.94**	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		----	----	----	----	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.002	µg/L		**0.102**	----	**0.049**	**2.96**	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.002	µg/L		<0.002	----	<0.002	**0.006**	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.002	µg/L		<0.002	----	<0.002	<0.004	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.002	µg/L		<0.002	----	<0.002	<0.004	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.002	µg/L		<0.002	----	<0.002	<0.004	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.005	µg/L		<0.005	----	<0.005	<0.010	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	MW05	GW8002b	GW201b	FD10	RB01
				Sampling date / time	28-Mar-2023 00:00	28-Mar-2023 00:00	28-Mar-2023 00:00	28-Mar-2023 00:00	28-Mar-2023 00:00
Compound	CAS Number	LOR	Unit		EM2305704-001	EM2305704-002	EM2305704-003	EM2305704-004	EM2305704-005
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorohexadecanoic acid (PFHxDA)	67905-19-5	0.005	µg/L		<0.005	----	<0.005	<0.010	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.002	µg/L		<0.002	----	<0.002	**0.009**	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.005	µg/L		<0.005	----	<0.005	<0.010	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.005	µg/L		<0.005	----	<0.005	<0.010	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.005	µg/L		<0.005	----	<0.005	<0.010	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.005	µg/L		<0.005	----	<0.005	<0.010	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.002	µg/L		<0.002	----	<0.002	<0.004	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.002	µg/L		<0.002	----	<0.002	<0.004	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.005	µg/L		<0.005	----	<0.005	<0.005	----
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		----	<0.05	----	----	----
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		----	----	----	----	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.005	µg/L		**0.018**	----	**0.022**	**12.0**	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		----	**11.1**	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		----	----	----	----	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.005	µg/L		<0.005	----	<0.005	**0.008**	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		----	<0.05	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	MW05	GW8002b	GW201b	FD10	RB01
				Sampling date / time	28-Mar-2023 00:00	28-Mar-2023 00:00	28-Mar-2023 00:00	28-Mar-2023 00:00	28-Mar-2023 00:00
Compound	CAS Number	LOR	Unit		EM2305704-001	EM2305704-002	EM2305704-003	EM2305704-004	EM2305704-005
					Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		----	----	----	----	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.005	µg/L		<0.005	----	<0.005	<0.005	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		----	<0.05	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		----	----	----	----	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.002	µg/L		**3.44**	----	**1.04**	**122**	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.002	µg/L		**2.41**	----	**0.659**	**74.0**	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		----	**71.4**	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		----	----	----	----	<0.01
Sum of PFAS (WA DER List)	----	0.002	µg/L		**3.16**	----	**0.904**	**112**	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		----	**108**	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		----	----	----	----	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.002	%		**89.3**	----	**92.7**	**85.8**	----
13C4-PFOS	----	0.02	%		----	**83.0**	----	----	----
13C4-PFOS	----	0.02	%		----	----	----	----	**98.2**
13C8-PFOA	----	0.002	%		**100**	----	**95.8**	**88.1**	----
13C8-PFOA	----	0.02	%		----	**90.3**	----	----	----
13C8-PFOA	----	0.02	%		----	----	----	----	**99.1**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	FB01	WWD-01	WWD-02	----	----
				Sampling date / time	28-Mar-2023 00:00	28-Mar-2023 00:00	28-Mar-2023 00:00	----	----
Compound	CAS Number	LOR	Unit		EM2305704-006	EM2305704-007	EM2305704-008	--------	--------
					Result	Result	Result	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		----	**24.0**	**0.50**	----	----
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L		----	**23.4**	**4.31**	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L		<0.01	----	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		----	**5.16**	**4.34**	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		----	**0.1**	**0.2**	----	----
Perfluorobutanoic acid (PFBA)	375-22-4	0.10	µg/L		<0.10	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		----	**1.57**	**0.53**	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		----	**5.80**	**1.46**	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		----	**1.22**	**0.19**	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		----	**1.15**	**0.22**	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		----	<0.05	<0.05	----	----
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		----	**0.70**	**0.79**	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		----	<0.05	<0.05	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	FB01	WWD-01	WWD-02	----	----
				Sampling date / time	28-Mar-2023 00:00	28-Mar-2023 00:00	28-Mar-2023 00:00	----	----
Compound	CAS Number	LOR	Unit		EM2305704-006	EM2305704-007	EM2305704-008	--------	--------
					Result	Result	Result	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		----	<0.05	<0.05	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	----	----	----	----
EP231P: PFAS Sums									
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		----	**28.6**	**8.65**	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	----	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		----	**63.1**	**12.5**	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	----	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		----	**91.6**	**92.4**	----	----
13C4-PFOS	----	0.02	%		**98.0**	----	----	----	----
13C8-PFOA	----	0.02	%		----	**92.0**	**97.5**	----	----
13C8-PFOA	----	0.02	%		**96.4**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: SOIL		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	36	140
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	62	128
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	40	139
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	54	125
2-Chlorophenol-D4	93951-73-6	65	123
2.4.6-Tribromophenol	118-79-6	34	122
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	61	125
Anthracene-d10	1719-06-8	62	130
4-Terphenyl-d14	1718-51-0	67	133
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	51	125
Toluene-D8	2037-26-5	55	125
4-Bromofluorobenzene	460-00-4	56	124
EP231S: PFAS Surrogate			
13C4-PFOS	----	68	136
13C8-PFOA	----	69	133

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP231S: PFAS Surrogate			
13C4-PFOS	----	65	140
13C8-PFOA	----	71	133

GHD Pty Ltd
GPO Box 2052
Adelaide
SA 5001

NATA Accredited
Accreditation Number 1261
Site Number 1254

Accredited for compliance with ISO/IEC 17025 – Testing
NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection, proficiency testing scheme providers and reference materials producers reports and certificates.

Attention: **Vera Biermann**

Report **977846-W**
Project name MFS ST MARYS PFAS INVESTIGATION
Project ID 12566684
Received Date Apr 03, 2023

Client Sample ID			**FS10**
Sample Matrix			**Water**
Eurofins Sample No.			**M23-Ap0004038**
Date Sampled			**Mar 28, 2023**
Test/Reference	LOR	Unit	
PFASs Summations			
Sum (PFHxS + PFOS)*	0.001	ug/L	61
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.001	ug/L	62.8
Sum of PFASs (n=30)*	0.005	ug/L	101.058
Sum of US EPA PFAS (PFOS + PFOA)*	0.001	ug/L	27.8
Sum of WA DWER PFAS (n=10)*	0.005	ug/L	92.239
Perfluoroalkyl sulfonamido substances- Trace			
Perfluorooctane sulfonamide (FOSA)[N11]	0.005	ug/L	[N09]0.016
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)[N11]	0.005	ug/L	< 0.005
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)[N11]	0.005	ug/L	< 0.005
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)[N11]	0.005	ug/L	< 0.005
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)[N11]	0.005	ug/L	< 0.005
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)[N11]	0.005	ug/L	< 0.005
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)[N11]	0.005	ug/L	< 0.005
13C8-FOSA (surr.)	1	%	69
D3-N-MeFOSA (surr.)	1	%	111
D5-N-EtFOSA (surr.)	1	%	43
D7-N-MeFOSE (surr.)	1	%	55
D9-N-EtFOSE (surr.)	1	%	27
D5-N-EtFOSAA (surr.)	1	%	18
D3-N-MeFOSAA (surr.)	1	%	29
Perfluoroalkyl carboxylic acids (PFCAs) - Trace			
Perfluorobutanoic acid (PFBA)[N11]	0.005	ug/L	0.53
Perfluoropentanoic acid (PFPeA)[N11]	0.001	ug/L	5.0
Perfluorohexanoic acid (PFHxA)[N11]	0.001	ug/L	10
Perfluoroheptanoic acid (PFHpA)[N11]	0.001	ug/L	[N09]1.5
Perfluorooctanoic acid (PFOA)[N11]	0.001	ug/L	[N09]1.8
Perfluorononanoic acid (PFNA)[N11]	0.001	ug/L	[N09]2.0
Perfluorodecanoic acid (PFDA)[N11]	0.001	ug/L	< 0.02
Perfluorotridecanoic acid (PFTrDA)[N15]	0.001	ug/L	< 0.001
Perfluoroundecanoic acid (PFUnDA)[N11]	0.001	ug/L	< 0.02
Perfluorododecanoic acid (PFDoDA)[N11]	0.001	ug/L	< 0.001

Client Sample ID			FS10
Sample Matrix			Water
Eurofins Sample No.			M23-Ap0004038
Date Sampled			Mar 28, 2023
Test/Reference	LOR	Unit	
Perfluoroalkyl carboxylic acids (PFCAs) - Trace			
Perfluorotetradecanoic acid (PFTeDA)[N11]	0.001	ug/L	< 0.001
13C4-PFBA (surr.)	1	%	87
13C5-PFPeA (surr.)	1	%	102
13C5-PFHxA (surr.)	1	%	103
13C4-PFHpA (surr.)	1	%	105
13C8-PFOA (surr.)	1	%	105
13C5-PFNA (surr.)	1	%	104
13C6-PFDA (surr.)	1	%	98
13C2-PFUnDA (surr.)	1	%	157
13C2-PFDoDA (surr.)	1	%	53
13C2-PFTeDA (surr.)	1	%	71
Perfluoroalkyl sulfonic acids (PFSAs)- Trace			
Perfluorobutanesulfonic acid (PFBS)[N11]	0.001	ug/L	[N09]3.9
Perfluorononanesulfonic acid (PFNS)[N15]	0.001	ug/L	< 0.02
Perfluoropropanesulfonic acid (PFPrS)[N15]	0.001	ug/L	1.6
Perfluoropentanesulfonic acid (PFPeS)[N15]	0.001	ug/L	[N09]4.0
Perfluorohexanesulfonic acid (PFHxS)[N11]	0.001	ug/L	[N09]35
Perfluoroheptanesulfonic acid (PFHpS)[N15]	0.001	ug/L	[N09]1.2
Perfluorooctanesulfonic acid (PFOS)[N11]	0.001	ug/L	[N09]26
Perfluorodecanesulfonic acid (PFDS)[N15]	0.001	ug/L	< 0.02
13C3-PFBS (surr.)	1	%	106
18O2-PFHxS (surr.)	1	%	113
13C8-PFOS (surr.)	1	%	111
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)- Trace			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)[N11]	0.001	ug/L	0.003
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)[N11]	0.005	ug/L	8.5
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)[N11]	0.001	ug/L	0.009
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)[N11]	0.001	ug/L	< 0.001
13C2-4:2 FTSA (surr.)	1	%	52
13C2-6:2 FTSA (surr.)	1	%	95
13C2-8:2 FTSA (surr.)	1	%	51
13C2-10:2 FTSA (surr.)	1	%	67

Sample History

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

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

Description	Testing Site	Extracted	Holding Time
Per- and Polyfluoroalkyl Substances (PFASs) - Trace			
PFASs Summations	Melbourne	Apr 03, 2023	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS) - low level			
Perfluoroalkyl sulfonamido substances- Trace	Melbourne	Apr 04, 2023	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS) - low level			
Perfluoroalkyl carboxylic acids (PFCAs) - Trace	Melbourne	Apr 04, 2023	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS) - low level			
Perfluoroalkyl sulfonic acids (PFSAs)- Trace	Melbourne	Apr 04, 2023	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS) - low level			
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)- Trace	Melbourne	Apr 04, 2023	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS) - low level			

eurofins

web: www.eurofins.com.au
email: EnviroSales@eurofins.com

Eurofins Environment Testing Australia Pty Ltd
ABN: 50 005 085 521

Melbourne	Geelong	Sydney	Canberra	Brisbane	Newcastle
6 Monterey Road	19/8 Lewalan Street	179 Magowar Road	Unit 1,2 Dacre Street	1/21 Smallwood Place	1/2 Frost Drive
Dandenong South	Grovedale	Girraween	Mitchell	Murarrie	Mayfield West NSW 2304
VIC 3175	VIC 3216	NSW 2145	ACT 2911	QLD 4172	Tel: +61 2 4968 8448
Tel: +61 3 8564 5000	Tel: +61 3 8564 5000	Tel: +61 2 9900 8400	Tel: +61 2 6113 8091	Tel: +61 7 3902 4600	NATA# 1261
NATA# 1261 Site# 1254	NATA# 1261 Site# 25403	NATA# 1261 Site# 18217	NATA# 1261 Site# 25466	NATA# 1261 Site# 20794	Site# 25079 & 25289

Eurofins ARL Pty Ltd
ABN: 91 05 0159 898

Perth
46-48 Banksia Road
Welshpool
WA 6106
Tel: +61 8 6253 4444
NATA# 2377 Site# 2370

Eurofins Environment Testing NZ Ltd
NZBN: 9429046024954

Auckland	Christchurch
35 O'Rorke Road	43 Detroit Drive
Penrose,	Rolleston,
Auckland 1061	Christchurch 7675
Tel: +64 9 526 45 51	Tel: 0800 856 450
IANZ# 1327	IANZ# 1290

Company Name: GHD Pty Ltd SA
Address: GPO Box 2052
Adelaide
SA 5001

Project Name: MFS ST MARYS PFAS INVESTIGATION
Project ID: 12566684

Order No.:
Report #: 977846
Phone: 08 8111 6600
Fax: 08 8111 6699

Received: Apr 3, 2023 2:35 PM
Due: Apr 12, 2023
Priority: 5 Day
Contact Name: Vera Biermann

Eurofins Analytical Services Manager : Amy Meunier

Sample Detail						Per- and Polyfluoroalkyl Substances (PFASs) - Trace
Melbourne Laboratory - NATA # 1261 Site # 1254						X
External Laboratory						
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**	
1	FS10	Mar 28, 2023		Water	M23-Ap0004038	X
Test Counts						1

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Internal Quality Control Review and Glossary

General

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

Holding Times

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

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

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

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

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

Units

mg/kg: milligrams per kilogram
mg/L: milligrams per litre
µg/L: micrograms per litre
ppm: parts per million
ppb: parts per billion
%: Percentage
org/100 mL: Organisms per 100 millilitres
NTU: Nephelometric Turbidity Units
MPN/100 mL: Most Probable Number of organisms per 100 millilitres
CFU: Colony forming unit

Terms

APHA	American Public Health Association
COC	Chain of Custody
CP	Client Parent - QC was performed on samples pertaining to this report
CRM	Certified Reference Material (ISO17034) - reported as percent recovery.
Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
LOR	Limit of Reporting.
LCS	Laboratory Control Sample - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
SRA	Sample Receipt Advice
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
TBTO	Tributyltin oxide (*bis*-tributyltin oxide) - individual tributyltin compounds cannot be identified separately in the environment however free tributyltin was measured and its values were converted stoichiometrically into tributyltin oxide for comparison with regulatory limits.
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxic Equivalency Quotient or Total Equivalence
QSM	US Department of Defense Quality Systems Manual Version 5.4
US EPA	United States Environmental Protection Agency
WA DWER	Sum of PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC - Acceptance Criteria

The acceptance criteria should be used as a guide only and may be different when site specific Sampling Analysis and Quality Plan (SAQP) have been implemented

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

Results <10 times the LOR: No Limit

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

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

NOTE: pH duplicates are reported as a range not as RPD

Surrogate Recoveries: Recoveries must lie between 20-130% for Speciated Phenols & 50-150% for PFAS

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.4 where no positive PFAS results have been reported have been reviewed and no data was affected.

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore, laboratory analysis is unlikely to be completed within holding time.Analysis will begin as soon as possible after sample receipt.
4. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of recovery the term "INT" appears against that analyte.
5. For Matrix Spikes and LCS results a dash "-" in the report means that the specific analyte was not added to the QC sample.
6. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Perfluoroalkyl sulfonamido substances- Trace							
Perfluorooctane sulfonamide (FOSA)	ug/L	< 0.005			0.005	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	ug/L	< 0.005			0.005	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	ug/L	< 0.005			0.005	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	ug/L	< 0.005			0.005	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	ug/L	< 0.005			0.005	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	ug/L	< 0.005			0.005	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	ug/L	< 0.005			0.005	Pass	
Method Blank							
Perfluoroalkyl carboxylic acids (PFCAs) - Trace							
Perfluorobutanoic acid (PFBA)	ug/L	< 0.005			0.005	Pass	
Perfluoropentanoic acid (PFPeA)	ug/L	< 0.001			0.001	Pass	
Perfluorohexanoic acid (PFHxA)	ug/L	< 0.001			0.001	Pass	
Perfluoroheptanoic acid (PFHpA)	ug/L	< 0.001			0.001	Pass	
Perfluorooctanoic acid (PFOA)	ug/L	< 0.001			0.001	Pass	
Perfluorononanoic acid (PFNA)	ug/L	< 0.001			0.001	Pass	
Perfluorodecanoic acid (PFDA)	ug/L	< 0.001			0.001	Pass	
Perfluorotridecanoic acid (PFTrDA)	ug/L	< 0.001			0.001	Pass	
Perfluoroundecanoic acid (PFUnDA)	ug/L	< 0.001			0.001	Pass	
Perfluorododecanoic acid (PFDoDA)	ug/L	< 0.001			0.001	Pass	
Perfluorotetradecanoic acid (PFTeDA)	ug/L	< 0.001			0.001	Pass	
Method Blank							
Perfluoroalkyl sulfonic acids (PFSAs)- Trace							
Perfluorobutanesulfonic acid (PFBS)	ug/L	< 0.001			0.001	Pass	
Perfluorononanesulfonic acid (PFNS)	ug/L	< 0.001			0.001	Pass	
Perfluoropropanesulfonic acid (PFPrS)	ug/L	< 0.001			0.001	Pass	
Perfluoropentanesulfonic acid (PFPeS)	ug/L	< 0.001			0.001	Pass	
Perfluorohexanesulfonic acid (PFHxS)	ug/L	< 0.001			0.001	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	ug/L	< 0.001			0.001	Pass	
Perfluorooctanesulfonic acid (PFOS)	ug/L	< 0.001			0.001	Pass	
Perfluorodecanesulfonic acid (PFDS)	ug/L	< 0.001			0.001	Pass	
Method Blank							
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)- Trace							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	ug/L	< 0.001			0.001	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	ug/L	< 0.005			0.005	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	ug/L	< 0.001			0.001	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	ug/L	< 0.001			0.001	Pass	
LCS - % Recovery							
Perfluoroalkyl sulfonamido substances- Trace							
Perfluorooctane sulfonamide (FOSA)	%	101			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	%	58			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	%	59			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	%	94			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	%	95			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	%	134			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	%	80			50-150	Pass	
LCS - % Recovery							
Perfluoroalkyl carboxylic acids (PFCAs) - Trace							
Perfluorobutanoic acid (PFBA)	%	111			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	103			50-150	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Perfluorohexanoic acid (PFHxA)	%	114			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	109			50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	116			50-150	Pass	
Perfluorononanoic acid (PFNA)	%	121			50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	118			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	%	119			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	%	124			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	82			50-150	Pass	
LCS - % Recovery							
Perfluoroalkyl sulfonic acids (PFSAs)- Trace							
Perfluorobutanesulfonic acid (PFBS)	%	98			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	%	88			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	%	98			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	%	96			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	%	103			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	%	118			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	%	107			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	%	56			50-150	Pass	
LCS - % Recovery							
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)- Trace							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	%	87			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	%	107			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	%	90			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	%	106			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Perfluoroalkyl sulfonamido substances- Trace				Result 1					
Perfluorooctane sulfonamide (FOSA)	M23-Ap0000189	NCP	%	111			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	M23-Ap0000189	NCP	%	115			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	M23-Ap0000189	NCP	%	78			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	M23-Ap0000189	NCP	%	78			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	M23-Ap0000189	NCP	%	105			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	M23-Ap0000189	NCP	%	97			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	M23-Ap0000189	NCP	%	101			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl carboxylic acids (PFCAs) - Trace				Result 1					
Perfluorododecanoic acid (PFDoDA)	M23-Ap0000189	NCP	%	108			50-150	Pass	
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)- Trace				Result 1					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	M23-Ap0000189	NCP	%	93			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	M23-Ap0000189	NCP	%	131			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	M23-Ap0000189	NCP	%	108			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Perfluoroalkyl sulfonamido substances- Trace				Result 1	Result 2	RPD			
Perfluorooctane sulfonamide (FOSA)	M23-Ap0000187	NCP	ug/L	< 0.005	< 0.005	<1	30%	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	M23-Ap0000187	NCP	ug/L	< 0.005	< 0.005	<1	30%	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	M23-Ap0000187	NCP	ug/L	< 0.005	< 0.005	<1	30%	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	M23-Ap0000187	NCP	ug/L	< 0.005	< 0.005	<1	30%	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	M23-Ap0000187	NCP	ug/L	< 0.005	< 0.005	<1	30%	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	M23-Ap0000187	NCP	ug/L	< 0.005	< 0.005	<1	30%	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	M23-Ap0000187	NCP	ug/L	< 0.005	< 0.005	<1	30%	Pass	
Duplicate									
Perfluoroalkyl carboxylic acids (PFCAs) - Trace				Result 1	Result 2	RPD			
Perfluorotridecanoic acid (PFTrDA)	M23-Ap0000187	NCP	ug/L	< 0.001	< 0.001	<1	30%	Pass	
Perfluorododecanoic acid (PFDoDA)	M23-Ap0000187	NCP	ug/L	< 0.001	< 0.001	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	M23-Ap0000187	NCP	ug/L	< 0.001	< 0.001	<1	30%	Pass	
Duplicate									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)- Trace				Result 1	Result 2	RPD			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	M23-Ap0000187	NCP	ug/L	< 0.001	< 0.001	<1	30%	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	M23-Ap0000187	NCP	ug/L	< 0.001	< 0.001	<1	30%	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	M23-Ap0000187	NCP	ug/L	< 0.001	< 0.001	<1	30%	Pass	

Comments

Sample Integrity

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

Qualifier Codes/Comments

Code	Description
N09	Quantification of linear and branched isomers has been conducted as a single total response using the relative response factor for the corresponding linear/branched standard.
N11	Isotope dilution is used for calibration of each native compound for which an exact labelled analogue is available (Isotope Dilution Quantitation). The isotopically labelled analogues allow identification and recovery correction of the concentration of the associated native PFAS compounds.
N15	Where the native PFAS compound does not have labelled analogue then the quantification is made using the Extracted Internal Standard Analyte with the closest retention time to the analyte and no recovery correction has been made (Internal Standard Quantitation).

Authorised by:

Amy Meunier	Analytical Services Manager
Joseph Edouard	Senior Analyst-PFAS

Glenn Jackson
General Manager

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

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

Measurement uncertainty of test data is available on request or please click here.

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Appendix D

Field Sheets

GHD CLIENTS|PEOPLE|PERFORMANCE

Daily Record Sheet

001

Client: MFS		Job No: 12566684	
Job Name: St Marys DSI		Date: 05-10-2022	
GHD Representative:	V. Biermann	Arrival Time: 7.50	Departure Time: 17.50
Weather Conditions:	(Please circle) Fine (Overcast) Light Rain Heavy Rain Other_____		
Works Being Undertaken:	Soil bore drilling & sampling		

Personnel/Contractor(s) Present (List all); Inducted into GHD H&SP?	Inducted	Arrival Time	Departure Time
Dave Barber, Veris	✓	7.50	11.50
Ian Watt, WB Drilling	✓	9.00	16.00
James Strathearn	✓	8.45	16.00

Photographs Taken: (Please circle) Yes No If Yes, list below or attach photo register.

Location	Time	Record of Activities / Issues Encountered / Discussions with Client/Contractors / Sketch / Notes
		- Mark proposed borehole locations w/ spray paint (site walkover)
		- Underground services clearance
BH12		BH12-0.1-0.2
Σ6 prim. samples		BH12-0.5-0.6 Total depth 2.6m Sgl
		BH12-0.9-1.0 no water
		BH12-1.5-1.6
		BH12-2.0-2.1
		BH12-2.5-2.6
		Bitumen SFA 124 mm ; PT 50mm
BH13		40mm Bitumen ; subgrade to 400 mm HA to 1m ; PT to 2.6m
		BH13-0.0
Σ7 primary		BH13-0.1-0.3 FD01, FS01
		BH13-0.6-0.7
		BH13-1.0-1.1
		BH13-1.6-1.7
		BH13-2.0-2.1
		BH13-2.4-2.6

Is a Notice of Proposed Variation, Variation Order or Site Instruction Required? (Please circle) Yes No

Provide Details:

Further Inspection and/or Testing Required on above Work:	Σ7 BH09 Samples 0.0 ; 0.1-0.3 ; 0.4-0.6 ; 1.0-1.2 (FD02, FS02) 1.5-1.6 2.0-2.1 2.5-2.6
	Σ7 BH08 40mm bitumen 300mm subgrade HA to 1m ; PT to 2.6 0.0 ; 0.1-0.2 ; 0.5-0.6 ; 0.9-1.0 ; 1.5-1.6 ; 2.0-2.1 ; 2.5-2.6

Are there any H&S requirements to be considered for future works?
Has the site been reinstated suitably (left clean and tidy)?

27 primary samples

GHD CLIENTS|PEOPLE|PERFORMANCE

Daily Record Sheet

002
~~001~~

Client: MFS		Job No: 12566684	
Job Name: ST Marys DSI		Date: 5-10-22	
GHD Representative: Vera Biermann		Arrival Time:	Departure Time:
Weather Conditions:	(Please circle) Fine Overcast Light Rain Heavy Rain Other_____		
Works Being Undertaken:			

Personnel/Contractor(s) Present (List all); Inducted into GHD H&SP?	Inducted	Arrival Time	Departure Time

Photographs Taken: (Please circle) Yes No If Yes, list below or attach photo register.

Location	Time	Record of Activities / Issues Encountered / Discussions with Client/Contractors / Sketch / Notes
BH14		HA to 0.5m ; PT to 2.6 m bgl no water 0-0,1
34 Σ7 primary		0,2-0,4 (FD03, FS03); 0,6-0,8 ; 1,1-1,2 ; 1,5-1,6 ; 2,0-2,1, 2,5-2,6
BH15		HA to 0,5m, PT to 2,6 m bgl no water : 0-0,1 , 0,2-0,4
41 Σ7 primary		0,4-0,6 (FD04, FS04), 1,0-1,1, 1,5-1,6, 2,0-2,1, 2,5-2,6
BH11		HA to 0,5, PT to 2,6 m bgl 0-0,1, 0,2-0,4 ; 0,7-0,9
47 Σ6 primary		1,3-1,5 1,8-2,0 2,4-2,6
BH10		HA to 0,3 PT to 2,6 bitumen
		gravel layer grey @ 0,2-0,3 ; dark @ 0,7-0,8
53 Σ6 primary		0-0,1 ; 0,3-0,5 0,8-1,0 1,5-1,6 1,9-2,1 2,4-2,6
		FD05, FS05

Is a Notice of Proposed Variation, Variation Order or Site Instruction Required? (Please circle) Yes No

Provide Details:

Further Inspection and/or Testing Required on above Work:	

Are there any H&S requirements to be considered for future works?
Has the site been reinstated suitably (left clean and tidy)?

GHD CLIENTS | PEOPLE | PERFORMANCE

Daily Record Sheet

001

Client: MFS		Job No: 125666	
Job Name: ST Marys DSI		Date: 6-10-22	
GHD Representative:	V. Biermann; C. Davies	Arrival Time: ~~7.50~~ 8	Departure Time: 16.15
Weather Conditions:	(Please circle) Fine to Overcast	Light Rain	Heavy Rain Other
Works Being Undertaken:	Soil bore drilling & sampling; monitoring well installation		

Personnel/Contractor(s) Present (List all); Inducted into GHD H&SP?	Inducted	Arrival Time	Departure Time
Ian Watt WB Drilling	✓	7.50	
James Strathearn	✓	7.50	16.00

Soil
total 6-10-22

Photographs Taken: (Please circle) Yes No If Yes, list below or attach photo register.

Location	Time	Record of Activities / Issues Encountered / Discussions with Client/Contractors / Sketch / Notes
BH06		HA to 0.65 PT 2.7 no water
53 6PS		0-0.1, 0.2-0.4, FD06, FS06, 0.7-0.9, 1.3-1.5
		1.8-2.0, 2.4-2.6
		HA to 0.65 PT to
BH07		~~0-0.1~~, 0.3-0.5, FD07, FS07, 0.8-1.0, 1.3-1.5
59 12 25 PS soil		1.8-2.0; 2.4-2.6
1 concrete		0-0.15 Concrete BH07_0-0.15
		0.3-0.5 FD07, FS07; 0.8-~~0.9~~ 1.0;
BH05		concrete core 0-0.1; HA to 0.6m, PT to 2.~~7~~ m bgl
69 16 25 soil		0.1-0.6, 0.6-0.8; 0.8-2.~~7~~ Soil Layers
1 concrete		0.3-0.5 0.6-0.8 1.1-1.3 1.6-1.8 2.~~1~~2.3
77 24 BH01/MW01		concrete core 0-0.1 HA to 0.75 PT to 5.5 m
28 soil		0.11-0.3 gravelly sand; 0.3-0.8 gravelly clay; 0.8-3.5 brown clay
1 concrete		3.5-5.5 clay have gravel grey-brown mottled orange brown; 3.5-4.3 more gravel
		0.1-0.3; 0.~~5~~-0.~~7~~ FD08, FS08; 1.0-1.2; 1.5-1.7; 2.0-2.2
		3.0-3.2; ~~4.0~~-4.2; 5.0-5.2
		Well install screen 1-4 m bgl sand 0.2m above screen, bentonite seal
		gatic cover no water observed, installed dry

→ p. 1.0

Is a Notice of Proposed Variation, Variation Order or Site Instruction Required? (Please circle) Yes No

Provide Details:

Further Inspection and/or Testing Required on above Work:	General comment: driller uses Decon-90 in water to clean PT liners & soil trays in between BH locations followed by rinse w/ tap water

Are there any H&S requirements to be considered for future works?
Has the site been reinstated suitably (left clean and tidy)?

BH04 / MW04 HA to 0.6 PT to 4.0m bgL

0-0.1 Topsoil
0.1-

Samples 0-0.1✓ 1.3-1.5✓ 2.8-3.0✓
28 soil 0.3-0.5✓ 1.8-2.0✓ 3.8-4.0✓
0.8-1.0✓ 2.3-2.5✓

Total 85 soil
+3 concrete

Soil Waste Drum 1 SWD-01 1x glass jar → SA Waste Screen

RB02 off stainless steel spatula 1 plastic jar → PFAS

FB02

QA/QC overview

FD01, FS01	BH13_0.1-0.3	}	5/10/22
→ FD02, FS02	BH09_1.0-1.2		
→ FD03, FS03	BH14_0.2-0.4		
FD04, FS04	BH15_0.4-0.6		
FD05, FS05	BH10_0.3-0.5		
→ FD06, FS06	BH06_0.2-0.4	}	6/10/22
FD07, FS07	BH07_0.3-0.5		
FD08, FS08	MW01_0.5-0.7		
FD09, FS09	MW02_1.0-1.2		7/10/22

GHD

Daily Record Sheet

001

Client: MFS		Job No: 12566684	
Job Name: ST Marys Fire Stn DSI		Date: 7-10-2022	
GHD Representative: Vera Biermann		Arrival Time: 8,00	Departure Time: 12,45
Weather Conditions: (Please circle) Fine (Overcast) Light Rain Heavy Rain Other_____			
Works Being Undertaken: GW monitoring well installation ; soil sampling			

Personnel/Contractor(s) Present (List all); Inducted into GHD H&SP?	Inducted	Arrival Time	Departure Time
Ian Watt } WB Drilling	✓	8,00	12,00
James Strathearn }	✓	8,00	11,45

Photographs Taken: (Please circle) Yes No If Yes, list below or attach photo register.

Running total # primary soil samples 85

Location	Time	Record of Activities / Issues Encountered / Discussions with Client/Contractors / Sketch / Notes
		- Re-pack samples to remove ice water Replace ice w/ 4x ~~1.5~~ frozen water bottles (1.5L)
		- Gauge MW01, MW04 & pre-existing wells
MW02		HA to 0.8 m , PT to 4.0m
		Well install to 5.0 m bgl , screen 2-5 m ; sand 0.5m
		bentonite seal , gatic cover
92 7 primary		0-0.1 ~~0.1-0.2~~ 0.3-0.5 ; 1.0-1.2 FD09 FS09 ; 1.5-1.7
		2.0-2.2 ; 2.7-2.9 3.7-3.9
MW03		HA to 0.7 ; PT to 3.5
		Well install to 4.0m , screen 1-4 m ; sand 0.2m ,
99 7 p.s.		bentonite 0.2m ; finish w/ grout & gatic cover
		0-0.1 ; 0.3-0.5 ; 0.9-1.1 ; 2.4-2.6 ; 3.2-3.4
		1.4-1.6 ; ~~2.1-2.~~ 1.9-2.1 & FD10 ; FS10
		FB03, RB03 off stainless steel spatula
		Soil-waste-drum SWD-02 1 PFAS
		1 Sf Waste Screen

Is a Notice of Proposed Variation, Variation Order or Site Instruction Required? (Please circle) Yes No

Provide Details:

Further Inspection and/or Testing Required on above Work:	

Are there any H&S requirements to be considered for future works?
Has the site been reinstated suitably (left clean and tidy)?

WB Drilling PTY. LTD. ABN 17 116 301 181

1441

PRE-START CHECKLIST

Project: 6MW @ Soil Sampling	Project No.
Client: GHD	Date: 5/10/22
Client Contact: VERA	Time: 7.00
Site Location: St Marys Fire Station	Recorded By: MW

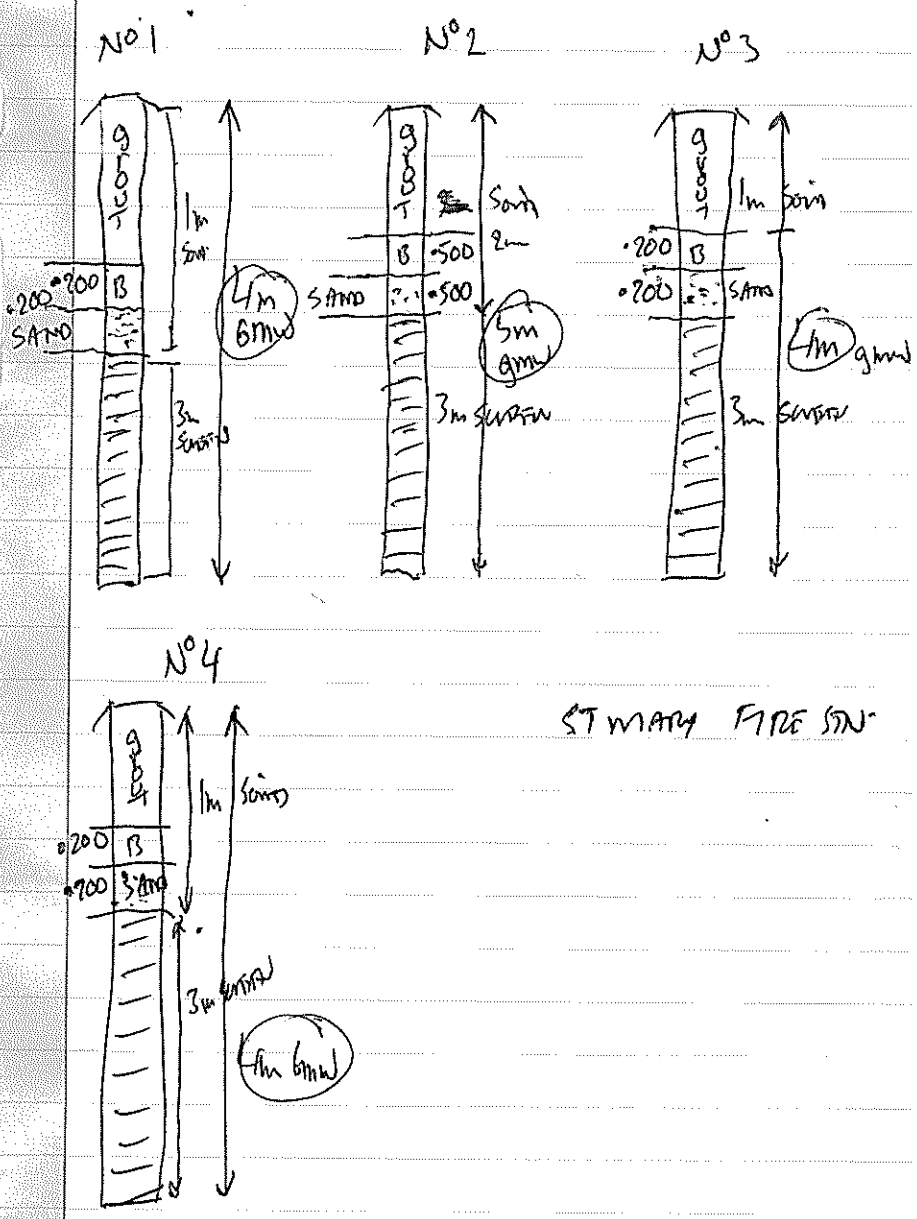
This pre-start checklist must be completed prior to the start of each day or after moving to a new location.

TOYOTA LAND CRUISER

Item	Check	Note
Oil & Coolant Levels	✓	
Tyres (Visual)	✓	
Lights, Flashing Light	✓	

EZIPROBE DRILL RIG

Item	Check	Note
Power Pac Oil & Coolant Levels	✓	
Fan Belt (Visual)	✓	
Winch and Cable (Visual)	✓	
Hydraulic Hoses (Visual)	✓	
Deadmans Switch	✓	
Control Levers (Visual)	✓	
Throttle (Visual)	✓	
Pivot Points (Visual)	✓	



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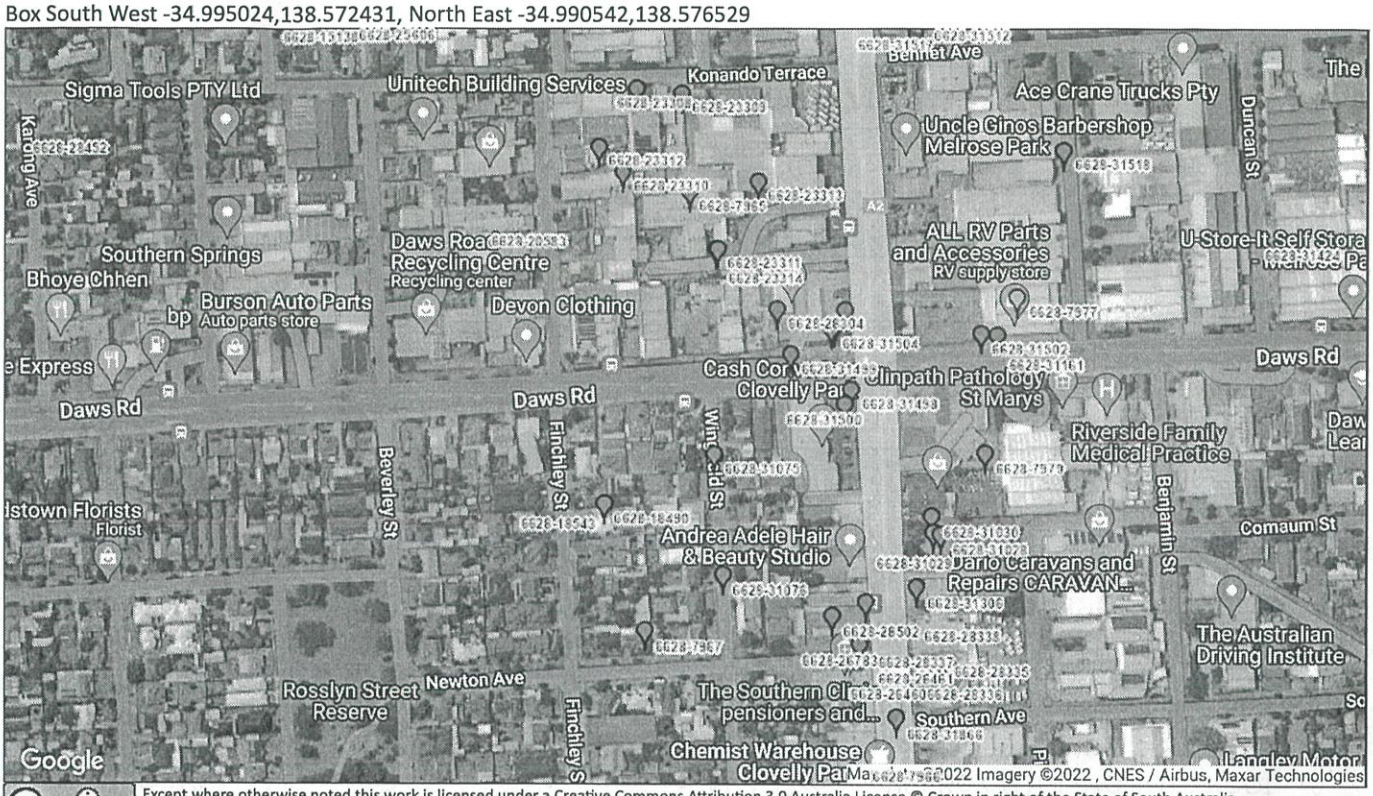
Groundwater Gauging Sheet

Client:	MFS	WL Meter Type: Dip / Fox (Int.Fce) / Gge	
Project:	~~125~~ St Marys DSI	Date:	05-10-2022 7-10-22
Job No.:	12566684	Time:	
Location:	ST Marys Fire Station	Sampler:	V. Biermann

Location / Bore ID	Stick up (m)	SWL (mbTOC)	Thickness of NAPL (mm)	Comment
GW201b	—	2.020	—	Data logger in well, no well cap
GW8002b	—	1.616	—	Data logger in well
GW8001b	—	17.046	—	Data logger in well
7-10-22		10h15		
MW04	—	1.852	—	Well installed 6-10-22 ≈15.00
GW201b	—	2.010	—	see above
GW8002b	—	1.632	—	see above
GW8001b	—	17.061	—	See above
MW01	—	dry	—	well depth 4.06 m bTOC
MW03	—	2.5	—	immediately after well install 11h20
~~MW02~~				well dept MW03 = 3.98 m bTOC
MW02		2.452		12h15 4.93 depth

Government of South Australia WaterConnect

Box South West -34.995024,138.572431, North East -34.990542,138.576529



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Find existing wells 7-10-22 NE of St Mary's Station

- 6628-31502 located in middle of Daws Rd (W-bound LH lane)
- 6628-31161 located → backfilled
- 6628-31076 located BH 7025 → backfilled rd hole next to it
- 6628-31075 located several round holes → backfilled (Bitumen)

Winfield St betw. Daws Rd & Newton Ave → no gatic well cover visible

Shell Express (NW) Corner Daws Rd & South Rd

→ no GW gatic visible; one possible (see photo near SW corner next to building) 6628-26304? Screw top >50 mm

Konando Tce: could not locate 6628-23309 or 6628-23308

Well locations 6628-23311, 6628-23313 → private property / no access

→ Could not locate any GW monitoring wells NW of the Station suitable for monitoring

GHD

Daily Record Sheet

001

Client: MFS		Job No: 12566684	
Job Name: MFS St Marys Station VSCAP, PSI & SAQP		Date: 12/10/22	
GHD Representative:	S Castillo	Arrival Time: 10.00 am	Departure Time:

Weather Conditions: (Please circle) Fine Overcast (Light Rain) Heavy Rain Other_____

Works Being Undertaken: Well development

Personnel/Contractor(s) Present (List all); Inducted into GHD H&SP?	Inducted	Arrival Time	Departure Time
Steven Castillo	✓	10.00 am	14.20
Lincoln Jeffery	✓	12.00	13.50

Photographs Taken: (Please circle) Yes No If Yes, list below or attach photo register.

Location	Time	Record of Activities / Issues Encountered / Discussions with Client/Contractors / Sketch / Notes
	~~10.00~~	Arrived at site - station empty, gate locked
	10.05	Personnel arrived, allowed entry
MW01	10.25	Dry at 3.975m
MW02		Developed
	12.00	Surveyor arrived
MW03		Slow recovery at ~ 13.0L / Developed
MW04		Slow recovery at ~ 9.5L / Developed
	13.50	Surveyor left
	14.20	Departure

Is a Notice of Proposed Variation, Variation Order or Site Instruction Required? (Please circle) Yes No

Provide Details:

Further Inspection and/or Testing Required on above Work:

Are there any H&S requirements to be considered for future works?
Has the site been reinstated suitably (left clean and tidy)?

Purging and Sampling Record

Bore ID: MW01

Job Information	Sampling Information	Bore Information
Client: MFS	Purge Method: SS. Bailer	SWL(mbTOC): – m Logic Check: –
Project: St Marys ISCAP, PSI & SAQP	Sample Method:	Screen: From: to: m Stick Up: – m
Proj. No.: 12576684	WQ Meter Type: YSI PRO PLUS	NAPL Check: – Bore Diam.: 50 mm
Sampler: S.C	Flow Cell: Y / N Pump Depth: – m	Ref.datum: MGA 54 H Well Cap Secure? Y
Date: 12/10/22	WLevel Meter Type: – Dip / Fox / Int.Fce / Gge	Bore Depth: m
Round: Development	Field Filtered? Y / N (filter vessel, disposable filter/syringe)	

Time (.....)	Volume (L)	Temp (°C)	pH (pH units)	Elec.Cond (.....)	Dis.Oxygen (.....)	Ox-Red Pt. (± mV)	SWL (m TOC)	WD (.....)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable when (3 consecutive readings):		-	*+/- 0.05 pH*	*+/- 3%*	*+/- 10%*	*+/- 10 mV*	*stable*		
10.25								3.975	DRY

Field QA Checks:

Air bubbles in vials? Y / N Any violent reactions? Y / N
Decontamination as per GHD procedure? Y / N
Was sampling equipment pre-cleaned? Y / N
COC updated? Y / N

Parameters	BTEX	TPH	PAH	CHC	PCB	OCP	OPP	Tot. Metal	Biol.				
Preservatives													

Comment: Duplicate samples collected, bottles used, access, condition of headworks etc

Purge Volumes

Casing Int. Dia (mm)	50	100	150
Vol (L/m of casing)	2.0	7.9	17.7

*Double for gravel pack

Purging and Sampling Record

Bore ID: MW02

Job Information		Sampling Information		Bore Information	
Client:	MFS	Purge Method:	SS Bailer	SWL(mbTOC):	2.493 m
Project:	St Marys VSCAP, PSI SAQP	Sample Method:	—	Screen: From: ..... to ..... m	Logic Check: —
Proj. No.:	12566684	WQ Meter Type:	YSI Pro Plus	NAPL Check:	—
Sampler:	SC	Flow Cell: Y / (N)	Pump Depth: — m	Ref.datum:	MGA 94H
Date:	12/10/22	WLevel Meter Type:	— Dip / Fox / (Int.Fce) / Gge	Bore Depth:	m
Round	Development	Field Filtered? Y / N (filter vessel, disposable filter/syringe)			Stick Up: — m; Bore Diam.: 50 mm; Well Cap Secure? Y

Time (.....)	Volume (L)	Temp (°C)	pH (pH units)	Elec.Cond (.....)	Dis.Oxygen (.....)	Ox-Red Pt. (± mV)	SWL (m TOC)	TD (.....)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable when (3 consecutive readings):		-	*+/- 0.05 pH*	*+/- 3%*	*+/- 10%*	*+/- 10 mV*	*stable*		
10.55	1.0L	19.1	7.07	7766	1.34	155.1	2.493	4.933	Brown, high Ts, low SL, no sheen, no odour
11.02	5.0L	19.1	7.42	7645	2.96	143.6			"
11.09	10.0L	19.3	7.52	8464	3.08	145.4			"
11.16	15.5L	19.5	7.69	8837	4.27	141.8	3.73	4.955	"
		✓	✓			✓			

SPC 9944 ~~9944~~
SPC 8607
SPC 9493

Field QA Checks:

Air bubbles in vials? Y / N Any violent reactions? Y / N
Decontamination as per GHD procedure? Y / N
Was sampling equipment pre-cleaned? Y / N
COC updated? Y / N

Parameters	BTEX	TPH	PAH	CHC	PCB	OCP	OPP	Tot. Metal	Biol.				
Preservatives													

Comment: Duplicate samples collected, bottles used, access, condition of headworks etc

Purge Volumes

Casing Int. Dia (mm)	50	100	150
Vol (L/m of casing)	2.0	7.9	17.7

*Double for gravel pack

Purging and Sampling Record

Bore ID: MW03

Job Information	Sampling Information	Bore Information
Client: MFS	Purge Method: SS Bailer	SWL(mbTOC): 2.183 (pre.) m
Project: 125666684	Sample Method:	Screen: From: to: m
Proj. No.: St Marys Statwin VSCAP, PST, SAQP	WQ Meter Type: YSI Pro Plus	NAPL Check:
Sampler: SC	Flow Cell: Y / N	Pump Depth: m
Date: 12/10/2022	WLevel Meter Type: –	Dip / Fox / Int.Fce / Gge
Round: Development	Field Filtered? Y / N (filter vessel, disposable filter/syringe)	Ref.datum: MGA 54H
		Bore Depth: m
		Logic Check: –
		Stick Up: – m
		Bore Diam.: 50 mm
		Well Cap Secure? Y

Time (.....)	Volume (L)	Temp (°C)	pH (pH units)	Elec.Cond (.....)	Dis.Oxygen (.....)	Ox-Red Pt. (± mV)	SWL (m TOC)	WD (.....)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable when (3 consecutive readings):		-	*+/- 0.05 pH*	*+/- 3%*	*+/- 10%*	*+/- 10 mV*	*stable*		
11.54	1.0L	17	7.44	20664	3.22	162.7	2.183	3.982	Brown, high tb, low-med SL, no odour, no sheen
12.19	4.0L	17.3	7.73	21080	4.11	148.5			" "
12.24	8.0L	17,5	7.82	21576	4.82	153			" "
12.35	12.5L	17.4	8.12	22442	5.51	160.2	3.30	4.007	" "
		✓		✓		✓			

Field QA Checks:

Air bubbles in vials? Y / N Any violent reactions? Y / N
Decontamination as per GHD procedure? Y / N
Was sampling equipment pre-cleaned? Y / N
COC updated? Y / N

Parameters	BTEX	TPH	PAH	CHC	PCB	OCP	OPP	Tot. Metal	Biol.				
Preservatives													

Comment: Duplicate samples collected, bottles used, access, condition of headworks etc

Purge Volumes

Casing Int. Dia (mm)	50	100	150
Vol (L/m of casing)	2.0	7.9	17.7

*Double for gravel pack

Purging and Sampling Record

Bore ID: MW04

Job Information	Sampling Information	Bore Information
Client: MFS	Purge Method: SS Bailer	SWL(mbTOC): 1.878 (pre) m
Project: St Marys Station VCAP, PSI, SAQP	Sample Method:	Logic Check: –
Proj. No.: 12566684	WQ Meter Type: YSI Pro Plus	Screen: From: to: m
Sampler: SC	Flow Cell: Y / (N)	Pump Depth: – m
Date: 12/10/2022	WLevel Meter Type: –	NAPL Check: –
Round: Development	Dip / Fox / (Int.Fce) / Gge	Stick Up: m
	Field Filtered? Y / N (filter vessel, disposable filter/syringe)	Bore Diam.: 50 mm
		Ref.datum: MGA 54H
		Well Cap Secure? Y
		Bore Depth: m

Time (.....)	Volume (L)	Temp (°C)	pH (pH units)	Elec.Cond (.....)	Dis.Oxygen (.....)	Ox-Red Pt. (± mV)	SWL (m TOC)	WD (.....)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable when (3 consecutive readings):		-	*+/- 0.05 pH*	*+/- 3%*	*+/- 10%*	*+/- 10 mV*	*stable*		
9:07	1.0L	17.1	7.60	12355	2.48	157.9	1.878	3.935	Brown, high TB, low-med SL, no odour, no sheen * foamy
13.11	4.0L	16.8	7.57	12682	2.72	153.8			" " still slightly foamy
13.18	8.0L	17.4	7.73	12283	3.94	159.6			" " * no longer foamy
13.30	12.0L	17.1	8.10	10441	4.48	174.8			" " SPC 12309
13.45	14.0L	17.3	8.21	9741	4.07	179.5			" " SPC 11439
13.57	18.0L	17.5	8.10	9886	5.72	174.7	2.83	4.06	" " SPC 11547
		✓	✓			✓			

Field QA Checks:

Air bubbles in vials? Y / N Any violent reactions? Y / N
Decontamination as per GHD procedure? Y / N
Was sampling equipment pre-cleaned? Y / N
COC updated? Y / N

Parameters	BTEX	TPH	PAH	CHC	PCB	OCP	OPP	Tot. Metal	Biol.				
Preservatives													

Comment: Duplicate samples collected, bottles used, access, condition of headworks etc

Purge Volumes

Casing Int. Dia (mm)	50	100	150
Vol (L/m of casing)	2.0	7.9	17.7

*Double for gravel pack

Groundwater Gauging Sheet

Client: MFS St Marys	WL Meter Type: Dip / Fox / Int.Fce / Gge
Project:	Date: 20/10/22
Job No.: 12566683	Time:
Location: MFS St Marys, South Rd	Sampler:

Location / Bore ID	Stick up (m)	SWL (mbTOC)	Thickness of NAPL (mm)	Comment
MW03		2.24		
GW201b		2.11		
GW80025		1.75		
GW8001b		17.3		
MW04		1.95		
MW02		2.55		
MW01		dry —		

Hydrasleeve Sampling Record

Project number:	12566684	**Sampler initials**	AK
Client:	MFS St Marys	**PM initials**	BP
Site location:	MFS St Marys		

Well ID	MW03	**Depth to Groundwater (mBTOC)**	2.24
Date	20/10/22	**Depth to top of sampler (mBTOC)**	
QC sample		**Well depth (mBTOC)**	

-0.5m

In situ downhole parameters (collect post sampling – ensure parameters have stabilised)

Time	pH	Temp (C)	EC (uS/cm)	Redox (mV)	DO (mg/L)
	7.33	19.4	10029	26.7	2.6

Comments (odour, colour, turbidity,sheen)

LNAPL Check Y ☐ N ☐	grab sample due to draw down, stopped at 2.42 mTOC med turbidity, low sediment load, no odour, no sheen

Well ID	GW ~~MW~~201	**Depth to Groundwater (mBTOC)**	2.11
Date		**Depth to top of sampler (mBTOC)**	N/A
QC sample		**Well depth (mBTOC)**	15.8

In situ downhole parameters (collect post sampling – ensure parameters have stabilised)

Time	pH	Temp (C)	EC (uS/cm)	Redox (mV)	DO (mg/L)

Comments (odour, colour, turbidity,sheen)

LNAPL Check Y ☐ N ☐	took out data logger at 11:43

Well ID	GW MW3002	**Depth to Groundwater (mBTOC)**	1.75
Date		**Depth to top of sampler (mBTOC)**	
QC sample		**Well depth (mBTOC)**	

In situ downhole parameters (collect post sampling – ensure parameters have stabilised)

Time	pH	Temp (C)	EC (uS/cm)	Redox (mV)	DO (mg/L)
	7.57	21.2	1036	10.7	0.6

Comments (odour, colour, turbidity,sheen)

LNAPL Check Y ☐ N ☐	took out data log at 12:03 grab sample due to draw down

Hydrasleeve Sampling Record

Project number:	12566684	**Sampler initials**	AK
Client:	MFS St Marys	**PM initials**	BP
Site location:	MFS St Marys		

Well ID	GW 8001	**Depth to Groundwater (mBTOC)**	17-3
Date		**Depth to top of sampler (mBTOC)**	
QC sample		**Well depth (mBTOC)**	

In situ downhole parameters (collect post sampling – ensure parameters have stabilised)

Time	pH	Temp (C)	EC (uS/cm)	Redox (mV)	DO (mg/L)

Comments (odour, colour, turbidity,sheen)

LNAPL Check Y ☐ N ☐	

Well ID	MW04	**Depth to Groundwater (mBTOC)**	1.95
Date	20/10	**Depth to top of sampler (mBTOC)**	
QC sample		**Well depth (mBTOC)**	

In situ downhole parameters (collect post sampling – ensure parameters have stabilised)

Time	pH	Temp (C)	EC (uS/cm)	Redox (mV)	DO (mg/L)
12:10	7.39	18.9	8454	26.7	1.95

Comments (odour, colour, turbidity,sheen)

LNAPL Check Y ☐ N ☐	mTOC stabilised at 2.09 clear - orange colour, low turbidity, low sediment load, no odour, no sheen

Well ID	MW02	**Depth to Groundwater (mBTOC)**	2.55
Date	20/10	**Depth to top of sampler (mBTOC)**	
QC sample		**Well depth (mBTOC)**	

In situ downhole parameters (collect post sampling – ensure parameters have stabilised)

Time	pH	Temp (C)	EC (uS/cm)	Redox (mV)	DO (mg/L)
13:56	7.37	23.1	5152	21.4	0.5

Comments (odour, colour, turbidity,sheen)

LNAPL Check Y ☐ N ☐	Stabalised at 2.63 mbTOC clear-orange colour, low sediment, low turbidity, no odour, no sheen

Hydrasleeve Sampling Record

Project number:	12566684	**Sampler initials**	AK
Client:	MFS St Marys	**PM initials**	BP
Site location:	MFS St Marys		

Well ID	GW 7003	**Depth to Groundwater (mBTOC)**	1.635
Date		**Depth to top of sampler (mBTOC)**	
QC sample		**Well depth (mBTOC)**	

In situ downhole parameters (collect post sampling – ensure parameters have stabilised)

Time	pH	Temp (C)	EC (uS/cm)	Redox (mV)	DO (mg/L)

Comments (odour, colour, turbidity,sheen)

LNAPL Check Y ☐ N ☐	

Well ID		**Depth to Groundwater (mBTOC)**	
Date		**Depth to top of sampler (mBTOC)**	
QC sample		**Well depth (mBTOC)**	

In situ downhole parameters (collect post sampling – ensure parameters have stabilised)

Time	pH	Temp (C)	EC (uS/cm)	Redox (mV)	DO (mg/L)

Comments (odour, colour, turbidity,sheen)

LNAPL Check Y ☐ N ☐	

Well ID		**Depth to Groundwater (mBTOC)**	
Date		**Depth to top of sampler (mBTOC)**	
QC sample		**Well depth (mBTOC)**	

In situ downhole parameters (collect post sampling – ensure parameters have stabilised)

Time	pH	Temp (C)	EC (uS/cm)	Redox (mV)	DO (mg/L)

Comments (odour, colour, turbidity,sheen)

LNAPL Check Y ☐ N ☐	

GHD

Daily Record Sheet

001

Client: MFS		Job No: 12566684	
Job Name: St Marys PFAS investigation		Date: 14-03-2023	
GHD Representative: V. Biermann		Arrival Time: 14.30	Departure Time: 15.40
Weather Conditions:	(Please circle) (Fine) Overcast Light Rain Heavy Rain Other_____		
Works Being Undertaken:	Service Location for off-site wells MW05 & MW07		

Personnel/Contractor(s) Present (List all); Inducted into GHD H&SP?	Inducted	Arrival Time	Departure Time
Graham Bates, Cable Search Services	—	14.30	15.40

Photographs Taken: (Please circle) Yes No If Yes, list below or attach photo register.

Location	Time	Record of Activities / Issues Encountered / Discussions with Client/Contractors / Sketch / Notes
MW05 4 Wingfield St	14.30	Pre-work assessment Locate underground services using DBYD plans provided Mark best location for MW05 on verge
MW07	14.90	Konando Tce / Laguna Ave • Only location for MW07 @ 14 Konando Tce is close to fence → may not be accessible for driller • Alternative location on N side of Konando Tce underneath power line GB marked both locations following location of underground services based on DBYD plans provided; stated preference for location at 3 Konando Tce (N-side) VB comment WCP only valid for 14 Konando Tce → requested GB to mark safe location at both sides of the road.

Is a Notice of Proposed Variation, Variation Order or Site Instruction Required? (Please circle) Yes No

Provide Details:

Further Inspection and/or Testing Required on above Work:	

Are there any H&S requirements to be considered for future works?
Has the site been reinstated suitably (left clean and tidy)?

WB Drilling PTY. LTD.

1519

ABN 17 116 301 181

PRE-START CHECKLIST

Project: GMW INSTAL	Project No. 12566684
Client: GHD	Date: 15/3/23
Client Contact: VERA	Time: 6.30
Site Location: ST. MARYS FIRE STN	Recorded By: IAN

This pre-start checklist must be completed prior to the start of each day or after moving to a new location.

TOYOTA LAND CRUISER

Item	Check	Note
Oil & Coolant Levels	✓	
Tyres (Visual)	✓	
Lights, Flashing Light	✓	

EZIPROBE DRILL RIG

Item	Check	Note
Power Pac Oil & Coolant Levels	✓	
Fan Belt (Visual)	✓	
Winch and Cable (Visual)	✓	
Hydraulic Hoses (Visual)	✓	
Deadmans Switch	✓	
Control Levers (Visual)	✓	
Throttle (Visual)	✓	
Pivot Points (Visual)	✓	

~~001~~

Daily Record Sheet

Client: SA MFS		Job No: 12566684	
Job Name: ST Marys PFAS investigation		Date: 15-03-2023	
GHD Representative: V. Biermann, A. Kirkman		Arrival Time: 8.00	Departure Time: 18.40
Weather Conditions: T. Wilson (Please circle) (Fine) Overcast Light Rain Heavy Rain Other_____			
Works Being Undertaken: Off-site well installation ; well development GW80016 MW05 & MW07			MW05, MW07

Personnel/Contractor(s) Present (List all); Inducted into GHD H&SP?	Inducted	Arrival Time	Departure Time
WB Drilling D. + I. Walt		8.00	13.30
W2T Sucha & Todd		8.00	12.45

Photographs Taken: (Please circle) Yes No If Yes, list below or attach photo register.

Location	Time	Record of Activities / Issues Encountered / Discussions with Client/Contractors / Sketch / Notes
4 Wingfield		St. → Doorknock, talk w/ residents re driveway access need to move vehicles
MW05		
		SWL 3.997m @ 10.05 Well depth 4.64m
MW07		Komando TCE @ 10.40
		Surface Layer: pale grey sandy gravel (fine) some brown clay
		SWL 5.052 @ 12.18 (~15min post installation)
		5.466 well depth
		Sand to 2m Bentonite to 1.5 grout to surface
		→ Driller: please email co-ordinates
MFS Station		→ Develop well GW80016
12.54	GW80016	Well 38.100
		SWL 24.755
		13.245 ≈ 13.3 x 4 = 53.2 = 1 Well volume
		Purge min 160L - 266
		→ 1st attempt foot valve shock came loose & was lost in well before water could be pursed
		→ ~~2nd~~ AK went to obtain 2 spare foot Valves & surge blocks

Is a Notice of Proposed Variation, Variation Order or Site Instruction Required? (Please circle) Yes No

Provide Details: from Eco Environmental

Further Inspection and/or Testing Required on above Work:

→ Resume Fit new valve & block to tubing
→ Start purging GW80016 @ 15.24
Watera Power Pump stopped working at 17.27
Total volume pursed: 131 L → placed into GW drum for disposal after GME.

Are there any H&S requirements to be considered for future works?
Has the site been reinstated suitably (left clean and tidy)?

Signed out at MFS station → AK went home
VB & TW proceeded to develop MW07

Daily Record Sheet

Client: MFS		Job No: 12566684	
Job Name: St Marys PFAS investig.		Date: 15-3-2023	18.35
GHD Representative:	V. Biermann, T Wilson	Arrival Time: 14.30	Departure Time: ~~18.35~~
Weather Conditions:	(Please circle) Fine Overcast Light Rain Heavy Rain Other_____		
Works Being Undertaken:	Develop new well MW05 @ 4 Wing field St.		

Personnel/Contractor(s) Present (List all); Inducted into GHD H&SP?	Inducted	Arrival Time	Departure Time

Photographs Taken: (Please circle) Yes No If Yes, list below or attach photo register.

Location	Time	Record of Activities / Issues Encountered / Discussions with Client/Contractors / Sketch / Notes
MW05	14.32	Depth 4.64
		SWL 2.198
		2.44 x 4 = 10L ⇒ Purge 30-50L
	14.51	well dry at 14.51
		Develop new well using a stainless steel bailer (see purge record & gauging record)
		⇒ Well was purged dry before water quality parameters stabilised or before target volume was achieved
		⇒ Purged GW collected and placed into GW drum at MFS Stn.
MW07	18.00	– 18.35 @ 14 Koncurdo Tce
		Develop MW07 using a stainless steel bailer until dry.
		⇒ See gauging sheet & purging record
		Purged GW collected & temporarily stored in bunker ⇒ to be returned to GW drum at St Marys Stn. during GME for subsequent disposal
		Target 35L
		Water column = 2.881m x4 l/m → 11.52L/well volume

Is a Notice of Proposed Variation, Variation Order or Site Instruction Required? (Please circle) Yes No

Provide Details:

Further Inspection and/or Testing Required on above Work:	When using Waterra power pack hearing protection is required as well as gloves. Power pack cannot be strapped to wells with gabit cover ⇒ need to hold on to
Are there any H&S requirements to be considered for future works? Has the site been reinstated suitably (left clean and tidy)?	Keep unit in place as it vibrates quite a bit.

Notes for GME: – need 50m IP
– 5/8" tubing in bunker for sampling with Waterra

Groundwater Gauging Sheet

Client: SA MFS	WL Meter Type: Dip / Fox / Int.Fce / Gge
Project: ST Marys PFAS investigation	Date: 15-03-2023
Job No.: 12566684	Time:
Location: Off-site & On-site wells	Sampler: VB

Location / Bore ID	Stick up (m)	SWL (mbTOC)	Thickness of NAPL (mm)	Comment (well depth)
MW05	—	3.997	—	@ 10:40 ≈ 15min post well install; 4.64 m TOC
MW07	—	5.052	—	@ 12:18 ≈ 15min post " " ; 5.466 m TOC
GW800116	—	24.755	—	@ 12:54 ;
"				
MW07	—	2.585	—	@ 18:06
MW05	—	2.198	—	@ 14:30

Purging and Sampling Record

Bore ID: MW07

Job Information

Client: MPS
Project: St Marys
Proj. No.: 12566684
Sampler: VB TW
Date: 15-3-23
Round: Development

Sampling Information

Purge Method: SS Bailer
Sample Method: MA
WQ Meter Type: YSI Pro
Flow Cell: Y (N) Pump Depth: / m
WLevel Meter Type: Dip / Fox (Int.Fce) / Gge
Field Filtered? Y / N (filter vessel, disposable filter/syringe)

Bore Information

SWL(mbTOC): 2.585 m
Screen: From: 2.47 to 5.47 m
NAPL Check:
Ref.datum:
Bore Depth: 5.466 m
Logic Check:
Stick Up: — m
Bore Diam.: 50 mm
Well Cap Secure? Yes

Time (.....)	Volume (L)	Temp (°C)	pH (pH units)	Elec.Cond (µS/cm)	Dis.Oxygen (mg/L)	Ox-Red Pt. (± mV)	SWL (m TOC)	TDS (mg/L)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable when (3 consecutive readings).	-		+/- 0.05 pH	+/- 3%	+/- 10%	+/- 10 mV	stable		
18.11	8.0 | 8.0	22.6	7.32	4200	6.43	73.0		2736.5	pale grey-brown moderate turbidity, no sheen, no odour
18.16	8.0 | 16	22.2	7.43	4284	0.91	68.0	5.03	2782	moderate turbidity
18.21	4.0 | 20	21.6	7.48	4265	0.38	66.3	5.26	2775.5	high turbidity, pale brown, no sheen, no odour
18.31	3.0 | 23	21.6	7.47	4269	5.24	67.4	5.234	2775.5	high turbidity, pale brown, no sheen, no odour

Field QA Checks:

Air bubbles in vials? Y / N Any violent reactions? Y / N
Decontamination as per GHD procedure? Y / N
Was sampling equipment pre-cleaned? Y / N
COC updated? Y / N

Parameters	BTEX	TPH	PAH	CHC	PCB	OCP	OPP	Tot. Metal	Biol.				
Preservatives													

Comment: Duplicate samples collected, bottles used, access, condition of headworks etc

5.466
− 2.585
2.881 × 4 ⇒ 11.52 L ≙ 1 Well Volume Target 34.56 L

Purge Volumes

Casing Int. Dia (mm)	50	100	150
Vol (L/m of casing)	2.0	7.9	17.7

*Double for gravel pack

Purging and Sampling Record

Bore ID: MW05

Job Information

Client: MPS
Project: 12566684
Proj. No.: ST Marys
Sampler: VB & TW
Date: 15-3-23
Round: 0 Development

Sampling Information

Purge Method: SS Bailer
Sample Method: N/A
WQ Meter Type: YSI Pro
Flow Cell: Y (N) Pump Depth: / m
WLevel Meter Type: Dip / Fox / (Int.Fce) / Gge
Field Filtered? Y / N (filter vessel, disposable filter/syringe)

Bore Information

SWL(mbTOC): 2.198 m
Screen: From: 1.64 to 3.64 m
NAPL Check:
Ref.datum:
Bore Depth: 4.64 m
Logic Check:
Stick Up: — m
Bore Diam.: 50 mm
Well Cap Secure? Yes

Time (.....)	Volume (L)	Temp (°C)	pH (pH units)	Elec.Cond (µS/cm)	Dis.Oxygen (.....)	Ox-Red Pt. (± mV)	SWL (m TOC)	Σ L Volume	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable when (3 consecutive readings):	-	+/- 0.05 pH	+/- 3%	+/- 10%	+/- 10 mV	stable			
14.40	8.0	23.8	7.99	7541	0.82	153.8	3.94	8.0	pale brown, high turbidy, no odour, no sheen
14.46	3.0	23.2	8.04	7436	0.42	131.6	4.39	11.0	" purged almost dry
14.51	1.0	23.7	8.31	7587	0.36	116.6	4.45	12.0	purged dry

Field QA Checks:

Air bubbles in vials? Y / N Any violent reactions? Y / N
Decontamination as per GHD procedure? Y / N
Was sampling equipment pre-cleaned? Y / N
COC updated? Y / N

Parameters	BTEX	TPH	PAH	CHC	PCB	OCP	OPP	Tot. Metal	Biol.				
Preservatives													

Comment: Duplicate samples collected, bottles used, access, condition of headworks etc

Water column = 2.44m x 4 ⇒ 10L well volume → target: purge 30-50L

Purge Volumes

Casing Int. Dia (mm)	50	100	150
Vol (L/m of casing)	2.0	7.9	17.7

*Double for gravel pack

Purging and Sampling Record

*26.47

Bore ID: GW 80016

P1

Job Information

Client: MPS
Project: St Marys
Proj. No.: 12566684
Sampler: VB, AK, TW
Date: 15-3-2023
Round: 0 (Development)

Sampling Information

Purge Method: Waterra pump w/ Surge block
Sample Method: N/A
WQ Meter Type: YSI Pro
Flow Cell: Y / N Pump Depth: Variable m
WLevel Meter Type: Dip / Fox / (Int.Fce) / Gge
Field Filtered? Y / N (filter vessel, disposable filter/syringe)

Bore Information

SWL(mbTOC): 24.755 m Logic Check:
Screen: From: to: m Stick Up: m
NAPL Check: None present Bore Diam.: 50 mm
Ref.datum: Well Cap Secure? Yes
Bore Depth: 38 m

Time (.....)	Volume (L)		Temp (°C)	pH (pH units)	Elec.Cond (µS/cm)	Dis.Oxygen (mg/L)	Ox-Red Pt. (± mV)	SWL (m TOC)	TDS (mg/L)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable when (3 consecutive readings):	3		-	+/- 0.05 pH	+/- 3%	+/- 10%	+/- 10 mV	stable		
13.44	—		—	—	—	—	—	24.600	—	SWL with pump in place @ 38.5 m bTOC
15.24	0	0	—	—	—	—	—	24.659	—	" " " " " @≈27.5 m bTOC
15.27	3.0	3.0	27.2	11.14	1639	1.58	-338.3	25.40	1059.5	Pump @ ≈ 27.5 m bTOC ; lower pump to 30m
15.40	9.0	12.0	25.7	10.22	1435	—	-301.8	26.10	929.5	Pump @ 35.5 m bTOC high turbidity pale grey-brown
15.49	9.0	21.0	25.2	8.85	1659	—	-302.9	26.07	79.0	pump @ 35.75 high turbidity, anoxic, odour
15.56	9.0	30.0	24.4	8.41	1738	—	-252.9	27.22	1131	pump @ 36.0 high turbidity, pale grey-brown, anoxic odour
16.04	9.0	39	23.9	8.15	1754	—	-239.7	27.49	1137.5	pump @ 36.5 " " "
16.09	9.0	48	23.4	8.34	1742	—	-259.8	27.62	1131.0	pump @ 37.0 " " "
16.15	9.0	57	22.7	8.40	1760	—	-237.6	27.52	1131.0	pump @ 36.5 " " "
16.20	9.0	66	23.0	8.11	1760	—	-244.0	28.10	1144.0	37.5 ↓same level " " "
16.23	9.0	75	22.7	7.91	1771	0.45	-201.2	28.21	1150.5	37.5 ↓same level " " "
16.29	9.0	84	23.2	7.86	1774	—	-216.3	27.67	1160.5	37.5 m bTOC " " "
16.35	9.0	93	22.9	7.90	1785	—	-212.0	27.89	1163.5	37 m bTOC " " "
16.42	9.0	102	23.3	8.10	1783	—	-241.5	27.53	1157.0	36.5 m bTOC " " "
16.47	9.0	111	22.8	7.91	1785	—	-218.3	28.16	1157.0	36.5 m bTOC " " "

Field QA Checks:

Air bubbles in vials? Y / N Any violent reactions? Y / N
Decontamination as per GHD procedure? Y / N
Was sampling equipment pre-cleaned? Y / N
COC updated? Y / N

Parameters	BTEX	TPH	PAH	CHC	PCB	OCP	OPP	Tot. Metal	Biol.				
Preservatives													

Comment: Duplicate samples collected, bottles used, access, condition of headworks etc

Target ≥ 160L

Purge Volumes

Casing Int. Dia (mm)	50	100	150
Vol (L/m of casing)	2.0	7.9	17.7

*Double for gravel pack

Purging and Sampling Record

Bore ID: GW80016

p.2

Job Information
Client: MFS
Project: St Marys PFAS Inv.
Proj. No.: 12566684
Sampler: VB, AK, TW
Date: 15-3-23
Round: 0 (Development)

Sampling Information
Purge Method: Waterra pump w. Surge Block
Sample Method: NA
WQ Meter Type: YSI Pro
Flow Cell: Y (N) Pump Depth: 35.5-37.5 m
WLevel Meter Type: Dip / Fox / (Int.Fce) / Gge
Field Filtered? Y / N (filter vessel, disposable filter/syringe)

Bore Information
SWL(mbTOC): ..... m Logic Check: .....
Screen: From: ..... to ..... m Stick Up: ..... m
NAPL Check: ..... Bore Diam.: 50 mm
Ref.datum: ..... Well Cap Secure? Yes
Bore Depth: 38m m

Time (.....)	Volume (L)	Temp (°C)	pH (pH units)	Elec.Cond (.....)	Dis.Oxygen (.....)	Ox-Red Pt. (± mV)	SWL (m TOC)	TDS (.....)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable when (3 consecutive readings):	-	*+/- 0.05 pH*	*+/- 3%*	*+/- 10%*	*+/- 10 mV*	*stable*			
16.52	9.0 / 120	23.2	7.80	1772	—	-217.9	27.54	1150.5	36m bTOC pump, high turbidity, pale grey-brown
17.01	9.0 / 129	24.0	7.80	1776	0.15	-171.7	25.18	1157.0	36 " slow flow, moving back down
17.10	1.0 / 128	25.0	7.88	1791	2.04	-95.0	24.95	1170.0	36.5 " pump slow
17.27	30 / 131	28.0	7.74	1824	2.26	-118.7	24.98	1183.0	35.5 - equipment failure Purging terminated

Field QA Checks:
Air bubbles in vials? Y / N Any violent reactions? Y / N
Decontamination as per GHD procedure? Y / N
Was sampling equipment pre-cleaned? Y / N
COC updated? Y / N

Parameters	BTEX	TPH	PAH	CHC	PCB	OCP	OPP	Tot. Metal	Biol.				
Preservatives													

Comment: Duplicate samples collected, bottles used, access, condition of headworks etc

Purge Volumes
Casing Int. Dia (mm) 50 100 150
Vol (L/m of casing) 2.0 7.9 17.7
*Double for gravel pack

Groundwater Gauging Sheet

Client: MFS	**WL Meter Type: Dip / Fox / Int.Fce / Gge**
Project: St Marys Station VSCAP, PSI & SAQP	**Date:** 28/3/23
Job No.: 125GGG84	**Time:**
Location: St Marys Station	**Sampler:** AK / CP

Location / Bore ID	Stick up (m)	SWL (mbTOC)	Thickness of NAPL (mm)	Comment
GW2015		2.577		WD 16.80
GW8001b		24.792		38.60
GW7003b		2.312		5.874
MW02		2.985		4.970
MW04		2.407		4.010
GW8002b		2.489		5.302
MW03		2.680		4.028
MW01		2.482		3.970
MW05		2.16		4.640

Purging and Sampling Record

Bore ID: MW05

Job Information	Sampling Information	Bore Information
Client: MES	Purge Method:	SWL(mbTOC): 2.16 m
Project:	Sample Method:	Screen: From: to: m
Proj. No.: 125886.84	WQ Meter Type:	NAPL Check:
Sampler: AK/CO	Flow Cell: Y / N Pump Depth: 3 m	Ref.datum:
Date: 28/3/23	WLevel Meter Type: Dip / Fox / Int.Fce / Gge	Bore Depth: 4.64 m
Round	Field Filtered? Y / N (filter vessel, disposable filter/syringe)	Logic Check: / Stick Up: m / Bore Diam.: mm / Well Cap Secure?

