



MFS Christie Downs Station

Detailed Site Investigation

South Australian Metropolitan Fire Service

November 29, 2023

→ The Power of Commitment



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Executive Summary

GHD Pty Ltd (GHD) was engaged by the South Australian (SA) Metropolitan Fire Service (MFS) to undertake a Detailed Site Investigation (DSI) for the Christie Downs Fire Station, located at Lot 121 Holman Road, Christie Downs, South Australia 5164 (the site).

In 2022, GHD undertook a site history review of 17 MFS sites (GHD 2022) and inspections of eight metropolitan sites to support environmental risk profiling using a multi-criteria analysis approach. The work was required to address the potential risks associated with former use of AFFF containing PFAS. The sites were prioritised to assist with the implementation of appropriate assessment and management measures to address the potential PFAS risks. The Christie Downs station was identified as high priority due to a history of AFFF use, identified soil impacts and proposed divestment.

The objective of this investigation is to address the SA EPA's requirement to undertake a DSI in order to assess:

- The nature and extent of PFAS contamination, both on- and off-site,
- The potential risks to human health and the environment associated with identified PFAS contamination on-site, in the context of continued commercial/industrial use and potential future residential use,
- 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

The following scope of works was undertaken in general accordance with the SAQP (GHD 2023):

- Six surface soil samples in areas of exposed soil,
- Advancement of 11 soil bores, eight on-site and three off-site,
- Installation of one groundwater monitoring well,
- Surveying of the one newly installed groundwater monitoring well relative to Australian Height Datum (AHD),
- Disposal of waste soil by a licenced contractor,
- Preparation of this DSI

Based on the information presented in this DSI report, it is considered that site contamination exists in relation to PFAS impacts identified in soil in the eastern portion of the site. The highest impacts are observed in the unsealed open ground north of the former training area.

Should the site be developed to a more sensitive land use, such as residential, PFAS impacts identified in the former training area soil present a potential risk to human health. Under the current commercial/industrial land use setting, no risk exists. GHD recommends further intrusive assessment works to delineate the nature and spatial extent of the contamination within this portion of the site along with the associated risk to human health and ecology. Soil samples taken within the former training area specifically, within the unsealed portions, reported elevated PFAS concentrations exceeding the ecological direct and/or indirect exposure criteria for PFOS. Surface soil sample SS03 reported elevated concentrations of PFAS disconnected from the primary source, inferring a possible second source of contamination. The vertical and lateral extent of PFAS contamination identified at this location has not yet been delineated, and further sampling to the north of this location would be required for lateral delineation.

GHD recommends further intrusive assessment works to delineate the nature and spatial extent of the contamination within this portion of the site along with the associated risk to human health and ecology. Further assessment would be required should the site use ever change, with further determination of the extent informing on preventative methods or disposal of contaminated soil. GHD also recommends assessment of soil north of site to confirm whether elevated concentrations of PFAS are present and the identifiable impacts associated.

This report is subject to, and must be read in conjunction with, the limitations set out in section 1.5 and the assumptions and qualifications contained throughout the Report.

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 <i>Guidelines for the Assessment and Remediation of Site Contamination 2019</i>
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

Abbreviation	Full Form
RPD	Relative Percentage Difference
SA EPA	South Australian Environment Protection Authority
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 <i>Environmental Protection (Water Quality) Policy</i> 2015

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1. Introduction

GHD Pty Ltd (GHD) was engaged by the South Australian (SA) Metropolitan Fire Service (MFS) to undertake a Detailed Site Investigation (DSI) for the former Christie Downs Fire Station, located at Lot 121 Holman Road, Christie Downs, South Australia 5164 (the site). The station is currently closed and became non-operational in December 2022. GHD understands that MFS are planning to divest the site.

This DSI is limited to potential impacts from the use of aqueous film-forming foam (AFFF) containing per- and poly-fluoroalkyl substances (PFAS) to address the action required by the SA Environment Protection Authority (EPA) letter GENI 62917 (refer to Appendix A). Other potential contaminating activities and related contaminants of concern (CoC) were not included in this assessment.

1.1 Background

The site began operation on 17 March 1978 and was staffed by full-time firefighters who provided 24-hour emergency response until its closure in December 2022.

Historically, MFS have used AFFF containing PFAS at the site during training activities. MFS commenced phasing out the use of firefighting foams containing perfluorooctane sulfonate (PFOS) in 2007 and perfluorooctanoic acid (PFOA) in 2014 after consultation with the Australasian Fire and Emergency Service Authorities Council (AFAC) and the SA EPA. MFS replaced all firefighting foam in 2016 to a fluorine-free foam product. During 2017/2018, MFS also removed all fire extinguishers containing PFAS from their sites.

In 2022, GHD undertook a site history review of 17 MFS sites (GHD 2022) and inspections of eight metropolitan sites to support environmental risk profiling using a multi-criteria analysis approach. The work was required to address the potential risks associated with former use of AFFF containing PFAS. The sites were prioritised to assist with the implementation of appropriate assessment and management measures to address the potential PFAS risks. The former Christie Downs station was included in the scope of works and identified as a high priority due to a history of AFFF use, identified soil impacts and proposed divestment. The GHD 2022 report was provided to the SA EPA who subsequently issued a letter dated 1 February 2023 (EPA GENI 62917) with the requirement to provide “a plan of proposed works and associated timelines to address the highest risk sites”.

GHD have completed a Preliminary Site Investigation (PSI) and Sampling Analysis and Quality Plan (SAQP) for the site. This DSI was prepared to address the data gaps identified in the PSI and the scope of works was undertaken in accordance with the SAQP.

1.2 Objective

The objective was to assess for the presence of PFAS contamination in soil and/or groundwater which may be present at the site as a result of historical firefighting operations and training activities.

1.3 Purpose

The purpose of the investigation was to:

- Respond to SA EPA requirement to undertake a DSI to assess:
 - The nature and extent of PFAS contamination in soils and groundwater, both on- and off-site,
 - The potential risks to human health and the environment associated with identified PFAS contamination on-site, in the context of continued commercial/industrial use and potential future residential use,
 - The potential risks to human health and the environment associated with PFAS contamination migrating off-site, in the context of the relevant off-site land uses and receiving environments
- Discuss potential risks posed by PFAS contamination at the site for a potentially more sensitive land use (i.e., residential) following proposed divestment by MFS

1.4 Scope of Works

The following scope of works was undertaken in general accordance with the SAQP (GHD 2023):

- Six surface soil samples collected in areas of exposed soils (garden beds) at the site,
- Advancement of 11 soil bores targeting former training, washdown and PFAS storage areas,
- Installation of one groundwater monitoring wells (installed dry),
- Preparation of this DSI report

1.5 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 1.3 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 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.

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.

Accessibility of documents

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.

2. Site information

2.1 Site identification

A summary of general site information is provided in Table 2.1.

Table 2.1 Summary of General Site Identification Information

Item	Detail
Site Address	Lot 121 Holman Road, Christie Downs, South Australia
Certificate of Title	CT 5534/85 and CT 5534/90
Legal Description	Allotments 120 and 121 in Deposited Plan 10165 in the area named, Christies Downs, Hundred of Noarlunga
Local Government Authority	City of Onkaparinga
Current Zoning	Housing Diversity Neighbourhood
Property Owner	South Australian Metropolitan Fire Service
Current Site Use	Non-operational fire station
Area	2,255 m ²
Site Elevation	64-70 m Australian Height Datum (AHD)

2.2 Site description

2.2.1 Site inspection and description

The site is located on Holman Road between Flaxmill Road to the south and Osmund Crescent to the north. The site is accessible via Flaxmill Road with a carpark on Holman Road and a small reserve opposite the eastern boundary. The site was used as an operational fire station until December of 2022. During a site inspection undertaken in June 2022, as part of the PSI (GHD 2023b), the site infrastructure comprised the main office building and attached engine bay in the centre of the site, a driveway along the southern site boundary and a shed at the north-west boundary. At the time of the inspection there were citrus trees growing along the site boundary to the south. MFS has advised that all stations were directed to remove edible vegetation by 31 October 2022.

Site Photographs from the site inspection are presented in Appendix B.

2.2.2 Historical use and storage of PFAS

During the site inspection on 22 June 2022 a questionnaire was distributed and completed by two Station Officers who have worked at the site since 1998 and 2004 regarding the historical use and storage of AFFF at the site.

The results from the questionnaire are presented in the GHD (2023b) PSI. The key points regarding the historical use and storage of PFAS containing AFFF at the site summarised as follows:

- Regular historical training exercises using AFFF were conducted every one to three months for each of the four shifts. Foam training occurred mostly in front of the station on the front apron along the eastern site boundary, which was a bitumen and concrete pad surface
- The estimated volume of PFAS containing AFFF used per training was between 1-20 litres (L), mostly over the sealed area of the front apron and some over the garden area to the north, and off-site with an estimated maximum extent of 20-30 metres (m) over Holman Road, into the adjacent carpark

Locations related to the historical use and storage of PFAS can be found in the PSI (GHD 2023b). A copy of the site survey can be found in Appendix C.

2.3 Surrounding land use

A summary of the uses of the land surrounding the site is provided in Table 2.2. Surrounding land use and zoning are shown in Figure 1.

Table 2.2 *Summary of Surrounding Land Use*

Orientation	Description of Land Use	Zoning (Municipal Council)
North	Osmund Crescent with residential properties beyond	Housing Diversity Neighbourhood
East	Holman Road with an adjacent car park, a small reserve and Flaxmill shopping centre beyond. The shopping centre includes a pharmacy, supermarket and takeaway shops. Residential properties are located beyond the shopping centre.	Suburban Activity Centre Housing Diversity Neighbourhood
South	Lonsdale Telstra Depot followed by Flaxmill Road and Niipu-niipu Wama (Morton Park) skate park and Christies Downs Community House beyond.	Housing Diversity Neighbourhood
South-west	Christie Downs train station and Southern Districts Baseball Club/Peregrine Park.	Housing Diversity Neighbourhood
West	Adjacent the site are residential properties with the Seaford Line of the Adelaide Metropolitan Passenger Rail Network and more residential properties beyond.	Housing Diversity Neighbourhood

3. Previous investigations

Previous PFAS investigations at the Christie Downs station were carried out by GHD in 2019, 2022 and 2023, as documented in the following reports:

- GHD (2019) *MFS State-wide Appliance and Station Sampling*, Report prepared for the South Australian Metropolitan Fire Service by GHD Pty Ltd, May 2019
- GHD (2022) *MFS 17 Fire Stations PFAS Risk Profiling*, Report prepared for the South Australian Metropolitan Fire Service by GHD Pty Ltd, October 2022
- GHD (2023a) *MFS Christie Downs Fire Station Preliminary Site Investigation (PSI)*, Report for the South Australian Metropolitan Fire Service, April 2023
- GHD (2023b) *MFS Christie Downs Fire Station Sampling Analysis and Quality Plan (SAQP)*, Report for the South Australian Metropolitan Fire Service, June 2023

3.1.1 GHD (2019) MFS state-wide appliance and station sampling

GHD (2019) reported that the site was included in preliminary environmental investigations carried out at 35 MFS fire stations across South Australia to assess for the presence of PFAS concentrations that may remain in firefighting appliances, accessible soils, and any biota (fruit, vegetables, herbs and poultry), if present.

Firefighters advised that AFFF training had occurred in the car park in front of the site.

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

- 1 surface soil sample (CHRISTIE_1) was collected from the garden located in southeast corner of the site (next to the letterbox/sign)
- 1 surface soil sample (CHRISTIE_2) was collected from garden located in the north-eastern corner of the site. Neither produced results exceeding any of the 2018 PFAS NEMP adopted guidelines used
- 2 biota samples (CHRISTIE_LIME and CHRISTIE_APRICOT) were collected and no exceedances of the adopted guidelines were reported. These samples were taken as there were multiple fruit trees located along the southern boundary of site and the fruit had historically been consumed by station staff

Sampling locations from the 2019 sampling event can be found in Figure 2.

It is noted that the 2018 PFAS NEMP guidelines were used in this report, which were superseded by the 2020 PFAS NEMP 2.0. However, this has no practical impact on the purposes of this report as the guideline values for soil at commercial/industrial properties are the same in both versions of the PFAS NEMP. In the 2020 PFAS NEMP 2.0, environmental guidelines values that refer to the sum of PFOS and perfluorohexane sulfonate (PFHxS) now explicitly apply not only to the sum of the two but also to PFOS only and to PFHxS only, which was only inferred in the 2018 PFAS NEMP 1.0.

3.1.2 GHD (2022) MFS 17 fire stations PFAS risk profiling

GHD was engaged to undertake a desktop assessment and multi-criteria analysis (MCA) for MFS to support the appropriate risk management approaches associated with PFAS contamination at 17 fire stations across South Australia (eight metropolitan and nine rural). The former Christies Downs Fire Station was part of this and was identified for prioritisation, included with the other 17 sites, by the SA EPA in the letter GENI 62485 dated 21 October 2021.

The methodology and findings of the PFAS risk profiling for the 17 MFS fire stations reported PFAS impacted soils, with the desktop review focused on identifying historical activities that may represent a source of PFAS contamination and potentially sensitive human or ecological receptors in the vicinity of the sites, as well as understanding potential source- pathway-receptor linkages that may be present.

Based on the potential to cause harm to the environment and/or human health, the sites were prioritised within the report for further assessment, with the former Christie Downs MFS fire station being classified as high-risk with high priority for further investigation of PFAS contamination with the former use of PFAS containing AFFF.

3.1.3 GHD (2023a) Preliminary Site Investigation (PSI)

A preliminary site investigation was undertaken to review historical site activities which may have contributed to PFAS contamination at the site and potentially off-site.