Time (.....)	Volume (L)	Temp (°C)	pH (pH units)	Elec.Cond (.....)	Dis.Oxygen (.....)	Ox-Red Pt. (± mV)	SWL (m TOC)	(...TDS..)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable when (3 consecutive readings):		-	*+/- 0.05 pH*	*+/- 3%*	*+/- 10%*	*+/- 10 mV*	*stable*		
0									
16.04	1 / 1	23.8	7.78	7182	1.83	-22	2.268	4667	clear/pale yellow, low turb/sed load, no odour/sheen
16.08	1 / 2	23.9	7.70	7296	1.63	-30.5	2.41	4745	"
16.10	1 / 3	24.0	7.60	7272	1.79	-33.4	2.50	4725	"
16.13	1 / 4	24.1	7.63	7196	*1.84	-31.6	2.66	4678	"
16.19	1.5 / 5.5	23.9	7.64	7282	1.74	-27.8	2.67	4732	" sample taken

Field QA Checks:

Air bubbles in vials? Y / N Any violent reactions? Y / N
Decontamination as per GHD procedure? Y / N
Was sampling equipment pre-cleaned? Y / N
COC updated? Y / N

Parameters	BTEX	TPH	PAH	CHC	PCB	OCP	OPP	Tot. Metal	Biol.				
Preservatives													

Comment: Duplicate samples collected, bottles used, access, condition of headworks etc

Purge Volumes

Casing Int. Dia (mm)	50	100	150
Vol (L/m of casing)	2.0	7.9	17.7

*Double for gravel pack

Purging and Sampling Record

Bore ID: G.W.8001.b

Job Information	Sampling Information	Bore Information
Client: MFS	Purge Method:	SWL(mbTOC): 24.792 m
Project:	Sample Method:	Screen: From: to: m
Proj. No.: 12566684	WQ Meter Type:	NAPL Check:
Sampler: AK/CD	Flow Cell: Y / N Pump Depth: 36 m	Ref.datum:
Date: 28/3/23	WLevel Meter Type: Dip / Fox / Int.Fce / Gge	Bore Depth: m
Round	Field Filtered? Y / N (filter vessel, disposable filter/syringe)	Logic Check: / Stick Up: m / Bore Diam.: mm / Well Cap Secure?

Time (.....)	Volume (L)	Temp (°C)	pH (pH units)	Elec.Cond (.....)	Dis.Oxygen (.....)	Ox-Red Pt. (± mV)	SWL (m TOC)	(.....)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable when (3 consecutive readings):		-	*+/- 0.05 pH*	*+/- 3%*	*+/- 10%*	*+/- 10 mV*	*stable*		
12:51	0								Could not pump

Field QA Checks:

Air bubbles in vials? Y / N Any violent reactions? Y / N
Decontamination as per GHD procedure? Y / N
Was sampling equipment pre-cleaned? Y / N
COC updated? Y / N

Parameters	BTEX	TPH	PAH	CHC	PCB	OCP	OPP	Tot. Metal	Biol.				
Preservatives													

Comment: Duplicate samples collected, bottles used, access, condition of headworks etc

Purge Volumes

Casing Int. Dia (mm)	50	100	150
Vol (L/m of casing)	2.0	7.9	17.7

*Double for gravel pack

Purging and Sampling Record

Bore ID: ...GW.201.b.....

Job Information	Sampling Information	Bore Information
Client: MFS	Purge Method:	SWL(mbTOC): 2.577 m
Project:	Sample Method:	Screen: From: to: m
Proj. No.: 12566.84	WQ Meter Type:	NAPL Check:
Sampler: AK/CO	Flow Cell: Y / N Pump Depth: 6 m	Ref.datum:
Date: 28/3/23	WLevel Meter Type: Dip / Fox / Int.Fce / Gge	Bore Depth: m
Round	Field Filtered? Y / N (filter vessel, disposable filter/syringe)	Logic Check: / Stick Up: m / Bore Diam.: mm / Well Cap Secure?

Time (min)	Volume (L)	Σ	Temp (°C)	pH (pH units)	Elec.Cond µS/cm	Dis.Oxygen (mg/L)	Ox-Red Pt. (± mV)	SWL (m TOC)	DO TDS	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable when (3 consecutive readings):			-	*+/- 0.05 pH*	*+/- 3%*	*+/- 10%*	*+/- 10 mV*	*stable*		
0	0							2.550		
4	2	2	20.1	7.98	3227	3.26	-245.7	2.700	21.255	Clear, no odour, no sheen, low turbidity
8	3.5	5.5	20.1	8.02	3346	1.70	-258.8	2.809	2177.5	"
15	3.5	9.0	20.0	8.10	3479	0.61	-263.6	2.946	2262	Clear, no sheen, slight sulphur odour, low turbidity
22	3.5	12.5	20.0	8.12	3522	0.81	-262.2	3.062	2288	"
29	3.5	16.0	20.0	8.17	3550	0.95	-256.5	3.170	2314	"
34	3.5	19.5	20.0	8.17	3562	1.15	-253.3	3.260	2307	"
36	3.5	23.0	20.0	8.19	3553	6.05	-184.0	3.286	2333.5	Sample @ 12:13 "

Field QA Checks:

Air bubbles in vials? Y / N Any violent reactions? Y / N
Decontamination as per GHD procedure? Y / N
Was sampling equipment pre-cleaned? Y / N
COC updated? Y / N

Parameters	BTEX	TPH	PAH	CHC	PCB	OCP	OPP	Tot. Metal	Biol.				
Preservatives													

Comment: Duplicate samples collected, bottles used, access, condition of headworks etc

Purge Volumes

Casing Int. Dia (mm)	50	100	150
Vol (L/m of casing)	2.0	7.9	17.7

*Double for gravel pack

Purging and Sampling Record

Bore ID: ..GW80026.....

Job Information	Sampling Information	Bore Information
Client: ..MFS.....	Purge Method:.....	SWL(mbTOC): ..2.492..... m Logic Check: .....
Project:	Sample Method:.....	Screen: From:.....to..... m Stick Up: ..... m
Proj. No.: ..12588684.....	WQ Meter Type:.....	NAPL Check:..... Bore Diam.: ..... mm
Sampler: ..AK/CO.....	Flow Cell: Y / N Pump Depth:..4.....m	Ref.datum: ..... Well Cap Secure?.....
Date: ..28/3/23.....	WLevel Meter Type: Dip / Fox / Int.Fce / Gge	Bore Depth: ..... m
Round	Field Filtered? Y / N (filter vessel, disposable filter/syringe)	

Time (.....)	Volume (L)		Temp (°C)	pH (pH units)	Elec.Cond (.....)	Dis.Oxygen (.....)	Ox-Red Pt. (± mV)	SWL (m TOC)	(..TDS..)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable when (3 consecutive readings):			-	*+/- 0.05 pH*	*+/- 3%*	*+/- 10%*	*+/- 10 mV*	*stable*		
14.08	0	0						2.492		
14.11	2	2	20.1	7.47	4643	2.44	-145.6	3.34	3029	grey/yellow, no odour. low turbidity
14.14	1.5	3.5	20.3	7.52	4794	0.56	-170.0	3.79	3133	dark grey, high turbidity, no odour, high sed load
14.17	1.5	5.0	20.4	7.60	4842	0.62	-193.1	4.02	3152.5	" slight sheen
14.21	1	6.0	20.2	7.65	4968	0.83	-173.0	3.73	3243	"
14.23	1.5	7.5	19.8	7.65	5054	1.21	-122.6	3.68	3303	grey, high turbidity + sed load, no sheen
14.27	1	8.5	19.8	7.65	5097	1.26	-122.9	3.66	3315	grey/brown, "
14.31	1	9.5	19.8	7.65	5116	1.25	-119.5	3.65	3328	
14.32										sampled - QA/QC (FS01 and FD01)

Field QA Checks:

Air bubbles in vials? Y / N Any violent reactions? Y / N
Decontamination as per GHD procedure? Y / N
Was sampling equipment pre-cleaned? Y / N
COC updated? Y / N

Parameters	BTEX	TPH	PAH	CHC	PCB	OCP	OPP	Tot. Metal	Biol.				
Preservatives													

Comment: Duplicate samples collected, bottles used, access, condition of headworks etc

Purge Volumes

Casing Int. Dia (mm)	50	100	150
Vol (L/m of casing)	2.0	7.9	17.7

*Double for gravel pack

Groundwater Gauging Sheet

Client: SA MFS	WL Meter Type: Dip / Fox / Int.Fce / Gge
Project: St Mary's DSI	Date: 20/4/23
Job No.: ~~12566084~~ 12566084	Time:
Location: St Mary's Station	Sampler: AK / BP

Location / Bore ID	Stick up (m)	SWL (mbTOC)	Thickness of NAPL (mm)	Comment
GW 8001b	-	24.172	-	WD 38.596
MW03	-	2.638	-	4.19
MW01	-	2.472	-	3.984
MW07	-	2.201	-	5.500
EPA_GW07	-	2.630	-	5.700

Purging and Sampling Record

Bore ID: GW80016

Job Information	Sampling Information	Bore Information
Client: MFS	**Purge Method:**	**SWL(mbTOC):** m — **Logic Check:**
Project: St. Marys OSI	**Sample Method:**	**Screen:** From: to: m — **Stick Up:** m
Proj. No.: 12566.84	**WQ Meter Type:**	**NAPL Check:** — **Bore Diam.:** mm
Sampler: AK / CO	**Flow Cell:** Y / N — **Pump Depth:** m	**Ref.datum:** — **Well Cap Secure?**
Date: ~~20/4/23~~ 26/4/23	**WLevel Meter Type:** Dip / Fox / Int.Fce / Gge	**Bore Depth:** m
Round	**Field Filtered?** Y / N (filter vessel, disposable filter/syringe)	

Time (.....)	Volume (L)	Temp (°C)	pH (pH units)	Elec.Cond (.....)	Dis.Oxygen (.....)	Ox-Red Pt. (± mV)	SWL (m TOC)	(.....)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable when (3 consecutive readings):		-	*+/- 0.05 pH*	*+/- 3%*	*+/- 10%*	*+/- 10 mV*	*stable*		
11.17	10	27.6	8.96	1621.0	1.58 ~~1.50~~	-256.1	24.172		grey/yellow, med turb, H_2S odour, low sed, no sheen, PVC shavings?
11.34	12 22	28.03	~~8.16~~ 8.16	1620.1	1.00	-240.9	24.861		yellow/grey, milky " " "
11.49	12 34	28.10	8.14	1840.5	0.36	-201.2	24.820		" sheen patches, med sed load "
12.03	10 44	28.54	8.27	1773.5	0.71	-211.8	24.840		"
									SAMPLE TAKEN

Field QA Checks:

Air bubbles in vials? Y / N Any violent reactions? Y / N
Decontamination as per GHD procedure? Y / N
Was sampling equipment pre-cleaned? Y / N
COC updated? Y / N

Parameters	BTEX	TPH	PAH	CHC	PCB	OCP	OPP	Tot. Metal	Biol.	PFAS	Mycro		
Preservatives	X	X								X	X		

Comment: Duplicate samples collected, bottles used, access, condition of headworks etc

FD01 / FS01

Purge Volumes

Casing Int. Dia (mm)	50	100	150
Vol (L/m of casing)	2.0	7.9	17.7

*Double for gravel pack

Purging and Sampling Record

Bore ID: MW01

Job Information

Client: MFS
Project:
Proj. No.: 12566.84
Sampler: AK/CO
Date: 28/12/23 - 29/12/23
Round

Sampling Information

Purge Method:
Sample Method: low flow peristaltic pump
WQ Meter Type:
Flow Cell: Y / N
Pump Depth: m
WLevel Meter Type: Dip / Fox / Int.Fce / Gge
Field Filtered? Y / N (filter vessel, disposable filter/syringe)

Bore Information

SWL(mbTOC): 2.48 m
Logic Check:
Screen: From: to: m
Stick Up: m
NAPL Check:
Bore Diam.: mm
Ref.datum:
Well Cap Secure?
Bore Depth: 3.98 m

Time (.....)	Volume (L)	Temp (°C)	pH (pH units)	Elec.Cond (.....)	Dis.Oxygen (.....)	Ox-Red Pt. (± mV)	SWL (m TOC)	(.....)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable when (3 consecutive readings):		-	*+/- 0.05 pH*	*+/- 3%*	*+/- 10%*	*+/- 10 mV*	*stable*		
		24.00	7.43	6572.9	0.97	-42.1	2.77		grab sample taken due to slow water recharge
		24.01							
									clear, no odour, no sheen, low S load & turbidity

Field QA Checks:

Air bubbles in vials? Y / N Any violent reactions? Y / N
Decontamination as per GHD procedure? Y / N
Was sampling equipment pre-cleaned? Y / N
COC updated? Y / N

Parameters	BTEX	TPH	PAH	CHC	PCB	OCP	OPP	Tot. Metal	Biol.				
Preservatives													

Comment: Duplicate samples collected, bottles used, access, condition of headworks etc

Purge Volumes

Casing Int. Dia (mm)	50	100	150
Vol (L/m of casing)	2.0	7.9	17.7

*Double for gravel pack

Purging and Sampling Record

Bore ID: ..MW03.....

Job Information

Client: ..MFS.....
Project: .....
Proj. No.: ..12566684.....
Sampler: ..AK/CO.....
Date: ~~20/12/23~~ 26/4/23
Round .....

Sampling Information

Purge Method:..... .....
Sample Method: low flow peri pump
WQ Meter Type:.....
Flow Cell: Y / N Pump Depth: 3.5 m
WLevel Meter Type: Dip / Fox / Int.Fce / Gge
Field Filtered? Y / N (filter vessel, disposable filter/syringe)

Bore Information

SWL(mbTOC): ..2.635..... m Logic Check: .....
Screen: From:.....to..... m Stick Up: ..... m
NAPL Check:..... Bore Diam.: ..... mm
Ref.datum: ..... Well Cap Secure?.....
Bore Depth: ..4.19..... m

Time (.....)	Volume (L)	Temp (°C)	pH (pH units)	Elec.Cond (.....)	Dis.Oxygen (.....)	Ox-Red Pt. (± mV)	SWL (m TOC)	(.....)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable when (3 consecutive readings):		-	*+/- 0.05 pH*	*+/- 3%*	*+/- 10%*	*+/- 10 mV*	*stable*		
12.58		28.8	7.84	7902.6	3.19	38.5	2.87		sample taken as grab sample - water level wouldn't stabilise
									clear/pale yellow, no odour, no sheen, low T + S load

Field QA Checks:

Air bubbles in vials? Y / N Any violent reactions? Y / N
Decontamination as per GHD procedure? Y / N
Was sampling equipment pre-cleaned? Y / N
COC updated? Y / N

Parameters	BTEX	TPH	PAH	CHC	PCB	OCP	OPP	Tot. Metal	Biol.				
Preservatives													

Comment: Duplicate samples collected, bottles used, access, condition of headworks etc

Purge Volumes

Casing Int. Dia (mm)	50	100	150
Vol (L/m of casing)	2.0	7.9	17.7

*Double for gravel pack

Purging and Sampling Record

Bore ID: MW07

Job Information	Sampling Information	Bore Information
Client: MFS	**Purge Method:**	**SWL(mbTOC):** 2.2 m **Logic Check:**
Project:	**Sample Method:** Low flow peri pump	**Screen:** From: to m **Stick Up:** m
Proj. No.: 12566684	**WQ Meter Type:**	**NAPL Check:** **Bore Diam.:** mm
Sampler: AK/CO	**Flow Cell:** Y / N **Pump Depth:** 5 m	**Ref.datum:** **Well Cap Secure?**
Date: 26/4/23	**WLevel Meter Type:** Dip / Fox / Int.Fce / Gge	**Bore Depth:** 5.5 m
Round	**Field Filtered?** Y / N (filter vessel, disposable filter/syringe)	

Time (.....)	Volume (L)	Temp (°C)	pH (pH units)	Elec.Cond (.....)	Dis.Oxygen (.....)	Ox-Red Pt. (± mV)	SWL (m TOC)	(.....)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable when (3 consecutive readings):		-	*+/- 0.05 pH*	*+/- 3%*	*+/- 10%*	*+/- 10 mV*	*stable*		
15:03	1	33.9	7.3	4442	1.92	96.2	2.45		clear, no odour/sheen, low turb/sed load
15:07		25.19	7.4	4693	2.87	105.7	2.55		
									sample @ 15:09 due to slow recharge

Field QA Checks:

Air bubbles in vials? Y / N Any violent reactions? Y / N
Decontamination as per GHD procedure? Y / N
Was sampling equipment pre-cleaned? Y / N
COC updated? Y / N

Parameters	BTEX	TPH	PAH	CHC	PCB	OCP	OPP	Tot. Metal	Biol.				
Preservatives													

Comment: Duplicate samples collected, bottles used, access, condition of headworks etc

Purge Volumes

Casing Int. Dia (mm)	50	100	150
Vol (L/m of casing)	2.0	7.9	17.7

*Double for gravel pack

Purging and Sampling Record

Bore ID: ..EPA...GW07

Job Information	Sampling Information	Bore Information
Client: .MFS.....	Purge Method:.....	SWL(mbTOC): ...2.63..... m Logic Check: .....
Project:	Sample Method:..low.flow.peri.pump.....	Screen: From:.....to..... m Stick Up: ..... m
Proj. No.: .12566684.....	WQ Meter Type:.....	NAPL Check:..... Bore Diam.: ..... mm
Sampler: ..AK.|.CO.....	Flow Cell: Y / N Pump Depth:.....m	Ref.datum: ..... Well Cap Secure?.....
Date: ..28/11/23...26/11/23..	WLevel Meter Type: Dip / Fox / Int.Fce / Gge	Bore Depth: ...5.70..... m
Round	Field Filtered? Y / N (filter vessel, disposable filter/syringe)	

Time (.....)	Volume (L)	Temp (°C)	pH (pH units)	Elec.Cond (.....)	Dis.Oxygen (.....)	Ox-Red Pt. (± mV)	SWL (m TOC)	(.....)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable when (3 consecutive readings):		-	*+/- 0.05 pH*	*+/- 3%*	*+/- 10%*	*+/- 10 mV*	*stable*		
14.18	1	32.5	6.96	7924	2.06	92.4	2.73		Clear, low turbid load, no sheen, no odour
14.23	1.2	32.6	6.94	7157.2	1.5	98.4	2.74		"
14.31	1.2	33.1	6.93	7043	1.33	98.7	2.74		" sample taken
14.38	1.4	24.91	6.93	7876	1.6	96.4	2.67		

Field QA Checks:

Air bubbles in vials? Y / N Any violent reactions? Y / N
Decontamination as per GHD procedure? Y / N
Was sampling equipment pre-cleaned? Y / N
COC updated? Y / N

Parameters	BTEX	TPH	PAH	CHC	PCB	OCP	OPP	Tot. Metal	Biol.				
Preservatives													

Comment: Duplicate samples collected, bottles used, access, condition of headworks etc

Purge Volumes

Casing Int. Dia (mm)	50	100	150
Vol (L/m of casing)	2.0	7.9	17.7

*Double for gravel pack

Appendix E

Borehole logs

BOREHOLE LOG

ENVIRONMENTAL-SOIL BORE

SOIL BORE BH05

Client SA Metropolitan Fire Service
Project MFS St Marys Station PFAS investigation
Project No. 12566684
Site St Marys Station
Location 1125 South Rd, St. Marys SA 5042
Date Drilled 06/10/2022

Drill Co. WB Drilling Pty Ltd
Driller Ian Watt
Rig Type Eziprobe
Drill Method Hand auger and Pushtube
Total Depth (m) 2.6
Diameter (mm) 50

Easting 278733.760532999
Northing 6124921.74559
Grid Ref GDA2020_MGA_zone_54
Elevation
Logged By Vera Biermann
Checked By B. Petticrew

Depth (m)	Drilling Method	PID (ppm)	Sample ID	Water	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials,separate phase liquids, imported fill, ash.	Elevation (m)
	DC		BH05_0.0_0.1			CONCRETE.				
	HA					Gravelly SAND, medium to coarse grained, grey to grey- brown, with clay, angular, fine to coarse gravel (FILL).	SM	L		
0.2										-0.2
			BH05_0.3_0.5			Gravelly CLAY, medium to high plasticity, grey- brown to brown, trace sand, angular, fine to coarse gravel (REWORKED NATURAL).	SM	F		
0.4										-0.4
0.6	PT		BH05_0.6_0.8			CLAY, medium to high plasticity, dark brown mottled red- brown (NATURAL - SOIL).	SM	F		-0.6
0.8						CLAY, medium plasticity, brown to red- brown (NATURAL - SOIL).	SM	ST		-0.8
1										-1
			BH05_1.1_1.3							
1.2										-1.2
1.4										-1.4
1.6			BH05_1.6_1.8							-1.6
1.8										-1.8
2										-2
			BH05_2.1_2.3							
2.2										-2.2
2.4										-2.4
2.6						Termination Depth at: 2.60 m				-2.6

Notes

This log is not intended for geotechnical purposes.

Drilling Abbreviations	Moisture Abbreviations	Consistency Abbreviations	
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Pushtube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	**Granular Soils** VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense,VD - Very Dense	**Cohesive Soils** VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard

BOREHOLE LOG

ENVIRONMENTAL-SOIL BORE

SOIL BORE BH06

Client SA Metropolitan Fire Service
Project MFS St Marys Station PFAS investigation
Project No. 12566684
Site St Marys Station
Location 1125 South Rd, St. Marys SA 5042
Date Drilled 06/10/2022

Drill Co. WB Drilling Pty Ltd
Driller Ian Watt
Rig Type Eziprobe
Drill Method Hand auger and Pushtube
Total Depth (m) 2.6
Diameter (mm) 50

Easting 278745.05057
Northing 6124935.37081999
Grid Ref GDA2020_MGA_zone_54
Elevation
Logged By Vera Biermann
Checked By B. Petticrew

Depth (m)	Drilling Method	PID (ppm)	Sample ID	Water	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials,separate phase liquids, imported fill, ash.	Elevation (m)
	HA		BH06_0.0_0.1			TOPSOIL/GRASSMAT.			small roots.	
						Gravelly CLAY, medium to high plasticity, dark brown and grey, trace sand, trace roots, angular, fine to coarse gravel (REWORKED NATURAL).	SM	F		
0.2			BH06_0.2_0.4 (FD06, FS06)							-0.2
0.4						CLAY, medium plasticity, dark brown to red- brown (NATURAL - SOIL).	SM	VST		-0.4
0.6										-0.6
	PT		BH06_0.7_0.9							
0.8										-0.8
1										-1
1.2										-1.2
			BH06_1.3_1.5							
1.4										-1.4
1.6										-1.6
1.8			BH06_1.8_2.0							-1.8
2										-2
2.2										-2.2
2.4			BH06_2.4_2.6							-2.4
2.6						Termination Depth at: 2.60 m				-2.6

Notes

This log is not intended for geotechnical purposes.

Drilling Abbreviations	Moisture Abbreviations	Consistency Abbreviations	
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Pushtube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	**Granular Soils** VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense,VD - Very Dense	**Cohesive Soils** VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard

BOREHOLE LOG

ENVIRONMENTAL-SOIL BORE

SOIL BORE BH07

Client SA Metropolitan Fire Service
Project MFS St Marys Station PFAS investigation
Project No. 12566684
Site St Marys Station
Location 1125 South Rd, St. Marys SA 5042
Date Drilled 06/10/2022

Drill Co. WB Drilling Pty Ltd
Driller Ian Watt
Rig Type Eziprobe
Drill Method Hand auger and Pushtube
Total Depth (m) 2.6
Diameter (mm) 50

Easting 278731.356206
Northing 6124936.85328999
Grid Ref GDA2020_MGA_zone_54
Elevation
Logged By Vera Biermann
Checked By B. Petticrew

Depth (m)	Drilling Method	PID (ppm)	Sample ID	Water	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials,separate phase liquids, imported fill, ash.	Elevation (m)
	DC		BH07_0.0_0.15			CONCRETE.				
0.2	HA					Gravelly SAND, medium to coarse grained, grey to grey- brown, with clay, angular, fine to coarse gravel (FILL).	SM	L		-0.2
0.4			BH07_0.3_0.5 (FD07, FS07)							-0.4
0.6						CLAY, medium to high plasticity, dark brown to brown (POSSIBLE NATURAL - SOIL).	SM	F		-0.6
0.8	PT		BH07_0.8_1.0							-0.8
1						CLAY, medium to high plasticity, dark brown to red-brown (NATURAL - SOIL).	SM	ST		-1
1.2										-1.2
1.4			BH07_1.3_1.5							-1.4
1.6										-1.6
1.8			BH07_1.8_2.0							-1.8
2										-2
2.2										-2.2
2.4			BH07_2.4_2.6							-2.4
2.6						Termination Depth at: 2.60 m				-2.6

Notes

This log is not intended for geotechnical purposes.

Drilling Abbreviations	Moisture Abbreviations	Consistency Abbreviations	
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Pushtube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	**Granular Soils** VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense,VD - Very Dense	**Cohesive Soils** VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard

BOREHOLE LOG

ENVIRONMENTAL-SOIL BORE

SOIL BORE BH08

Client SA Metropolitan Fire Service
Project MFS St Marys Station PFAS investigation
Project No. 12566684
Site St Marys Station
Location 1125 South Rd, St. Marys SA 5042
Date Drilled 05/10/2022

Drill Co. WB Drilling Pty Ltd
Driller Ian Watt
Rig Type Eziprobe
Drill Method Hand auger and Pushtube
Total Depth (m) 2.6
Diameter (mm) 50

Easting 278747.761646999
Northing 6124952.10498
Grid Ref GDA2020_MGA_zone_54
Elevation
Logged By Vera Biermann
Checked By B. Petticrew

Depth (m)	Drilling Method	PID (ppm)	Sample ID	Water	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials,separate phase liquids, imported fill, ash.	Elevation (m)
0	SFA		BH08_0.0			OTHER.			bitumen.	0
	HA					Sandy GRAVEL, fine to coarse grained, angular, grey to grey- brown, trace clay, fine to coarse sand (FILL).	SM	L		
			BH08_0.1_0.2							
0.2										-0.2
						CLAY, medium plasticity, dark brown to brown (POSSIBLE NATURAL - SOIL).	SM	ST		
0.4										-0.4
			BH08_0.5_0.6							
0.6										-0.6
0.8						CLAY, medium to high plasticity, brown to orange-brown (NATURAL - SOIL).	SM	ST		-0.8
			BH08_0.9_1							
1	PT									-1
1.2										-1.2
1.4										-1.4
			BH08_1.5_1.6							
1.6										-1.6
1.8										-1.8
2			BH08_2.0_2.1							-2
2.2										-2.2
2.4										-2.4
			BH08_2.5_2.6							
2.6						Termination Depth at: 2.60 m				-2.6

Notes

This log is not intended for geotechnical purposes.

Drilling Abbreviations	Moisture Abbreviations	Consistency Abbreviations	
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Pushtube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	**Granular Soils** VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense,VD - Very Dense	**Cohesive Soils** VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard

BOREHOLE LOG

ENVIRONMENTAL-SOIL BORE

SOIL BORE BH09

Client SA Metropolitan Fire Service
Project MFS St Marys Station PFAS investigation
Project No. 12566684
Site St Marys Station
Location 1125 South Rd, St. Marys SA 5042
Date Drilled 05/10/2022

Drill Co. WB Drilling Pty Ltd
Driller Ian Watt
Rig Type Eziprobe
Drill Method Hand auger and Pushtube
Total Depth (m) 2.6
Diameter (mm) 50

Easting 278729.108914999
Northing 6124951.25066
Grid Ref GDA2020_MGA_zone_54
Elevation
Logged By Vera Biermann
Checked By B. Petticrew

Depth (m)	Drilling Method	PID (ppm)	Sample ID	Water	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials,separate phase liquids, imported fill, ash.	Elevation (m)
	SFA		BH09_0.0			OTHER.			bitumen.	
	HA					Gravelly SAND, fine to coarse grained, grey to yellow-brown, trace clay, angular, fine to medium gravel (FILL).	SM	L		
0.2			BH09_0.1_0.3							-0.2
						Gravelly CLAY, medium to high plasticity, brown to red-brown, trace medium to coarse sand, angular, fine to coarse gravel (REWORKED NATURAL).	SM	F		
0.4			BH09_0.4_0.6							-0.4
0.6						CLAY, medium plasticity, brown mottled orange- brown (NATURAL - SOIL).	SM	F		-0.6
0.8										-0.8
1	PT		BH09_1.0_1.2 (FD02, FS02)							-1
1.2						CLAY, medium plasticity, brown to orange- brown (NATURAL - SOIL).	SM	F		-1.2
1.4										-1.4
			BH09_1.5_1.6							
1.6										-1.6
1.8										-1.8
2			BH09_2.0_2.1			CLAY, medium plasticity, brown mottled orange- brown (NATURAL - SOIL).	SM	F		-2
2.2										-2.2
2.4										-2.4
			BH09_2.5_2.6							
2.6						Termination Depth at: 2.60 m				-2.6

Notes

This log is not intended for geotechnical purposes.

Drilling Abbreviations	Moisture Abbreviations	Consistency Abbreviations	
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Pushtube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	**Granular Soils** VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense,VD - Very Dense	**Cohesive Soils** VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard

BOREHOLE LOG

ENVIRONMENTAL-SOIL BORE

SOIL BORE BH10

Client SA Metropolitan Fire Service
Project MFS St Marys Station PFAS investigation
Project No. 12566684
Site St Marys Station
Location 1125 South Rd, St. Marys SA 5042
Date Drilled 05/10/2022

Drill Co. WB Drilling Pty Ltd
Driller Ian Watt
Rig Type Eziprobe
Drill Method Hand auger and Pushtube
Total Depth (m) 2.6
Diameter (mm) 50

Easting 278711.025733
Northing 6124949.68439999
Grid Ref GDA2020_MGA_zone_54
Elevation
Logged By Vera Biermann
Checked By B. Petticrew

Depth (m)	Drilling Method	PID (ppm)	Sample ID	Water	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials,separate phase liquids, imported fill, ash.	Elevation (m)
0	HA		BH10_0.0_0.1			TOPSOIL/GRASSMAT.			small roots.	0
0.2						Gravelly CLAY, medium to high plasticity, brown to red-brown, angular to subangular, fine to coarse gravel (REWORKED NATURAL).	SM	ST	bitumen at 0.7-0.8, trace bitumen.	-0.2
0.4	PT		BH10_0.3_0.5 (FD05, FS05)							-0.4
0.6										-0.6
0.8			BH10_0.8_1.0			CLAY, medium to high plasticity, dark brown to red-brown (NATURAL - SOIL).	SM	ST		-0.8
1										-1
1.2										-1.2
1.4			BH10_1.4_1.6							-1.4
1.6										-1.6
1.8										-1.8
2			BH10_1.9_2.1							-2
2.2										-2.2
2.4			BH10_2.4_2.6							-2.4
2.6						Termination Depth at: 2.60 m				-2.6

Notes

This log is not intended for geotechnical purposes.

Drilling Abbreviations	Moisture Abbreviations	Consistency Abbreviations	
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Pushtube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	**Granular Soils** VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense,VD - Very Dense	**Cohesive Soils** VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard

BOREHOLE LOG

ENVIRONMENTAL-SOIL BORE

SOIL BORE BH11

Client SA Metropolitan Fire Service
Project MFS St Marys Station PFAS investigation
Project No. 12566684
Site St Marys Station
Location 1125 South Rd, St. Marys SA 5042
Date Drilled 05/10/2022

Drill Co. WB Drilling Pty Ltd
Driller Ian Watt
Rig Type Eziprobe
Drill Method Hand auger and Pushtube
Total Depth (m) 2.6
Diameter (mm) 50

Easting 278694.50881
Northing 6124949.96917
Grid Ref GDA2020_MGA_zone_54
Elevation
Logged By Vera Biermann
Checked By B. Petticrew

Depth (m)	Drilling Method	PID (ppm)	Sample ID	Water	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials,separate phase liquids, imported fill, ash.	Elevation (m)
0	HA		BH11_0.0_0.1			TOPSOIL/GRASSMAT.			small roots.	0
						Gravelly CLAY, medium to high plasticity, red- brown and grey, trace roots, angular to subangular, fine to medium gravel (FILL).	SM	ST		
0.2			BH11_0.2_0.4							-0.2
0.4						CLAY, medium to high plasticity, dark brown to grey-brown, trace sand, trace roots (REWORKED NATURAL).	SM	ST		-0.4
	PT									
0.6										-0.6
			BH11_0.7_0.9							
0.8										-0.8
						CLAY, medium to high plasticity, brown mottled orange- brown (NATURAL - SOIL).	SM	ST		
1										-1
1.2										-1.2
			BH11_1.3_1.5							
1.4										-1.4
1.6										-1.6
1.8			BH11_1.8_2.0							-1.8
2										-2
2.2										-2.2
2.4			BH11_2.4_2.6							-2.4
2.6						Termination Depth at: 2.60 m				-2.6

Notes

This log is not intended for geotechnical purposes.

Drilling Abbreviations	Moisture Abbreviations	Consistency Abbreviations	
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Pushtube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	**Granular Soils** VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense,VD - Very Dense	**Cohesive Soils** VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard

BOREHOLE LOG

ENVIRONMENTAL-SOIL BORE

SOIL BORE BH12

Client SA Metropolitan Fire Service
Project MFS St Marys Station PFAS investigation
Project No. 12566684
Site St Marys Station
Location 1125 South Rd, St. Marys SA 5042
Date Drilled 05/10/2022

Drill Co. WB Drilling Pty Ltd
Driller Ian Watt
Rig Type Eziprobe
Drill Method Hand auger and Pushtube
Total Depth (m) 2.6
Diameter (mm) 50

Easting 278748.34424
Northing 6124969.7887
Grid Ref GDA2020_MGA_zone_54
Elevation
Logged By Vera Biermann
Checked By B. Petticrew

Depth (m)	Drilling Method	PID (ppm)	Sample ID	Water	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials,separate phase liquids, imported fill, ash.	Elevation (m)
	SFA					OTHER.			bitumen.	
	HA					Sandy GRAVEL, fine to medium grained, angular, pale grey to pale brown, trace clay, subrounded, medium to coarse sand (FILL).	SM	L		
			BH12_0.1_0.2							
0.2										-0.2
						Gravelly CLAY, medium to high plasticity, brown to dark brown, trace medium to coarse sand, angular, fine to medium gravel (REWORKED NATURAL).	M	F		
0.4										-0.4
			BH12_0.5_0.6							
0.6										-0.6
						CLAY, medium plasticity, dark brown to brown (NATURAL - SOIL).	SM	ST		
0.8										-0.8
			BH12_0.9_1.0							
1	PT									-1
1.2										-1.2
1.4						CLAY, medium plasticity, brown to orange- brown (NATURAL - SOIL).	SM	ST		-1.4
			BH12_1.5_1.6							
1.6										-1.6
1.8										-1.8
2			BH12_2.0_2.1							-2
2.2										-2.2
2.4										-2.4
			BH12_2.5_2.6							
2.6						Termination Depth at: 2.60 m				-2.6

Notes

This log is not intended for geotechnical purposes.

Drilling Abbreviations	Moisture Abbreviations	Consistency Abbreviations	
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Pushtube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	**Granular Soils** VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense,VD - Very Dense	**Cohesive Soils** VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard

BOREHOLE LOG

ENVIRONMENTAL-SOIL BORE

SOIL BORE BH13

Client SA Metropolitan Fire Service
Project MFS St Marys Station PFAS investigation
Project No. 12566684
Site St Marys Station
Location 1125 South Rd, St. Marys SA 5042
Date Drilled 05/10/2022

Drill Co. WB Drilling Pty Ltd
Driller Ian Watt
Rig Type Eziprobe
Drill Method Hand auger and Pushtube
Total Depth (m) 2.6
Diameter (mm) 50

Easting 278727.685042999
Northing 6124966.20131999
Grid Ref GDA2020_MGA_zone_54
Elevation
Logged By Vera Biermann
Checked By B. Petticrew

Depth (m)	Drilling Method	PID (ppm)	Sample ID	Water	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials,separate phase liquids, imported fill, ash.	Elevation (m)
	SFA		BH13_0.0			OTHER.			bitumen.	
	HA					Gravelly SAND, fine to coarse grained, yellow- brown with pale grey, trace clay, angular, fine to medium gravel (FILL).	SM	L		
0.2			BH13_0.1_0.3 (FD01, FS01)							-0.2
0.4						Gravelly CLAY, medium to high plasticity, brown to red-brown, trace medium to coarse sand, angular, fine to coarse gravel (REWORKED NATURAL).	M	F		-0.4
0.6			BH13_0.6_0.7							-0.6
0.8										-0.8
1	PT		BH13_1.0_1.1			CLAY, medium plasticity, dark brown to brown (NATURAL - SOIL).	SM	ST		-1
1.2										-1.2
1.4						CLAY, medium plasticity, brown to orange- brown (NATURAL - SOIL).	SM	ST		-1.4
1.6			BH13_1.6_1.7							-1.6
1.8										-1.8
2			BH13_2.0_2.1							-2
2.2										-2.2
2.4			BH13_2.4_2.6							-2.4
2.6						Termination Depth at: 2.60 m				-2.6

Notes

This log is not intended for geotechnical purposes.

Drilling Abbreviations	Moisture Abbreviations	Consistency Abbreviations	
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Pushtube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	**Granular Soils** VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense,VD - Very Dense	**Cohesive Soils** VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard

BOREHOLE LOG

ENVIRONMENTAL-SOIL BORE

SOIL BORE BH14

Client SA Metropolitan Fire Service
Project MFS St Marys Station PFAS investigation
Project No. 12566684
Site St Marys Station
Location 1125 South Rd, St. Marys SA 5042
Date Drilled 05/10/2022

Drill Co. WB Drilling Pty Ltd
Driller Ian Watt
Rig Type Eziprobe
Drill Method Hand auger and Pushtube
Total Depth (m) 2.6
Diameter (mm) 50

Easting 278708.747536999
Northing 6124964.35029
Grid Ref GDA2020_MGA_zone_54
Elevation
Logged By Vera Biermann
Checked By B. Petticrew

Depth (m)	Drilling Method	PID (ppm)	Sample ID	Water	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials,separate phase liquids, imported fill, ash.	Elevation (m)
0	HA		BH14_0.0_0.1			TOPSOIL/GRASSMAT.			small roots.	0
						Sandy GRAVEL, fine to coarse grained, angular to subangular, yellow- brown and red- brown, with clay, fine to coarse sand (FILL).	M	L		
0.2			BH14_0.2_0.4 (FD03, FS03)							-0.2
0.4										-0.4
	PT									
0.6			BH14_0.6_0.8			Gravelly CLAY, medium plasticity, red- brown to brown, trace fine to coarse sand, angular to subangular, fine to medium gravel (REWORKED NATURAL).	SM	ST		-0.6
0.8						CLAY, medium to high plasticity, brown orange- brown, trace fine to medium gravel, angular gravel (NATURAL - SOIL).	SM	ST		-0.8
1										-1
			BH14_1.1_1.2							
1.2										-1.2
1.4										-1.4
			BH14_1.5_1.6							
1.6										-1.6
1.8										-1.8
2			BH14_2.0_2.1							-2
2.2										-2.2
2.4										-2.4
			BH14_2.5_2.6							
2.6						Termination Depth at: 2.60 m				-2.6

Notes

This log is not intended for geotechnical purposes.

Drilling Abbreviations	Moisture Abbreviations	Consistency Abbreviations	
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Pushtube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	**Granular Soils** VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense,VD - Very Dense	**Cohesive Soils** VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard

BOREHOLE LOG

ENVIRONMENTAL-SOIL BORE

SOIL BORE BH15

Client SA Metropolitan Fire Service
Project MFS St Marys Station PFAS investigation
Project No. 12566684
Site St Marys Station
Location 1125 South Rd, St. Marys SA 5042
Date Drilled 05/10/2022

Drill Co. WB Drilling Pty Ltd
Driller Ian Watt
Rig Type Eziprobe
Drill Method Hand auger and Pushtube
Total Depth (m) 2.6
Diameter (mm) 50

Easting 278693.369712
Northing 6124962.92640999
Grid Ref GDA2020_MGA_zone_54
Elevation
Logged By Vera Biermann
Checked By B. Petticrew

Depth (m)	Drilling Method	PID (ppm)	Sample ID	Water	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials,separate phase liquids, imported fill, ash.	Elevation (m)
0	HA		BH15_0.0_0.1			TOPSOIL/GRASSMAT.			small roots.	0
						Gravelly CLAY, medium to high plasticity, red- brown and grey, trace sand, angular to subangular, fine to medium gravel (REWORKED NATURAL).	SM	F		
0.2			BH15_0.2_0.4							-0.2
0.4			BH15_0.4_0.6 (FD04, FS04)			CLAY, medium plasticity, dark brown to brown, trace sand, trace fine to medium gravel (REWORKED NATURAL).	SM	ST		-0.4
	PT									
0.6						CLAY, medium to high plasticity, brown mottled orange- brown, trace fine to medium gravel (NATURAL - SOIL).	SM	ST		-0.6
0.8										-0.8
1			BH15_1.0_1.1							-1
1.2										-1.2
1.4										-1.4
			BH15_1.5_1.6							
1.6										-1.6
1.8										-1.8
2			BH15_2.0_2.1							-2
2.2										-2.2
2.4										-2.4
			BH15_2.5_2.6							
2.6						Termination Depth at: 2.60 m				-2.6

Notes

This log is not intended for geotechnical purposes.

Drilling Abbreviations	Moisture Abbreviations	Consistency Abbreviations	
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Pushtube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	**Granular Soils** VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense,VD - Very Dense	**Cohesive Soils** VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard

BOREHOLE LOG

ENVIRONMENTAL-GROUNDWATER

MONITORING WELL MW01

Client SA Metropolitan Fire Service
Project MFS St Marys Station PFAS investigation
Project No. 12566684
Site St Marys Station
Location 1125 South Rd, St. Marys SA 5042
Date Drilled 06/10/2022

Drill Co. WB Drilling Pty Ltd
Driller Ian Watt
Rig Type Eziprobe
Drill Method Pushtube, and Solid Flight Auger
Total Depth (m) 5.50
Casing Diameter (mm) 50

Easting, Northing 278750.396, 6124923.553
Grid Ref GDA2020_MGA_zone_54
Elevation 31.858
TOC mAHD 31.787
Logged By Vera Biermann
Checked By B. Petticrew

W.C.P. No. 428620 **Casing** 50 mm PVC (Class 18) **Screen** 0.5mm Slotted PVC (Class 18) **Surface Completion** Gatic Cover

Depth (m)	Drilling Method	PID (ppm)	Sample ID	Water	Well Details	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials,separate phase liquids, imported fill, ash.	Elevation (m)
0	DC		MW01_0.0_0.1				CONCRETE				31.8
0.2	HA		MW01_0.1_0.3		Grout		Gravelly SAND medium to coarse, angular to subangular, grey to brown, trace clay,	SM	L		31.6
0.4							angular, fine gravel (FILL)	SM	F		31.4
0.6			MW01_0.5_0.7 (FD08, FS08)		Bentonite		Gravelly CLAY medium to high plasticity, brown mottled orange- brown, trace sand, trace roots, angular, fine to medium gravel (Reworked NATURAL)				31.2
0.8	PT						CLAY medium plasticity, dark brown to red- brown, trace roots (NATURAL - SOIL)	SM	ST		31
1			MW01_1.0_1.2								30.8
1.2											30.6
1.4											30.4
1.6			MW01_1.5_1.7								30.2
1.8											30
2			MW01_2.0_2.2								29.8
2.2											29.6
2.4					Sand						29.4
2.6				▽							29.2
2.8											29
3			MW01_3.0_3.2								28.8
3.2											28.6
3.4											28.4
3.6							CLAY medium plasticity, brown mottled orange- brown, trace fine to coarse gravel (NATURAL - SOIL)	SM	VST		28.2
3.8											28
4			MW01_4.0_4.2								27.8
4.2											27.6
4.4							CLAY medium plasticity, grey- brown mottled orange (NATURAL - SOIL)	SM	VST		27.4
4.6											27.2
4.8											27
5			MW01_5.0_5.2								26.8
5.2											26.6
5.4											26.4
5.6							Termination Depth at: 5.50 m				26.2

Notes BH: PT to 5.5 m; well: SFA to 4.0 m; 4.0-5.5 m backfilled with drilling spoils (clay). SWL recorded on 26/04/2023.

This log is not intended for geotechnical purposes. Hollow triangle symbolises water strike, solid triangle symbolises recovered water level.

Drilling Abbreviations	Moisture Abbreviations	Consistency Abbreviations	
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, MR-Mud Rotary, NDD-Non Destructive Drilling, PT-Pushtube, RB-Rotary Blade, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	**Granular Soils** VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense,VD - Very Dense	**Cohesive Soils** VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard

BOREHOLE LOG

ENVIRONMENTAL-GROUNDWATER

MONITORING WELL MW02

Client SA Metropolitan Fire Service
Project MFS St Marys Station PFAS investigation
Project No. 12566684
Site St Marys Station
Location 1125 South Rd, St. Marys SA 5042
Date Drilled 07/10/2022

Drill Co. WB Drilling Pty Ltd
Driller Ian Watt
Rig Type Eziprobe
Drill Method Pushtube, and Solid Flight Auger
Total Depth (m) 5.00
Casing Diameter (mm) 50

Easting, Northing 278728.359, 6124974.907
Grid Ref GDA2020_MGA_zone_54
Elevation 32.194
TOC mAHD 32.071
Logged By Vera Biermann
Checked By B. Petticrew

W.C.P. No. 428622 **Casing** 50 mm PVC (Class 18) **Screen** 0.5mm Slotted PVC (Class 18) **Surface Completion** Gatic Cover

Depth (m)	Drilling Method	PID (ppm)	Sample ID	Water	Well Details	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials,separate phase liquids, imported fill, ash.	Elevation (m)
0	HA		MW02_0.0_0.1				TOPSOIL/GRASSMAT			Rootlets	32.2
0.2							Gravelly CLAY medium to high plasticity, brown, trace sand, angular, fine to coarse gravel (FILL)	SM	F		32
0.4			MW02_0.3_0.5		Grout						31.8
0.6											31.6
0.8	PT										31.4
1							CLAY medium plasticity, dark brown to red- brown (possible NATURAL - SOIL)	SM	ST		31.2
1.2			MW02_1.0_1.2 (FD09, FS09)		Bentonite						31
1.4											30.8
1.6			MW02_1.5_1.7								30.6
1.8											30.4
2			MW02_2.0_2.2								30.2
2.2											30
2.4				▼							29.8
2.6							CLAY medium to high plasticity, brown to red- brown (NATURAL - SOIL)	VM	S		29.6
2.8			MW02_2.7_2.9								29.4
3							CLAY medium plasticity, grey- brown mottled orange- brown (NATURAL - SOIL)	SM	ST		29.2
3.2					Sand						29
3.4											28.8
3.6											28.6
3.8			MW02_3.7_3.9								28.4
4	SFA										28.2
4.2											28
4.4											27.8
4.6											27.6
4.8											27.4
5											27.2
5.2							Termination Depth at: 5.00 m. Target depth achieved.				27
5.4											26.8
5.6											26.6

Notes BH: PT to 4.0 m; well: SFA to 5.0 m; 4.0-5.0 m not characterised and not sampled.

This log is not intended for geotechnical purposes. Hollow triangle symbolises water strike, solid triangle symbolises recovered water level.

Drilling Abbreviations	Moisture Abbreviations	Consistency Abbreviations	
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, MR-Mud Rotary, NDD-Non Destructive Drilling, PT-Pushtube, RB-Rotary Blade, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	**Granular Soils** VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense,VD - Very Dense	**Cohesive Soils** VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard

BOREHOLE LOG

ENVIRONMENTAL-GROUNDWATER

MONITORING WELL MW03

Client SA Metropolitan Fire Service
Project MFS St Marys Station PFAS investigation
Project No. 12566684
Site St Marys Station
Location 1125 South Rd, St. Marys SA 5042
Date Drilled 07/10/2022

Drill Co. WB Drilling Pty Ltd
Driller Ian Watt
Rig Type Eziprobe
Drill Method Pushtube, and Solid Flight Auger
Total Depth (m) 4.00
Casing Diameter (mm) 50

Easting, Northing 278705.145, 6124972.395
Grid Ref GDA2020_MGA_zone_54
Elevation 31.676
TOC mAHD 31.597
Logged By Vera Biermann
Checked By B. Petticrew

W.C.P. No. 428623 **Casing** 50 mm PVC (Class 18) **Screen** 0.5mm Slotted PVC (Class 18) **Surface Completion** Gatic Cover

Depth (m)	Drilling Method	PID (ppm)	Sample ID	Water	Well Details	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials,separate phase liquids, imported fill, ash.	Elevation (m)
0	HA		MW03_0.0_0.1				TOPSOIL/GRASSMAT			Rootlets	31.6
0.2					Grout		Gravelly CLAY medium to high plasticity, brown to red- brown, trace sand, angular, fine to coarse gravel (Reworked NATURAL)	SM	F		31.4
0.4			MW03_0.3_0.5								31.2
0.6											31
0.8	PT				Bentonite		CLAY medium to high plasticity, dark brown to orange- brown, trace fine to medium gravel, trace roots (NATURAL - SOIL)	M	F		30.8
1			MW03_0.9_1.1								30.6
1.2											30.4
1.4			MW03_1.4_1.6								30.2
1.6											30
1.8			MW03_1.9_2.1								29.8
2											29.6
2.2											29.4
2.4			MW03_2.4_2.6 (FD10, FS10)	▼	Sand						29.2
2.6											29
2.8											28.8
3											28.6
3.2			MW03_3.2_3.4				Gravelly CLAY medium to high plasticity, brown mottled orange- brown, trace sand, angular, fine to medium gravel (NATURAL - SOIL)	SM	ST		28.4
3.4											28.2
3.6	SFA										28
3.8											27.8
4							Termination Depth at: 4.00 m. Target depth achieved.				27.6
4.2											27.4
4.4											27.2
4.6											27
4.8											26.8
5											26.6
5.2											26.4
5.4											26.2
5.6											26

Notes BH: PT to 3.5 m; well: SFA to 4.0 m; 3.5-4.0 m not characterised and not sampled.

This log is not intended for geotechnical purposes. Hollow triangle symbolises water strike, solid triangle symbolises recovered water level.

Drilling Abbreviations	Moisture Abbreviations	Consistency Abbreviations	
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, MR-Mud Rotary, NDD-Non Destructive Drilling, PT-Pushtube, RB-Rotary Blade, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	**Granular Soils** VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense,VD - Very Dense	**Cohesive Soils** VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard

BOREHOLE LOG

ENVIRONMENTAL-GROUNDWATER

MONITORING WELL MW04

Client SA Metropolitan Fire Service
Project MFS St Marys Station PFAS investigation
Project No. 12566684
Site St Marys Station
Location 1125 South Rd, St. Marys SA 5042
Date Drilled 06/10/2022

Drill Co. WB Drilling Pty Ltd
Driller Ian Watt
Rig Type Eziprobe
Drill Method Pushtube, and Solid Flight Auger
Total Depth (m) 4.00
Casing Diameter (mm) 50

Easting, Northing 278688.686, 6124963.288
Grid Ref GDA2020_MGA_zone_54
Elevation 31.352
TOC mAHD 31.218
Logged By Vera Biermann
Checked By B. Petticrew

W.C.P. No. 428621 **Casing** 50 mm PVC (Class 18) **Screen** 0.5mm Slotted PVC (Class 18) **Surface Completion** Gatic Cover

Depth (m)	Drilling Method	PID (ppm)	Sample ID	Water	Well Details	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials,separate phase liquids, imported fill, ash.	Elevation (m)
0	HA		MW04_0.0_0.1				TOPSOIL/GRASSMAT				31.2
0.2					Grout		CLAY medium to high plasticity, brown, with fine to medium gravel, trace sand, angular to subangular gravel (Reworked NATURAL)	SM	F		31
0.4			MW04_0.3_0.5								
0.6	PT				Bentonite		CLAY medium plasticity, red- brown mottled grey- brown (possible NATURAL - SOIL)	SM	VST		30.8
0.8			MW04_0.8_1.0								30.6
1											30.4
1.2							CLAY medium to high plasticity, brown mottled red- brown, trace fine to medium gravel, angular gravel (NATURAL - SOIL)	SM	ST		30.2
1.4			MW04_1.3_1.5								30
1.6											29.8
1.8			MW04_1.8_2.0	▼							29.6
2											29.4
2.2											29.2
2.4			MW04_2.3_2.5		Sand		CLAY medium to high plasticity, brown mottled red- brown (NATURAL - SOIL)	M	F		29
2.6											28.8
2.8			MW04_2.8_3.0								28.6
3											28.4
3.2											28.2
3.4											28
3.6											27.8
3.8			MW04_3.8_4.0								27.6
4											27.4
4							Termination Depth at: 4.00 m. Target depth achieved.				
4.2											27.2
4.4											27
4.6											26.8
4.8											26.6
5											26.4
5.2											26.2
5.4											26
5.6											25.8

Notes BH: PT to 4.0 m; well: SFA to 4.0 m.

This log is not intended for geotechnical purposes. Hollow triangle symbolises water strike, solid triangle symbolises recovered water level.

Drilling Abbreviations	Moisture Abbreviations	Consistency Abbreviations	
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, MR-Mud Rotary, NDD-Non Destructive Drilling, PT-Pushtube, RB-Rotary Blade, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	**Granular Soils** VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense,VD - Very Dense	**Cohesive Soils** VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard

BOREHOLE LOG

ENVIRONMENTAL-GROUNDWATER

MONITORING WELL MW05

Client SA Metropolitan Fire Service
Project MFS St Marys Station PFAS investigation
Project No. 12566684
Site St Marys Station
Location 1125 South Rd, St. Marys SA 5042
Date Drilled 15/03/2023

Drill Co. WB Drilling Pty Ltd
Driller David and Ian Watt
Rig Type Eziprobe
Drill Method Pushtube, and Solid Flight Auger
Total Depth (m) 4.70
Casing Diameter (mm) 50

Easting, Northing 278558.742, 6124973.732
Grid Ref GDA2020_MGA_zone_54
Elevation 30.267
TOC mAHD 30.162
Logged By A. Kirkman, T. Wilson
Checked By B. Petticrew

W.C.P. No. 432309 **Casing** 50 mm PVC (Class 18) **Screen** 0.5mm Slotted PVC (Class 18) **Surface Completion** Gatic

Depth (m)	Drilling Method	PID (ppm)	Sample ID	Water	Well Details	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials,separate phase liquids, imported fill, ash.	Elevation (m)
0	HA				Grout		TOPSOIL/GRASSMAT				30.2
0.2							Gravelly CLAY medium to high plasticity, brown, trace fine to coarse sand, angular to subangular, fine to medium gravel	SM	S		30
0.4							(Reworked NATURAL)	SM	VST		29.8
0.6							CLAY medium plasticity, mottled red-brown, trace fine to medium gravel (NATURAL - SOIL)				29.6
0.8											29.4
1	PT				Bentonite						29.2
1.2											29
1.4											28.8
1.6											28.6
1.8											28.4
2							CLAY high plasticity, brown (NATURAL - SOIL)	SM	ST	Slightly moist - moist	28.2
2.2											28
2.4											27.8
2.6							Sandy CLAY medium plasticity, brown (NATURAL - SOIL)	M	F		27.6
2.8				▽							
3					Sand		CLAY high plasticity, brown (NATURAL - SOIL)	M	F	Firm - stiff	27.4
3.2											27.2
3.4											27
3.6											26.8
3.8							CLAY medium plasticity, mottled orange-brown and mottled grey- brown (NATURAL - SOIL)	SM	VST	Firm - stiff	26.6
4	SFA										26.4
4.2											26.2
4.4											26
4.6											25.8
4.8							Termination Depth at: 4.70 m. Target depth achieved.				25.6
5											25.4
5.2											25.2
5.4											25
5.6											24.8
											24.6

Notes BH: PT to 5.5 m; well: SFA to 5.5 m.

This log is not intended for geotechnical purposes. Hollow triangle symbolises water strike, solid triangle symbolises recovered water level.

Drilling Abbreviations	Moisture Abbreviations	Consistency Abbreviations	
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, MR-Mud Rotary, NDD-Non Destructive Drilling, PT-Pushtube, RB-Rotary Blade, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	**Granular Soils** VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense,VD - Very Dense	**Cohesive Soils** VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard

BOREHOLE LOG

ENVIRONMENTAL-GROUNDWATER

MONITORING WELL MW07

Client SA Metropolitan Fire Service
Project MFS St Marys Station PFAS investigation
Project No. 12566684
Site St Marys Station
Location 1125 South Rd, St. Marys SA 5042
Date Drilled 15/03/2023

Drill Co. WB Drilling Pty Ltd
Driller David and Ian Watt
Rig Type Eziprobe
Drill Method Pushtube, and Solid Flight Auger
Total Depth (m) 5.50
Casing Diameter (mm) 50

Easting, Northing 278431.973, 6125245.162
Grid Ref GDA2020_MGA_zone_54
Elevation 28.437
TOC mAHD 28.313
Logged By A. Kirkman, T. Wilson
Checked By B. Petticrew

W.C.P. No. 432310 **Casing** 50 mm PVC (Class 18) **Screen** 0.5mm Slotted PVC (Class 18) **Surface Completion** Gatic

Depth (m)	Drilling Method	PID (ppm)	Sample ID	Water	Well Details	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials,separate phase liquids, imported fill, ash.	Elevation (m)
0	HA				Grout		OTHER			sfG	28.4
0.2							CLAY medium to high plasticity, brown, trace fine gravel, trace fine to coarse sand (Reworked NATURAL)	SM	ST		28.2
0.4								SM	F		28
0.6							CLAY medium to high plasticity, dark brown, with silt, trace fine sand (NATURAL - SOIL)	SM	VST		27.8
0.8							CLAY high plasticity, brown mottled grey-brown (NATURAL - SOIL)				27.6
1	PT										27.4
1.2											27.2
1.4											27
1.6					Bentonite						26.8
1.8											26.6
2											26.4
2.2											26.2
2.4											26
2.6											25.8
2.8											25.6
3											25.4
3.2											25.2
3.4											25
3.6					Sand						24.8
3.8							CLAY high plasticity, brown mottled grey-black, trace fine gravel (NATURAL - SOIL)	M	ST		24.6
4							CLAY medium to high plasticity, brown mottled grey- brown, trace fine gravel (NATURAL - SOIL)	M	ST		24.4
4.2											24.2
4.4											24
4.6											23.8
4.8											23.6
5											23.4
5.2											23.2
5.4											23
5.6							Termination Depth at: 5.50 m. Target depth achieved.				22.8

Notes Cnr Lagunta Ave & Konando Tce

This log is not intended for geotechnical purposes. Hollow triangle symbolises water strike, solid triangle symbolises recovered water level.

Drilling Abbreviations

AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, MR-Mud Rotary, NDD-Non Destructive Drilling, PT-Pushtube, RB-Rotary Blade, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler

Moisture Abbreviations

D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated

Consistency Abbreviations

Granular Soils VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense,VD - Very Dense

Cohesive Soils VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard

T2D GEOVENTURE

REPORT OF STANDPIPE INSTALLATION: GW201b

SHEET: 1 OF 3

CLIENT:	DIT	COORDS: 278699.9 m E 6124960.3 m N MGA94 54	DRILL RIG: Schramm 450
PROJECT:	North South Corridor	SURFACE RL: 31.50 m DATUM: AHD	CONTRACTOR: Underdale Drillers Oz
LOCATION:	St Marys Fire Station	INCLINATION: -90°	LOGGED: SS DATE: 7-12-20
JOB NO:	PS120896	HOLE DIA: 150 mm HOLE DEPTH: 17.00 m	CHECKED: SPJ DATE: 19-3-21

Drilling				Field Material Description		Instrumentation Details
METHOD	WATER	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	SOIL/ROCK MATERIAL DESCRIPTION	
AS		0	31.50		SANDY CLAY	Fush Gatic Cover
			1.00			
RMF		1	30.50		CLAY	
			2.00			
		2	29.50		CLAY	
			3.00			Cement grout backfill (0m to 8m)
		3	28.50		CLAY	
			4.00			
		4	27.50		CLAY	
			5.00			Blank (0.1m to 11m): 177mm Class 12 uPVC
		5	26.50		CLAY	
		6	6.00			

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GAP gINT FN. F17 RL1

GAP 8_16.10.LIB - T2D GEOVENTURE (1).GLB Log GAP WELL 3 NSC STAGE 1 ENV MASTER.GPJ <<DrawingFile>> 07-05-2021 13:52 10.02.00.04 Datgel Tools

T2D GEOVENTURE

REPORT OF STANDPIPE INSTALLATION: GW201b

SHEET: 2 OF 3

CLIENT:	DIT	COORDS: 278699.9 m E 6124960.3 m N MGA94 54	DRILL RIG: Schramm 450
PROJECT:	North South Corridor	SURFACE RL: 31.50 m DATUM: AHD	CONTRACTOR: Underdale Drillers Oz
LOCATION:	St Marys Fire Station	INCLINATION: -90°	LOGGED: SS DATE: 7-12-20
JOB NO:	PS120896	HOLE DIA: 150 mm HOLE DEPTH: 17.00 m	CHECKED: SPJ DATE: 19-3-21

Drilling				Field Material Description		Instrumentation Details
METHOD	WATER	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	SOIL/ROCK MATERIAL DESCRIPTION	
RMF		6	25.50		CLAY	
		7	7.00 24.50		CLAY	
		8	8.00 23.50		CLAY	8.00, RL23.50
		9	9.00 22.50		CLAY	Bentonite seal (8m to 10m)
		10				10.00, RL21.50
		11	11.00 20.50		CLAYEY GRAVEL	Filter pack (10m to 16m) washed 3mm-6mm
		12	12.00 19.50		SANDY GRAVELLY CLAY	

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GAP gINT FN. F17 RL1

GAP 8_16.10.LIB - T2D GEOVENTURE (1).GLB Log GAP WELL 3 NSC STAGE 1 ENV MASTER.GPJ <<DrawingFile>> 07-05-2021 13:52 10.02.00.04 Datgel Tools

T2D GEOVENTURE

REPORT OF STANDPIPE INSTALLATION: GW201b

SHEET: 3 OF 3

CLIENT:	DIT	COORDS: 278699.9 m E 6124960.3 m N MGA94 54	DRILL RIG: Schramm 450
PROJECT:	North South Corridor	SURFACE RL: 31.50 m DATUM: AHD	CONTRACTOR: Underdale Drillers Oz
LOCATION:	St Marys Fire Station	INCLINATION: -90°	LOGGED: SS DATE: 7-12-20
JOB NO:	PS120896	HOLE DIA: 150 mm HOLE DEPTH: 17.00 m	CHECKED: SPJ DATE: 19-3-21

Drilling				Field Material Description		Instrumentation Details
METHOD	WATER	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	SOIL/ROCK MATERIAL DESCRIPTION	
RMF		13			SANDY GRAVELLY CLAY	Screen (11m to 15m): 177mm Class 12 uPVC machine slotted 0.5mm aperture
		14	14.00 17.50		GRAVEL	
		15	15.00 16.50		CLAY	15.00, RL16.50 Sump (15m to 16m)
		16				16.00, RL15.50 PVC end cap
		17	17.00 14.50		END OF BOREHOLE @ 17.00 m TARGET DEPTH GROUNDWATER NOT OBSERVED PIEZOMETER INSTALLED	Filter pack (16m to 17m) washed 3mm-6mm 17.00, RL14.50
		18				
		19				

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GAP 8_16.10.LIB - T2D GEOVENTURE (1).GLB Log GAP WELL 3 NSC STAGE 1 ENV MASTER.GPJ <<DrawingFile>> 07-05-2021 13:52 10.02.00.04 Datgel Tools

REPORT OF STANDPIPE INSTALLATION: BH7003

T2D GEOVENTURE

SHEET: 1 OF 2

CLIENT:	DIT	COORDS: 278689.8 m E 6124913.8 m N MGA94 54		DRILL RIG: Geoprobe 540	
PROJECT:	North South Corridor	SURFACE RL: 31.50 m DATUM: AHD		CONTRACTOR: WDS	
LOCATION:	St Marys Fire Station	INCLINATION: -90°		LOGGED: ES	DATE: 7-12-20
JOB NO:	PS120896	HOLE DIA: 50 mm HOLE DEPTH: 6.00 m		CHECKED: SPJ	DATE: 24-3-21

Drilling				Field Material Description		Instrumentation Details
METHOD	WATER	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	SOIL/ROCK MATERIAL DESCRIPTION	
DTC		-0.5				
		0.0	31.50		CONCRETE	Flush Gatic Cover
			0.11			
			0.16		SAND	
			0.21		SANDY GRAVEL	
			31.29		SANDY CLAY	
			0.50			
		0.5	31.00		CLAY	
			0.90			
			30.60		SANDY CLAY	
		1.0				Cement grout backfill (0.0 to 2.0 m)
		1.5				Blank threaded 50mm PVC (0.0 to 3.0 m)
			1.80			
			29.70		CLAY	
		2.0				2.00, RL29.50
						Bentonite seal (2.0 to 2.5 m)
		2.5				2.50, RL29.00
		3.0				
		3.5				Filter pack sand (2.5 to 6.0 m) 8/16 mm
		4.0				
PT		4.5	4.50			

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GAP gINT FN. F17
RL1

GAP 8_16.10 LIB - T2D GEOVENTURE (1).GLB Log GAP WELL 3 NSC STAGE 1 ENV MASTER.GPJ <<DrawingFile>> 07-05-2021 14:00 10.02.00.04 Datgel Tools

T2D GEOVENTURE

REPORT OF STANDPIPE INSTALLATION: BH7003

SHEET: 2 OF 2

CLIENT:	DIT	COORDS:	278689.8 m E 6124913.8 m N MGA94 54	DRILL RIG:	Geoprobe 540
PROJECT:	North South Corridor	SURFACE RL:	31.50 m DATUM: AHD	CONTRACTOR:	WDS
LOCATION:	St Marys Fire Station	INCLINATION:	-90°	LOGGED: ES	DATE: 7-12-20
JOB NO:	PS120896	HOLE DIA:	50 mm HOLE DEPTH: 6.00 m	CHECKED: SPJ	DATE: 24-3-21

Drilling				Field Material Description		Instrumentation Details
METHOD	WATER	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	SOIL/ROCK MATERIAL DESCRIPTION	
PT		4.5	27.00		CLAY	Screen (3.0 - 6.0 m): 50mm Class 18
			4.80			
			26.70		NO CORE	
		5.0				
			5.40			
			26.10		SANDY CLAY	
		5.5				
					END OF BOREHOLE @ 6.00 m TARGET DEPTH GROUNDWATER NOT OBSERVED PIEZOMETER INSTALLED	
			6.00			6.00, RL25.50 PVC end cap
		6.0				
		6.5				
		7.0				
		7.5				
		8.0				
		8.5				
		9.0				
		9.5				

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GAP gINT FN. F17
RL1

GAP 8_16.10 LIB - T2D GEOVENTURE (1).GLB Log GAP WELL 3 NSC STAGE 1 ENV MASTER.GPJ <<DrawingFile>> 07-05-2021 14:01 10.02.00.04 Datgel Tools

T2D GEOVENTURE

REPORT OF STANDPIPE INSTALLATION: GW8001b

SHEET: 1 OF 8

CLIENT:	DIT	COORDS: 278706.5 m E 6124951.9 m N MGA94 54	DRILL RIG: Schramm 450
PROJECT:	North South Corridor	SURFACE RL: 31.70 m DATUM: AHD	CONTRACTOR: Underdale Drillers Oz
LOCATION:	St Marys Fire Station	INCLINATION: -90°	LOGGED: SS DATE: 3-12-20
JOB NO:	PS120896	HOLE DIA: 150 mm HOLE DEPTH: 38.50 m	CHECKED: SPJ DATE: 25-3-21

Drilling				Field Material Description		Instrumentation Details
METHOD	WATER	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	SOIL/ROCK MATERIAL DESCRIPTION	
AS		0.0	31.70		CLAYEY SAND	Fush Gatic Cover
			1.00 30.70		CLAY	
			2.00 29.70		CLAY	
RMF			3.00 28.70		CLAY	Blank (0.1m to 36.5m): Class 18 uPVC screw thread

GAP 8_16.10.LIB - T2D GEOVENTURE (1).GLB Log GAP WELL 3 NSC STAGE 1 ENV MASTER.GPJ <<DrawingFile>> 07-05-2021 14:24 10.02.00.04 Datgel Tools

This report of standpipe installation must be read in conjunction with accompanying notes and abbreviations. It has been prepared for hydrogeological purposes only, without attempt to assess geotechnical properties or possible contamination. Any reference to geotechnical properties or potential contamination are for information only and do not necessarily indicate the presence or absence of the properties stated.