The potential risks to human health and the environment outlined in the PCSM were as follows:

- Consumption of contaminated groundwater extracted off-site for domestic/drinking purposes,
- Consumption of edible vegetation grown off-site where plants were irrigated with contaminated groundwater or where plant roots accessed shallow contaminated groundwater. It should be noted that no fruits or vegetables are present at the site
- Incidental ingestion of contaminated groundwater extracted off-site for recreational purposes such as filling of swimming pools. Additionally discharge of groundwater to surface water bodies (Christie Creek) may impact recreational users
- Exposure of future 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 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

The outcomes of these works are incorporated in the applicable sections of this report.

3.1.4 GHD (2023b) Sampling and Analysis Quality Program (SAQP)

Following finalisation of the PSI, a Sampling Analysis and Quality Plan (SAQP) was prepared to undertake intrusive investigations for the delineation of the lateral and vertical extent of PFAS contamination on- and off-site.

The purpose of the SAQP was to present the scope of work, methodologies, and sampling rationale to be utilised during the further intrusive works for this DSI to meet the investigation objectives.

- Based upon the PCSM provided in the PSI, the following data gaps were identified:
 - The lateral and vertical extent of PFAS contamination in soil has not been delineated
 - The lateral and vertical extent of PFAS contamination in groundwater has not been determined
 - The degree of PFAS contamination in on-site concrete and bitumen surfaces and the associated PFAS flux from these materials has not been assessed
 - The potential for PFAS to leach from contaminated soil into groundwater has not been tested yet

4. Environmental setting

4.1 Topography

The general topography of the area is relatively flat and forms part of the Adelaide Plains, between the Gulf of St Vincent to the west, and the Mount Lofty Ranges to the east. The site slopes gradually upwards to the northern boundary with the site sitting at an elevation of 64 m AHD. Most of the property is sealed with narrow garden beds running along the northern and southern boundary and a garden bed and grassed area in the north-east corner of the site.

4.2 Site drainage

Most of the site is comprised of sealed surfaces (buildings, concrete hardstand, bitumen, etc.) with the stormwater discharging to off-site underground stormwater drains via stormwater drainage pipes and wash-bay drains.

Stormwater from the site is captured in drains to the east (i.e., front of the site) of the engine bay and along the southern site boundary. The drains and surface water runoff from Holman Road in front of the station discharge to the south of the site and into the public stormwater system on Flaxmill Road. On-site stormwater drainage infrastructure has not been reconfigured since originally constructed in 1978 and stormwater has not been harvested.

Anecdotal information given by MFS staff reported that appliances would be either rinsed and residual AFFF deposited into the drain or rinsed down Holman Road onto Flaxmill Road following training exercises or incidents. The information is provided in the MFS staff surveys reported in the GHD PSI report (2023a)

4.3 Surface water

The nearest natural surface water body from the site is the Christie Creek, located approximately 530 m northwest and uphill from the site. The creek flows in a westerly direction and discharges into the Gulf of St Vincent at Christies Beach approximately 2.5 km west of the site. The Onkaparinga River is approximately 3 km south of the site. Stormwater from the site likely discharges into Christies Creek.

4.4 Geology

The PSI (2023a) report indicated the site is in an area containing Hindmarsh Clay, Carisbrooke Sand, Ochre Cove Formation and Seaford Formation. The soil type on-site is calcareous loam on clay. Historical soil samples collected during the GHD 2019 MFS state-wide investigation reported shallow soil profiles comprising dark brown, stiff sandy clay. Soil within a 100 m radius of the site is classified as Chromosol by the Atlas of Australian Soils (CSIRO 2013 referenced in Lotsearch 2023). Chromosol soils are generally associated with cracking clays and sandy alkaline yellow mottled soils.

Boreholes advanced on the site during the DSI indicate that the geology is not consistent with the regional Hindmarsh Clay, with the borelogs describing sandy clays, clayey sand and siltstone. The encountered lithologies are more consistent with the Wilmington Formation which comprises interbedded sandstone, limestone and siltstone of red and grey colouring. The shallower descriptions of sandy clays and clayey sands are likely weathered bedrock from the siltstone and sandstone. Further information regarding the encountered lithologies can be found in Section 6.

4.5 Hydrogeology

According to the Department of Water, Land and Biodiversity Conservation (DWLBC) Report (Gerges 2006), the site lies within 'hydrogeological zone 1', which covers the basement rocks of the Adelaide Hills and contains a fractured rock aquifer. The expected groundwater aquifer underlain the site comprises sedimentary rocks inclusive of limestone (cavernous), sandstone, sand shale and clay material. A second aquifer unit was identified 484 m north-west from the site and was described as fractured rocks – Cambrian and Precambrian rocks – quartzite, sandstone, limestone, dolomite, slate, marble, siltstone, phyllite, schist and gneiss (Gerges 2006).

A search of the South Australian Resources Information Gateway (SARIG) database reported the site is within an area of shallow groundwater with standing water levels (SWL) of 10-20 m AHD, producing yields in the range 0.5-2.5 L per second. Groundwater salinity ranged from 3,000-7,000 mg/L total dissolved solids (TDS) indicating brackish water.

TDS data was available for 18 wells within the 2 km radius from the site and ranged between 80 mg/L and 10,939 mg/L. The 80 mg/L data point is likely an error when considering the wider regional aquifer properties, therefore the TDS data indicates the likely regional presence of brackish groundwater.

On-site drilling confirmed that there was no groundwater to a depth of 20 m bgl at the site. MW01 was drilled to a depth of 20 m bgl and backfilled for installation at 10.8 m bgl where a slightly moist sandstone unit was encountered. The well has still not made water at the time of writing.

4.6 Local groundwater users (WaterConnect Database)

A search of groundwater wells within a two-kilometre radius was conducted using the SA WaterConnect Database (Appendix B) on 18 September 2023. The results of the search located 121 wells. Of these, 15 were listed as either backfilled, dry or abandoned. From the remaining well data, no wells were identified as having a domestic purpose, 71 wells were listed for either investigation, monitoring, or environmental purposes and 2 wells were listed for an irrigation purpose.

5. Assessment criteria

The CoCs in this investigation were limited to PFAS. As such, assessment criteria from HEPA (2020) PFAS National Environmental Management Plan (Version 2.0) and Heads of Environment Protection Authorities Australia and New Zealand, January 2020 (PFAS NEMP) have been used.

5.1 Soil

In accordance with the PFAS NEMP (2020), the assessment criteria listed in Table 5.1 have been adopted for the assessment of soil samples.

Table 5.1 Adopted PFAS Assessment Criteria - Soil

Exposure Scenario	PFHxS ¹	PFOS ²	Sum of PFOS and PFHxS	PFOA ³	Principal Reference Document
Human Health Investigation Levels (HIL)					
HIL-A residential with garden/accessible soil	0.01 mg/kg	0.01 mg/kg	0.01 mg/kg	0.1 mg/kg	PFAS NEMP (HEPA 2020)
HIL-B residential with limited soil contact	2 mg/kg	2 mg/kg	2 mg/kg	20 mg/kg	
HIL-C public open space	1 mg/kg	1 mg/kg	1 mg/kg	10 mg/kg	
Site-specific HILs ⁴ for the screening of PFAS contaminated soils at MFS sites (Metropolitan, Staffed)	-	-	14 mg/kg	50 mg/kg	
HIL-D commercial/industrial	20 mg/kg	20 mg/kg	20 mg/kg	50 mg/kg	
Ecological Screening Levels					
Ecological indirect exposure – Developed sites	-	0.14 mg/kg	-	-	PFAS NEMP (HEPA 2020)
Ecological direct exposure	-	1 mg/kg	-	10 mg/kg	

Notes:

¹ PFHxS – perfluorohexane sulfonate

² PFOS – perfluorooctane sulfonate

³ PFOA – perfluorooctanoic acid

⁴ Discussed further in section 5.1.1

The typical usage patterns at MFS fire stations most closely align with the exposure assumptions that underpin HIL D (commercial/industrial) values. The following inconsistencies are however noted:

- The PSIs undertaken at MFS sites across South Australia has identified that some fire stations have a higher proportion of unsealed ground (up to approximately 75% of the total site area) than has been assumed in the derivation of the HIL D values (up to approximately 20% of the total site area). As a result of this, there may be greater opportunities for direct access to soil at MFS fire stations, including the ingestion of soil and soil-derived dust
- The shifts worked by MFS firefighters do not align with the assumption of a standard working week that underpins the HIL D values

Given these factors, Site-specific Health Investigation Levels (SSHILs) have been derived using exposure assumptions that reflect the typical usage pattern of the MFS fire stations, to allow for tailored assessment of the potential exposure risks that may be associated with the presence of PFAS in shallow soils (GHD 2023c). Further discussion regarding the development of the SSHILs is provided in Section 5.1.1.

GHD has made reference to the HIL A and HIL B criteria presented within the PFAS NEMP (2020) to enable assessment of contamination exposure risks with respect to potential future sensitive land use scenarios (such as residential) given the site's proposed divestment by MFS.

GHD has made reference to both the ecological direct exposure and indirect exposure scenario criteria within the PFAS NEMP (2020) to assess potential ecological exposure risks. These generic criteria apply to all land use scenarios. Further discussion regarding these criteria is provided in Section 5.1.2.

5.1.1 Site specific human health investigation levels

GHD letter report *Derivation of site-specific Health Investigation Levels (HILs) for urban and regional fire stations* (GHD, July 2023) outlines SSHILs for the two types of MFS fire stations:

- Urban/metropolitan (also referred to as “staffed”)
- Regional (also referred to as “retained”)

The methodology and associated exposure assessment processes are outlined in Appendix E. The SSHILs will be used in place of the generic HIL D (commercial/industrial) guidelines from the PFAS NEMP 2.0 for the purpose of preliminary screening of potential human health exposure risks for MFS sites.

There are no criteria specific to the assessment of concrete and bitumen regarding potential human health or ecological risk. Sampling of these media has been conducted to assess their potential to act as an ongoing source of PFAS impact to the environment via leaching.

5.1.2 Ecological soil guideline values

The PFAS NEMP provides the following guidance regarding 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, however 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)*. This document provides 0.14 mg/kg as the soil guidelines for PFOS in two circumstances:

- Soil Quality Guideline to Protect Freshwater Life under all land uses
- Soil Quality Guideline for Off-site 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 soil quality guideline for off-site 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 use 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. Canadian Council of Ministers of the Environment (CCME) (2017) specifically states that this approach is imprecise and that the derived values should be used as a check mechanism only, with professional judgement used to assess whether this is likely to be a migration pathway of concern for an individual site. Given the predominantly commercial land use surrounding the site, it is unlikely than any soil migrating from the site via erosion would be deposited in an area of significant ecological value.

Although the CCME (2017) guidelines have been superseded, the more recent guidelines (Specific Criteria Document for the Development of the Canadian Soil and Groundwater Quality Guidelines for the Protection of Environmental and Human Health - Perfluorooctane Sulfonate) use a similar approach and derive similar values. The reference to the CCME (2017) for this document is to maintain consistency with the PFAS NEMP 2.0 and the original reference material within that document.

6. Soil investigation

6.1 Soil sample locations and rationale

The soil investigation works described in this section were conducted between 14 July 2023 – 21 July 2023 under the supervision of an experienced GHD environmental professional. A total of 11 bores (BH01 to BH11) were drilled as part of the soil investigation, with a further three (MW01 to MW03) being drilled at intended installation locations for groundwater monitoring wells. The investigation locations are shown on Figure 2. A summary of the rationale behind each location is provided in Table 6.1 below.

Table 6.1 Soil bore location rationale

Soil sampling location	Location Rationale
BH01	Topographically upgradient location from former training area. Unlikely to be impacted by PFAS use (although overspray may have occurred)
BH02	
BH04	Garden bed adjacent to the former training area where overspray is likely.
BH03	East of the former training area on Holman Road. Area where overspray, PFAS use and runoff of PFAS containing AFFF are likely.
BH07	
BH08	
BH09	
MW01	
BH05	Within former training area concrete pad
BH06	
BH10	Adjacent to the western boundary of the site to assess potential presence of PFAS contamination near residential properties
BH11	
MW02	
MW03	
SS01	Southern boundary garden bed to assess if PFAS contamination has occurred through overspray
SS02	
SS03	Eastern rear access driveway to assess if PFAS contamination has occurred through overspray
SS04	
SS05	
SS06	Northern unsealed area of the site to assess if PFAS contamination has occurred through overspray

GHD notes the number of soil sampling locations was in accordance with the NSW Sampling Design Guidelines requirement for the minimum number of sampling locations for a targeted sampling design at a site with an area of 2,255 m².

6.2 Methodology

The methodologies detailed below are in accordance with the following guidelines:

- HEPA (2020) PFAS NEMP (Version 2.0), Heads of Environment Protection Authorities Australia and New Zealand, January 2020, (PFAS NEMP)
- National Environment Protection (Assessment of Site Contamination) Measure (1999) as amended in 2013 (ASC NEPM)

- WA DER (2017) Interim Guideline of Assessment and Management of Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS), Version 2.1, Contaminated Sites Guidelines, Department of Environment Regulation, Western Australia, Perth, January 2017

The soil investigation methodology was as follows:

- Prior to any intrusive works being undertaken a review of Before You Dig (BYD) plans was conducted and all investigation locations were cleared for the presence of underground service by an accredited service locator
- A total of 14 bores (BH01 to BH11 and MW01-MW03) were drilled as part of the soil investigation. Locations positioned within hardstand areas required concrete/paver cutting prior to drilling
- All soil bores were advanced via drill rig utilising push tube drilling techniques. High density polyethylene (HDPE) core liners were used to retrieve soil cores to minimise the risk of PFAS cross-contamination
- Soils recovered from each soil bore were logged by an experienced GHD environmental professional, and representative soil samples were collected at regular depth intervals and/at each new soil horizon for potential laboratory analyses
- A fresh pair of disposable gloves were worn by the sampler when collecting each individual sample and soil samples were placed in laboratory-supplied sampling jars suitable for PFAS analysis. Soil samples from soil bores were collected immediately following drilling. In general soil samples were taken at near surface (0.1 m bgl), at 0.5 m bgl and every 0.5 m thereafter
- Quality assurance and quality control (QA/QC) samples including intra-laboratory duplicate samples, inter-laboratory duplicate (split) samples, and rinsate blanks were collected as part of the soil sampling program.
- Logging of the soil bores was undertaken by an environmental scientist to assess the underlying geology and contaminant indicators in accordance with AS 1726:2017
- Soil samples were stored in an ice filled cool box and transported to a National Association of Testing Authorities (NATA) accredited laboratory under chain of custody documentation

In addition to the soil sampling program three concrete paver samples were taken from locations which required concrete coring. These samples were broken into small fragments and placed into laboratory supplied sampling containers. The samples were then managed in accordance with the above methodology.

6.3 Soil analytical program

All soil samples were submitted to a NATA accredited laboratory for analysis. In general, two to three samples from each borehole were analysed, with each sample analysed for PFAS compounds.

6.4 Soil sampling results

6.4.1 Subsurface conditions

Fill material was encountered at all locations with the exception of BH04, generally comprising of fine to medium, poorly graded sand and subangular gravel. The fill ranged in colour from pale grey to brown in appearance and was slightly moist to dry. BH04 borelog describes fine to medium, poorly graded silty sand natural material which had been reworked, with a dark brown appearance and slight moisture content. No staining, distinguishable odours or fragments of asbestos debris were noted during sampling. Rootlets noted at BH02, BH04 and BH09.

All locations consisted of primarily natural soils, with the general composition being low plasticity, fine to medium clayey sands, with occasional inclusions of fine to coarse gravel, before progressing deeper to low plasticity clays. The colouration of the material graduated from browns to pale brown/grey before reaching the orange/brown clay. The shallow lithology is likely a weathered bedrock from the underlain siltstone and sandstone.

Refusal of soil bores occurred at all locations due to underlying bedrock (weathered rock or siltstone) with the maximum depth achieved being 3.5 m bgl. A summary of materials encountered at the site is provided in Table 6.2. Detailed borelogs can be found in Appendix D.

Table 6.2 Summary of lithologies encountered

Lithology	Depths observed (m bgl)	Description
Fill	0.0 – 0.7	Gravelly SAND; fine to coarse sand with fine to medium gravels, grey to brown, slightly moist, loose
Natural soils (weathered bedrock)	0.0 – 2.6	Clayey SAND: Fine to medium sand with low to no plasticity clays, pale brown, pale red and white, slightly moist to dry, medium to dense
	0.3 – 2.2	Sandy CLAY: Fine to medium sand with low to no plasticity clays, pale brown, pale red and white, dry, firm to very stiff
	1.8 – 3.5	CLAY: Red, brown and pale purple, low to no plasticity
Bedrock	3.5 – 20.0	SILTSTONE; Pale white to brown, dry, hard to very hard

6.4.2 Analytical results

The exceedances of the adopted assessment criteria protective of human health and the environment are presented in Table 6.3. PFAS concentrations in all remaining soil samples were reported to be below the laboratory reporting limits or below the adopted assessment criteria.

The laboratory certificates for the soil analytical results, along with chain of custody and sample receipt notifications are provided in Appendix F. A full set of tabulated analytical results can be found in Appendix G.

Table 6.3 Results above adopted PFAS assessment criteria

Location	Depth (m bgl)	PFHxS (mg/kg)	PFOS (mg/kg)	PFOA (mg/kg)	Sum of PFHxS and PFOS (mg/kg)
BH01	0 - 0.13	<0.005	0.013	<0.005	0.013
BH02	0.35 - 0.45	0.078	3.6*	0.024	3.678*
BH04	0.4 - 0.5	0.016	0.46	0.0079	0.476
	2.1 - 2.2	0.019	0.029	<0.005	0.048
BH06	0.15 - 0.35	0.015	0.13	<0.005	0.145
BH08	0.35 - 0.45	0.0064	0.044	<0.005	0.0504
BH09	0 - 0.15	<0.005	0.35	<0.005	0.35
BH10	0.12 - 0.3	0.0093	0.054	<0.005	0.0633
BH11	1.5 - 1.6	0.054	0.064	<0.005	0.118
MW02	0.12 - 0.32	0.0079	0.054	<0.005	0.0619
MW03	0.12 - 0.22	0.012	0.073	<0.005	0.085
SS01	0 - 0.1	0.0068	0.066	<0.005	0.0728
SS03	0 - 0.1	0.0053	0.25	<0.005	0.2553
SS04	0 - 0.1	<0.005	0.03	<0.005	0.03
SS05	0 - 0.1	<0.005	0.091	<0.005	0.091

Notes:

Grey denotes an exceedance of the HIL A residential assessment criteria

Blue denotes an exceedance of the ecological indirect exposure assessment criteria for developed sites

Yellow denotes an exceedance of the HIL B residential assessment criteria

* also denoted an exceedance of the HIL C public open space assessment criteria

Detections of PFAS in soil were reported above the LOR to a depth of 2.8 m bgl (BH02_2.7-2.8). All soil results from 2.8 m bgl onwards were lower than the LOR.

7. Groundwater investigation

7.1 Groundwater well locations and rationale

The SAQP outlined that three groundwater wells (MW01 to MW03) were scheduled to be installed at the site to target the following site features:

- One cross/up hydraulic gradient well located to the east of the site (MW01) to enable the calculation of the local groundwater flow direction and to determine if PFAS impacts in groundwater are migrating off-site
- Two down hydraulic gradient wells located on the north and north-west of the site (MW02 and MW03) to enable the calculation of the local groundwater flow direction and to determine the potential presence of on-site PFAS sources

During the drilling works the encountered siltstone bedrock was shallower and harder than expected. This meant that the groundwater monitoring well locations could not be advanced past 3.5 m bgl using push tube or solid flight auger drilling methodology. As a result, a second drilling mobilisation was undertaken which utilised an air hammer methodology to advance through the siltstone. Additionally, the location of MW01 was moved to match the soil bore location BH04, as this had reported the highest concentration of PFAS compounds in the soil.

7.2 MW01 well installation methodology

Of the three proposed groundwater monitoring wells, only one (MW01) was drilled and installed during the DSI. The drilling method used a combination of solid flight auger and air hammer to the base of the borehole. A well permit was obtained from the Government of South Australia's Department of Environment and Water. Copies of well permits are provided in Appendix H. The well construction methodology is outlined below:

- The monitoring well was drilled to a depth of approximately 20 m in an attempt to reach the uppermost aquifer (indicated by a groundwater strike or water cut). No water strike was observed during drilling, however moist silty clays were observed between 10.0 and 11.2 m bgl. The borehole was backfilled to 10.8 m bgl and a groundwater monitoring well was installed
 - A 3 m PVC slotted PVC screen was installed at 10.8 m bgl with solid PVC casing extending to the surface. The PVC was installed with approximately two metres of screen above the top of the moist clayey silt to account for seasonal groundwater level variations
 - A sand pack was installed around the screen extending 0.5 m above the top of screen
 - A bentonite plug was installed above the sand pack with a thickness of 1 m to protect the aquifer from any direct infiltration of surface water into the well screens
 - The rest of the annulus was filled with cement slurry
- A lockable gatic cover was installed and concreted in place flush to the surrounding ground surface.

The MW01 groundwater well construction log is presented in Appendix D.

A week following the installation of the well GHD gauged the well to assess if the aquifer was producing water slowly. Results for the gauging indicated the well was still dry.

8. Quality assurance and quality control

A detailed Quality Assurance and Control (QA/QC) assessment was completed for all analytical sample data, in order to determine whether it is of suitable quality on which to base the site assessment. This included the collection and review of inter- and intra-laboratory duplicates and rinsate blank samples.

The QA/QC assessment found that the majority GHD QA/QC Data Quality Indicators (DQIs) were within the specified requirements. Some PFAS compounds noted RPD exceedances, however this is likely due to the low concentrations of PFAS compounds detected in the samples. The data is, 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 I.

9. Conceptual site model

Fundamental to any contamination investigation is the development of a Conceptual Site Model (CSM), which is a description of the plausible mechanisms ('pathway'), by which people and ecology ('receptors') may be exposed to chemicals in the environment ('sources'). Potential risks to human health or the environment cannot occur unless there is a complete Source-Pathway-Receptor (SPR) linkage. Conversely, complete SPR linkages do not by default indicate a risk and the site investigation process is used to evaluate the extent of potential risks.

A tabular CSM can be found below in Table 9.1, with supporting figures Figure 4 and Figure 5 to visualise the CSM.

Groundwater has been excluded from the CSM as it was not encountered during drilling and vertical delineation of PFAS impacts has been achieved as discussed in section 7.

Table 9.1 CSM for PFAS exposure – SPR linkage assessment

Source	Potential Receptors	Exposure Pathways	Risk from exposure through SPR Linkages
PFAS impacted soils	<u>Current</u> : Site users, visitors, maintenance, and construction workers	Direct dermal contact with contaminated soil	Unlikely and acceptable Concentrations reported from samples taken on-site were below the human health investigation levels except for sample BH02_0.35-0.45. However, as the site is currently unoccupied the potential risk of direct dermal contact to PFAS contaminated soil is unlikely to impact human health. It is considered unlikely that visitors, maintenance or construction workers would be exposed to PFAS quantities detrimental to their health via direct contact, incidental ingestion or dust inhalation as reported concentrations from investigations locations within the site boundary were below the adopted HIL D criteria. If intrusive works or excavation were to be undertaken in shallow soils in the vicinity of BH02 then reference would need to be made to a soil management plan or similar, detailing specific risk mitigation measures to minimise potential exposure to PFAS impacted soils.
		Incidental ingestion of contaminated soil	
		Inhalation of contaminated soil or dust from disturbed soils	
	<u>Future</u> : Site residents (i.e., sensitive use), visitors, maintenance and construction workers	Direct dermal contact with contaminated soil	Possible and manageable, subject to further investigation There are several exceedances of the Tier 1 HIL A residential across the site which suggests potential exposure pathways could exist should the site be developed for a more sensitive use. Of the exceedances reported, only soils samples from the northeastern portion of the site are accessible with the current site configuration. The remainder of exceedances are overlain by hardstand concrete and are inaccessible, with the exception of SS01. If future use of the site is to include residential developments then further investigation is required to determine the risk that PFAS impacted soils currently present with respect to what mitigation controls regarding potential exposure are required.
		Incidental ingestion of contaminated soil	
		Ingestion of produce grown in contaminated soils	
		Inhalation of contaminated soil or dust from disturbed soils	

Source	Potential Receptors	Exposure Pathways	Risk from exposure through SPR Linkages
	Ecosystem at, and immediately surrounding, the site	Direct contact with contaminated soil Ingestion of contaminated soil Bioaccumulation through indirect contact Rainwater/surface runoff leaching impacted soils into stormwater systems which discharge to surface water bodies	Possible and manageable Exceedances of the ecological indirect assessment criteria for PFOS concentrations in SS03 and BH09 were present in near surface soils. Exceedances of the ecological indirect assessment criteria at BH04_0.4-0.5 and an exceedance of the ecological direct exposure criteria BH02_0.35-0.45 demonstrate that there is potential for bioaccumulation through indirect contact. Further, as direct exposure is not able to be ruled out, it is considered a lower risk as generally near surface samples reported relatively low concentrations below the direct exposure criteria. We note that higher trophic species are unlikely to come into direct contact with this soil, given they would likely only consume PFAS as a result of bioaccumulation through the food chain. Runoff from impacted soils into the stormwater system which eventually discharges to Christie Creek is a possible pathway to ecological receptors. Given the large catchment area which flows into Christie Creek it would not be possible to distinguish the difference between site derived impacts and those which may occur regionally due to the urban nature of the catchment area.

Source	Potential Receptors	Exposure Pathways	Risk from exposure through SPR Linkages
	Groundwater beneath the site	Vertical migration of PFAS compounds from impacted soil	Low and acceptable Soil samples reported that PFAS compounds were not detected below a depth of 2.8 m bgl. The installation and drilling of MW01 confirmed that PFAS was not reported above the LOR for soils sampled at depths of 4.5 m bgl to 20 m bgl. Additionally, no groundwater was encountered during drilling to a depth of 20 m bgl. GHD considers it possible that the shallow bedrock of the region may be acting as an aquitard which may potentially limit the vertical migration of PFAS in site soils to groundwater. The potential risk of site derived PFAS contamination impacting groundwater is considered to be low. However, as groundwater was not sampled during the DSI, if the future land use changes to a more sensitive use then further groundwater assessment may be required to identify and assess potential risks associated with groundwater as a receptor. This includes receptors associated with PFAS impacted groundwater such as waterways, consumption of edible vegetation from deep rooted biota, and use of groundwater in a human health exposure context.

Source	Potential Receptors	Exposure Pathways	Risk from exposure through SPR Linkages
PFAS impacted concrete and bitumen surfaces	<u>Future and current:</u> Site users, visitors, maintenance, and construction workers	Direct dermal contact with contaminated concrete or bitumen	Low and acceptable Concrete and bitumen surfaces on-site that have historically been exposed to PFAS containing AFFF during washdown of appliances have been sampled and confirmed the presence of PFAS compounds. It is considered a low likelihood that site users, visitors, maintenance, or construction workers would be exposed to PFAS quantities detrimental to their health via this exposure pathway.
		Inhalation of contaminated dust Historical soaking of washdown wastewater into the ground	
	Surface water bodies connected to stormwater (Christie Creek), adjacent commercial property to the south	Rainwater/surface runoff leaching impacted concrete/bitumen into stormwater systems which discharge to surface water bodies	Possible Given the historical training area slopes towards the south into stormwater systems and the presence of PFAS in concrete and paver samples it is considered possible that PFAS impacted rainwater/surface water could enter the stormwater system and discharge to surface water bodies/adjacent commercial property to the south. GHD considers it likely that the low residual PFAS mass within the concrete and asphalt are unlikely to create a significant exposure risk given the low reported concentrations. Notwithstanding, further sampling work during periods of high rainfall may be required to confirm PFAS concentration in surface water at the site with respect to the potential risk to the potential receptors.