T2D GEOVENTURE

REPORT OF STANDPIPE INSTALLATION: GW8001b

SHEET: 2 OF 8

CLIENT:	DIT	COORDS: 278706.5 m E 6124951.9 m N MGA94 54	DRILL RIG: Schramm 450
PROJECT:	North South Corridor	SURFACE RL: 31.70 m DATUM: AHD	CONTRACTOR: Underdale Drillers Oz
LOCATION:	St Marys Fire Station	INCLINATION: -90°	LOGGED: SS DATE: 3-12-20
JOB NO:	PS120896	HOLE DIA: 150 mm HOLE DEPTH: 38.50 m	CHECKED: SPJ DATE: 25-3-21

Drilling				Field Material Description		Instrumentation Details
METHOD	WATER	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	SOIL/ROCK MATERIAL DESCRIPTION	
RMF		4.5			CLAY	
		5.0	5.00 26.70		CLAY	
		5.5				
		6.0				Cement grout backfill (0m to 34.5m)
		6.5				
		7.0	7.00 24.70		CLAY	
		7.5				
		8.0	8.00 23.70		CLAY	
		8.5				
		9.0				
		9.5				

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GAP gINT FN. F17 RL1

GAP 8_16.10.LIB - T2D GEOVENTURE (1).GLB Log GAP WELL 3 NSC STAGE 1 ENV MASTER.GPJ <<DrawingFile>> 07-05-2021 14:24 10.02.00.04 Datgel Tools

T2D GEOVENTURE

REPORT OF STANDPIPE INSTALLATION: GW8001b

SHEET: 3 OF 8

CLIENT:	DIT	COORDS: 278706.5 m E 6124951.9 m N MGA94 54	DRILL RIG: Schramm 450
PROJECT:	North South Corridor	SURFACE RL: 31.70 m DATUM: AHD	CONTRACTOR: Underdale Drillers Oz
LOCATION:	St Marys Fire Station	INCLINATION: -90°	LOGGED: SS DATE: 3-12-20
JOB NO:	PS120896	HOLE DIA: 150 mm HOLE DEPTH: 38.50 m	CHECKED: SPJ DATE: 25-3-21

Drilling				Field Material Description		Instrumentation Details
METHOD	WATER	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	SOIL/ROCK MATERIAL DESCRIPTION	
RMF		9.5			CLAY	
		10.0	10.00 21.70		SANDY CLAY	
		10.5				
		11.0	11.00 20.70		SANDY CLAY	
		11.5				
		12.0	12.00 19.70		CLAY	
		12.5				
		13.0	13.00 18.70		SANDY GRAVELLY CLAY	
		13.5				
		14.0	14.00 17.70		SANDY CLAYEY GRAVEL	
		14.5				

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GAP gINT FN. F17 RL1

GAP 8_16.10.LIB - T2D GEOVENTURE (1).GLB Log: GAP WELL 3 NSC STAGE 1 ENV MASTER.GPJ <<DrawingFile>> 07-05-2021 14:24 10.02.00.04 Datgel Tools

T2D GEOVENTURE

REPORT OF STANDPIPE INSTALLATION: GW8001b

SHEET: 4 OF 8

CLIENT:	DIT	COORDS: 278706.5 m E 6124951.9 m N MGA94 54	DRILL RIG: Schramm 450
PROJECT:	North South Corridor	SURFACE RL: 31.70 m DATUM: AHD	CONTRACTOR: Underdale Drillers Oz
LOCATION:	St Marys Fire Station	INCLINATION: -90°	LOGGED: SS DATE: 3-12-20
JOB NO:	PS120896	HOLE DIA: 150 mm HOLE DEPTH: 38.50 m	CHECKED: SPJ DATE: 25-3-21

Drilling				Field Material Description		Instrumentation Details
METHOD	WATER	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	SOIL/ROCK MATERIAL DESCRIPTION	
RMF		14.5			SANDY CLAYEY GRAVEL	
		15.0	15.00 16.70		CLAY	
		15.5				
		16.0				
		16.5				
		17.0	17.00 14.70		CLAY	
		17.5				
		18.0	18.00 13.70		CLAY	
		18.5				
		19.0				
		19.5				

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GAP 8_16.10.LIB - T2D GEOVENTURE (1).GLB Log GAP WELL 3 NSC STAGE 1 ENV MASTER.GPJ <<DrawingFile>> 07-05-2021 14:24 10.02.00.04 Datgel Tools

T2D GEOVENTURE

REPORT OF STANDPIPE INSTALLATION: GW8001b

SHEET: 5 OF 8

CLIENT:	DIT	COORDS: 278706.5 m E 6124951.9 m N MGA94 54	DRILL RIG: Schramm 450
PROJECT:	North South Corridor	SURFACE RL: 31.70 m DATUM: AHD	CONTRACTOR: Underdale Drillers Oz
LOCATION:	St Marys Fire Station	INCLINATION: -90°	LOGGED: SS DATE: 3-12-20
JOB NO:	PS120896	HOLE DIA: 150 mm HOLE DEPTH: 38.50 m	CHECKED: SPJ DATE: 25-3-21

Drilling				Field Material Description		Instrumentation Details
METHOD	WATER	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	SOIL/ROCK MATERIAL DESCRIPTION	
RMF		19.5			CLAY	
		20.0				
		20.5				
		21.0				
		21.5				
		22.0				
		22.5				
		23.0				
		23.5				
		24.0	24.00 7.70		CLAY	
		24.5				

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GAP gINT FN. F17 RL1

GAP 8_16.10.LIB - T2D GEOVENTURE (1).GLB Log GAP WELL 3 NSC STAGE 1 ENV MASTER.GPJ <<DrawingFile>> 07-05-2021 14:24 10.02.00.04 Datgel Tools

T2D GEOVENTURE

REPORT OF STANDPIPE INSTALLATION: GW8001b

SHEET: 6 OF 8

CLIENT:	DIT	COORDS: 278706.5 m E 6124951.9 m N MGA94 54	DRILL RIG: Schramm 450
PROJECT:	North South Corridor	SURFACE RL: 31.70 m DATUM: AHD	CONTRACTOR: Underdale Drillers Oz
LOCATION:	St Marys Fire Station	INCLINATION: -90°	LOGGED: SS DATE: 3-12-20
JOB NO:	PS120896	HOLE DIA: 150 mm HOLE DEPTH: 38.50 m	CHECKED: SPJ DATE: 25-3-21

Drilling				Field Material Description		Instrumentation Details
METHOD	WATER	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	SOIL/ROCK MATERIAL DESCRIPTION	
RMF		24.5			CLAY	
		25.0				
		25.5				
		26.0				
		26.5				
		27.0				
		27.5				
		28.0				
		28.5				
		29.0				
		29.5				

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GAP 8_16.10.LIB - T2D GEOVENTURE (1).GLB Log GAP WELL 3 NSC STAGE 1 ENV MASTER.GPJ <<DrawingFile>> 07-05-2021 14:24 10.02.00.04 Datgel Tools

T2D GEOVENTURE

REPORT OF STANDPIPE INSTALLATION: GW8001b

SHEET: 7 OF 8

CLIENT:	DIT	COORDS: 278706.5 m E 6124951.9 m N MGA94 54	DRILL RIG: Schramm 450
PROJECT:	North South Corridor	SURFACE RL: 31.70 m DATUM: AHD	CONTRACTOR: Underdale Drillers Oz
LOCATION:	St Marys Fire Station	INCLINATION: -90°	LOGGED: SS DATE: 3-12-20
JOB NO:	PS120896	HOLE DIA: 150 mm HOLE DEPTH: 38.50 m	CHECKED: SPJ DATE: 25-3-21

Drilling				Field Material Description		Instrumentation Details
METHOD	WATER	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	SOIL/ROCK MATERIAL DESCRIPTION	
RMF		29.5			CLAY	
		30.0				
		30.5				
		31.0				
		31.5				
		32.0	32.00 -0.30		CLAY	
		32.5				
		33.0				
		33.5				
		34.0	34.00 -2.30		CLAY	
		34.5				34.50, RL-2.80

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GAP gINT FN. F17 RL1

GAP 8_16.10.LIB - T2D GEOVENTURE (1).GLB Log GAP WELL 3 NSC STAGE 1 ENV MASTER.GPJ <<DrawingFile>> 07-05-2021 14:24 10.02.00.04 Datgel Tools

T2D GEOVENTURE

REPORT OF STANDPIPE INSTALLATION: GW8001b

SHEET: 8 OF 8

CLIENT:	DIT	COORDS: 278706.5 m E 6124951.9 m N MGA94 54	DRILL RIG: Schramm 450
PROJECT:	North South Corridor	SURFACE RL: 31.70 m DATUM: AHD	CONTRACTOR: Underdale Drillers Oz
LOCATION:	St Marys Fire Station	INCLINATION: -90°	LOGGED: SS DATE: 3-12-20
JOB NO:	PS120896	HOLE DIA: 150 mm HOLE DEPTH: 38.50 m	CHECKED: SPJ DATE: 25-3-21

Drilling				Field Material Description		Instrumentation Details
METHOD	WATER	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	SOIL/ROCK MATERIAL DESCRIPTION	
RMF		34.5			CLAY	
			35.00 -3.30		SANDY CLAY	
		35.5				35.50, RL-3.80
			36.00 -4.30		SANDY CLAY	
		36.5				
		37.0				
		37.5				
		38.0				
			38.30 -6.60		POSSIBLE CALCAREOUS SANDSTONE	
			38.50 -6.80		END OF BOREHOLE @ 38.50 m TARGET DEPTH GROUNDWATER NOT OBSERVED PIEZOMETER INSTALLED	38.50, RL-6.80
		39.0				
		39.5				

Bentonite seal (34.5m to 35.5m)

Filter pack (35.5m to 38.5m) washed 3mm-6mm

Screen (36.5m to 38.5m): 50mm Class 18 uPVC machine slotted

PVC end cap

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GAP gINT FN. F17 RL1

GAP 8_16.10.LIB - T2D GEOVENTURE (1).GLB Log GAP WELL 3 NSC STAGE 1 ENV MASTER.GPJ <<DrawingFile>> 07-05-2021 14:24 10.02.00.04 Data1 Tools

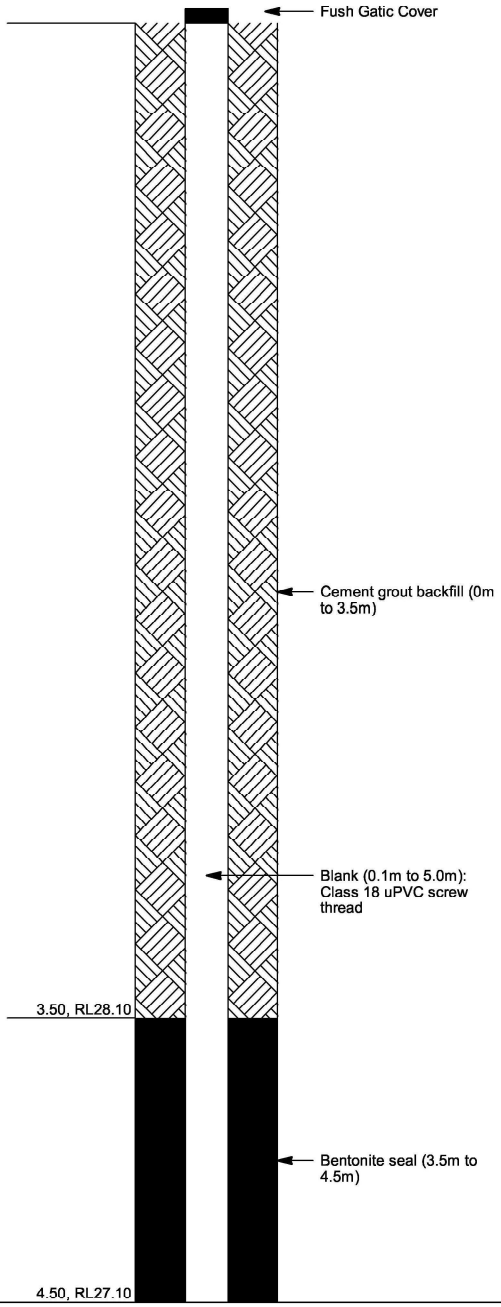
REPORT OF STANDPIPE INSTALLATION: GW8002b

T2D GEOVENTURE

SHEET: 1 OF 2

CLIENT:	DIT	COORDS: 278700.7 m E 6124952.0 m N MGA94 54	DRILL RIG: Schramm 450
PROJECT:	North South Corridor	SURFACE RL: 31.60 m DATUM: AHD	CONTRACTOR: Underdale Drillers Oz
LOCATION:	St Marys Fire Station	INCLINATION: -90°	LOGGED: SS DATE: 4-12-20
JOB NO:	PS120896	HOLE DIA: 150 mm HOLE DEPTH: 6.00 m	CHECKED: SPJ DATE: 25-3-21

Drilling				Field Material Description		Instrumentation Details
METHOD	WATER	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	SOIL/ROCK MATERIAL DESCRIPTION	
AS		-0.5				
		0.0	31.60		CLAYEY SAND	
		0.5				
			1.00			
RMF		1.0	30.60		CLAY	
		1.5				
			2.00			
		2.0	29.60		CLAY	
		2.5				
			3.00			
		3.0	28.60		CLAY	
		3.5				
			4.00			
		4.0	27.60		SANDY CLAY	
		4.5				



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GAP gINT FN. F17 RL1

GAP 8_16.10.LIB - T2D GEOVENTURE (1).GLB Log GAP WELL 3 NSC STAGE 1 ENV MASTER.GPJ <<DrawingFile>> 07-05-2021 14:27 10.02.00.04 Datgel Tools

T2D GEOVENTURE

REPORT OF STANDPIPE INSTALLATION: GW8002b

SHEET: 2 OF 2

CLIENT:	DIT	COORDS: 278700.7 m E 6124952.0 m N MGA94 54	DRILL RIG: Schramm 450
PROJECT:	North South Corridor	SURFACE RL: 31.60 m DATUM: AHD	CONTRACTOR: Underdale Drillers Oz
LOCATION:	St Marys Fire Station	INCLINATION: -90°	LOGGED: SS DATE: 4-12-20
JOB NO:	PS120896	HOLE DIA: 150 mm HOLE DEPTH: 6.00 m	CHECKED: SPJ DATE: 25-3-21

Drilling				Field Material Description		Instrumentation Details
METHOD	WATER	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	SOIL/ROCK MATERIAL DESCRIPTION	
RMF		4.5			SANDY CLAY	Filter pack (4.5m to 6.0m) washed 3mm-6mm
		5.0	5.00 26.60		SANDY CLAYEY GRAVEL	Screen (5.0m to 6.0m): 50mm Class 18 uPVC machine slotted
		5.5				
		6.0	6.00 25.60		END OF BOREHOLE @ 6.00 m TARGET DEPTH GROUNDWATER NOT OBSERVED PIEZOMETER INSTALLED	6.00, RL 25.60 PVC end cap
		6.5				
		7.0				
		7.5				
		8.0				
		8.5				
		9.0				
		9.5				

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GAP gINT FN. F17 RL1

GAP 8_16.10.LIB - T2D GEOVENTURE (1).GLB Log GAP WELL 3 NSC STAGE 1 ENV MASTER.GPJ <<DrawingFile>> 07-05-2021 14:27 10.02.00.04 Data1 Tools

Appendix F

Photographic Log

Photograph	Details
	Photo 1 Date: 02 September 2022 Description: **Front entrance of station** on the eastern side of South Road – facing north-east
	Photo 2 Date: 04 October 2022 Description: **Eastern site entrance with gate in Pinn Street** – facing south. Relevant features: - Concrete stormwater drain - Cracked concrete adjacent entrance gate (centre) - Diesel fuel bowser

Photograph	Details
	Photo 3 Date: 04 October 2022 Description: **Eastern site entrance and drain leading off-site** – facing east Relevant features: - Eastern gate in Pinn Street - Drain discharging surface water offsite (centre) - Cracked concrete driveway (right)
	Photo 4 Date: 04 October 2022 Description: **Eastern portion of rear carpark / training area** facing east Relevant features: - Cracked bitumen hardstand / training area (centre) - Garden bed (rear)

Photograph	Details
	Photo 5 Date: 04 October 2022 Description: **Pinn Street adjacent the eastern site boundary** – facing north-west Relevant features: - Fenced site boundary (left) - Garden bed - Surface water from site discharges into storm water drain (right)
	Photo 6 Date: 04 October 2022 Description: **Car park / training area in the north-eastern portion of the site** – facing north Relevant features: - Stormwater drain running west-east dividing the bitumen and concrete hardstands - Stormwater drain in the concrete hardstand

Photograph	Details
	Photo 7 Date: 07 October 2022 Description: **Stormwater drain** facing south. Relevant features: - Surface water running through Stormwater drain (centre) - Concrete hardstand with cracks
	Photo 8 Date: 17 November 2022 Description: **Stormwater drain** facing east. Relevant features: - Water running through Stormwater drain discharging onto Pinn Street (left) - Concrete hardstand with cracks - Diesel fuel bowser (background) - Eastern gate to Pinn Street (background)

Photograph	Details
	Photo 9 Date: 06 October 2022 Description: **BH05** facing west. Relevant features: - BH05 backfilled (foreground) - Cracked and weathered concrete hardstand (left) - Sealed fire station patio area (background)
	Photo 10 Date: 06 October 2022 Description: **BH05** facing south. Relevant features: - Unsealed barbecue area (background) - BH05 backfilled located on the concrete hardstand east of the main fire station (foreground)

Photograph	Details
	Photo 11 Date: 06 October 2022 Description: **BH05 core.** 0-2.6 m bgl target depth reached.
	Photo 12 Date: 06 October 2022 Description: **BH06 backfilled** facing east. Relevant features: - Eastern site entrance (Pinn Street) - BH06 on unsealed portion of the concrete driveway / training area

Photograph	Details
	Photo 13 Date: 06 October 2022 Description: **BH06** facing north. Relevant features: - Concrete driveway - Bitumen hardstand (north-east training area)
	Photo 14 Date: 06 October 2022 Description: **BH06 core**. 0-2.6 m bgl target depth reached.

Photograph	Details
	Photo 15 Date: 06 October 2022 Description: **BH07** facing west. Relevant features: - Stormwater drain on concrete hardstand leading off-site
	Photo 16 Date: 06 October 2022 Description: **BH07** facing north. Relevant features: - Bitumen hardstand (north-eastern training area) - Training tower - Drains - Concrete hardstand / driveway (south-eastern training area)

Photograph	Details
	Photo 17 Date: 06 October 2022 Description: **BH07 core.** 0-2.6 m bgl target depth reached.
	Photo 18 Date: 05 October 2022 Description: **BH08** facing east. Relevant features: - Eastern garden bed and Pinn Street (background) - Cracked bitumen in training area (centre) - BH08 backfilled (foreground)
	Photo 19 Date: 05 October 2022 Description: **BH08 core.** 0-2.6 m bgl target depth reached.

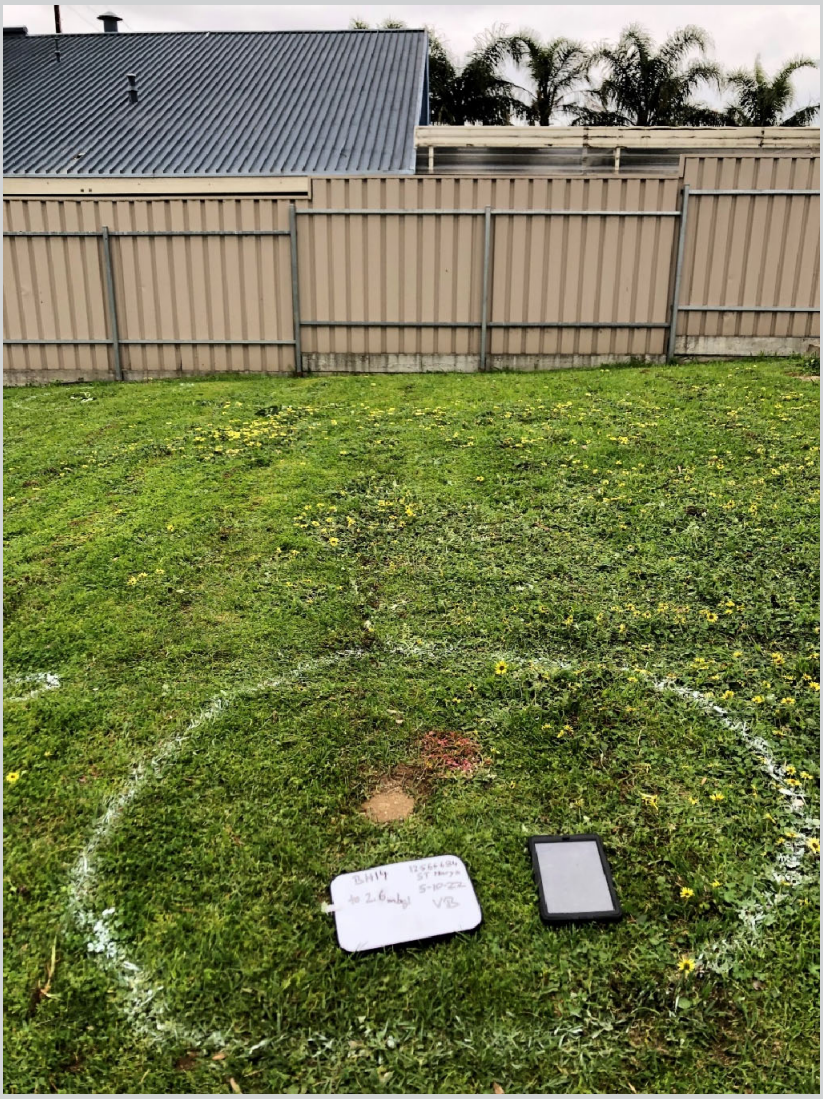
Photograph	Details
	Photo 20 Date: 18 October 2022 Description: **BH09** facing south. Relevant features: - Cracked bitumen hardstand (centre) - BH09 backfilled (foreground) - East west running drains (background) - Concrete hardstand (background)
	Photo 21 Date: 05 October 2022 Description: **BH09 core**. 0-2.6 m bgl target depth reached.

Photograph	Details
	Photo 22 Date: 18 October 2022 Description: **BH10** facing west. Relevant features: - Grass training area with backfilled bore hole (foreground) - Main South Road (background)

Photograph	Details
	Photo 23 Date: 18 October 2022 Description: **BH11** (foreground) facing west. Relevant features: - Grass training area (centre) - South Road (background) - BH11 backfilled (centre foreground)
	Photo 24 Date: 05 October 2022 Description: **BH11 (bottom) and BH10 (top) core.** 0-2.6 m bgl target depth reached.

Photograph	Details
	Photo 25 Date: 05 October 2022 Description: **BH12** facing north. Relevant features: - North-eastern corner of training area - Drill rig (centre)
	Photo 26 Date: 05 October 2022 Description: **BH12 core.** 0-2.6 m bgl target depth reached.

Photograph	Details
	Photo 27 Date: 05 October 2022 Description: **BH12 backfilled** facing south. Relevant features: - Bitumen harstand
	Photo 28 Date: 05 October 2022 Description: **BH13 core.** 0-2.5 mbgl target depth reached.

Photograph	Details
	Photo 29 Date: 19 October 2022 Description: **BH14** facing north Relevant features: - North-east portion of grass training area - BH14 backfilled (foreground)
	Photo 30 Date: 18 October 2022 Description: **BH14** facing east. Relevant features: - Bitumen hardstand training area (background) - Grass training area (foreground) - BH14 backfilled (centre foreground)

Photograph	Details
	Photo 31 Date: 05 October 2022 Description: **BH14 core.** 0-2.6 m bgl target depth reached.
	Photo 32 Date: 05 October 2022 Description: **Organic matter found in BH14 core**
	Photo 33 Date: 05 October 2022 Description: **BH15 core.** 0-2.6 m bgl target depth.

Photograph	Details
	Photo 34 Date: 06 October 2022 Description: **BH01 / MW01 gatic cover** facing south-east. Relevant features: - Unsealed garden bed (background) - Shed – former AFFF storage - Gatic cover installed in concrete hardstand (centre right)
	Photo 35 Date: 06 October 2022 Description: **BH01 / MW01** facing east. Relevant features: - Fruit trees have been removed from site (background) - Installed gatic cover in concrete hardstand area - Shed – former AFFF storage - Diesel fuel bowser - Diesel underground storage tank

Photograph	Details
	Photo 36 Date: 06 October 2022 Description: **BH01 / MW01 gatic cover**
	Photo 37 Date: 17 November 2022 Description: **MW01 gatic cover**

Photograph	Details
	Photo 38 Date: 06 October 2022 Description: **BH01 / MW01 core.** 0-5.5 mbgl target depth reached, advanced to monitoring well
	Photo 39 Date: 07 October 2022 Description: **BH02 / MW02** facing north. Relevant features: - Drill rig (back centre)

Photograph	Details
	Photo 40 Date: 07 October 2022 Description: **BH02 / MW02 gatic cover**
	Photo 41 Date: 07 October 2022 Description: **BH02 / MW02 – facing north**

Photograph	Details
	Photo 42 Date: 07 October 2022 Description: **BH02 / MW02 core.** 0-4 m bgl target depth achieved
	Photo 43 Date: 17 October 2022 Description: **BH03 / MW03** – facing west Relevant features: - Grass training area (foreground) - South Road (background)

Photograph	Details
	Photo 44 Date: 17 October 2022 Description: **BH03 / MW03** – facing east Relevant features: - Grass training area (foreground) - Bitumen hardstand car park / training area (background)
	Photo 45 Date: 17 October 2022 Description: **BH03 / MW03 – facing south** Relevant features: - Grass training area (foreground) - Station building (background)

Photograph	Details
	Photo 46 Date: 17 November 2022 Description: **BH03 / MW03 core.** 0-3.5 m bgl target depth reached, advanced to monitoring well.
	Photo 47 Date: 06 October 2022 Description: **BH04 / MW04 gatic cover** facing west. Relevant features: - Grass training area (foreground) - South Road (background)

Photograph	Details
	Photo 48 Date: 06 October 2022 Description: **BH04 / MW04** facing south.
	Photo 49 Date: 06 October 2022 Description: **BH04 / MW04 gatic cover**

Photograph	Details
	Photo 50 Date: 07 October 2022 Description: **MW04** Inside gatic cover
	Photo 51 Date: 06 October 2022 Description: **BH04 / MW04.** 0-4 m bgl target depth reach advanced to monitoring well

Photograph	Details
	Photo 52 Date: 15 March 2023 Description: **Installation of MW05** at 4 Wingfield Street – facing south. Relevant features: - Drill rig (centre) - Residential yard (right)
	Photo 53 Date: 15 March 2023 Description: **MW05 core**. 0-4.64 mbgl target depth reached.

Photograph	Details
	Photo 54 Date: 15 March 2023 Description: **MW07 Corner** Lagunta Ave and Konando Tce - facing north-west.
	Photo 55 Date: 15 March 2023 Description: **MW07 installation -** facing south-west**.** Relevant features: - Drill rig (centre left) - Lagunta Avenue and Konando Terrace street sign (centre right)

Photograph	Details
	Photo 56 Date: 15 March 2023 Description: **MW07 core.** 0-5.46 m bgl.
	Photo 57 Date: 15 March 2023 Description: **MW07 core.** Relevant features: -

Photograph	Details
	Photo 58 Date: 15 March 2023 Description: **MW07 gatic cover.**

Photograph	Details
	Photo 59 Date: 28 March 2023 Description: **Damaged GW8001b bladder.**

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→ The Power of Commitment

Appendix G

Laboratory Reports and Chain of Custody Documentation

CHAIN OF CUSTODY FORM - Client

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ENVIROLAB GROUP
National phone number 1300 424 344

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

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

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

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

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

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

Client: GHD Pty Ltd	Client Project Name/Number/Site etc (ie report title): 12566684
Contact Person: Vera Biermann	
Project Mgr: Vera Biermann	PO No.: 12566684
Sampler: Vera Biermann	Envirolab Quote No. :
Address: GHD Adelaide, Level 4, 211 Victoria Square, Adelaide SA 5000	Date results required: standard turn around Or choose: standard / same day / 1 day / 2 day / 3 day *Note: Inform lab in advance if urgent turnaround is required - surcharges apply*
Phone: (08) 8111 6958 Mob: 0435981783	Additional report format: esdat / ~~equis~~ / ~~-~~
Email: GHDLabReports@ghd.com vera.biermann@ghd.com ben.petticrew@ghd.com	Lab Comments:

Sample information					Tests Required														Comments
Envirolab Sample ID	Client Sample ID or information	Depth	Date sampled	Type of sample	PFAS - short suite	SA Waste screen	Hold												Provide as much information about the sample as you can
1	BH05_0-0.1	0-0.1	6/10/2022	concrete	x														
2	BH05_0.3-0.5	0.3-0.5	6/10/2022	soil	x														
3	BH05_0.6-0.8	0.6-0.8	6/10/2022	soil			x												
4	BH05_1.1-1.3	1.1-1.3	6/10/2022	soil			x												
5	BH05_1.6-1.8	1.6-1.8	6/10/2022	soil			x												
6	BH05_2.1-2.3	2.1-2.3	6/10/2022	soil			x												
7	BH06_0-0.1	0-0.1	6/10/2022	soil	x														
8	BH06_0.2-0.4	0.2-0.4	6/10/2022	soil	x														
9	BH06_0.7-0.9	0.7-0.9	6/10/2022	soil			x												
10	BH06_1.3-1.5	1.3-1.5	6/10/2022	soil			x												
11	BH06_1.8-2.0	1.8-2.0	6/10/2022	soil			x												
12	BH06_2.4-2.6	2.4-2.6	6/10/2022	soil			x												

ENVIROLAB 25 Research Drive Croydon South VIC 3136 Ph: (03) 9762 2500

Job No: 33940

Date Received 10/10/22

Time Received 8am

Received By: GS

Temp. Cool/Ambient

Cooling: Ice/Icepack 11.2

Security: Intact/Broken/None

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

Relinquished by (Company):	Received by (Company): ENVIROLAB SA.	*Lab Use Only*
Print Name:	Print Name: J. BOWDEN	Job number: / Cooling: ~~Ice~~ / Ice pack / ~~None~~ (office)
Date & Time:	Date & Time: 07-10-22	Temperature: 14.6° (office) / Security seal: Intact / Broken / None
Signature:	Signature:	TAT Req - SAME day / 1 / 2 / 3 / 4 / STD

CHAIN OF CUSTODY FORM - Client

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National phone number 1300 424 344

Sydney Lab - Envirolab Services
12 Ashley St, Chatswood, NSW 2067
① 02 9910 6200 | ✉ sydney@envirolab.com.au

Perth Lab - MPL Laboratories
16-18 Hayden Crt, Myaree, WA 6154
① 08 9317 2505 | ✉ lab@mpl.com.au

Melbourne Lab - Envirolab Services
25 Research Drive, Croydon South, VIC 3136
① 03 9763 2500 | ✉ melbourne@envirolab.com.au

Adelaide Office - Envirolab Services
7a The Parade, Norwood, SA 5067
① 08 7087 6800 | ✉ adelaide@envirolab.com.au

Brisbane Office - Envirolab Services
20a, 10-20 Depot St, Banyo, QLD 4014
① 07 3266 9532 | ✉ brisbane@envirolab.com.au

Darwin Office - Envirolab Services
Unit 20/119 Reichardt Road, Winnellie, NT 0820
① 08 8967 1201 | ✉ darwin@envirolab.com.au

Client: GHD Pty Ltd	Client Project Name/Number/Site etc (le report title): 12566684
Contact Person: Vera Biermann	
Project Mgr: Vera Biermann	PO No.: 12566684
Sampler: Vera Biermann	Envirolab Quote No. :
Address: GHD Adelaide, Level 4, 211 Victoria Square, Adelaide SA 5000	Date results required: standard turn around Or choose: standard / same day / 1 day / 2 day / 3 day *Note: Inform lab in advance if urgent turnaround is required - surcharges apply*
Phone: (08) 8111 6958 Mob: 0435981783	Additional report format: esdat / ~~equis~~ /
Email: GHDLabReports@ghd.com vera.biermann@ghd.com ben.petticrew@ghd.com	Lab Comments:

Sample Information					Tests Required															Comments
Envirolab Sample ID	Client Sample ID or Information	Depth	Date sampled	Type of sample	PFAS - short suite	SA Waste screen	Hold													Provide as much information about the sample as you can
13	BH07_0-0.15	0-0.15	6/10/2022	concrete	x															
14	BH07_0.3-0.5	0.3-0.5	6/10/2022	soil	x															
15	BH07_0.8-1.0	0.8-1.0	6/10/2022	soil			x													
16	BH07_1.3-1.5	1.3-1.5	6/10/2022	soil			x													
17	BH07_1.8-2.0	1.8-2.0	6/10/2022	soil			x													
18	BH07_2.4-2.6	2.4-2.6	6/10/2022	soil			x													
19	BH08_0.0	0-0.04	5/10/2022	bitumen			x													
20	BH08_0.1-0.2	0.1-0.2	5/10/2022	soil	x															
21	BH08_0.5-0.6	0.5-0.6	5/10/2022	soil			x													
22	BH08_0.9-1.0	0.9-1.0	5/10/2022	soil	x															
23	BH08_1.5-1.6	1.5-1.6	5/10/2022	soil			x													
24	BH08_2.0-2.1	2.0-2.1	5/10/2022	soil			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):	Received by (Company): ENVIROLAB SA	*Lab Use Only*	
Print Name:	Print Name: J. BOWDEN	Job number:	Cooling: Ice / Ice pack / None
Date & Time:	Date & Time: 07-10-22	Temperature:	Security seal: Intact / Broken / None
Signature:	Signature:	TAT Req - SAME day / 1 / 2 / 3 / 4 / STD	

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

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

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

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Email: GHDLabReports@ghd.com vera.biermann@ghd.com ben.petticrew@ghd.com	Lab Comments:

Sample Information					Tests Required															Comments
Envirolab Sample ID	Client Sample ID or Information	Depth	Date sampled	Type of sample	PFAS - short suite	SA Waste screen	Hold													Provide as much information about the sample as you can
25	BH08_2.5-2.6	2.5-2.6	5/10/2022	soil																
26	BH09_0.0	0-0.04	5/10/2022	bitumen	x															
27	BH09_0.1-0.3	0.1-0.3	5/10/2022	soil	x															
28	BH09_0.4-0.6	0.4-0.6	5/10/2022	soil			x													
29	BH09_1.0-1.2	1.0-1.2	5/10/2022	soil			x													
30	BH09_1.5-1.6	1.5-1.6	5/10/2022	soil			x													
31	BH09_2.0-2.1	2.0-2.1	5/10/2022	soil			x													
32	BH09_2.5-2.6	2.5-2.6	5/10/2022	soil			x													
33	BH10_0-0.1	0-0.1	5/10/2022	soil	x															
34	BH10_0.3-0.5	0.3-0.5	5/10/2022	soil	x															
35	BH10_0.8-1.0	0.8-1.0	5/10/2022	soil			x													
36	BH10_1.4-1.6	1.4-1.6	5/10/2022	soil			x													

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Relinquished by (Company):	Received by (Company): ENVIROLAB SA.	Lab Use Only	
Print Name:	Print Name: J. BOWDEN	Job number:	Cooling: Ice / Ice pack / None
Date & Time:	Date & Time: 07-10-22	Temperature:	Security seal: Intact / Broken / None
Signature:	Signature:	TAT Req - SAME day / 1 / 2 / 3 / 4 / STD	

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✆ 02 9910 6200 | ✉ sydney@envirolab.com.au

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Sample Information					Tests Required														Comments
Envirolab Sample ID	Client Sample ID or Information	Depth	Date sampled	Type of sample	PFAS - short suite	SA Waste screen	Hold												Provide as much information about the sample as you can
37	BH10_1.9-2.1	1.9-2.1	5/10/2022	soil															
38	BH10_2.4-2.6	2.4-2.6	5/10/2022	soil															
39	BH11_0-0.1	0-0.1	5/10/2022	soil	x														
40	BH11_0.2-0.4	0.2-0.4	5/10/2022	soil	x														
41	BH11_0.7-0.9	0.7-0.9	6/10/2022	soil			x												
42	BH11_1.3-1.5	1.3-1.5	5/10/2022	soil			x												
43	BH11_1.8-2.0	1.8-2.0	5/10/2022	soil			x												
44	BH11_2.4-2.6	2.4-2.6	5/10/2022	soil			x												
45	BH12_0.1-0.2	0.1-0.2	5/10/2022	soil	x														
46	BH12_0.5-0.6	0.5-0.6	5/10/2022	soil	x														
47	BH12_0.9-1.0	0.9-1.0	5/10/2022	soil			x												
48	BH12_1.5-1.6	1.5-1.6	5/10/2022	soil			x												

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

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Sydney Lab - Envirolab Services
12 Ashley St, Chatswood, NSW 2067
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Perth Lab - MPL Laboratories
16-18 Hayden Crt, Myaree, WA 6154
① 08 9317 2505 | ✉ lab@mpl.com.au

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① 03 9763 2500 | ✉ melbourne@envirolab.com.au

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① 07 3266 9532 | ✉ brisbane@envirolab.com.au

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Unit 20/119 Reichardt Road, Winnellie, NT 0820
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Contact Person: Vera Biermann	
Project Mgr: Vera Biermann	PO No.: 12566684
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Email: GHDLabReports@ghd.com vera.biermann@ghd.com ben.petticrew@ghd.com	Lab Comments:

Sample Information					Tests Required																Comments
Envirolab Sample ID	Client Sample ID or Information	Depth	Date sampled	Type of sample	PFAS - short suite	SA Waste screen	Hold														Provide as much information about the sample as you can
49	BH12_2.0-2.1	2.0-2.1	5/10/2022	soil			x														
50	BH12_2.5-2.6	2.5-2.6	5/10/2022	soil			x														
51	BH13_0.0	0-0.04	5/10/2022	soil	x																
52	BH13_0.1-0.3	0.1-0.3	5/10/2022	soil	x																
53	BH13_0.6-0.7	0.6-0.7	5/10/2022	soil			x														
54	BH13_1.0-1.1	1.0-1.1	5/10/2022	soil			x														
55	BH13_1.6-1.7	1.6-1.7	5/10/2022	soil			x														
56	BH13_2.0-2.1	2.0-2.1	5/10/2022	soil			x														
57	BH13_2.4-2.6	2.4-2.6	5/10/2022	soil			x														
58	BH14_0-0.1	0-0.1	5/10/2022	soil	x																
59	BH14_0.2-0.4	0.2-0.4	5/10/2022	soil	x																
60	BH14_0.6-0.8	0.6-0.8	5/10/2022	soil			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):	Received by (Company):	*Lab Use Only*
Print Name:	Print Name:	Job number: / Cooling: Ice / Ice pack / None
Date & Time:	Date & Time: 7-10-22	Temperature: / Security seal: Intact / Broken / None
Signature:	Signature:	TAT Req - SAME day / 1 / 2 / 3 / 4 / STD

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12 Ashley St, Chatswood, NSW 2067
① 02 9910 6200 | ✉ sydney@envirolab.com.au

Perth Lab - MPL Laboratories
16-18 Hayden Crt, Myaree, WA 6154
① 08 9317 2505 | ✉ lab@mpl.com.au

Melbourne Lab - Envirolab Services
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① 03 9763 2500 | ✉ melbourne@envirolab.com.au

Adelaide Office - Envirolab Services
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① 08 7087 6800 | ✉ adelaide@envirolab.com.au

Brisbane Office - Envirolab Services
20a, 10-20 Depot St, Banyo, QLD 4014
① 07 3266 9532 | ✉ brisbane@envirolab.com.au

Darwin Office - Envirolab Services
Unit 20/119 Reichardt Road, Winnellie, NT 0820
① 08 8967 1201 | ✉ darwin@envirolab.com.au

Client: GHD Pty Ltd
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Address: GHD Adelaide, Level 4, 211 Victoria Square, Adelaide SA 5000

Phone: (08) 8111 6958 Mob: 0435981783
Email: GHDLabReports@ghd.com
vera.biermann@ghd.com
ben.petticrew@ghd.com

Client Project Name/Number/Site etc (ie report title):
12566684
PO No.: 12566684
Envirolab Quote No. :
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Or choose: standard / same day / 1 day / 2 day / 3 day
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Additional report format: esdat / ~~equis~~ /
Lab Comments:

Sample information | **Tests Required** | **Comments**

Envirolab Sample ID	Client Sample ID or information	Depth	Date sampled	Type of sample	PFAS - short suite	SA Waste screen	Hold												Provide as much information about the sample as you can
61	BH14_1.1-1.2	1.1-1.2	5/10/2022	soil			x												
62	BH14_1.5-1.6	1.5-1.6	5/10/2022	soil			x												
63	BH14_2.0-2.1	2.0-2.1	5/10/2022	soil			x												
64	BH14_2.5-2.8	2.5-2.6	5/10/2022	soil			x												
65	BH15_0-0.1	0-0.1	5/10/2022	soil	x														
66	BH15_0.2-0.4	0.2-0.4	5/10/2022	soil	x														
67	BH15_0.4-0.6	0.4-0.6	5/10/2022	soil			x												
68	BH15_1.0-1.1	1.0-1.1	5/10/2022	soil			x												
69	BH15_1.5-1.6	1.5-1.6	5/10/2022	soil			x												
70	BH15_2.0-2.1	2.0-2.1	5/10/2022	soil			x												
71	BH15_2.5-2.6	2.5-2.6	5/10/2022	soil			x												
72	MW01_0-0.1	0-0.1	6/10/2022	concrete	x														

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Relinquished by (Company):	Received by (Company):	*Lab Use Only*	
Print Name:	Print Name:	Job number:	Cooling: Ice / Ice pack / None
Date & Time:	Date & Time: 7-10-22	Temperature:	Security seal: Intact / Broken / None
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Sample Information | **Tests Required** | **Comments**

Envirolab Sample ID	Client Sample ID or information	Depth	Date sampled	Type of sample	PFAS - short suite	SA Waste screen	Hold													Provide as much information about the sample as you can
73	MW01_0.1-0.3	0.1-0.3	5/10/2022	soil	x															
74	MW01_0.5-0.7	0.5-0.7	5/10/2022	soil			x													
75	MW01_1.0-1.2	1.0-1.2	5/10/2022	soil			x													
76	MW01_1.5-1.7	1.5-1.7	5/10/2022	soil			x													
77	MW01_2.0-2.2	2.0-2.2	5/10/2022	soil			x													
78	MW01_3.0-3.2	3.0-3.2	5/10/2022	soil			x													
79	MW01_4.0-4.2	4.0-4.2	5/10/2022	soil			x													
80	MW01_5.0-5.2	5.0-5.2	5/10/2022	soil			x													
81	MW04_0-0.1	0-0.1	5/10/2022	soil	x															
82	MW04_0.3-0.5	0.3-0.5	5/10/2022	soil	x															
83	MW04_0.8-1.0	0.8-1.0	5/10/2022	soil			x													
84	MW04_1.3-1.5	1.3-1.5	6/10/2022	soil			x													

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Relinquished by (Company):	Received by (Company):	*Lab Use Only*	
Print Name:	Print Name:	Job number:	Cooling: Ice / Ice pack / None
Date & Time:	Date & Time: 7-10-22	Temperature:	Security seal: Intact / Broken / None
Signature:	Signature:	TAT Req - SAME day / 1 / 2 / 3 / 4 / STD	

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Lab Comments:

Sample Information | **Tests Required** | **Comments**

Envirolab Sample ID	Client Sample ID or information	Depth	Date sampled	Type of sample	PFAS - short suite	SA Waste screen	Hold													Comments
																				Provide as much information about the sample as you can
85	MW04_1.8-2.0	1.8-2.0	6/10/2022	soil			x													
86	MW04_2.3-2.5	2.3-2.5	6/10/2022	soil			x													
87	MW04_2.8-3.0	2.8-3.0	6/10/2022	soil			x													
88	MW04_3.8-4.0	3.8-4.0	6/10/2022	soil			x													
89	SWD-01		6/10/2022	soil	x	x														
90	FD01		5/10/2022	soil			X													
91	FS01		5/10/2022	soil			X													
92	FD02		5/10/2022	soil	x															
—	FS02		5/10/2022	soil	x															
93	FD03		5/10/2022	soil	x															please forward to ALS
—	FS03		5/10/2022	soil	x															
94	FD04		5/10/2022	soil			X													please forward to ALS

☐ *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):	Received by (Company):	*Lab Use Only*	
Print Name:	Print Name:	Job number:	Cooling: Ice / Ice pack / None
Date & Time:	Date & Time: 7-10-22	Temperature:	Security seal: Intact / Broken / None
Signature:	Signature:	TAT Req - SAME day / 1 / 2 / 3 / 4 / STD	

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National phone number 1300 424 344

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12 Ashley St, Chatswood, NSW 2067
02 9910 6200 | sydney@envirolab.com.au

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

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

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

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

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

Client: GHD Pty Ltd	Client Project Name/Number/Site etc (ie report title): 12566684
Contact Person: Vera Biermann	PO No.: 12566684
Project Mgr: Vera Biermann	Envirolab Quote No. :
Sampler: Vera Biermann	Date results required: standard turn around
Address: GHD Adelaide, Level 4, 211 Victoria Square, Adelaide SA 5000	Or choose: standard / same day / 1 day / 2 day / 3 day *Note: Inform lab in advance if urgent turnaround is required - surcharges apply*
Phone: (08) 8111 6958 Mob: 0435981783	Additional report format: esdat / ~~equis~~
Email: GHDLabReports@ghd.com vera.biermann@ghd.com ben.petticrew@ghd.com	Lab Comments:

Sample information | **Tests Required** | **Comments**

Envirolab Sample ID	Client Sample ID or information	Depth	Date sampled	Type of sample	PFAS - short suite	SA Waste screen	Hold	Comments
95	FS04		5/10/2022	soil			X	
96	FD05		5/10/2022	soil			X	
97	FS05		5/10/2022	soil			X	
98	FD06		6/10/2022	soil	x			
——→	FS06		6/10/2022	soil	x			
99	FD07		6/10/2022	soil			X	please forward to ALS
100	FS07		6/10/2022	soil			X	
101	FD08		6/10/2022	soil			X	
102	FS08		6/10/2022	soil			X	
103	RB01		5/10/2022	water	x			
104	RB02		6/10/2022	water	x			
105	FB01		5/10/2022	water	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):	Received by (Company):	*Lab Use Only*
Print Name:	Print Name:	Job number: / Cooling: Ice / Ice pack / None
Date & Time:	Date & Time: 7-10-22	Temperature: / Security seal: Intact / Broken / None
Signature:	Signature:	TAT Req - SAME day / 1 / 2 / 3 / 4 / STD

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12 Ashley St, Chatswood, NSW 2067
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Melbourne Lab - Envirolab Services
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① 03 9763 2500 | ✉ melbourne@envirolab.com.au

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Darwin Office - Envirolab Services
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① 08 8967 1201 | ✉ darwin@envirolab.com.au

Client: GHD Pty Ltd
Contact Person: Vera Biermann
Project Mgr: Vera Biermann
Sampler: Vera Biermann
Address: GHD Adelaide, Level 4, 211 Victoria Square, Adelaide SA 5000

Phone: (08) 8111 6958 Mob: 0435981783
Email: GHDLabReports@ghd.com
vera.biermann@ghd.com
ben.petticrew@ghd.com

Client Project Name/Number/Site etc (ie report title): 12566684
PO No.: 12566684
Envirolab Quote No. :
Date results required: standard turn around
Or choose: standard / same day / 1 day / 2 day / 3 day
Note: Inform lab in advance if urgent turnaround is required - surcharges apply
Additional report format: esdat / ~~equis~~ /
Lab Comments:

Sample information | **Tests Required**

Envirolab Sample ID	Client Sample ID or information	Depth	Date sampled	Type of sample	PFAS - short suite	SA Waste screen	Hold	Comments
106	FB02		6/10/2022	water	x			Provide as much information about the sample as you can
107	MW02_0-0.1	0-0.1	7-10-22	Soil	X			
108	MW02_0.3-0.5	0.3-0.5	"	"	X			
109	MW02_1.0-1.2	1.0-1.2	"	"		X	X	
110	MW02_1.5-1.7	1.5-1.7	"	"		X	X	
111	MW02_2.0-2.2	2.0-2.2	"	"		X	X	
112	MW02_2.7-2.9	2.7-2.9	"	"		X	X	
113	MW02_3.7-3.9	3.7-3.9	"	"		X	X	
114	MW03_0-0.1	0-0.1	"	"	X			
115	MW03_0.3-0.5	0.3-0.5	"	"	X			
116	MW03_0.9-1.1	0.9-1.1	"	"		X	X	
117	MW03_1.4-1.6	1.4-1.6	"	"		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):	Received by (Company):	*Lab Use Only*	
Print Name:	Print Name:	Job number:	Cooling: Ice / Ice pack / None
Date & Time:	Date & Time: 7-10-22	Temperature:	Security seal: Intact / Broken / None
Signature:	Signature:	TAT Req - SAME day / 1 / 2 / 3 / 4 / STD	

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Client: GHD Pty Ltd	Client Project Name/Number/Site etc (ie report title): 12566684
Contact Person: Vera Biermann	
Project Mgr: Vera Biermann	PO No.: 12566684
Sampler: Vera Biermann	Envirolab Quote No. :
Address: GHD Adelaide, Level 4, 211 Victoria Square, Adelaide SA 5000	Date results required: standard turn around Or choose: standard / same day / 1 day / 2 day / 3 day *Note: Inform lab in advance if urgent turnaround is required - surcharges apply*
Phone: (08) 8111 6958 Mob: 0435981783	Additional report format: esdat / equis /
Email: GHDLabReports@ghd.com vera.biermann@ghd.com ben.petticrew@ghd.com	Lab Comments:

Sample Information					Tests Required																Comments
Envirolab Sample ID	Client Sample ID or information	Depth	Date sampled	Type of sample	PFAS - short suite	SA Waste screen	Hold														Provide as much information about the sample as you can
118	MW03_1.9-2.1	1.9-2.1	7-10-22	soil			X														
119	MW03_2.4-2.6	2.4-2.6	"	"			X														
120	MW03_3.2-3.4	3.2-3.4	"	"			X														
121	FD09		"	"			X														
122	FS09		"	"			X														
123	FD10		"	"			X														
124	FS10		"	"			X														
125	RB03		"	Water	X																
126	FB03		"	Water	X																
127	SWD-02		"	soil	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):	Received by (Company):	*Lab Use Only*	
Print Name:	Print Name:	Job number:	Cooling: Ice / Ice pack / None
Date & Time:	Date & Time: 7-10-22	Temperature:	Security seal: Intact / Broken / None
Signature:	Signature:	TAT Req - SAME day / 1 / 2 / 3 / 4 / STD	

Sample Receipt Melbourne

From: Vera Biermann <Vera.Biermann@ghd.com>
Sent: Monday, 10 October 2022 11:54 AM
To: Sample Receipt Melbourne
Cc: Gemma Sliz; Ben Petticrew
Subject: RE: Project 12566684

CAUTION: This email originated from outside of the organisation. Do not act on instructions, click links or open attachments unless you recognise the sender and know the content is authentic and safe.

Hi Alisha,

Thank you for sending the photos. Following review of our records the extra sample BH11_1.4-1.6 should have been labelled BH10_1.4-1.6.

I'm not sure what happened to BH11_2.4-2.6.

Can you please email me a sample receipt and a copy of the completed COC?

Thanks and regards
Vera

Vera Biermann (she/her)
PhD Environmental Engineering
Environmental Engineer

(Available Mondays, Tuesdays, Thursdays and Fridays 9.30-17.00)

GHD
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Level 4 211 Victoria Square Adelaide SA 5000 Australia
D +61 8 8111 6958 M +61 435 981 783 E vera.biermann@ghd.com

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Connect

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From: Sample Receipt Melbourne <loginvic@envirolab.com.au>
Sent: Monday, 10 October 2022 10:56 AM
To: Vera Biermann <Vera.Biermann@ghd.com>
Cc: Gemma Sliz <G5liz@envirolab.com.au>; Ben Petticrew <Ben.Petticrew@ghd.com>
Subject: RE: Project 12566684

You don't often get email from loginvic@envirolab.com.au. Learn why this is important

Hi Vera,

Please find attached photos.

Regards,
Alisha

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

Client	GHD SA
Attention	Vera Biermann

Sample Login Details

Your reference	12566684
Envirolab Reference	33940
Date Sample Received	10/10/2022
Date Instructions Received	10/10/2022
Date Results Expected to be Reported	17/10/2022

Sample Condition

Samples received in appropriate condition for analysis	Yes
No. of Samples Provided	121 Soil, 6 Water
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	11.2
Cooling Method	Ice Pack
Sampling Date Provided	YES

Comments

Nil

Please direct any queries to:

Pamela Adams	Chris De Luca
Phone: 03 9763 2500	**Phone: 03 9763 2500**
Fax: 03 9763 2633	**Fax: 03 9763 2633**
Email: padams@envirolab.com.au	**Email: cdeluca@envirolab.com.au**

Analysis Underway, details 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	PCE in soil	vTRH(C6-C10)/BTEXN in Soil	TRH Soil C10-C40 NEPM	PAHs in Soil	Speciated Phenols in Soil	OCP in Soil	PCBsin Soil	SA waste screen metals in soil	Total Cyanide	Hexavalent Chromium, Cr6+	PFAS in Soil Short	PFAS in Water Short	On Hold
BH05_0-0.1											✓		
BH05_0.3-0.5											✓		
BH05_0.6-0.8													✓
BH05_1.1-1.3													✓
BH05_1.6-1.8													✓
BH05_2.1-2.3													✓
BH06_0-0.1											✓		
BH06_0.2-0.4											✓		
BH06_0.7-0.9													✓
BH06_1.3-1.5													✓
BH06_1.8-2.0													✓
BH06_2.4-2.6													✓
BH07_0-0.15											✓		
BH07_0.3-0.5											✓		
BH07_0.8-1.0													✓
BH07_1.3-1.5													✓
BH07_1.8-2.0													✓
BH07_2.4-2.6													✓
BH08_0.0													✓
BH08_0.1-0.2											✓		
BH08_0.5-0.6													✓
BH08_0.9-1.0											✓		
BH08_1.5-1.6													✓
BH08_2.0-2.1													✓
BH08_2.5-2.6													✓
BH09_0.0											✓		
BH09_0.1-0.3											✓		
BH09_0.4-0.6													✓
BH09_1.0-1.2													✓
BH09_1.5-1.6													✓
BH09_2.0-2.1													✓
BH09_2.5-2.6													✓

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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	PCE in soil	vTRH(C6-C10)/BTEXN in Soil	TRH Soil C10-C40 NEPM	PAHs in Soil	Speciated Phenols in Soil	OCP in Soil	PCBsin Soil	SA waste screen metals in soil	Total Cyanide	Hexavalent Chromium, Cr6+	PFAS in Soil Short	PFAS in Water Short	On Hold
BH10_0-0.1											✓		
BH10_0.3-0.5											✓		
BH10_0.8-1.0													✓
BH10_1.4-1.6													✓
BH10_1.9-2.1													✓
BH10_2.4-2.6													✓
BH11_0-0.1											✓		
BH11_0.2-0.4											✓		
BH11_0.7-0.9													✓
BH11_1.3-1.5													✓
BH11_1.8-2.0													✓
BH11_2.4-2.6													✓
BH12_0.1-0.2											✓		
BH12_0.5-0.6											✓		
BH12_0.9-1.0													✓
BH12_1.5-1.6													✓
BH12_2.0-2.1													✓
BH12_2.5-2.6													✓
BH13_0.0											✓		
BH13_0.1-0.3											✓		
BH13_0.6-0.7													✓
BH13_1.0-1.1													✓
BH13_1.6-1.7													✓
BH13_2.0-2.1													✓
BH13_2.4-2.6													✓
BH14_0-0.1											✓		
BH14_0.2-0.4											✓		
BH14_0.6-0.8													✓
BH14_1.1-1.2													✓
BH14_1.5-1.6													✓
BH14_2.0-2.1													✓
BH14_2.5-2.6													✓

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Sample ID	PCE in soil	vTRH(C6-C10)/BTEXN in Soil	TRH Soil C10-C40 NEPM	PAHs in Soil	Speciated Phenols in Soil	OCP in Soil	PCBsin Soil	SA waste screen metals in soil	Total Cyanide	Hexavalent Chromium, Cr6+	PFAS in Soil Short	PFAS in Water Short	On Hold
BH15_0-0.1											✓		
BH15_0.2-0.4											✓		
BH15_0.4-0.6													✓
BH15_1.0-1.1													✓
BH15_1.5-1.6													✓
BH15_2.0-2.1													✓
BH15_2.5-2.6													✓
MW01_0-0.01											✓		
MW01_0.1-0.3											✓		
MW01_0.5-0.7													✓
MW01_1.0-1.2													✓
MW01_1.5-1.7													✓
MW01_2.0-2.2													✓
MW01_3.0-3.2													✓
MW01_4.0-4.2													✓
MW01_5.0-5.2													✓
MW04_0-0.1											✓		
MW04_0.3-0.5											✓		
MW04_0.8-1.0													✓
MW04_1.3-1.5													✓
MW04_1.8-2.0													✓
MW04_2.3-2.5													✓
MW04_2.8-3.0													✓
MW04_3.8-4.0													✓
SWD-01	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
FD01													✓
FS01													✓
FD02											✓		
FD03											✓		
FD04													✓
FS04													✓
FD05													✓

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ABN 37 112 535 645 - 002
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ph 03 9763 2500 fax 03 9763 2633
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www.envirolab.com.au

Sample ID	PCE in soil	vTRH(C6-C10)/BTEXN in Soil	TRH Soil C10-C40 NEPM	PAHs in Soil	Speciated Phenols in Soil	OCP in Soil	PCBsin Soil	SA waste screen metals in soil	Total Cyanide	Hexavalent Chromium, Cr6+	PFAS in Soil Short	PFAS in Water Short	On Hold
FS05													✓
FD06											✓		
FD07													✓
FS07													✓
FD08													✓
FS08													✓
RB01												✓	
RB02												✓	
FB01												✓	
FB02												✓	
MW02_0-0.1											✓		
MW02_0.3-0.5											✓		
MW02_1.0-1.2													✓
MW02_1.5-1.7													✓
MW02_2.0-2.2													✓
MW02_2.7-2.9													✓
MW02_3.7-3.9													✓
MW03_0-0.1											✓		
MW03_0.3-0.5											✓		
MW03_0.9-1.1													✓
MW03_1.4-1.6													✓
MW03_1.9-2.1													✓
MW03_2.4-2.6													✓
MW03_3.2-3.4													✓
FD09													✓
FS09													✓
FD10													✓
FS10													✓
RB03												✓	
FB03												✓	
SWD-02	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		

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

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ABN 37 112 535 645 - 002
25 Research Drive Croydon South VIC 3136
ph 03 9763 2500 fax 03 9763 2633
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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.

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CERTIFICATE OF ANALYSIS 33940

Client Details

Client	GHD SA
Attention	Vera Biermann
Address	Level 4, 211 Victoria Square, Adelaide, SA, 5000

Sample Details

Your Reference	**12566684**
Number of Samples	1 Concretre, 116 Soil, 2 Concrete, 2 Bitumen, 6 Water
Date samples received	10/10/2022
Date completed instructions received	10/10/2022

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	17/10/2022
Date of Issue	17/10/2022

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Results Approved By
Chaminda Gunasekara, Inorganics Supervisor
Chris De Luca, Operations Manager
Phalak Inthakesone, Group Organics Manager
Tianna Milburn, Chemist

Authorised By

Pamela Adams, Laboratory Manager

PCE in soil			
Our Reference		33940-89	33940-127
Your Reference	UNITS	SWD-01	SWD-02
Date Sampled		06/10/2022	07/10/2022
Type of sample		Soil	Soil
Date extracted	-	11/10/2022	11/10/2022
Date analysed	-	11/10/2022	11/10/2022
Tetrachloroethene	mg/kg	<0.5	<0.5
Surrogate Dibromofluoromethane	%	99	98
Surrogate aaa-Trifluorotoluene	%	86	92
Surrogate Toluene-d_8	%	99	99
Surrogate 4-Bromofluorobenzene	%	101	102

vTRH(C6-C10)/BTEXN in Soil			
Our Reference		33940-89	33940-127
Your Reference	UNITS	SWD-01	SWD-02
Date Sampled		06/10/2022	07/10/2022
Type of sample		Soil	Soil
Date extracted	-	11/10/2022	11/10/2022
Date analysed	-	11/10/2022	11/10/2022
vTRH C_6 - C_9	mg/kg	<25	<25
vTRH C_6 - C_{10}	mg/kg	<25	<25
TRH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25
Benzene	mg/kg	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1
m+p-xylene	mg/kg	<2	<2
o-Xylene	mg/kg	<1	<1
Naphthalene	mg/kg	<1	<1
Total BTEX	mg/kg	<1	<1
Total +ve Xylenes	mg/kg	<1	<1
Surrogate aaa-Trifluorotoluene	%	83	88

TRH Soil C10-C40 NEPM			
Our Reference		33940-89	33940-127
Your Reference	UNITS	SWD-01	SWD-02
Date Sampled		06/10/2022	07/10/2022
Type of sample		Soil	Soil
Date extracted	-	11/10/2022	11/10/2022
Date analysed	-	11/10/2022	11/10/2022
TRH C_{10} - C_{14}	mg/kg	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100
Total +ve TRH (C10-C36)	mg/kg	<50	<50
TRH >C_{10} -C_{16}	mg/kg	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50
Surrogate o-Terphenyl	%	85	82

PAHs in Soil			
Our Reference	UNITS	33940-89	33940-127
Your Reference		SWD-01	SWD-02
Date Sampled		06/10/2022	07/10/2022
Type of sample		Soil	Soil
Date extracted	-	11/10/2022	11/10/2022
Date analysed	-	12/10/2022	12/10/2022
Naphthalene	mg/kg	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1
Benzo(b,j&k)fluoranthene	mg/kg	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1
Total +ve PAH's	mg/kg	<0.05	<0.05
Benzo(a)pyrene TEQ calc (Zero)	mg/kg	<0.5	<0.5
Benzo(a)pyrene TEQ calc (Half)	mg/kg	<0.5	<0.5
Benzo(a)pyrene TEQ calc (PQL)	mg/kg	<0.5	<0.5
Surrogate p-Terphenyl-d_{14}	%	82	84

Speciated Phenols in Soil			
Our Reference		33940-89	33940-127
Your Reference	UNITS	SWD-01	SWD-02
Date Sampled		06/10/2022	07/10/2022
Type of sample		Soil	Soil
Date extracted	-	11/10/2022	11/10/2022
Date analysed	-	12/10/2022	12/10/2022
Phenol	mg/kg	<0.2	<0.2
2-Chlorophenol	mg/kg	<0.2	<0.2
2-Methylphenol	mg/kg	<0.2	<0.2
3/4-Methylphenol	mg/kg	<0.4	<0.4
2-Nitrophenol	mg/kg	<0.2	<0.2
2,4-Dimethylphenol	mg/kg	<0.2	<0.2
2,4-Dichlorophenol	mg/kg	<0.2	<0.2
2,6-Dichlorophenol	mg/kg	<0.2	<2
2,4,5-Trichlorophenol	mg/kg	<0.2	<0.2
2,4,6-Trichlorophenol	mg/kg	<0.2	<0.2
2,4-Dinitrophenol	mg/kg	<2	<2
4-Nitrophenol	mg/kg	<4	<4
2,3,4,6-Tetrachlorophenol	mg/kg	<0.2	<0.2
Pentachlorophenol	mg/kg	<1	<5
4-Chloro-3-Methylphenol	mg/kg	<2	<2
Total +ve Cresols	mg/kg	<0.2	<0.2
Total +ve Phenols	mg/kg	<0.2	<0.2
Total +ve Phenols Halogenated	mg/kg	<0.02	<0.02
Total +ve Phenols non-Halogenated	mg/kg	<5	<5
Surrogate Phenol-d_6	%	62	62
Surrogate 2-fluorophenol	%	60	62

OCP in Soil			
Our Reference	UNITS	33940-89	33940-127
Your Reference		SWD-01	SWD-02
Date Sampled		06/10/2022	07/10/2022
Type of sample		Soil	Soil
Date extracted	-	11/10/2022	11/10/2022
Date analysed	-	12/10/2022	12/10/2022
alpha-BHC	mg/kg	<0.1	<0.1
Hexachlorobenzene	mg/kg	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1
Total +ve reported Aldrin + Dieldrin	mg/kg	<0.1	<0.1
Total +ve reported DDT+DDD+DDE	mg/kg	<0.1	<0.1
Surrogate 2-chlorophenol-d4	%	66	68

PCBs in Soil			
Our Reference		33940-89	33940-127
Your Reference	UNITS	SWD-01	SWD-02
Date Sampled		06/10/2022	07/10/2022
Type of sample		Soil	Soil
Date extracted	-	11/10/2022	11/10/2022
Date analysed	-	12/10/2022	12/10/2022
Aroclor 1016	mg/kg	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1
Surrogate 2-fluorobiphenyl	%	82	82

SA waste screen metals in soil			
Our Reference		33940-89	33940-127
Your Reference	UNITS	SWD-01	SWD-02
Date Sampled		06/10/2022	07/10/2022
Type of sample		Soil	Soil
Date digested	-	11/10/2022	11/10/2022
Date analysed	-	11/10/2022	11/10/2022
Arsenic	mg/kg	5	14
Silver	mg/kg	<1	<1
Barium	mg/kg	110	59
Beryllium	mg/kg	<1	<1
Cadmium	mg/kg	<0.4	<0.4
Chromium	mg/kg	35	30
Cobalt	mg/kg	11	6
Copper	mg/kg	220	17
Lead	mg/kg	420	30
Manganese	mg/kg	290	230
Molybdenum	mg/kg	37	1
Mercury	mg/kg	<0.1	<0.1
Nickel	mg/kg	17	8
Zinc	mg/kg	150	100
Trivalent Cr	mg/kg	35	30

Misc Inorg - soil SA waste			
Our Reference		33940-89	33940-127
Your Reference	UNITS	SWD-01	SWD-02
Date Sampled		06/10/2022	07/10/2022
Type of sample		Soil	Soil
Date prepared	-	11/10/2022	11/10/2022
Date analysed	-	11/10/2022	11/10/2022
Total Cyanide	mg/kg	<0.5	<0.5
Hexavalent Chromium, Cr^{6+}	mg/kg	<1	<1

Moisture						
Our Reference		33940-1	33940-2	33940-7	33940-8	33940-13
Your Reference	UNITS	BH05_0-0.1	BH05_0.3-0.5	BH06_0-0.1	BH06_0.2-0.4	BH07_0-0.15
Date Sampled		06/10/2022	06/10/2022	06/10/2022	06/10/2022	06/10/2022
Type of sample		Concretre	Soil	Soil	Soil	Concrete
Date prepared	-	11/10/2022	11/10/2022	11/10/2022	11/10/2022	11/10/2022
Date analysed	-	12/10/2022	12/10/2022	12/10/2022	12/10/2022	12/10/2022
Moisture	%	2.9	12	23	13	4.3

Moisture						
Our Reference		33940-14	33940-20	33940-22	33940-26	33940-27
Your Reference	UNITS	BH07_0.3-0.5	BH08_0.1-0.2	BH08_0.9-1.0	BH09_0.0	BH09_0.1-0.3
Date Sampled		06/10/2022	05/10/2022	05/10/2022	05/10/2022	05/10/2022
Type of sample		Soil	Soil	Soil	Bitumen	Soil
Date prepared	-	11/10/2022	11/10/2022	11/10/2022	11/10/2022	11/10/2022
Date analysed	-	12/10/2022	12/10/2022	12/10/2022	12/10/2022	12/10/2022
Moisture	%	7.0	3.7	21	0.7	4.8

Moisture						
Our Reference		33940-33	33940-34	33940-39	33940-40	33940-45
Your Reference	UNITS	BH10_0-0.1	BH10_0.3-0.5	BH11_0-0.1	BH11_0.2-0.4	BH12_0.1-0.2
Date Sampled		05/10/2022	05/10/2022	05/10/2022	05/10/2022	05/10/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	11/10/2022	11/10/2022	11/10/2022	11/10/2022	11/10/2022
Date analysed	-	12/10/2022	12/10/2022	12/10/2022	12/10/2022	12/10/2022
Moisture	%	20	15	18	13	4.9

Moisture						
Our Reference		33940-46	33940-51	33940-52	33940-58	33940-59
Your Reference	UNITS	BH12_0.5-0.6	BH13_0.0	BH13_0.1-0.3	BH14_0-0.1	BH14_0.2-0.4
Date Sampled		05/10/2022	05/10/2022	05/10/2022	05/10/2022	05/10/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	11/10/2022	11/10/2022	11/10/2022	11/10/2022	11/10/2022
Date analysed	-	12/10/2022	12/10/2022	12/10/2022	12/10/2022	12/10/2022
Moisture	%	11	1.1	5.1	26	10

Moisture						
Our Reference		33940-65	33940-66	33940-72	33940-73	33940-81
Your Reference	UNITS	BH15_0-0.1	BH15_0.2-0.4	MW01_0-0.01	MW01_0.1-0.3	MW04_0-0.1
Date Sampled		05/10/2022	05/10/2022	06/10/2022	05/10/2022	05/10/2022
Type of sample		Soil	Soil	Concrete	Soil	Soil
Date prepared	-	11/10/2022	11/10/2022	11/10/2022	11/10/2022	11/10/2022
Date analysed	-	12/10/2022	12/10/2022	12/10/2022	12/10/2022	12/10/2022
Moisture	%	14	13	4.7	4.4	25

Moisture						
Our Reference		33940-82	33940-89	33940-92	33940-93	33940-98
Your Reference	UNITS	MW04_0.3-0.5	SWD-01	FD02	FD03	FD06
Date Sampled		05/10/2022	06/10/2022	05/10/2022	05/10/2022	06/10/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	11/10/2022	11/10/2022	11/10/2022	11/10/2022	11/10/2022
Date analysed	-	12/10/2022	12/10/2022	12/10/2022	12/10/2022	12/10/2022
Moisture	%	12	15	19	10	11

Moisture						
Our Reference		33940-107	33940-108	33940-114	33940-115	33940-127
Your Reference	UNITS	MW02_0-0.1	MW02_0.3-0.5	MW03_0-0.1	MW03_0.3-0.5	SWD-02
Date Sampled		07/10/2022	07/10/2022	07/10/2022	07/10/2022	07/10/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	11/10/2022	11/10/2022	11/10/2022	11/10/2022	11/10/2022
Date analysed	-	12/10/2022	12/10/2022	12/10/2022	12/10/2022	12/10/2022
Moisture	%	17	13	25	13	18

PFAS in Soil Short						
Our Reference		33940-1	33940-2	33940-7	33940-8	33940-13
Your Reference	UNITS	BH05_0-0.1	BH05_0.3-0.5	BH06_0-0.1	BH06_0.2-0.4	BH07_0-0.15
Date Sampled		06/10/2022	06/10/2022	06/10/2022	06/10/2022	06/10/2022
Type of sample		Concretre	Soil	Soil	Soil	Concrete
Date prepared	-	11/10/2022	12/10/2022	12/10/2022	12/10/2022	11/10/2022
Date analysed	-	11/10/2022	12/10/2022	12/10/2022	12/10/2022	11/10/2022
Perfluorohexanesulfonic acid PFHxS	µg/kg	0.7	56	7.0	4.7	0.2
Perfluorooctanesulfonic acid PFOS	µg/kg	3.4	610	62	48	0.9
Perfluorooctanoic acid PFOA	µg/kg	0.2	5.2	3.1	2.4	<0.1
6:2 FTS	µg/kg	3.8	<0.1	0.7	<0.1	0.3
8:2 FTS	µg/kg	0.3	<0.2	1	<0.2	1
Surrogate $^{13}C_8$ PFOS	%	101	100	97	97	101
Surrogate $^{13}C_2$ PFOA	%	100	101	99	101	99
Extracted ISTD $^{18}O_2$ *PFHxS*	%	106	90	105	105	84
Extracted ISTD $^{13}C_4$ *PFOS*	%	98	92	82	100	83
Extracted ISTD $^{13}C_4$ *PFOA*	%	102	94	88	116	76
Extracted ISTD $^{13}C_2$ *6:2FTS*	%	102	91	92	120	70
Extracted ISTD $^{13}C_2$ *8:2FTS*	%	106	96	59	109	68
Total Positive PFHxS & PFOS	µg/kg	4.1	670	69	52	1.1
Total Positive PFOS & PFOA	µg/kg	3.6	620	65	50	0.9
Total Positive PFAS	µg/kg	8.4	670	74	55	2.4

PFAS in Soil Short						
Our Reference		33940-14	33940-20	33940-22	33940-26	33940-27
Your Reference	UNITS	BH07_0.3-0.5	BH08_0.1-0.2	BH08_0.9-1.0	BH09_0.0	BH09_0.1-0.3
Date Sampled		06/10/2022	05/10/2022	05/10/2022	05/10/2022	05/10/2022
Type of sample		Soil	Soil	Soil	Bitumen	Soil
Date prepared	-	12/10/2022	12/10/2022	12/10/2022	12/10/2022	12/10/2022
Date analysed	-	12/10/2022	12/10/2022	12/10/2022	12/10/2022	12/10/2022
Perfluorohexanesulfonic acid PFHxS	µg/kg	1.4	0.6	170	10	9.6
Perfluorooctanesulfonic acid PFOS	µg/kg	140	12	66	100	170
Perfluorooctanoic acid PFOA	µg/kg	0.9	0.1	20	1.2	3.6
6:2 FTS	µg/kg	9.8	0.9	0.3	<0.5	0.1
8:2 FTS	µg/kg	28	32	<0.2	<1	0.4
Surrogate $^{13}C_8$ PFOS	%	102	98	98	93	102
Surrogate $^{13}C_2$ PFOA	%	101	101	100	96	101
Extracted ISTD $^{18}O_2$ *PFHxS*	%	104	110	94	107	109
Extracted ISTD $^{13}C_4$ *PFOS*	%	95	105	105	106	94
Extracted ISTD $^{13}C_4$ *PFOA*	%	103	109	101	110	109
Extracted ISTD $^{13}C_2$ *6:2FTS*	%	100	113	105	109	111
Extracted ISTD $^{13}C_2$ *8:2FTS*	%	105	119	111	117	105
Total Positive PFHxS & PFOS	µg/kg	140	13	240	110	180
Total Positive PFOS & PFOA	µg/kg	140	12	87	100	180
Total Positive PFAS	µg/kg	180	46	260	110	190