10. Discussion

10.1 Current land use

10.1.1 Human health

The PFAS NEMP 2.0 (2020) HIL D investigation level assumes 8 hours is spent indoors and 1 hour spent outdoors at a site such as a shop, office, factory or industrial site. The guideline also notes that if the typical exposure for a site is predominantly outdoors with significant earthen areas, recalculation of a site-specific value is recommended. To address this, the SSHILs for the screening of PFAS contaminated soils at MFS sites (Metropolitan, Staffed) have also been adopted.

No exceedances of the human health HIL D or MFS metropolitan staffed stations assessment criteria were reported during the investigation. The vertical and lateral extent of PFAS impacts have been delineated to the adopted assessment criteria for current site use (i.e., HIL D and MFS metropolitan staffed stations). The potential risks to human health for the current site use are considered low and acceptable. Impacts for more sensitive potential future land use have not been delineated (i.e., residential or other sensitive use) laterally and are discussed further in Section 10.2.

10.1.2 Ecological

The PFAS NEMP 2.0 (2020) direct and indirect ecological exposure risk values for PFOS and PFOA are protective of organisms that are in direct contact with soil (i.e., plants and worms) and secondary consumers (i.e., birds, small mammals, and reptiles), respectively.

The PFAS NEMP (2020) indirect ecological exposure value of 0.01 mg/kg is a default value derived for all land use scenarios. However, the PFAS NEMP (2020) also states that this guideline value may be overprotective and site-specific characteristics may justify the use of a higher value (0.14 mg/kg), for example in scenarios where a site is located within an extensively built-up urban setting. The default value of 0.01 mg/kg is therefore not considered relevant as the site does not provide high quality foraging habitat for higher trophic level organisms. Additional lines of evidence supportive for the adoption of a higher value are that the closest surface water receptor, Christie Creek, is only discharged to via stormwater, not direct runoff from the site or broader catchment and that groundwater is unlikely to be impacted from site derived PFAS contamination in soil.

The soil dataset identified PFOS concentrations above the adopted assessment criteria for the protection of direct ecological exposure in one sample and indirect ecological exposure in four sample locations (detailed in Table 6.3). The PFOS exceedances were reported in near surface soil samples at BH09 and SS03 and at a depth of 0.5 m bgl at BH04 in reworked natural topsoils (considered to representative of fill).

All exceedances of the tier 1 ecological assessment criteria were reported in areas where there was no hardstand and the bare soil was exposed. The highest concentrations were reported in the north-western corner of the site, where unsealed ground was present adjacent to the former training area. The only exception to this was the exceedance reported at BH09, which was located within the former training area on a small nature strip of unsealed ground. The reported exceedances are likely due to overspray of PFAS containing AFFF during training exercises which then soaked into the unsealed ground.

Other soil borehole investigation locations within the former training area (BH05 – BH08) all reported results below the tier 1 ecological assessment criteria. The soil bores were located in areas where hardstand was present, such as the concrete forecourt of the station or the asphalt/bitumen on Holman Road. The hardstand would have limited vertical migration potential of PFAS into the underlying soil. This combined with the southerly sloping gradient of Holman Road would have likely directed PFAS containing foams or water into the stormwater system, resulting in lower PFAS concentrations in the underlying soils.

It should be noted that PFAS leaching from the hardstand concrete, asphalt and impacted soils into surface water (rainfall and stormwater discharge from the site) has not been assessed. As concrete is a porous material, it is likely that PFAS will continue leaching when it comes into contact with water during rainfall or when undertaking other activities like washing vehicles or overspray when watering plants. Further assessment may be required to assess the release of PFAS from impacted hardstand at the site.

Further assessment is likely required to assess if the PFAS containing soils at the site are causing an unacceptable risk to the ecological environment. Consideration should be given to designs which encapsulate impacted PFAS soils and concrete for future use.

10.2 Future potential sensitive land use

10.2.1 Human health

The PFAS NEMP (2020) HIL A and HIL B human health-based investigation levels for soil are used to assess potential human exposure to PFAS contaminated soils in line with the applicable soil accessibility. The HIL A investigation level assumes that soil is accessible, and that edible vegetation is grown, with up to 10% of the edible vegetation making up an individual's diet. The HIL B investigation level assumes no potential use for soil for consumption of home-grown produce, such as dwellings with fully paved yard spaces. The HIL A and HIL B criteria have therefore been selected to assess potential PFAS exposure risks for a potential future sensitive site use.

Exceedances of the HIL A tier 1 human health investigation level were reported at 13 of the 19 soil sampling locations. The majority of exceedances were reported within the surficial soils (top 0.5 m), or soil which was directly underlying the hardstand. Deeper HIL A exceedances were reported at locations BH11 (1.5 – 1.6 m bgl) and BH04/MW01 (2.1 – 2.2 m bgl). One exceedance of the HIL B tier 1 human health investigation level was reported at BH02 at a depth of 0.35 – 0.45 m bgl.

As the future layout and usage of the site is unknown it is possible that the exceedances of the HIL A or HIL B criteria reflect a risk to human health. If edible vegetation is grown in garden beds the shallow PFAS contamination may be taken up by vegetation and consumed by site users. Should developments include low to medium density residential properties, further assessment may be required to determine the risk of the PFAS contaminated soils to human health. This may be able to be managed through design considerations which limit the accessibility of soils (i.e. restricting the potential direct contact exposure pathway and requiring the use of planter boxes with imported clean fill to grow fruit and vegetables).

Vertical delineation has been achieved for sensitive potential future land use such as residential with garden accessible soil (HIL A). The highest concentration of PFOS was detected in the soil bore located within the open garden bed (BH02) on the east of the site. This sample exceeded the HIL B assessment criteria for residential properties with minimal soil accessibility. Lateral delineation of PFAS impacts for sensitive land use have not determined.

10.2.2 Ecological

The ecological assessment for future site use aligns with the current site use scenario discussion in Section 10.1.2.

10.3 Groundwater

An attempt was made to investigate the contamination status of groundwater at the site through the drilling and installation of one groundwater monitoring well. Drilling was advanced to a depth of 20 m to identify the potential presence of groundwater. During drilling, moisture was noted between 10.0 and 11.2 m bgl, and as a result the monitoring well was installed to intersect this level. No other indications were noted during drilling as to the apparent presence of groundwater.

Resultant field observation during groundwater gauging of the installed monitoring (location MW01) indicated the well to be dry. With respect to the observations also made during drilling, the inferred depth to groundwater is considered likely to be beyond 20 m bgl.

In the absence of being able to retrieve and analyse a groundwater sample, GHD submitted soil/weathered rock samples for analysis that were recovered during drilling. These were obtained from depths 4.5 m, 10 m, 15 m and 20 m bgl from borehole MW01. Results of PFAS analysis undertaken on the soil/weathered rock samples indicates an absence of PFAS as reported results were below the laboratory limit of detection.

Taking into account observations made during drilling and resultant soil/weathered rock sample analysis, GHD considers it unlikely that groundwater at the site has been impacted by historical firefighting activities involving PFAS. With respect to the soil sampling results, GHD considers the potential for the clay and weathered bedrock underlying the site to form an aquitard/confining layer, which may limit the potential for vertical migration of PFAS impacts from site soils.

It is noted that PFAS or other impacts may still be present in groundwater beneath the site; however at this time the potential pathway for groundwater contamination from site derived soils is considered incomplete. Further groundwater investigation work is likely required to confirm the absence of PFAS contamination in groundwater on the basis that the site is developed for a more sensitive use. Any further assessment work should consider the potential exposure risk of any impacted groundwater (from either on-site sources or potential off-site sources) to associated sensitive receptors.

11. Conclusions and recommendations

Based on the results of this investigation the following conclusions have been made:

- The encountered lithologies underlain the site are consistent with the Wilmington Formation which comprises interbedded sandstone, limestone and siltstone of red and grey colouring. The shallower descriptions of sandy clays and clayey sands are likely weathered bedrock from the siltstone and sandstone
- PFAS impacts in soil at the site are most likely related to historical firefighting activities including training and storage of PFAS containing AFFF
- Regarding reported soil results:
 - The highest reported concentrations of PFAS in soils have been identified in the north-western corner of the site in a patch of unsealed ground just north of the former training area
 - Exceedances of the Tier 1 HIL A residential with gardens/accessible soil investigation criteria were reported from 13 investigation locations. Additionally, one exceedance of the Tier 1 HIL B residential with minimal soil accessibility criteria was reported in sample BH02_0.35-0.45 . Further work is required to confirm the suitability of the site for a sensitive land use
 - The site in its current condition is considered suitable for ongoing commercial use due to the absence of criteria exceedances with respect to HIL D
 - Four exceedances of the tier 1 ecological indirect exposure were reported. All exceedances were reported in areas where there was no hardstand present and the soil is exposed. The presence of ecological exposure risks require further assessment work to close out potential impacts to both potential on-site and off-site receptors
 - PFAS soil impacts have been delineated vertically to a depth of approximately 2.8 m bgl across the site
 - PFAS soil impacts have been delineated laterally for the current land use (commercial). If a more sensitive land use is realised in the future further assessment is required
- While groundwater was not encountered during the investigation, it is considered likely that the risk to groundwater from historical firefighting activities undertaken at the site are low. As the future use of the site is unknown future, should potential receptors or groundwater users be identified, further assessment is required to assess the risk to groundwater and associated receptors

The following recommendations have been made:

- Further assessment is required if the site use changes to a more sensitive land use scenario
- Further sampling to delineate the PFAS impacts observed at SS03 in the northern portion of the site
- If developments or soil works are to be undertaken in the future additional sampling would be required if the spoil soil is to be disposed of off-site or reused on site
- A soil management plan (or similar) should be developed which details specific risks and associated mitigation measures to minimise potential exposure to PFAS impacted soils to construction and maintenance workers, should works involve exposure scenarios (soil disturbance, dust inhalation and incidental ingestion)

12. References

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- NEPC 1999, *National Environmental Protection (Assessment of Site Contamination) Measure 1999* (ASC NEPM), as amended 2013, National Environment Protection Council.
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- SA EPA 2019b, Guidelines for Regulatory Monitoring and Testing – Groundwater Sampling, Environment Protection Authority, South Australia.
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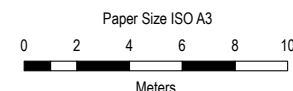
Figures

<i>Figure 1</i>	<i>Site Location Plan</i>
<i>Figure 2</i>	<i>Soil Sampling Locations</i>
<i>Figure 3</i>	<i>Soil Criteria Exceedances</i>
<i>Figure 4</i>	<i>Cross Section CSM</i>
<i>Figure 5</i>	<i>Source Pathway Receptor CSM</i>

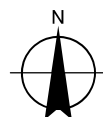


Data Disclaimer

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



South Australian Metropolitan Fire Service
Christie Downs Detailed Site Investigation

Project No. 12612725
Revision No. B
Date 09/11/2023

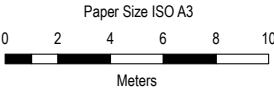
Christie Downs Site Location Plan

FIGURE 1

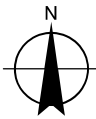


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Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 54

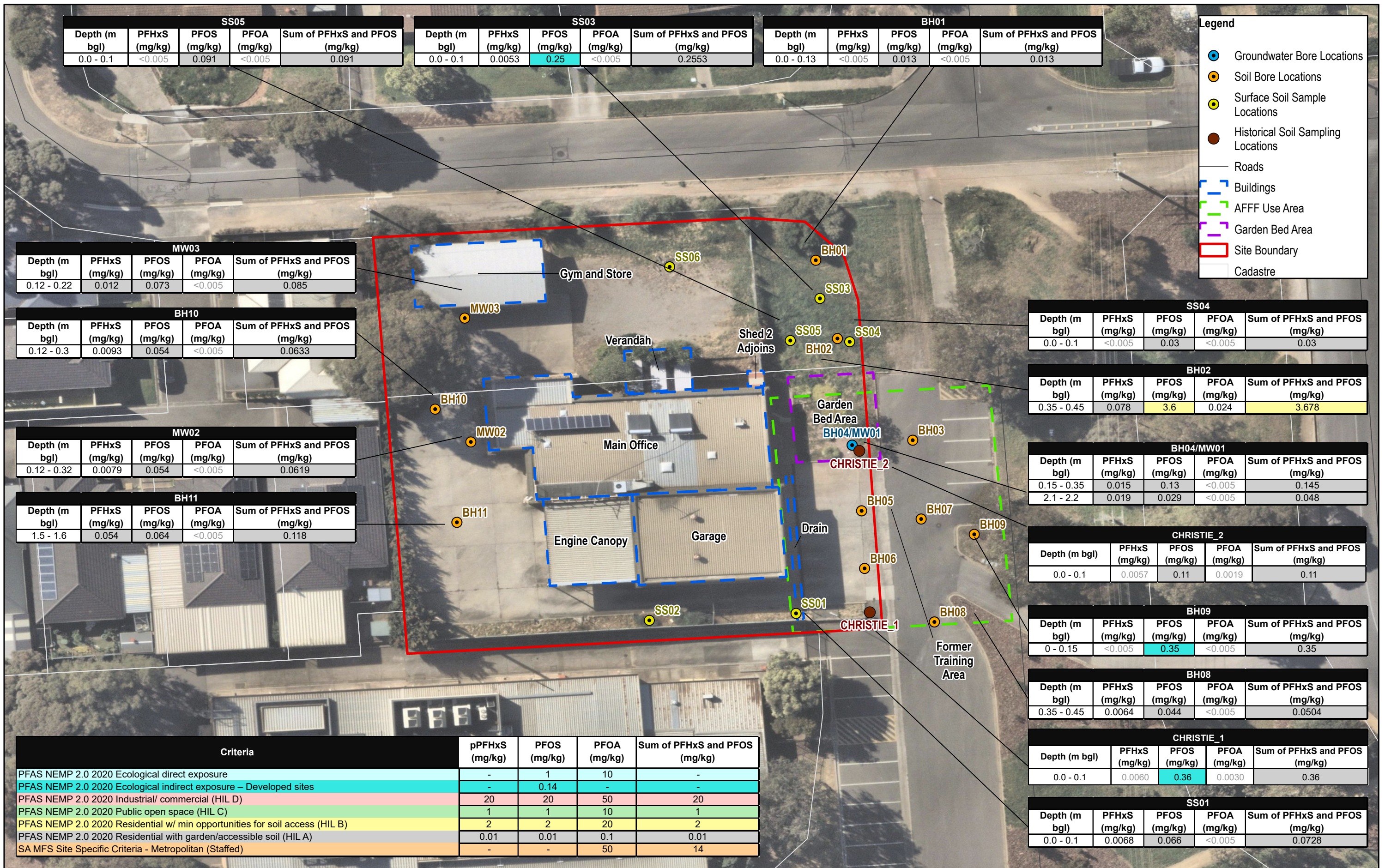


South Australian Metropolitan Fire Service
Christie Downs Detailed Site Investigation

Christie Downs
Sample Locations Plan

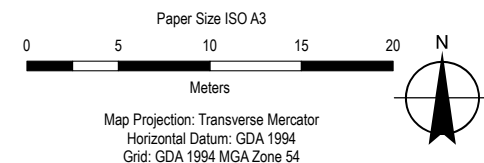
Project No. 12612725
Revision No. C
Date 09/11/2023

FIGURE 2



Data Disclaimer

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South Australian Metropolitan Fire Service
Christie Downs Detailed Site Investigation

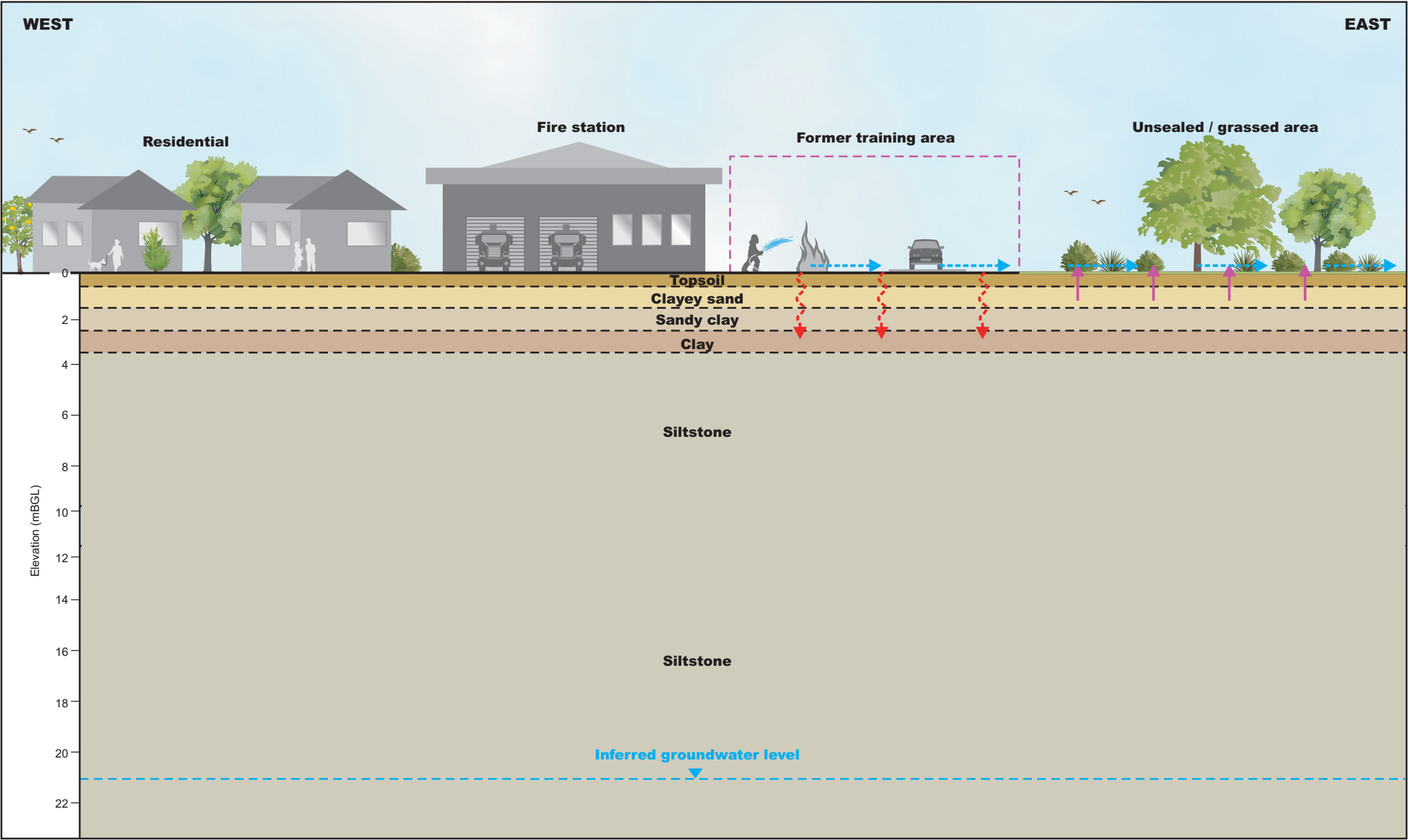
Soil Exceedances
of Adopted Criteria

Project No. 12612725
Revision No. D
Date 10/11/2023

FIGURE 3

\\ghdnet\ghd\AU\Melbourne\Projects\33112612725\GIS\Maps\Deliverables\12612725_Figures.aprx
Print date: 10 Nov 2023 - 12:10

Data source: GHD: Site Boundary (2022); DPTI: Cadastre, Roads (2016), Nearmap: Imagery;
Date Extracted: 28/02/2023 Created by: ejuan



- LEGEND**
- Surface water running to offsite stormwater system
 - PFAS biotic uptake
 - PFAS infiltration

NOTE
No groundwater was encountered during the drilling program

Conceptual diagram only - scale is approximate

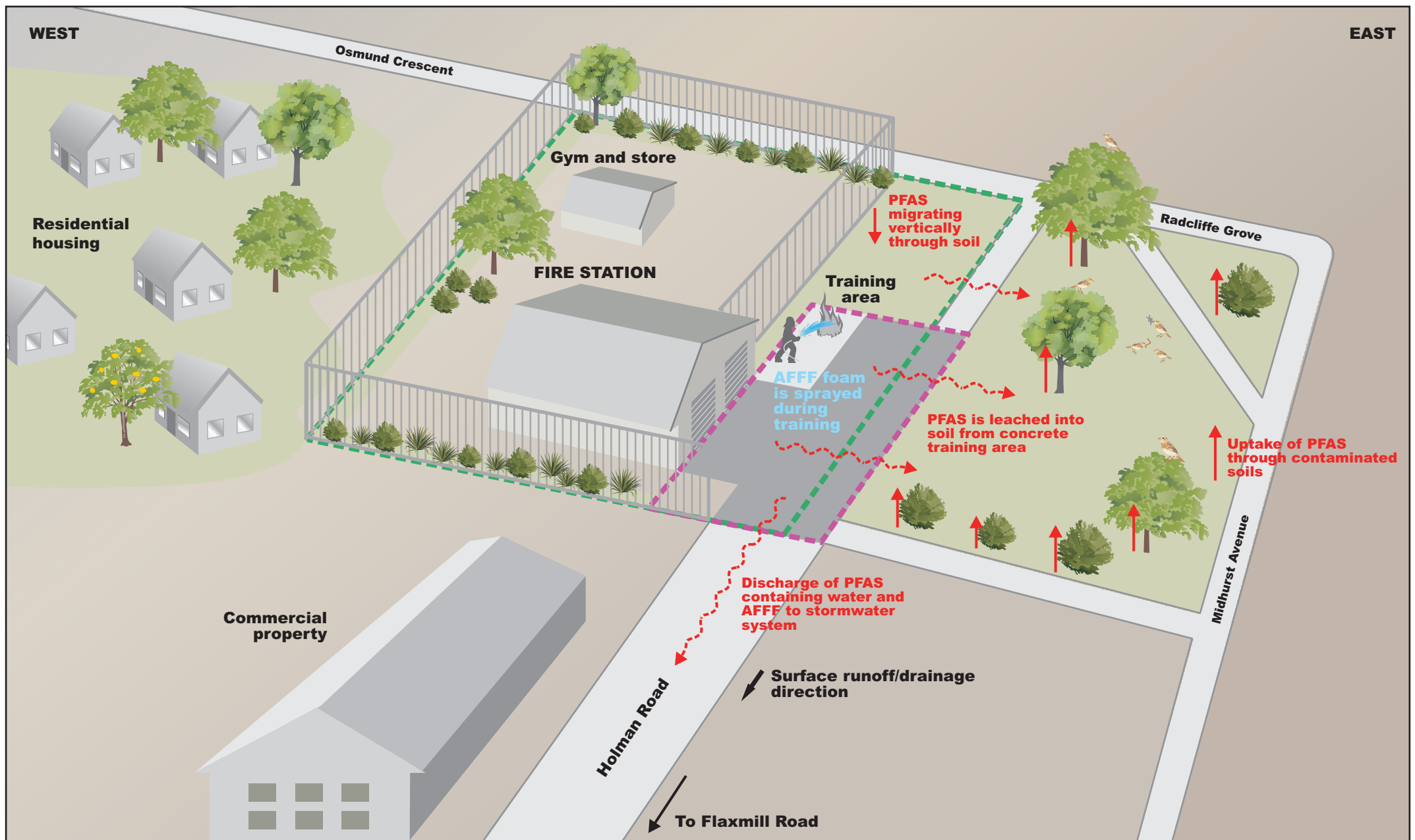


SA MFS
Christie Downs DSI
Lot 121 Holman Road, Christie Downs, SA 5164

Conceptual site model

Project No. 12612725
Revision No. 0
Date 31/10/2023

FIGURE 4



LEGEND

- Site boundary
- Former training area

Conceptual diagram only -
scale is approximate



SA MFS
Christie Downs DSI
Lot 121 Holman Road, Christie Downs, SA 5164

Conceptual site model

Project No. 12612725
Revision No. 31/10/2023
Date

FIGURE 5

AU\Launceston\Projects\Admin\Graphics\12612725\12612725_LST_01.cdr

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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

Appendices

Appendix A

SA EPA Letter GENI 62917

OFFICIAL



Environment Protection Authority

GPO Box 2607 Adelaide SA 5001

T (08) 8204 2004

Country areas 1800 623 445

EPA GENI 62917

Krystle Mitchell

Senior Scientific and Environmental Officer

South Australian Metropolitan Fire Service

By Email: Krystle.Mitchell@eso.sa.gov.au

Dear Ms Mitchell,

RE: REVIEW OF SITE CONTAMINATION REPORT – ACTION REQUIRED

Site: Various Metropolitan Fire Service (MFS) Fire Stations, South Australia

Thank you for providing the Environment Protection Authority (EPA) with a copy of the following report:

- *MFS 17 Fire Stations PFAS Risk Profiling*, prepared by GHD and dated 26 October 2022.

The above report documents a desktop risk profiling and prioritisation assessment completed for 17 MFS stations previously identified as containing PFAS contamination, based on limited site sampling completed in 2019 (GHD 2019)¹.

The EPA requests that you submit a plan of proposed works and associated timelines to address the highest risk sites by **30 June 2023**.

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 delivery date please contact the EPA as soon as possible.

It is not clear in the above report whether stations where no soil sampling was completed, or where the limited sampling showed no site contamination, were considered as part of the risk screening assessment. The EPA notes that the sampling documented in GHD (2019) was highly limited and may not capture all potential PFAS source areas at a station. The EPA recommends that these stations be risk profiled if not undertaken previously.

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

A handwritten signature in cursive script that reads 'H Custance'.

Hannah Custance

PRINCIPAL ADVISER, SITE CONTAMINATION

ENVIRONMENT PROTECTION AUTHORITY

Date: 1 February 2023

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

¹ *MFS State Wide Appliance and Station Sampling*, prepared by GHD and dated May 2019.

Appendix B

Photolog

Christie Downs Photolog



Photo 1 View of station from the north-east corner of the site



Photo 2 View of driveway along the southern site boundary, facing west



Photo 3 View of engine bay and wash down area with drain, facing south-south-west



Photo 4 View of driveway with drains and fruit trees along southern site boundary, facing east



Photo 5 Fruit trees in SW corner of site, facing south-west



Photo 6 Southern drain near fruit trees, facing south



Photo 7 View of stormwater drain, facing south-east towards Flaxmill Rd



Photo 8 View of stormwater drain, facing south towards Flaxmill Rd



Photo 9 Close up of stormwater drain



Photo 10 Close up of stormwater drain



Photo 11 Wash down area in front of the station with the carpark on Holman Rd beyond, facing east



Photo 12 Wash down area in front of the station facing south-east towards the Holman Rd / Flaxmill Rd



Photo 13 Garden bed with tap to the north of the wash down area along the eastern site boundary, facing north-east



Photo 14 Osmund Crescent to the north of the site, facing north-west from the Holman Rd / Osmund Crescent intersection

Appendix C

MFS Surveys

MFS Station – AFFF Historical Use Questionnaire

Please distribute the following questionnaire to nominated MFS personnel who have worked at MFS sites when active use of AFFF (*aqueous film-forming foam, firefighting foam*) occurred before it was phased out in 2016. When applicable, please annotate key site features on the site plans attached at the end of this questionnaire.