PFAS in Soil Short						
Our Reference		33940-33	33940-34	33940-39	33940-40	33940-45
Your Reference	UNITS	BH10_0-0.1	BH10_0.3-0.5	BH11_0-0.1	BH11_0.2-0.4	BH12_0.1-0.2
Date Sampled		05/10/2022	05/10/2022	05/10/2022	05/10/2022	05/10/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	12/10/2022	12/10/2022	12/10/2022	12/10/2022	12/10/2022
Date analysed	-	12/10/2022	12/10/2022	12/10/2022	12/10/2022	12/10/2022
Perfluorohexanesulfonic acid PFHxS	µg/kg	3.3	1.7	4.5	3.6	0.9
Perfluorooctanesulfonic acid PFOS	µg/kg	160	150	110	300	2.6
Perfluorooctanoic acid PFOA	µg/kg	4.6	1.3	1.4	1.2	0.1
6:2 FTS	µg/kg	1.4	1.3	0.4	1.2	0.2
8:2 FTS	µg/kg	1	0.8	0.4	2	<0.2
Surrogate $^{13}C_8$ PFOS	%	104	95	98	99	93
Surrogate $^{13}C_2$ PFOA	%	98	101	99	101	100
Extracted ISTD $^{18}O_2$ *PFHxS*	%	106	109	101	101	107
Extracted ISTD $^{13}C_4$ *PFOS*	%	95	97	97	94	107
Extracted ISTD $^{13}C_4$ *PFOA*	%	108	113	108	103	110
Extracted ISTD $^{13}C_2$ *6:2FTS*	%	110	115	108	107	119
Extracted ISTD $^{13}C_2$ *8:2FTS*	%	115	107	107	109	127
Total Positive PFHxS & PFOS	µg/kg	160	160	120	310	3.4
Total Positive PFOS & PFOA	µg/kg	160	160	120	300	2.7
Total Positive PFAS	µg/kg	170	160	120	310	3.8

PFAS in Soil Short						
Our Reference		33940-46	33940-51	33940-52	33940-58	33940-59
Your Reference	UNITS	BH12_0.5-0.6	BH13_0.0	BH13_0.1-0.3	BH14_0-0.1	BH14_0.2-0.4
Date Sampled		05/10/2022	05/10/2022	05/10/2022	05/10/2022	05/10/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	12/10/2022	12/10/2022	12/10/2022	12/10/2022	12/10/2022
Date analysed	-	12/10/2022	12/10/2022	12/10/2022	12/10/2022	12/10/2022
Perfluorohexanesulfonic acid PFHxS	µg/kg	64	7.2	1.2	21	12
Perfluorooctanesulfonic acid PFOS	µg/kg	820	71	35	670	4,100
Perfluorooctanoic acid PFOA	µg/kg	5.7	0.5	0.1	1.7	1.5
6:2 FTS	µg/kg	2.1	<0.1	<0.1	<0.1	<0.1
8:2 FTS	µg/kg	0.4	<0.2	<0.2	0.2	5.1
Surrogate $^{13}C_8$ PFOS	%	95	99	95	100	98
Surrogate $^{13}C_2$ PFOA	%	101	100	99	101	100
Extracted ISTD $^{18}O_2$ *PFHxS*	%	102	110	109	104	102
Extracted ISTD $^{13}C_4$ *PFOS*	%	95	81	103	98	94
Extracted ISTD $^{13}C_4$ *PFOA*	%	105	115	108	100	108
Extracted ISTD $^{13}C_2$ *6:2FTS*	%	107	131	107	105	124
Extracted ISTD $^{13}C_2$ *8:2FTS*	%	111	85	130	98	125
Total Positive PFHxS & PFOS	µg/kg	890	78	36	690	4,100
Total Positive PFOS & PFOA	µg/kg	830	71	35	680	4,100
Total Positive PFAS	µg/kg	900	79	36	700	4,100

PFAS in Soil Short						
Our Reference		33940-65	33940-66	33940-72	33940-73	33940-81
Your Reference	UNITS	BH15_0-0.1	BH15_0.2-0.4	MW01_0-0.01	MW01_0.1-0.3	MW04_0-0.1
Date Sampled		05/10/2022	05/10/2022	06/10/2022	05/10/2022	05/10/2022
Type of sample		Soil	Soil	Concrete	Soil	Soil
Date prepared	-	12/10/2022	12/10/2022	11/10/2022	12/10/2022	12/10/2022
Date analysed	-	12/10/2022	12/10/2022	11/10/2022	12/10/2022	12/10/2022
Perfluorohexanesulfonic acid PFHxS	µg/kg	1.4	1.1	11	98	3.9
Perfluorooctanesulfonic acid PFOS	µg/kg	30	100	21	600	190
Perfluorooctanoic acid PFOA	µg/kg	2.0	1.8	0.5	6.7	4.9
6:2 FTS	µg/kg	1.8	3.8	0.1	1.7	7.7
8:2 FTS	µg/kg	3.0	9.5	<0.2	0.4	12
Surrogate $^{13}C_8$ PFOS	%	100	96	99	100	99
Surrogate $^{13}C_2$ PFOA	%	101	101	104	101	99
Extracted ISTD $^{18}O_2$ *PFHxS*	%	92	104	98	95	86
Extracted ISTD $^{13}C_4$ *PFOS*	%	95	97	94	100	79
Extracted ISTD $^{13}C_4$ *PFOA*	%	98	102	90	97	71
Extracted ISTD $^{13}C_2$ *6:2FTS*	%	108	102	95	99	84
Extracted ISTD $^{13}C_2$ *8:2FTS*	%	91	118	96	103	55
Total Positive PFHxS & PFOS	µg/kg	32	100	32	700	200
Total Positive PFOS & PFOA	µg/kg	32	100	22	610	200
Total Positive PFAS	µg/kg	39	120	33	710	220

PFAS in Soil Short						
Our Reference		33940-82	33940-89	33940-92	33940-93	33940-98
Your Reference	UNITS	MW04_0.3-0.5	SWD-01	FD02	FD03	FD06
Date Sampled		05/10/2022	06/10/2022	05/10/2022	05/10/2022	06/10/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	12/10/2022	12/10/2022	12/10/2022	12/10/2022	12/10/2022
Date analysed	-	12/10/2022	12/10/2022	12/10/2022	12/10/2022	12/10/2022
Perfluorohexanesulfonic acid PFHxS	µg/kg	2.0	8.3	0.8	11	3.9
Perfluorooctanesulfonic acid PFOS	µg/kg	450	140	0.2	4,100	37
Perfluorooctanoic acid PFOA	µg/kg	1.9	1.9	1.5	1.4	1.6
6:2 FTS	µg/kg	3.6	4.6	<0.1	<0.1	<0.1
8:2 FTS	µg/kg	7.9	4.7	<0.2	5.8	<0.2
Surrogate $^{13}C_8$ PFOS	%	96	98	99	93	95
Surrogate $^{13}C_2$ PFOA	%	97	102	97	99	98
Extracted ISTD $^{18}O_2$ *PFHxS*	%	105	100	84	110	110
Extracted ISTD $^{13}C_4$ *PFOS*	%	97	98	107	95	104
Extracted ISTD $^{13}C_4$ *PFOA*	%	109	97	111	111	119
Extracted ISTD $^{13}C_2$ *6:2FTS*	%	105	102	113	109	120
Extracted ISTD $^{13}C_2$ *8:2FTS*	%	113	90	122	121	114
Total Positive PFHxS & PFOS	µg/kg	450	150	0.9	4,100	41
Total Positive PFOS & PFOA	µg/kg	450	140	1.7	4,100	39
Total Positive PFAS	µg/kg	470	160	2.5	4,100	43

PFAS in Soil Short						
Our Reference		33940-107	33940-108	33940-114	33940-115	33940-127
Your Reference	UNITS	MW02_0-0.1	MW02_0.3-0.5	MW03_0-0.1	MW03_0.3-0.5	SWD-02
Date Sampled		07/10/2022	07/10/2022	07/10/2022	07/10/2022	07/10/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	12/10/2022	12/10/2022	12/10/2022	12/10/2022	12/10/2022
Date analysed	-	12/10/2022	12/10/2022	12/10/2022	12/10/2022	12/10/2022
Perfluorohexanesulfonic acid PFHxS	µg/kg	7.2	29	0.9	0.3	17
Perfluorooctanesulfonic acid PFOS	µg/kg	140	780	49	30	8.6
Perfluorooctanoic acid PFOA	µg/kg	0.6	1.6	0.4	0.1	0.8
6:2 FTS	µg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
8:2 FTS	µg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Surrogate $^{13}C_8$ PFOS	%	99	96	93	91	97
Surrogate $^{13}C_2$ PFOA	%	100	99	101	102	100
Extracted ISTD $^{18}O_2$ *PFHxS*	%	107	107	103	103	101
Extracted ISTD $^{13}C_4$ *PFOS*	%	99	99	95	101	97
Extracted ISTD $^{13}C_4$ *PFOA*	%	110	109	97	103	104
Extracted ISTD $^{13}C_2$ *6:2FTS*	%	113	110	105	110	107
Extracted ISTD $^{13}C_2$ *8:2FTS*	%	118	120	82	122	115
Total Positive PFHxS & PFOS	µg/kg	150	810	50	30	26
Total Positive PFOS & PFOA	µg/kg	140	790	50	30	9.5
Total Positive PFAS	µg/kg	150	820	51	30	27

PFAS in Water Short						
Our Reference		33940-103	33940-104	33940-105	33940-106	33940-125
Your Reference	UNITS	RB01	RB02	FB01	FB02	RB03
Date Sampled		05/10/2022	06/10/2022	05/10/2022	06/10/2022	07/10/2022
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	11/10/2022	11/10/2022	11/10/2022	11/10/2022	11/10/2022
Date analysed	-	11/10/2022	11/10/2022	11/10/2022	11/10/2022	11/10/2022
Perfluorohexanesulfonic acid PFHxS	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorooctanesulfonic acid PFOS	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorooctanoic acid PFOA	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
6:2 FTS	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
8:2 FTS	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Surrogate $^{13}C_8$ PFOS	%	106	102	110	106	105
Surrogate $^{13}C_2$ PFOA	%	105	105	107	105	105
Extracted ISTD $^{18}O_2$ *PFHxS*	%	95	93	94	94	92
Extracted ISTD $^{13}C_4$ *PFOS*	%	92	93	89	91	92
Extracted ISTD $^{13}C_4$ *PFOA*	%	93	95	91	94	92
Extracted ISTD $^{13}C_2$ *6:2FTS*	%	92	93	93	88	87
Extracted ISTD $^{13}C_2$ *8:2FTS*	%	103	98	97	101	101
Total Positive PFHxS & PFOS	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Total Positive PFOS & PFOA	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Total Positive PFAS	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01

PFAS in Water Short		
Our Reference		33940-126
Your Reference	UNITS	FB03
Date Sampled		07/10/2022
Type of sample		Water
Date prepared	-	11/10/2022
Date analysed	-	11/10/2022
Perfluorohexanesulfonic acid PFHxS	µg/L	<0.01
Perfluorooctanesulfonic acid PFOS	µg/L	<0.01
Perfluorooctanoic acid PFOA	µg/L	<0.01
6:2 FTS	µg/L	<0.01
8:2 FTS	µg/L	<0.02
Surrogate $^{13}C_8$ PFOS	%	105
Surrogate $^{13}C_2$ PFOA	%	102
Extracted ISTD $^{18}O_2$ *PFHxS*	%	94
Extracted ISTD $^{13}C_4$ *PFOS*	%	92
Extracted ISTD $^{13}C_4$ *PFOA*	%	94
Extracted ISTD $^{13}C_2$ *6:2FTS*	%	86
Extracted ISTD $^{13}C_2$ *8:2FTS*	%	100
Total Positive PFHxS & PFOS	µg/L	<0.01
Total Positive PFOS & PFOA	µg/L	<0.01
Total Positive PFAS	µg/L	<0.01

Method ID	Methodology Summary
Inorg-008	Moisture content determined by heating at 105°C for a minimum of 12 hours.
Inorg-014	Cyanide - free, total, weak acid dissociable by segmented flow analyser (in line dialysis with colourimetric finish). Solids/Filters and sorbents are extracted in a caustic media prior to analysis. Impingers are pH adjusted as required prior to analysis. Cyanides amenable to Chlorination - samples are analysed untreated and treated with hypochlorite to assess the potential for chlorination of cyanide forms. Based on APHA latest edition, 4500-CN_G,H. Please note:- i) The amenable to Chlorination test is only carried out for solids where the Total Cyanide result is >50mg/kg. The Category D/industrial waste upper limit for Total Concentrations of Cyanide (amenable) is 300mg/kg (Table 2, VIC EPA 1828.2 March 2021), the lower limit used (250mg/kg) is to accommodate analytical uncertainty. ii) The amenable to Chlorination test is only carried out for leachates where the Total Cyanide result is >1mg/L. The Category D/industrial waste upper limit for Leachable Concentrations of Cyanide (amenable) is 1.75mg/L (Table 2, VIC EPA 1828.2 March 2021), the lower limit used (1mg/L) is to accommodate analytical uncertainty
Inorg-024	Hexavalent Chromium (Cr6+) - determined colourimetrically by discrete analyser. Water samples are filtered on receipt prior to analysis.
INORG-118	Hexavalent Chromium by Ion Chromatographic separation and colourimetric determination.
Metals-020 ICP-AES	Determination of various metals by ICP-AES.
Metals-021 CV-AAS	Determination of Mercury by Cold Vapour AAS.
Org-020	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis. Note, the Total +ve TRH PQL is reflective of the lowest individual PQL and is therefore "Total +ve TRH" is simply a sum of the positive individual TRH fractions (>C10-C40).

Method ID	Methodology Summary
Org-021/022	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD or GC-MS. Note, the Total +ve PCBs PQL is reflective of the lowest individual PQL and is therefore" Total +ve PCBs" is simply a sum of the positive individual PCBs.
Org-022	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS.
Org-022	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Note, For OCs the Total +ve reported DDD+DDE+DDT PQL is reflective of the lowest individual PQL and is therefore simply a sum of the positive individually report DDD+DDE+DDT.
Org-022	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Note, the Total +ve Cresols or Phenols PQL is reflective of the lowest individual PQL and is therefore" Total +ve Cresols or Phenols" is simply a sum of the positive individual Cresols or Phenols.
Org-022	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013. For soil results:- 1. 'EQ PQL'values are assuming all contributing PAHs reported as <PQL are actually at the PQL. This is the most conservative approach and can give false positive TEQs given that PAHs that contribute to the TEQ calculation may not be present. 2. 'EQ zero'values are assuming all contributing PAHs reported as <PQL are zero. This is the least conservative approach and is more susceptible to false negative TEQs when PAHs that contribute to the TEQ calculation are present but below PQL. 3. 'EQ half PQL'values are assuming all contributing PAHs reported as <PQL are half the stipulated PQL. Hence a mid-point between the most and least conservative approaches above. Note, the Total +ve PAHs PQL is reflective of the lowest individual PQL and is therefore" Total +ve PAHs" is simply a sum of the positive individual PAHs.
Org-023	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS.
Org-023	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater. 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.

Method ID	Methodology Summary
Org-029	Soil samples are extracted with basified Methanol. Waters and soil extracts are directly injected and/or concentrated/extracted using SPE. TCLP/ASLP leachates are centrifuged, the supernatant is then analysed (including amendment with solvent) - as per the option in AS4439.3. Analysis is undertaken with LC-MS/MS. PFAS results include the sum of branched and linear isomers where applicable. Please note that PFAS results are corrected for Extracted Internal Standards (QSM 5.3 Table B-15 terminology), which are mass labelled analytes added prior to sample preparation to assess matrix effects and verify processing of the sample. PFAS analytes without a commercially available mass labelled analogue are corrected vs a closely eluting mass labelled PFAS compound. Surrogates are also reported, in this context they are mass labelled PFAS compounds added prior to extraction but are used as monitoring compounds only (not used for result correction). Envicarb (or similar) is used discretionally to remove interfering matrix components. Please contact the laboratory if estimates of Measurement Uncertainty are required as per WA DER

QUALITY CONTROL: PCE in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	33940-89
Date extracted	-			11/10/2022	89	11/10/2022	11/10/2022		11/10/2022	11/10/2022
Date analysed	-			11/10/2022	89	11/10/2022	11/10/2022		11/10/2022	11/10/2022
Tetrachloroethene	mg/kg	0.5	Org-023	<0.5	89	<0.5	<0.5	0	83	72
Surrogate Dibromofluoromethane	%		Org-023	98	89	99	98	1	98	98
Surrogate aaa-Trifluorotoluene	%		Org-023	103	89	86	92	7	101	86
Surrogate Toluene-d_8	%		Org-023	98	89	99	98	1	97	98
Surrogate 4-Bromofluorobenzene	%		Org-023	101	89	101	102	1	101	100

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	33940-89
Date extracted	-			11/10/2022	89	11/10/2022	11/10/2022		11/10/2022	11/10/2022
Date analysed	-			11/10/2022	89	11/10/2022	11/10/2022		11/10/2022	11/10/2022
vTRH C_6 - C_9	mg/kg	25	Org-023	<25	89	<25	<25	0	97	90
vTRH C_6 - C_{10}	mg/kg	25	Org-023	<25	89	<25	<25	0	97	90
Benzene	mg/kg	0.2	Org-023	<0.2	89	<0.2	<0.2	0	95	86
Toluene	mg/kg	0.5	Org-023	<0.5	89	<0.5	<0.5	0	99	92
Ethylbenzene	mg/kg	1	Org-023	<1	89	<1	<1	0	97	91
m+p-xylene	mg/kg	2	Org-023	<2	89	<2	<2	0	96	90
o-Xylene	mg/kg	1	Org-023	<1	89	<1	<1	0	93	87
Naphthalene	mg/kg	1	Org-023	<1	89	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-023	99	89	83	88	6	98	87

QUALITY CONTROL: TRH Soil C10-C40 NEPM						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	33940-127
Date extracted	-			11/10/2022	127	11/10/2022	11/10/2022		11/10/2022	11/10/2022
Date analysed	-			11/10/2022	127	11/10/2022	11/10/2022		11/10/2022	12/10/2022
TRH C_{10} - C_{14}	mg/kg	50	Org-020	<50	127	<50	<50	0	90	85
TRH C_{15} - C_{28}	mg/kg	100	Org-020	<100	127	<100	<100	0	90	90
TRH C_{29} - C_{36}	mg/kg	100	Org-020	<100	127	<100	<100	0	107	107
TRH >C_{10} -C_{16}	mg/kg	50	Org-020	<50	127	<50	<50	0	90	85
TRH >C_{16} -C_{34}	mg/kg	100	Org-020	<100	127	<100	<100	0	90	90
TRH >C_{34} -C_{40}	mg/kg	100	Org-020	<100	127	<100	<100	0	107	107
Surrogate o-Terphenyl	%		Org-020	85	127	82	82	0	79	79

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	33940-127
Date extracted	-			11/10/2022	127	11/10/2022	11/10/2022		11/10/2022	11/10/2022
Date analysed	-			12/10/2022	127	12/10/2022	12/10/2022		12/10/2022	12/10/2022
Naphthalene	mg/kg	0.1	Org-022	<0.1	127	<0.1	<0.1	0	94	82
Acenaphthylene	mg/kg	0.1	Org-022	<0.1	127	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-022	<0.1	127	<0.1	<0.1	0	94	82
Fluorene	mg/kg	0.1	Org-022	<0.1	127	<0.1	<0.1	0	90	82
Phenanthrene	mg/kg	0.1	Org-022	<0.1	127	<0.1	<0.1	0	94	86
Anthracene	mg/kg	0.1	Org-022	<0.1	127	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-022	<0.1	127	<0.1	<0.1	0	92	88
Pyrene	mg/kg	0.1	Org-022	<0.1	127	<0.1	<0.1	0	92	86
Benzo(a)anthracene	mg/kg	0.1	Org-022	<0.1	127	<0.1	<0.1	0	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-022	<0.1	127	<0.1	<0.1	0	90	84
Benzo(b,j&k)fluoranthene	mg/kg	0.2	Org-022	<0.2	127	<0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-022	<0.05	127	<0.05	<0.05	0	100	96
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-022	<0.1	127	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-022	<0.1	127	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-022	<0.1	127	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d_{14}	%		Org-022	84	127	84	92	9	84	82

QUALITY CONTROL: Speciated Phenols in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	33940-127
Date extracted	-		Org-022	11/10/2022	127	11/10/2022	11/10/2022		11/10/2022	11/10/2022
Date analysed	-		Org-022	12/10/2022	127	12/10/2022	12/10/2022		12/10/2022	12/10/2022
Phenol	mg/kg	0.2	Org-022	<0.2	127	<0.2	<0.2	0	76	71
2-Chlorophenol	mg/kg	0.2	Org-022	<0.2	127	<0.2	<0.2	0	82	61
2-Methylphenol	mg/kg	0.2	Org-022	<0.2	127	<0.2	<0.2	0	88	83
3/4-Methylphenol	mg/kg	0.4	Org-022	<0.4	127	<0.4	<0.4	0	[NT]	[NT]
2-Nitrophenol	mg/kg	0.2	Org-022	<0.2	127	<0.2	<0.2	0	[NT]	[NT]
2,4-Dimethylphenol	mg/kg	0.2	Org-022	<0.2	127	<0.2	<0.2	0	[NT]	[NT]
2,4-Dichlorophenol	mg/kg	0.2	Org-022	<0.2	127	<0.2	<0.2	0	[NT]	[NT]
2,6-Dichlorophenol	mg/kg	0.2	Org-022	<0.2	127	<2	<2	0	108	#
2,4,5-Trichlorophenol	mg/kg	0.2	Org-022	<0.2	127	<0.2	<0.2	0	[NT]	[NT]
2,4,6-Trichlorophenol	mg/kg	0.2	Org-022	<0.2	127	<0.2	<0.2	0	[NT]	[NT]
2,4-Dinitrophenol	mg/kg	2	Org-022	<2	127	<2	<2	0	[NT]	[NT]
4-Nitrophenol	mg/kg	4	Org-022	<4	127	<4	<4	0	[NT]	[NT]
2,3,4,6-Tetrachlorophenol	mg/kg	0.2	Org-022	<0.2	127	<0.2	<0.2	0	[NT]	[NT]
Pentachlorophenol	mg/kg	1	Org-022	<1	127	<5	<5	0	106	33
4-Chloro-3-Methylphenol	mg/kg	2	Org-022	<2	127	<2	<2	0	[NT]	[NT]
Surrogate Phenol-d_6	%		Org-022	60	127	62	62	0	66	70
Surrogate 2-fluorophenol	%		Org-022	66	127	62	62	0	68	61

QUALITY CONTROL: OCP in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	33940-127
Date extracted	-			11/10/2022	127	11/10/2022	11/10/2022		11/10/2022	11/10/2022
Date analysed	-			12/10/2022	127	12/10/2022	12/10/2022		12/10/2022	12/10/2022
alpha-BHC	mg/kg	0.1	Org-022	<0.1	127	<0.1	<0.1	0	106	94
Hexachlorobenzene	mg/kg	0.1	Org-022	<0.1	127	<0.1	<0.1	0	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-022	<0.1	127	<0.1	<0.1	0	102	91
gamma-BHC	mg/kg	0.1	Org-022	<0.1	127	<0.1	<0.1	0	[NT]	[NT]
Heptachlor	mg/kg	0.1	Org-022	<0.1	127	<0.1	<0.1	0	102	87
delta-BHC	mg/kg	0.1	Org-022	<0.1	127	<0.1	<0.1	0	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-022	<0.1	127	<0.1	<0.1	0	82	72
Heptachlor Epoxide	mg/kg	0.1	Org-022	<0.1	127	<0.1	<0.1	0	116	104
gamma-Chlordane	mg/kg	0.1	Org-022	<0.1	127	<0.1	<0.1	0	108	96
alpha-chlordane	mg/kg	0.1	Org-022	<0.1	127	<0.1	<0.1	0	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-022	<0.1	127	<0.1	<0.1	0	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-022	<0.1	127	<0.1	<0.1	0	112	98
Dieldrin	mg/kg	0.1	Org-022	<0.1	127	<0.1	<0.1	0	110	100
Endrin	mg/kg	0.1	Org-022	<0.1	127	<0.1	<0.1	0	[NT]	[NT]
Endosulfan II	mg/kg	0.1	Org-022	<0.1	127	<0.1	<0.1	0	[NT]	[NT]
pp-DDD	mg/kg	0.1	Org-022	<0.1	127	<0.1	<0.1	0	108	118
Endrin Aldehyde	mg/kg	0.1	Org-022	<0.1	127	<0.1	<0.1	0	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-022	<0.1	127	<0.1	<0.1	0	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-022	<0.1	127	<0.1	<0.1	0	108	101
Methoxychlor	mg/kg	0.1	Org-022	<0.1	127	<0.1	<0.1	0	[NT]	[NT]
Surrogate 2-chlorophenol-d4	%		Org-022	70	127	68	68	0	74	60

QUALITY CONTROL: PCBs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	33940-127
Date extracted	-			11/10/2022	127	11/10/2022	11/10/2022		11/10/2022	11/10/2022
Date analysed	-			12/10/2022	127	12/10/2022	12/10/2022		12/10/2022	12/10/2022
Aroclor 1016	mg/kg	0.1	Org-022	<0.1	127	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-022	<0.1	127	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-022	<0.1	127	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-022	<0.1	127	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-022	<0.1	127	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-022	<0.1	127	<0.1	<0.1	0	97	83
Aroclor 1260	mg/kg	0.1	Org-022	<0.1	127	<0.1	<0.1	0	[NT]	[NT]
Surrogate 2-fluorobiphenyl	%		Org-022	86	127	82	82	0	86	86

QUALITY CONTROL: SA waste screen metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date digested	-			11/10/2022	[NT]	[NT]	[NT]	[NT]	11/10/2022	[NT]
Date analysed	-			11/10/2022	[NT]	[NT]	[NT]	[NT]	11/10/2022	[NT]
Arsenic	mg/kg	4	Metals-020 ICP-AES	<4	[NT]	[NT]	[NT]	[NT]	105	[NT]
Silver	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	[NT]	[NT]	93	[NT]
Barium	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	[NT]	[NT]	107	[NT]
Beryllium	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	[NT]	[NT]	107	[NT]
Cadmium	mg/kg	0.4	Metals-020 ICP-AES	<0.4	[NT]	[NT]	[NT]	[NT]	105	[NT]
Chromium	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	[NT]	[NT]	108	[NT]
Cobalt	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	[NT]	[NT]	101	[NT]
Copper	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	[NT]	[NT]	102	[NT]
Lead	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	[NT]	[NT]	106	[NT]
Manganese	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	[NT]	[NT]	107	[NT]
Molybdenum	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	[NT]	[NT]	104	[NT]
Mercury	mg/kg	0.1	Metals-021 CV-AAS	<0.1	[NT]	[NT]	[NT]	[NT]	101	[NT]
Nickel	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	[NT]	[NT]	107	[NT]
Zinc	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	[NT]	[NT]	106	[NT]

QUALITY CONTROL: Misc Inorg - soil SA waste						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			11/10/2022	[NT]	[NT]	[NT]	[NT]	11/10/2022	[NT]
Date analysed	-			11/10/2022	[NT]	[NT]	[NT]	[NT]	11/10/2022	[NT]
Total Cyanide	mg/kg	0.5	Inorg-014	<0.5	[NT]	[NT]	[NT]	[NT]	98	[NT]
Hexavalent Chromium, Cr^{6+}	mg/kg	1	INORG-118	<1	[NT]	[NT]	[NT]	[NT]	100	[NT]

QUALITY CONTROL: PFAS in Soil Short						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	33940-2
Perfluorohexanesulfonic acid PFHxS	µg/kg	0.1	Org-029	<0.1	7	7.0	8.0	13	89	##
Perfluorooctanesulfonic acid PFOS	µg/kg	0.1	Org-029	<0.1	7	62	64	3	93	##
Perfluorooctanoic acid PFOA	µg/kg	0.1	Org-029	<0.1	7	3.1	3.2	3	86	##
6:2 FTS	µg/kg	0.1	Org-029	<0.1	7	0.7	0.8	13	79	84
8:2 FTS	µg/kg	0.2	Org-029	<0.2	7	1	1	0	92	90
Surrogate $^{13}C_8$ PFOS	%		Org-029	101	7	97	95	2	100	93
Surrogate $^{13}C_2$ PFOA	%		Org-029	100	7	99	100	1	99	100
Extracted ISTD $^{18}O_2$ PFHxS	%		Org-029	98	7	105	103	2	104	98
Extracted ISTD $^{13}C_4$ PFOS	%		Org-029	102	7	82	75	9	100	59
Extracted ISTD $^{13}C_4$ PFOA	%		Org-029	101	7	88	88	0	103	103
Extracted ISTD $^{13}C_2$ 6:2FTS	%		Org-029	98	7	92	84	9	107	103
Extracted ISTD $^{13}C_2$ 8:2FTS	%		Org-029	103	7	59	47	23	99	108

QUALITY CONTROL: PFAS in Soil Short						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	33940-66
Perfluorohexanesulfonic acid PFHxS	µg/kg	0.1	Org-029	[NT]	33	3.3	3.1	6	103	88
Perfluorooctanesulfonic acid PFOS	µg/kg	0.1	Org-029	[NT]	33	160	150	6	104	##
Perfluorooctanoic acid PFOA	µg/kg	0.1	Org-029	[NT]	33	4.6	4.0	14	102	81
6:2 FTS	µg/kg	0.1	Org-029	[NT]	33	1.4	1.6	13	96	91
8:2 FTS	µg/kg	0.2	Org-029	[NT]	33	1	1	0	103	##
Surrogate $^{13}C_8$ PFOS	%		Org-029	[NT]	33	104	103	1	94	94
Surrogate $^{13}C_2$ PFOA	%		Org-029	[NT]	33	98	100	2	99	98
Extracted ISTD $^{18}O_2$ PFHxS	%		Org-029	[NT]	33	106	106	0	102	106
Extracted ISTD $^{13}C_4$ PFOS	%		Org-029	[NT]	33	95	97	2	103	98
Extracted ISTD $^{13}C_4$ PFOA	%		Org-029	[NT]	33	108	109	1	101	108
Extracted ISTD $^{13}C_2$ 6:2FTS	%		Org-029	[NT]	33	110	107	3	101	112
Extracted ISTD $^{13}C_2$ 8:2FTS	%		Org-029	[NT]	33	115	121	5	105	121

QUALITY CONTROL: PFAS in Soil Short					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Perfluorohexanesulfonic acid PFHxS	µg/kg	0.1	Org-029	[NT]	65	1.4	2.5	56	[NT]	[NT]
Perfluorooctanesulfonic acid PFOS	µg/kg	0.1	Org-029	[NT]	65	30	62	70	[NT]	[NT]
Perfluorooctanoic acid PFOA	µg/kg	0.1	Org-029	[NT]	65	2.0	4.2	71	[NT]	[NT]
6:2 FTS	µg/kg	0.1	Org-029	[NT]	65	1.8	3.4	62	[NT]	[NT]
8:2 FTS	µg/kg	0.2	Org-029	[NT]	65	3.0	6.4	72	[NT]	[NT]
Surrogate $^{13}C_8$ PFOS	%		Org-029	[NT]	65	100	93	7	[NT]	[NT]
Surrogate $^{13}C_2$ PFOA	%		Org-029	[NT]	65	101	101	0	[NT]	[NT]
Extracted ISTD $^{18}O_2$ PFHxS	%		Org-029	[NT]	65	92	101	9	[NT]	[NT]
Extracted ISTD $^{13}C_4$ PFOS	%		Org-029	[NT]	65	95	92	3	[NT]	[NT]
Extracted ISTD $^{13}C_4$ PFOA	%		Org-029	[NT]	65	98	99	1	[NT]	[NT]
Extracted ISTD $^{13}C_2$ 6:2FTS	%		Org-029	[NT]	65	108	104	4	[NT]	[NT]
Extracted ISTD $^{13}C_2$ 8:2FTS	%		Org-029	[NT]	65	91	110	19	[NT]	[NT]

QUALITY CONTROL: PFAS in Soil Short					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Perfluorohexanesulfonic acid PFHxS	µg/kg	0.1	Org-029	[NT]	107	7.2	4.0	57	[NT]	[NT]
Perfluorooctanesulfonic acid PFOS	µg/kg	0.1	Org-029	[NT]	107	140	58	83	[NT]	[NT]
Perfluorooctanoic acid PFOA	µg/kg	0.1	Org-029	[NT]	107	0.6	0.3	67	[NT]	[NT]
6:2 FTS	µg/kg	0.1	Org-029	[NT]	107	<0.1	<0.1	0	[NT]	[NT]
8:2 FTS	µg/kg	0.2	Org-029	[NT]	107	<0.2	<0.2	0	[NT]	[NT]
Surrogate $^{13}C_8$ PFOS	%		Org-029	[NT]	107	99	105	6	[NT]	[NT]
Surrogate $^{13}C_2$ PFOA	%		Org-029	[NT]	107	100	98	2	[NT]	[NT]
Extracted ISTD $^{18}O_2$ PFHxS	%		Org-029	[NT]	107	107	110	3	[NT]	[NT]
Extracted ISTD $^{13}C_4$ PFOS	%		Org-029	[NT]	107	99	100	1	[NT]	[NT]
Extracted ISTD $^{13}C_4$ PFOA	%		Org-029	[NT]	107	110	114	4	[NT]	[NT]
Extracted ISTD $^{13}C_2$ 6:2FTS	%		Org-029	[NT]	107	113	123	8	[NT]	[NT]
Extracted ISTD $^{13}C_2$ 8:2FTS	%		Org-029	[NT]	107	118	132	11	[NT]	[NT]

QUALITY CONTROL: PFAS in Water Short					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Perfluorohexanesulfonic acid PFHxS	µg/L	0.01	Org-029	<0.01	[NT]	[NT]	[NT]	[NT]	122	[NT]
Perfluorooctanesulfonic acid PFOS	µg/L	0.01	Org-029	<0.01	[NT]	[NT]	[NT]	[NT]	119	[NT]
Perfluorooctanoic acid PFOA	µg/L	0.01	Org-029	<0.01	[NT]	[NT]	[NT]	[NT]	120	[NT]
6:2 FTS	µg/L	0.01	Org-029	<0.01	[NT]	[NT]	[NT]	[NT]	113	[NT]
8:2 FTS	µg/L	0.02	Org-029	<0.02	[NT]	[NT]	[NT]	[NT]	121	[NT]
Surrogate $^{13}C_8$ PFOS	%		Org-029	106	[NT]	[NT]	[NT]	[NT]	108	[NT]
Surrogate $^{13}C_2$ PFOA	%		Org-029	107	[NT]	[NT]	[NT]	[NT]	108	[NT]
Extracted ISTD $^{18}O_2$ PFHxS	%		Org-029	94	[NT]	[NT]	[NT]	[NT]	93	[NT]
Extracted ISTD $^{13}C_4$ PFOS	%		Org-029	91	[NT]	[NT]	[NT]	[NT]	90	[NT]
Extracted ISTD $^{13}C_4$ PFOA	%		Org-029	93	[NT]	[NT]	[NT]	[NT]	91	[NT]
Extracted ISTD $^{13}C_2$ 6:2FTS	%		Org-029	98	[NT]	[NT]	[NT]	[NT]	92	[NT]
Extracted ISTD $^{13}C_2$ 8:2FTS	%		Org-029	99	[NT]	[NT]	[NT]	[NT]	96	[NT]

Result Definitions

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

Quality Control Definitions

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

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

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

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

Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

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

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

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

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

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

Report Comments

PFAS analysed for samples 1, 13 & 72 by Envirolab Sydney, report number 307610.

SVOC: # Matrix spike recovery is not possible to report for 2,6-Dichlorophenol due to sample matrix interferences. However, an acceptable recovery was obtained for the LCS.

Matrix spike recovery is low for Pentachlorophenol due to sample matrix interferences. However, an acceptable recovery was obtained for the LCS.

The PQL(s) for 33940-127 has been raised for 2,6-Dichlorophenol & Pentachlorophenol due to the low spike recovery/recoveries. This may reflect other samples where similar in matrix and similar analytical interferences occur.

PFAS_S:## Matrix spike recovery is not possible due to high concentration of analyte/s, however an acceptable recovery was achieved for the LCS.

Quote 22SA096

Ken Nguyen

From: Tom Duncan <Thomas.Duncan@ghd.com>
Sent: Friday, 11 November 2022 3:33 PM
To: Ken Nguyen
Cc: Vera Biermann; Ben Petticrew
Subject: Additional analysis - 33940

CAUTION: This email originated from outside of the organisation. Do not act on instructions, click links or open attachments unless you recognise the sender and know the content is authentic and safe.

Hi Ken,

My name is Tom, I'm working with the Adelaide team on some projects which Envirolab has completed some analysis. Can I please request additional analysis for lab report 33940

BH09_1.0-1.2 - 29
BH12_0.9-1.0 - 47
BH14_1.1-1.2 - 61
BH14_2.0-2.1 - 63
BH14_2.5-2.8 - 64
MW02_1.0-1.2 - 109

33940-A
Due 18/11/22
Std TAT

Can these all please be analysed for PFAS short suite?

Thanks

Tom Duncan (he/him)
B. Engineering (Environmental) (Hons)
Senior Environmental Engineer

GHD
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Level 9, 180 Lonsdale Street, Melbourne, VIC 3000
D 61 0 8687 8327 **M** 61 413 476 581 **E** Tom.Duncan@ghd.com

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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

Client	GHD SA
Attention	Tom Duncan

Sample Login Details

Your reference	12566684
Envirolab Reference	33940-A
Date Sample Received	10/10/2022
Date Instructions Received	11/11/2022
Date Results Expected to be Reported	18/11/2022

Sample Condition

Samples received in appropriate condition for analysis	Yes
No. of Samples Provided	1 Concretre, 116 Soil, 2 Concrete, 2 Bitumen, 6 Water
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	11.2
Cooling Method	Ice Pack
Sampling Date Provided	YES

Comments

Nil

Please direct any queries to:

Pamela Adams	Chris De Luca
Phone: 03 9763 2500	**Phone: 03 9763 2500**
Fax: 03 9763 2633	**Fax: 03 9763 2633**
Email: padams@envirolab.com.au	**Email: cdeluca@envirolab.com.au**

Analysis Underway, details 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	PFAS in Soil Short	On Hold
BH05_0-0.1		✓
BH05_0.3-0.5		✓
BH05_0.6-0.8		✓
BH05_1.1-1.3		✓
BH05_1.6-1.8		✓
BH05_2.1-2.3		✓
BH06_0-0.1		✓
BH06_0.2-0.4		✓
BH06_0.7-0.9		✓
BH06_1.3-1.5		✓
BH06_1.8-2.0		✓
BH06_2.4-2.6		✓
BH07_0-0.15		✓
BH07_0.3-0.5		✓
BH07_0.8-1.0		✓
BH07_1.3-1.5		✓
BH07_1.8-2.0		✓
BH07_2.4-2.6		✓
BH08_0.0		✓
BH08_0.1-0.2		✓
BH08_0.5-0.6		✓
BH08_0.9-1.0		✓
BH08_1.5-1.6		✓
BH08_2.0-2.1		✓
BH08_2.5-2.6		✓
BH09_0.0		✓
BH09_0.1-0.3		✓
BH09_0.4-0.6		✓
BH09_1.0-1.2	✓	
BH09_1.5-1.6		✓
BH09_2.0-2.1		✓
BH09_2.5-2.6		✓

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ABN 37 112 535 645 - 002
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ph 03 9763 2500 fax 03 9763 2633
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Sample ID	PFAS in Soil Short	On Hold
BH10_0-0.1		✓
BH10_0.3-0.5		✓
BH10_0.8-1.0		✓
BH10_1.4-1.6		✓
BH10_1.9-2.1		✓
BH10_2.4-2.6		✓
BH11_0-0.1		✓
BH11_0.2-0.4		✓
BH11_0.7-0.9		✓
BH11_1.3-1.5		✓
BH11_1.8-2.0		✓
BH11_2.4-2.6		✓
BH12_0.1-0.2		✓
BH12_0.5-0.6		✓
BH12_0.9-1.0	✓	
BH12_1.5-1.6		✓
BH12_2.0-2.1		✓
BH12_2.5-2.6		✓
BH13_0.0		✓
BH13_0.1-0.3		✓
BH13_0.6-0.7		✓
BH13_1.0-1.1		✓
BH13_1.6-1.7		✓
BH13_2.0-2.1		✓
BH13_2.4-2.6		✓
BH14_0-0.1		✓
BH14_0.2-0.4		✓
BH14_0.6-0.8		✓
BH14_1.1-1.2	✓	
BH14_1.5-1.6		✓
BH14_2.0-2.1	✓	
BH14_2.5-2.6	✓	

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melbourne@envirolab.com.au
www.envirolab.com.au

Sample ID	PFAS in Soil Short	On Hold
BH15_0-0.1		✓
BH15_0.2-0.4		✓
BH15_0.4-0.6		✓
BH15_1.0-1.1		✓
BH15_1.5-1.6		✓
BH15_2.0-2.1		✓
BH15_2.5-2.6		✓
MW01_0-0.01		✓
MW01_0.1-0.3		✓
MW01_0.5-0.7		✓
MW01_1.0-1.2		✓
MW01_1.5-1.7		✓
MW01_2.0-2.2		✓
MW01_3.0-3.2		✓
MW01_4.0-4.2		✓
MW01_5.0-5.2		✓
MW04_0-0.1		✓
MW04_0.3-0.5		✓
MW04_0.8-1.0		✓
MW04_1.3-1.5		✓
MW04_1.8-2.0		✓
MW04_2.3-2.5		✓
MW04_2.8-3.0		✓
MW04_3.8-4.0		✓
SWD-01		✓
FD01		✓
FS01		✓
FD02		✓
FD03		✓
FD04		✓
FS04		✓
FD05		✓

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melbourne@envirolab.com.au
www.envirolab.com.au

Sample ID	PFAS in Soil Short	On Hold
FS05		✓
FD06		✓
FD07		✓
FS07		✓
FD08		✓
FS08		✓
RB01		✓
RB02		✓
FB01		✓
FB02		✓
MW02_0-0.1		✓
MW02_0.3-0.5		✓
MW02_1.0-1.2	✓	
MW02_1.5-1.7		✓
MW02_2.0-2.2		✓
MW02_2.7-2.9		✓
MW02_3.7-3.9		✓
MW03_0-0.1		✓
MW03_0.3-0.5		✓
MW03_0.9-1.1		✓
MW03_1.4-1.6		✓
MW03_1.9-2.1		✓
MW03_2.4-2.6		✓
MW03_3.2-3.4		✓
FD09		✓
FS09		✓
FD10		✓
FS10		✓
RB03		✓
FB03		✓
SWD-02		✓

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

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

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.

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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

CERTIFICATE OF ANALYSIS 33940-A

Client Details

Client	GHD SA
Attention	Tom Duncan
Address	Level 4, 211 Victoria Square, Adelaide, SA, 5000

Sample Details

Your Reference	**12566684**
Number of Samples	1 Concretre, 116 Soil, 2 Concrete, 2 Bitumen, 6 Water
Date samples received	10/10/2022
Date completed instructions received	11/11/2022

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	18/11/2022
Date of Issue	18/11/2022

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
Simon Mills, Group R&D Manager

Authorised By

Pamela Adams, Laboratory Manager

PFAS in Soil Short						
Our Reference		33940-A-29	33940-A-47	33940-A-61	33940-A-63	33940-A-64
Your Reference	UNITS	BH09_1.0-1.2	BH12_0.9-1.0	BH14_1.1-1.2	BH14_2.0-2.1	BH14_2.5-2.6
Date Sampled		05/10/2022	05/10/2022	05/10/2022	05/10/2022	05/10/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	15/11/2022	15/11/2022	15/11/2022	15/11/2022	15/11/2022
Date analysed	-	15/11/2022	15/11/2022	15/11/2022	15/11/2022	15/11/2022
Perfluorohexanesulfonic acid PFHxS	µg/kg	2.1	260	34	800	530
Perfluorooctanesulfonic acid PFOS	µg/kg	0.1	0.9	3,400	58	36
Perfluorooctanoic acid PFOA	µg/kg	4.2	19	4.1	57	35
6:2 FTS	µg/kg	<0.1	0.1	0.1	0.5	1.0
8:2 FTS	µg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Surrogate $^{13}C_8$ PFOS	%	106	99	105	103	101
Surrogate $^{13}C_2$ PFOA	%	98	98	97	105	104
Extracted ISTD $^{18}O_2$ *PFHxS*	%	101	107	97	110	78
Extracted ISTD $^{13}C_4$ *PFOS*	%	98	99	106	96	100
Extracted ISTD $^{13}C_4$ *PFOA*	%	109	101	105	92	103
Extracted ISTD $^{13}C_2$ *6:2FTS*	%	101	98	106	90	94
Extracted ISTD $^{13}C_2$ *8:2FTS*	%	94	77	97	100	103
Total Positive PFHxS & PFOS	µg/kg	2.2	260	3,400	860	570
Total Positive PFOS & PFOA	µg/kg	4.4	20	3,400	120	71
Total Positive PFAS	µg/kg	6.5	280	3,500	920	600

PFAS in Soil Short		
Our Reference		33940-A-109
Your Reference	UNITS	MW02_1.0-1.2
Date Sampled		07/10/2022
Type of sample		Soil
Date prepared	-	15/11/2022
Date analysed	-	15/11/2022
Perfluorohexanesulfonic acid PFHxS	µg/kg	60
Perfluorooctanesulfonic acid PFOS	µg/kg	150
Perfluorooctanoic acid PFOA	µg/kg	5.8
6:2 FTS	µg/kg	<0.1
8:2 FTS	µg/kg	<0.2
Surrogate $^{13}C_8$ PFOS	%	106
Surrogate $^{13}C_2$ PFOA	%	106
Extracted ISTD $^{18}O_2$ *PFHxS*	%	109
Extracted ISTD $^{13}C_4$ *PFOS*	%	86
Extracted ISTD $^{13}C_4$ *PFOA*	%	105
Extracted ISTD $^{13}C_2$ *6:2FTS*	%	98
Extracted ISTD $^{13}C_2$ *8:2FTS*	%	102
Total Positive PFHxS & PFOS	µg/kg	210
Total Positive PFOS & PFOA	µg/kg	160
Total Positive PFAS	µg/kg	220

Moisture						
Our Reference		33940-A-29	33940-A-47	33940-A-61	33940-A-63	33940-A-64
Your Reference	UNITS	BH09_1.0-1.2	BH12_0.9-1.0	BH14_1.1-1.2	BH14_2.0-2.1	BH14_2.5-2.6
Date Sampled		05/10/2022	05/10/2022	05/10/2022	05/10/2022	05/10/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	14/11/2022	14/11/2022	14/11/2022	14/11/2022	14/11/2022
Date analysed	-	15/11/2022	15/11/2022	15/11/2022	15/11/2022	15/11/2022
Moisture	%	20	19	20	20	19

Moisture		
Our Reference		33940-A-109
Your Reference	UNITS	MW02_1.0-1.2
Date Sampled		07/10/2022
Type of sample		Soil
Date prepared	-	14/11/2022
Date analysed	-	15/11/2022
Moisture	%	15

Method ID	Methodology Summary
Inorg-008	Moisture content determined by heating at 105°C for a minimum of 12 hours.
Org-029	Soil samples are extracted with basified Methanol. Waters and soil extracts are directly injected and/or concentrated/extracted using SPE. TCLP/ASLP leachates are centrifuged, the supernatant is then analysed (including amendment with solvent) - as per the option in AS4439.3. Analysis is undertaken with LC-MS/MS. PFAS results include the sum of branched and linear isomers where applicable. Please note that PFAS results are corrected for Extracted Internal Standards (QSM 5.4 Table B-15 terminology), which are mass labelled analytes added prior to sample preparation to assess matrix effects and verify processing of the sample. PFAS analytes without a commercially available mass labelled analogue are corrected vs a closely eluting mass labelled PFAS compound. Surrogates are also reported, in this context they are mass labelled PFAS compounds added prior to extraction but are used as monitoring compounds only (not used for result correction). Envicarb (or similar) is used discretionally to remove interfering matrix components. Please contact the laboratory if estimates of Measurement Uncertainty are required as per WA DER

QUALITY CONTROL: PFAS in Soil Short						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	33940-A-47
Perfluorohexanesulfonic acid PFHxS	µg/kg	0.1	Org-029	<0.1	29	2.1	2.1	0	101	#
Perfluorooctanesulfonic acid PFOS	µg/kg	0.1	Org-029	<0.1	29	0.1	0.2	67	100	100
Perfluorooctanoic acid PFOA	µg/kg	0.1	Org-029	<0.1	29	4.2	4.1	2	107	#
6:2 FTS	µg/kg	0.1	Org-029	<0.1	29	<0.1	<0.1	0	99	95
8:2 FTS	µg/kg	0.2	Org-029	<0.2	29	<0.2	<0.2	0	99	99
Surrogate $^{13}C_8$ PFOS	%		Org-029	105	29	106	98	8	100	102
Surrogate $^{13}C_2$ PFOA	%		Org-029	96	29	98	98	0	97	95
Extracted ISTD $^{18}O_2$ PFHxS	%		Org-029	103	29	101	100	1	100	84
Extracted ISTD $^{13}C_4$ PFOS	%		Org-029	99	29	98	99	1	96	102
Extracted ISTD $^{13}C_4$ PFOA	%		Org-029	112	29	109	108	1	104	102
Extracted ISTD $^{13}C_2$ 6:2FTS	%		Org-029	112	29	101	102	1	102	97
Extracted ISTD $^{13}C_2$ 8:2FTS	%		Org-029	106	29	94	98	4	98	86

Result Definitions

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

Quality Control Definitions

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

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

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

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

Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

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

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

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

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

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

Report Comments

PFAS_S # Matrix spike recovery is not possible to report for PFHxS and PFOA due to the high concentration of analytes in the sample/s have
caused interference. However, an acceptable recovery was obtained for the LCS.

CHAIN OF CUSTODY FORM - Client

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ENVIROLAB GROUP
National phone number 1300 424 344

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

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

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

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

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

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

Client: GHD Pty Ltd	Client Project Name/Number/Site etc (ie report title): 12566684
Contact Person: Vera Biermann	
Project Mgr: Vera Biermann	PO No.: 12566684
Sampler: Vera Biermann	Envirolab Quote No. :
Address: GHD Adelaide, Level 4, 211 Victoria Square, Adelaide SA 5000	Date results required: standard turn around Or choose: standard / same day / 1 day / 2 day / 3 day *Note: Inform lab in advance if urgent turnaround is required - surcharges apply*
Phone: (08) 8111 6958 Mob: 0435981783	Additional report format: esdat / equis /
Email: GHDLabReports@ghd.com vera.biermann@ghd.com ben.petticrew@ghd.com	Lab Comments:

Sample information					Tests Required									Comments
Envirolab Sample ID	Client Sample ID or Information	Depth	Date sampled	Type of sample	PFAS - short suite	SA Waste screen	Hold							Provide as much information about the sample as you can
85	MW04_1.8-2.0	1.8-2.0	6/10/2022	soil			x							
86	MW04_2.3-2.5	2.3-2.5	6/10/2022	soil			x							
87	MW04_2.8-3.0	2.8-3.0	6/10/2022	soil			x							
88	MW04_3.8-4.0	3.8-4.0	6/10/2022	soil			x							
89	SWD-01		6/10/2022	soil	x	x								
90	FD01		5/10/2022	soil			X							
91	FS01		5/10/2022	soil			X							
92	FD02		5/10/2022	soil	x									
—	(1) FS02		5/10/2022	soil	x									please forward to ALS
93	FD03		5/10/2022	soil	x									
—	(2) FS03		5/10/2022	soil	x									please forward to ALS
94	FD04		5/10/2022	soil			X							

Environmental Division
Melbourne
Work Order Reference
EM2219930

Telephone : + 61-3-8549 9600

☐ *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):	Received by (Company):	*Lab Use Only*
Print Name:	Print Name:	Job number: / Cooling: Ice / Ice pack / None
Date & Time:	Date & Time: 7-10-22	Temperature: / Security seal: Intact / Broken / None
Signature:	Signature:	TAT Req - SAME day / 1 / 2 / 3 / 4 / STD

Received: Andrew (ALS) 10:10 1022

1/2

Relinquished & Received ELS Melb AP 10/10/22

CHAIN OF CUSTODY FORM - Client

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ENVIROLAB GROUP
National phone number 1300 424 344

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

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

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

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

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

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

Client: GHD Pty Ltd	Client Project Name/Number/Site etc (to report title): 12566684
Contact Person: Vera Biermann	
Project Mgr: Vera Biermann	PO No.: 12566684
Sampler: Vera Biermann	Envirolab Quote No.:
Address: GHD Adelaide, Level 4, 211 Victoria Square, Adelaide SA 5000	Date results required: standard turn around Or choose: standard / same day / 1 day / 2 day / 3 day *Note: inform lab in advance if urgent turnaround is required - surcharges apply*
Phone: (08) 8111 6958 Mob: 0435981783	Additional report format: esdat / equis /
Email: GHDLabReports@ghd.com vera.biermann@ghd.com ben.petticrew@ghd.com	Lab Comments:

Sample Information | **Tests Required** | **Comments**

Envirolab Sample ID	Client Sample ID or Information	Depth	Date sampled	Type of sample	PFAS - short suite	SA Waste screen	Hold	Comments
95	FS04		5/10/2022	soil			X	
96	FD05		5/10/2022	soil			X	
97	FS05		5/10/2022	soil			X	
98	FD06		6/10/2022	soil	x			
—→	(3) FS06		6/10/2022	soil	x			
99	FD07		6/10/2022	soil			X	please forward to ALS
100	FS07		6/10/2022	soil			X	
101	FD08		6/10/2022	soil			X	
102	FS08		6/10/2022	soil			X	
103	RB01		5/10/2022	water	x			
104	RB02		6/10/2022	water	x			
105	FB01		5/10/2022	water	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):	Received by (Company):	*Lab Use Only*
Print Name:	Print Name:	Job number: / Cooling: Ice / Ice pack / None
Date & Time:	Date & Time: 7-10-22	Temperature: / Security seal: Intact / Broken / None
Signature:	Signature:	TAT Req - SAME day / 1 / 2 / 3 / 4 / STD

AM 10.10 4622

2/2

ALS Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EM2219930**

Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: VERA BIERMANN	Contact	: Peter Ravlic
Address	: Level 4, 211 VICTORIA SQUARE ADELAIDE SA, AUSTRALIA 5000	Address	: 4 Westall Rd Springvale VIC Australia 3171
E-mail	: vera.biermann@ghd.com	E-mail	: peter.ravlic@alsglobal.com
Telephone	: ----	Telephone	: +6138549 9645
Facsimile	: ----	Facsimile	: +61-3-8549 9626
Project	: 12566684	Page	: 1 of 2
Order number	: 12566684	Quote number	: EB2020GHDSER0038 (EN/005)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	:		
Sampler	: VB		

Dates

Date Samples Received	: 10-Oct-2022 15:52	Issue Date	: 12-Oct-2022
Client Requested Due Date	: 17-Oct-2022	Scheduled Reporting Date	: **17-Oct-2022**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 1	Temperature	: 18.5°c - Ice Bricks present
Receipt Detail	:	No. of samples received / analysed	: 3 / 3

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Sample(s) received in non-ALS container(s).**
- **Please direct any queries related to sample condition / numbering / breakages to Client Services.**
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **Analytical work for this work order will be conducted at ALS Springvale.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Sampling date / time	Sample ID	SOIL - EA055-103 Moisture Content	SOIL - EP231 (solids) PFAS - Short Suite (12 analytes)
EM2219930-001	05-Oct-2022 00:00	FS02	✓	✓
EM2219930-002	05-Oct-2022 00:00	FS03	✓	✓
EM2219930-003	06-Oct-2022 00:00	FS06	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE		
- A4 - AU Tax Invoice (INV)	Email	accountspayableAU@ghd.com
Accounts Payable Australia		
- A4 - AU Tax Invoice (INV)	Email	accountspayableAU@ghd.com
BEN PETTICREW		
- *AU Certificate of Analysis - NATA (COA)	Email	ben.petticrew@ghd.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	ben.petticrew@ghd.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	ben.petticrew@ghd.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	ben.petticrew@ghd.com
- Chain of Custody (CoC) (COC)	Email	ben.petticrew@ghd.com
- EDI Format - ESDAT (ESDAT)	Email	ben.petticrew@ghd.com
- EDI Format - XTab (XTAB)	Email	ben.petticrew@ghd.com
- Electronic SRN for ESdat (ESRN_ESDAT)	Email	ben.petticrew@ghd.com
GHD LAB REPORTS		
- *AU Certificate of Analysis - NATA (COA)	Email	ghdlabreports@ghd.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	ghdlabreports@ghd.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	ghdlabreports@ghd.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	ghdlabreports@ghd.com
- EDI Format - ESDAT (ESDAT)	Email	ghdlabreports@ghd.com
- Electronic SRN for ESdat (ESRN_ESDAT)	Email	ghdlabreports@ghd.com
VERA BIERMANN		
- *AU Certificate of Analysis - NATA (COA)	Email	vera.biermann@ghd.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	vera.biermann@ghd.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	vera.biermann@ghd.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	vera.biermann@ghd.com
- A4 - AU Tax Invoice (INV)	Email	vera.biermann@ghd.com
- Chain of Custody (CoC) (COC)	Email	vera.biermann@ghd.com
- EDI Format - ESDAT (ESDAT)	Email	vera.biermann@ghd.com
- EDI Format - XTab (XTAB)	Email	vera.biermann@ghd.com
- Electronic SRN for ESdat (ESRN_ESDAT)	Email	vera.biermann@ghd.com

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EM2219930**	Page	: 1 of 4
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: VERA BIERMANN	Contact	: Peter Ravlic
Address	: Level 4, 211 VICTORIA SQUARE ADELAIDE SA, AUSTRALIA 5000	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: ----	Telephone	: +6138549 9645
Project	: 12566684	Date Samples Received	: 10-Oct-2022 15:52
Order number	: 12566684	Date Analysis Commenced	: 12-Oct-2022
C-O-C number	: ----	Issue Date	: 14-Oct-2022 18:47
Sampler	: VB		
Site	:		
Quote number	: EN/005		
No. of samples received	: 3		
No. of samples analysed	: 3		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Xing Lin	Senior Organic Chemist	Melbourne Inorganics, Springvale, VIC
Xing Lin	Senior Organic Chemist	Melbourne Organics, Springvale, VIC

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EP231X: Sample (EM2219930-002) required dilution due to matrix interferences. LOR values have been adjusted accordingly.
- EP231X: Poor matrix spike recovery for sample EM2219930-001 due to sample matrix interference. Confirmed by re-analysis.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	FS02	FS03	FS06	----	----
				Sampling date / time	05-Oct-2022 00:00	05-Oct-2022 00:00	06-Oct-2022 00:00	----	----
Compound	CAS Number	LOR	Unit		EM2219930-001	EM2219930-002	EM2219930-003	--------	--------
					Result	Result	Result	----	----
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	0.1	%		**15.6**	**11.0**	**11.3**	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg		**0.0008**	**0.0005**	**0.0004**	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg		**0.0023**	**0.0126**	**0.0036**	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg		<0.0002	**3.24**	**0.0302**	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg		<0.001	<0.002	<0.001	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg		**0.0008**	<0.0004	**0.0025**	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg		**0.0028**	<0.0004	**0.0016**	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg		<0.0002	<0.0004	**0.0008**	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg		**0.0027**	**0.0013**	**0.0012**	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	**0.0064**	<0.0005	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	**0.0195**	<0.0005	----	----
EP231P: PFAS Sums									
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		**0.0023**	**3.25**	**0.0338**	----	----
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		**0.0094**	**3.26**	**0.0403**	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**90.0**	**124**	**108**	----	----
13C8-PFOA	----	0.0002	%		**90.8**	**89.5**	**97.0**	----	----

Surrogate Control Limits

Sub-Matrix: **SOIL**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	68	136
13C8-PFOA	----	69	133

QUALITY CONTROL REPORT

Work Order	: **EM2219930**	Page	: 1 of 5
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: VERA BIERMANN	Contact	: Peter Ravlic
Address	: Level 4, 211 VICTORIA SQUARE ADELAIDE SA, AUSTRALIA 5000	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: ----	Telephone	: +6138549 9645
Project	: 12566684	Date Samples Received	: 10-Oct-2022
Order number	: 12566684	Date Analysis Commenced	: 12-Oct-2022
C-O-C number	: ----	Issue Date	: 14-Oct-2022
Sampler	: VB		
Site	:		
Quote number	: EN/005		
No. of samples received	: 3		
No. of samples analysed	: 3		

Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Xing Lin	Senior Organic Chemist	Melbourne Inorganics, Springvale, VIC
Xing Lin	Senior Organic Chemist	Melbourne Organics, Springvale, VIC

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 4633198)									
EM2219905-002	Anonymous	EA055: Moisture Content	----	0.1	%	10.7	9.4	12.0	0% - 50%
EM2219917-009	Anonymous	EA055: Moisture Content	----	0.1	%	20.2	20.6	2.2	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4634465)									
EM2218301-026	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	0.0039	0.0031	23.4	0% - 50%
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.201	0.169	17.1	0% - 20%
EM2220012-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<5.0 µg/kg	<0.0050	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<5.0 µg/kg	<0.0050	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<5.0 µg/kg	<0.0050	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4634465)									
EM2218301-026	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	0.0005	0.0005	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	0.0012	0.0010	15.5	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	0.0003	0.0002	46.3	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EM2220012-001	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<5.0 µg/kg	<0.0050	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<5.0 µg/kg	<0.0050	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<5.0 µg/kg	<0.0050	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<5.0 µg/kg	<0.0050	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<5 µg/kg	<0.005	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4634465)									
EM2218301-026	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4634465) - continued									
EM2218301-026	Anonymous	EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EM2220012-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<5.0 µg/kg	<0.0050	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<10.0 µg/kg	<0.0100	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<5.0 µg/kg	<0.0050	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<5.0 µg/kg	<0.0050	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 4634465)									
EM2218301-026	Anonymous	EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	0.205	0.172	17.4	0% - 20%
		EP231X: Sum of PFAS (WA DER List)	----	0.0002	mg/kg	0.207	0.174	17.4	0% - 20%
EM2220012-001	Anonymous	EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	<5.0 µg/kg	<0.0050	0.0	No Limit
		EP231X: Sum of PFAS (WA DER List)	----	0.0002	mg/kg	<10.0 µg/kg	<0.0100	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4634465)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	94.6	72.0	128
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	84.0	67.0	130
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	81.9	68.0	136
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4634465)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	91.2	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	90.4	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	99.3	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	92.3	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	95.5	69.0	133
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4634465)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	91.8	62.0	145
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	97.7	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	101	65.0	137
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	70.1	70.0	130
EP231P: PFAS Sums (QCLot: 4634465)								
EP231X: Sum of PFHxS and PFOS	355-46-4/17 63-23-1	0.0002	mg/kg	<0.0002	----	----	----	----
EP231X: Sum of PFAS (WA DER List)	----	0.0002	mg/kg	<0.0002	----	----	----	----

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4634465)							
EM2219930-001	FS02	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	126	72.0	128
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	128	67.0	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	103	68.0	136
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4634465)							
EM2219930-001	FS02	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	105	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	129	69.0	132

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4634465) - continued							
EM2219930-001	FS02	EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	# Not Determined	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	# Not Determined	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	# Not Determined	69.0	133
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4634465)							
EM2219930-001	FS02	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	100.0	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	109	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	105	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	# 68.0	70.0	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EM2219930**	Page	: 1 of 5
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: VERA BIERMANN	Telephone	: +6138549 9645
Project	: 12566684	Date Samples Received	: 10-Oct-2022
Site	:	Issue Date	: 14-Oct-2022
Sampler	: VB	No. of samples received	: 3
Order number	: 12566684	No. of samples analysed	: 3

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EP231D: (n:2) Fluorotelomer Sulfonic Acids	EM2219930--001	FS02	**10:2 Fluorotelomer sulfonic acid (10:2 FTS)**	120226-60-0	68.0 %	70.0-130%	**Recovery less than lower data quality objective**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content (Dried @ 105-110°C)							
HDPE Soil Jar (EA055) FS02, FS03	**05-Oct-2022**	**----**	----	----	**12-Oct-2022**	19-Oct-2022	✓
HDPE Soil Jar (EA055) FS06	**06-Oct-2022**	**----**	----	----	**12-Oct-2022**	20-Oct-2022	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE Soil Jar (EP231X) FS02, FS03	**05-Oct-2022**	**13-Oct-2022**	03-Apr-2023	✓	**13-Oct-2022**	22-Nov-2022	✓
HDPE Soil Jar (EP231X) FS06	**06-Oct-2022**	**13-Oct-2022**	04-Apr-2023	✓	**13-Oct-2022**	22-Nov-2022	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE Soil Jar (EP231X) FS02, FS03	**05-Oct-2022**	**13-Oct-2022**	03-Apr-2023	✓	**13-Oct-2022**	22-Nov-2022	✓
HDPE Soil Jar (EP231X) FS06	**06-Oct-2022**	**13-Oct-2022**	04-Apr-2023	✓	**13-Oct-2022**	22-Nov-2022	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE Soil Jar (EP231X) FS02, FS03	**05-Oct-2022**	**13-Oct-2022**	03-Apr-2023	✓	**13-Oct-2022**	22-Nov-2022	✓
HDPE Soil Jar (EP231X) FS06	**06-Oct-2022**	**13-Oct-2022**	04-Apr-2023	✓	**13-Oct-2022**	22-Nov-2022	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231P: PFAS Sums							
HDPE Soil Jar (EP231X)							
FS02, FS03	**05-Oct-2022**	**13-Oct-2022**	03-Apr-2023	✓	**13-Oct-2022**	22-Nov-2022	✓
HDPE Soil Jar (EP231X)							
FS06	**06-Oct-2022**	**13-Oct-2022**	04-Apr-2023	✓	**13-Oct-2022**	22-Nov-2022	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Moisture Content	EA055	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	SOIL	In-house: Analysis of soils by solvent extraction followed by LC-Electrospray-MS-MS, Negative Mode using MRM using internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to a portion of soil which is then extracted with MTBE and an ion pairing reagent. A portion of extract is exchanged into the analytical solvent mixture, combined with an equal volume reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
QuECheRS Extraction of Solids	ORG71	SOIL	In house: Sequential extractions with Acetonitrile/Methanol by shaking. Extraction efficiency aided by the addition of salts under acidic conditions. Where relevant, interferences from co-extracted organics are removed with dispersive clean-up media (dSPE). The extract is either diluted or concentrated and exchanged into the analytical solvent.

CHAIN OF CUSTODY FORM - Client

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ENVIROLAB GROUP
National phone number 1300 424 344

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

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

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

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

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

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

Client: GHD Pty Ltd	Client Project Name/Number/Site etc (ie report title): 12566684- MFS St Marys station VSCAP, PSI & SAQP
Contact Person: Ben Petticrew	
Project Mgr: Vera Biermann	PO No.:
Sampler: Ben Petticrew, Ally Kirkman	Envirolab Quote No. :
Address: Level 4, 211 Victoria Square, Adelaide, 5000	Date results required: Or choose: standard / same day / 1 day / 2 day / 3 day *Note: Inform lab in advance if urgent turnaround is required - surcharges apply*
Phone: (08) 8111 6544 Mob:	Additional report format: esdat / equis /
Email: GHDLabReports@ghd.com; ben.petticrew@ghd.com; vera.biermann@ghd.com; ally.kirkman@ghd.com	Lab Comments:

Sample information | **Tests Required** | **Comments**

Envirolab Sample ID	Client Sample ID or information	Container type	Date sampled	Type of sample	PFAS (Short)	PFAS (Long Suite and Trace)	Major Cations/Anions	Major Cations/Anions					Comments
1	MW02	2B	20/10/2022	water	X								
2	MW03	2B	20/10/2022	"	X								
3	MW04	2B	20/10/2022	"	X								
4	GW8001b	2B	21/10/2022	"		X	X	X					
5	GW8002b	6B	21/10/2022	"		X							
6	GW201b	2B	21/10/2022	"		X	X	X					
7	GW7003b	2B	21/10/2022	"		X							
8	FD01	2B	21/10/2022	"		X	X	X					
—	FT01 (ALS)	2B	21/10/2022	"		X	X	X					Forward to ALS
9	QB01												

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

Job No: 308730
Date Received: 21/10/22
Time Received: 0900
Received By: TJ HAN/AP
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

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

Relinquished by (Company): GHD Pty Ltd	Received by (Company): ECS ADL	**Lab Use Only**
Print Name: Ally Kirkman	Print Name: KSHANE	Job number: 308730 — Cooling: Ice / Ice pack / None
Date & Time: 21/10/2022	Date & Time: 21/10/22 7:45pm	Temperature: 14 — Security seal: Intact / Broken / None
Signature: AK	Signature: [signature] ICES 12.1°C icepack.	TAT Req - SAME day / 1 / 2 / 3 / 4 / STD

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

SAMPLE RECEIPT ADVICE

Client Details

Client	GHD Pty Ltd
Attention	Ben Petticrew

Sample Login Details

Your reference	12566684-MFS St Marys Station VSCAP, PSI & SAQP
Envirolab Reference	308730
Date Sample Received	24/10/2022
Date Instructions Received	24/10/2022
Date Results Expected to be Reported	31/10/2022

Sample Condition

Samples received in appropriate condition for analysis	Yes
No. of Samples Provided	9 Water
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	19
Cooling Method	Ice Pack
Sampling Date Provided	YES

Comments

Nil

Please direct any queries to:

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

Analysis Underway, details on the following page:

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

Sample ID	Calcium - Dissolved	Potassium - Dissolved	Sodium - Dissolved	Magnesium - Dissolved	Hardness	Hydroxide Alkalinity (OH-) as CaCO3	Bicarbonate Alkalinity as CaCO3	Carbonate Alkalinity as CaCO3	Total Alkalinity as CaCO3	Sulphate, SO4	Chloride, Cl	Ionic Balance	PFAS in Waters Short	PFAS in Waters Trace Extended	PFAS in Water TRACE Short
MW02													✓		
MW03													✓		
MW04													✓		
GW8001b	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	
GW8002b														✓	
GW201b	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	
GW7003b														✓	
FD01	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	
RB01															✓

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

INTERIM REPORT 308730

Client Details

Client	GHD Pty Ltd
Attention	Ben Petticrew
Address	GPO Box 2052, Adelaide, SA, 5001

Sample Details

Your Reference	**12566684-MFS St Marys Station VSCAP, PSI & SAQP**
Number of Samples	9 Water
Date samples received	24/10/2022
Date completed instructions received	24/10/2022

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	31/10/2022
Interim Report Date	31/10/2022

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

Ion Balance				
Our Reference		308730-4	308730-6	308730-8
Your Reference	UNITS	GW8001b	GW201b	FD01
Type of sample		Water	Water	Water
Date Sampled		21/10/2022	21/10/2022	21/10/2022
Date prepared	-	24/10/2022	24/10/2022	24/10/2022
Date analysed	-	24/10/2022	24/10/2022	24/10/2022
Calcium - Dissolved	mg/L	37	13	14
Potassium - Dissolved	mg/L	19	9.5	9.6
Sodium - Dissolved	mg/L	240	740	730
Magnesium - Dissolved	mg/L	<0.5	20	20
Hardness	mgCaCO 3 /L	92	120	120
Hydroxide Alkalinity (OH^-) as $CaCO_3$	mg/L	100	<5	<5
Bicarbonate Alkalinity as $CaCO_3$	mg/L	<5	720	700
Carbonate Alkalinity as $CaCO_3$	mg/L	100	<5	<5
Total Alkalinity as $CaCO_3$	mg/L	200	720	700
Sulphate, SO4	mg/L	160	120	110
Chloride, Cl	mg/L	220	800	780
Ionic Balance	%	-3.0	-6.0	-5.0

PFAS in Waters Short				
Our Reference		308730-1	308730-2	308730-3
Your Reference	UNITS	MW02	MW03	MW04
Type of sample		Water	Water	Water
Date Sampled		20/10/2022	20/10/2022	20/10/2022
Date prepared	-	25/10/2022	25/10/2022	25/10/2022
Date analysed	-	25/10/2022	25/10/2022	25/10/2022
Perfluorohexanesulfonic acid - PFHxS	µg/L	49	240	86
Perfluorooctanesulfonic acid PFOS	µg/L	19	26	30
Perfluorooctanoic acid PFOA	µg/L	2.0	14	3.2
6:2 FTS	µg/L	0.06	0.67	6.9
8:2 FTS	µg/L	<0.02	<0.02	<0.02
Surrogate $^{13}C_8$ *PFOS*	%	96	92	94
Surrogate $^{13}C_2$ *PFOA*	%	111	106	105
Extracted ISTD $^{18}O_2$ *PFHxS*	%	93	94	89
Extracted ISTD $^{13}C_4$ *PFOS*	%	101	101	105
Extracted ISTD $^{13}C_4$ *PFOA*	%	95	100	89
Extracted ISTD $^{13}C_2$ *6:2FTS*	%	62	38	56
Extracted ISTD $^{13}C_2$ *8:2FTS*	%	82	55	67
Total Positive PFHxS & PFOS	µg/L	68	260	120
Total Positive PFOA & PFOS	µg/L	21	40	33
Total Positive PFAS	µg/L	70	280	130

PFAS in Waters Trace Extended						
Our Reference		308730-4	308730-5	308730-6	308730-7	308730-8
Your Reference	UNITS	GW8001b	GW8002b	GW201b	GW7003b	FD01
Type of sample		Water	Water	Water	Water	Water
Date Sampled		21/10/2022	21/10/2022	21/10/2022	21/10/2022	21/10/2022
Date prepared	-	27/10/2022	25/10/2022	27/10/2022	27/10/2022	27/10/2022
Date analysed	-	27/10/2022	25/10/2022	27/10/2022	27/10/2022	27/10/2022
Perfluorobutanesulfonic acid	µg/L	0.058	4.6	0.060	0.090	0.061
Perfluoropentanesulfonic acid	µg/L	0.096	5.7	0.097	0.11	0.094
Perfluorohexanesulfonic acid - PFHxS	µg/L	0.55	44	0.64	1.2	0.60
Perfluoroheptanesulfonic acid	µg/L	0.017	2.0	0.021	0.074	0.020
Perfluorooctanesulfonic acid PFOS	µg/L	0.31	42	0.30	2.0	0.31
Perfluorodecanesulfonic acid	µg/L	<0.002	<0.02	<0.002	<0.002	<0.002
Perfluorobutanoic acid	µg/L	0.047	1.6	0.01	0.048	0.01
Perfluoropentanoic acid	µg/L	0.12	5.1	0.034	0.021	0.033
Perfluorohexanoic acid	µg/L	0.20	42	0.11	0.067	0.10
Perfluoroheptanoic acid	µg/L	0.036	1.9	0.019	0.016	0.019
Perfluorooctanoic acid PFOA	µg/L	0.026	2.2	0.023	0.051	0.022
Perfluorononanoic acid	µg/L	0.092	4.3	0.077	0.027	0.070
Perfluorodecanoic acid	µg/L	<0.002	<0.02	<0.002	<0.002	<0.002
Perfluoroundecanoic acid	µg/L	<0.002	<0.02	<0.002	<0.002	<0.002
Perfluorododecanoic acid	µg/L	<0.005	<0.05	<0.005	<0.005	<0.005
Perfluorotridecanoic acid	µg/L	<0.01	<0.1	<0.01	<0.01	<0.01
Perfluorotetradecanoic acid	µg/L	<0.05	<0.5	<0.05	<0.05	<0.05
4:2 FTS	µg/L	<0.001	<0.01	<0.001	<0.001	<0.001
6:2 FTS	µg/L	0.68	11	0.022	0.0067	0.019
8:2 FTS	µg/L	0.002	<0.02	0.0007	<0.0004	0.0007
10:2 FTS	µg/L	<0.002	<0.02	<0.002	<0.002	<0.002
Perfluorooctane sulfonamide	µg/L	<0.01	<0.1	<0.01	<0.01	<0.01
N-Methyl perfluorooctane sulfonamide	µg/L	<0.05	<0.5	<0.05	<0.05	<0.05
N-Ethyl perfluorooctanesulfon amide	µg/L	<0.1	<1	<0.1	<0.1	<0.1
N-Me perfluorooctanesulfonamid oethanol	µg/L	<0.05	<0.5	<0.05	<0.05	<0.05
N-Et perfluorooctanesulfonamid oethanol	µg/L	<0.5	<5	<0.5	<0.5	<0.5
MePerfluorooctanesulf- amid oacetic acid	µg/L	<0.002	<0.02	<0.002	<0.002	<0.002
EtPerfluorooctanesulf- amid oacetic acid	µg/L	<0.002	<0.02	<0.002	<0.002	<0.002
Surrogate $^{13}C_8$ *PFOS*	%	92	95	93	90	90
Surrogate $^{13}C_2$ *PFOA*	%	108	100	117	115	115
Extracted ISTD $^{13}C_3$ *PFBS*	%	109	100	88	85	90
Extracted ISTD $^{18}O_2$ *PFHxS*	%	92	93	95	92	93
Extracted ISTD $^{13}C_4$ *PFOS*	%	102	109	101	102	103
Extracted ISTD $^{13}C_4$ *PFBA*	%	95	61	40	79	40

PFAS in Waters Trace Extended						
Our Reference		308730-4	308730-5	308730-6	308730-7	308730-8
Your Reference	UNITS	GW8001b	GW8002b	GW201b	GW7003b	FD01
Type of sample		Water	Water	Water	Water	Water
Date Sampled		21/10/2022	21/10/2022	21/10/2022	21/10/2022	21/10/2022
Extracted ISTD $^{13}C_3$ *PFPeA*	%	112	82	59	20	60
Extracted ISTD $^{13}C_2$ *PFHxA*	%	106	105	96	44	93
Extracted ISTD $^{13}C_4$ *PFHpA*	%	60	80	84	48	89
Extracted ISTD $^{13}C_4$ *PFOA*	%	74	100	96	69	102
Extracted ISTD $^{13}C_5$ *PFNA*	%	75	69	85	44	97
Extracted ISTD $^{13}C_2$ *PFDA*	%	92	92	100	85	114
Extracted ISTD $^{13}C_2$ *PFUnDA*	%	116	102	110	103	112
Extracted ISTD $^{13}C_2$ *PFDoDA*	%	74	104	95	91	106
Extracted ISTD $^{13}C_2$ *PFTeDA*	%	78	83	86	77	91
Extracted ISTD $^{13}C_2$ *4:2FTS*	%	#	75	143	107	155
Extracted ISTD $^{13}C_2$ *6:2FTS*	%	103	101	129	110	144
Extracted ISTD $^{13}C_2$ *8:2FTS*	%	#	80	177	150	192
Extracted ISTD $^{13}C_8$ *FOSA*	%	28	106	60	46	60
Extracted ISTD d_3 *N MeFOSA*	%	114	113	116	116	114
Extracted ISTD d_5 *N EtFOSA*	%	115	118	114	116	111
Extracted ISTD d_7 *N MeFOSE*	%	97	98	99	101	101
Extracted ISTD d_9 *N EtFOSE*	%	100	102	102	106	106
Extracted ISTD d_3 *N MeFOSAA*	%	80	87	119	83	127
Extracted ISTD d_5 *N EtFOSAA*	%	103	80	112	80	117
Total Positive PFHxS & PFOS	µg/L	0.86	86	0.95	3.2	0.91
Total Positive PFOS & PFOA	µg/L	0.34	44	0.33	2.0	0.34
Total Positive PFAS	µg/L	2.2	170	1.4	3.7	1.4

PFAS in Water TRACE Short		
Our Reference		308730-9
Your Reference	UNITS	RB01
Type of sample		Water
Date Sampled		.
Date prepared	-	28/10/2022
Date analysed	-	28/10/2022
Perfluorohexanesulfonic acid - PFHxS	µg/L	
Perfluorooctanesulfonic acid PFOS	µg/L	
Perfluorooctanoic acid PFOA	µg/L	
6:2 FTS	µg/L	
8:2 FTS	µg/L	
Surrogate $^{13}C_8$ *PFOS*	%	
Surrogate $^{13}C_2$ *PFOA*	%	
Extracted ISTD $^{18}O_2$ *PFHxS*	%	
Extracted ISTD $^{13}C_4$ *PFOS*	%	
Extracted ISTD $^{13}C_4$ *PFOA*	%	
Extracted ISTD$^{13}C_2$ *6:2FTS*	%	
Extracted ISTD $^{13}C_2$ *8:2FTS*	%	
Total Positive PFHxS & PFOS	µg/L	
Total Positive PFOS & PFOA	µg/L	
Total Positive PFAS	µg/L	

Method ID	Methodology Summary
Inorg-006	Alkalinity - determined titrimetrically in accordance with APHA latest edition, 2320-B.
Inorg-040	The concentrations of the major ions (mg/L) are converted to milliequivalents and summed. The ionic balance should be within +/- 15% ie total anions = total cations +/-15%.
Inorg-081	Anions - a range of Anions are determined by Ion Chromatography, in accordance with APHA latest edition, 4110-B. Waters samples are filtered on receipt prior to analysis. Alternatively determined by colourimetry/turbidity using Discrete Analyser.
Metals-020	Determination of various metals by ICP-AES.
Org-029	Soil samples are extracted with basified Methanol. Waters and soil extracts are directly injected and/or concentrated/extracted using SPE. TCLPs/ASLP leachates are centrifuged, the supernatant is then analysed (including amendment with solvent) - as per the option in AS4439.3. Analysis is undertaken with LC-MS/MS. PFAS results include the sum of branched and linear isomers where applicable. Please note that PFAS results are corrected for Extracted Internal Standards (QSM 5.4 Table B-15 terminology), which are mass labelled analytes added prior to sample preparation to assess matrix effects and verify processing of the sample. PFAS analytes without a commercially available mass labelled analogue are corrected vs a closely eluting mass labelled PFAS compound. Surrogates are also reported, in this context they are mass labelled PFAS compounds added prior to extraction but are used as monitoring compounds only (not used for result correction). Envicarb (or similar) is used discretionally to remove interfering matrix components. Please contact the laboratory if estimates of Measurement Uncertainty are required as per WA DER.

QUALITY CONTROL: Ion Balance						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date prepared	-			24/10/2022	4	24/10/2022	24/10/2022		24/10/2022	[NT]
Date analysed	-			24/10/2022	4	24/10/2022	24/10/2022		24/10/2022	[NT]
Calcium - Dissolved	mg/L	0.5	Metals-020	<0.5	4	37	37	0	91	[NT]
Potassium - Dissolved	mg/L	0.5	Metals-020	<0.5	4	19	19	0	94	[NT]
Sodium - Dissolved	mg/L	0.5	Metals-020	<0.5	4	240	240	0	90	[NT]
Magnesium - Dissolved	mg/L	0.5	Metals-020	<0.5	4	<0.5	<0.5	0	104	[NT]
Hardness	mgCaCO 3 /L	3	Metals-020	[NT]	4	92	91	1	[NT]	[NT]
Hydroxide Alkalinity (OH^-) as $CaCO_3$	mg/L	5	Inorg-006	<5	4	100	[NT]		[NT]	[NT]
Bicarbonate Alkalinity as $CaCO_3$	mg/L	5	Inorg-006	<5	4	<5	[NT]		[NT]	[NT]
Carbonate Alkalinity as $CaCO_3$	mg/L	5	Inorg-006	<5	4	100	[NT]		[NT]	[NT]
Total Alkalinity as $CaCO_3$	mg/L	5	Inorg-006	<5	4	200	[NT]		91	[NT]
Sulphate, SO4	mg/L	1	Inorg-081	<1	4	160	[NT]		102	[NT]
Chloride, Cl	mg/L	1	Inorg-081	<1	4	220	[NT]		101	[NT]
Ionic Balance	%		Inorg-040	[NT]	4	-3.0	[NT]		[NT]	[NT]

QUALITY CONTROL: PFAS in Waters Short						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date prepared	-			25/10/2022	[NT]	[NT]	[NT]	[NT]	25/10/2022	[NT]
Date analysed	-			25/10/2022	[NT]	[NT]	[NT]	[NT]	25/10/2022	[NT]
Perfluorohexanesulfonic acid - PFHxS	µg/L	0.01	Org-029	<0.01	[NT]	[NT]	[NT]	[NT]	110	[NT]
Perfluorooctanesulfonic acid PFOS	µg/L	0.01	Org-029	<0.01	[NT]	[NT]	[NT]	[NT]	104	[NT]
Perfluorooctanoic acid PFOA	µg/L	0.01	Org-029	<0.01	[NT]	[NT]	[NT]	[NT]	101	[NT]
6:2 FTS	µg/L	0.01	Org-029	<0.01	[NT]	[NT]	[NT]	[NT]	103	[NT]
8:2 FTS	µg/L	0.02	Org-029	<0.02	[NT]	[NT]	[NT]	[NT]	107	[NT]
Surrogate $^{13}C_8$ *PFOS*	%		Org-029	99	[NT]	[NT]	[NT]	[NT]	97	[NT]
Surrogate $^{13}C_2$ *PFOA*	%		Org-029	102	[NT]	[NT]	[NT]	[NT]	98	[NT]
Extracted ISTD $^{18}O_2$ *PFHxS*	%		Org-029	100	[NT]	[NT]	[NT]	[NT]	95	[NT]
Extracted ISTD $^{13}C_4$ *PFOS*	%		Org-029	103	[NT]	[NT]	[NT]	[NT]	98	[NT]
Extracted ISTD $^{13}C_4$ *PFOA*	%		Org-029	105	[NT]	[NT]	[NT]	[NT]	103	[NT]
Extracted ISTD $^{13}C_2$ *6:2FTS*	%		Org-029	114	[NT]	[NT]	[NT]	[NT]	104	[NT]
Extracted ISTD $^{13}C_2$ *8:2FTS*	%		Org-029	114	[NT]	[NT]	[NT]	[NT]	114	[NT]

QUALITY CONTROL: PFAS in Waters Trace Extended						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	308730-5
Date prepared	-			27/10/2022	4	27/10/2022	27/10/2022		27/10/2022	27/10/2022
Date analysed	-			27/10/2022	4	27/10/2022	27/10/2022		27/10/2022	27/10/2022
Perfluorobutanesulfonic acid	µg/L	0.0004	Org-029	<0.0004	4	0.058	0.057	2	102	102
Perfluoropentanesulfonic acid	µg/L	0.001	Org-029	<0.001	4	0.096	0.094	2	112	129
Perfluorohexanesulfonic acid - PFHxS	µg/L	0.0002	Org-029	<0.0002	4	0.55	0.51	8	93	##
Perfluoroheptanesulfonic acid	µg/L	0.001	Org-029	<0.001	4	0.017	0.017	0	97	101
Perfluorooctanesulfonic acid PFOS	µg/L	0.0002	Org-029	<0.0002	4	0.31	0.28	10	92	##
Perfluorodecanesulfonic acid	µg/L	0.002	Org-029	<0.002	4	<0.002	<0.002	0	74	101
Perfluorobutanoic acid	µg/L	0.002	Org-029	<0.002	4	0.047	0.041	14	89	97
Perfluoropentanoic acid	µg/L	0.002	Org-029	<0.002	4	0.12	0.11	9	91	94
Perfluorohexanoic acid	µg/L	0.0004	Org-029	<0.0004	4	0.20	0.19	5	89	##
Perfluoroheptanoic acid	µg/L	0.0004	Org-029	<0.0004	4	0.036	0.035	3	97	107
Perfluorooctanoic acid PFOA	µg/L	0.0002	Org-029	<0.0002	4	0.026	0.027	4	82	91
Perfluorononanoic acid	µg/L	0.001	Org-029	<0.001	4	0.092	0.097	5	107	134
Perfluorodecanoic acid	µg/L	0.002	Org-029	<0.002	4	<0.002	<0.002	0	103	109
Perfluoroundecanoic acid	µg/L	0.002	Org-029	<0.002	4	<0.002	<0.002	0	92	85
Perfluorododecanoic acid	µg/L	0.005	Org-029	<0.005	4	<0.005	<0.005	0	99	98
Perfluorotridecanoic acid	µg/L	0.01	Org-029	<0.01	4	<0.01	<0.01	0	71	90
Perfluorotetradecanoic acid	µg/L	0.05	Org-029	<0.05	4	<0.05	<0.05	0	87	104
4:2 FTS	µg/L	0.001	Org-029	<0.001	4	<0.001	<0.001	0	97	103
6:2 FTS	µg/L	0.0004	Org-029	<0.0004	4	0.68	0.63	8	90	##
8:2 FTS	µg/L	0.0004	Org-029	<0.0004	4	0.002	0.002	0	89	100
10:2 FTS	µg/L	0.002	Org-029	<0.002	4	<0.002	<0.002	0	95	90
Perfluorooctane sulfonamide	µg/L	0.01	Org-029	<0.01	4	<0.01	<0.01	0	96	96
N-Methyl perfluorooctane sulfonamide	µg/L	0.05	Org-029	<0.05	4	<0.05	<0.05	0	118	99
N-Ethyl perfluorooctanesulfon amide	µg/L	0.1	Org-029	<0.1	4	<0.1	<0.1	0	116	94
N-Me perfluorooctanesulfonamid oethanol	µg/L	0.05	Org-029	<0.05	4	<0.05	<0.05	0	106	93
N-Et perfluorooctanesulfonamid oethanol	µg/L	0.5	Org-029	<0.5	4	<0.5	<0.5	0	93	92
MePerfluorooctanesulf- amid oacetic acid	µg/L	0.002	Org-029	<0.002	4	<0.002	<0.002	0	99	100
EtPerfluorooctanesulf- amid oacetic acid	µg/L	0.002	Org-029	<0.002	4	<0.002	<0.002	0	101	111
Surrogate $^{13}C_8$ *PFOS*	%		Org-029	92	4	92	92	0	92	95
Surrogate $^{13}C_2$ *PFOA*	%		Org-029	106	4	108	112	4	103	105

QUALITY CONTROL: PFAS in Waters Trace Extended						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	308730-5
Extracted ISTD $^{13}C_3$ *PFBS*	%		Org-029	90	4	109	111	2	93	98
Extracted ISTD $^{18}O_2$ *PFHxS*	%		Org-029	81	4	92	95	3	89	82
Extracted ISTD $^{13}C_4$ *PFOS*	%		Org-029	91	4	102	105	3	101	89
Extracted ISTD $^{13}C_4$ *PFBA*	%		Org-029	111	4	95	96	1	122	61
Extracted ISTD $^{13}C_3$ *PFPeA*	%		Org-029	88	4	112	115	3	98	81
Extracted ISTD $^{13}C_2$ *PFHxA*	%		Org-029	101	4	106	107	1	115	91
Extracted ISTD $^{13}C_4$ *PFHpA*	%		Org-029	93	4	60	62	3	103	77
Extracted ISTD $^{13}C_4$ *PFOA*	%		Org-029	94	4	74	72	3	106	97
Extracted ISTD $^{13}C_5$ *PFNA*	%		Org-029	94	4	75	72	4	105	64
Extracted ISTD $^{13}C_2$ *PFDA*	%		Org-029	100	4	92	96	4	112	92
Extracted ISTD $^{13}C_2$ *PFUnDA*	%		Org-029	100	4	116	111	4	111	102
Extracted ISTD $^{13}C_2$ *PFDoDA*	%		Org-029	106	4	74	70	6	117	102
Extracted ISTD $^{13}C_2$ *PFTeDA*	%		Org-029	65	4	78	73	7	66	88
Extracted ISTD $^{13}C_2$ *4:2FTS*	%		Org-029	132	4	#	#		145	72
Extracted ISTD$^{13}C_2$ *6:2FTS*	%		Org-029	122	4	103	113	9	138	68
Extracted ISTD $^{13}C_2$ *8:2FTS*	%		Org-029	147	4	#	#		163	85
Extracted ISTD $^{13}C_8$ *FOSA*	%		Org-029	74	4	28	28	0	75	103
Extracted ISTD d_3 *N MeFOSA*	%		Org-029	112	4	114	115	1	104	113
Extracted ISTD d_5 *N EtFOSA*	%		Org-029	112	4	115	119	3	104	118
Extracted ISTD d_7 *N MeFOSE*	%		Org-029	102	4	97	102	5	96	99

QUALITY CONTROL: PFAS in Waters Trace Extended						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	308730-5
Extracted ISTD d_9 *N EtFOSE*	%		Org-029	103	4	100	101	1	98	101
Extracted ISTD d_3 *N MeFOSAA*	%		Org-029	106	4	80	81	1	108	85
Extracted ISTD d_5 *N EtFOSAA*	%		Org-029	100	4	103	101	2	113	75

QUALITY CONTROL: PFAS in Waters Trace Extended						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	8	27/10/2022	27/10/2022		[NT]	[NT]
Date analysed	-			[NT]	8	27/10/2022	27/10/2022		[NT]	[NT]
Perfluorobutanesulfonic acid	µg/L	0.0004	Org-029	[NT]	8	0.061	0.059	3	[NT]	[NT]
Perfluoropentanesulfonic acid	µg/L	0.001	Org-029	[NT]	8	0.094	0.091	3	[NT]	[NT]
Perfluorohexanesulfonic acid - PFHxS	µg/L	0.0002	Org-029	[NT]	8	0.60	0.56	7	[NT]	[NT]
Perfluoroheptanesulfonic acid	µg/L	0.001	Org-029	[NT]	8	0.020	0.020	0	[NT]	[NT]
Perfluorooctanesulfonic acid PFOS	µg/L	0.0002	Org-029	[NT]	8	0.31	0.31	0	[NT]	[NT]
Perfluorodecanesulfonic acid	µg/L	0.002	Org-029	[NT]	8	<0.002	<0.002	0	[NT]	[NT]
Perfluorobutanoic acid	µg/L	0.002	Org-029	[NT]	8	0.01	0.01	0	[NT]	[NT]
Perfluoropentanoic acid	µg/L	0.002	Org-029	[NT]	8	0.033	0.033	0	[NT]	[NT]
Perfluorohexanoic acid	µg/L	0.0004	Org-029	[NT]	8	0.10	0.10	0	[NT]	[NT]
Perfluoroheptanoic acid	µg/L	0.0004	Org-029	[NT]	8	0.019	0.018	5	[NT]	[NT]
Perfluorooctanoic acid PFOA	µg/L	0.0002	Org-029	[NT]	8	0.022	0.022	0	[NT]	[NT]
Perfluorononanoic acid	µg/L	0.001	Org-029	[NT]	8	0.070	0.070	0	[NT]	[NT]
Perfluorodecanoic acid	µg/L	0.002	Org-029	[NT]	8	<0.002	<0.002	0	[NT]	[NT]
Perfluoroundecanoic acid	µg/L	0.002	Org-029	[NT]	8	<0.002	<0.002	0	[NT]	[NT]
Perfluorododecanoic acid	µg/L	0.005	Org-029	[NT]	8	<0.005	<0.005	0	[NT]	[NT]
Perfluorotridecanoic acid	µg/L	0.01	Org-029	[NT]	8	<0.01	<0.01	0	[NT]	[NT]
Perfluorotetradecanoic acid	µg/L	0.05	Org-029	[NT]	8	<0.05	<0.05	0	[NT]	[NT]
4:2 FTS	µg/L	0.001	Org-029	[NT]	8	<0.001	<0.001	0	[NT]	[NT]
6:2 FTS	µg/L	0.0004	Org-029	[NT]	8	0.019	0.020	5	[NT]	[NT]
8:2 FTS	µg/L	0.0004	Org-029	[NT]	8	0.0007	0.0007	0	[NT]	[NT]
10:2 FTS	µg/L	0.002	Org-029	[NT]	8	<0.002	<0.002	0	[NT]	[NT]
Perfluorooctane sulfonamide	µg/L	0.01	Org-029	[NT]	8	<0.01	<0.01	0	[NT]	[NT]
N-Methyl perfluorooctane sulfonamide	µg/L	0.05	Org-029	[NT]	8	<0.05	<0.05	0	[NT]	[NT]
N-Ethyl perfluorooctanesulfon amide	µg/L	0.1	Org-029	[NT]	8	<0.1	<0.1	0	[NT]	[NT]
N-Me perfluorooctanesulfonamid oethanol	µg/L	0.05	Org-029	[NT]	8	<0.05	<0.05	0	[NT]	[NT]
N-Et perfluorooctanesulfonamid oethanol	µg/L	0.5	Org-029	[NT]	8	<0.5	<0.5	0	[NT]	[NT]
MePerfluorooctanesulf- amid oacetic acid	µg/L	0.002	Org-029	[NT]	8	<0.002	<0.002	0	[NT]	[NT]
EtPerfluorooctanesulf- amid oacetic acid	µg/L	0.002	Org-029	[NT]	8	<0.002	<0.002	0	[NT]	[NT]
Surrogate $^{13}C_8$ *PFOS*	%		Org-029	[NT]	8	90	89	1	[NT]	[NT]
Surrogate $^{13}C_2$ *PFOA*	%		Org-029	[NT]	8	115	113	2	[NT]	[NT]

QUALITY CONTROL: PFAS in Waters Trace Extended						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Extracted ISTD $^{13}C_3$ PFBS	%		Org-029	[NT]	8	90	92	2	[NT]	[NT]
Extracted ISTD $^{18}O_2$ PFHxS	%		Org-029	[NT]	8	93	100	7	[NT]	[NT]
Extracted ISTD $^{13}C_4$ PFOS	%		Org-029	[NT]	8	103	107	4	[NT]	[NT]
Extracted ISTD $^{13}C_4$ PFBA	%		Org-029	[NT]	8	40	41	2	[NT]	[NT]
Extracted ISTD $^{13}C_3$ PFPeA	%		Org-029	[NT]	8	60	62	3	[NT]	[NT]
Extracted ISTD $^{13}C_2$ PFHxA	%		Org-029	[NT]	8	93	94	1	[NT]	[NT]
Extracted ISTD $^{13}C_4$ PFHpA	%		Org-029	[NT]	8	89	90	1	[NT]	[NT]
Extracted ISTD $^{13}C_4$ PFOA	%		Org-029	[NT]	8	102	100	2	[NT]	[NT]
Extracted ISTD $^{13}C_5$ PFNA	%		Org-029	[NT]	8	97	96	1	[NT]	[NT]
Extracted ISTD $^{13}C_2$ PFDA	%		Org-029	[NT]	8	114	107	6	[NT]	[NT]
Extracted ISTD $^{13}C_2$ PFUnDA	%		Org-029	[NT]	8	112	108	4	[NT]	[NT]
Extracted ISTD $^{13}C_2$ PFDoDA	%		Org-029	[NT]	8	106	99	7	[NT]	[NT]
Extracted ISTD $^{13}C_2$ PFTeDA	%		Org-029	[NT]	8	91	86	6	[NT]	[NT]
Extracted ISTD $^{13}C_2$ 4:2FTS	%		Org-029	[NT]	8	155	155	0	[NT]	[NT]
Extracted ISTD$^{13}C_2$ 6:2FTS	%		Org-029	[NT]	8	144	138	4	[NT]	[NT]
Extracted ISTD $^{13}C_2$ 8:2FTS	%		Org-029	[NT]	8	192	188	2	[NT]	[NT]
Extracted ISTD $^{13}C_8$ FOSA	%		Org-029	[NT]	8	60	66	10	[NT]	[NT]
Extracted ISTD d_3 N MeFOSA	%		Org-029	[NT]	8	114	118	3	[NT]	[NT]
Extracted ISTD d_5 N EtFOSA	%		Org-029	[NT]	8	111	115	4	[NT]	[NT]
Extracted ISTD d_7 N MeFOSE	%		Org-029	[NT]	8	101	102	1	[NT]	[NT]

QUALITY CONTROL: PFAS in Waters Trace Extended						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Extracted ISTD d_9 *N EtFOSE*	%		Org-029	[NT]	8	106	107	1	[NT]	[NT]
Extracted ISTD d_3 *N MeFOSAA*	%		Org-029	[NT]	8	127	120	6	[NT]	[NT]
Extracted ISTD d_5 *N EtFOSAA*	%		Org-029	[NT]	8	117	117	0	[NT]	[NT]

QUALITY CONTROL: PFAS in Water TRACE Short						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date prepared	-			28/10/2022	[NT]	[NT]	[NT]	[NT]	28/10/2022	[NT]
Date analysed	-			28/10/2022	[NT]	[NT]	[NT]	[NT]	28/10/2022	[NT]
Perfluorohexanesulfonic acid - PFHxS	µg/L	0.0002	Org-029	<0.0002	[NT]	[NT]	[NT]	[NT]	98	[NT]
Perfluorooctanesulfonic acid PFOS	µg/L	0.0002	Org-029	<0.0002	[NT]	[NT]	[NT]	[NT]	96	[NT]
Perfluorooctanoic acid PFOA	µg/L	0.0002	Org-029	<0.0002	[NT]	[NT]	[NT]	[NT]	96	[NT]
6:2 FTS	µg/L	0.0004	Org-029	<0.0004	[NT]	[NT]	[NT]	[NT]	95	[NT]
8:2 FTS	µg/L	0.0004	Org-029	<0.0004	[NT]	[NT]	[NT]	[NT]	93	[NT]
Surrogate $^{13}C_8$ *PFOS*	%		Org-029	95	[NT]	[NT]	[NT]	[NT]	101	[NT]
Surrogate $^{13}C_2$ *PFOA*	%		Org-029	102	[NT]	[NT]	[NT]	[NT]	104	[NT]
Extracted ISTD $^{18}O_2$ *PFHxS*	%		Org-029	90	[NT]	[NT]	[NT]	[NT]	91	[NT]
Extracted ISTD $^{13}C_4$ *PFOS*	%		Org-029	91	[NT]	[NT]	[NT]	[NT]	85	[NT]
Extracted ISTD $^{13}C_4$ *PFOA*	%		Org-029	98	[NT]	[NT]	[NT]	[NT]	96	[NT]
Extracted ISTD $^{13}C_2$ *6:2FTS*	%		Org-029	108	[NT]	[NT]	[NT]	[NT]	106	[NT]
Extracted ISTD $^{13}C_2$ *8:2FTS*	%		Org-029	129	[NT]	[NT]	[NT]	[NT]	121	[NT]

Result Definitions

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

Quality Control Definitions

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

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

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

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

Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

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

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

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

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

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

Report Comments

Dissolved Metals: no filtered, preserved sample was received, therefore the unpreserved sample was filtered through 0.45µm filter at the lab.
Note: there is a possibility some elements may be underestimated.

For PFAS Extracted Internal Standards denoted with # or outside the 50-150% acceptance range, the respective target analyte results may be unaffected, in other circumstances the PQL has been raised to accommodate the outlier(s).

PFAS in Water:
Percent recovery is not applicable due to the high concentration of the analytes in the sample. However an acceptable recovery was obtained for the LCS.

Ming To

Subject: FW: Results for Registration 308730 12566684-MFS St Marys Station VSCAP, PSI & SAQP

Ref: 308730-A
TAT: Standard.
Due: 14/11/2022
MT.

From: Greta Petzold
Sent: Friday, 4 November 2022 3:30 PM
To: Ben Petticrew <Ben.Petticrew@ghd.com>
Cc: Vera Biermann <Vera.Biermann@ghd.com>; GHD Lab Reports <GHDLabReports@ghd.com>; Ally Kirkman <Ally.Kirkman@ghd.com>; Adelaide <adelaide@envirolab.com.au>
Subject: RE: Results for Registration 308730 12566684-MFS St Marys Station VSCAP, PSI & SAQP

Hi Ben,

We can do cations, Chloride and sulphate from the PFAS bottles but not alkalinity. I'll get the lab to check how much sample is left.

Cheers

From: Ben Petticrew <Ben.Petticrew@ghd.com>
Sent: Friday, 4 November 2022 1:57 PM
To: Greta Petzold <GPetzold@envirolab.com.au>; Vera Biermann <Vera.Biermann@ghd.com>; GHD Lab Reports <GHDLabReports@ghd.com>; Ally Kirkman <Ally.Kirkman@ghd.com>; Adelaide <adelaide@envirolab.com.au>
Subject: RE: Results for Registration 308730 12566684-MFS St Marys Station VSCAP, PSI & SAQP

CAUTION: This email originated from outside of the organisation. Do not act on instructions, click links or open attachments unless you recognise the sender and know the content is authentic and safe.

Hi,
If the bottles are available, can we have major cations and anions run on sample GW8002b (5) as well please

Thanks

Ben Petticrew
Technical/Project Director – Contamination Assessment and Remediation

GHD
M 61 460 830 524 E ben.petticrew@ghd.com

From: Greta Petzold <GPetzold@envirolab.com.au>
Sent: Tuesday, 1 November 2022 4:29 PM
To: Vera Biermann <vera.biermann@ghd.com>; GHD Lab Reports <GHDLabreports@ghd.com>; Ally Kirkman <ally.kirkman@ghd.com>; Ben Petticrew <ben.petticrew@ghd.com>; Adelaide <adelaide@envirolab.com.au>
Subject: Results for Registration 308730 12566684-MFS St Marys Station VSCAP, PSI & SAQP

You don't often get email from gpetzold@envirolab.com.au. Learn why this is important

Please refer to attached for:
a copy of the Certificate of Analysis
a copy of the COC/paperwork received from you
ESDAT Extracts
an Excel or .csv file containing the results

Please note that a hard copy will not be posted.

Enquiries should be made directly to:
customerservice@envirolab.com.au

How did we do? Send Feedback

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

SAMPLE RECEIPT ADVICE

Client Details

Client	GHD Pty Ltd
Attention	Ben Petticrew

Sample Login Details

Your reference	12566684-MFS St Marys Station VSCAP, PSI & SAQP
Envirolab Reference	308730-A
Date Sample Received	24/10/2022
Date Instructions Received	07/11/2022
Date Results Expected to be Reported	14/11/2022

Sample Condition

Samples received in appropriate condition for analysis	Yes
No. of Samples Provided	additional analysis
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	19
Cooling Method	Ice Pack
Sampling Date Provided	YES

Comments

Nil

Please direct any queries to:

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

Analysis Underway, details on the following page:

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Sample ID	Cations in water Dissolved	Sulphate, SO4	Chloride, Cl	On Hold
MW02				✓
MW03				✓
MW04				✓
GW8001b				✓
GW8002b	✓	✓	✓	
GW201b				✓
GW7003b				✓
FD01				✓
RB01				✓

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

Additional Info

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

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ABN 37 112 535 645
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ph 02 9910 6200 fax 02 9910 6201
customerservice@envirolab.com.au
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CERTIFICATE OF ANALYSIS 308730-A

Client Details

Client	GHD Pty Ltd
Attention	Ben Petticrew
Address	GPO Box 2052, Adelaide, SA, 5001

Sample Details

Your Reference	**12566684-MFS St Marys Station VSCAP, PSI & SAQP**
Number of Samples	additional analysis
Date samples received	24/10/2022
Date completed instructions received	07/11/2022

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	14/11/2022
Date of Issue	14/11/2022

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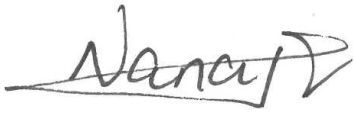
Results Approved By
Giovanni Agosti, Group Technical Manager
Nick Sarlamis, Assistant Operation Manager

Authorised By



Nancy Zhang, Laboratory Manager

Cations in water Dissolved		
Our Reference		308730-A-5
Your Reference	UNITS	GW8002b
Type of sample		Water
Date Sampled		21/10/2022
Date digested	-	07/11/2022
Date analysed	-	07/11/2022
Sodium - Dissolved	mg/L	1,200
Potassium - Dissolved	mg/L	5.4
Calcium - Dissolved	mg/L	36
Magnesium - Dissolved	mg/L	20

Miscellaneous Inorganics		
Our Reference	UNITS	308730-A-5
Your Reference		GW8002b
Type of sample		Water
Date Sampled		21/10/2022
Date prepared	-	08/11/2022
Date analysed	-	08/11/2022
Sulphate, SO4	mg/L	610
Chloride, Cl	mg/L	710

Method ID	Methodology Summary
Inorg-081	Anions - a range of Anions are determined by Ion Chromatography, in accordance with APHA latest edition, 4110-B. Waters samples are filtered on receipt prior to analysis. Alternatively determined by colourimetry/turbidity using Discrete Analyser.
Metals-020	Determination of various metals by ICP-AES.

QUALITY CONTROL: Cations in water Dissolved						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date digested	-			07/11/2022	[NT]	[NT]	[NT]	[NT]	07/11/2022	[NT]
Date analysed	-			07/11/2022	[NT]	[NT]	[NT]	[NT]	07/11/2022	[NT]
Sodium - Dissolved	mg/L	0.5	Metals-020	<0.5	[NT]	[NT]	[NT]	[NT]	96	[NT]
Potassium - Dissolved	mg/L	0.5	Metals-020	<0.5	[NT]	[NT]	[NT]	[NT]	94	[NT]
Calcium - Dissolved	mg/L	0.5	Metals-020	<0.5	[NT]	[NT]	[NT]	[NT]	99	[NT]
Magnesium - Dissolved	mg/L	0.5	Metals-020	<0.5	[NT]	[NT]	[NT]	[NT]	102	[NT]

QUALITY CONTROL: Miscellaneous Inorganics					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date prepared	-			08/11/2022	[NT]	[NT]	[NT]	[NT]	08/11/2022	[NT]
Date analysed	-			08/11/2022	[NT]	[NT]	[NT]	[NT]	08/11/2022	[NT]
Sulphate, SO4	mg/L	1	Inorg-081	<1	[NT]	[NT]	[NT]	[NT]	95	[NT]
Chloride, Cl	mg/L	1	Inorg-081	<1	[NT]	[NT]	[NT]	[NT]	96	[NT]

Result Definitions

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

Quality Control Definitions

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

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

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

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

Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

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

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

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

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

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

Report Comments

Dissolved Metals: no filtered, preserved sample was received, therefore the unpreserved sample was filtered through 0.45µm filter at the lab.
Note: there is a possibility some elements may be underestimated.

CHAIN OF CUSTODY FORM - Client

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ENVIROLAB GROUP
National phone number 1300 424 344

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

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

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

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

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

Darwin Office - Envirolab Services
Unit 20/119 Reichardt Road, Winnellie, NT 0820

Client: GHD Pty Ltd	Client Project Name/Number/Site etc (ie report title): 12566684- MFS St Marys station VSCAP, PSI & SAQP
Contact Person: Ben Petticrew	
Project Mgr: Vera Biermann	PO No.:
Sampler: Ben Petticrew, Ally Kirkman	Envirolab Quote No. :
Address: Level 4, 211 Victoria Square, Adelaide, 5000	Date results required: Or choose: standard / same day / 1 day / 2 day / 3 day *Note: Inform lab in advance if urgent turnaround is required - surcharges apply*
Phone: (08) 8111 6544 Mob:	Additional report format: esdat / equis /
Email: GHDLabReports@ghd.com, ben.petticrew@ghd.com, vera.biermann@ghd.com, ally.kirkman@ghd.com	Lab Comments:

Sample Information					Tests Required															Comments
Envirolab Sample ID	Client Sample ID or information	Container type	Date sampled	Type of sample	TRH (F1 and F4)	TRH Silica Gel Clean Up	BTEXN													Provide as much information about the sample as you can
1	GW8002b	6B	21/10/2022	water	X	X	X													
2	GW201b	2B	21/10/2022	water	X	X	X													
3	GW7003b	2B	21/10/2022	"	X	X	X													
4	FD01	2B	21/10/2022	"	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): GHD Pty Ltd	Received by (Company): ELS	Lab Use Only	
Print Name: Ally Kirkman	Print Name: Alex Steele	Job number: 308746	Cooling: Ice / Ice/pack / None
Date & Time: 21/10/2022	Date & Time: 21/10/22 @ 2:15pm	Temperature: 19	Security seal: Intact / Broken / None
Signature: AK	Signature: 12-1°C Icepack.	TAT Req - SAME day / 1 / 2 / 3 / 4 / STD	

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

Job No: 308746
Date Received: 21-10-22
Time Received: 0800
Received By: TJ/AW
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

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12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
customerservice@envirolab.com.au
www.envirolab.com.au

SAMPLE RECEIPT ADVICE

Client Details

Client	GHD Pty Ltd
Attention	Ben Petticrew

Sample Login Details

Your reference	12566684
Envirolab Reference	308746
Date Sample Received	24/10/2022
Date Instructions Received	24/10/2022
Date Results Expected to be Reported	31/10/2022

Sample Condition

Samples received in appropriate condition for analysis	Yes
No. of Samples Provided	4 Water
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	19
Cooling Method	Ice Pack
Sampling Date Provided	YES

Comments

Nil

Please direct any queries to:

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

Analysis Underway, details on the following page:

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ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
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Sample ID	vTRH(C6-C10)/BTEXN in Water	svTRH (C10-C40) in Water	sTPH in Water (C10-C40) NEPM Silica gel
GW8002b	✓	✓	✓
GW201b	✓	✓	✓
GW7003b	✓	✓	✓
FD01	✓	✓	✓

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

Additional Info

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

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CERTIFICATE OF ANALYSIS 308746

Client Details

Client	GHD Pty Ltd
Attention	Ben Petticrew
Address	GPO Box 2052, Adelaide, SA, 5001

Sample Details

Your Reference	**12566684**
Number of Samples	4 Water
Date samples received	24/10/2022
Date completed instructions received	24/10/2022

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	31/10/2022
Date of Issue	31/10/2022

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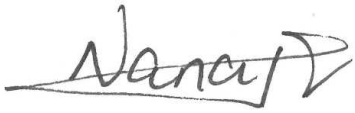
Results Approved By
Liam Timmins, Organic Instruments Team Leader
Steven Luong, Senior Chemist

Authorised By



Nancy Zhang, Laboratory Manager

vTRH(C6-C10)/BTEXN in Water					
Our Reference	UNITS	308746-1	308746-2	308746-3	308746-4
Your Reference		GW8002b	GW201b	GW7003b	FD01
Date Sampled		21/10/2022	21/10/2022	21/10/2022	21/10/2022
Type of sample		Water	Water	Water	Water
Date extracted	-	26/10/2022	26/10/2022	26/10/2022	26/10/2022
Date analysed	-	28/10/2022	28/10/2022	28/10/2022	28/10/2022
TRH C_6 - C_9	µg/L	<10	60	<10	61
TRH C_6 - C_{10}	µg/L	<10	71	<10	65
TRH C_6 - C_{10} less BTEX (F1)	µg/L	<10	71	<10	65
Benzene	µg/L	<1	<1	<1	<1
Toluene	µg/L	<1	<1	<1	<1
Ethylbenzene	µg/L	<1	<1	<1	<1
m+p-xylene	µg/L	<2	<2	<2	<2
o-xylene	µg/L	<1	<1	<1	<1
Naphthalene	µg/L	<1	<1	<1	<1
Surrogate Dibromofluoromethane	%	107	108	106	108
Surrogate toluene-d8	%	100	99	100	98
Surrogate 4-BFB	%	95	94	95	95

svTRH (C10-C40) in Water					
Our Reference	UNITS	308746-1	308746-2	308746-3	308746-4
Your Reference		GW8002b	GW201b	GW7003b	FD01
Date Sampled		21/10/2022	21/10/2022	21/10/2022	21/10/2022
Type of sample		Water	Water	Water	Water
Date extracted	-	25/10/2022	25/10/2022	25/10/2022	25/10/2022
Date analysed	-	25/10/2022	25/10/2022	25/10/2022	25/10/2022
TRH C_{10} - C_{14}	µg/L	<50	<50	<50	<50
TRH C_{15} - C_{28}	µg/L	200	<100	<100	<100
TRH C_{29} - C_{36}	µg/L	<100	<100	<100	<100
Total +ve TRH (C10-C36)	µg/L	200	<50	<50	<50
TRH >C_{10} - C_{16}	µg/L	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	µg/L	<50	<50	<50	<50
TRH >C_{16} - C_{34}	µg/L	190	<100	<100	<100
TRH >C_{34} - C_{40}	µg/L	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	µg/L	190	<50	<50	<50
Surrogate o-Terphenyl	%	104	113	96	109

sTPH in Water (C10-C40) NEPM Silica gel		
Our Reference		308746-1
Your Reference	UNITS	GW8002b
Date Sampled		21/10/2022
Type of sample		Water
Date extracted	-	26/10/2022
Date analysed	-	27/10/2022
TPH C_{10} - C_{14}	µg/L	<50
TPH C_{15} - C_{28}	µg/L	<100
TPH C_{29} - C_{36}	µg/L	<100
TPH >C_{10} - C_{16}	µg/L	<50
TPH >C_{16} - C_{34}	µg/L	<100
TPH >C_{34} - C_{40}	µg/L	<100
Surrogate o-Terphenyl	%	97

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

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Water					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W4	[NT]
Date extracted	-			26/10/2022	2	26/10/2022	27/10/2022		26/10/2022	[NT]
Date analysed	-			28/10/2022	2	28/10/2022	28/10/2022		28/10/2022	[NT]
TRH C_6 - C_9	µg/L	10	Org-023	<10	2	60	51	16	99	[NT]
TRH C_6 - C_{10}	µg/L	10	Org-023	<10	2	71	66	7	99	[NT]
Benzene	µg/L	1	Org-023	<1	2	<1	<1	0	99	[NT]
Toluene	µg/L	1	Org-023	<1	2	<1	<1	0	99	[NT]
Ethylbenzene	µg/L	1	Org-023	<1	2	<1	<1	0	99	[NT]
m+p-xylene	µg/L	2	Org-023	<2	2	<2	<2	0	100	[NT]
o-xylene	µg/L	1	Org-023	<1	2	<1	<1	0	101	[NT]
Naphthalene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-023	103	2	108	104	4	103	[NT]
Surrogate toluene-d8	%		Org-023	99	2	99	99	0	102	[NT]
Surrogate 4-BFB	%		Org-023	96	2	94	96	2	101	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			25/10/2022	[NT]	[NT]	[NT]	[NT]	25/10/2022	[NT]
Date analysed	-			27/10/2022	[NT]	[NT]	[NT]	[NT]	25/10/2022	[NT]
TRH C_{10} - C_{14}	µg/L	50	Org-020	<50	[NT]	[NT]	[NT]	[NT]	86	[NT]
TRH C_{15} - C_{28}	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	110	[NT]
TRH C_{29} - C_{36}	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	100	[NT]
TRH >C_{10} - C_{16}	µg/L	50	Org-020	<50	[NT]	[NT]	[NT]	[NT]	86	[NT]
TRH >C_{16} - C_{34}	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	110	[NT]
TRH >C_{34} - C_{40}	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	100	[NT]
Surrogate o-Terphenyl	%		Org-020	112	[NT]	[NT]	[NT]	[NT]	87	[NT]

QUALITY CONTROL: sTPH in Water (C10-C40) NEPM Silica gel					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W3	[NT]
Date extracted	-			26/10/2022	[NT]	[NT]	[NT]	[NT]	26/10/2022	[NT]
Date analysed	-			27/10/2022	[NT]	[NT]	[NT]	[NT]	27/10/2022	[NT]
TPH C_{10} - C_{14}	µg/L	50	Org-020	<50	[NT]	[NT]	[NT]	[NT]	75	[NT]
TPH C_{15} - C_{28}	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	73	[NT]
TPH C_{29} - C_{36}	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	71	[NT]
TPH >C_{10} - C_{16}	µg/L	50	Org-020	<50	[NT]	[NT]	[NT]	[NT]	75	[NT]
TPH >C_{16} - C_{34}	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	73	[NT]
TPH >C_{34} - C_{40}	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	71	[NT]
Surrogate o-Terphenyl	%		Org-020	112	[NT]	[NT]	[NT]	[NT]	113	[NT]

Result Definitions

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

Quality Control Definitions

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

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

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

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

Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

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

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

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

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

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

CHAIN OF CUSTODY FORM - Client

ENVIROLAB GROUP | ENVIROLAB SERVICES | mpl

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ENVIROLAB GROUP
National phone numb

Sydney Lab - Envirola
12 Ashley St, Chatsw
02 9910 6200 | sy

Perth Lab - MPL Labo
16-18 Hayden Crt, Mya
08 9317 2505 | la

Melbourne Lab - Envir
25 Research Drive, Cr
03 9763 2500 | m

Adelaide Office - Envi
7a The Parade, Norwo
08 7087 6800 | ad

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

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

Environmental Division
Sydney
Work Order Reference
ES2238073

Telephone - 61-2-8784 85

Client: GHD Pty Ltd	Client Project Name/Number/Site etc (ie report title): 12566684- MFS St Marys station VSCAP, PSI & SAQP
Contact Person: Ben Petticrew	
Project Mgr: Vera Biermann	PO No.:
Sampler: Ben Petticrew, Ally Kirkman	Envirolab Quote No. :
Address: Level 4, 211 Victoria Square, Adelaide, 5000	Date results required: Or choose: standard / same day / 1 day / 2 day / 3 day *Note: Inform lab in advance if urgent turnaround is required - surcharges apply*
Phone: (08) 8111 6544 Mob:	Additional report format: esdat / equis /
Email: GHDLabReports@ghd.com, ben.petticrew@ghd.com, vera.biermann@ghd.com, ally.kirkman@ghd.com	Lab Comments:

Sample information					Tests Required													Comments
Envirolab Sample ID	Client Sample ID or information	Container type	Date sampled	Type of sample	PFAS (Short)	PFAS (Long Suite and Trace)	Major Cations/Anions	Major Cations/Anions										Provide as much information about the sample as you can
1	MW02	2B	20/10/2022	water	X													
2	MW03	2B	20/10/2022	"	X													
3	MW04	2B	20/10/2022	"	X													
4	GW8001b	2B	21/10/2022	"		X	X	X										
5	GW8002b	6B	21/10/2022	"		X												
6	GW201b	2B	21/10/2022	"		X	X	X										
7	GW7003b	2B	21/10/2022	"		X												
8	FD01	2B	21/10/2022	"		X	X	X										
(1)	FT01 (ALS)	2B	21/10/2022	"		X	X	X										Forward to ALS
9	RB01																	

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

Job No: 308730
Date Received: 24/10/22
Time Received: 0806
Received By: TJ MANILAO
Temp: Cool / Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

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

Relinquished by (Company): GHD Pty Ltd	EA Smd	Received by (Company): ECS / ADL	Lab Use Only
Print Name: Ally Kirkman	E Muellner	Print Name: K Spone	Job number: 308730 — Cooling: Ice / Ice pack / None
Date & Time: 21/10/2022	24/10 1330	Date & Time: 21/10/22 3:45pm	Temperature: 14 — Security seal: Intact / Broken / None
Signature: AK	MM	Signature: RA / KS 12-1°C icepack	TAT Req - SAME day / 1 / 2 / 3 / 4 / STD

Rec: LO 24/10/22 1430

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **ES2238073**

Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: VERA BIERMANN	Contact	: Sarah Mathew
Address	: Level 4, 211 VICTORIA SQUARE ADELAIDE SA, AUSTRALIA 5000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: vera.biermann@ghd.com	E-mail	: sarah.mathew@alsglobal.com
Telephone	: ----	Telephone	: +61-2-8784 8555
Facsimile	: ----	Facsimile	: +61-2-8784 8500
Project	: 12566684	Page	: 1 of 3
Order number	: 12566684	Quote number	: EB2020GHDSER0038 (EN/005)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	:		
Sampler	: ALLY KIRKMAN, BEN PETTICREW		

Dates

Date Samples Received	: 24-Oct-2022 14:00	Issue Date	: 25-Oct-2022
Client Requested Due Date	: 31-Oct-2022	Scheduled Reporting Date	: **31-Oct-2022**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 1	Temperature	: 14.7'C - Ice Bricks present
Receipt Detail	:	No. of samples received / analysed	: 1 / 1

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - NT-01 & 02 Ca, Mg, Na, K, Cl, SO4, Alkalinity
ES2238073-001	21-Oct-2022 00:00	FT01	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE

- A4 - AU Tax Invoice (INV)	Email	accountspayableAU@ghd.com

Accounts Payable Australia

- A4 - AU Tax Invoice (INV)	Email	accountspayableAU@ghd.com

ALLY KIRKMAN

- *AU Certificate of Analysis - NATA (COA)	Email	ally.kirkman@ghd.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	ally.kirkman@ghd.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	ally.kirkman@ghd.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	ally.kirkman@ghd.com
- Chain of Custody (CoC) (COC)	Email	ally.kirkman@ghd.com
- EDI Format - ESDAT (ESDAT)	Email	ally.kirkman@ghd.com
- EDI Format - XTab (XTAB)	Email	ally.kirkman@ghd.com
- Electronic SRN for ESdat (ESRN_ESDAT)	Email	ally.kirkman@ghd.com

BEN PETTICREW

- *AU Certificate of Analysis - NATA (COA)	Email	ben.petticrew@ghd.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	ben.petticrew@ghd.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	ben.petticrew@ghd.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	ben.petticrew@ghd.com
- Chain of Custody (CoC) (COC)	Email	ben.petticrew@ghd.com
- EDI Format - ESDAT (ESDAT)	Email	ben.petticrew@ghd.com
- EDI Format - XTab (XTAB)	Email	ben.petticrew@ghd.com
- Electronic SRN for ESdat (ESRN_ESDAT)	Email	ben.petticrew@ghd.com

GHD LAB REPORTS

- *AU Certificate of Analysis - NATA (COA)	Email	ghdlabreports@ghd.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	ghdlabreports@ghd.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	ghdlabreports@ghd.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	ghdlabreports@ghd.com
- EDI Format - ESDAT (ESDAT)	Email	ghdlabreports@ghd.com
- Electronic SRN for ESdat (ESRN_ESDAT)	Email	ghdlabreports@ghd.com

VERA BIERMANN

- *AU Certificate of Analysis - NATA (COA)	Email	vera.biermann@ghd.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	vera.biermann@ghd.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	vera.biermann@ghd.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	vera.biermann@ghd.com
- A4 - AU Tax Invoice (INV)	Email	vera.biermann@ghd.com
- Chain of Custody (CoC) (COC)	Email	vera.biermann@ghd.com
- EDI Format - ESDAT (ESDAT)	Email	vera.biermann@ghd.com
- EDI Format - XTab (XTAB)	Email	vera.biermann@ghd.com
- Electronic SRN for ESdat (ESRN_ESDAT)	Email	vera.biermann@ghd.com

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES2238073**	Page	: 1 of 6
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: VERA BIERMANN	Contact	: Sarah Mathew
Address	: Level 4, 211 VICTORIA SQUARE ADELAIDE SA, AUSTRALIA 5000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: 12566684	Date Samples Received	: 24-Oct-2022 14:00
Order number	: 12566684	Date Analysis Commenced	: 25-Oct-2022
C-O-C number	: ----	Issue Date	: 31-Oct-2022 13:16
Sampler	: ALLY KIRKMAN, BEN PETTICREW		
Site	:		
Quote number	: EN/005		
No. of samples received	: 1		
No. of samples analysed	: 1		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- As per QWI – EN55-3 Data Interpreting Procedures, Ionic balances are typically calculated using Major Anions - Chloride, Alkalinity and Sulfate; and Major Cations - Calcium, Magnesium, Potassium and Sodium. Where applicable and dependent upon sample matrix, the Ionic Balance may also include the additional contribution of Ammonia, Dissolved Metals by ICPMS and H+ to the Cations and Nitrate, SiO2 and Fluoride to the Anions.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	FT01	----	----	----	----
				Sampling date / time	21-Oct-2022 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		ES2238073-001	--------	--------	--------	--------
					Result	----	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		**24**	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**728**	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		**752**	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**129**	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**961**	----	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**13**	----	----	----	----
Magnesium	7439-95-4	1	mg/L		**21**	----	----	----	----
Sodium	7440-23-5	1	mg/L		**911**	----	----	----	----
Potassium	7440-09-7	1	mg/L		**9**	----	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**44.8**	----	----	----	----
ø Total Cations	----	0.01	meq/L		**42.2**	----	----	----	----
ø Ionic Balance	----	0.01	%		**2.97**	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.002	µg/L		**0.074**	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.002	µg/L		**0.085**	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.002	µg/L		**0.604**	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.002	µg/L		**0.022**	----	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.002	µg/L		**0.419**	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.002	µg/L		<0.002	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.01	µg/L		**0.02**	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.002	µg/L		**0.046**	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.002	µg/L		**0.131**	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.002	µg/L		**0.024**	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	FT01	----	----	----	----
				Sampling date / time	21-Oct-2022 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		ES2238073-001	--------	--------	--------	--------
					Result	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorooctanoic acid (PFOA)	335-67-1	0.002	µg/L		**0.037**	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.002	µg/L		**0.084**	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.002	µg/L		<0.002	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.002	µg/L		<0.002	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.002	µg/L		<0.002	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.002	µg/L		<0.002	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.005	µg/L		<0.005	----	----	----	----
Perfluorohexadecanoic acid (PFHxDA)	67905-19-5	0.005	µg/L		<0.005	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.002	µg/L		<0.002	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.005	µg/L		<0.005	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.005	µg/L		<0.005	----	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.005	µg/L		<0.005	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.005	µg/L		<0.005	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.002	µg/L		<0.002	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.002	µg/L		<0.002	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.005	µg/L		<0.005	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.005	µg/L		**0.029**	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	FT01	----	----	----	----
				Sampling date / time	21-Oct-2022 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		ES2238073-001	--------	--------	--------	--------
					Result	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.005	µg/L		<0.005	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.005	µg/L		<0.005	----	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.002	µg/L		**1.58**	----	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.002	µg/L		**1.02**	----	----	----	----
Sum of PFAS (WA DER List)	----	0.002	µg/L		**1.38**	----	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.002	%		**110**	----	----	----	----
13C8-PFOA	----	0.002	%		**97.9**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

QUALITY CONTROL REPORT

Work Order	: **ES2238073**	Page	: 1 of 6
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: VERA BIERMANN	Contact	: Sarah Mathew
Address	: Level 4, 211 VICTORIA SQUARE ADELAIDE SA, AUSTRALIA 5000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: 12566684	Date Samples Received	: 24-Oct-2022
Order number	: 12566684	Date Analysis Commenced	: 25-Oct-2022
C-O-C number	: ----	Issue Date	: 31-Oct-2022
Sampler	: ALLY KIRKMAN, BEN PETTICREW		
Site	:		
Quote number	: EN/005		
No. of samples received	: 1		
No. of samples analysed	: 1		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED037P: Alkalinity by PC Titrator (QC Lot: 4660215)									
ES2238073-001	FT01	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	24	24	0.0	0% - 20%
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	728	703	3.5	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	752	727	3.4	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 4661184)									
ES2238223-008	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	11	11	0.0	0% - 50%
ES2238081-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	147	147	0.0	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 4661185)									
ES2238223-008	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	38	38	0.0	0% - 20%
ES2238081-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	281	283	0.8	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 4663592)									
ES2238058-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	12	13	0.0	0% - 50%
		ED093F: Magnesium	7439-95-4	1	mg/L	9	9	0.0	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	23	23	0.0	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	1	1	0.0	No Limit
ES2238058-011	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	8	8	0.0	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	4	4	0.0	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	24	24	0.0	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	2	2	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4666072)									
ES2238073-001	FT01	EP231X-LL: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.002	µg/L	0.074	0.076	2.1	0% - 20%
		EP231X-LL: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.002	µg/L	0.085	0.088	3.2	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4666072) - continued									
ES2238073-001	FT01	EP231X-LL: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.002	µg/L	0.604	0.610	0.9	0% - 20%
		EP231X-LL: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.002	µg/L	0.022	0.023	0.0	0% - 50%
		EP231X-LL: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.002	µg/L	0.419	0.414	1.3	0% - 20%
		EP231X-LL: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.002	µg/L	<0.002	<0.002	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4666072)									
ES2238073-001	FT01	EP231X-LL: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.002	µg/L	0.046	0.045	0.0	0% - 20%
		EP231X-LL: Perfluorohexanoic acid (PFHxA)	307-24-4	0.002	µg/L	0.131	0.135	3.1	0% - 20%
		EP231X-LL: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.002	µg/L	0.024	0.023	0.0	0% - 50%
		EP231X-LL: Perfluorooctanoic acid (PFOA)	335-67-1	0.002	µg/L	0.037	0.035	5.5	0% - 50%
		EP231X-LL: Perfluorononanoic acid (PFNA)	375-95-1	0.002	µg/L	0.084	0.078	7.4	0% - 20%
		EP231X-LL: Perfluorodecanoic acid (PFDA)	335-76-2	0.002	µg/L	<0.002	<0.002	0.0	No Limit
		EP231X-LL: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.002	µg/L	<0.002	<0.002	0.0	No Limit
		EP231X-LL: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.002	µg/L	<0.002	<0.002	0.0	No Limit
		EP231X-LL: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.002	µg/L	<0.002	<0.002	0.0	No Limit
		EP231X-LL: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.005	µg/L	<0.005	<0.005	0.0	No Limit
		EP231X-LL: Perfluorohexadecanoic acid (PFHxDA)	67905-19-5	0.005	µg/L	<0.005	<0.005	0.0	No Limit
		EP231X-LL: Perfluorobutanoic acid (PFBA)	375-22-4	0.01	µg/L	0.02	0.02	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4666072)									
ES2238073-001	FT01	EP231X-LL: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.002	µg/L	<0.002	<0.002	0.0	No Limit
		EP231X-LL: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.002	µg/L	<0.002	<0.002	0.0	No Limit
		EP231X-LL: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.002	µg/L	<0.002	<0.002	0.0	No Limit
		EP231X-LL: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.005	µg/L	<0.005	<0.005	0.0	No Limit
		EP231X-LL: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.005	µg/L	<0.005	<0.005	0.0	No Limit
		EP231X-LL: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.005	µg/L	<0.005	<0.005	0.0	No Limit
		EP231X-LL: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.005	µg/L	<0.005	<0.005	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4666072)									
ES2238073-001	FT01	EP231X-LL: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.005	µg/L	<0.005	<0.005	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4666072) - continued									
ES2238073-001	FT01	EP231X-LL: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.005	µg/L	0.029	0.029	0.0	No Limit
		EP231X-LL: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.005	µg/L	<0.005	<0.005	0.0	No Limit
		EP231X-LL: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.005	µg/L	<0.005	<0.005	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
ED037P: Alkalinity by PC Titrator (QCLot: 4660215)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	103	81.0	111
				----	50 mg/L	111	80.0	120
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4661184)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	105	82.0	122
				<1	500 mg/L	102	82.0	122
ED045G: Chloride by Discrete Analyser (QCLot: 4661185)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	50 mg/L	101	80.9	127
				<1	1000 mg/L	103	80.9	127
ED093F: Dissolved Major Cations (QCLot: 4663592)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	98.2	80.0	114
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	99.9	90.0	116
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	99.0	82.0	120
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	99.4	85.0	113
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4666072)								
EP231X-LL: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.002	µg/L	<0.002	0.025 µg/L	92.4	72.0	130
EP231X-LL: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.002	µg/L	<0.002	0.025 µg/L	90.4	71.0	127
EP231X-LL: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.002	µg/L	<0.002	0.025 µg/L	86.0	68.0	131
EP231X-LL: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.002	µg/L	<0.002	0.025 µg/L	90.0	69.0	134
EP231X-LL: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.002	µg/L	<0.002	0.025 µg/L	100	65.0	140
EP231X-LL: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.002	µg/L	<0.002	0.025 µg/L	85.2	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4666072)								
EP231X-LL: Perfluorobutanoic acid (PFBA)	375-22-4	0.01	µg/L	<0.01	0.125 µg/L	85.5	73.0	129
EP231X-LL: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.002	µg/L	<0.002	0.025 µg/L	80.8	72.0	129
EP231X-LL: Perfluorohexanoic acid (PFHxA)	307-24-4	0.002	µg/L	<0.002	0.025 µg/L	95.6	72.0	129
EP231X-LL: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.002	µg/L	<0.002	0.025 µg/L	106	72.0	130
EP231X-LL: Perfluorooctanoic acid (PFOA)	335-67-1	0.002	µg/L	<0.002	0.025 µg/L	112	71.0	133
EP231X-LL: Perfluorononanoic acid (PFNA)	375-95-1	0.002	µg/L	<0.002	0.025 µg/L	114	69.0	130
EP231X-LL: Perfluorodecanoic acid (PFDA)	335-76-2	0.002	µg/L	<0.002	0.025 µg/L	104	71.0	129
EP231X-LL: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.002	µg/L	<0.002	0.025 µg/L	90.4	69.0	133
EP231X-LL: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.002	µg/L	<0.002	0.025 µg/L	75.6	72.0	134
EP231X-LL: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.002	µg/L	<0.002	0.025 µg/L	102	65.0	144
EP231X-LL: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.005	µg/L	<0.005	0.0625 µg/L	98.2	71.0	132
EP231X-LL: Perfluorohexadecanoic acid (PFHxDA)	67905-19-5	0.005	µg/L	<0.005	0.025 µg/L	111	65.6	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4666072)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4666072) - continued								
EP231X-LL: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.002	µg/L	<0.002	0.025 µg/L	78.8	67.0	137
EP231X-LL: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.005	µg/L	<0.005	0.0625 µg/L	92.3	68.0	141
EP231X-LL: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.005	µg/L	<0.005	0.0625 µg/L	73.3	61.1	139
EP231X-LL: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.005	µg/L	<0.005	0.0625 µg/L	90.2	72.3	128
EP231X-LL: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.005	µg/L	<0.005	0.0625 µg/L	89.3	63.2	134
EP231X-LL: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.002	µg/L	<0.002	0.025 µg/L	77.2	65.0	136
EP231X-LL: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.002	µg/L	<0.002	0.025 µg/L	93.6	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4666072)								
EP231X-LL: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.005	µg/L	<0.005	0.025 µg/L	84.0	63.0	143
EP231X-LL: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.005	µg/L	<0.005	0.025 µg/L	104	64.0	140
EP231X-LL: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.005	µg/L	<0.005	0.025 µg/L	94.4	67.0	138
EP231X-LL: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.005	µg/L	<0.005	0.025 µg/L	102	75.2	137

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4661184)							
ES2238081-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	# Not Determined	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 4661185)							
ES2238081-001	Anonymous	ED045G: Chloride	16887-00-6	50 mg/L	# Not Determined	70.0	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES2238073**	Page	: 1 of 5
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: VERA BIERMANN	Telephone	: +61-2-8784 8555
Project	: 12566684	Date Samples Received	: 24-Oct-2022
Site	:	Issue Date	: 31-Oct-2022
Sampler	: ALLY KIRKMAN, BEN PETTICREW	No. of samples received	: 1
Order number	: 12566684	No. of samples analysed	: 1

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	ES2238081--001	Anonymous	**Sulfate as SO4 - Turbidimetric**	14808-79-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
ED045G: Chloride by Discrete Analyser	ES2238081--001	Anonymous	**Chloride**	16887-00-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Matrix Spikes (MS)					
Per- and Polyfluoroalkyl Substances (PFAS by LCMSMS	0	1	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / ***Container*** / Client Sample ID(s)	***Sample Date***	*Extraction / Preparation*			*Analysis*		
		Date extracted	*Due for extraction*	*Evaluation*	***Date analysed***	*Due for analysis*	*Evaluation*
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
FT01	**21-Oct-2022**	**----**	----	----	**25-Oct-2022**	04-Nov-2022	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
FT01	**21-Oct-2022**	**----**	----	----	**26-Oct-2022**	18-Nov-2022	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
FT01	**21-Oct-2022**	**----**	----	----	**26-Oct-2022**	18-Nov-2022	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
FT01	**21-Oct-2022**	**----**	----	----	**27-Oct-2022**	28-Oct-2022	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X-LL)							
FT01	**21-Oct-2022**	**28-Oct-2022**	19-Apr-2023	✓	**28-Oct-2022**	19-Apr-2023	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X-LL)							
FT01	**21-Oct-2022**	**28-Oct-2022**	19-Apr-2023	✓	**28-Oct-2022**	19-Apr-2023	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X-LL)							
FT01	**21-Oct-2022**	**28-Oct-2022**	19-Apr-2023	✓	**28-Oct-2022**	19-Apr-2023	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X-LL)							
FT01	**21-Oct-2022**	**28-Oct-2022**	19-Apr-2023	✓	**28-Oct-2022**	19-Apr-2023	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X-LL)							
FT01	**21-Oct-2022**	**28-Oct-2022**	19-Apr-2023	✓	**28-Oct-2022**	19-Apr-2023	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by Auto Titrator	ED037-P	1	2	**50.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS by LCMSMS	EP231X-LL	1	1	**100.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by Auto Titrator	ED037-P	2	2	**100.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS by LCMSMS	EP231X-LL	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS by LCMSMS	EP231X-LL	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS by LCMSMS	EP231X-LL	0	1	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Alkalinity by Auto Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm.
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS by LCMSMS	EP231X-LL	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is concentrated, combined with an equal volume of reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

CHAIN OF CUSTODY RECORD

GHD

Turnaround Requirement:
X STANDARD
☐ NON-STANDARD

Page ____ of ____

18.9°C

FREIGHT

Job Number	GHD Office	Relinquished By:	Received By:	Relinquished By:	Received By:
12566684	Adelaide	Date/Time:	Date/Time: 29/3/23	Date/Time: 29/3/23	Date/Time:

Project: MFS St Marys PFAS investigation

GHD Project Manager	GHD Contact
Vera Biermann 043598781	Ally Kirkman 0412625108 Chelsie Davies 0424267548
Email Reports to: ghdlabreports@ghd.com vera.biermann@ghd.com chelsie.davies@ghd.com Ally.kirkman@ghd.com	Quote Number

SEND TO:

X **ALS Laboratories**
Suite D, 32 West Thebarton Rd, Thebarton SA 5031
Ph: 08 8162 5130
Contact: Kieren Burns

☐ **Envirolab Services**
7a The Parade, NORWOOD SA 5067
Ph: 08 7087 6800
Contact: Alex Stenta

☐ **Eurofins | Environment Testing**
6 Monterey Rd, DANDENONG SOUTH VIC 3175
Ph: 03 8564 5006
Contact: Rhonda Chouman

☐
Ph:
Contact:

	Sample I.D.	Date	Time	Sample Matrix S: Soil SL: Sludge W: Water A: Air	Container Type J: Jar; B: Bag; V: Vial; G: Glass bottle; P: Plastic bottle	PFAS (Short)	PFAS (Long Suite and Trace)	Major Cations/Anions	SA WASTE SCREEN	Remarks
1	MW05	28/03/2023					X			
2	GW8002b	28/03/2023				X		X		
3	GW201b	28/03/2023					X	X		
4	FD10	28/03/2023		w			X			
	FS10	28/03/2023		w			X			Please forward to Eurofins
5	RB01	28/03/2023		w		X				
6	FB01	28/03/2023		w		X				
7	WWD-01	28/03/2023		w		X				
8	WWD-02	28/03/2023		w		X				
9	SWD-02	28/03/2023		s		X			X	
10	MW01	28/03/2023		w			X			
11	swd-03	28/03/2023		s		X			X	

Remarks: esdat report format

NR

Environmental Division
Melbourne
Work Order Reference
EM2305704

Telephone : + 61-3-8549 9600

30/3, 1200

CERTIFICATE OF ANALYSIS

Work Order	: **EM2305704**	Page	: 1 of 14
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: VERA BIERMANN	Contact	: Peter Ravlic
Address	: Level 4, 211 VICTORIA SQUARE ADELAIDE SA, AUSTRALIA 5000	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: ----	Telephone	: +6138549 9645
Project	: 12566684	Date Samples Received	: 30-Mar-2023 11:30
Order number	: 12566684	Date Analysis Commenced	: 31-Mar-2023
C-O-C number	: ----	Issue Date	: 06-Apr-2023 21:29
Sampler	: ----		
Site	:		
Quote number	: EN/005		
No. of samples received	: 10		
No. of samples analysed	: 10		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Dilani Fernando	Laboratory Coordinator	Melbourne Inorganics, Springvale, VIC
Xing Lin	Senior Organic Chemist	Melbourne Inorganics, Springvale, VIC
Xing Lin	Senior Organic Chemist	Melbourne Organics, Springvale, VIC