MFS Station: Christie Downs SAMFS Fire Station

Name: REDACTED

Position when working at the site: Station Officer / Station Officer

Phone number: REDACTED

Email: REDACTED

Date of response: 22/06/2022

Item	Question	Response
1	<i>When did you start working at this station?</i>	1998; Jan 2004
2	<i>How long have you worked at this station?</i>	
3	<i>Can you describe where stormwater from the site is usually discharged to (e.g. stormwater pit, nearby creek / pond, street gutter)?</i>	Drain at the front of the station and then straight onto Flaxmill Rd / public stormwater system; Foam gets washed onto Flaxmill Rd before it reaches the drain
4	<i>Can you describe any changes in how stormwater has been managed at the site over time?</i>	No
5	<i>Is stormwater harvested within the site?</i>	No
5.1	<i>If yes, please describe where and how stormwater is harvested.</i>	No
5.2	<i>For what purposes is stormwater harvested?</i>	No
6	<i>Are there groundwater wells / bores at the site?</i>	No
6.1	<i>If yes, for what purpose is groundwater used at the site?</i>	NA

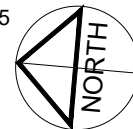
Item	Question	Response
6.2	<i>Where are the groundwater well / bores located on site? Please mark the location on the attached site plan.</i>	NA
7	<i>Date when AFFF was first used on site?</i>	At least mid 80s
8	<i>Can you provide the product names of any AFFF used on the site? (e.g. Ansulite, 3M Light Water)</i>	3M, triple M
9	<i>Was AFFF used in regular training exercises? If so:</i>	Yes
9.1	<i>How often was the training? (e.g. weekly, monthly, quarterly)</i>	every 1-3 months x 4 shifts (joint training with refinery fire fighters)
9.2	<i>Can you describe the location of the training areas and annotate them on the site plan?</i>	In front of the station on the front apron
9.3	<i>Can provide an estimate of how much AFFF was used in each training?</i>	1-20 L, average 5-10 L
9.4	<i>Was the training ground sealed / open?</i>	bitumen and concrete pad
9.5	<i>Was AFFF dispersed aerially? If so, please indicate the maximum extent on the site plan?</i>	max 20-30 m, mostly on sealed area some on the garden
9.6	<i>When was the date of the last training event that included the use of AFFF?</i>	Don't know
10	<i>Please describe how the waste water was managed following training events? Specifically, was there a recycling system, storage pond, storage tanks or drains? Please annotate waste water discharge point / pathways on the site plan.</i>	same as stormwater: drain at the front of station to discharge into the public stormwater drain or down the road into drain or onto Flaxmill Rd
11	<i>Did any waste water flow into drains that directed the waste water off-site? Please annotate the waste water discharge points / pathways on the site plan.</i>	Yes, see photos
12	<i>Were there any changes how the waste water was managed over time? If so, please describe the changes.</i>	No
13	<i>Is there any inventory of AFFF use for the site?</i>	No

Item	Question	Response
14	<i>Can you estimate the total volume of AFFF used on site before it was phased out in 2016?</i>	no
15	<i>Where was AFFF stored on site? Please annotate the storage location on the site plan.</i>	Foam tank on the appliances
15.1	<i>What type and size of storage containers were used to store AFFF on site?</i>	~120-150 L tank on the appliances, 2 appliances
15.2	<i>What is the number of storage containers or the total volume of AFFF that was typically stored on site at any given time prior to 2016?</i>	2 appliances
16	<i>Please describe where and how AFFF was transferred from storage containers to the fire trucks / fire-fighting appliances. What equipment was used to transfer the AFFF?</i>	Topped up at Adelaide Stn, no transfer on site
17	<i>How were spent drums of AFFF disposed of?</i>	NA
18	<i>Were there any wash down areas for fire trucks, equipment or AFFF containers? If so:</i>	Front apron to the east of the building
18.1	<i>How was the waste water from such areas managed? (e.g. recycling, treatment, storage pond or discharge to drains)</i>	Rinse pipes and water tank on appliance with water to remove residual foam; foam forms a blanket on front apron and is then pushed with water into the drain with some foamy water flowing down the road onto Flaxmill Rd. Total estimated water use ~1000L.
18.2	<i>Were there any changes how the waste water was managed over? If so, please describe the changes.</i>	No
19	<i>Please describe / annotate the specific location(s) of any other chemical storage facilities (including fuel and oil) and describe the type and typical use of those chemicals.</i>	Jerry cans with fuel; back engine room: degreaser 4 containers @5L, bleach;
20	<i>Is there an incident log / register for the site?</i>	Central reporting

Item	Question	Response
21	<i>Are you aware of any AFFF (or other chemical) releases that may have occurred outside of typical application scenarios? If so:</i>	No
21.1	<i>When did such release(s) happen?</i>	NA
21.2	<i>What substance(s) was/were released?</i>	NA
21.3	<i>Where did such release(s) happen? Please annotate the release point(s) on the site plan.</i>	NA
21.4	<i>Where was the released AFFF or chemical discharged to? Please annotate the discharge point(s) on the site plan.</i>	NA
22	<i>Are there areas of the site where training activities and / or AFFF release(s) have historically occurred that are now unused or have been built on?</i>	No
23	<i>Have there been any significant bulk earthworks on the Station site that resulted in soil being relocated from one area to another?</i>	No
24	<i>Please describe any changes to the Station that you are aware of with respect to the storage and use of AFFF.</i>	No

Any other comments or notes.

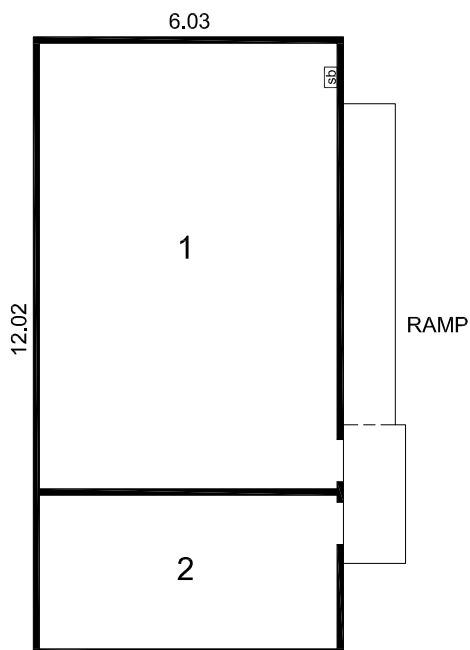
Station ~50 years old, due to move into new station in 6 months
 Fruit trees on southern and northern boundary: lemons, oranges, mandarins, passion fruit trees

Department for Transport,
Energy and Infrastructure

Strategic Asset Management Information System Plan

SAMIS 09161-01-1

Bldg area m²	456	Ver area m²	116	Plan ref.	-
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Asset Name					CHRISTIE DOWNS SAMFS FIRE STATION			Government of South Australia	
Building Use					GYMNASIUM & STORE			Department for Transport, Energy and Infrastructure	
Created by.		Survcad	Drawn		R.L.Chapman	Date		Apr 2010	
Modified by.		Survcad	Drawn		R.L.Chapman	Date		Apr 2010	
Bldg area m²		72	Ver area m²		-	Plan ref.		-	
								Strategic Asset Management Information System Plan	
								SAMIS 09161-02-1	

Appendix D

Borehole Logs



BOREHOLE LOG

ENVIRONMENTAL-SOIL BORE

SOIL BORE BH01

Page 1 of 1

Client SA MFS	Drill Co. WB Drilling	Easting 272013.07
Project MFS Christie Downs DSI	Driller WB Drilling	Northing 6110044.25
Project No. 12612725	Rig Type Eziprobe	Grid Ref GDA94_MGA_zone_54
Site MFS Christie Downs	Total Depth (m) 3.50	Elevation
Location 21 Holman Road	Diameter (mm) 50	Logged By TW
Date Drilled 19/07/2023 - 19/07/2023		Checked By TD

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)
0.2	HA		BH01_0-0.13			SAND; fine to medium, poorly graded, brown, some fine to medium gravel (FILL)	SM	L	No odour, no staining	-0.2
0.4						Silty SAND; fine to medium, poorly graded, brown (FILL)	SM	L	No odour, no staining	-0.4
0.6						Clayey SAND; no plasticity, fine to medium, poorly graded, pale brown (NATURAL - SOIL)	SM	L	No odour, no staining	-0.6
0.8	PT									-0.8
1.0						Clayey SAND; no plasticity, fine to medium, poorly graded, tan- white (NATURAL - SOIL)	D	L	No odour, no staining.	-1.0
1.2										-1.2
1.4						Clayey SAND; no plasticity, fine to medium, poorly graded, pale red (NATURAL - SOIL)	D	L	No odour, no staining	-1.4
1.6										-1.6
1.8										-1.8
2.0										-2.0
2.2										-2.2
2.4										-2.4
2.6										-2.6
2.8						LIMESTONE; hard, pale grey- white (NATURAL)	D	H	No odour, no staining.	-2.8
3.0										-3.0
3.2										-3.2
3.4			BH01_3.4-3.5			CLAY; low plasticity, pale purple- brown (NATURAL - SOIL)	D	H	No odour, no staining.	-3.4
3.6						Termination Depth at: 3.50 m. Refusal on bedrock.				-3.6

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, MR-Mud Rotary, 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 BH02

Page 1 of 1

Client SA MFS	Drill Co. WB Drilling	Easting 272015.4
Project MFS Christie Downs DSI	Driller WB Drilling	Northing 6110035.07
Project No. 12612725	Rig Type Eziprobe	Grid Ref GDA94_MGA_zone_54
Site MFS Christie Downs	Total Depth (m) 2.80	Elevation
Location 21 Holman Road	Diameter (mm) 50	Logged By TW
Date Drilled 19/07/2023 - 19/07/2023		Checked By TD

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)
0.0	HA					Silty SAND; fine to medium, poorly graded, brown, trace rootlets (FILL)	SM	L	No odour, no staining.	0.0
0.2										-0.2
0.4			BH02_0.35-0.45							-0.4
0.6						Clayey SAND; no plasticity, poorly graded, tan- white (NATURAL - SOIL)	SM	L	No odour, no staining.	-0.6
0.8	PT									-0.8
1.0										-1.0
1.2						Clayey SAND; no plasticity, fine to medium, poorly graded, pale red (NATURAL - SOIL)	D	L	No odour, no staining.	-1.2
1.4										-1.4
1.6						SAND; fine to medium, poorly graded, pale grey- white (NATURAL - SOIL)	D	L	Calcrete. No odour, no staining.	-1.6
1.8										-1.8
2.0										-2.0
2.2						CLAY; low plasticity, pale purple- brown (NATURAL - SOIL)	D	VST	No odour, no staining.	-2.2
2.4										-2.4
2.6										-2.6
2.8			BH02_2.7-2.8			CLAY; low plasticity, orange- brown (NATURAL - SOIL)	D	H	No odour, no staining.	-2.8
2.8						Termination Depth at: 2.80 m. Refusal on bedrock.				-2.8

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, MR-Mud Rotary, 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 BH03

Page 1 of 1

Client SA MFS	Drill Co. WB Drilling	Easting 272022.99
Project MFS Christie Downs DSI	Driller WB Drilling	Northing 6110023.27
Project No. 12612725	Rig Type Eziprobe	Grid Ref GDA94_MGA_zone_54
Site MFS Christie Downs	Total Depth (m) 2.20	Elevation
Location 21 Holman Road	Diameter (mm) 50	Logged By TW
Date Drilled 20/07/2023 - 20/07/2023		Checked By TD

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)
	PT		BH03_BITUMEN			ASPHALT				
0.1			BH03_0.04-0.14			Sandy GRAVEL; fine to medium, poorly graded, subangular, pale grey, fine to coarse, poorly graded sand (FILL)	D	L	No odour, no staining.	-0.1
0.2										-0.2
0.3						Clayey SAND; no plasticity, fine to medium, poorly graded, pale brown, trace fine gravel (NATURAL - SOIL)	D	L	No odour, no staining.	-0.3
0.4										-0.4
0.5										-0.5
0.6										-0.6
0.7										-0.7
0.8										-0.8
0.9										-0.9
1										-1
1.1						CLAY; no plasticity, pale purple- brown (NATURAL - SOIL)	D	ST	No odour, no staining.	-1.1
1.2										-1.2
1.3										-1.3
1.4										-1.4
1.5										-1.5
1.6										-1.6
1.7										-1.7
1.8										-1.8
1.9										-1.9
2						CLAY; no plasticity, pale brown- tan (NATURAL - SOIL)	D	H	No odour, no staining.	-2
2.1			BH03_2.1-2.2							-2.1
2.2						Termination Depth at: 2.20 m. Refusal on bedrock.				-2.2
2.3										-2.3

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, MR-Mud Rotary, 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

SOIL BORE BH04

ENVIRONMENTAL-SOIL BORE

Page 1 of 1

Client SA MFS	Drill Co. WB Drilling	Easting 272017.14
Project MFS Christie Downs DSI	Driller WB Drilling	Northing 6110022.54
Project No. 12612725	Rig Type Eziprobe	Grid Ref GDA94_MGA_zone_54
Site MFS Christie Downs	Total Depth (m) 2.20	Elevation
Location 21 Holman Road	Diameter (mm) 50	Logged By TW
Date Drilled 20/07/2023 - 20/07/2023		Checked By TD

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)
0.1	HA					Silty SAND; fine to medium, poorly graded, dark brown, trace rootlets (Reworked NATURAL)	SM		No odour, no staining.	-0.1
0.2						Clayey SAND; no plasticity, fine to medium, poorly graded, tan- brown (Reworked NATURAL)	SM	L	No odour, no staining.	-0.2
0.3										-0.3
0.4			BH04_0.4-0.5							-0.4
0.5										-0.5
0.6										-0.6
0.7										-0.7
0.8	PT					Clayey SAND; no plasticity, fine to medium, poorly graded, pale tan- brown (NATURAL - SOIL)	SM		No odour, no staining.	-0.8
0.9										-0.9
1.0										-1.0
1.1										-1.1
1.2										-1.2
1.3						Sandy CLAY; no plasticity, pale brown with grey- white, fine to medium, poorly graded sand (NATURAL - SOIL)	D	H	No odour, no staining.	-1.3
1.4										-1.4
1.5										-1.5
1.6										-1.6
1.7										-1.7
1.8										-1.8
1.9						CLAY; no plasticity, pale purple- brown (NATURAL - SOIL)	D	H	No odour, no staining.	-1.9
2.0										-2.0
2.1			BH04_2.1-2.2							-2.1
2.2						Termination Depth at: 2.20 m. Refusal on bedrock.				-2.2
2.3										-2.3