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EP068: Where reported, Total Chlordane (sum) is the sum of the reported concentrations of cis-Chlordane and trans-Chlordane at or above the LOR.
- EP068: Where reported, Total OCP is the sum of the reported concentrations of all Organochlorine Pesticides at or above LOR.
- EP075(SIM): Where reported, Total Cresol is the sum of the reported concentrations of 2-Methylphenol and 3- & 4-Methylphenol at or above the LOR.
- As per QWI – EN55-3 Data Interpreting Procedures, Ionic balances are typically calculated using Major Anions - Chloride, Alkalinity and Sulfate; and Major Cations - Calcium, Magnesium, Potassium and Sodium. Where applicable and dependent upon sample matrix, the Ionic Balance may also include the additional contribution of Ammonia, Dissolved Metals by ICPMS and H+ to the Cations and Nitrate, SiO2 and Fluoride to the Anions.
- EP231X-LL: Sample EM2305704-004 required dilution due to matrix interferences. LOR values have been adjusted accordingly.
- EG005-T : EM2305630 #17 Poor duplicate precision for total Iron due to sample matrix. Confirmed by re-digestion and re-analysis.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.
- EP231X-INJ: The direct injection LCMSMS method may be used where the sample matrix is not suitable for Solid Phase Extraction (e.g. significant particulate load) or where only a single sample container is received.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	SWD-02	SWD-03	----	----	----
			Sampling date / time	28-Mar-2023 00:00	28-Mar-2023 00:00	----	----	----
Compound	CAS Number	LOR	Unit	EM2305704-009	EM2305704-011	--------	--------	--------
				Result	Result	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	**26.5**	**23.0**	----	----	----
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	<5	----	----	----
Barium	7440-39-3	10	mg/kg	**180**	**100**	----	----	----
Beryllium	7440-41-7	1	mg/kg	<1	<1	----	----	----
Cadmium	7440-43-9	1	mg/kg	<1	<1	----	----	----
Chromium	7440-47-3	2	mg/kg	**35**	**39**	----	----	----
Cobalt	7440-48-4	2	mg/kg	**19**	**10**	----	----	----
Copper	7440-50-8	5	mg/kg	**15**	**15**	----	----	----
Iron	7439-89-6	50	mg/kg	**32200**	**37300**	----	----	----
Lead	7439-92-1	5	mg/kg	**26**	**21**	----	----	----
Manganese	7439-96-5	5	mg/kg	**937**	**240**	----	----	----
Nickel	7440-02-0	2	mg/kg	**22**	**22**	----	----	----
Silver	7440-22-4	2	mg/kg	<2	<2	----	----	----
Zinc	7440-66-6	5	mg/kg	**41**	**39**	----	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	----	----	----
EG048: Hexavalent Chromium (Alkaline Digest)								
Hexavalent Chromium	18540-29-9	0.5	mg/kg	<0.5	<0.5	----	----	----
EK026SF: Total CN by Segmented Flow Analyser								
Total Cyanide	57-12-5	1	mg/kg	<1	<1	----	----	----
EP066: Polychlorinated Biphenyls (PCB)								
Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	----	----	----
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	----	----	----
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	----	----	----
beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	----	----	----
gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	----	----	----
delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	----	----	----
Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	----	----	----
Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	----	----	----
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	----	----	----
^ Total Chlordane (sum)	----	0.05	mg/kg	<0.05	<0.05	----	----	----
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	SWD-02	SWD-03	----	----	----
				Sampling date / time	28-Mar-2023 00:00	28-Mar-2023 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EM2305704-009	EM2305704-011	--------	--------	--------
					Result	Result	----	----	----
EP068A: Organochlorine Pesticides (OC) - Continued									
alpha-Endosulfan	959-98-8	0.05	mg/kg		<0.05	<0.05	----	----	----
cis-Chlordane	5103-71-9	0.05	mg/kg		<0.05	<0.05	----	----	----
Dieldrin	60-57-1	0.05	mg/kg		<0.05	<0.05	----	----	----
4.4`-DDE	72-55-9	0.05	mg/kg		<0.05	<0.05	----	----	----
Endrin	72-20-8	0.05	mg/kg		<0.05	<0.05	----	----	----
beta-Endosulfan	33213-65-9	0.05	mg/kg		<0.05	<0.05	----	----	----
^ **Endosulfan (sum)**	115-29-7	0.05	mg/kg		<0.05	<0.05	----	----	----
4.4`-DDD	72-54-8	0.05	mg/kg		<0.05	<0.05	----	----	----
Endrin aldehyde	7421-93-4	0.05	mg/kg		<0.05	<0.05	----	----	----
Endosulfan sulfate	1031-07-8	0.05	mg/kg		<0.05	<0.05	----	----	----
4.4`-DDT	50-29-3	0.2	mg/kg		<0.2	<0.2	----	----	----
Endrin ketone	53494-70-5	0.05	mg/kg		<0.05	<0.05	----	----	----
Methoxychlor	72-43-5	0.2	mg/kg		<0.2	<0.2	----	----	----
^ **Sum of Aldrin + Dieldrin**	309-00-2/60-57-1	0.05	mg/kg		<0.05	<0.05	----	----	----
^ **Sum of DDD + DDE + DDT**	72-54-8/72-55-9/50-29-3	0.05	mg/kg		<0.05	<0.05	----	----	----
EP075(SIM)A: Phenolic Compounds									
Phenol	108-95-2	0.5	mg/kg		<0.5	<0.5	----	----	----
2-Chlorophenol	95-57-8	0.5	mg/kg		<0.5	<0.5	----	----	----
2-Methylphenol	95-48-7	0.5	mg/kg		<0.5	<0.5	----	----	----
3- & 4-Methylphenol	1319-77-3	1	mg/kg		<1	<1	----	----	----
2-Nitrophenol	88-75-5	0.5	mg/kg		<0.5	<0.5	----	----	----
2.4-Dimethylphenol	105-67-9	0.5	mg/kg		<0.5	<0.5	----	----	----
2.4-Dichlorophenol	120-83-2	0.5	mg/kg		<0.5	<0.5	----	----	----
2.6-Dichlorophenol	87-65-0	0.5	mg/kg		<0.5	<0.5	----	----	----
4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg		<0.5	<0.5	----	----	----
2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg		<0.5	<0.5	----	----	----
2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg		<0.5	<0.5	----	----	----
Pentachlorophenol	87-86-5	2	mg/kg		<2	<2	----	----	----
^ **Sum of Phenols**	----	0.5	mg/kg		<0.5	<0.5	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	<0.5	----	----	----
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	<0.5	----	----	----
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	<0.5	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	SWD-02	SWD-03	----	----	----
				Sampling date / time	28-Mar-2023 00:00	28-Mar-2023 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EM2305704-009	EM2305704-011	--------	--------	--------
					Result	Result	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Fluorene	86-73-7	0.5	mg/kg		<0.5	<0.5	----	----	----
Phenanthrene	85-01-8	0.5	mg/kg		<0.5	<0.5	----	----	----
Anthracene	120-12-7	0.5	mg/kg		<0.5	<0.5	----	----	----
Fluoranthene	206-44-0	0.5	mg/kg		<0.5	<0.5	----	----	----
Pyrene	129-00-0	0.5	mg/kg		<0.5	<0.5	----	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg		<0.5	<0.5	----	----	----
Chrysene	218-01-9	0.5	mg/kg		<0.5	<0.5	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		<0.5	<0.5	----	----	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	<0.5	----	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	<0.5	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	<0.5	----	----	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	<0.5	----	----	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		<0.5	<0.5	----	----	----
^ **Sum of polycyclic aromatic hydrocarbons**	----	0.5	mg/kg		<0.5	<0.5	----	----	----
^ **Benzo(a)pyrene TEQ (zero)**	----	0.5	mg/kg		<0.5	<0.5	----	----	----
^ **Benzo(a)pyrene TEQ (half LOR)**	----	0.5	mg/kg		**0.6**	**0.6**	----	----	----
^ **Benzo(a)pyrene TEQ (LOR)**	----	0.5	mg/kg		**1.2**	**1.2**	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	----	----	----
C10 - C14 Fraction	----	50	mg/kg		<50	<50	----	----	----
C15 - C28 Fraction	----	100	mg/kg		<100	<100	----	----	----
C29 - C36 Fraction	----	100	mg/kg		<100	<100	----	----	----
^ **C10 - C36 Fraction (sum)**	----	50	mg/kg		<50	<50	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	----	----	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	10	mg/kg		<10	<10	----	----	----
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	----	----	----
>C16 - C34 Fraction	----	100	mg/kg		<100	<100	----	----	----
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	----	----	----
^ **>C10 - C40 Fraction (sum)**	----	50	mg/kg		<50	<50	----	----	----
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	50	mg/kg		<50	<50	----	----	----
EP080: BTEXN									

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	SWD-02	SWD-03	----	----	----
			Sampling date / time	28-Mar-2023 00:00	28-Mar-2023 00:00	----	----	----
Compound	CAS Number	LOR	Unit	EM2305704-009	EM2305704-011	--------	--------	--------
				Result	Result	----	----	----
EP080: BTEXN - Continued								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	----	----	----
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	----	----	----
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	----	----	----
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	----	----	----
^ **Sum of BTEX**	----	0.2	mg/kg	<0.2	<0.2	----	----	----
^ **Total Xylenes**	----	0.5	mg/kg	<0.5	<0.5	----	----	----
Naphthalene	91-20-3	1	mg/kg	<1	<1	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	**0.0011**	<0.0002	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	**0.0081**	<0.0002	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
EP231P: PFAS Sums								
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	**0.0092**	<0.0002	----	----	----
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	**0.0092**	<0.0002	----	----	----
EP066S: PCB Surrogate								

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	SWD-02	SWD-03	----	----	----
				Sampling date / time	28-Mar-2023 00:00	28-Mar-2023 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EM2305704-009	EM2305704-011	--------	--------	--------
					Result	Result	----	----	----
EP066S: PCB Surrogate - Continued									
Decachlorobiphenyl	2051-24-3	0.1	%		**67.4**	**82.8**	**----**	**----**	**----**
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	%		**85.7**	**95.6**	**----**	**----**	**----**
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.05	%		**81.6**	**68.1**	**----**	**----**	**----**
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		**74.7**	**91.4**	**----**	**----**	**----**
2-Chlorophenol-D4	93951-73-6	0.5	%		**96.8**	**111**	**----**	**----**	**----**
2.4.6-Tribromophenol	118-79-6	0.5	%		**77.3**	**96.8**	**----**	**----**	**----**
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		**82.1**	**90.9**	**----**	**----**	**----**
Anthracene-d10	1719-06-8	0.5	%		**83.8**	**96.4**	**----**	**----**	**----**
4-Terphenyl-d14	1718-51-0	0.5	%		**87.9**	**95.0**	**----**	**----**	**----**
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		**102**	**87.2**	**----**	**----**	**----**
Toluene-D8	2037-26-5	0.2	%		**109**	**94.6**	**----**	**----**	**----**
4-Bromofluorobenzene	460-00-4	0.2	%		**111**	**96.5**	**----**	**----**	**----**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**122**	**92.2**	**----**	**----**	**----**
13C8-PFOA	----	0.0002	%		**85.2**	**106**	**----**	**----**	**----**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	MW05	GW8002b	GW201b	FD10	RB01
				Sampling date / time	28-Mar-2023 00:00	28-Mar-2023 00:00	28-Mar-2023 00:00	28-Mar-2023 00:00	28-Mar-2023 00:00
Compound	CAS Number	LOR	Unit		EM2305704-001	EM2305704-002	EM2305704-003	EM2305704-004	EM2305704-005
					Result	Result	Result	Result	Result
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		----	<1	<1	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		----	**37**	**38**	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		----	**1420**	**650**	----	----
Total Alkalinity as CaCO3	----	1	mg/L		----	**1460**	**689**	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		----	**444**	**122**	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		----	**932**	**906**	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		----	**20**	**11**	----	----
Magnesium	7439-95-4	1	mg/L		----	**33**	**20**	----	----
Sodium	7440-23-5	1	mg/L		----	**1290**	**805**	----	----
Potassium	7440-09-7	1	mg/L		----	**9**	**11**	----	----
EN055: Ionic Balance									
ø **Total Anions**	----	0.01	meq/L		----	**64.7**	**41.9**	----	----
ø **Total Cations**	----	0.01	meq/L		----	**60.0**	**37.5**	----	----
ø **Ionic Balance**	----	0.01	%		----	**3.73**	**5.51**	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.002	µg/L		**0.113**	----	**0.048**	**4.38**	----
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		----	**4.18**	----	----	----
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		----	----	----	----	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.002	µg/L		**0.135**	----	**0.072**	**4.96**	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.002	µg/L		**1.08**	----	**0.446**	**39.4**	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L		----	**37.0**	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L		----	----	----	----	<0.01
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.002	µg/L		**0.045**	----	**0.017**	**1.79**	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	MW05	GW8002b	GW201b	FD10	RB01
				Sampling date / time	28-Mar-2023 00:00	28-Mar-2023 00:00	28-Mar-2023 00:00	28-Mar-2023 00:00	28-Mar-2023 00:00
Compound	CAS Number	LOR	Unit		EM2305704-001	EM2305704-002	EM2305704-003	EM2305704-004	EM2305704-005
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.002	µg/L		**1.33**	----	**0.213**	**34.6**	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.002	µg/L		<0.002	----	<0.002	**0.004**	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		----	**34.4**	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		----	----	----	----	<0.01
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.01	µg/L		**0.05**	----	**0.01**	**0.65**	----
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		----	**0.7**	----	----	----
Perfluorobutanoic acid (PFBA)	375-22-4	0.10	µg/L		----	----	----	----	<0.10
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.002	µg/L		**0.107**	----	**0.028**	**5.31**	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		----	**5.47**	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		----	----	----	----	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.002	µg/L		**0.339**	----	**0.096**	**12.2**	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		----	**11.3**	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		----	----	----	----	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.002	µg/L		**0.052**	----	**0.017**	**1.77**	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		----	**1.74**	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		----	----	----	----	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.002	µg/L		**0.073**	----	**0.024**	**2.10**	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		----	**1.94**	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		----	----	----	----	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.002	µg/L		**0.102**	----	**0.049**	**2.96**	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.002	µg/L		<0.002	----	<0.002	**0.006**	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.002	µg/L		<0.002	----	<0.002	<0.004	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.002	µg/L		<0.002	----	<0.002	<0.004	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.002	µg/L		<0.002	----	<0.002	<0.004	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.005	µg/L		<0.005	----	<0.005	<0.010	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	MW05	GW8002b	GW201b	FD10	RB01
				Sampling date / time	28-Mar-2023 00:00	28-Mar-2023 00:00	28-Mar-2023 00:00	28-Mar-2023 00:00	28-Mar-2023 00:00
Compound	CAS Number	LOR	Unit		EM2305704-001	EM2305704-002	EM2305704-003	EM2305704-004	EM2305704-005
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorohexadecanoic acid (PFHxDA)	67905-19-5	0.005	µg/L		<0.005	----	<0.005	<0.010	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.002	µg/L		<0.002	----	<0.002	**0.009**	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.005	µg/L		<0.005	----	<0.005	<0.010	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.005	µg/L		<0.005	----	<0.005	<0.010	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.005	µg/L		<0.005	----	<0.005	<0.010	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.005	µg/L		<0.005	----	<0.005	<0.010	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.002	µg/L		<0.002	----	<0.002	<0.004	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.002	µg/L		<0.002	----	<0.002	<0.004	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.005	µg/L		<0.005	----	<0.005	<0.005	----
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		----	<0.05	----	----	----
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		----	----	----	----	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.005	µg/L		**0.018**	----	**0.022**	**12.0**	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		----	**11.1**	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		----	----	----	----	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.005	µg/L		<0.005	----	<0.005	**0.008**	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		----	<0.05	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	MW05	GW8002b	GW201b	FD10	RB01
				Sampling date / time	28-Mar-2023 00:00	28-Mar-2023 00:00	28-Mar-2023 00:00	28-Mar-2023 00:00	28-Mar-2023 00:00
Compound	CAS Number	LOR	Unit		EM2305704-001	EM2305704-002	EM2305704-003	EM2305704-004	EM2305704-005
					Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		----	----	----	----	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.005	µg/L		<0.005	----	<0.005	<0.005	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		----	<0.05	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		----	----	----	----	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.002	µg/L		**3.44**	----	**1.04**	**122**	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.002	µg/L		**2.41**	----	**0.659**	**74.0**	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		----	**71.4**	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		----	----	----	----	<0.01
Sum of PFAS (WA DER List)	----	0.002	µg/L		**3.16**	----	**0.904**	**112**	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		----	**108**	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		----	----	----	----	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.002	%		**89.3**	----	**92.7**	**85.8**	----
13C4-PFOS	----	0.02	%		----	**83.0**	----	----	----
13C4-PFOS	----	0.02	%		----	----	----	----	**98.2**
13C8-PFOA	----	0.002	%		**100**	----	**95.8**	**88.1**	----
13C8-PFOA	----	0.02	%		----	**90.3**	----	----	----
13C8-PFOA	----	0.02	%		----	----	----	----	**99.1**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	FB01	WWD-01	WWD-02	----	----
				Sampling date / time	28-Mar-2023 00:00	28-Mar-2023 00:00	28-Mar-2023 00:00	----	----
Compound	CAS Number	LOR	Unit		EM2305704-006	EM2305704-007	EM2305704-008	--------	--------
					Result	Result	Result	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		----	**24.0**	**0.50**	----	----
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L		----	**23.4**	**4.31**	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L		<0.01	----	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		----	**5.16**	**4.34**	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		----	**0.1**	**0.2**	----	----
Perfluorobutanoic acid (PFBA)	375-22-4	0.10	µg/L		<0.10	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		----	**1.57**	**0.53**	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		----	**5.80**	**1.46**	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		----	**1.22**	**0.19**	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		----	**1.15**	**0.22**	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		----	<0.05	<0.05	----	----
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		----	**0.70**	**0.79**	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		----	<0.05	<0.05	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	FB01	WWD-01	WWD-02	----	----
				Sampling date / time	28-Mar-2023 00:00	28-Mar-2023 00:00	28-Mar-2023 00:00	----	----
Compound	CAS Number	LOR	Unit		EM2305704-006	EM2305704-007	EM2305704-008	--------	--------
					Result	Result	Result	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		----	<0.05	<0.05	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	----	----	----	----
EP231P: PFAS Sums									
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		----	**28.6**	**8.65**	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	----	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		----	**63.1**	**12.5**	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	----	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		----	**91.6**	**92.4**	----	----
13C4-PFOS	----	0.02	%		**98.0**	----	----	----	----
13C8-PFOA	----	0.02	%		----	**92.0**	**97.5**	----	----
13C8-PFOA	----	0.02	%		**96.4**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: SOIL		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	36	140
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	62	128
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	40	139
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	54	125
2-Chlorophenol-D4	93951-73-6	65	123
2.4.6-Tribromophenol	118-79-6	34	122
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	61	125
Anthracene-d10	1719-06-8	62	130
4-Terphenyl-d14	1718-51-0	67	133
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	51	125
Toluene-D8	2037-26-5	55	125
4-Bromofluorobenzene	460-00-4	56	124
EP231S: PFAS Surrogate			
13C4-PFOS	----	68	136
13C8-PFOA	----	69	133

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP231S: PFAS Surrogate			
13C4-PFOS	----	65	140
13C8-PFOA	----	71	133

QUALITY CONTROL REPORT

Work Order	: **EM2305704**	Page	: 1 of 16
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: VERA BIERMANN	Contact	: Peter Ravlic
Address	: Level 4, 211 VICTORIA SQUARE ADELAIDE SA, AUSTRALIA 5000	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: ----	Telephone	: +6138549 9645
Project	: 12566684	Date Samples Received	: 30-Mar-2023
Order number	: 12566684	Date Analysis Commenced	: 31-Mar-2023
C-O-C number	: ----	Issue Date	: 06-Apr-2023
Sampler	: ----		
Site	:		
Quote number	: EN/005		
No. of samples received	: 10		
No. of samples analysed	: 10		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Dilani Fernando	Laboratory Coordinator	Melbourne Inorganics, Springvale, VIC
Xing Lin	Senior Organic Chemist	Melbourne Inorganics, Springvale, VIC
Xing Lin	Senior Organic Chemist	Melbourne Organics, Springvale, VIC

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 4967804)									
EM2305630-017	Anonymous	EG005T: Lead	7439-92-1	5	mg/kg	155	174	11.9	0% - 20%
		EG005T: Manganese	7439-96-5	5	mg/kg	283	296	4.3	0% - 20%
		EG005T: Zinc	7440-66-6	5	mg/kg	131	141	7.2	0% - 20%
		EG005T: Iron	7439-89-6	50	mg/kg	25800	# 18000	35.5	0% - 20%
EM2305678-017	Anonymous	EG005T: Manganese	7439-96-5	5	mg/kg	452	471	4.0	0% - 20%
EM2305630-017	Anonymous	EG005T: Beryllium	7440-41-7	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Barium	7440-39-3	10	mg/kg	100	110	13.9	0% - 50%
		EG005T: Chromium	7440-47-3	2	mg/kg	16	22	33.7	0% - 50%
		EG005T: Cobalt	7440-48-4	2	mg/kg	6	9	33.0	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	20	28	34.1	0% - 50%
		EG005T: Silver	7440-22-4	2	mg/kg	<2	<2	0.0	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	36	36	0.0	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	24	24	0.0	No Limit
EM2305678-017	Anonymous	EG005T: Beryllium	7440-41-7	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Barium	7440-39-3	10	mg/kg	80	70	13.9	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	29	22	30.4	0% - 50%
		EG005T: Cobalt	7440-48-4	2	mg/kg	10	7	43.7	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	14	12	16.0	No Limit
		EG005T: Silver	7440-22-4	2	mg/kg	<2	<2	0.0	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	10	6	50.3	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	10	9	11.8	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	18	14	23.9	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 4967804) - continued									
EM2305678-017	Anonymous	EG005T: Zinc	7440-66-6	5	mg/kg	24	24	0.0	No Limit
		EG005T: Iron	7439-89-6	50	mg/kg	34000	29800	13.2	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 4967619)									
EM2305630-002	Anonymous	EA055: Moisture Content	----	0.1	%	11.3	9.7	14.7	0% - 50%
EM2305630-022	Anonymous	EA055: Moisture Content	----	0.1	%	9.1	13.8	40.9	0% - 50%
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 4967803)									
EM2305630-017	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	0.2	<0.1	0.0	No Limit
EM2305678-017	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EG048: Hexavalent Chromium (Alkaline Digest) (QC Lot: 4967825)									
EM2305704-009	SWD-02	EG048G: Hexavalent Chromium	18540-29-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
EK026SF: Total CN by Segmented Flow Analyser (QC Lot: 4969484)									
EM2305621-017	Anonymous	EK026SF: Total Cyanide	57-12-5	1	mg/kg	<1	<1	0.0	No Limit
EM2305621-012	Anonymous	EK026SF: Total Cyanide	57-12-5	1	mg/kg	<1	<1	0.0	No Limit
EP066: Polychlorinated Biphenyls (PCB) (QC Lot: 4967778)									
EM2305704-009	SWD-02	EP066: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EP068A: Organochlorine Pesticides (OC) (QC Lot: 4967781)									
EM2305704-009	SWD-02	EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
EP075(SIM)A: Phenolic Compounds (QC Lot: 4967780)									
EM2305704-009	SWD-02	EP075(SIM): Phenol	108-95-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP075(SIM)A: Phenolic Compounds (QC Lot: 4967780) - continued									
EM2305704-009	SWD-02	EP075(SIM): 2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2.4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2.4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2.6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	<1	0.0	No Limit
		EP075(SIM): Pentachlorophenol	87-86-5	2	mg/kg	<2	<2	0.0	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 4967780)									
EM2305704-009	SWD-02	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 4967756)									
EM2305704-009	SWD-02	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 4967779)									
EM2305704-009	SWD-02	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 4967756)									
EM2305704-009	SWD-02	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 4967779)									
EM2305704-009	SWD-02	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 4967779) - continued									
EM2305704-009	SWD-02	EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
EP080: BTEXN (QC Lot: 4967756)									
EM2305704-009	SWD-02	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4968249)									
EM2305524-020	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4968249)									
EM2305524-020	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4968249)									
EM2305524-020	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 4968249)									
EM2305524-020	Anonymous	EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Sum of PFAS (WA DER List)	----	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED037P: Alkalinity by PC Titrator (QC Lot: 4968387)									
EM2305633-018	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	72	71	2.0	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
ED037P: Alkalinity by PC Titrator (QC Lot: 4968387) - continued									
EM2305633-018	Anonymous	ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	72	71	2.0	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 4969129)									
EM2305612-016	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	3220	3210	0.3	0% - 20%
EM2305702-003	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	378	380	0.6	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 4969128)									
EM2305612-016	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	6650	6640	0.1	0% - 20%
EM2305702-003	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	14	14	0.0	0% - 50%
ED093F: Dissolved Major Cations (QC Lot: 4968626)									
EM2305612-017	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	1280	1220	4.9	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	401	391	2.4	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	3290	3210	2.4	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	149	149	0.0	0% - 20%
EM2305651-006	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	21	22	0.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	21	22	0.0	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	171	172	0.0	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	4	4	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4976482)									
EM2305704-005	RB01	EP231X-INJ: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X-INJ: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X-INJ: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4976482)									
EM2305704-005	RB01	EP231X-INJ: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X-INJ: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X-INJ: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X-INJ: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X-INJ: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.10	<0.10	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4976482)									
EM2305704-005	RB01	EP231X-INJ: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X-INJ: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X-INJ: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X-INJ: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 4976482)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231P: PFAS Sums (QC Lot: 4976482) - continued									
EM2305704-005	RB01	EP231X-INJ: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X-INJ: Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 4967804)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	123 mg/kg	116	70.0	130
EG005T: Barium	7440-39-3	10	mg/kg	<10	99.3 mg/kg	99.3	70.0	130
EG005T: Beryllium	7440-41-7	1	mg/kg	<1	0.67 mg/kg	116	70.0	130
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	1.23 mg/kg	71.6	50.0	130
EG005T: Chromium	7440-47-3	2	mg/kg	<2	20.2 mg/kg	113	70.0	130
EG005T: Cobalt	7440-48-4	2	mg/kg	<2	11.2 mg/kg	97.7	70.0	130
EG005T: Copper	7440-50-8	5	mg/kg	<5	55.9 mg/kg	101	70.0	130
EG005T: Iron	7439-89-6	50	mg/kg	<50	33227 mg/kg	116	70.0	130
EG005T: Lead	7439-92-1	5	mg/kg	<5	62.4 mg/kg	113	70.0	130
EG005T: Manganese	7439-96-5	5	mg/kg	<5	590 mg/kg	99.8	70.0	130
EG005T: Nickel	7440-02-0	2	mg/kg	<2	15.4 mg/kg	111	70.0	130
EG005T: Silver	7440-22-4	2	mg/kg	<2	2.9 mg/kg	79.3	70.0	130
EG005T: Zinc	7440-66-6	5	mg/kg	<5	162 mg/kg	88.8	70.0	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 4967803)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	0.64 mg/kg	82.0	70.0	130
EG048: Hexavalent Chromium (Alkaline Digest) (QCLot: 4967825)								
EG048G: Hexavalent Chromium	18540-29-9	0.5	mg/kg	<0.5	20 mg/kg	96.1	70.0	130
EK026SF: Total CN by Segmented Flow Analyser (QCLot: 4969484)								
EK026SF: Total Cyanide	57-12-5	1	mg/kg	<1	20 mg/kg	105	70.0	130
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 4967778)								
EP066: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	1 mg/kg	112	68.0	133
EP068A: Organochlorine Pesticides (OC) (QCLot: 4967781)								
EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	0.5 mg/kg	88.8	71.8	126
EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	0.5 mg/kg	89.9	72.2	125
EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	0.5 mg/kg	89.6	70.0	124
EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	0.5 mg/kg	89.3	69.1	124
EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	88.2	69.2	125
EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	0.5 mg/kg	87.2	66.6	122
EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	0.5 mg/kg	91.0	68.8	123
EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	0.5 mg/kg	88.2	67.2	124

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP068A: Organochlorine Pesticides (OC) (QCLot: 4967781) - continued								
EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	0.5 mg/kg	90.8	66.0	126
EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	0.5 mg/kg	87.8	70.2	126
EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	0.5 mg/kg	89.5	72.1	124
EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	0.5 mg/kg	89.8	68.0	122
EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	0.5 mg/kg	89.3	68.9	124
EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	0.5 mg/kg	88.5	55.8	130
EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	0.5 mg/kg	89.0	67.9	124
EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	0.5 mg/kg	86.1	72.0	127
EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	0.5 mg/kg	95.7	66.3	131
EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	0.5 mg/kg	82.6	62.4	131
EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	0.5 mg/kg	79.4	55.4	130
EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	0.5 mg/kg	84.3	68.8	128
EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	0.5 mg/kg	84.1	55.5	132
EP075(SIM)A: Phenolic Compounds (QCLot: 4967780)								
EP075(SIM): Phenol	108-95-2	0.5	mg/kg	<0.5	3 mg/kg	96.5	81.2	121
EP075(SIM): 2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	3 mg/kg	99.4	83.2	120
EP075(SIM): 2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	3 mg/kg	98.0	81.6	123
EP075(SIM): 3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	6 mg/kg	97.3	79.7	129
EP075(SIM): 2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	3 mg/kg	80.9	49.8	129
EP075(SIM): 2.4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	3 mg/kg	98.0	81.5	127
EP075(SIM): 2.4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	3 mg/kg	90.4	74.2	125
EP075(SIM): 2.6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	3 mg/kg	97.2	79.8	121
EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	3 mg/kg	95.9	71.5	121
EP075(SIM): 2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	3 mg/kg	91.7	67.8	119
EP075(SIM): 2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	3 mg/kg	98.3	64.5	126
EP075(SIM): Pentachlorophenol	87-86-5	2	mg/kg	<2	3 mg/kg	58.5	10.0	118
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 4967780)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	3 mg/kg	98.0	85.7	123
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	3 mg/kg	97.7	81.0	123
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	3 mg/kg	97.5	83.6	120
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	3 mg/kg	96.9	81.3	126
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	3 mg/kg	98.5	79.4	123
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	3 mg/kg	97.6	81.7	127
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	3 mg/kg	96.8	78.3	124

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 4967780) - continued								
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	3 mg/kg	98.5	79.9	128
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	3 mg/kg	96.3	76.9	123
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	3 mg/kg	97.4	80.9	130
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	3 mg/kg	97.2	70.0	121
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	3 mg/kg	96.9	80.4	130
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	3 mg/kg	93.8	70.2	123
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	3 mg/kg	82.1	67.9	122
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	3 mg/kg	81.5	65.8	123
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	3 mg/kg	82.2	65.8	127
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4967756)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	36 mg/kg	112	58.6	131
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4967779)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	770 mg/kg	113	75.0	128
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	2860 mg/kg	99.0	82.0	123
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	1540 mg/kg	109	82.4	121
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4967756)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	45 mg/kg	108	59.3	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4967779)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	1170 mg/kg	92.2	77.0	130
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	3830 mg/kg	105	81.5	120
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	290 mg/kg	98.1	73.3	137
EP080: BTEXN (QCLot: 4967756)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	2 mg/kg	111	61.6	117
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	2 mg/kg	109	65.8	125
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	2 mg/kg	111	65.8	124
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	4 mg/kg	117	64.8	134
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	2 mg/kg	113	68.7	132
EP080: Naphthalene	91-20-3	1	mg/kg	<1	0.5 mg/kg	86.5	61.8	123
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4968249)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00111 mg/kg	93.7	72.0	128
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00114 mg/kg	95.4	67.0	130
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00116 mg/kg	109	68.0	136
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4968249)								

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4968249) - continued								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	93.9	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	82.8	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	79.4	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	85.5	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	93.8	69.0	133
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4968249)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00117 mg/kg	88.2	62.0	145
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00119 mg/kg	96.5	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.0012 mg/kg	96.3	65.0	137
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00121 mg/kg	73.3	70.0	130
EP231P: PFAS Sums (QCLot: 4968249)								
EP231X: Sum of PFHxS and PFOS	355-46-4/17 63-23-1	0.0002	mg/kg	<0.0002	----	----	----	----
EP231X: Sum of PFAS (WA DER List)	----	0.0002	mg/kg	<0.0002	----	----	----	----

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
ED037P: Alkalinity by PC Titrator (QCLot: 4968387)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	96.4	85.0	116
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4969129)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	107	90.0	110
				<1	500 mg/L	104	90.0	110
ED045G: Chloride by Discrete Analyser (QCLot: 4969128)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	102	90.0	110
				<1	1000 mg/L	103	90.0	110
ED093F: Dissolved Major Cations (QCLot: 4968626)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	97.1	80.0	120
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	101	80.0	120
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	100	80.0	120
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	99.9	80.0	120
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4967623)								
EP231X-LL: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.002	µg/L	<0.002	0.0222 µg/L	87.6	72.0	130
EP231X-LL: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.002	µg/L	<0.002	0.0235 µg/L	113	71.0	127
EP231X-LL: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.002	µg/L	<0.002	0.0228 µg/L	103	68.0	131

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4967623) - continued								
EP231X-LL: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.002	µg/L	<0.002	0.0238 µg/L	116	69.0	134
EP231X-LL: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.002	µg/L	<0.002	0.0232 µg/L	104	65.0	140
EP231X-LL: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.002	µg/L	<0.002	0.0241 µg/L	95.9	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4967626)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.222 µg/L	95.8	72.0	130
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.228 µg/L	104	68.0	131
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.232 µg/L	105	65.0	140
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4976482)								
EP231X-INJ: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.444 µg/L	110	72.0	130
EP231X-INJ: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.457 µg/L	95.5	68.0	131
EP231X-INJ: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.465 µg/L	91.5	65.0	140
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4967623)								
EP231X-LL: Perfluorobutanoic acid (PFBA)	375-22-4	0.01	µg/L	<0.01	0.125 µg/L	97.7	73.0	129
EP231X-LL: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.002	µg/L	<0.002	0.025 µg/L	91.2	72.0	129
EP231X-LL: Perfluorohexanoic acid (PFHxA)	307-24-4	0.002	µg/L	<0.002	0.025 µg/L	97.8	72.0	129
EP231X-LL: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.002	µg/L	<0.002	0.025 µg/L	97.0	72.0	130
EP231X-LL: Perfluorooctanoic acid (PFOA)	335-67-1	0.002	µg/L	<0.002	0.025 µg/L	91.3	71.0	133
EP231X-LL: Perfluorononanoic acid (PFNA)	375-95-1	0.002	µg/L	<0.002	0.025 µg/L	95.8	69.0	130
EP231X-LL: Perfluorodecanoic acid (PFDA)	335-76-2	0.002	µg/L	<0.002	0.025 µg/L	100	71.0	129
EP231X-LL: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.002	µg/L	<0.002	0.025 µg/L	101	69.0	133
EP231X-LL: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.002	µg/L	<0.002	0.025 µg/L	95.5	72.0	134
EP231X-LL: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.002	µg/L	<0.002	0.025 µg/L	91.8	65.0	144
EP231X-LL: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.005	µg/L	<0.005	0.0625 µg/L	91.7	71.0	132
EP231X-LL: Perfluorohexadecanoic acid (PFHxDA)	67905-19-5	0.005	µg/L	<0.005	0.025 µg/L	90.4	70.0	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4967626)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	98.2	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	91.0	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	101	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	96.8	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	93.3	71.0	133
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4976482)								
EP231X-INJ: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.10	2.5 µg/L	102	73.0	129
EP231X-INJ: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.5 µg/L	98.1	72.0	129
EP231X-INJ: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.5 µg/L	96.5	72.0	129

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4976482) - continued								
EP231X-INJ: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.5 µg/L	97.5	72.0	130
EP231X-INJ: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.5 µg/L	99.7	71.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4967623)								
EP231X-LL: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.002	µg/L	<0.002	0.025 µg/L	105	67.0	137
EP231X-LL: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.005	µg/L	<0.005	0.0625 µg/L	127	68.0	141
EP231X-LL: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.005	µg/L	<0.005	0.0625 µg/L	120	70.0	130
EP231X-LL: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.005	µg/L	<0.005	0.0625 µg/L	108	70.0	130
EP231X-LL: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.005	µg/L	<0.005	0.0625 µg/L	100	70.0	130
EP231X-LL: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.002	µg/L	<0.002	0.025 µg/L	96.0	65.0	136
EP231X-LL: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.002	µg/L	<0.002	0.025 µg/L	96.0	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4967623)								
EP231X-LL: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.005	µg/L	<0.005	0.0234 µg/L	90.5	63.0	143
EP231X-LL: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.005	µg/L	<0.005	0.0238 µg/L	97.6	64.0	140
EP231X-LL: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.005	µg/L	<0.005	0.024 µg/L	102	67.0	138
EP231X-LL: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.005	µg/L	<0.005	0.0242 µg/L	74.4	70.0	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4967626)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.234 µg/L	97.3	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.238 µg/L	101	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.24 µg/L	111	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.242 µg/L	89.2	70.0	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4976482)								
EP231X-INJ: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.469 µg/L	107	63.0	143
EP231X-INJ: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.476 µg/L	96.8	64.0	140
EP231X-INJ: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.48 µg/L	95.1	67.0	138
EP231X-INJ: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.483 µg/L	76.2	70.0	130
EP231P: PFAS Sums (QCLot: 4967623)								
EP231X-LL: Sum of PFAS	----	0.002	µg/L	<0.002	----	----	----	----
EP231X-LL: Sum of PFHxS and PFOS	355-46-4/17 63-23-1	0.002	µg/L	<0.002	----	----	----	----
EP231X-LL: Sum of PFAS (WA DER List)	----	0.002	µg/L	<0.002	----	----	----	----
EP231P: PFAS Sums (QCLot: 4967626)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	LCS: Spike Recovery (%)	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231P: PFAS Sums (QCLot: 4967626) - continued								
EP231X: Sum of PFHxS and PFOS	355-46-4/17 63-23-1	0.01	µg/L	<0.01	----	----	----	----
EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	----	----	----	----
EP231P: PFAS Sums (QCLot: 4976482)								
EP231X-INJ: Sum of PFHxS and PFOS	355-46-4/17 63-23-1	0.01	µg/L	<0.01	----	----	----	----
EP231X-INJ: Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	----	----	----	----

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 4967804)							
EM2305678-001	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	98.5	78.0	124
		EG005T: Cadmium	7440-43-9	50 mg/kg	99.1	79.7	116
		EG005T: Chromium	7440-47-3	50 mg/kg	91.9	79.0	121
		EG005T: Copper	7440-50-8	250 mg/kg	96.1	80.0	120
		EG005T: Lead	7439-92-1	250 mg/kg	98.3	80.0	120
		EG005T: Nickel	7440-02-0	50 mg/kg	98.7	78.0	120
		EG005T: Zinc	7440-66-6	250 mg/kg	101	80.0	120
EG035T: Total Recoverable Mercury by FIMS (QCLot: 4967803)							
EM2305678-001	Anonymous	EG035T: Mercury	7439-97-6	0.5 mg/kg	87.4	76.0	116
EG048: Hexavalent Chromium (Alkaline Digest) (QCLot: 4967825)							
EM2305704-011	SWD-03	EG048G: Hexavalent Chromium	18540-29-9	20 mg/kg	98.7	58.0	114
EM2305704-011	SWD-03	EG048G: Hexavalent Chromium	18540-29-9	20 mg/kg	95.8	58.0	114
EK026SF: Total CN by Segmented Flow Analyser (QCLot: 4969484)							
EM2305621-013	Anonymous	EK026SF: Total Cyanide	57-12-5	40 mg/kg	108	70.0	130
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 4967778)							
EM2305704-009	SWD-02	EP066: Total Polychlorinated biphenyls	----	1 mg/kg	91.7	63.2	144
EP068A: Organochlorine Pesticides (OC) (QCLot: 4967781)							
EM2305704-011	SWD-03	EP068: gamma-BHC	58-89-9	0.5 mg/kg	90.4	51.4	139
		EP068: Heptachlor	76-44-8	0.5 mg/kg	86.6	49.1	130
		EP068: Aldrin	309-00-2	0.5 mg/kg	92.1	38.4	135
		EP068: Dieldrin	60-57-1	0.5 mg/kg	90.7	58.4	136

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP068A: Organochlorine Pesticides (OC) (QCLot: 4967781) - continued							
EM2305704-011	SWD-03	EP068: Endrin	72-20-8	0.5 mg/kg	85.8	33.0	146
		EP068: 4.4`-DDT	50-29-3	0.5 mg/kg	73.5	20.0	133
EP075(SIM)A: Phenolic Compounds (QCLot: 4967780)							
EM2305704-011	SWD-03	EP075(SIM): Phenol	108-95-2	3 mg/kg	88.0	77.1	119
		EP075(SIM): 2-Chlorophenol	95-57-8	3 mg/kg	89.5	78.9	123
		EP075(SIM): 2-Nitrophenol	88-75-5	3 mg/kg	65.2	43.8	136
		EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	3 mg/kg	84.7	61.5	120
		EP075(SIM): Pentachlorophenol	87-86-5	3 mg/kg	58.1	15.3	139
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 4967780)							
EM2305704-011	SWD-03	EP075(SIM): Acenaphthene	83-32-9	3 mg/kg	89.2	77.2	116
		EP075(SIM): Pyrene	129-00-0	3 mg/kg	91.8	65.5	136
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4967756)							
EM2305704-011	SWD-03	EP080: C6 - C9 Fraction	----	28 mg/kg	81.2	33.4	124
EP080/071: Total Petroleum Hydrocarbons (QCLot: 4967779)							
EM2305704-011	SWD-03	EP071: C10 - C14 Fraction	----	770 mg/kg	111	71.2	125
		EP071: C15 - C28 Fraction	----	2860 mg/kg	97.0	75.6	122
		EP071: C29 - C36 Fraction	----	1540 mg/kg	107	78.0	120
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4967756)							
EM2305704-011	SWD-03	EP080: C6 - C10 Fraction	C6_C10	33 mg/kg	78.0	30.8	120
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 4967779)							
EM2305704-011	SWD-03	EP071: >C10 - C16 Fraction	----	1170 mg/kg	90.3	72.2	128
		EP071: >C16 - C34 Fraction	----	3830 mg/kg	103	76.5	119
		EP071: >C34 - C40 Fraction	----	290 mg/kg	100	66.8	138
EP080: BTEXN (QCLot: 4967756)							
EM2305704-011	SWD-03	EP080: Benzene	71-43-2	2 mg/kg	94.9	54.4	127
		EP080: Toluene	108-88-3	2 mg/kg	96.3	57.1	131
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4968249)							
EM2305621-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00111 mg/kg	90.6	72.0	128
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00114 mg/kg	78.1	67.0	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00116 mg/kg	99.6	68.0	136
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4968249)							
EM2305621-001	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	87.2	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	78.6	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	75.9	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	80.1	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	81.0	69.0	133

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4968249)							
EM2305621-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00117 mg/kg	79.2	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00119 mg/kg	82.2	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0012 mg/kg	112	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00121 mg/kg	71.2	70.0	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4969129)							
EM2305612-017	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 4969128)							
EM2305612-017	Anonymous	ED045G: Chloride	16887-00-6	400 mg/L	# Not Determined	70.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4976482)							
EM2305704-006	FB01	EP231X-INJ: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.444 µg/L	104	72.0	130
		EP231X-INJ: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.457 µg/L	105	68.0	131
		EP231X-INJ: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.465 µg/L	97.4	65.0	140
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4976482)							
EM2305704-006	FB01	EP231X-INJ: Perfluorobutanoic acid (PFBA)	375-22-4	2.5 µg/L	106	73.0	129
		EP231X-INJ: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.5 µg/L	103	72.0	129
		EP231X-INJ: Perfluorohexanoic acid (PFHxA)	307-24-4	0.5 µg/L	101	72.0	129
		EP231X-INJ: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.5 µg/L	104	72.0	130
		EP231X-INJ: Perfluorooctanoic acid (PFOA)	335-67-1	0.5 µg/L	101	71.0	133
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4976482)							
EM2305704-006	FB01	EP231X-INJ: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.469 µg/L	112	63.0	143
		EP231X-INJ: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.476 µg/L	105	64.0	140
		EP231X-INJ: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.48 µg/L	98.7	67.0	138
		EP231X-INJ: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.483 µg/L	114	70.0	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EM2305704**	Page	: 1 of 11
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: VERA BIERMANN	Telephone	: +6138549 9645
Project	: 12566684	Date Samples Received	: 30-Mar-2023
Site	:	Issue Date	: 06-Apr-2023
Sampler	: ----	No. of samples received	: 10
Order number	: 12566684	No. of samples analysed	: 10

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Duplicate outliers exist - please see following pages for full details.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Duplicate (DUP) RPDs							
EG005(ED093)T: Total Metals by ICP-AES	EM2305630--017	Anonymous	**Iron**	7439-89-6	35.5 %	0% - 20%	**RPD exceeds LOR based limits**

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EM2305612--017	Anonymous	**Sulfate as SO4 - Turbidimetric**	14808-79-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
ED045G: Chloride by Discrete Analyser	EM2305612--017	Anonymous	**Chloride**	16887-00-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC 1	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Alkalinity by Auto Titrator	1	11	9.09	10.00	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS by LCMSMS	0	11	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	14	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Per- and Polyfluoroalkyl Substances (PFAS by LCMSMS	0	11	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	14	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content (Dried @ 105-110°C)							
Soil Glass Jar - Unpreserved (EA055) SWD-02, SWD-03	**28-Mar-2023**	**----**	----	**----**	**01-Apr-2023**	11-Apr-2023	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG005(ED093)T: Total Metals by ICP-AES								
Soil Glass Jar - Unpreserved (EG005T)								
SWD-02,	SWD-03	**28-Mar-2023**	**03-Apr-2023**	24-Sep-2023	✓	**03-Apr-2023**	24-Sep-2023	✓
EG035T: Total Recoverable Mercury by FIMS								
Soil Glass Jar - Unpreserved (EG035T)								
SWD-02,	SWD-03	**28-Mar-2023**	**03-Apr-2023**	25-Apr-2023	✓	**03-Apr-2023**	25-Apr-2023	✓
EG048: Hexavalent Chromium (Alkaline Digest)								
Soil Glass Jar - Unpreserved (EG048G)								
SWD-02,	SWD-03	**28-Mar-2023**	**03-Apr-2023**	25-Apr-2023	✓	**04-Apr-2023**	10-Apr-2023	✓
EK026SF: Total CN by Segmented Flow Analyser								
Soil Glass Jar - Unpreserved (EK026SF)								
SWD-02,	SWD-03	**28-Mar-2023**	**03-Apr-2023**	11-Apr-2023	✓	**05-Apr-2023**	17-Apr-2023	✓
EP066: Polychlorinated Biphenyls (PCB)								
Soil Glass Jar - Unpreserved (EP066)								
SWD-02,	SWD-03	**28-Mar-2023**	**03-Apr-2023**	11-Apr-2023	✓	**04-Apr-2023**	13-May-2023	✓
EP068A: Organochlorine Pesticides (OC)								
Soil Glass Jar - Unpreserved (EP068)								
SWD-02,	SWD-03	**28-Mar-2023**	**03-Apr-2023**	11-Apr-2023	✓	**04-Apr-2023**	13-May-2023	✓
EP075(SIM)A: Phenolic Compounds								
Soil Glass Jar - Unpreserved (EP075(SIM))								
SWD-02,	SWD-03	**28-Mar-2023**	**03-Apr-2023**	11-Apr-2023	✓	**03-Apr-2023**	13-May-2023	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Soil Glass Jar - Unpreserved (EP075(SIM))								
SWD-02,	SWD-03	**28-Mar-2023**	**03-Apr-2023**	11-Apr-2023	✓	**03-Apr-2023**	13-May-2023	✓
EP080/071: Total Petroleum Hydrocarbons								
Soil Glass Jar - Unpreserved (EP080)								
SWD-02,	SWD-03	**28-Mar-2023**	**01-Apr-2023**	11-Apr-2023	✓	**03-Apr-2023**	11-Apr-2023	✓
Soil Glass Jar - Unpreserved (EP071)								
SWD-02,	SWD-03	**28-Mar-2023**	**03-Apr-2023**	11-Apr-2023	✓	**03-Apr-2023**	13-May-2023	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
Soil Glass Jar - Unpreserved (EP080)								
SWD-02,	SWD-03	**28-Mar-2023**	**01-Apr-2023**	11-Apr-2023	✓	**03-Apr-2023**	11-Apr-2023	✓
Soil Glass Jar - Unpreserved (EP071)								
SWD-02,	SWD-03	**28-Mar-2023**	**03-Apr-2023**	11-Apr-2023	✓	**03-Apr-2023**	13-May-2023	✓
EP080: BTEXN								
Soil Glass Jar - Unpreserved (EP080)								
SWD-02,	SWD-03	**28-Mar-2023**	**01-Apr-2023**	11-Apr-2023	✓	**03-Apr-2023**	11-Apr-2023	✓
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE Soil Jar (EP231X)								
SWD-02,	SWD-03	**28-Mar-2023**	**03-Apr-2023**	24-Sep-2023	✓	**04-Apr-2023**	13-May-2023	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE Soil Jar (EP231X)								
SWD-02,	SWD-03	**28-Mar-2023**	**03-Apr-2023**	24-Sep-2023	✓	**04-Apr-2023**	13-May-2023	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE Soil Jar (EP231X)								
SWD-02,	SWD-03	**28-Mar-2023**	**03-Apr-2023**	24-Sep-2023	✓	**04-Apr-2023**	13-May-2023	✓
EP231P: PFAS Sums								
HDPE Soil Jar (EP231X)								
SWD-02,	SWD-03	**28-Mar-2023**	**03-Apr-2023**	24-Sep-2023	✓	**04-Apr-2023**	13-May-2023	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P)								
GW8002b,	GW201b	**28-Mar-2023**	**----**	----	**----**	**04-Apr-2023**	11-Apr-2023	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G)								
GW8002b,	GW201b	**28-Mar-2023**	**----**	----	**----**	**04-Apr-2023**	25-Apr-2023	✓
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G)								
GW8002b,	GW201b	**28-Mar-2023**	**----**	----	**----**	**04-Apr-2023**	25-Apr-2023	✓
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Natural (ED093F)								
GW8002b,	GW201b	**28-Mar-2023**	**----**	----	**----**	**03-Apr-2023**	04-Apr-2023	✓
EP231A: Perfluoroalkyl Sulfonic Acids								
Clear Plastic Bottle - Natural (EP231X-INJ)								
RB01,	FB01	**28-Mar-2023**	**06-Apr-2023**	24-Sep-2023	✓	**06-Apr-2023**	24-Sep-2023	✓
HDPE (no PTFE) (EP231X)								
MW05, GW201b, WWD-01,	GW8002b, FD10, WWD-02	**28-Mar-2023**	**01-Apr-2023**	24-Sep-2023	✓	**04-Apr-2023**	24-Sep-2023	✓
EP231B: Perfluoroalkyl Carboxylic Acids								
Clear Plastic Bottle - Natural (EP231X-INJ)								
RB01,	FB01	**28-Mar-2023**	**06-Apr-2023**	24-Sep-2023	✓	**06-Apr-2023**	24-Sep-2023	✓
HDPE (no PTFE) (EP231X)								
MW05, GW201b, WWD-01,	GW8002b, FD10, WWD-02	**28-Mar-2023**	**01-Apr-2023**	24-Sep-2023	✓	**04-Apr-2023**	24-Sep-2023	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X-LL)							
MW05, GW201b, FD10	**28-Mar-2023**	**01-Apr-2023**	24-Sep-2023	✓	**04-Apr-2023**	24-Sep-2023	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
Clear Plastic Bottle - Natural (EP231X-INJ)							
RB01, FB01	**28-Mar-2023**	**06-Apr-2023**	24-Sep-2023	✓	**06-Apr-2023**	24-Sep-2023	✓
HDPE (no PTFE) (EP231X)							
MW05, GW8002b, GW201b, FD10, WWD-01, WWD-02	**28-Mar-2023**	**01-Apr-2023**	24-Sep-2023	✓	**04-Apr-2023**	24-Sep-2023	✓
EP231P: PFAS Sums							
Clear Plastic Bottle - Natural (EP231X-INJ)							
RB01, FB01	**28-Mar-2023**	**06-Apr-2023**	24-Sep-2023	✓	**06-Apr-2023**	24-Sep-2023	✓
HDPE (no PTFE) (EP231X)							
MW05, GW8002b, GW201b, FD10, WWD-01, WWD-02	**28-Mar-2023**	**01-Apr-2023**	24-Sep-2023	✓	**04-Apr-2023**	24-Sep-2023	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	1	2	**50.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Moisture Content	EA055	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	2	**50.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	9	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	2	**50.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	2	**50.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Cyanide by Segmented Flow Analyser	EK026SF	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	4	20	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	2	**50.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	2	**50.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	2	2	**100.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Cyanide by Segmented Flow Analyser	EK026SF	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Cyanide by Segmented Flow Analyser	EK026SF	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	2	2	**100.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Matrix Spikes (MS) - Continued							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Cyanide by Segmented Flow Analyser	EK026SF	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by Auto Titrator	ED037-P	1	11	**9.09**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	12	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS by LCMSMS	EP231X-LL	0	11	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	0	14	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-INJ	1	4	**25.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by Auto Titrator	ED037-P	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS by LCMSMS	EP231X-LL	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-INJ	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Chloride by Discrete Analyser	ED045G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS by LCMSMS	EP231X-LL	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-INJ	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS by LCMSMS	EP231X-LL	0	11	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	0	14	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-INJ	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Matrix Spikes (MS) - Continued							
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to APHA 3112 Hg - B (Flow-injection (SnCl2) (Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3)
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	SOIL	In house: Referenced to USEPA SW846, Method 3060. Hexavalent chromium is extracted by alkaline digestion. The digest is determined by photometrically by automatic discrete analyser, following pH adjustment. The instrument uses colour development using dephenylcarbazide. Each run of samples is measured against a five-point calibration curve. This method is compliant with NEPM Schedule B(3)
Total Cyanide by Segmented Flow Analyser	EK026SF	SOIL	In house: Referenced to APHA 4500-CN C / ASTM D7511 / ISO 14403. Caustic leachates of soil samples are introduced into an automated segmented flow analyser. Complex bound cyanide is decomposed in a continuously flowing stream, at a pH of 3.8, by the effect of UV light. A UV-B lamp (312 nm) and a decomposition spiral of borosilicate glass are used to filter out UV light with a wavelength of less than 290 nm thus preventing the conversion of thiocyanate into cyanide. The hydrogen cyanide present at a pH of 3.8 is separated by gas dialysis. The hydrogen cyanide is then determined photometrically, based on the reaction of cyanide with chloramine-T to form cyanogen chloride. This then reacts with 4-pyridine carboxylic acid and 1,3-dimethylbarbituric acid to give a red colour which is measured at 600 nm. This method is compliant with NEPM Schedule B(3).
Polychlorinated Biphenyls (PCB)	EP066	SOIL	In house: Referenced to USEPA SW 846 - 8270 Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3).
Pesticides by GCMS	EP068	SOIL	In house: Referenced to USEPA SW 846 - 8270 Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This technique is compliant with NEPM Schedule B(3).
TRH - Semivolatile Fraction	EP071	SOIL	In house: Referenced to USEPA SW 846 - 8015 Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM Schedule B(3).
PAH/Phenols (SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270. Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)

Analytical Methods	Method	Matrix	Method Descriptions
TRH Volatiles/BTEX	EP080	SOIL	In house: Referenced to USEPA SW 846 - 8260. Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. Compliant with NEPM Schedule B(3) amended.
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	SOIL	In-house: Analysis of soils by solvent extraction followed by LC-Electrospray-MS-MS, Negative Mode using MRM using internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to a portion of soil which is then extracted with MTBE and an ion pairing reagent. A portion of extract is exchanged into the analytical solvent mixture, combined with an equal volume reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.
Alkalinity by Auto Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm.
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-INJ	WATER	In house: Direct injection analysis of fresh waters after dilution (1:1) with mobile phase solvent. Analysis by LC-Electrospray-MS-MS, Negative Mode using MRM. Where commercially available, isotopically labelled analogues of the target analytes are used as internal standards for quantification. Where a labelled analogue is not commercially available, the internal standard with similar chemistry and the closest retention time to the target is used for quantification. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers.

Analytical Methods	Method	Matrix	Method Descriptions
Per- and Polyfluoroalkyl Substances (PFAS by LCMSMS	EP231X-LL	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is concentrated, combined with an equal volume of reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
NaOH leach for CN in Soils	CN-PR	SOIL	In house: APHA 4500 CN. Samples are extracted by end-over-end tumbling with NaOH.
Alkaline digestion for Hexavalent Chromium	EG048PR	SOIL	In house: Referenced to USEPA SW846, Method 3060A.
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM Schedule B(3).
Methanolic Extraction of Soils for Purge and Trap	ORG16	SOIL	In house: Referenced to USEPA SW 846 - 5030A. 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.
Tumbler Extraction of Solids	ORG17	SOIL	In house: Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.
QuECheRS Extraction of Solids	ORG71	SOIL	In house: Sequential extractions with Acetonitrile/Methanol by shaking. Extraction efficiency aided by the addition of salts under acidic conditions. Where relevant, interferences from co-extracted organics are removed with dispersive clean-up media (dSPE). The extract is either diluted or concentrated and exchanged into the analytical solvent.
Preparation for PFAS in water.	EP231-PR	WATER	Method presumes direct injection without workup. Preparation includes addition of internal standard and surrogate, and filtration prior to analysis.
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

CHAIN OF CUSTODY RECORD

GHD

FREIGHT

18.9°

390

Turnaround Requirement:
X STANDARD
☐ NON-STANDARD

Page ___ of ___

Job Number	GHD Office	Relinquished By:	Received By:	Relinquished By:	Received By:
12566684	Adelaide	Date/Time:	Date/Time: 29/3/23	Date/Time: 29/3/23	Date/Time:

Project: MFS St Marys PFAS investigation

GHD Project Manager: Vera Biermann 043598781

Email Reports to: ghdlabreports@ghd.com; vera.biermann@ghd.com; chelsie.davies@ghd.com; Ally.kirkman@ghd.com

GHD Contact: Ally Kirkman 0412625108; Chelsie Davies 0424267548

Quote Number

SEND TO:

X **ALS Laboratories**
Suite D, 32 W... Rd, Th...
Ph: 08 8162 5130
Contact: Kieren Burns

☐ **Envirolab Services**
7a The Parade, NORWOOD SA 5067
Ph: 08 7087 6800
Contact: Alex Stenta

☐ **Eurofins | Environment Testing**
6 Monterey Rd, DANDENONG SOUTH VIC 3175
Ph: 03 8564 5006
Contact: Rhonda Chouman

☐
Ph:
Contact:

	Sample I.D.	Date	Time	Sample Matrix S: Soil SL: Sludge W: Water A: Air	Container Type J: Jar, B: Bag, V: Vial; G: Glass bottle; P: Plastic bottle	PFAS (Short)	PFAS (Long Suite and Trace)	Major Cations/Anions	SA WASTE SCREEN	Remarks
1	MW05	28/03/2023					X			
2	GW8002b	28/03/2023				X		X		
3	GW201b	28/03/2023					X	X		
4	FD10	28/03/2023		W			X			
	FS10	28/03/2023		W			X			
5	RB01	28/03/2023		W		X				Please forward to Eurofins
6	FB01	28/03/2023		W		X				
7	WWD-01	28/03/2023		W		X				
8	WWD-02	28/03/2023		W		X				
9	SWD-02	28/03/2023		S		X			X	
10	MW01	28/03/2023		W			X			
11	swd-03	28/03/2023		S		X			X	

Remarks: esdat report format

NR

RELINQUISHED BY
JW (ALS) 3/4

30/3, 1200

DATE: 3/4
TIME: 2:35pm
COURIER: yes
TEMPERATURE 13.1
ATTEMP TO CHILL : YES NO
ESS-3

Environmental Division
Melbourne
Work Order Reference
EM2305704

Telephone : + 61-3-8549 9600

917846
3/4

eurofins | Environment Testing

www.eurofins.com.au EnviroSales@eurofins.com

Eurofins Environment Testing Australia Pty Ltd

ABN: 50 005 085 521

Melbourne	Geelong	Sydney	Canberra	Brisbane	Newcastle
6 Monterey Road	19/8 Lewalan Street	179 Magowar Road	Unit 1,2 Dacre Street	1/21 Smallwood Place	1/2 Frost Drive
Dandenong South	Grovedale	Girraween	Mitchell	Murarrie	Mayfield West NSW 2304
VIC 3175	VIC 3216	NSW 2145	ACT 2911	QLD 4172	Tel: +61 2 4968 8448
Tel: +61 3 8564 5000	Tel: +61 3 8564 5000	Tel: +61 2 9900 8400	Tel: +61 2 6113 8091	Tel: +61 7 3902 4600	NATA# 1261
NATA# 1261 Site# 1254	NATA# 1261 Site# 25403	NATA# 1261 Site# 18217	NATA# 1261 Site# 25466	NATA# 1261 Site# 20794	Site# 25079 & 25289

Eurofins ARL Pty Ltd

ABN: 91 05 0159 898

Perth
46-48 Banksia Road
Welshpool
WA 6106
Tel: +61 8 6253 4444
NATA# 2377 Site# 2370

Eurofins Environment Testing NZ Ltd

NZBN: 9429046024954

Auckland	Christchurch
35 O'Rorke Road	43 Detroit Drive
Penrose,	Rolleston,
Auckland 1061	Christchurch 7675
Tel: +64 9 526 45 51	Tel: 0800 856 450
IANZ# 1327	IANZ# 1290

Sample Receipt Advice

Company name:	GHD Pty Ltd SA
Contact name:	Vera Biermann
Project name:	MFS ST MARYS PFAS INVESTIGATION
Project ID:	12566684
Turnaround time:	5 Day
Date/Time received	Apr 3, 2023 2:35 PM
Eurofins reference	977846

Sample Information

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

Notes

Contact

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

Amy Meunier on phone : or by email: AmyMeunier@eurofins.com

Results will be delivered electronically via email to Vera Biermann - vera.biermann@ghd.com.

Note: A copy of these results will also be delivered to the general GHD Pty Ltd SA email address.

GHD Pty Ltd
GPO Box 2052
Adelaide
SA 5001

NATA Accredited
Accreditation Number 1261
Site Number 1254

Accredited for compliance with ISO/IEC 17025 – Testing
NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection, proficiency testing scheme providers and reference materials producers reports and certificates.

Attention: **Vera Biermann**

Report **977846-W**
Project name MFS ST MARYS PFAS INVESTIGATION
Project ID 12566684
Received Date Apr 03, 2023

Client Sample ID			**FS10**
Sample Matrix			**Water**
Eurofins Sample No.			**M23-Ap0004038**
Date Sampled			**Mar 28, 2023**
Test/Reference	LOR	Unit	
PFASs Summations			
Sum (PFHxS + PFOS)*	0.001	ug/L	61
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.001	ug/L	62.8
Sum of PFASs (n=30)*	0.005	ug/L	101.058
Sum of US EPA PFAS (PFOS + PFOA)*	0.001	ug/L	27.8
Sum of WA DWER PFAS (n=10)*	0.005	ug/L	92.239
Perfluoroalkyl sulfonamido substances- Trace			
Perfluorooctane sulfonamide (FOSA)[N11]	0.005	ug/L	[N09]0.016
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)[N11]	0.005	ug/L	< 0.005
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)[N11]	0.005	ug/L	< 0.005
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)[N11]	0.005	ug/L	< 0.005
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)[N11]	0.005	ug/L	< 0.005
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)[N11]	0.005	ug/L	< 0.005
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)[N11]	0.005	ug/L	< 0.005
13C8-FOSA (surr.)	1	%	69
D3-N-MeFOSA (surr.)	1	%	111
D5-N-EtFOSA (surr.)	1	%	43
D7-N-MeFOSE (surr.)	1	%	55
D9-N-EtFOSE (surr.)	1	%	27
D5-N-EtFOSAA (surr.)	1	%	18
D3-N-MeFOSAA (surr.)	1	%	29
Perfluoroalkyl carboxylic acids (PFCAs) - Trace			
Perfluorobutanoic acid (PFBA)[N11]	0.005	ug/L	0.53
Perfluoropentanoic acid (PFPeA)[N11]	0.001	ug/L	5.0
Perfluorohexanoic acid (PFHxA)[N11]	0.001	ug/L	10
Perfluoroheptanoic acid (PFHpA)[N11]	0.001	ug/L	[N09]1.5
Perfluorooctanoic acid (PFOA)[N11]	0.001	ug/L	[N09]1.8
Perfluorononanoic acid (PFNA)[N11]	0.001	ug/L	[N09]2.0
Perfluorodecanoic acid (PFDA)[N11]	0.001	ug/L	< 0.02
Perfluorotridecanoic acid (PFTrDA)[N15]	0.001	ug/L	< 0.001
Perfluoroundecanoic acid (PFUnDA)[N11]	0.001	ug/L	< 0.02
Perfluorododecanoic acid (PFDoDA)[N11]	0.001	ug/L	< 0.001

Client Sample ID			FS10
Sample Matrix			Water
Eurofins Sample No.			M23-Ap0004038
Date Sampled			Mar 28, 2023
Test/Reference	LOR	Unit	
Perfluoroalkyl carboxylic acids (PFCAs) - Trace			
Perfluorotetradecanoic acid (PFTeDA)[N11]	0.001	ug/L	< 0.001
13C4-PFBA (surr.)	1	%	87
13C5-PFPeA (surr.)	1	%	102
13C5-PFHxA (surr.)	1	%	103
13C4-PFHpA (surr.)	1	%	105
13C8-PFOA (surr.)	1	%	105
13C5-PFNA (surr.)	1	%	104
13C6-PFDA (surr.)	1	%	98
13C2-PFUnDA (surr.)	1	%	157
13C2-PFDoDA (surr.)	1	%	53
13C2-PFTeDA (surr.)	1	%	71
Perfluoroalkyl sulfonic acids (PFSAs)- Trace			
Perfluorobutanesulfonic acid (PFBS)[N11]	0.001	ug/L	[N09]3.9
Perfluorononanesulfonic acid (PFNS)[N15]	0.001	ug/L	< 0.02
Perfluoropropanesulfonic acid (PFPrS)[N15]	0.001	ug/L	1.6
Perfluoropentanesulfonic acid (PFPeS)[N15]	0.001	ug/L	[N09]4.0
Perfluorohexanesulfonic acid (PFHxS)[N11]	0.001	ug/L	[N09]35
Perfluoroheptanesulfonic acid (PFHpS)[N15]	0.001	ug/L	[N09]1.2
Perfluorooctanesulfonic acid (PFOS)[N11]	0.001	ug/L	[N09]26
Perfluorodecanesulfonic acid (PFDS)[N15]	0.001	ug/L	< 0.02
13C3-PFBS (surr.)	1	%	106
18O2-PFHxS (surr.)	1	%	113
13C8-PFOS (surr.)	1	%	111
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)- Trace			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)[N11]	0.001	ug/L	0.003
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)[N11]	0.005	ug/L	8.5
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)[N11]	0.001	ug/L	0.009
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)[N11]	0.001	ug/L	< 0.001
13C2-4:2 FTSA (surr.)	1	%	52
13C2-6:2 FTSA (surr.)	1	%	95
13C2-8:2 FTSA (surr.)	1	%	51
13C2-10:2 FTSA (surr.)	1	%	67

Sample History

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

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

Description	Testing Site	Extracted	Holding Time
Per- and Polyfluoroalkyl Substances (PFASs) - Trace			
PFASs Summations	Melbourne	Apr 03, 2023	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS) - low level			
Perfluoroalkyl sulfonamido substances- Trace	Melbourne	Apr 04, 2023	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS) - low level			
Perfluoroalkyl carboxylic acids (PFCAs) - Trace	Melbourne	Apr 04, 2023	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS) - low level			
Perfluoroalkyl sulfonic acids (PFSAs)- Trace	Melbourne	Apr 04, 2023	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS) - low level			
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)- Trace	Melbourne	Apr 04, 2023	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS) - low level			

Eurofins Environment Testing Australia Pty Ltd
ABN: 50 005 085 521

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

Geelong
19/8 Lewalan Street
Grovedale
VIC 3216
Tel: +61 3 8564 5000
NATA# 1261 Site# 25403

Sydney
179 Magowar Road
Girraween
NSW 2145
Tel: +61 2 9900 8400
NATA# 1261 Site# 18217

Canberra
Unit 1,2 Dacre Street
Mitchell
ACT 2911
Tel: +61 2 6113 8091
NATA# 1261 Site# 25466

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

Newcastle
1/2 Frost Drive
Mayfield West NSW 2304
Tel: +61 2 4968 8448
NATA# 1261
Site# 25079 & 25289

Eurofins ARL Pty Ltd
ABN: 91 05 0159 898

Perth
46-48 Banksia Road
Welshpool
WA 6106
Tel: +61 8 6253 4444
NATA# 2377 Site# 2370

Eurofins Environment Testing NZ Ltd
NZBN: 9429046024954

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

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

web: www.eurofins.com.au
email: EnviroSales@eurofins.com

Company Name: GHD Pty Ltd SA
Address: GPO Box 2052
Adelaide
SA 5001

Project Name: MFS ST MARYS PFAS INVESTIGATION
Project ID: 12566684

Order No.:
Report #: 977846
Phone: 08 8111 6600
Fax: 08 8111 6699

Received: Apr 3, 2023 2:35 PM
Due: Apr 12, 2023
Priority: 5 Day
Contact Name: Vera Biermann

Eurofins Analytical Services Manager : Amy Meunier

Sample Detail						Per- and Polyfluoroalkyl Substances (PFASs) - Trace
Melbourne Laboratory - NATA # 1261 Site # 1254						X
External Laboratory						
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**	
1	FS10	Mar 28, 2023		Water	M23-Ap0004038	X
Test Counts						1

Internal Quality Control Review and Glossary

General

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

Holding Times

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

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

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

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

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

Units

mg/kg: milligrams per kilogram	**mg/L:** milligrams per litre	**µg/L:** micrograms per litre
ppm: parts per million	**ppb:** parts per billion	**%:** Percentage
org/100 mL: Organisms per 100 millilitres	**NTU:** Nephelometric Turbidity Units	**MPN/100 mL:** Most Probable Number of organisms per 100 millilitres
CFU: Colony forming unit		

Terms

APHA	American Public Health Association
COC	Chain of Custody
CP	Client Parent - QC was performed on samples pertaining to this report
CRM	Certified Reference Material (ISO17034) - reported as percent recovery.
Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
LOR	Limit of Reporting.
LCS	Laboratory Control Sample - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
SRA	Sample Receipt Advice
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
TBTO	Tributyltin oxide (*bis*-tributyltin oxide) - individual tributyltin compounds cannot be identified separately in the environment however free tributyltin was measured and its values were converted stoichiometrically into tributyltin oxide for comparison with regulatory limits.
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxic Equivalency Quotient or Total Equivalence
QSM	US Department of Defense Quality Systems Manual Version 5.4
US EPA	United States Environmental Protection Agency
WA DWER	Sum of PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC - Acceptance Criteria

The acceptance criteria should be used as a guide only and may be different when site specific Sampling Analysis and Quality Plan (SAQP) have been implemented

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

Results <10 times the LOR: No Limit

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

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

NOTE: pH duplicates are reported as a range not as RPD

Surrogate Recoveries: Recoveries must lie between 20-130% for Speciated Phenols & 50-150% for PFAS

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.4 where no positive PFAS results have been reported have been reviewed and no data was affected.

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore, laboratory analysis is unlikely to be completed within holding time.Analysis will begin as soon as possible after sample receipt.
4. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of recovery the term "INT" appears against that analyte.
5. For Matrix Spikes and LCS results a dash "-" in the report means that the specific analyte was not added to the QC sample.
6. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Perfluoroalkyl sulfonamido substances- Trace							
Perfluorooctane sulfonamide (FOSA)	ug/L	< 0.005			0.005	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	ug/L	< 0.005			0.005	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	ug/L	< 0.005			0.005	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	ug/L	< 0.005			0.005	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	ug/L	< 0.005			0.005	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	ug/L	< 0.005			0.005	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	ug/L	< 0.005			0.005	Pass	
Method Blank							
Perfluoroalkyl carboxylic acids (PFCAs) - Trace							
Perfluorobutanoic acid (PFBA)	ug/L	< 0.005			0.005	Pass	
Perfluoropentanoic acid (PFPeA)	ug/L	< 0.001			0.001	Pass	
Perfluorohexanoic acid (PFHxA)	ug/L	< 0.001			0.001	Pass	
Perfluoroheptanoic acid (PFHpA)	ug/L	< 0.001			0.001	Pass	
Perfluorooctanoic acid (PFOA)	ug/L	< 0.001			0.001	Pass	
Perfluorononanoic acid (PFNA)	ug/L	< 0.001			0.001	Pass	
Perfluorodecanoic acid (PFDA)	ug/L	< 0.001			0.001	Pass	
Perfluorotridecanoic acid (PFTrDA)	ug/L	< 0.001			0.001	Pass	
Perfluoroundecanoic acid (PFUnDA)	ug/L	< 0.001			0.001	Pass	
Perfluorododecanoic acid (PFDoDA)	ug/L	< 0.001			0.001	Pass	
Perfluorotetradecanoic acid (PFTeDA)	ug/L	< 0.001			0.001	Pass	
Method Blank							
Perfluoroalkyl sulfonic acids (PFSAs)- Trace							
Perfluorobutanesulfonic acid (PFBS)	ug/L	< 0.001			0.001	Pass	
Perfluorononanesulfonic acid (PFNS)	ug/L	< 0.001			0.001	Pass	
Perfluoropropanesulfonic acid (PFPrS)	ug/L	< 0.001			0.001	Pass	
Perfluoropentanesulfonic acid (PFPeS)	ug/L	< 0.001			0.001	Pass	
Perfluorohexanesulfonic acid (PFHxS)	ug/L	< 0.001			0.001	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	ug/L	< 0.001			0.001	Pass	
Perfluorooctanesulfonic acid (PFOS)	ug/L	< 0.001			0.001	Pass	
Perfluorodecanesulfonic acid (PFDS)	ug/L	< 0.001			0.001	Pass	
Method Blank							
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)- Trace							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	ug/L	< 0.001			0.001	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	ug/L	< 0.005			0.005	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	ug/L	< 0.001			0.001	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	ug/L	< 0.001			0.001	Pass	
LCS - % Recovery							
Perfluoroalkyl sulfonamido substances- Trace							
Perfluorooctane sulfonamide (FOSA)	%	101			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	%	58			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	%	59			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	%	94			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	%	95			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	%	134			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	%	80			50-150	Pass	
LCS - % Recovery							
Perfluoroalkyl carboxylic acids (PFCAs) - Trace							
Perfluorobutanoic acid (PFBA)	%	111			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	103			50-150	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Perfluorohexanoic acid (PFHxA)	%	114			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	109			50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	116			50-150	Pass	
Perfluorononanoic acid (PFNA)	%	121			50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	118			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	%	119			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	%	124			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	82			50-150	Pass	
LCS - % Recovery							
Perfluoroalkyl sulfonic acids (PFSAs)- Trace							
Perfluorobutanesulfonic acid (PFBS)	%	98			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	%	88			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	%	98			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	%	96			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	%	103			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	%	118			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	%	107			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	%	56			50-150	Pass	
LCS - % Recovery							
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)- Trace							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	%	87			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	%	107			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	%	90			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	%	106			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Perfluoroalkyl sulfonamido substances- Trace				Result 1					
Perfluorooctane sulfonamide (FOSA)	M23-Ap0000189	NCP	%	111			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	M23-Ap0000189	NCP	%	115			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	M23-Ap0000189	NCP	%	78			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	M23-Ap0000189	NCP	%	78			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	M23-Ap0000189	NCP	%	105			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	M23-Ap0000189	NCP	%	97			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	M23-Ap0000189	NCP	%	101			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl carboxylic acids (PFCAs) - Trace				Result 1					
Perfluorododecanoic acid (PFDoDA)	M23-Ap0000189	NCP	%	108			50-150	Pass	
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)- Trace				Result 1					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	M23-Ap0000189	NCP	%	93			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	M23-Ap0000189	NCP	%	131			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	M23-Ap0000189	NCP	%	108			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Perfluoroalkyl sulfonamido substances- Trace				Result 1	Result 2	RPD			
Perfluorooctane sulfonamide (FOSA)	M23-Ap0000187	NCP	ug/L	< 0.005	< 0.005	<1	30%	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	M23-Ap0000187	NCP	ug/L	< 0.005	< 0.005	<1	30%	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	M23-Ap0000187	NCP	ug/L	< 0.005	< 0.005	<1	30%	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	M23-Ap0000187	NCP	ug/L	< 0.005	< 0.005	<1	30%	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	M23-Ap0000187	NCP	ug/L	< 0.005	< 0.005	<1	30%	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	M23-Ap0000187	NCP	ug/L	< 0.005	< 0.005	<1	30%	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	M23-Ap0000187	NCP	ug/L	< 0.005	< 0.005	<1	30%	Pass	
Duplicate									
Perfluoroalkyl carboxylic acids (PFCAs) - Trace				Result 1	Result 2	RPD			
Perfluorotridecanoic acid (PFTrDA)	M23-Ap0000187	NCP	ug/L	< 0.001	< 0.001	<1	30%	Pass	
Perfluorododecanoic acid (PFDoDA)	M23-Ap0000187	NCP	ug/L	< 0.001	< 0.001	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	M23-Ap0000187	NCP	ug/L	< 0.001	< 0.001	<1	30%	Pass	
Duplicate									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)- Trace				Result 1	Result 2	RPD			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	M23-Ap0000187	NCP	ug/L	< 0.001	< 0.001	<1	30%	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	M23-Ap0000187	NCP	ug/L	< 0.001	< 0.001	<1	30%	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	M23-Ap0000187	NCP	ug/L	< 0.001	< 0.001	<1	30%	Pass	

Comments

Sample Integrity

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

Qualifier Codes/Comments

Code	Description
N09	Quantification of linear and branched isomers has been conducted as a single total response using the relative response factor for the corresponding linear/branched standard.
N11	Isotope dilution is used for calibration of each native compound for which an exact labelled analogue is available (Isotope Dilution Quantitation). The isotopically labelled analogues allow identification and recovery correction of the concentration of the associated native PFAS compounds.
N15	Where the native PFAS compound does not have labelled analogue then the quantification is made using the Extracted Internal Standard Analyte with the closest retention time to the analyte and no recovery correction has been made (Internal Standard Quantitation).