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, MR-Mud Rotary, 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 BH05

Page 1 of 1

Client SA MFS	Drill Co. WB Drilling	Easting 272018.25
Project MFS Christie Downs DSI	Driller WB Drilling	Northing 6110014.82
Project No. 12612725	Rig Type Eziprobe	Grid Ref GDA94_MGA_zone_54
Site MFS Christie Downs	Total Depth (m) 1.90	Elevation
Location 21 Holman Road	Diameter (mm) 50	Logged By TW
Date Drilled 20/07/2023 - 20/07/2023		Checked By TD

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)
0.1	DC		BH05_CONCRETE			CONCRETE				-0.1
0.2	HA		BH05_0.12-0.2			Sandy GRAVEL; fine to medium, poorly graded, subangular, pale brown, fine to coarse, poorly graded sand (FILL)	SM	L	No odour, no staining.	-0.2
0.3						Sandy CLAY; low plasticity, pale brown with white, fine to medium, poorly graded sand (NATURAL - SOIL)	SM	ST	No odour, no staining.	-0.3
0.4	PT									-0.4
0.5										-0.5
0.6										-0.6
0.7										-0.7
0.8										-0.8
0.9										-0.9
1.0										-1.0
1.1										-1.1
1.2										-1.2
1.3										-1.3
1.4										-1.4
1.5										-1.5
1.6						CLAY; no plasticity, pale purple- brown (NATURAL - SOIL)	D	H	No odour, no staining.	-1.6
1.7										-1.7
1.8			BH05_1.8-1.9							-1.8
1.9						Termination Depth at: 1.90 m. Refusal on bedrock.				-1.9

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, MR-Mud Rotary, 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

Page 1 of 1

Client SA MFS
Project MFS Christie Downs DSI
Project No. 12612725
Site MFS Christie Downs
Location 21 Holman Road
Date Drilled 20/07/2023 - 20/07/2023

Drill Co. WB Drilling
Driller WB Drilling
Rig Type Eziprobe
Total Depth (m) 2.50
Diameter (mm) 50

Easting 272018.71
Northing 6110008.04
Grid Ref GDA94_MGA_zone_54
Elevation
Logged By TW
Checked By TD

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)
0.1	DC		BH06_CONCRETE (FD03,FS03)			CONCRETE				-0.1
0.2	HA		BH06_0.15-0.35			Sandy GRAVEL; fine to medium, poorly graded, subangular, pale brown, fine to coarse, poorly graded sand (FILL)	SM	L	No odour, no staining.	-0.2
0.3										-0.3
0.4	PT					Sandy CLAY; no plasticity, pale brown with white, fine to medium, poorly graded sand (NATURAL - SOIL)	D	ST	No odour, no staining.	-0.4
0.5										-0.5
0.6										-0.6
0.7										-0.7
0.8										-0.8
0.9										-0.9
1										-1
1.1										-1.1
1.2										-1.2
1.3										-1.3
1.4										-1.4
1.5										-1.5
1.6										-1.6
1.7										-1.7
1.8										-1.8
1.9										-1.9
2										-2
2.1										-2.1
2.2						CLAY; no plasticity, pale purple- brown (NATURAL - SOIL)	D	H	No odour, no staining.	-2.2
2.3										-2.3
2.4			BH06_2.4-2.5							-2.4
2.5						Termination Depth at: 2.50 m. Refusal on bedrock.				-2.5
2.6										-2.6

Notes

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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, 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

Page 1 of 1

Client SA MFS	Drill Co. WB Drilling	Easting 272024.04
Project MFS Christie Downs DSI	Driller WB Drilling	Northing 6110014
Project No. 12612725	Rig Type Eziprobe	Grid Ref GDA94_MGA_zone_54
Site MFS Christie Downs	Total Depth (m) 2.70	Elevation
Location 21 Holman Road	Diameter (mm) 50	Logged By TW
Date Drilled 20/07/2023 - 20/07/2023		Checked By TD

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	PT		BH07_BITUMEN (FD01,FS01)			ASPHALT				0
0.2						Sandy GRAVEL; no plasticity, fine to medium, poorly graded, subangular, pale grey, fine to medium, poorly graded sand (FILL)	D	L	No odour, no staining.	-0.2
0.4										-0.4
0.6										-0.6
0.8						Clayey SAND; no plasticity, fine to medium, poorly graded, pale brown, trace fine gravel (NATURAL - SOIL)	D	L	No odour, no staining.	-0.8
1			BH07_1.0-1.1							-1
1.2										-1.2
1.4										-1.4
1.6						CLAY; no plasticity, red- brown (NATURAL - SOIL)	D	L	No odour, no staining.	-1.6
1.8										-1.8
2						CLAY; no plasticity, tan- brown (NATURAL - SOIL)	D	ST	No odour, no staining.	-2
2.2						CLAY; no plasticity, pale purple- brown (NATURAL - SOIL)	D	H	No odour, no staining.	-2.2
2.4										-2.4
2.6			BH07_2.6-2.7							-2.6
2.8						Termination Depth at: 2.70 m. Refusal on bedrock.				-2.8

Notes

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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, 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

Page 1 of 1

Client SA MFS	Drill Co. WB Drilling	Easting 272025.63
Project MFS Christie Downs DSI	Driller WB Drilling	Northing 6110001.9
Project No. 12612725	Rig Type Eziprobe	Grid Ref GDA94_MGA_zone_54
Site MFS Christie Downs	Total Depth (m) 3.30	Elevation
Location 21 Holman Road	Diameter (mm) 50	Logged By TW
Date Drilled 20/07/2023 - 20/07/2023		Checked By TD

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)
	PT		BH08_BITUMEN			ASPHALT				
0.2			BH08_0.05-0.15 (FD02,FS02)			Sandy GRAVEL; no plasticity, fine to medium, poorly graded, subangular, pale grey, fine to coarse, poorly graded sand (FILL)	D	L	No odour, no staining.	-0.2
0.4			BH08_0.35-0.45							-0.4
0.6						CLAY; no plasticity, red- brown (NATURAL - SOIL)	D	VST	No odour, no staining.	-0.6
0.8										-0.8
1										-1
1.2										-1.2
1.4										-1.4
1.6						Clayey SAND; fine to medium, poorly graded, tan-white (NATURAL - SOIL)	D	MD	No odour, no staining.	-1.6
1.8										-1.8
2										-2
2.2										-2.2
2.4										-2.4
2.6						CLAY; no plasticity, pale purple- brown (NATURAL - SOIL)	D	H	No odour, no staining.	-2.6
2.8										-2.8
3										-3
3.2			BH08_3.2-3.3							-3.2
3.4						Termination Depth at: 3.30 m. Refusal on bedrock.				-3.4

Notes

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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, 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

Page 1 of 1

Client SA MFS	Drill Co. WB Drilling	Easting 272029.03
Project MFS Christie Downs DSI	Driller WB Drilling	Northing 6110013.52
Project No. 12612725	Rig Type Eziprobe	Grid Ref GDA94_MGA_zone_54
Site MFS Christie Downs	Total Depth (m) 3.50	Elevation
Location 21 Holman Road	Diameter (mm) 50	Logged By TW
Date Drilled 20/07/2023 - 20/07/2023		Checked By TD

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)
0.2	HA		BH09_0-0.15			Silty SAND; fine to medium, poorly graded, brown, trace rootlets (Reworked NATURAL)	SM	L	No odour, no staining.	
0.4	PT					Sandy GRAVEL; fine to medium, poorly graded, subangular, tan- brown, fine to medium, poorly graded sand (FILL)	SM	L	No odour, no staining.	-0.2
0.6						Sandy CLAY; low plasticity, pale orange- brown, fine to medium, poorly graded sand (NATURAL - SOIL)	SM	F	No odour, no staining.	-0.4
0.8										-0.6
1.0										-0.8
1.2										-1.0
1.4										-1.2
1.6										-1.4
1.8										-1.6
2.0										-1.8
2.2						Clayey SAND; fine to medium, poorly graded, tan-white (NATURAL - SOIL)	D	MD	No odour, no staining.	-2.0
2.4										-2.2
2.6						CLAY; no plasticity, pale purple- brown (NATURAL - SOIL)	D	H	No odour, no staining.	-2.4
2.8										-2.6
3.0										-2.8
3.2										-3.0
3.4			BH09_3.4-3.5							-3.2
3.6						Termination Depth at: 3.50 m. Refusal on bedrock.				-3.4

Notes

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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, 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

Page 1 of 1

Client SA MFS	Drill Co. WB Drilling	Easting 271976.66
Project MFS Christie Downs DSI	Driller WB Drilling	Northing 6110025.77
Project No. 12612725	Rig Type Eziprobe	Grid Ref GDA94_MGA_zone_54
Site MFS Christie Downs	Total Depth (m) 2.40	Elevation
Location 21 Holman Road	Diameter (mm) 50	Logged By TW
Date Drilled 21/07/2023 - 21/07/2023		Checked By TD

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)
0.1	DC					CONCRETE			No odour, no staining.	-0.1
0.2	PT		BH10_0.12-0.3			Gravelly SAND; fine to coarse, poorly graded, grey-brown, subangular, fine to medium, poorly graded gravel (FILL)	SM	L	No odour, no staining.	-0.2
0.3						Clayey SAND; low plasticity, fine to medium, poorly graded, dark brown (Reworked NATURAL)	SM	MD	No odour, no staining.	-0.3
0.4										-0.4
0.5										-0.5
0.6										-0.6
0.7										-0.7
0.8						Clayey SAND; low plasticity, fine to medium, poorly graded, pale brown, fine to medium, poorly graded sand (NATURAL - SOIL)	SM	MD	No odour, no staining.	-0.8
0.9										-0.9
1			BH10_1.0-1.1							-1
1.1						Sandy CLAY; no plasticity, pale grey- white, fine to medium, poorly graded sand (NATURAL - SOIL)	D	H	No odour, no staining.	-1.1
1.2										-1.2
1.3										-1.3
1.4										-1.4
1.5										-1.5
1.6										-1.6
1.7										-1.7
1.8										-1.8
1.9										-1.9
2										-2
2.1										-2.1
2.2										-2.2
2.3						CLAY; no plasticity, brown (NATURAL - SOIL)	D	H	No odour, no staining.	-2.3
2.4						Termination Depth at: 2.40 m. Refusal on bedrock.				-2.4
2.5										-2.5

Notes

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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, 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

Page 1 of 1

Client SA MFS	Drill Co. WB Drilling	Easting 271979.1
Project MFS Christie Downs DSI	Driller WB Drilling	Northing 6110012.48
Project No. 12612725	Rig Type Eziprobe	Grid Ref GDA94_MGA_zone_54
Site MFS Christie Downs	Total Depth (m) 2.90	Elevation
Location 21 Holman Road	Diameter (mm) 50	Logged By TW
Date Drilled 21/07/2023 - 21/07/2023		Checked By TD

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					CONCRETE				
0.2	PT		BH11_0.12-0.22			Gravelly SAND; fine to coarse, poorly graded, grey-brown, subangular, fine to medium, poorly graded gravel (FILL)	SM	L	No odour, no staining.	-0.2
0.4										-0.4
0.6										-0.6
0.8						Clayey SAND; low plasticity, fine to medium, poorly graded, dark brown, trace fine gravel (Reworked NATURAL)	SM	MD	No odour, no staining.	-0.8
1										-1
1.2						Sandy CLAY; no plasticity, pale brown- tan, fine to medium, poorly graded sand (NATURAL - SOIL)	D	F	No odour, no staining.	-1.2
1.4										-1.4
1.6			BH11_1.5-1.6							-1.6
1.8						Sandy CLAY; no plasticity, pale brown, fine to medium, poorly graded sand (NATURAL - SOIL)	D	ST	No odour, no staining.	-1.8
2										-2
2.2										-2.2
2.4						CLAY; no plasticity, pale purple- brown (NATURAL - SOIL)	D	H	No odour, no staining.	-2.4
2.6										-2.6
2.8						Sandy CLAY; no plasticity, pale grey- white, fine to medium, poorly graded sand (NATURAL - SOIL)	D	H	No odour, no staining.	-2.8
3						Termination Depth at: 2.90 m. Refusal on bedrock.				-3

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, MR-Mud Rotary, 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



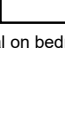
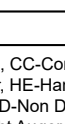
BOREHOLE LOG

ENVIRONMENTAL-SOIL BORE

SOIL BORE MW01

Page 1 of 1

Client SA MFS	Drill Co. WB Drilling	Easting 272027.42
Project MFS Christie Downs DSI	Driller WB Drilling	Northing 6110030.98
Project No. 12612725	Rig Type Eziprobe	Grid Ref GDA94_MGA_zone_54
Site MFS Christie Downs	Total Depth (m) 2.10	Elevation
Location 21 Holman Road	Diameter (mm) 50	Logged By TW
Date Drilled 21/07/2023 - 21/07/2023		Checked By TD

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)
0.1	PT		MW01_0.05-0.15			ASPHALT				-0.1
0.2						Sandy GRAVEL; fine to medium, poorly graded, subangular, pale grey, fine to coarse, poorly graded sand (FILL)	SM	L	No odour, no staining.	-0.2
0.3						Clayey SAND; no plasticity, fine to medium, poorly graded, tan- brown (NATURAL - SOIL)	D	L	No odour, no staining.	-0.3
0.4										-0.4
0.5										-0.5
0.6										-0.6
0.7										-0.7
0.8										-0.8
0.9										-0.9
1.0										-1.0
1.1										-1.1
1.2										-1.2
1.3										-1.3
1.4										-1.4
1.5										-1.5
1.6										-1.6
1.7						CLAY; no plasticity, pale purple- brown (NATURAL - SOIL)	D	H	No odour, no staining.	-1.7
1.8										-1.8
1.9										-1.9
2.0										-2.0
2.1			MW01_2.0-2.1			Sandy CLAY; no plasticity, grey- white, fine to medium, poorly graded sand (NATURAL - SOIL)	D	H	No odour, no staining.	-2.1
2.2						Termination Depth at: 2.10 m. Refusal on bedrock.				-2.2

Notes This is the original MW01 location, due to refusal on bedrock the well was installed at location BH04/MW01. Please refer to the borelog for BH01/MW01 for further information.