Authorised by:

Amy Meunier	Analytical Services Manager
Joseph Edouard	Senior Analyst-PFAS

Glenn Jackson
General Manager

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

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

Measurement uncertainty of test data is available on request or please click here.

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CHAIN OF CUSTODY

ALS Laboratory: please tick →

FREIGHT

CLIENT: GHD Pty Ltd	TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g., Ultra Trace Organics)	☐ Standard TAT (List due date):	FOR LABORATORY USE ONLY (Circle)
OFFICE: 211 Victoria Square, Level 4, Adelaide SA 5000		☐ Non Standard or urgent TAT (List due date):	Custody Seal Intact? Yes No N/A
	ALS QUOTE:	COC SEQUENCE NUMBER (Circle)	Free ice / frozen ice bricks present upon receipt? Yes No N/A
PROJECT: 12566684	ORDER NO.:	COC: 1 2 3 4 5 6 7	Random Sample Temperature on Receipt: 13.3 °C
PROJECT MANAGER: Ben Petticrew	CONTACT PH: 0460830524	OF: 1 2 3 4 5 6 7	Other comment:
SAMPLER: AK / BP	SAMPLER MOBILE: 0412625108		
COC emailed to ALS? (YES / NO)	EDD FORMAT (or default):		
Email Reports to: GHDLabReports@ghd.com; ben.petticrew@ghd.com			
Email Invoice to: vera.biermann@ghd.com			

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
ELP (ALS)			
DATE/TIME: 1/5/23	DATE/TIME: 27-4-23 @ 1330	DATE/TIME: 27-4-23 @ 1500	DATE/TIME: 28/4/23 @ 1025

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).				Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	PFAS - full suite	Major cations/anions	PFAS - full suite, trace		
1	GW8001b	26/04/2023	W		4		X	X		
2	MW03	26/04/2023	W		3	X				
3	MW01	26/04/2023	W		3	X				
4	EPA-GW07	26/04/2023	W		3	X				
5	MW07	26/04/2023	W		3	X				
	FS01	26/04/2023	W		3			X		forward to Eurofins
6	FD01	26/04/2023	W		2			X		
7	RB01	26/04/2023	W		2			X		
	DATE: 2/5									
	TIME 9am									
	COURIER:									
	TEMPERATURE: 5.1									
	TEMP TO CHILL: YES NO									
	Sealed 5.0			TOTAL	23					

#98553 9
02/05/23

Environmental Division Melbourne
Work Order Reference
EM2307449

Telephone : +61-3-8549 9600

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

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CHAIN OF CUSTODY

ALS Laboratory: please tick →

CLIENT: GHD Pty Ltd	TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g. Ultra Trace Organics)	☐ Standard TAT (List due date):	FOR LABORATORY USE ONLY (Circle)
OFFICE: 211 Victoria Square, Level 4, Adelaide SA 5000		☐ Non Standard or urgent TAT (List due date):	Custody Seal Intact? Yes No N/A
	ALS QUOTE:	COC SEQUENCE NUMBER (Circle)	Free ice / frozen ice bricks present upon receipt? Yes No N/A
PROJECT: 12566684	ORDER NO.:	COC: 1 2 3 4 5 6 7	Random Sample Temperature on Receipt: 17.3 °C
PROJECT MANAGER: Ben Petticrew	CONTACT PH: 0460830524	OF: 1 2 3 4 5 6 7	Other comment:
SAMPLER: AK / BP	SAMPLER MOBILE: 0412625108	RELINQUISHED BY:	RECEIVED BY:
COC emailed to ALS? (YES / NO)	EDD FORMAT (or default):	DATE/TIME:	DATE/TIME: 27-4-23 @ 1330
Email Reports to: GHDLabReports@ghd.com; ben.petticrew@ghd.com; vera.biermann@ghd.com		RELINQUISHED BY:	RECEIVED BY:
Email Invoice to:		DATE/TIME:	DATE/TIME: 27-4-23 @ 1520
COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:			DATE/TIME: 28/4 10:2

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	TRH/BTEXN			#985539					
1	GW8001b	26/04/2023	W		3	X			02/05/23					
3	MW01	26/04/2023	W		3	X								
6	FD01	26/04/2023	W		3	X								
	FS01	26/04/2023	W		3	X								forward to eurofins
				TOTAL	12									

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

(1) 2/2

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EM2307449**

Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: BEN PETTICREW	Contact	: Peter Ravlic
Address	: Level 4, 211 VICTORIA SQUARE ADELAIDE SA, AUSTRALIA 5000	Address	: 4 Westall Rd Springvale VIC Australia 3171
E-mail	: ben.petticrew@ghd.com	E-mail	: peter.ravlic@alsglobal.com
Telephone	: ----	Telephone	: +6138549 9645
Facsimile	: ----	Facsimile	: +61-3-8549 9626
Project	: 12566684	Page	: 1 of 3
Order number	: ----	Quote number	: EB2020GHDSER0038 (EN/005)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	:		
Sampler	: AK, BP		

Dates

Date Samples Received	: 28-Apr-2023 10:55	Issue Date	: 29-Apr-2023
Client Requested Due Date	: 09-May-2023	Scheduled Reporting Date	: **09-May-2023**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 1	Temperature	: 7.4°C - Ice present
Receipt Detail	:	No. of samples received / analysed	: 7 / 7

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Please direct any queries related to sample condition / numbering / breakages to Client Services.**
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **Analytical work for this work order will be conducted at ALS Springvale and ALS Sydney.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - EP231X-LL PFAS - Full Suite Low Level (28 analytes)	WATER - NT-01 & 02 Ca, Mg, Na, K, Cl, SO4, Alkalinity	WATER - W-04 TRH/BTEXN
EM2307449-001	26-Apr-2023 00:00	GW8001b		✓	✓	✓
EM2307449-002	26-Apr-2023 00:00	MW03	✓			
EM2307449-003	26-Apr-2023 00:00	MW01	✓			✓
EM2307449-004	26-Apr-2023 00:00	EPA-GW07	✓			
EM2307449-005	26-Apr-2023 00:00	MW07	✓			
EM2307449-006	26-Apr-2023 00:00	FD01		✓		✓
EM2307449-007	26-Apr-2023 00:00	RB01		✓		

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE

- A4 - AU Tax Invoice (INV)	Email	accountspayableAU@ghd.com

BEN PETTICREW

- *AU Certificate of Analysis - NATA (COA)	Email	ben.petticrew@ghd.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	ben.petticrew@ghd.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	ben.petticrew@ghd.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	ben.petticrew@ghd.com
- A4 - AU Tax Invoice (INV)	Email	ben.petticrew@ghd.com
- Chain of Custody (CoC) (COC)	Email	ben.petticrew@ghd.com
- EDI Format - ESDAT (ESDAT)	Email	ben.petticrew@ghd.com
- EDI Format - XTab (XTAB)	Email	ben.petticrew@ghd.com
- Electronic SRN for ESdat (ESRN_ESDAT)	Email	ben.petticrew@ghd.com

GHD LAB REPORTS

- *AU Certificate of Analysis - NATA (COA)	Email	ghdlabreports@ghd.com
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VERA BIERMANN

- *AU Certificate of Analysis - NATA (COA)	Email	vera.biermann@ghd.com
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- Electronic SRN for ESdat (ESRN_ESDAT)	Email	vera.biermann@ghd.com

CERTIFICATE OF ANALYSIS

Work Order	: **EM2307449**	Page	: 1 of 11
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: BEN PETTICREW	Contact	: Peter Ravlic
Address	: Level 4, 211 VICTORIA SQUARE ADELAIDE SA, AUSTRALIA 5000	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: ----	Telephone	: +6138549 9645
Project	: 12566684	Date Samples Received	: 28-Apr-2023 10:55
Order number	: ----	Date Analysis Commenced	: 01-May-2023
C-O-C number	: ----	Issue Date	: 04-May-2023 15:57
Sampler	: AK, BP		
Site	:		
Quote number	: EN/005		
No. of samples received	: 7		
No. of samples analysed	: 7		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Jarwis Nheu	Non-Metals Team Leader	Melbourne Inorganics, Springvale, VIC
Nancy Wang	2IC Organic Chemist	Melbourne Organics, Springvale, VIC

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- As per QWI – EN55-3 Data Interpreting Procedures, Ionic balances are typically calculated using Major Anions - Chloride, Alkalinity and Sulfate; and Major Cations - Calcium, Magnesium, Potassium and Sodium. Where applicable and dependent upon sample matrix, the Ionic Balance may also include the additional contribution of Ammonia, Dissolved Metals by ICPMS and H+ to the Cations and Nitrate, SiO2 and Fluoride to the Anions.
- EP231X: Poor matrix spike recovery for sample EM2307449-006 due to sample matrix interference. Confirmed by re-analysis.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	GW8001b	MW03	MW01	EPA-GW07	MW07
				Sampling date / time	26-Apr-2023 00:00	26-Apr-2023 00:00	26-Apr-2023 00:00	26-Apr-2023 00:00	26-Apr-2023 00:00
Compound	CAS Number	LOR	Unit		EM2307449-001	EM2307449-002	EM2307449-003	EM2307449-004	EM2307449-005
					Result	Result	Result	Result	Result
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		**22**	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**383**	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		**405**	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**131**	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**364**	----	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**21**	----	----	----	----
Magnesium	7439-95-4	1	mg/L		**20**	----	----	----	----
Sodium	7440-23-5	1	mg/L		**342**	----	----	----	----
Potassium	7440-09-7	1	mg/L		**20**	----	----	----	----
EN055: Ionic Balance									
ø **Total Anions**	----	0.01	meq/L		**21.1**	----	----	----	----
ø **Total Cations**	----	0.01	meq/L		**18.1**	----	----	----	----
ø **Ionic Balance**	----	0.01	%		**7.67**	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	----	<20	----	----
C10 - C14 Fraction	----	50	µg/L		<50	----	<50	----	----
C15 - C28 Fraction	----	100	µg/L		**520**	----	<100	----	----
C29 - C36 Fraction	----	50	µg/L		**590**	----	<50	----	----
^ **C10 - C36 Fraction (sum)**	----	50	µg/L		**1110**	----	<50	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	----	<20	----	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	----	<20	----	----
>C10 - C16 Fraction	----	100	µg/L		<100	----	<100	----	----
>C16 - C34 Fraction	----	100	µg/L		**990**	----	**130**	----	----
>C34 - C40 Fraction	----	100	µg/L		**390**	----	<100	----	----
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		**1380**	----	**130**	----	----
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L		<100	----	<100	----	----
EP080: BTEXN									

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	GW8001b	MW03	MW01	EPA-GW07	MW07
				Sampling date / time	26-Apr-2023 00:00	26-Apr-2023 00:00	26-Apr-2023 00:00	26-Apr-2023 00:00	26-Apr-2023 00:00
Compound	CAS Number	LOR	Unit		EM2307449-001	EM2307449-002	EM2307449-003	EM2307449-004	EM2307449-005
					Result	Result	Result	Result	Result
EP080: BTEXN - Continued									
Benzene	71-43-2	1	µg/L		<1	----	<1	----	----
Toluene	108-88-3	2	µg/L		<2	----	<2	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	----	<2	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	----	<2	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	----	<2	----	----
^ **Total Xylenes**	----	2	µg/L		<2	----	<2	----	----
^ **Sum of BTEX**	----	1	µg/L		<1	----	<1	----	----
Naphthalene	91-20-3	5	µg/L		<5	----	<5	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.002	µg/L		**0.003**	----	----	----	----
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		----	**7.93**	**10.2**	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.002	µg/L		**0.003**	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		----	**8.68**	**17.2**	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.002	µg/L		**0.028**	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L		----	**60.2**	**99.6**	**0.13**	**0.08**
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.002	µg/L		<0.002	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		----	**1.14**	**6.74**	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.002	µg/L		**0.029**	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.002	µg/L		<0.002	----	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		----	**12.9**	**122**	**0.08**	**0.06**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		----	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.01	µg/L		<0.01	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	GW8001b	MW03	MW01	EPA-GW07	MW07
				Sampling date / time	26-Apr-2023 00:00	26-Apr-2023 00:00	26-Apr-2023 00:00	26-Apr-2023 00:00	26-Apr-2023 00:00
Compound	CAS Number	LOR	Unit		EM2307449-001	EM2307449-002	EM2307449-003	EM2307449-004	EM2307449-005
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		----	**1.1**	**1.2**	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.002	µg/L		**0.007**	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		----	**2.13**	**11.0**	**0.04**	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.002	µg/L		**0.011**	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		----	**9.96**	**39.2**	**0.03**	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.002	µg/L		**0.003**	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		----	**3.31**	**5.71**	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.002	µg/L		**0.003**	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		----	**3.57**	**7.09**	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.002	µg/L		**0.008**	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		----	**11.9**	**11.3**	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.002	µg/L		<0.002	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		----	<0.02	**0.09**	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.002	µg/L		<0.002	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		----	<0.02	**0.04**	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.002	µg/L		<0.002	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		----	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.002	µg/L		<0.002	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		----	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.005	µg/L		<0.005	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		----	<0.05	<0.05	<0.05	<0.05
Perfluorohexadecanoic acid (PFHxDA)	67905-19-5	0.005	µg/L		<0.005	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.002	µg/L		<0.002	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	GW8001b	MW03	MW01	EPA-GW07	MW07
				Sampling date / time	26-Apr-2023 00:00	26-Apr-2023 00:00	26-Apr-2023 00:00	26-Apr-2023 00:00	26-Apr-2023 00:00
Compound	CAS Number	LOR	Unit		EM2307449-001	EM2307449-002	EM2307449-003	EM2307449-004	EM2307449-005
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		----	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.005	µg/L		<0.005	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		----	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.005	µg/L		<0.005	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		----	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.005	µg/L		<0.005	----	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		----	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.005	µg/L		<0.005	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		----	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.002	µg/L		<0.002	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		----	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.002	µg/L		<0.002	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		----	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.005	µg/L		<0.005	----	----	----	----
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		----	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	GW8001b	MW03	MW01	EPA-GW07	MW07
				Sampling date / time	26-Apr-2023 00:00	26-Apr-2023 00:00	26-Apr-2023 00:00	26-Apr-2023 00:00	26-Apr-2023 00:00
Compound	CAS Number	LOR	Unit		EM2307449-001	EM2307449-002	EM2307449-003	EM2307449-004	EM2307449-005
					Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.005	µg/L		**0.081**	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		----	**0.12**	**0.70**	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.005	µg/L		<0.005	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		----	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.005	µg/L		<0.005	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		----	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.002	µg/L		**0.176**	----	----	----	----
Sum of PFAS	----	0.01	µg/L		----	**123**	**332**	**0.28**	**0.14**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.002	µg/L		**0.057**	----	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		----	**73.1**	**222**	**0.21**	**0.14**
Sum of PFAS (WA DER List)	----	0.002	µg/L		**0.165**	----	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		----	**101**	**297**	**0.28**	**0.14**
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**99.0**	----	**110**	----	----
Toluene-D8	2037-26-5	2	%		**101**	----	**112**	----	----
4-Bromofluorobenzene	460-00-4	2	%		**109**	----	**110**	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.002	%		**78.0**	----	----	----	----
13C4-PFOS	----	0.02	%		----	**97.6**	**76.3**	**95.3**	**102**
13C8-PFOA	----	0.002	%		**92.9**	----	----	----	----
13C8-PFOA	----	0.02	%		----	**98.6**	**84.8**	**99.2**	**98.7**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	FD01	RB01	----	----	----
				Sampling date / time	26-Apr-2023 00:00	26-Apr-2023 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EM2307449-006	EM2307449-007	--------	--------	--------
					Result	Result	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	----	----	----	----
C10 - C14 Fraction	----	50	µg/L		<50	----	----	----	----
C15 - C28 Fraction	----	100	µg/L		**570**	----	----	----	----
C29 - C36 Fraction	----	50	µg/L		**640**	----	----	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L		**1210**	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	----	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	----	----	----	----
>C10 - C16 Fraction	----	100	µg/L		<100	----	----	----	----
>C16 - C34 Fraction	----	100	µg/L		**1080**	----	----	----	----
>C34 - C40 Fraction	----	100	µg/L		**430**	----	----	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L		**1510**	----	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	----	----	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	----	----	----	----
Toluene	108-88-3	2	µg/L		<2	----	----	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	----	----	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	----	----	----	----
^ Total Xylenes	----	2	µg/L		<2	----	----	----	----
^ Sum of BTEX	----	1	µg/L		<1	----	----	----	----
Naphthalene	91-20-3	5	µg/L		<5	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.002	µg/L		**0.003**	<0.002	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.002	µg/L		**0.002**	<0.002	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.002	µg/L		**0.027**	<0.002	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.002	µg/L		<0.002	<0.002	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.002	µg/L		**0.034**	<0.002	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	FD01	RB01	----	----	----
				Sampling date / time	26-Apr-2023 00:00	26-Apr-2023 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EM2307449-006	EM2307449-007	--------	--------	--------
					Result	Result	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.002	µg/L		<0.002	<0.002	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.01	µg/L		<0.01	<0.01	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.002	µg/L		**0.005**	<0.002	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.002	µg/L		**0.010**	<0.002	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.002	µg/L		**0.002**	<0.002	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.002	µg/L		**0.003**	<0.002	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.002	µg/L		**0.007**	<0.002	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.002	µg/L		<0.002	<0.002	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.002	µg/L		<0.002	<0.002	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.002	µg/L		<0.002	<0.002	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.002	µg/L		<0.002	<0.002	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.005	µg/L		<0.005	<0.005	----	----	----
Perfluorohexadecanoic acid (PFHxDA)	67905-19-5	0.005	µg/L		<0.005	<0.005	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.002	µg/L		<0.002	<0.002	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.005	µg/L		<0.005	<0.005	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.005	µg/L		<0.005	<0.005	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.005	µg/L		<0.005	<0.005	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.005	µg/L		<0.005	<0.005	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.002	µg/L		<0.002	<0.002	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	FD01	RB01	----	----	----
				Sampling date / time	26-Apr-2023 00:00	26-Apr-2023 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EM2307449-006	EM2307449-007	--------	--------	--------
					Result	Result	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.002	µg/L		<0.002	<0.002	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.005	µg/L		<0.005	<0.005	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.005	µg/L		**0.065**	<0.005	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.005	µg/L		<0.005	<0.005	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.005	µg/L		<0.005	<0.005	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.002	µg/L		**0.158**	<0.002	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.002	µg/L		**0.061**	<0.002	----	----	----
Sum of PFAS (WA DER List)	----	0.002	µg/L		**0.149**	<0.002	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**104**	----	----	----	----
Toluene-D8	2037-26-5	2	%		**107**	----	----	----	----
4-Bromofluorobenzene	460-00-4	2	%		**115**	----	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.002	%		**93.4**	**98.5**	----	----	----
13C8-PFOA	----	0.002	%		**99.0**	**101**	----	----	----

Surrogate Control Limits

Sub-Matrix: **WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	73	129
Toluene-D8	2037-26-5	70	125
4-Bromofluorobenzene	460-00-4	71	129
EP231S: PFAS Surrogate			
13C4-PFOS	----	65	140
13C8-PFOA	----	71	133

QUALITY CONTROL REPORT

Work Order	: **EM2307449**	Page	: 1 of 13
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: BEN PETTICREW	Contact	: Peter Ravlic
Address	: Level 4, 211 VICTORIA SQUARE ADELAIDE SA, AUSTRALIA 5000	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: ----	Telephone	: +6138549 9645
Project	: 12566684	Date Samples Received	: 28-Apr-2023
Order number	: ----	Date Analysis Commenced	: 01-May-2023
C-O-C number	: ----	Issue Date	: 04-May-2023
Sampler	: AK, BP		
Site	:		
Quote number	: EN/005		
No. of samples received	: 7		
No. of samples analysed	: 7		

Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Jarwis Nheu	Non-Metals Team Leader	Melbourne Inorganics, Springvale, VIC
Nancy Wang	2IC Organic Chemist	Melbourne Organics, Springvale, VIC

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED037P: Alkalinity by PC Titrator (QC Lot: 5021275)									
EM2307433-004	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	160	157	2.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	160	157	2.0	0% - 20%
EM2307430-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	1700	1700	0.1	0% - 20%
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	41	38	7.2	0% - 20%
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	1740	1740	0.1	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 5019232)									
EM2307424-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	<1	0.0	No Limit
EM2307432-002	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	242	243	0.6	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 5019233)									
EM2307424-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	<1	<1	0.0	No Limit
EM2307432-002	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	1660	1670	0.7	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 5023171)									
EM2307224-009	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	24	24	0.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	7	7	0.0	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	8	8	0.0	No Limit
		ED093F: Potassium	7440-09-7	1	mg/L	4	4	0.0	No Limit
EM2307398-004	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	32	32	0.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	59	60	0.0	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	1610	1620	0.9	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	57	58	0.0	0% - 20%

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 5019544)									
EM2307426-005	Anonymous	EP071: C15 - C28 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
		EP071: C10 - C14 Fraction	----	50	µg/L	<50	<50	0.0	No Limit
		EP071: C29 - C36 Fraction	----	50	µg/L	<50	<50	0.0	No Limit
EM2307305-001	Anonymous	EP071: C15 - C28 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
		EP071: C10 - C14 Fraction	----	50	µg/L	<50	<50	0.0	No Limit
		EP071: C29 - C36 Fraction	----	50	µg/L	<50	<50	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 5020237)									
EM2307426-007	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
EM2307426-003	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 5019544)									
EM2307426-005	Anonymous	EP071: >C10 - C16 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
		EP071: >C16 - C34 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
		EP071: >C34 - C40 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
EM2307305-001	Anonymous	EP071: >C10 - C16 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
		EP071: >C16 - C34 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
		EP071: >C34 - C40 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 5020237)									
EM2307426-007	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.0	No Limit
EM2307426-003	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.0	No Limit
EP080: BTEXN (QC Lot: 5020237)									
EM2307426-007	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit
EM2307426-003	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 5023669)									
EM2307449-002	MW03	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	60.2	59.6	0.9	0% - 20%
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	12.9	12.8	0.3	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	7.93	7.42	6.7	0% - 20%
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	8.68	8.80	1.4	0% - 20%

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 5023669) - continued									
EM2307449-002	MW03	EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	1.14	1.35	17.2	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 5023670)									
EM2307449-001	GW8001b	EP231X-LL: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.002	µg/L	0.003	0.004	0.0	No Limit
		EP231X-LL: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.002	µg/L	0.003	0.003	0.0	No Limit
		EP231X-LL: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.002	µg/L	0.028	0.030	6.1	0% - 50%
		EP231X-LL: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.002	µg/L	<0.002	<0.002	0.0	No Limit
		EP231X-LL: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.002	µg/L	0.029	0.031	7.4	0% - 50%
		EP231X-LL: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.002	µg/L	<0.002	<0.002	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 5023669)									
EM2307449-002	MW03	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	3.57	3.41	4.5	0% - 20%
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	2.13	2.12	0.6	0% - 20%
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	9.96	10.2	2.3	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	3.31	3.15	5.0	0% - 20%
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	11.9	11.9	0.1	0% - 20%
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	1.1	1.1	0.0	0% - 50%
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 5023670)									
EM2307449-001	GW8001b	EP231X-LL: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.002	µg/L	0.007	0.007	0.0	No Limit
		EP231X-LL: Perfluorohexanoic acid (PFHxA)	307-24-4	0.002	µg/L	0.011	0.012	0.0	No Limit
		EP231X-LL: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.002	µg/L	0.003	0.002	0.0	No Limit
		EP231X-LL: Perfluorooctanoic acid (PFOA)	335-67-1	0.002	µg/L	0.003	0.003	0.0	No Limit
		EP231X-LL: Perfluorononanoic acid (PFNA)	375-95-1	0.002	µg/L	0.008	0.007	0.0	No Limit
		EP231X-LL: Perfluorodecanoic acid (PFDA)	335-76-2	0.002	µg/L	<0.002	<0.002	0.0	No Limit
		EP231X-LL: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.002	µg/L	<0.002	<0.002	0.0	No Limit
		EP231X-LL: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.002	µg/L	<0.002	<0.002	0.0	No Limit
		EP231X-LL: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.002	µg/L	<0.002	<0.002	0.0	No Limit
		EP231X-LL: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.005	µg/L	<0.005	<0.005	0.0	No Limit
		EP231X-LL: Perfluorohexadecanoic acid (PFHxDA)	67905-19-5	0.005	µg/L	<0.005	<0.005	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 5023670) - continued									
EM2307449-001	GW8001b	EP231X-LL: Perfluorobutanoic acid (PFBA)	375-22-4	0.01	µg/L	<0.01	<0.01	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 5023669)									
EM2307449-002	MW03	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 5023670)									
EM2307449-001	GW8001b	EP231X-LL: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.002	µg/L	<0.002	<0.002	0.0	No Limit
		EP231X-LL: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.002	µg/L	<0.002	<0.002	0.0	No Limit
		EP231X-LL: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.002	µg/L	<0.002	<0.002	0.0	No Limit
		EP231X-LL: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.005	µg/L	<0.005	<0.005	0.0	No Limit
		EP231X-LL: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.005	µg/L	<0.005	<0.005	0.0	No Limit
		EP231X-LL: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.005	µg/L	<0.005	<0.005	0.0	No Limit
		EP231X-LL: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.005	µg/L	<0.005	<0.005	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 5023669)									
EM2307449-002	MW03	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	0.12	0.09	30.4	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 5023670)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 5023670) - continued									
EM2307449-001	GW8001b	EP231X-LL: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.005	µg/L	<0.005	<0.005	0.0	No Limit
		EP231X-LL: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.005	µg/L	0.081	0.083	2.7	0% - 50%
		EP231X-LL: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.005	µg/L	<0.005	<0.005	0.0	No Limit
		EP231X-LL: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.005	µg/L	<0.005	<0.005	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 5023669)									
EM2307449-002	MW03	EP231X: Sum of PFAS	----	0.01	µg/L	123	122	0.8	0% - 20%
		EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	73.1	72.4	1.0	0% - 20%
		EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	101	99.9	1.3	0% - 20%
EP231P: PFAS Sums (QC Lot: 5023670)									
EM2307449-001	GW8001b	EP231X-LL: Sum of PFAS	----	0.002	µg/L	0.176	0.182	3.4	0% - 20%
		EP231X-LL: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.002	µg/L	0.057	0.061	6.8	0% - 20%
		EP231X-LL: Sum of PFAS (WA DER List)	----	0.002	µg/L	0.165	0.172	4.2	0% - 20%

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
ED037P: Alkalinity by PC Titrator (QCLot: 5021275)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	104	85.0	116
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 5019232)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	107	90.0	110
				<1	500 mg/L	109	90.0	110
ED045G: Chloride by Discrete Analyser (QCLot: 5019233)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	108	90.0	110
				<1	1000 mg/L	105	90.0	110
ED093F: Dissolved Major Cations (QCLot: 5023171)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	98.5	80.0	120
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	95.8	80.0	120
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	98.1	80.0	120
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	93.7	80.0	120
EP080/071: Total Petroleum Hydrocarbons (QCLot: 5019544)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	4560 µg/L	98.0	47.2	122
EP071: C15 - C28 Fraction	----	100	µg/L	<100	16200 µg/L	123	52.9	131
EP071: C29 - C36 Fraction	----	50	µg/L	<50	8650 µg/L	120	50.4	127
EP080/071: Total Petroleum Hydrocarbons (QCLot: 5020237)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	360 µg/L	116	66.2	134
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 5019544)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	6190 µg/L	105	49.1	125
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	22200 µg/L	120	51.6	128
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	1520 µg/L	114	47.2	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 5020237)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	450 µg/L	116	66.2	132
EP080: BTEXN (QCLot: 5020237)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	107	68.8	127
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	112	72.9	129
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	109	71.7	130
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	111	72.3	136
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	115	75.9	134

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP080: BTEXN (QCLot: 5020237) - continued								
EP080: Naphthalene	91-20-3	5	µg/L	<5	5 µg/L	113	68.3	131
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5023669)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.222 µg/L	100	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.235 µg/L	105	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.228 µg/L	95.5	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.238 µg/L	110	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.232 µg/L	93.1	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.241 µg/L	94.9	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5023670)								
EP231X-LL: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.002	µg/L	<0.002	0.0222 µg/L	84.1	72.0	130
EP231X-LL: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.002	µg/L	<0.002	0.0235 µg/L	92.8	71.0	127
EP231X-LL: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.002	µg/L	<0.002	0.0228 µg/L	87.5	68.0	131
EP231X-LL: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.002	µg/L	<0.002	0.0238 µg/L	102	69.0	134
EP231X-LL: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.002	µg/L	<0.002	0.0232 µg/L	88.4	65.0	140
EP231X-LL: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.002	µg/L	<0.002	0.0241 µg/L	87.3	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5023669)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	97.0	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	91.6	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	96.9	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	93.8	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	92.8	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	94.2	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	95.9	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	99.7	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	94.9	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	88.4	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	104	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5023670)								
EP231X-LL: Perfluorobutanoic acid (PFBA)	375-22-4	0.01	µg/L	<0.01	0.125 µg/L	118	73.0	129
EP231X-LL: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.002	µg/L	<0.002	0.025 µg/L	87.5	72.0	129
EP231X-LL: Perfluorohexanoic acid (PFHxA)	307-24-4	0.002	µg/L	<0.002	0.025 µg/L	82.6	72.0	129
EP231X-LL: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.002	µg/L	<0.002	0.025 µg/L	87.4	72.0	130
EP231X-LL: Perfluorooctanoic acid (PFOA)	335-67-1	0.002	µg/L	<0.002	0.025 µg/L	89.9	71.0	133
EP231X-LL: Perfluorononanoic acid (PFNA)	375-95-1	0.002	µg/L	<0.002	0.025 µg/L	94.6	69.0	130

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5023670) - continued								
EP231X-LL: Perfluorodecanoic acid (PFDA)	335-76-2	0.002	µg/L	<0.002	0.025 µg/L	92.8	71.0	129
EP231X-LL: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.002	µg/L	<0.002	0.025 µg/L	91.7	69.0	133
EP231X-LL: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.002	µg/L	<0.002	0.025 µg/L	98.4	72.0	134
EP231X-LL: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.002	µg/L	<0.002	0.025 µg/L	92.8	65.0	144
EP231X-LL: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.005	µg/L	<0.005	0.0625 µg/L	114	71.0	132
EP231X-LL: Perfluorohexadecanoic acid (PFHxDA)	67905-19-5	0.005	µg/L	<0.005	0.025 µg/L	101	70.0	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5023669)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	95.1	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	127	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	114	70.0	130
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	102	70.0	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	99.4	70.0	130
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	101	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	118	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5023670)								
EP231X-LL: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.002	µg/L	<0.002	0.025 µg/L	81.6	67.0	137
EP231X-LL: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.005	µg/L	<0.005	0.0625 µg/L	107	68.0	141
EP231X-LL: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.005	µg/L	<0.005	0.0625 µg/L	100	70.0	130
EP231X-LL: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.005	µg/L	<0.005	0.0625 µg/L	94.2	70.0	130
EP231X-LL: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.005	µg/L	<0.005	0.0625 µg/L	90.0	70.0	130
EP231X-LL: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.002	µg/L	<0.002	0.025 µg/L	91.0	65.0	136
EP231X-LL: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.002	µg/L	<0.002	0.025 µg/L	84.4	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5023669)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.234 µg/L	91.8	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.238 µg/L	91.6	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.24 µg/L	91.3	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.242 µg/L	106	70.0	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5023670)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5023670) - continued								
EP231X-LL: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.005	µg/L	<0.005	0.0234 µg/L	90.8	63.0	143
EP231X-LL: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.005	µg/L	<0.005	0.0238 µg/L	93.7	64.0	140
EP231X-LL: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.005	µg/L	<0.005	0.024 µg/L	109	67.0	138
EP231X-LL: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.005	µg/L	<0.005	0.0242 µg/L	84.6	70.0	130
EP231P: PFAS Sums (QCLot: 5023669)								
EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	----	----	----	----
EP231X: Sum of PFHxS and PFOS	355-46-4/17 63-23-1	0.01	µg/L	<0.01	----	----	----	----
EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	----	----	----	----
EP231P: PFAS Sums (QCLot: 5023670)								
EP231X-LL: Sum of PFAS	----	0.002	µg/L	<0.002	----	----	----	----
EP231X-LL: Sum of PFHxS and PFOS	355-46-4/17 63-23-1	0.002	µg/L	<0.002	----	----	----	----
EP231X-LL: Sum of PFAS (WA DER List)	----	0.002	µg/L	<0.002	----	----	----	----

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 5019232)							
EM2307424-002	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 5019233)							
EM2307424-002	Anonymous	ED045G: Chloride	16887-00-6	400 mg/L	108	70.0	142
EP080/071: Total Petroleum Hydrocarbons (QCLot: 5020237)							
EM2307426-004	Anonymous	EP080: C6 - C9 Fraction	----	280 µg/L	93.9	33.9	126
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 5020237)							
EM2307426-004	Anonymous	EP080: C6 - C10 Fraction	C6_C10	330 µg/L	87.4	34.0	122
EP080: BTEXN (QCLot: 5020237)							
EM2307426-004	Anonymous	EP080: Benzene	71-43-2	20 µg/L	107	56.3	133
		EP080: Toluene	108-88-3	20 µg/L	109	60.4	132
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5023669)							
EM2307449-003	MW01						

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5023669) - continued							
EM2307449-003	MW01	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.222 µg/L	# Not Determined	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.235 µg/L	# Not Determined	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.228 µg/L	# Not Determined	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.238 µg/L	# Not Determined	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.232 µg/L	# Not Determined	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.241 µg/L	112	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5023670)							
EM2307449-006	FD01	EP231X-LL: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0222 µg/L	88.8	72.0	130
		EP231X-LL: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0235 µg/L	81.5	71.0	127
		EP231X-LL: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0228 µg/L	74.6	68.0	131
		EP231X-LL: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0238 µg/L	91.2	69.0	134
		EP231X-LL: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0232 µg/L	70.3	65.0	140
		EP231X-LL: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0241 µg/L	82.8	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5023669)							
EM2307449-003	MW01	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	77.8	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	# Not Determined	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	# Not Determined	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	# Not Determined	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	# Not Determined	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	# Not Determined	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	84.1	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	83.7	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	79.2	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	69.2	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	73.2	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5023670)							
EM2307449-006	FD01	EP231X-LL: Perfluorobutanoic acid (PFBA)	375-22-4	0.125 µg/L	# 57.1	73.0	129
		EP231X-LL: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.025 µg/L	# 68.6	72.0	129
		EP231X-LL: Perfluorohexanoic acid (PFHxA)	307-24-4	0.025 µg/L	77.2	72.0	129

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5023670) - continued							
EM2307449-006	FD01	EP231X-LL: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.025 µg/L	89.9	72.0	130
		EP231X-LL: Perfluorooctanoic acid (PFOA)	335-67-1	0.025 µg/L	89.0	71.0	133
		EP231X-LL: Perfluorononanoic acid (PFNA)	375-95-1	0.025 µg/L	96.9	69.0	130
		EP231X-LL: Perfluorodecanoic acid (PFDA)	335-76-2	0.025 µg/L	83.5	71.0	129
		EP231X-LL: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.025 µg/L	87.7	69.0	133
		EP231X-LL: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.025 µg/L	82.8	72.0	134
		EP231X-LL: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.025 µg/L	69.6	65.0	144
		EP231X-LL: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0625 µg/L	87.1	71.0	132
		EP231X-LL: Perfluorohexadecanoic acid (PFHxDA)	67905-19-5	0.025 µg/L	84.1	70.0	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5023669)							
EM2307449-003	MW01	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	75.1	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	85.1	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	73.4	70.0	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	83.1	70.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	78.0	70.0	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	78.4	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	72.4	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5023670)							
EM2307449-006	FD01	EP231X-LL: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.025 µg/L	82.2	67.0	137
		EP231X-LL: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0625 µg/L	79.2	68.0	141
		EP231X-LL: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0625 µg/L	# 69.4	70.0	130
		EP231X-LL: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0625 µg/L	76.4	70.0	130
		EP231X-LL: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0625 µg/L	81.2	70.0	130
		EP231X-LL: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.025 µg/L	84.7	65.0	136
		EP231X-LL: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.025 µg/L	83.7	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5023669)							
EM2307449-003	MW01	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.234 µg/L	92.5	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.238 µg/L	93.6	64.0	140

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5023669) - continued							
EM2307449-003	MW01	EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.24 µg/L	81.4	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.242 µg/L	89.5	70.0	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5023670)							
EM2307449-006	FD01	EP231X-LL: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0234 µg/L	83.8	63.0	143
		EP231X-LL: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0238 µg/L	69.0	64.0	140
		EP231X-LL: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.024 µg/L	97.9	67.0	138
		EP231X-LL: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0242 µg/L	# 66.5	70.0	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EM2307449**	Page	: 1 of 7
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: BEN PETTICREW	Telephone	: +6138549 9645
Project	: 12566684	Date Samples Received	: 28-Apr-2023
Site	:	Issue Date	: 04-May-2023
Sampler	: AK, BP	No. of samples received	: 7
Order number	: ----	No. of samples analysed	: 7

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EM2307424--002	Anonymous	**Sulfate as SO4 - Turbidimetric**	14808-79-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231A: Perfluoroalkyl Sulfonic Acids	EM2307449--003	MW01	**Perfluorobutane sulfonic acid (PFBS)**	375-73-5	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231A: Perfluoroalkyl Sulfonic Acids	EM2307449--003	MW01	**Perfluoropentane sulfonic acid (PFPeS)**	2706-91-4	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231A: Perfluoroalkyl Sulfonic Acids	EM2307449--003	MW01	**Perfluorohexane sulfonic acid (PFHxS)**	355-46-4	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231A: Perfluoroalkyl Sulfonic Acids	EM2307449--003	MW01	**Perfluoroheptane sulfonic acid (PFHpS)**	375-92-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231A: Perfluoroalkyl Sulfonic Acids	EM2307449--003	MW01	**Perfluorooctane sulfonic acid (PFOS)**	1763-23-1	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231B: Perfluoroalkyl Carboxylic Acids	EM2307449--003	MW01	**Perfluoropentanoic acid (PFPeA)**	2706-90-3	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231B: Perfluoroalkyl Carboxylic Acids	EM2307449--003	MW01	**Perfluorohexanoic acid (PFHxA)**	307-24-4	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231B: Perfluoroalkyl Carboxylic Acids	EM2307449--003	MW01	**Perfluoroheptanoic acid (PFHpA)**	375-85-9	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231B: Perfluoroalkyl Carboxylic Acids	EM2307449--003	MW01	**Perfluorooctanoic acid (PFOA)**	335-67-1	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231B: Perfluoroalkyl Carboxylic Acids	EM2307449--003	MW01	**Perfluorononanoic acid (PFNA)**	375-95-1	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231B: Perfluoroalkyl Carboxylic Acids	EM2307449--006	FD01	**Perfluorobutanoic acid (PFBA)**	375-22-4	57.1 %	73.0-129%	**Recovery less than lower data quality objective**
EP231B: Perfluoroalkyl Carboxylic Acids	EM2307449--006	FD01	**Perfluoropentanoic acid (PFPeA)**	2706-90-3	68.6 %	72.0-129%	**Recovery less than lower data quality objective**
EP231C: Perfluoroalkyl Sulfonamides	EM2307449--006	FD01	**N-Ethyl perfluorooctane sulfonamide (EtFOSA)**	4151-50-2	69.4 %	70.0-130%	**Recovery less than lower data quality objective**

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries - Continued							
EP231D: (n:2) Fluorotelomer Sulfonic Acids	EM2307449--006	FD01	**10:2 Fluorotelomer sulfonic acid (10:2 FTS)**	120226-60-0	66.5 %	70.0-130%	**Recovery less than lower data quality objective**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count QC	Count Regular	Rate (%) Actual	Rate (%) Expected	Quality Control Specification
Matrix Spikes (MS)					
TRH - Semivolatile Fraction	0	20	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / ***Container*** / Client Sample ID(s)	***Sample Date***	*Extraction / Preparation* ***Date extracted***	Due for extraction	Evaluation	*Analysis* ***Date analysed***	Due for analysis	Evaluation
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P) GW8001b	**26-Apr-2023**	**----**	----	----	**03-May-2023**	10-May-2023	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G) GW8001b	**26-Apr-2023**	**----**	----	----	**02-May-2023**	24-May-2023	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G) GW8001b	**26-Apr-2023**	**----**	----	----	**02-May-2023**	24-May-2023	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F) GW8001b	**26-Apr-2023**	**----**	----	----	**03-May-2023**	03-May-2023	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071) GW8001b, MW01, FD01	**26-Apr-2023**	**01-May-2023**	03-May-2023	✓	**03-May-2023**	10-Jun-2023	✓
Amber VOC Vial - Sulfuric Acid (EP080) GW8001b, MW01, FD01	**26-Apr-2023**	**02-May-2023**	10-May-2023	✓	**03-May-2023**	10-May-2023	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071)							
GW8001b, MW01, FD01	**26-Apr-2023**	**01-May-2023**	03-May-2023	✓	**03-May-2023**	10-Jun-2023	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
GW8001b, MW01, FD01	**26-Apr-2023**	**02-May-2023**	10-May-2023	✓	**03-May-2023**	10-May-2023	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080)							
GW8001b, MW01, FD01	**26-Apr-2023**	**02-May-2023**	10-May-2023	✓	**03-May-2023**	10-May-2023	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X-LL)							
GW8001b, MW03, MW01, EPA-GW07, MW07, FD01, RB01	**26-Apr-2023**	**03-May-2023**	23-Oct-2023	✓	**03-May-2023**	23-Oct-2023	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X-LL)							
GW8001b, MW03, MW01, EPA-GW07, MW07, FD01, RB01	**26-Apr-2023**	**03-May-2023**	23-Oct-2023	✓	**03-May-2023**	23-Oct-2023	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X-LL)							
GW8001b, MW03, MW01, EPA-GW07, MW07, FD01, RB01	**26-Apr-2023**	**03-May-2023**	23-Oct-2023	✓	**03-May-2023**	23-Oct-2023	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X-LL)							
GW8001b, MW03, MW01, EPA-GW07, MW07, FD01, RB01	**26-Apr-2023**	**03-May-2023**	23-Oct-2023	✓	**03-May-2023**	23-Oct-2023	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X-LL)							
GW8001b, MW03, MW01, EPA-GW07, MW07, FD01, RB01	**26-Apr-2023**	**03-May-2023**	23-Oct-2023	✓	**03-May-2023**	23-Oct-2023	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by Auto Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS by LCMSMS	EP231X-LL	1	3	**33.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	4	**25.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by Auto Titrator	ED037-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS by LCMSMS	EP231X-LL	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Chloride by Discrete Analyser	ED045G	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS by LCMSMS	EP231X-LL	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS by LCMSMS	EP231X-LL	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	20	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Alkalinity by Auto Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm.
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015 The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260 Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Analytical Methods	Method	Matrix	Method Descriptions
Per- and Polyfluoroalkyl Substances (PFAS by LCMSMS	EP231X-LL	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is concentrated, combined with an equal volume of reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for purging.
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

Rebatch

Client / Client code: GHDSER
Project: 12566684
Project Manger: BEN PETTICREW
Date /time sample rec: 30/03/2023 12:000:00 PM
Date/time Instructions rec: 8/05/2023 15:35
Due date: Monday, 15 May 2023
Due date surcharge: **STANDARD**
Client aware of any holding time issues

CS Contact: Peter Ravlic
Additional Information:
Report receipients as per previous work order and the person requesting this analysis

Environmental Division
Melbourne
Work Order Reference
EM2308182

Telephone : +61-3-8549 9600

New Lab ID	Sample information: Client ID	Sampling Date / Time	Previous Work Order Reference	Previous ALS ID	Tray Number(s)	Container	Number of Containers	Analysis: Standard: EP071 SV-SG-use previous extract	Analysis: Standard: TDS and standard 8 metals	Shortest Holding time expiry
1	GW8001b	26/04/2023 0:00	EM2307449	1	MG: 1041	GREEN PLASTIC	1	X	X	03-May-23
2	MW01	26/04/2023 0:00	EM2307449	3	MPW: 233-236	PFAS CONTAINER	1		X	03-May-23
3	GW201b	28/03/2023 0:00	EM2305704	3	MG: 789	GREEN PLASTIC	1		X	04-Apr-23
4	GW8002b	28/03/2023 0:00	EM2305704	2	MG: 789	GREEN PLASTIC	1		X	04-Apr-23
						TOTAL	4			

Ciara Barr

From: Peter Ravlic
Sent: Tuesday, 9 May 2023 7:00 PM
To: Ru Jayasinghe
Subject: FW: [EXTERNAL] - GHD Project 12566684 - Additional Analysis

Hi Ru

Can you please organise the below RB

FYI:
For batch EM2305704, OK to do metals from green as well for both samples
For batch EM2307449, OK to use 250ml PFAS bottle for sample MW01. For sample GW8001b, we have a green bottle so all good

Thanks

Kind Regards

right solutions. right partner.

Peter Ravlic
Client Services
ALS Limited

Ph: +61 3 8549 9600
peter.ravlic@alsglobal.com

2-4 Westall Road, Springvale VIC 3171

alsglobal.com

From: Nathan Muirhead <Nathan.Muirhead@ghd.com>
Sent: Monday, 8 May 2023 3:35 PM
To: Peter Ravlic <peter.ravlic@alsglobal.com>
Cc: Ben Petticrew <Ben.Petticrew@ghd.com>
Subject: [EXTERNAL] - GHD Project 12566684 - Additional Analysis

CAUTION: This email originated from outside of ALS. Do not click links or open attachments unless you recognize the sender and are sure content is relevant to you.

Hey Peter,

Could you please organise a silica gel clean-up analysis for sample GW8001b from report No EM2307449.

Additionally, if there is enough sample left could we also have the following analysed?

- TDS and standard 8 metals for:
  - GW201b - EM2305704

- GW8001b - EM2307449
- GW8002b - EM2305704
- MW01 - EM2307449

Regards,

Nathan Muirhead
Environmental Scientist – Contamination Assessment and Remediation

GHD
Proudly employee owned | ghd.com
5 Church Street, Traralgon VIC 3844 Australia
D +61 3 8687 8605 **M** +61 474 028 353 **E** Nathan.Muirhead@ghd.com

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Connect

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CERTIFICATE OF ANALYSIS

Work Order	: **EM2308182**	Page	: 1 of 3
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: BEN PETTICREW	Contact	: Peter Ravlic
Address	: Level 4, 211 VICTORIA SQUARE ADELAIDE SA, AUSTRALIA 5000	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: ----	Telephone	: +6138549 9645
Project	: 12566684	Date Samples Received	: 28-Apr-2023 10:55
Order number	: ----	Date Analysis Commenced	: 02-May-2023
C-O-C number	: ----	Issue Date	: 15-May-2023 15:07
Sampler	:		
Site	:		
Quote number	: EN/005		
No. of samples received	: 2		
No. of samples analysed	: 2		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Dilani Fernando	Laboratory Coordinator	Melbourne Inorganics, Springvale, VIC
Eric Chau	Metals Team Leader	Melbourne Inorganics, Springvale, VIC
Xing Lin	Senior Organic Chemist	Melbourne Organics, Springvale, VIC

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EG035T: EM2308083#8 Poor matrix spike recovery for total mercury due to sample matrix. Confirmed by re-extraction and re-analysis.
- EA015H: EM2308182 #1: TDS by method EA-015 may bias high due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	GW8001b	MW01	----	----	----
			Sampling date / time	26-Apr-2023 00:00	26-Apr-2023 00:00	----	----	----
Compound	CAS Number	LOR	Unit	EM2308182-001	EM2308182-002	--------	--------	--------
				Result	Result	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	**1770**	**4580**	----	----	----
EG020T: Total Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	**0.065**	**0.023**	----	----	----
Cadmium	7440-43-9	0.0001	mg/L	**0.0002**	<0.0001	----	----	----
Chromium	7440-47-3	0.001	mg/L	**0.109**	**0.001**	----	----	----
Copper	7440-50-8	0.001	mg/L	**0.053**	**0.001**	----	----	----
Nickel	7440-02-0	0.001	mg/L	**0.043**	**0.006**	----	----	----
Lead	7439-92-1	0.001	mg/L	**0.115**	<0.001	----	----	----
Zinc	7440-66-6	0.005	mg/L	**0.160**	<0.005	----	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	----	----	----
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup								
C10 - C36 Fraction (sum)	----	50	µg/L	**960**	----	----	----	----
EP071 SG: Total Petroleum Hydrocarbons - SV Silica gel cleanup								
C10 - C14 Fraction	----	50	µg/L	<50	----	----	----	----
C15 - C28 Fraction	----	100	µg/L	**450**	----	----	----	----
C29 - C36 Fraction	----	50	µg/L	**510**	----	----	----	----
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup								
>C10 - C40 Fraction (sum)	----	100	µg/L	**1150**	----	----	----	----
EP071 SG: Total Recoverable Hydrocarbons - SV NEPM 2013 Fractions - Silica gel cleanup								
>C10 - C16 Fraction	----	100	µg/L	<100	----	----	----	----
>C16 - C34 Fraction	----	100	µg/L	**850**	----	----	----	----
>C34 - C40 Fraction	----	100	µg/L	**300**	----	----	----	----

QUALITY CONTROL REPORT

Work Order	: **EM2308182**	Page	: 1 of 4
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: BEN PETTICREW	Contact	: Peter Ravlic
Address	: Level 4, 211 VICTORIA SQUARE ADELAIDE SA, AUSTRALIA 5000	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: ----	Telephone	: +6138549 9645
Project	: 12566684	Date Samples Received	: 28-Apr-2023
Order number	: ----	Date Analysis Commenced	: 02-May-2023
C-O-C number	: ----	Issue Date	: 15-May-2023
Sampler	:		
Site	:		
Quote number	: EN/005		
No. of samples received	: 2		
No. of samples analysed	: 2		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Dilani Fernando	Laboratory Coordinator	Melbourne Inorganics, Springvale, VIC
Eric Chau	Metals Team Leader	Melbourne Inorganics, Springvale, VIC
Xing Lin	Senior Organic Chemist	Melbourne Organics, Springvale, VIC

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 5044588)									
EM2308043-008	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	205	192	6.4	0% - 20%
EM2308156-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	1440	1420	1.1	0% - 20%
EM2308187-002	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	6610	6710	1.5	0% - 20%
EM2307888-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	1190	1130	4.7	0% - 20%
EG020T: Total Metals by ICP-MS (QC Lot: 5043249)									
EM2308182-001	GW8001b	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	0.0002	0.0002	0.0	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	0.065	0.059	9.9	0% - 20%
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	0.109	0.095	13.4	0% - 20%
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.053	0.047	12.1	0% - 20%
		EG020A-T: Lead	7439-92-1	0.001	mg/L	0.115	0.109	5.5	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.043	0.038	12.1	0% - 20%
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.160	0.143	11.2	0% - 20%
EM2308122-002	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	0.002	0.003	0.0	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	0.004	0.006	24.0	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.005	0.007	31.4	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.040	0.041	3.9	0% - 20%
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.005	0.0	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 5048669)									
EM2307918-003	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EM2308218-001	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP071 SG: Total Petroleum Hydrocarbons - SV Silica gel cleanup (QCLot: 5041479)								
EP071-SVSG: C10 - C14 Fraction	----	50	µg/L	<50	4460 µg/L	68.2	40.3	115
EP071-SVSG: C15 - C28 Fraction	----	100	µg/L	<100	14300 µg/L	86.0	36.8	133
EP071-SVSG: C29 - C36 Fraction	----	50	µg/L	<50	7300 µg/L	89.0	59.6	122
EP071 SG: Total Recoverable Hydrocarbons - SV NEPM 2013 Fractions - Silica gel cleanup (QCLot: 5041479)								
EP071-SVSG: >C10 - C16 Fraction	----	100	µg/L	<100	6090 µg/L	66.8	62.3	120
EP071-SVSG: >C16 - C34 Fraction	----	100	µg/L	<100	19400 µg/L	86.5	62.4	128
EP071-SVSG: >C34 - C40 Fraction	----	100	µg/L	<100	1300 µg/L	78.8	56.2	100
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 5044588)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	102	91.0	110
				<10	2440 mg/L	108	81.6	118
				<10	293 mg/L	109	91.0	110
EG020T: Total Metals by ICP-MS (QCLot: 5043249)								
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	106	89.2	115
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	110	86.4	115
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	109	86.9	112
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	103	86.9	111
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	106	88.3	112
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	102	87.9	113
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	109	86.7	117
EG035T: Total Recoverable Mercury by FIMS (QCLot: 5048669)								
EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	94.7	73.4	119

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020T: Total Metals by ICP-MS (QCLot: 5043249)							
EM2308100-001	Anonymous	EG020A-T: Arsenic	7440-38-2	1 mg/L	93.0	82.0	123

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EG020T: Total Metals by ICP-MS (QCLot: 5043249) - continued							
EM2308100-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.25 mg/L	101	81.8	123
		EG020A-T: Chromium	7440-47-3	1 mg/L	103	78.9	119
		EG020A-T: Copper	7440-50-8	1 mg/L	93.9	80.4	118
		EG020A-T: Lead	7439-92-1	1 mg/L	97.2	80.5	121
		EG020A-T: Nickel	7440-02-0	1 mg/L	92.5	80.0	118
		EG020A-T: Zinc	7440-66-6	1 mg/L	93.0	74.0	120
EG035T: Total Recoverable Mercury by FIMS (QCLot: 5048669)							
EM2308083-008	Anonymous	EG035T: Mercury	7439-97-6	0.1 mg/L	# 34.5	70.0	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EM2308182**	Page	: 1 of 5
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Melbourne
Contact	: BEN PETTICREW	Telephone	: +6138549 9645
Project	: 12566684	Date Samples Received	: 28-Apr-2023
Site	:	Issue Date	: 15-May-2023
Sampler	:	No. of samples received	: 2
Order number	: ----	No. of samples analysed	: 2

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EG035T: Total Recoverable Mercury by FIMS	EM2308083--008	Anonymous	**Mercury**	7439-97-6	34.5 %	70.0-130%	**Recovery less than lower data quality objective**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)		Extraction / Preparation: Date extracted	Due for extraction	Days overdue	Analysis: Date analysed	Due for analysis	Days overdue
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural							
GW8001b,	MW01	----	----	----	12-May-2023	03-May-2023	**9**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count: QC	Count: Regular	Rate (%): Actual	Rate (%): Expected	Quality Control Specification
	0				
Laboratory Duplicates (DUP)					
TRH - Semivolatile Fractions Only (after Silica Gel Cleanup)	0	1	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
TRH - Semivolatile Fractions Only (after Silica Gel Cleanup)	0	1	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation: Date extracted	Due for extraction	Evaluation	Analysis: Date analysed	Due for analysis	Evaluation
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Clear Plastic Bottle - Natural (EA015H)								
GW8001b,	MW01	**26-Apr-2023**	**----**	----	**----**	**12-May-2023**	03-May-2023	×
EG020T: Total Metals by ICP-MS								
Clear Plastic Bottle - Natural (EG020A-T)								
GW8001b,	MW01	**26-Apr-2023**	**11-May-2023**	23-Oct-2023	✓	**11-May-2023**	23-Oct-2023	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG035T: Total Recoverable Mercury by FIMS							
Clear Plastic Bottle - Natural (EG035T) GW8001b, MW01	**26-Apr-2023**	**----**	----	**----**	**15-May-2023**	24-May-2023	✓
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup							
Amber Glass Bottle - Unpreserved (EP071-SVSG) GW8001b	**26-Apr-2023**	**02-May-2023**	03-May-2023	✓	**11-May-2023**	11-Jun-2023	✓
EP071 SG: Total Petroleum Hydrocarbons - SV Silica gel cleanup							
Amber Glass Bottle - Unpreserved (EP071-SVSG) GW8001b	**26-Apr-2023**	**02-May-2023**	03-May-2023	✓	**11-May-2023**	11-Jun-2023	✓
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup							
Amber Glass Bottle - Unpreserved (EP071-SVSG) GW8001b	**26-Apr-2023**	**02-May-2023**	03-May-2023	✓	**11-May-2023**	11-Jun-2023	✓
EP071 SG: Total Recoverable Hydrocarbons - SV NEPM 2013 Fractions - Silica gel cleanup							
Amber Glass Bottle - Unpreserved (EP071-SVSG) GW8001b	**26-Apr-2023**	**02-May-2023**	03-May-2023	✓	**11-May-2023**	11-Jun-2023	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Total Dissolved Solids (High Level)	EA015H	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fractions Only (after Silica Gel Cleanup)	EP071-SVSG	0	1	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Total Dissolved Solids (High Level)	EA015H	3	40	**7.50**	**7.50**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fractions Only (after Silica Gel Cleanup)	EP071-SVSG	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Total Dissolved Solids (High Level)	EA015H	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fractions Only (after Silica Gel Cleanup)	EP071-SVSG	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Total Mercury by FIMS	EG035T	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fractions Only (after Silica Gel Cleanup)	EP071-SVSG	0	1	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Mercury by FIMS	EG035T	WATER	In house: Referenced to APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the unfiltered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3).
TRH - Semivolatile Fractions Only (after Silica Gel Cleanup)	EP071-SVSG	WATER	In house: Referenced to USEPA SW 846 - 8015 Sample extracts cleaned up using silica gel and are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C36. This method is compliant with NEPM Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM Schedule B(3) . ALS default excludes sediment which may be resident in the container.

CHAIN OF CUSTODY

ALS Laboratory: please tick →

FREIGHT

CLIENT: GHD Pty Ltd	TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g., Ultra Trace Organics)	☐ Standard TAT (List due date):	FOR LABORATORY USE ONLY (Circle)
OFFICE: 211 Victoria Square, Level 4, Adelaide SA 5000		☐ Non Standard or urgent TAT (List due date):	Custody Seal Intact? Yes No N/A
	ALS QUOTE:	COC SEQUENCE NUMBER (Circle)	Free ice / frozen ice bricks present upon receipt? Yes No N/A
PROJECT: 12566684	ORDER NO.:	COC: 1 2 3 4 5 6 7	Random Sample Temperature on Receipt: 13.3 °C
PROJECT MANAGER: Ben Petticrew	CONTACT PH: 0460830524	OF: 1 2 3 4 5 6 7	Other comment:
SAMPLER: AK / BP	SAMPLER MOBILE: 0412625108		
COC emailed to ALS? (YES / NO)	EDD FORMAT (or default):		
Email Reports to: GHDLabReports@ghd.com; ben.petticrew@ghd.com			
Email Invoice to: vera.biermann@ghd.com			

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
ELP (ALS)			
DATE/TIME: 1/5/23	DATE/TIME: 27-4-23 @ 1330	DATE/TIME: 27-4-23 @ 1500	DATE/TIME: 28/4/23 @ 1025

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).				Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	PFAS - full suite	Major cations/anions	PFAS - full suite, trace		
1	GW8001b	26/04/2023	W		4		X	X		
2	MW03	26/04/2023	W		3	X				
3	MW01	26/04/2023	W		3	X				
4	EPA-GW07	26/04/2023	W		3	X				
5	MW07	26/04/2023	W		3	X				
	FS01	26/04/2023	W		3			X		forward to Eurofins
6	FD01	26/04/2023	W		2			X		
7	RB01	26/04/2023	W		2			X		
	DATE: 2/5									
	TIME 9am									
	COURIER:									
	TEMPERATURE: 5.1									
	TEMP TO CHILL: YES NO									
	Sealed 5.0			TOTAL	23					

#98553 9
02/05/23

Environmental Division Melbourne
Work Order Reference
EM2307449

Telephone : +61-3-8549 9600

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

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CHAIN OF CUSTODY

ALS Laboratory: please tick →

CLIENT: GHD Pty Ltd	TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g. Ultra Trace Organics)	☐ Standard TAT (List due date):	FOR LABORATORY USE ONLY (Circle)
OFFICE: 211 Victoria Square, Level 4, Adelaide SA 5000		☐ Non Standard or urgent TAT (List due date):	Custody Seal Intact? Yes No N/A
	ALS QUOTE:	COC SEQUENCE NUMBER (Circle)	Free ice / frozen ice bricks present upon receipt? Yes No N/A
PROJECT: 12566684	ORDER NO.:	COC: 1 2 3 4 5 6 7	Random Sample Temperature on Receipt: 17.3 °C
PROJECT MANAGER: Ben Petticrew	CONTACT PH: 0460830524	OF: 1 2 3 4 5 6 7	Other comment:
SAMPLER: AK / BP	SAMPLER MOBILE: 0412625108	RELINQUISHED BY:	RECEIVED BY:
COC emailed to ALS? (YES / NO)	EDD FORMAT (or default):	DATE/TIME:	DATE/TIME: 27-4-23 @ 1330
Email Reports to: GHDLabReports@ghd.com; ben.petticrew@ghd.com; vera.biermann@ghd.com		RELINQUISHED BY:	RECEIVED BY:
Email Invoice to:		DATE/TIME:	DATE/TIME: 27-4-23 @ 1520
COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:			DATE/TIME: 28/4 10:2

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	TRH/BTEXN			#985539					
1	GW8001b	26/04/2023	W		3	X			02/05/23					
3	MW01	26/04/2023	W		3	X								
6	FD01	26/04/2023	W		3	X								
	FS01	26/04/2023	W		3	X								forward to eurofins
				TOTAL	12									

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

(1) 2/2

eurofins | Environment Testing

www.eurofins.com.au EnviroSales@eurofins.com

Eurofins Environment Testing Australia Pty Ltd

ABN: 50 005 085 521

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

Geelong
19/8 Lewalan Street
Grovedale
VIC 3216
Tel: +61 3 8564 5000
NATA# 1261 Site# 25403

Sydney
179 Magowar Road
Girraween
NSW 2145
Tel: +61 2 9900 8400
NATA# 1261 Site# 18217

Canberra
Unit 1,2 Dacre Street
Mitchell
ACT 2911
Tel: +61 2 6113 8091
NATA# 1261 Site# 25466

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

Newcastle
1/2 Frost Drive
Mayfield West NSW 2304
Tel: +61 2 4968 8448
NATA# 1261
Site# 25079 & 25289

Eurofins ARL Pty Ltd

ABN: 91 05 0159 898

Perth
46-48 Banksia Road
Welshpool
WA 6106
Tel: +61 8 6253 4444
NATA# 2377 Site# 2370

Eurofins Environment Testing NZ Ltd

NZBN: 9429046024954

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

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

Sample Receipt Advice

Company name:	GHD Pty Ltd SA
Contact name:	Ben Petticrew
Project name:	Not provided
Project ID:	12566684
Turnaround time:	5 Day
Date/Time received	May 2, 2023 9:00 AM
Eurofins reference	985539

Sample Information

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

Notes

Contact

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

Amy Meunier on phone : or by email: AmyMeunier@eurofins.com

Results will be delivered electronically via email to Ben Petticrew - ben.petticrew@ghd.com.

Note: A copy of these results will also be delivered to the general GHD Pty Ltd SA email address.

GHD Pty Ltd
GPO Box 2052
Adelaide
SA 5001

NATA Accredited
Accreditation Number 1261
Site Number 1254

Accredited for compliance with ISO/IEC 17025 – Testing
NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection, proficiency testing scheme providers and reference materials producers reports and certificates.

Attention: **Ben Petticrew**

Report **985539-W**
Project name
Project ID 12566684
Received Date May 02, 2023

Client Sample ID			**FS01**
Sample Matrix			**Water**
Eurofins Sample No.			**M23-My0003769**
Date Sampled			**Apr 26, 2023**
Test/Reference	LOR	Unit	
Total Recoverable Hydrocarbons			
TRH C6-C9	0.02	mg/L	< 0.02
TRH C10-C14	0.05	mg/L	< 0.05
TRH C15-C28	0.1	mg/L	< 0.1
TRH C29-C36	0.1	mg/L	< 0.1
TRH C10-C36 (Total)	0.1	mg/L	< 0.1
TRH C6-C10	0.02	mg/L	< 0.02
TRH C6-C10 less BTEX (F1)[N04]	0.02	mg/L	< 0.02
TRH >C10-C16	0.05	mg/L	< 0.05
TRH >C10-C16 less Naphthalene (F2)[N01]	0.05	mg/L	< 0.05
TRH >C16-C34	0.1	mg/L	< 0.1
TRH >C34-C40	0.1	mg/L	< 0.1
TRH >C10-C40 (total)*	0.1	mg/L	< 0.1
BTEX			
Benzene	0.001	mg/L	< 0.001
Toluene	0.001	mg/L	< 0.001
Ethylbenzene	0.001	mg/L	< 0.001
m&p-Xylenes	0.002	mg/L	< 0.002
o-Xylene	0.001	mg/L	< 0.001
Xylenes - Total*	0.003	mg/L	< 0.003
4-Bromofluorobenzene (surr.)	1	%	143
Total Recoverable Hydrocarbons - 2013 NEPM Fractions			
Naphthalene[N02]	0.01	mg/L	< 0.01
PFASs Summations			
Sum (PFHxS + PFOS)*	0.001	ug/L	0.058
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.001	ug/L	0.061
Sum of PFASs (n=30)*	0.005	ug/L	0.168
Sum of US EPA PFAS (PFOS + PFOA)*	0.001	ug/L	0.038
Sum of WA DWER PFAS (n=10)*	0.005	ug/L	0.155

Client Sample ID			FS01
Sample Matrix			Water
Eurofins Sample No.			M23-My0003769
Date Sampled			Apr 26, 2023
Test/Reference	LOR	Unit	
Perfluoroalkyl sulfonamido substances- Trace			
Perfluorooctane sulfonamide (FOSA)[N11]	0.005	ug/L	< 0.005
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)[N11]	0.005	ug/L	< 0.005
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)[N11]	0.005	ug/L	< 0.005
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)[N11]	0.005	ug/L	< 0.005
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)[N11]	0.005	ug/L	< 0.005
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)[N11]	0.005	ug/L	< 0.005
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)[N11]	0.005	ug/L	< 0.005
13C8-FOSA (surr.)	1	%	165
D3-N-MeFOSA (surr.)	1	%	187
D5-N-EtFOSA (surr.)	1	%	181
D7-N-MeFOSE (surr.)	1	%	159
D9-N-EtFOSE (surr.)	1	%	139
D5-N-EtFOSAA (surr.)	1	%	101
D3-N-MeFOSAA (surr.)	1	%	93
Perfluoroalkyl carboxylic acids (PFCAs) - Trace			
Perfluorobutanoic acid (PFBA)[N11]	0.005	ug/L	< 0.005
Perfluoropentanoic acid (PFPeA)[N11]	0.001	ug/L	0.007
Perfluorohexanoic acid (PFHxA)[N11]	0.001	ug/L	0.011
Perfluoroheptanoic acid (PFHpA)[N11]	0.001	ug/L	[N09]0.002
Perfluorooctanoic acid (PFOA)[N11]	0.001	ug/L	[N09]0.003
Perfluorononanoic acid (PFNA)[N11]	0.001	ug/L	[N09]0.008
Perfluorodecanoic acid (PFDA)[N11]	0.001	ug/L	< 0.001
Perfluorotridecanoic acid (PFTrDA)[N15]	0.001	ug/L	< 0.001
Perfluoroundecanoic acid (PFUnDA)[N11]	0.001	ug/L	< 0.001
Perfluorododecanoic acid (PFDoDA)[N11]	0.001	ug/L	< 0.001
Perfluorotetradecanoic acid (PFTeDA)[N11]	0.001	ug/L	< 0.001
13C4-PFBA (surr.)	1	%	19
13C5-PFPeA (surr.)	1	%	109
13C5-PFHxA (surr.)	1	%	106
13C4-PFHpA (surr.)	1	%	103
13C8-PFOA (surr.)	1	%	99
13C5-PFNA (surr.)	1	%	99
13C6-PFDA (surr.)	1	%	102
13C2-PFUnDA (surr.)	1	%	87
13C2-PFDoDA (surr.)	1	%	117
13C2-PFTeDA (surr.)	1	%	151
Perfluoroalkyl sulfonic acids (PFSAs)- Trace			
Perfluorobutanesulfonic acid (PFBS)[N11]	0.001	ug/L	0.004
Perfluorononanesulfonic acid (PFNS)[N15]	0.001	ug/L	< 0.001
Perfluoropropanesulfonic acid (PFPrS)[N15]	0.001	ug/L	0.001
Perfluoropentanesulfonic acid (PFPeS)[N15]	0.001	ug/L	[N09]0.003
Perfluorohexanesulfonic acid (PFHxS)[N11]	0.001	ug/L	[N09]0.023
Perfluoroheptanesulfonic acid (PFHpS)[N15]	0.001	ug/L	[N09]0.001
Perfluorooctanesulfonic acid (PFOS)[N11]	0.001	ug/L	[N09]0.035
Perfluorodecanesulfonic acid (PFDS)[N15]	0.001	ug/L	< 0.001

Client Sample ID			FS01
Sample Matrix			Water
Eurofins Sample No.			M23-My0003769
Date Sampled			Apr 26, 2023
Test/Reference	LOR	Unit	
Perfluoroalkyl sulfonic acids (PFSAs)- Trace			
13C3-PFBS (surr.)	1	%	95
18O2-PFHxS (surr.)	1	%	104
13C8-PFOS (surr.)	1	%	71
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)- Trace			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)[N11]	0.001	ug/L	< 0.001
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)[N11]	0.005	ug/L	0.070
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)[N11]	0.001	ug/L	< 0.001
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)[N11]	0.001	ug/L	< 0.001
13C2-4:2 FTSA (surr.)	1	%	109
13C2-6:2 FTSA (surr.)	1	%	85
13C2-8:2 FTSA (surr.)	1	%	97
13C2-10:2 FTSA (surr.)	1	%	90

Sample History

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

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

Description	Testing Site	Extracted	Holding Time
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Melbourne	May 02, 2023	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	May 02, 2023	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	May 02, 2023	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
BTEX and Naphthalene			
BTEX	Melbourne	May 02, 2023	14 Days
- Method: LTM-ORG-2010 BTEX and Volatile TRH			
Per- and Polyfluoroalkyl Substances (PFASs) - Trace			
PFASs Summations	Melbourne	May 02, 2023	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS) - low level			
Perfluoroalkyl sulfonamido substances- Trace	Melbourne	May 02, 2023	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS) - low level			
Perfluoroalkyl carboxylic acids (PFCAs) - Trace	Melbourne	May 02, 2023	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS) - low level			
Perfluoroalkyl sulfonic acids (PFSAs)- Trace	Melbourne	May 02, 2023	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS) - low level			
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)- Trace	Melbourne	May 02, 2023	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS) - low level			

Eurofins Environment Testing Australia Pty Ltd
ABN: 50 005 085 521

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

Geelong
19/8 Lewalan Street
Grovedale
VIC 3216
Tel: +61 3 8564 5000
NATA# 1261 Site# 25403

Sydney
179 Magowar Road
Girraween
NSW 2145
Tel: +61 2 9900 8400
NATA# 1261 Site# 18217

Canberra
Unit 1,2 Dacre Street
Mitchell
ACT 2911
Tel: +61 2 6113 8091
NATA# 1261 Site# 25466

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

Newcastle
1/2 Frost Drive
Mayfield West NSW 2304
Tel: +61 2 4968 8448
NATA# 1261
Site# 25079 & 25289

Eurofins ARL Pty Ltd
ABN: 91 05 0159 898

Perth
46-48 Banksia Road
Welshpool
WA 6106
Tel: +61 8 6253 4444
NATA# 2377 Site# 2370

Eurofins Environment Testing NZ Ltd
NZBN: 9429046024954

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

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

web: www.eurofins.com.au
email: EnviroSales@eurofins.com

Company Name: GHD Pty Ltd SA
Address: GPO Box 2052
Adelaide
SA 5001

Project Name:
Project ID: 12566684

Order No.:
Report #: 985539
Phone: 08 8111 6600
Fax: 08 8111 6699

Received: May 2, 2023 9:00 AM
Due: May 9, 2023
Priority: 5 Day
Contact Name: Ben Petticrew

Eurofins Analytical Services Manager : Amy Meunier

Sample Detail						BTEX and Naphthalene	Total Recoverable Hydrocarbons	Per- and Polyfluoroalkyl Substances (PFASs) - Trace
Melbourne Laboratory - NATA # 1261 Site # 1254						X	X	X
External Laboratory								
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**			
1	FS01	Apr 26, 2023		Water	M23-My0003769	X	X	X
Test Counts						1	1	1

Internal Quality Control Review and Glossary

General

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

Holding Times

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

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

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

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

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

Units

mg/kg: milligrams per kilogram	**mg/L:** milligrams per litre	**µg/L:** micrograms per litre
ppm: parts per million	**ppb:** parts per billion	**%:** Percentage
org/100 mL: Organisms per 100 millilitres	**NTU:** Nephelometric Turbidity Units	**MPN/100 mL:** Most Probable Number of organisms per 100 millilitres
CFU: Colony forming unit		

Terms

APHA	American Public Health Association
COC	Chain of Custody
CP	Client Parent - QC was performed on samples pertaining to this report
CRM	Certified Reference Material (ISO17034) - reported as percent recovery.
Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
LOR	Limit of Reporting.
LCS	Laboratory Control Sample - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
SRA	Sample Receipt Advice
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
TBTO	Tributyltin oxide (*bis*-tributyltin oxide) - individual tributyltin compounds cannot be identified separately in the environment however free tributyltin was measured and its values were converted stoichiometrically into tributyltin oxide for comparison with regulatory limits.
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxic Equivalency Quotient or Total Equivalence
QSM	US Department of Defense Quality Systems Manual Version 5.4
US EPA	United States Environmental Protection Agency
WA DWER	Sum of PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC - Acceptance Criteria

The acceptance criteria should be used as a guide only and may be different when site specific Sampling Analysis and Quality Plan (SAQP) have been implemented

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

Results <10 times the LOR: No Limit

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

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

NOTE: pH duplicates are reported as a range not as RPD

Surrogate Recoveries: Recoveries must lie between 20-130% for Speciated Phenols & 50-150% for PFAS

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.4 where no positive PFAS results have been reported have been reviewed and no data was affected.

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore, laboratory analysis is unlikely to be completed within holding time.Analysis will begin as soon as possible after sample receipt.
4. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of recovery the term "INT" appears against that analyte.
5. For Matrix Spikes and LCS results a dash "-" in the report means that the specific analyte was not added to the QC sample.
6. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Recoverable Hydrocarbons							
TRH C6-C9	mg/L	< 0.02			0.02	Pass	
TRH C10-C14	mg/L	< 0.05			0.05	Pass	
TRH C15-C28	mg/L	< 0.1			0.1	Pass	
TRH C29-C36	mg/L	< 0.1			0.1	Pass	
TRH C6-C10	mg/L	< 0.02			0.02	Pass	
TRH >C10-C16	mg/L	< 0.05			0.05	Pass	
TRH >C16-C34	mg/L	< 0.1			0.1	Pass	
TRH >C34-C40	mg/L	< 0.1			0.1	Pass	
Method Blank							
BTEX							
Benzene	mg/L	< 0.001			0.001	Pass	
Toluene	mg/L	< 0.001			0.001	Pass	
Ethylbenzene	mg/L	< 0.001			0.001	Pass	
m&p-Xylenes	mg/L	< 0.002			0.002	Pass	
o-Xylene	mg/L	< 0.001			0.001	Pass	
Xylenes - Total*	mg/L	< 0.003			0.003	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	mg/L	< 0.01			0.01	Pass	
Method Blank							
Perfluoroalkyl sulfonamido substances- Trace							
Perfluorooctane sulfonamide (FOSA)	ug/L	< 0.005			0.005	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	ug/L	< 0.005			0.005	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	ug/L	< 0.005			0.005	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	ug/L	< 0.005			0.005	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	ug/L	< 0.005			0.005	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	ug/L	< 0.005			0.005	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	ug/L	< 0.005			0.005	Pass	
Method Blank							
Perfluoroalkyl carboxylic acids (PFCAs) - Trace							
Perfluorobutanoic acid (PFBA)	ug/L	< 0.005			0.005	Pass	
Perfluoropentanoic acid (PFPeA)	ug/L	< 0.001			0.001	Pass	
Perfluorohexanoic acid (PFHxA)	ug/L	< 0.001			0.001	Pass	
Perfluoroheptanoic acid (PFHpA)	ug/L	< 0.001			0.001	Pass	
Perfluorooctanoic acid (PFOA)	ug/L	< 0.001			0.001	Pass	
Perfluorononanoic acid (PFNA)	ug/L	< 0.001			0.001	Pass	
Perfluorodecanoic acid (PFDA)	ug/L	< 0.001			0.001	Pass	
Perfluorotridecanoic acid (PFTrDA)	ug/L	< 0.001			0.001	Pass	
Perfluoroundecanoic acid (PFUnDA)	ug/L	< 0.001			0.001	Pass	
Perfluorododecanoic acid (PFDoDA)	ug/L	< 0.001			0.001	Pass	
Perfluorotetradecanoic acid (PFTeDA)	ug/L	< 0.001			0.001	Pass	
Method Blank							
Perfluoroalkyl sulfonic acids (PFSAs)- Trace							
Perfluorobutanesulfonic acid (PFBS)	ug/L	< 0.001			0.001	Pass	
Perfluorononanesulfonic acid (PFNS)	ug/L	< 0.001			0.001	Pass	
Perfluoropropanesulfonic acid (PFPrS)	ug/L	< 0.001			0.001	Pass	
Perfluoropentanesulfonic acid (PFPeS)	ug/L	< 0.001			0.001	Pass	
Perfluorohexanesulfonic acid (PFHxS)	ug/L	< 0.001			0.001	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	ug/L	< 0.001			0.001	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Perfluorooctanesulfonic acid (PFOS)	ug/L	< 0.001			0.001	Pass	
Perfluorodecanesulfonic acid (PFDS)	ug/L	< 0.001			0.001	Pass	
Method Blank							
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)- Trace							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	ug/L	< 0.001			0.001	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	ug/L	< 0.005			0.005	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	ug/L	< 0.001			0.001	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	ug/L	< 0.001			0.001	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons							
TRH C6-C9	%	109			70-130	Pass	
TRH C10-C14	%	97			70-130	Pass	
TRH C6-C10	%	110			70-130	Pass	
TRH >C10-C16	%	100			70-130	Pass	
LCS - % Recovery							
BTEX							
Benzene	%	113			70-130	Pass	
Toluene	%	113			70-130	Pass	
Ethylbenzene	%	112			70-130	Pass	
m&p-Xylenes	%	111			70-130	Pass	
Xylenes - Total*	%	112			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	%	121			70-130	Pass	
LCS - % Recovery							
Perfluoroalkyl sulfonamido substances- Trace							
Perfluorooctane sulfonamide (FOSA)	%	101			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	%	107			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	%	101			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	%	106			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	%	102			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	%	100			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	%	114			50-150	Pass	
LCS - % Recovery							
Perfluoroalkyl carboxylic acids (PFCAs) - Trace							
Perfluorobutanoic acid (PFBA)	%	104			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	94			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	98			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	89			50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	128			50-150	Pass	
Perfluorononanoic acid (PFNA)	%	134			50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	136			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	%	107			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	%	103			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	%	95			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	98			50-150	Pass	
LCS - % Recovery							
Perfluoroalkyl sulfonic acids (PFSAs)- Trace							
Perfluorobutanesulfonic acid (PFBS)	%	90			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	%	87			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	%	105			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	%	95			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	%	95			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	%	117			50-150	Pass	

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Perfluorooctanesulfonic acid (PFOS)			%	104			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)			%	54			50-150	Pass	
LCS - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)- Trace									
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)			%	104			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)			%	96			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)			%	104			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)			%	96			50-150	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
Total Recoverable Hydrocarbons				Result 1					
TRH C6-C9	M23-My0007212	NCP	%	100			70-130	Pass	
TRH C10-C14	M23-My0004767	NCP	%	100			70-130	Pass	
TRH C6-C10	M23-My0007212	NCP	%	96			70-130	Pass	
TRH >C10-C16	M23-My0004767	NCP	%	99			70-130	Pass	
Spike - % Recovery									
BTEX				Result 1					
Benzene	M23-My0007212	NCP	%	87			70-130	Pass	
Toluene	M23-My0007212	NCP	%	95			70-130	Pass	
Ethylbenzene	M23-My0007212	NCP	%	99			70-130	Pass	
m&p-Xylenes	M23-My0007212	NCP	%	100			70-130	Pass	
o-Xylene	M23-My0007212	NCP	%	96			70-130	Pass	
Xylenes - Total*	M23-My0007212	NCP	%	99			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	M23-My0007212	NCP	%	102			70-130	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonamido substances- Trace				Result 1					
Perfluorooctane sulfonamide (FOSA)	M23-Ap0060021	NCP	%	89			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	M23-Ap0060021	NCP	%	113			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	M23-Ap0060021	NCP	%	100			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	M23-Ap0060021	NCP	%	98			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	M23-Ap0060021	NCP	%	103			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	M23-Ap0060021	NCP	%	91			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	M23-Ap0060021	NCP	%	97			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl carboxylic acids (PFCAs) - Trace				Result 1					
Perfluorobutanoic acid (PFBA)	M23-Ap0060021	NCP	%	92			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	M23-Ap0060021	NCP	%	84			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	M23-Ap0060021	NCP	%	89			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	M23-Ap0060021	NCP	%	82			50-150	Pass	
Perfluorooctanoic acid (PFOA)	M23-Ap0060021	NCP	%	116			50-150	Pass	
Perfluorononanoic acid (PFNA)	M23-Ap0060021	NCP	%	118			50-150	Pass	
Perfluorodecanoic acid (PFDA)	M23-Ap0060021	NCP	%	126			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	M23-Ap0060021	NCP	%	109			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	M23-Ap0060021	NCP	%	97			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Perfluorododecanoic acid (PFDoDA)	M23-Ap0060021	NCP	%	89			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	M23-Ap0060021	NCP	%	106			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonic acids (PFSAs)- Trace				Result 1					
Perfluorobutanesulfonic acid (PFBS)	M23-Ap0060021	NCP	%	81			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	M23-Ap0060021	NCP	%	73			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	M23-Ap0060021	NCP	%	93			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	M23-Ap0060021	NCP	%	87			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	M23-Ap0060021	NCP	%	90			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	M23-Ap0060021	NCP	%	111			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	M23-Ap0060021	NCP	%	90			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	M23-Ap0060021	NCP	%	50			50-150	Pass	
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)- Trace				Result 1					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	M23-Ap0060021	NCP	%	94			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	M23-Ap0060021	NCP	%	102			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	M23-Ap0060021	NCP	%	93			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	M23-Ap0060021	NCP	%	103			50-150	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Total Recoverable Hydrocarbons				Result 1	Result 2	RPD			
TRH C6-C9	M23-My0004053	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
TRH C10-C14	M23-My0004045	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
TRH C15-C28	M23-My0004045	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH C29-C36	M23-My0004045	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH C6-C10	M23-My0004053	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
TRH >C10-C16	M23-My0004045	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
TRH >C16-C34	M23-My0004045	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH >C34-C40	M23-My0004045	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	M23-My0004053	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Toluene	M23-My0004053	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Ethylbenzene	M23-My0004053	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
m&p-Xylenes	M23-My0004053	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
o-Xylene	M23-My0004053	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Xylenes - Total*	M23-My0004053	NCP	mg/L	< 0.003	< 0.003	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	M23-My0004053	NCP	mg/L	< 0.01	< 0.01	<1	30%	Pass	

Duplicate									
Perfluoroalkyl sulfonamido substances- Trace				Result 1	Result 2	RPD			
Perfluorooctane sulfonamide (FOSA)	M23-Ap0060020	NCP	ug/L	< 0.005	< 0.005	<1	30%	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	M23-Ap0060020	NCP	ug/L	< 0.005	< 0.005	<1	30%	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	M23-Ap0060020	NCP	ug/L	< 0.005	< 0.005	<1	30%	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	M23-Ap0060020	NCP	ug/L	< 0.005	< 0.005	<1	30%	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	M23-Ap0060020	NCP	ug/L	< 0.005	< 0.005	<1	30%	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	M23-Ap0060020	NCP	ug/L	< 0.005	< 0.005	<1	30%	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	M23-Ap0060020	NCP	ug/L	< 0.005	< 0.005	<1	30%	Pass	
Duplicate									
Perfluoroalkyl carboxylic acids (PFCAs) - Trace				Result 1	Result 2	RPD			
Perfluorobutanoic acid (PFBA)	M23-Ap0060020	NCP	ug/L	< 0.005	< 0.005	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	M23-Ap0060020	NCP	ug/L	< 0.001	< 0.001	<1	30%	Pass	
Perfluorohexanoic acid (PFHxA)	M23-Ap0060020	NCP	ug/L	< 0.001	< 0.001	<1	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	M23-Ap0060020	NCP	ug/L	< 0.001	< 0.001	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	M23-Ap0060020	NCP	ug/L	< 0.001	< 0.001	<1	30%	Pass	
Perfluorononanoic acid (PFNA)	M23-Ap0060020	NCP	ug/L	< 0.001	< 0.001	<1	30%	Pass	
Perfluorodecanoic acid (PFDA)	M23-Ap0060020	NCP	ug/L	< 0.001	< 0.001	<1	30%	Pass	
Perfluorotridecanoic acid (PFTrDA)	M23-Ap0060020	NCP	ug/L	< 0.001	< 0.001	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnDA)	M23-Ap0060020	NCP	ug/L	< 0.001	< 0.001	<1	30%	Pass	
Perfluorododecanoic acid (PFDoDA)	M23-Ap0060020	NCP	ug/L	< 0.001	< 0.001	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	M23-Ap0060020	NCP	ug/L	< 0.001	< 0.001	<1	30%	Pass	
Duplicate									
Perfluoroalkyl sulfonic acids (PFSAs)- Trace				Result 1	Result 2	RPD			
Perfluorobutanesulfonic acid (PFBS)	M23-Ap0060020	NCP	ug/L	< 0.001	< 0.001	<1	30%	Pass	
Perfluorononanesulfonic acid (PFNS)	M23-Ap0060020	NCP	ug/L	< 0.001	< 0.001	<1	30%	Pass	
Perfluoropropanesulfonic acid (PFPrS)	M23-Ap0060020	NCP	ug/L	< 0.001	< 0.001	<1	30%	Pass	
Perfluoropentanesulfonic acid (PFPeS)	M23-Ap0060020	NCP	ug/L	< 0.001	< 0.001	<1	30%	Pass	
Perfluorohexanesulfonic acid (PFHxS)	M23-Ap0060020	NCP	ug/L	< 0.001	< 0.001	<1	30%	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	M23-Ap0060020	NCP	ug/L	< 0.001	< 0.001	<1	30%	Pass	
Perfluorooctanesulfonic acid (PFOS)	M23-Ap0060020	NCP	ug/L	< 0.001	< 0.001	<1	30%	Pass	
Perfluorodecanesulfonic acid (PFDS)	M23-Ap0060020	NCP	ug/L	< 0.001	< 0.001	<1	30%	Pass	
Duplicate									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)- Trace				Result 1	Result 2	RPD			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	M23-Ap0060020	NCP	ug/L	< 0.001	< 0.001	<1	30%	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	M23-Ap0060020	NCP	ug/L	< 0.005	< 0.005	<1	30%	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	M23-Ap0060020	NCP	ug/L	< 0.001	< 0.001	<1	30%	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	M23-Ap0060020	NCP	ug/L	< 0.001	< 0.001	<1	30%	Pass	

Comments

Sample Integrity

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

Qualifier Codes/Comments

Code	Description
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.
N09	Quantification of linear and branched isomers has been conducted as a single total response using the relative response factor for the corresponding linear/branched standard.
N11	Isotope dilution is used for calibration of each native compound for which an exact labelled analogue is available (Isotope Dilution Quantitation). The isotopically labelled analogues allow identification and recovery correction of the concentration of the associated native PFAS compounds.
N15	Where the native PFAS compound does not have labelled analogue then the quantification is made using the Extracted Internal Standard Analyte with the closest retention time to the analyte and no recovery correction has been made (Internal Standard Quantitation).

Authorised by:

Amy Meunier	Analytical Services Manager
Edward Lee	Senior Analyst-Organic
Joseph Edouard	Senior Analyst-PFAS
Joseph Edouard	Senior Analyst-Volatile

Glenn Jackson
General Manager

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

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

Measurement uncertainty of test data is available on request or please click here.

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Appendix H

Well Construction Permits

GOVERNMENT OF SOUTH AUSTRALIA

DEPARTMENT FOR ENVIRONMENT AND WATER

Mt Gambier Office | PO Box 1046 | Mt Gambier SA 5290 | [P] 8735 1134 [F] 8735 1135

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

Subject to full compliance with all the procedures, specifications and limitations contained or referred to, in the conditions set out below,

Permit No:	432311
Expiry Date:	24/11/2023

Permission is hereby granted to: GHD PTY LTD
ACN 008 488 373
LEVEL 4, 211 VICTORIA SQUARE
ADELAIDE SA 5000

To undertake the following water affecting activity:

Activity: Well Construction

Well Use: Investigation

CONDITIONS:

1. The activity authorised by this permit must only be undertaken on the land described below:

   CT 5288/893
   Allotment 23 in Deposited Plan 3280
   Hundred of Adelaide

2. The equipment, materials and methods used in drilling, plugging, backfilling or sealing of a well, or the replacement or alteration of the casing, lining or screen of a well, shall not adversely affect the quality of an underground water resource.
3. Aquifers shall be protected during drilling, plugging, backfilling or sealing of a well, or the replacement or alteration of the casing, lining or screen of a well, to prevent adverse impacts upon the integrity of the aquifer.
4. This work may be subject to inspection by the Department's Drilling Inspectors.
5. If this well is incidental/ancillary to mining operations authorised under the Mining Act 1971, or a regulated activity under the Petroleum and Geothermal Energy Act 2000 (Acts), the well must be decommissioned (as outlined in the Minimum Construction Requirements for Water Bores in Australia Fourth Edition) prior to the relinquishment of the licence or lease under the associated Acts, unless alternative formal arrangements can be made with the owner or occupier of the land on which the well is located subject to approval by the relevant Minister or the Minister's agent.
6. Activities shall not have an unacceptable detrimental impact on cultural, heritage or social values.
7. The activity must not adversely affect water-dependent ecosystems nearby.
8. The well driller must submit a Well Completion Report to the Department within 30 days of completion of each activity authorised by this well construction permit.

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

9. Well Construction must comply with the mandatory requirements of the Minimum Construction Requirements for Water Bores in Australia (4th Edition) and the General Specifications for Well Drilling Operations Affecting Water in South Australia (or any subsequent or related policy), as provided by the relevant authority.
10. The authorised activity must be undertaken by a licensed driller.
11. If the well is considered unsatisfactory, it may be abandoned and a replacement well may then be constructed provided that the abandoned well is backfilled prior to the drill rig leaving the site.
12. Water samples are required from all wells drilled in respect of this permit.
13. Strata samples are not required.
14. The licensed well driller must forward with the report a plan obtained from the permit holder, who must mark thereon the location of all wells drilled in respect of this permit.
15. All wells must be drilled vertical unless written permission is obtained from the Minister.
16. Where a well passes or will pass through two or more aquifers, an impervious seal shall be made and maintained between the aquifers to prevent leakage between the aquifers.
17. All groundwater extracted during sampling and/or purging must be contained and disposed of in an appropriate manner to minimise risk to health and the environment.
18. A lithological log is to be submitted with the drillers well construction report from all wells drilled in respect of this permit as per the National Environmental Protection (assessment of Site Contamination) measure 1999.
19. Wells are to be backfilled when no longer required for ongoing monitoring and investigation purposes.
20. This permit authorises the construction of a well on the portion of road adjacent to the land parcel described above.
21. The well is not to penetrate beyond a depth of 15 metres unless approved by the Regional Hydrogeologist.
22. Due to known soil/groundwater contamination in the sediments and aquifers above, caution should be taken in the drilling and/or cementing of this well.

NOTES:

1. Under section 216(1)(b)(ii) of the Act, you have a right of appeal to the Environment, Resources and Development Court against the imposition of any condition on this permit. The appeal must be instituted within six weeks of the date of permit issue. The appeal must also be served upon this department within that time.
2. This permit is not transferable.
3. This well construction permit is not an authorisation for a person to enter private property and prior authority must be obtained from the land owner in all circumstances.
4. The issue of this permit does not negate the requirement to comply with the provisions of other Acts that may impact on the activity undertaken pursuant to this permit.
5. This permit is not an approval to clear native vegetation.

Mt Gambier Office | PO Box 1046 | Mt Gambier SA 5290 | [P] 8735 1134 [F] 8735 1135

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

6. It is recommended that all drilling equipment be decontaminated prior to construction of a new well or rehabilitation of an existing well to prevent the introduction or transfer of iron bacteria. Similar precautions should also be taken with pump installation equipment.
7. Due to potential land contamination issues it is recommended that a hydrogeological assessment be carried out to determine the long term prospects for groundwater quality and quantity with regard to the site and desired use.
8. This permit does not authorise the taking of water from the well for any purpose other than testing.
9. If the extracted groundwater supply is required for human consumption, it is recommended that the water be quality tested.

TAKE NOTE that the permit holder, or a person acting on behalf of the permit holder, who contravenes or fails to comply with a condition of this permit is guilty of an offence, and such acts or ommisions may result in the variation, suspension or revocation of the permit.

Date: 24/11/2022

Sonya Knight
Senior Water Licensing Officer
Delegate of Minister for Climate, Environment and Water

GOVERNMENT OF SOUTH AUSTRALIA

DEPARTMENT FOR ENVIRONMENT AND WATER

Mt Gambier Office | PO Box 1046 | Mt Gambier SA 5290 | [P] 8735 1134 [F] 8735 1135

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

Subject to full compliance with all the procedures, specifications and limitations contained or referred to, in the conditions set out below,

Permit No:	432310
Expiry Date:	24/11/2023

Permission is hereby granted to: GHD PTY LTD
ACN 008 488 373
LEVEL 4, 211 VICTORIA SQUARE
ADELAIDE SA 5000

To undertake the following water affecting activity:

Activity: Well Construction

Well Use: Investigation

CONDITIONS:

1. The activity authorised by this permit must only be undertaken on the land described below:

   CT 5013/525
   Strata Unit CP in Strata Plan 6432
   Hundred of Adelaide

2. The equipment, materials and methods used in drilling, plugging, backfilling or sealing of a well, or the replacement or alteration of the casing, lining or screen of a well, shall not adversely affect the quality of an underground water resource.
3. Aquifers shall be protected during drilling, plugging, backfilling or sealing of a well, or the replacement or alteration of the casing, lining or screen of a well, to prevent adverse impacts upon the integrity of the aquifer.
4. This work may be subject to inspection by the Department's Drilling Inspectors.
5. If this well is incidental/ancillary to mining operations authorised under the Mining Act 1971, or a regulated activity under the Petroleum and Geothermal Energy Act 2000 (Acts), the well must be decommissioned (as outlined in the Minimum Construction Requirements for Water Bores in Australia Fourth Edition) prior to the relinquishment of the licence or lease under the associated Acts, unless alternative formal arrangements can be made with the owner or occupier of the land on which the well is located subject to approval by the relevant Minister or the Minister's agent.
6. Activities shall not have an unacceptable detrimental impact on cultural, heritage or social values.
7. The activity must not adversely affect water-dependent ecosystems nearby.
8. The well driller must submit a Well Completion Report to the Department within 30 days of completion of each activity authorised by this well construction permit.

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

9. Well Construction must comply with the mandatory requirements of the Minimum Construction Requirements for Water Bores in Australia (4th Edition) and the General Specifications for Well Drilling Operations Affecting Water in South Australia (or any subsequent or related policy), as provided by the relevant authority.
10. The authorised activity must be undertaken by a licensed driller.
11. If the well is considered unsatisfactory, it may be abandoned and a replacement well may then be constructed provided that the abandoned well is backfilled prior to the drill rig leaving the site.
12. Water samples are required from all wells drilled in respect of this permit.
13. Strata samples are not required.
14. The licensed well driller must forward with the report a plan obtained from the permit holder, who must mark thereon the location of all wells drilled in respect of this permit.
15. All wells must be drilled vertical unless written permission is obtained from the Minister.
16. Where a well passes or will pass through two or more aquifers, an impervious seal shall be made and maintained between the aquifers to prevent leakage between the aquifers.
17. All groundwater extracted during sampling and/or purging must be contained and disposed of in an appropriate manner to minimise risk to health and the environment.
18. A lithological log is to be submitted with the drillers well construction report from all wells drilled in respect of this permit as per the National Environmental Protection (assessment of Site Contamination) measure 1999.
19. Wells are to be backfilled when no longer required for ongoing monitoring and investigation purposes.
20. This permit authorises the construction of a well on the portion of road adjacent to the land parcel described above.
21. The well is not to penetrate beyond a depth of 15 metres unless approved by the Regional Hydrogeologist.
22. Due to known soil/groundwater contamination in the sediments and aquifers above, caution should be taken in the drilling and/or cementing of this well.

NOTES:

1. Under section 216(1)(b)(ii) of the Act, you have a right of appeal to the Environment, Resources and Development Court against the imposition of any condition on this permit. The appeal must be instituted within six weeks of the date of permit issue. The appeal must also be served upon this department within that time.
2. This permit is not transferable.
3. This well construction permit is not an authorisation for a person to enter private property and prior authority must be obtained from the land owner in all circumstances.
4. The issue of this permit does not negate the requirement to comply with the provisions of other Acts that may impact on the activity undertaken pursuant to this permit.
5. This permit is not an approval to clear native vegetation.

Mt Gambier Office | PO Box 1046 | Mt Gambier SA 5290 | [P] 8735 1134 [F] 8735 1135

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

6. It is recommended that all drilling equipment be decontaminated prior to construction of a new well or rehabilitation of an existing well to prevent the introduction or transfer of iron bacteria. Similar precautions should also be taken with pump installation equipment.
7. Due to potential land contamination issues it is recommended that a hydrogeological assessment be carried out to determine the long term prospects for groundwater quality and quantity with regard to the site and desired use.
8. This permit does not authorise the taking of water from the well for any purpose other than testing.
9. If the extracted groundwater supply is required for human consumption, it is recommended that the water be quality tested.

TAKE NOTE that the permit holder, or a person acting on behalf of the permit holder, who contravenes or fails to comply with a condition of this permit is guilty of an offence, and such acts or ommisions may result in the variation, suspension or revocation of the permit.

Date: 24/11/2022

Sonya Knight
Senior Water Licensing Officer
Delegate of Minister for Climate, Environment and Water

GOVERNMENT OF SOUTH AUSTRALIA

DEPARTMENT FOR ENVIRONMENT AND WATER

Mt Gambier Office | PO Box 1046 | Mt Gambier SA 5290 | [P] 8735 1134 [F] 8735 1135

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

Subject to full compliance with all the procedures, specifications and limitations contained or referred to, in the conditions set out below,

Permit No:	432309
Expiry Date:	24/11/2023

Permission is hereby granted to: GHD PTY LTD
ACN 008 488 373
LEVEL 4, 211 VICTORIA SQUARE
ADELAIDE SA 5000

To undertake the following water affecting activity:

Activity: Well Construction

Well Use: Investigation

CONDITIONS:

1. The activity authorised by this permit must only be undertaken on the land described below:

   CT 5302/255
   Allotment 64 in Deposited Plan 3034
   Hundred of Adelaide

2. The equipment, materials and methods used in drilling, plugging, backfilling or sealing of a well, or the replacement or alteration of the casing, lining or screen of a well, shall not adversely affect the quality of an underground water resource.
3. Aquifers shall be protected during drilling, plugging, backfilling or sealing of a well, or the replacement or alteration of the casing, lining or screen of a well, to prevent adverse impacts upon the integrity of the aquifer.
4. This work may be subject to inspection by the Department's Drilling Inspectors.
5. If this well is incidental/ancillary to mining operations authorised under the Mining Act 1971, or a regulated activity under the Petroleum and Geothermal Energy Act 2000 (Acts), the well must be decommissioned (as outlined in the Minimum Construction Requirements for Water Bores in Australia Fourth Edition) prior to the relinquishment of the licence or lease under the associated Acts, unless alternative formal arrangements can be made with the owner or occupier of the land on which the well is located subject to approval by the relevant Minister or the Minister's agent.
6. Activities shall not have an unacceptable detrimental impact on cultural, heritage or social values.
7. The activity must not adversely affect water-dependent ecosystems nearby.
8. The well driller must submit a Well Completion Report to the Department within 30 days of completion of each activity authorised by this well construction permit.

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

9. Well Construction must comply with the mandatory requirements of the Minimum Construction Requirements for Water Bores in Australia (4th Edition) and the General Specifications for Well Drilling Operations Affecting Water in South Australia (or any subsequent or related policy), as provided by the relevant authority.
10. The authorised activity must be undertaken by a licensed driller.
11. If the well is considered unsatisfactory, it may be abandoned and a replacement well may then be constructed provided that the abandoned well is backfilled prior to the drill rig leaving the site.
12. Water samples are required from all wells drilled in respect of this permit.
13. Strata samples are not required.
14. The licensed well driller must forward with the report a plan obtained from the permit holder, who must mark thereon the location of all wells drilled in respect of this permit.
15. All wells must be drilled vertical unless written permission is obtained from the Minister.
16. Where a well passes or will pass through two or more aquifers, an impervious seal shall be made and maintained between the aquifers to prevent leakage between the aquifers.
17. All groundwater extracted during sampling and/or purging must be contained and disposed of in an appropriate manner to minimise risk to health and the environment.
18. A lithological log is to be submitted with the drillers well construction report from all wells drilled in respect of this permit as per the National Environmental Protection (assessment of Site Contamination) measure 1999.
19. Wells are to be backfilled when no longer required for ongoing monitoring and investigation purposes.
20. This permit authorises the construction of a well on the portion of road adjacent to the land parcel described above.
21. The well is not to penetrate beyond a depth of 15 metres unless approved by the Regional Hydrogeologist.
22. Due to known soil/groundwater contamination in the sediments and aquifers above, caution should be taken in the drilling and/or cementing of this well.

NOTES:

1. Under section 216(1)(b)(ii) of the Act, you have a right of appeal to the Environment, Resources and Development Court against the imposition of any condition on this permit. The appeal must be instituted within six weeks of the date of permit issue. The appeal must also be served upon this department within that time.
2. This permit is not transferable.
3. This well construction permit is not an authorisation for a person to enter private property and prior authority must be obtained from the land owner in all circumstances.
4. The issue of this permit does not negate the requirement to comply with the provisions of other Acts that may impact on the activity undertaken pursuant to this permit.
5. This permit is not an approval to clear native vegetation.

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

6. It is recommended that all drilling equipment be decontaminated prior to construction of a new well or rehabilitation of an existing well to prevent the introduction or transfer of iron bacteria. Similar precautions should also be taken with pump installation equipment.
7. Due to potential land contamination issues it is recommended that a hydrogeological assessment be carried out to determine the long term prospects for groundwater quality and quantity with regard to the site and desired use.
8. This permit does not authorise the taking of water from the well for any purpose other than testing.
9. If the extracted groundwater supply is required for human consumption, it is recommended that the water be quality tested.

TAKE NOTE that the permit holder, or a person acting on behalf of the permit holder, who contravenes or fails to comply with a condition of this permit is guilty of an offence, and such acts or ommisions may result in the variation, suspension or revocation of the permit.

Date: 24/11/2022

Sonya Knight
Senior Water Licensing Officer
Delegate of Minister for Climate, Environment and Water

GOVERNMENT OF SOUTH AUSTRALIA

DEPARTMENT FOR ENVIRONMENT AND WATER

Mt Gambier Office | PO Box 1046 | Mt Gambier SA 5290 | [P] 8735 1134 [F] 8735 1135

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

Subject to full compliance with all the procedures, specifications and limitations contained or referred to, in the conditions set out below,

Permit No:	428620
Expiry Date:	06/10/2023

Permission is hereby granted to: GHD PTY LTD
ACN 008 488 373
LEVEL 4, 211 VICTORIA SQUARE
ADELAIDE SA 5000

To undertake the following water affecting activity:

Activity: Well Construction

Well Use: Investigation

CONDITIONS:

1. The activity authorised by this permit must only be undertaken on the land described below:

   CT 5808/746
   Allotment 68 in Filed Plan 12879
   Hundred of Adelaide

2. The equipment, materials and methods used in drilling, plugging, backfilling or sealing of a well, or the replacement or alteration of the casing, lining or screen of a well, shall not adversely affect the quality of an underground water resource.
3. Aquifers shall be protected during drilling, plugging, backfilling or sealing of a well, or the replacement or alteration of the casing, lining or screen of a well, to prevent adverse impacts upon the integrity of the aquifer.
4. This work may be subject to inspection by the Department's Drilling Inspectors.
5. If this well is incidental/ancillary to mining operations authorised under the Mining Act 1971, or a regulated activity under the Petroleum and Geothermal Energy Act 2000 (Acts), the well must be decommissioned (as outlined in the Minimum Construction Requirements for Water Bores in Australia Fourth Edition) prior to the relinquishment of the licence or lease under the associated Acts, unless alternative formal arrangements can be made with the owner or occupier of the land on which the well is located subject to approval by the relevant Minister or the Minister's agent.
6. Activities shall not have an unacceptable detrimental impact on cultural, heritage or social values.
7. The activity must not adversely affect water-dependent ecosystems nearby.
8. The well driller must submit a Well Completion Report to the Department within 30 days of completion of each activity authorised by this well construction permit.

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

9. Well Construction must comply with the mandatory requirements of the Minimum Construction Requirements for Water Bores in Australia (4th Edition) and the General Specifications for Well Drilling Operations Affecting Water in South Australia (or any subsequent or related policy), as provided by the relevant authority.
10. The authorised activity must be undertaken by a licensed driller.
11. If the well is considered unsatisfactory, it may be abandoned and a replacement well may then be constructed provided that the abandoned well is backfilled prior to the drill rig leaving the site.
12. Water samples are required from all wells drilled in respect of this permit.
13. Strata samples are not required.
14. The licensed well driller must forward with the report a plan obtained from the permit holder, who must mark thereon the location of all wells drilled in respect of this permit.
15. All wells must be drilled vertical unless written permission is obtained from the Minister.
16. Where a well passes or will pass through two or more aquifers, an impervious seal shall be made and maintained between the aquifers to prevent leakage between the aquifers.
17. All groundwater extracted during sampling and/or purging must be contained and disposed of in an appropriate manner to minimise risk to health and the environment.
18. A lithological log is to be submitted with the drillers well construction report from all wells drilled in respect of this permit as per the National Environmental Protection (assessment of Site Contamination) measure 1999.
19. Wells are to be backfilled when no longer required for ongoing monitoring and investigation purposes.
20. The well is not to penetrate beyond a depth of 30 metres unless approved by the Regional Hydrogeologist.
21. Due to known soil/groundwater contamination in the sediments and aquifers above, caution should be taken in the drilling and/or cementing of this well.

NOTES:

1. Under section 216(1)(b)(ii) of the Act, you have a right of appeal to the Environment, Resources and Development Court against the imposition of any condition on this permit. The appeal must be instituted within six weeks of the date of permit issue. The appeal must also be served upon this department within that time.
2. This permit is not transferable.
3. This well construction permit is not an authorisation for a person to enter private property and prior authority must be obtained from the land owner in all circumstances.
4. The issue of this permit does not negate the requirement to comply with the provisions of other Acts that may impact on the activity undertaken pursuant to this permit.
5. This permit is not an approval to clear native vegetation.
6. It is recommended that all drilling equipment be decontaminated prior to construction of a new well or rehabilitation of an existing well to prevent the introduction or transfer of iron bacteria. Similar precautions should also be taken with pump installation equipment.

DEPARTMENT FOR ENVIRONMENT AND WATER

Mt Gambier Office | PO Box 1046 | Mt Gambier SA 5290 | [P] 8735 1134 [F] 8735 1135

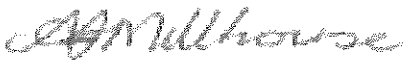
PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

7. Due to potential land contamination issues it is recommended that a hydrogeological assessment be carried out to determine the long term prospects for groundwater quality and quantity with regard to the site and desired use.
8. This permit does not authorise the taking of water from the well for any purpose other than testing.
9. If the extracted groundwater supply is required for human consumption, it is recommended that the water be quality tested.

TAKE NOTE that the permit holder, or a person acting on behalf of the permit holder, who contravenes or fails to comply with a condition of this permit is guilty of an offence, and such acts or ommisions may result in the variation, suspension or revocation of the permit.



Date: 06/10/2022

Alicia Millhouse
Water Licensing Officer
Delegate of Minister for Climate, Environment and Water

GOVERNMENT OF SOUTH AUSTRALIA

DEPARTMENT FOR ENVIRONMENT AND WATER

Mt Gambier Office | PO Box 1046 | Mt Gambier SA 5290 | [P] 8735 1134 [F] 8735 1135

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

Subject to full compliance with all the procedures, specifications and limitations contained or referred to, in the conditions set out below,

Permit No:	428621
Expiry Date:	06/10/2023

Permission is hereby granted to: GHD PTY LTD
ACN 008 488 373
LEVEL 4, 211 VICTORIA SQUARE
ADELAIDE SA 5000

To undertake the following water affecting activity:

Activity: Well Construction

Well Use: Investigation

CONDITIONS:

1. The activity authorised by this permit must only be undertaken on the land described below:

   CT 5808/746
   Allotment 68 in Filed Plan 12879
   Hundred of Adelaide

2. The equipment, materials and methods used in drilling, plugging, backfilling or sealing of a well, or the replacement or alteration of the casing, lining or screen of a well, shall not adversely affect the quality of an underground water resource.
3. Aquifers shall be protected during drilling, plugging, backfilling or sealing of a well, or the replacement or alteration of the casing, lining or screen of a well, to prevent adverse impacts upon the integrity of the aquifer.
4. This work may be subject to inspection by the Department's Drilling Inspectors.
5. If this well is incidental/ancillary to mining operations authorised under the Mining Act 1971, or a regulated activity under the Petroleum and Geothermal Energy Act 2000 (Acts), the well must be decommissioned (as outlined in the Minimum Construction Requirements for Water Bores in Australia Fourth Edition) prior to the relinquishment of the licence or lease under the associated Acts, unless alternative formal arrangements can be made with the owner or occupier of the land on which the well is located subject to approval by the relevant Minister or the Minister's agent.
6. Activities shall not have an unacceptable detrimental impact on cultural, heritage or social values.
7. The activity must not adversely affect water-dependent ecosystems nearby.
8. The well driller must submit a Well Completion Report to the Department within 30 days of completion of each activity authorised by this well construction permit.

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

9. Well Construction must comply with the mandatory requirements of the Minimum Construction Requirements for Water Bores in Australia (4th Edition) and the General Specifications for Well Drilling Operations Affecting Water in South Australia (or any subsequent or related policy), as provided by the relevant authority.
10. The authorised activity must be undertaken by a licensed driller.
11. If the well is considered unsatisfactory, it may be abandoned and a replacement well may then be constructed provided that the abandoned well is backfilled prior to the drill rig leaving the site.
12. Water samples are required from all wells drilled in respect of this permit.
13. Strata samples are not required.
14. The licensed well driller must forward with the report a plan obtained from the permit holder, who must mark thereon the location of all wells drilled in respect of this permit.
15. All wells must be drilled vertical unless written permission is obtained from the Minister.
16. Where a well passes or will pass through two or more aquifers, an impervious seal shall be made and maintained between the aquifers to prevent leakage between the aquifers.
17. All groundwater extracted during sampling and/or purging must be contained and disposed of in an appropriate manner to minimise risk to health and the environment.
18. A lithological log is to be submitted with the drillers well construction report from all wells drilled in respect of this permit as per the National Environmental Protection (assessment of Site Contamination) measure 1999.
19. Wells are to be backfilled when no longer required for ongoing monitoring and investigation purposes.
20. The well is not to penetrate beyond a depth of 30 metres unless approved by the Regional Hydrogeologist.
21. Due to known soil/groundwater contamination in the sediments and aquifers above, caution should be taken in the drilling and/or cementing of this well.

NOTES:

1. Under section 216(1)(b)(ii) of the Act, you have a right of appeal to the Environment, Resources and Development Court against the imposition of any condition on this permit. The appeal must be instituted within six weeks of the date of permit issue. The appeal must also be served upon this department within that time.
2. This permit is not transferable.
3. This well construction permit is not an authorisation for a person to enter private property and prior authority must be obtained from the land owner in all circumstances.
4. The issue of this permit does not negate the requirement to comply with the provisions of other Acts that may impact on the activity undertaken pursuant to this permit.
5. This permit is not an approval to clear native vegetation.
6. It is recommended that all drilling equipment be decontaminated prior to construction of a new well or rehabilitation of an existing well to prevent the introduction or transfer of iron bacteria. Similar precautions should also be taken with pump installation equipment.

DEPARTMENT FOR ENVIRONMENT AND WATER

Mt Gambier Office | PO Box 1046 | Mt Gambier SA 5290 | [P] 8735 1134 [F] 8735 1135

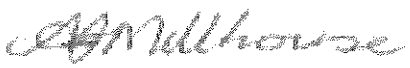
PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

7. Due to potential land contamination issues it is recommended that a hydrogeological assessment be carried out to determine the long term prospects for groundwater quality and quantity with regard to the site and desired use.
8. This permit does not authorise the taking of water from the well for any purpose other than testing.
9. If the extracted groundwater supply is required for human consumption, it is recommended that the water be quality tested.

TAKE NOTE that the permit holder, or a person acting on behalf of the permit holder, who contravenes or fails to comply with a condition of this permit is guilty of an offence, and such acts or ommisions may result in the variation, suspension or revocation of the permit.



Date: 06/10/2022

Alicia Millhouse
Water Licensing Officer
Delegate of Minister for Climate, Environment and Water

GOVERNMENT OF SOUTH AUSTRALIA

DEPARTMENT FOR ENVIRONMENT AND WATER

Mt Gambier Office | PO Box 1046 | Mt Gambier SA 5290 | [P] 8735 1134 [F] 8735 1135

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

Subject to full compliance with all the procedures, specifications and limitations contained or referred to, in the conditions set out below,

Permit No:	428622
Expiry Date:	06/10/2023

Permission is hereby granted to: GHD PTY LTD
ACN 008 488 373
LEVEL 4, 211 VICTORIA SQUARE
ADELAIDE SA 5000

To undertake the following water affecting activity:

Activity: Well Construction

Well Use: Investigation

CONDITIONS:

1. The activity authorised by this permit must only be undertaken on the land described below:

   CT 5808/746
   Allotment 68 in Filed Plan 12879
   Hundred of Adelaide

2. The equipment, materials and methods used in drilling, plugging, backfilling or sealing of a well, or the replacement or alteration of the casing, lining or screen of a well, shall not adversely affect the quality of an underground water resource.
3. Aquifers shall be protected during drilling, plugging, backfilling or sealing of a well, or the replacement or alteration of the casing, lining or screen of a well, to prevent adverse impacts upon the integrity of the aquifer.
4. This work may be subject to inspection by the Department's Drilling Inspectors.
5. If this well is incidental/ancillary to mining operations authorised under the Mining Act 1971, or a regulated activity under the Petroleum and Geothermal Energy Act 2000 (Acts), the well must be decommissioned (as outlined in the Minimum Construction Requirements for Water Bores in Australia Fourth Edition) prior to the relinquishment of the licence or lease under the associated Acts, unless alternative formal arrangements can be made with the owner or occupier of the land on which the well is located subject to approval by the relevant Minister or the Minister's agent.
6. Activities shall not have an unacceptable detrimental impact on cultural, heritage or social values.
7. The activity must not adversely affect water-dependent ecosystems nearby.
8. The well driller must submit a Well Completion Report to the Department within 30 days of completion of each activity authorised by this well construction permit.

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

9. Well Construction must comply with the mandatory requirements of the Minimum Construction Requirements for Water Bores in Australia (4th Edition) and the General Specifications for Well Drilling Operations Affecting Water in South Australia (or any subsequent or related policy), as provided by the relevant authority.
10. The authorised activity must be undertaken by a licensed driller.
11. If the well is considered unsatisfactory, it may be abandoned and a replacement well may then be constructed provided that the abandoned well is backfilled prior to the drill rig leaving the site.
12. Water samples are required from all wells drilled in respect of this permit.
13. Strata samples are not required.
14. The licensed well driller must forward with the report a plan obtained from the permit holder, who must mark thereon the location of all wells drilled in respect of this permit.
15. All wells must be drilled vertical unless written permission is obtained from the Minister.
16. Where a well passes or will pass through two or more aquifers, an impervious seal shall be made and maintained between the aquifers to prevent leakage between the aquifers.
17. All groundwater extracted during sampling and/or purging must be contained and disposed of in an appropriate manner to minimise risk to health and the environment.
18. A lithological log is to be submitted with the drillers well construction report from all wells drilled in respect of this permit as per the National Environmental Protection (assessment of Site Contamination) measure 1999.
19. Wells are to be backfilled when no longer required for ongoing monitoring and investigation purposes.
20. The well is not to penetrate beyond a depth of 30 metres unless approved by the Regional Hydrogeologist.
21. Due to known soil/groundwater contamination in the sediments and aquifers above, caution should be taken in the drilling and/or cementing of this well.

NOTES:

1. Under section 216(1)(b)(ii) of the Act, you have a right of appeal to the Environment, Resources and Development Court against the imposition of any condition on this permit. The appeal must be instituted within six weeks of the date of permit issue. The appeal must also be served upon this department within that time.
2. This permit is not transferable.
3. This well construction permit is not an authorisation for a person to enter private property and prior authority must be obtained from the land owner in all circumstances.
4. The issue of this permit does not negate the requirement to comply with the provisions of other Acts that may impact on the activity undertaken pursuant to this permit.
5. This permit is not an approval to clear native vegetation.
6. It is recommended that all drilling equipment be decontaminated prior to construction of a new well or rehabilitation of an existing well to prevent the introduction or transfer of iron bacteria. Similar precautions should also be taken with pump installation equipment.

Mt Gambier Office | PO Box 1046 | Mt Gambier SA 5290 | [P] 8735 1134 [F] 8735 1135

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

7. Due to potential land contamination issues it is recommended that a hydrogeological assessment be carried out to determine the long term prospects for groundwater quality and quantity with regard to the site and desired use.
8. This permit does not authorise the taking of water from the well for any purpose other than testing.
9. If the extracted groundwater supply is required for human consumption, it is recommended that the water be quality tested.

TAKE NOTE that the permit holder, or a person acting on behalf of the permit holder, who contravenes or fails to comply with a condition of this permit is guilty of an offence, and such acts or ommisions may result in the variation, suspension or revocation of the permit.

Date: 06/10/2022

Alicia Millhouse
Water Licensing Officer
Delegate of Minister for Climate, Environment and Water

GOVERNMENT OF SOUTH AUSTRALIA

DEPARTMENT FOR ENVIRONMENT AND WATER

Mt Gambier Office | PO Box 1046 | Mt Gambier SA 5290 | [P] 8735 1134 [F] 8735 1135

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

Subject to full compliance with all the procedures, specifications and limitations contained or referred to, in the conditions set out below,

Permit No:	428623
Expiry Date:	06/10/2023

Permission is hereby granted to: GHD PTY LTD
ACN 008 488 373
LEVEL 4, 211 VICTORIA SQUARE
ADELAIDE SA 5000

To undertake the following water affecting activity:

Activity: Well Construction

Well Use: Investigation

CONDITIONS:

1. The activity authorised by this permit must only be undertaken on the land described below:

   CT 5808/746
   Allotment 68 in Filed Plan 12879
   Hundred of Adelaide

2. The equipment, materials and methods used in drilling, plugging, backfilling or sealing of a well, or the replacement or alteration of the casing, lining or screen of a well, shall not adversely affect the quality of an underground water resource.
3. Aquifers shall be protected during drilling, plugging, backfilling or sealing of a well, or the replacement or alteration of the casing, lining or screen of a well, to prevent adverse impacts upon the integrity of the aquifer.
4. This work may be subject to inspection by the Department's Drilling Inspectors.
5. If this well is incidental/ancillary to mining operations authorised under the Mining Act 1971, or a regulated activity under the Petroleum and Geothermal Energy Act 2000 (Acts), the well must be decommissioned (as outlined in the Minimum Construction Requirements for Water Bores in Australia Fourth Edition) prior to the relinquishment of the licence or lease under the associated Acts, unless alternative formal arrangements can be made with the owner or occupier of the land on which the well is located subject to approval by the relevant Minister or the Minister's agent.
6. Activities shall not have an unacceptable detrimental impact on cultural, heritage or social values.
7. The activity must not adversely affect water-dependent ecosystems nearby.
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PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

9. Well Construction must comply with the mandatory requirements of the Minimum Construction Requirements for Water Bores in Australia (4th Edition) and the General Specifications for Well Drilling Operations Affecting Water in South Australia (or any subsequent or related policy), as provided by the relevant authority.
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17. All groundwater extracted during sampling and/or purging must be contained and disposed of in an appropriate manner to minimise risk to health and the environment.
18. A lithological log is to be submitted with the drillers well construction report from all wells drilled in respect of this permit as per the National Environmental Protection (assessment of Site Contamination) measure 1999.
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DEPARTMENT FOR ENVIRONMENT AND WATER

Mt Gambier Office | PO Box 1046 | Mt Gambier SA 5290 | [P] 8735 1134 [F] 8735 1135

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 112 of the Landscape South Australia Act 2019

WELL PERMIT

7. Due to potential land contamination issues it is recommended that a hydrogeological assessment be carried out to determine the long term prospects for groundwater quality and quantity with regard to the site and desired use.
8. This permit does not authorise the taking of water from the well for any purpose other than testing.
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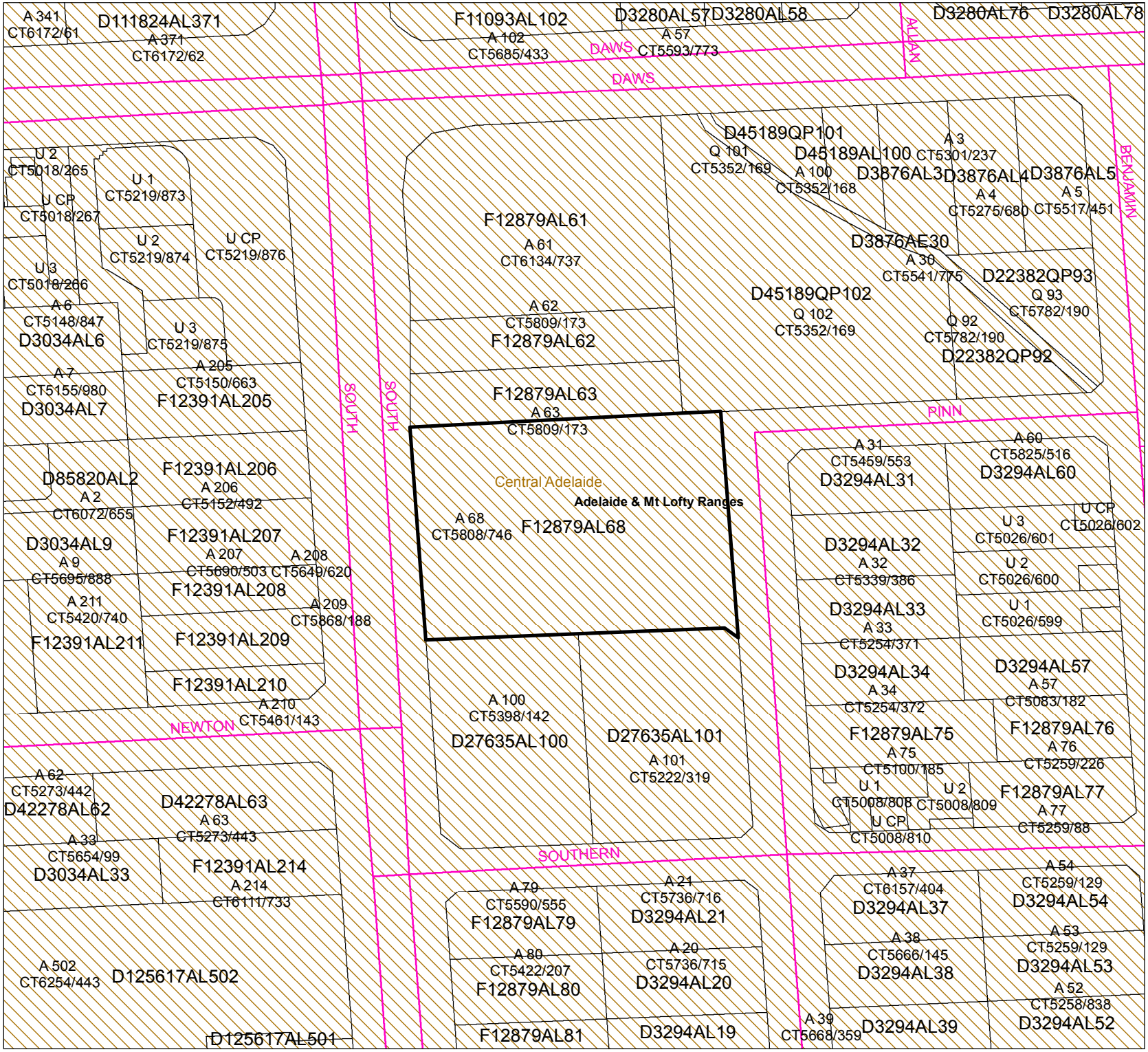
Date: 06/10/2022

Alicia Millhouse
Water Licensing Officer
Delegate of Minister for Climate, Environment and Water



PLEASE ATTACH WELL LOCATION MAP TO THE DRILLERS REPORT

CUSTOMER: GHD P/L
Permit No: 428620 - 428623
Prescribed Area/NOP: CAPWA
Hundred: ADELAIDE
Suburb: ST MARYS
NRM Region/Plan: AMLR
CT 5808/746, F12879, A68

Legend

- MAR_Sites
- MAR_Sites_300m_Buffer
- DCDB.ParcelCadastreFull
- DCDB.PARCEL
- Topo.Roads
- NrmRegions
- Prescribed Surfacewater Area
- Prescribed Water Resources Area
- Prescribed Wells Area
- Prescribed Watercourse
- River Murray Protection Area

0 45 90
Meters

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Appendix I

Well Survey Report

LINKUP CONSTRUCTION SURVEYS PTY LTD

`

To: Steven Castillo
Company: GHD
Phone: 8111 6832

From: Lincoln Jeffery
Phone: 0414 840 569
Email: Lincoln@linkupconstructionsurveys.com.au

Date: 12/10/2022

Monitoring well coordinates – St Mary's MFS
1125 South Road, St Marys SA

Well or Bore No.	Easting MGA20	Northing MGA20	R.L. Top of Casing A.H.D.	Natural Surface A.H.D.
GW201B	278700.338	6124961.159	31.469	31.530
GW7003	278690.367	6124914.632	31.436	31.544
GW80001B	278706.958	6124952.792	31.708	31.783
GW8002B	278701.151	6124952.805	31.534	31.621
MW01	278750.396	6124923.553	31.787	31.858
MW02	278728.359	6124974.907	32.071	32.194
MW03	278705.145	6124972.395	31.597	31.676
MW04	278688.686	6124963.288	31.218	31.352

All Survey information was based from the MGA20 Z54 grid system and Australian Height Datum (AHD), Triangulated from Network Survey Marks.

LINKUP CONSTRUCTION SURVEYS PTY LTD

`

To: Steven Castillo
Company: GHD
Phone: 8111 6832

From: Lincoln Jeffery
Phone: 0414 840 569
Email: Lincoln@linkupconstructionsurveys.com.au

Date: 29/04/2023

Monitoring well coordinates – St Mary's MFS
1125 South Road, St Marys SA

Well or Bore No.	Easting MGA20	Northing MGA20	R.L. Top of Casing A.H.D.	Natural Surface A.H.D.
GW201B	278700.338	6124961.159	31.469	31.530
GW7003	278690.367	6124914.632	31.436	31.544
GW80001B	278706.958	6124952.792	31.708	31.783
GW8002B	278701.151	6124952.805	31.534	31.621
MW01	278750.396	6124923.553	31.787	31.858
MW02	278728.359	6124974.907	32.071	32.194
MW03	278705.145	6124972.395	31.597	31.676
MW04	278688.686	6124963.288	31.218	31.352
MW05	**278558.742**	**6124973.732**	**30.162**	**30.267**
MW07	**278431.973**	**6125245.162**	**28.313**	**28.437**

All Survey information was based from the MGA20 Z54 grid system and Australian Height Datum (AHD), Triangulated from Network Survey Marks.

Appendix J

Calibration Certificates

Oil / Water Interface Meter

Instrument Geotech Interface Meter (30M)
Serial No. 4021

airmet
Air-Met Scientific Pty Ltd
1300 137 067

Item	Test	Pass	Comments
Battery	Compartment	✓	
	Capacity	✓	
	above 7.9v	✓	
Probe	Cleaned/Decon.	✓	
	Operation	✓	
Connectors	Condition	✓	
		✓	
Tape Check	Cleaned	✓	
Connectors	Checked for cuts	✓	
Instrument Test	At surface level	✓	

Certificate of Calibration

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

Calibrated by: Anthony Marafioti

Calibration date: 04-Oct-22

Next calibration due: 02-Apr-23

Solinst Model 122 Interface Meter

airmet

Air-Met Scientific Pty Ltd
1300 137 067

Instrument Interface Meter (30M)
Serial No. 312011

Item	Test	Pass	Comments
Battery	Compartment	✓	
	Capacity	✓	8.74 V
Probe	Cleaned/Decon.	✓	
	Operation	✓	
Connectors	Condition	✓	
		✓	
Tape Check	Cleaned	✓	
Connectors	Checked for cuts	✓	
Instrument Test	At surface level	✓	

Certificate of Calibration

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

Calibrated by: Trent Chase

Calibration date: 9/03/2023

Next calibration due: 8/05/2023

Multi Parameter Water Meter

Instrument **YSI Quatro Pro Plus**
Serial No. **12C101247**

airmet
Air-Met Scientific Pty Ltd
1300 137 067

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

Certificate of Calibration

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

Sensor	Serial no	Standard Solutions	Certified	Solution Bottle Number	Instrument Reading
1. D.O		0 ppm		1640	0 ppm
2. Conductivity		2496 uS @ 24.8°C		385407	2480 uS
3. pH7		pH 7.00		386467	pH 7.00
4. pH4		pH 4.00		389384	pH 4.00
5. ORP mV		233.78 @ 22.5 °C		355023/355024	233.8
6. Temp °C		21.3		Multitherm	21.3

Calibrated by: **Trent Chase**

Calibration date: **9-Mar-23**

Next calibration due: **5-Sep-23**

Oil / Water Interface Meter

Instrument Interface Meter (60M)
Serial No. 485330

airmet
Air-Met Scientific Pty Ltd
1300 137 067

Item	Test	Pass	Comments
Battery	Compartment	✓	
	Capacity	✓	9.02 V
Probe	Cleaned/Decon.	✓	
	Operation	✓	
Connectors	Condition	✓	
		✓	
Tape Check	Cleaned	✓	
	Checked for cuts	✓	
Instrument Test	At surface level	✓	

Certificate of Calibration

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

Calibrated by: **Trent Chase**

Calibration date: **24/03/2023**

Next calibration due: **23/05/2023**

Multi Parameter Water Meter

Instrument **YSI Quatro Pro Plus**
Serial No. **12C101247**

airmet
Air-Met Scientific Pty Ltd
1300 137 067

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

Certificate of Calibration

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

Sensor	Serial no	Standard Solutions	Certified	Solution Bottle Number	Instrument Reading
1. D.O		0 ppm		1640	0 ppm
2. Conductivity		2602 uS @ 22.0°C		385407	2600 uS
3. pH7		pH 7.00		386467	pH 7.00
4. pH4		pH 4.00		389384	pH 3.99
5. ORP mV		229.38 @ 22.0 °C		355023/355024	229.4 uS
6. Temp °C		22.0 °C		Multitherm	22.2 °C

Calibrated by: **Trent Chase**

Calibration date: **24-Mar-23**

Next calibration due: **20-Sep-23**

KENNARDS HIRE

EQUIPMENT CERTIFICATION REPORT

PGN9003871 WATER QUALITY METER – MULTIFUNCTION (AQUATROLL 600)

Plant Number: 235611 **Serial Number:** 466943

SENSOR	CONCENTRATION	SPAN 1	SPAN 2	TRACEABILITY	PASS
pH	pH 4.00 / pH 7.00	4.00 pH	7.00 pH	380324 330434	☑
Conductivity	12.88 mS/cm	12.88 mS/cm	N/A	364454	☑
Dissolvent Oxygen	Sodium Sulphite	0% in Sodium Sulphite	100 % Saturation in Air	10465	☑
Redox (ORP)	240 mV @ 25degC	240 mV	N/A	5931	☑
~~Turbidity~~	~~360 NTU~~	~~0.0 NTU~~	~~360 NTU~~		☑

Battery Status 100 %	Temperature 28,1 °C
Electrical Test & Tag (AS/NZS 3760)	Electrodes Cleaned and Checked

Note: Calibration solution traceability information is available upon request.

Checked By: Wilma Foachi Date: 26/4/24 Signed:

Accessories List:

User's Manual	Transit Case	Blue Top Cap
Probe Guard	Tablet with Vu-Situ App	Wireless Bluetooth Receiver
Charger With USB Cable	Backshell / Hanger Connector	Spare D Batteries

Appendix K

Quality Assurance and Quality Control Report (in progress)

Laboratories and data set

The bitumen, concrete, soil and groundwater samples collected in October 2022 were submitted to Envirolab as the primary laboratory and ALS as the secondary laboratory. The groundwater samples collected in March/April 2023 were submitted to ALS as the primary laboratory and Eurofins as the secondary laboratory. These laboratories are NATA accredited to perform the required analysis.

The selected laboratories conducted the requested analyses in accordance with the guidelines outlined in the National Environment Protection (Assessment of Site Contamination) Measure 1999 (ASC NEPM), as amended in 2013 (NEPC 1999).

The primary results and QA/QC results were reported in the laboratory Certificates of Analysis provided in Appendix G.

Data quality indicators

Table K.1 provides a review of the DQIs adopted during the sampling investigation.

Table K.1 DQI review

DQI	Objective	Outcome	References
GHD Internal Procedures			
Comparison of field and analytical data	Agreement between visual and olfactory evidence with laboratory results	Achieved	This was reflected in analytical results. Eurofins/ALS Certificates of Analysis (Appendix G) and Field Records (Appendix D)
Calibration of field instruments	Meet calibration specifications	Achieved	Calibration certificates can be found in Appendix J
Chain of Custody documentation	Supply Chain of Custody Documentation with all samples	Achieved	Copies of Chain of Custody Documentation (Appendix G)
Sample analysis and extraction holding times	Comply with holding times	Achieved	Envirolab / ALS / Eurofins Laboratory Quality Control Reports (Appendix G)
Analysis of inter and intra-laboratory duplicate samples	Analysis of duplicate samples in 10% of primary samples	Achieved	PFAS NEMP and ASC NEPM 1999 (as amended 2013) and ALS/Eurofins certificates of analysis (Appendix G)
External Laboratory Procedures			
Analysis of laboratory method blanks	No contamination of blanks	Achieved	Envirolab / ALS / Eurofins Laboratory Quality Control Reports (Appendix G)
Analysis of laboratory spike recoveries	Recoveries within the laboratory specified recovery limits	Achieved	Envirolab / ALS / Eurofins Laboratory Quality Control Reports (Appendix G)
Analysis of laboratory internal duplicates	Frequencies and RPDs within guideline and internal laboratory limits (RPD of 0-30%)	Achieved	ASC NEPM 1999 (as amended 2013). Envirolab / ALS / Eurofins Laboratory Quality Control Reports (Appendix G)

QA/QC assessment method

Established QA/QC procedures to assess data quality were maintained throughout the project. The QA/QC program undertaken as part of the assessment by GHD included the following:

– Use of appropriately qualified and trained staff.
– Use of PFAS-free sampling equipment and laboratory sample containers.
– Preservation of samples with ice during transport from the field to the laboratory.

– Transportation of samples with accompanying chain-of-custody documentation.
– Compliance with sample holding times.
– Review of results of blind duplicate samples.
– Review of results of split duplicate samples.
– Review of results of field blank samples.
– Review of internal analysis of laboratory duplicates, spikes and blanks.

The QC program employed during this investigation was in accordance with the general requirements set out in the Australian Standard AS4482.1 (2005) and the PFAS NEMP 2.0 (HEPA 2020). QC samples provide information that discounts or potentially identifies errors due to possible sources of cross contamination, inconsistencies in sampling and analytical techniques used. The QC program completed included the collection and analysis of duplicate samples, rinsate samples and trip blank samples as described below:

– **Blind duplicate samples:** These are coded duplicate samples submitted to the primary laboratory for analysis as individual samples without any indication to the laboratory that they have been duplicated.
– **Split duplicate samples:** These are duplicate samples split in the field, with one sample being sent to a secondary laboratory for analysis. The same parameters are analysed utilising similar analytical techniques.
– **Rinsate samples:** A rinsate sample is collected from a re-usable piece of equipment to detect potential cross-contamination between sampling locations.
– **Field Blanks:** A sample of laboratory supplied analyte free (blank) deionised water collected in the field to assess the potential for cross contamination during the sampling process in the field.

A quantitative measure of the accuracy of the check analyses results obtained was made using calculated relative percentage difference (RPD) values. The RPD values were calculated using the following equation.

$$RPD(\%) = \frac{\langle Co - Cs \rangle}{\left\langle \frac{Co + Cs}{2} \right\rangle} \times 100$$

Where Co = concentration obtained from the original sample

Cs = concentration obtained from the duplicate sample

GHD adopts the acceptance criteria of 30% and 50% RPD for field duplicates of PFAS / inorganics and organics, respectively. Blind duplicate and split samples should have RPDs less than the criteria in each instance. However, it is noted that the criteria will not always be achieved, particularly in heterogeneous materials, or at low analyte concentrations. RPD acceptance criteria were not applied where analyte concentrations were less than ten times the laboratory LOR. In the instance where samples and their corresponding duplicates have concentrations of target analytes less than the laboratory LOR, no quantitative comparison can be carried out and therefore the RPD is undefined.

GHD field quality control

Duplicate samples

All RPD values were within the acceptable ranges with exceptions summarised in Table K.2. All soil and groundwater RPD results can be found in full in Table 8 and Table 9.

Table K.2 Blind duplicate and split duplicate RPD exceedance summary

Primary sample	QAQC samples	Analyte	Primary result	Duplicate result	Split result	Highest RPD
Soil (results in mg/kg)						
BH09_1.0-1.2	FD02 FS02	PFHxS	0.0021	0.0008	0.0023	90%
		PFOA	0.0042	0.0015	0.0027	95%

Primary sample	QAQC samples	Analyte	Primary result	Duplicate result	Split result	Highest RPD
		Sum of PFHxS and PFOS	0.0022	0.0009	0.0023	84%
		Sum of PFOS and PFOA	0.0044	0.0017	0.0027	89%
		PFAS (Sum of Total)	0.0065	0.0025	0.0050	89%
BH06_0.2-0.4	FD06 FS06	PFOS	0.048	0.037	0.0302	46%
		PFOA	0.0024	0.0016	0.0012	67%
		Sum of PFHxS and PFOS	0.052	0.041	0.0338	42%
Groundwater (results in µg/L)						
GW201b	FD01 FT01	PFOS	0.30	0.31	0.419	33%
		PFOA	0.023	0.022	0.037	47%
		Ionic balance	-6.0	-5.0	2.97	592%

Soil RPD exceedances are likely due to the heterogeneity of soil samples. Given all other RPD values are within the acceptable range, GHD considers the data set to be of an acceptable quality for this assessment. Additionally, given the low-level concentrations detectable for PFAS compounds the likelihood of elevated RPD values is increased.

Groundwater RPD exceedances found in PFAS samples were considered minor given they were within the same order of magnitude.

Where an RPD non-conformance was identified the highest value was adopted for the purpose of this assessment.

Blind duplicate and split duplicate sample frequency

A summary of the blind and split duplicate sample frequency is presented in Table K.3.

Table K.3 Blind duplicate and split duplicate sample frequency

Matrix	Primary Samples Count	Blind Duplicate Samples Count	Percentage of Primary Samples	Required QC sample frequency of 10% met?	Split Samples Count	Percentage of Primary Samples	Required QC sample frequency of 10% met?
Bitumen	2	0	0%	No	0	0%	No
Concrete	3	0	0%	No	0	0%	No
Soil	31	3	9.7%	No	3	9.7%	No
Groundwater	15	3	20%	Yes	2	13%	Yes

The QC rates for the groundwater investigation satisfy the data quality objective for this investigation as they are in general accordance with the ASC NEPM and the PFAS NEMP 2.0 (2020). The QC rates for the soil investigation are in general accordance with the ASC NEPM and just below the requirements of the PFAS NEMP. There are considered to satisfy the data quality objective for this investigation.

Field Blanks

All analytes were reported below the laboratory LOR for the field blank sample analysed. Field blank results are presented in Table 10.

Rinsate Blanks

All analytes were reported below the laboratory LOR for the rinsate sample analysed. Rinsate blank results are presented in Table 10.

Laboratory QA/QC

Results of the internal laboratory quality control programs are included in the laboratory reports provided in Appendix G.

Internal duplicates

RPDs for laboratory internal duplicates were within the laboratory nominated accepted ranges except for those presented in Table K.4.

Table K.4 Laboratory duplicate RPD outliers

Analyte	Laboratory report	Laboratory comments
Total metals by ICP-AES	EM2305630	RPD (35.5%) exceeds LOR based limits (0%-20%)

Matrix spikes

Matrix spikes were within the laboratory acceptable ranges, except for those presented in Table K.5

Table K.5 Matrix spike outliers

Analyte	Laboratory report	Laboratory comments
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	EM2219930	Spike recovery (68%) less than lower data quality objective (70%)
Sulfate	EM2238081, EM2305704, EM2307449	Matrix spike recovery not determined, background level greater than or equal to 4x spike level.
Chloride	EM2238081, EM2305704	Matrix spike recovery not determined, background level greater than or equal to 4x spike level.
Perfluoroalkyl sulfonic acids (PFBS, PFPeS), PFHxS, PFHpS, PFOS)	EM23207449	Matrix spike recovery not determined, background level greater than or equal to 4x spike level.
Perfluoroalkyl carboxylic acids (PFPeA, PFHxA, PFHpA, PFOA, and PFNA)	EM23207449	Matrix spike recovery not determined, background level greater than or equal to 4x spike level.
Perfluorbutanoic acid (PFBA)	EM23207449	Matrix spike recovery (57.1%) less than lower data quality objective (73%)
Perfluorpentanoic acid (PFPeA)	EM23207449	Matrix spike recovery (68.6%) less than lower data quality objective (72%)
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	EM23207449	Matrix spike recovery (69.4%) less than lower data quality objective (70%)
Total Recoverable Mercury	EM2308182	Matrix spike recovery (34.5%) less than lower data quality objective (70%)

Laboratory control spikes

Laboratory control spikes were within the laboratory nominated acceptable ranges.

Method blanks

All reported concentrations for laboratory method blanks analysed by both laboratories were less than their respective laboratory reporting limits.

Holding times

All samples were analysed for all analytes within the required holding times in accordance with the ASC NEPM, except for those listed in Table K.7.

Table K.6 Analysis holding time outliers

	Laboratory report	Laboratory comments
Total dissolved solids	EM2308182	Nine days overdue (date analysed 12/05/2023, date due for analysis 03/05/2023)

Laboratory QA/QC summary

Given the relatively low number of laboratory QA/QC result outliers and the presence of matrix interference in the matrix spike outliers, GHD considers the data to be of satisfactory precision on which to base the assessment.

Conclusion

Based on the QA/QC program undertaken during the sampling programs, the data obtained during the assessment is considered to be robust and defensible on which to base interpretations and draw conclusions regarding the environmental status of the site.

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