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, MR-Mud Rotary, 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 MW02

Page 1 of 1

Client SA MFS	Drill Co. WB Drilling	Easting 271980.21
Project MFS Christie Downs DSI	Driller WB Drilling	Northing 6110021.99
Project No. 12612725	Rig Type Eziprobe	Grid Ref GDA94_MGA_zone_54
Site MFS Christie Downs	Total Depth (m) 3.50	Elevation
Location 21 Holman Road	Diameter (mm) 50	Logged By TW
Date Drilled 21/07/2023 - 21/07/2023		Checked By TD

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					CONCRETE				
0.2	PT		MW02_0.12-0.32 (FD04,FS04)			Gravelly SAND; fine to coarse, poorly graded, grey-brown, subangular, fine to medium, poorly graded gravel (FILL)	SM	L	No odour, no staining.	-0.2
0.4						Clayey SAND; low plasticity, fine to medium, poorly graded, dark brown (Reworked NATURAL)	SM	MD	No odour, no staining.	-0.4
0.6										-0.6
0.8										-0.8
1						Clayey SAND; fine to medium, poorly graded, pale brown (NATURAL - SOIL)	SM	L	No odour, no staining.	-1
1.2										-1.2
1.4						Sandy CLAY; low plasticity, pale brown- tan, fine to medium, poorly graded sand (NATURAL - SOIL)	D	F	No odour, no staining.	-1.4
1.6										-1.6
1.8						CLAY; low plasticity, red- brown (NATURAL - SOIL)	SM	ST	No odour, no staining.	-1.8
2										-2
2.2			MW02_2.2-2.3							-2.2
2.4						CLAY; low to medium plasticity, pale purple- brown (NATURAL - SOIL)	SM	ST	No odour, no staining.	-2.4
2.6										-2.6
2.8										-2.8
3										-3
3.2										-3.2
3.4										-3.4
3.6						Termination Depth at: 3.50 m. Refusal on bedrock.				-3.6

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, MR-Mud Rotary, 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 MW03

Page 1 of 1

Client SA MFS	Drill Co. WB Drilling	Easting 271979.13
Project MFS Christie Downs DSI	Driller WB Drilling	Northing 6110038.29
Project No. 12612725	Rig Type Eziprobe	Grid Ref GDA94_MGA_zone_54
Site MFS Christie Downs	Total Depth (m) 3.50	Elevation
Location 21 Holman Road	Diameter (mm) 50	Logged By TW
Date Drilled 21/07/2023 - 21/07/2023		Checked By TD

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					CONCRETE				
0.2	PT		MW03_0.12-0.22			Gravelly SAND; fine to coarse, poorly graded, grey-brown, subangular, fine to medium, poorly graded gravel (FILL)	SM	L	No odour, no staining.	-0.2
0.4						Clayey SAND; low plasticity, fine to medium, poorly graded, dark brown (Reworked NATURAL)	SM	MD	No odour, no staining.	-0.4
0.6										-0.6
0.8						Clayey SAND low plasticity, fine to medium, poorly graded, pale tan- brown (NATURAL - SOIL)	SM	MD	No odour, no staining.	-0.8
1										-1
1.2										-1.2
1.4						Clayey SAND fine to medium, poorly graded, angular, pale brown (NATURAL - SOIL)	D	MD	No odour, no staining.	-1.4
1.6										-1.6
1.8										-1.8
2										-2
2.2										-2.2
2.4						CLAY low to medium plasticity, orange- brown (NATURAL - SOIL)	SM	F	No odour, no staining.	-2.4
2.6										-2.6
2.8										-2.8
3										-3
3.2						CLAY no plasticity, pale purple- brown (NATURAL - SOIL)	D	H	No odour, no staining.	-3.2
3.4			MW03_3.4-3.5							-3.4
3.6						Termination Depth at: 3.50 m. Refusal on bedrock.				-3.6

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, MR-Mud Rotary, 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

Page 1 of 1

Client SA MFS Project MFS Christie Downs DSI Project No. 12612725 Site MFS Christie Downs Location 21 Holman Road Date Drilled 09/04/2023 -				Drill Co. A &S Drilling Driller A &S Drilling Rig Type Eziprobe Drill Method SFA / AH Total Depth (m) 20.00 Casing Diameter (mm) 50mm				Easting, Northing , Grid Ref GDA94_MGA_zone_54 Elevation TOC mAHD - Logged By LW Checked By TD								
B.C.L No. 441219				Casing 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)					
1	AH		BH04_0.4-0.5				Silty SAND; fine to medium, poorly graded, dark brown, trace rootlets (Reworked NATURAL)	SM	L	No odour, no staining.	-1					
			Clayey SAND; no plasticity, fine to medium, poorly graded, tan- brown (Reworked NATURAL)				SM		No odour, no staining.	-1						
2			BH04_2.1-2.2				Clayey SAND; no plasticity, fine to medium, poorly graded, pale tan- brown (NATURAL - SOIL)	D	H	No odour, no staining.	-2					
			Clayey SAND; no plasticity, fine to medium, poorly graded, pale tan- brown (NATURAL - SOIL)				D	H	No odour, no staining.	-2						
3											Sandy CLAY; no plasticity, pale brown with grey- white, fine to medium, poorly graded sand (NATURAL - SOIL)	D		No odour, no staining.	-3	
											CLAY; no plasticity, pale purple- brown (NATURAL - SOIL)					
4											Siltstone; pale brown					-4
5								MW01_4.5-5.0								-5
6																-6
7																-7
8											-8					
9											-9					
10			MW01_10.0				Silty CLAY; dark brown	M	VS	No odour, no staining.	-10					
11							Siltstone; pale brown	D	H	No odour, no staining.	-11					
12											-12					
13											-13					
14											-14					
15			MW01_15.0								-15					
16											-16					
17											-17					
18											-18					
19											-19					
20			MW01_20.0				Termination depth 20.0 m. No Groundwater.				-20					

Notes The top 2.2m is BH04 and was drilled 20/7/23, MW01 was advanced through the same hole on 4/9/23. This log is BH04 and MW01 combined. The original MW01 location is now BH12.

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

Appendix E

SSHIL Methodology

Our ref: 12602101

28 June 2023

Krystle Mitchell
Senior Scientific and Environment Officer
South Australian Metropolitan Fire Service
99 Wakefield Street
Adelaide, SA 5000

Derivation of site-specific health investigation levels for urban and regional fire stations – South Australia Metropolitan Fire Service (SA MFS)

Dear Krystle,

1. Introduction

This letter describes the derivation of site-specific health investigation levels (SSHILs) for per- and poly-fluoroalkyl substance (PFAS) contaminated soil at fire stations operated by the South Australia Metropolitan Fire Service (SA MFS). SSHILs have been derived for urban and regional settings based on the methodology provided in the following documents:

- Heads of EPAs Australia and New Zealand (HEPA) and the Australian Government Department of the Environment and Energy (DoEE) – *PFAS National Environmental Management Plan* (the 'PFAS NEMP') (HEPA, 2020)
- National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended 2013 (NEPC, 2013) (the 'ASC NEPM')
- NSW and Office of Environment and Heritage (OEH, 2019) *Human health soil screening criteria for PFOS, PFHxS and PFOA*

1.1 Background

From 2007, SA MFS began phasing out the use of aqueous film-forming foam (AFFF) containing perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA) as key constituents, due to concerns regarding the hazards posed by these compounds to human health and the environment. The SA MFS replaced all firefighting foam in 2016 to ensure that only fluorine-free foam was in use. Currently, state-wide, all SA MFS appliances carry firefighting foams that do not contain PFOS or PFOA and are fluorine-free. During 2017/2018, the SA MFS also removed all fire extinguishers containing PFAS. In 2018, SA MFS engaged GHD to provide ongoing environmental services and undertake site contamination assessments across many of their operational sites as well as risk profiling for their entire portfolio of sites to effectively manage the potential for PFAS contamination and any associated human health and ecological risks.

The PFAS NEMP provides generic health investigation levels (HILs) for PFOS, PFOA and perfluorohexane sulfonate (PFHxS) in soil in four land use settings, as summarised in Table 1 below. 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 derivation of the PFAS HIL values is described in detail by OEH (2019).

Table 1 Summary of exposure scenarios adopted to derive generic HILs.

Land use	HIL (mg/kg)	Exposure scenario description
HIL A Residential, with gardens /accessible soil	PFOS+PFHxS: 0.01 PFOA: 0.1	- Low-density residential settings with sizeable gardens and with areas of soil that are accessible - Gardens are assumed to consist of lawns, garden beds and small vegetable gardens and areas of fruit trees - Assumes home-grown produce provides up to 10% of fruit and vegetable intake (does not account for consumption of eggs from home poultry) - Site users are adults, children and infants who spend most of their time at home and use the outdoor areas of the residences on a frequent basis for activities such as gardening or recreation. This scenario assumes 20 hours a day spent indoors and 4 hours a day spent outdoors in direct contact with soil. - Children are the most sensitive human receptors. This scenario is protective of childcare centres, kindergartens, preschools and primary schools and their integral playgrounds.
HIL B Residential, with minimal opportunities for soil access	PFOS+PFHxS: 2 PFOA: 20	- 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
HIL C Public open space	PFOS+PFHxS: 1 PFOA: 10	- Parks, playgrounds, recreational areas and playing fields that are fully accessible to the public - These areas may contain lawns, gardens, vegetated areas, and walkways with some areas of exposed soil - Assumes no use of soil to produce vegetables, fruit or poultry - Site users are adults and children who may use the area for up to 2 hours a day, 7 days a week - Children are the most sensitive human receptors
HIL D Commercial/ industrial	PFOS+PFHxS: 20 PFOA: 50	- 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.

A review of Table 1 indicates that the typical usage patterns at SA MFS fire stations most closely align with the exposure assumptions that underpin the HIL D values. The following inconsistencies are however noted:

- The preliminary site investigations undertaken at SA MFS sites across South Australia has identified that some fire stations have a higher proportion of unsealed ground (up to approximately 75% of the total site area) than has been assumed in the derivation of the HIL D values (up to approximately 20% of the total site area). As a result of this, there may be greater opportunities for direct access to soil at SA MFS fire stations, including the ingestion of soil and soil-derived dust.
- The shifts worked by SA MFS firefighters do not align with the assumption of a standard working week than underpins the HIL D values

Given these factors, SSHILs have been derived using exposure assumptions that reflect the typical usage pattern of the SA MFS fire stations, to allow for a more accurate assessment of the health risks that may be associated with the presence of PFAS in shallow soils.

1.2 Objective of this report

The objective of this report is to derive SSHILs for PFOS+PFHxS and PFOA in soils that are protective of workers at SA MFS fire stations in typical urban and regional settings. The purpose of these SSHILs is to facilitate the screening assessment of soil datasets for human health risks.

2. Derivation methodology

The SSHILs have been calculated using the HILs spreadsheet (Excel format) provided on the ASC NEPM website¹. The algorithms underlying the HILs spreadsheet are detailed in Schedule B7 of the ASC NEPM. These algorithms were also used in the derivation of the HILs PFOS+PFHxS and PFOA, presented in Table 1 and as detailed by OEH (2019).

The process used to derive the SSHILs involved the following key steps:

- **Toxicity assessment:** which established the relationships between PFAS exposure and potential health and ecological effects, using published toxicological information
- **Exposure assessment:** which produced estimates of the PFAS exposure that may be experienced by users of SA MFS fire stations.
- **Risk characterisation:** which combines the results of the toxicity assessment and exposure assessment, to derive soil criteria that are protective of potential risks to the health of users of SA MFS fire stations.

The toxicity assessment and exposure assessment inputs used in the derivation of the SSHILs are detailed herein, with the SSHILs provided in Section 3.

2.1 Toxicity assessment methodology

A toxicity assessment determines whether human exposure to a chemical could cause an increase in the incidence of an adverse health condition (NEPC, 2013). The outcomes of the toxicity assessment process are a set of toxicity criteria that have been used to derive the SSHILs.

For most chemicals there is a dose below which no adverse health effect will occur (i.e., a threshold toxicant). PFAS have been linked with several threshold toxicities, including effects on cholesterol and immunotoxicity. Accordingly, the SSHILs focus on potential threshold risks linked to PFAS exposure. Chronic health risks for threshold chemicals are assessed by comparing the estimated intake with toxicity reference values (TRVs), which are a measure of tolerable daily exposure. The TRVs adopted in the derivation of the SSHILs are consistent with those that underpin the HIL D values presented in the PFAS NEMP, as detailed in Table 2.

The toxicity assessment process also considers the toxicokinetics of PFAS and in particular the tendency of PFAS to be absorbed via the various potential routes of exposure (i.e., ingestion, inhalation and dermal absorption). Consistent with the approach adopted by OEH (2019) the dermal uptake of PFAS has been assumed to be negligible and has not been included in the derivation of the SSHILs.

¹ <https://www.nepc.gov.au/nepms/assessment-site-contamination/toolbox>

Table 2 Summary of toxicological input parameters used in the derivation of the SSHILs.

Chemical	Toxicity assessment input parameters	Source
Toxicity reference values		
PFOS, PFHxS (sum)	20 ng/kg/day	OEH (2019); FSANZ (2017)
PFOA	160 ng/kg/day	OEH (2019); FSANZ (2017)
Absorption parameters		
Dermal absorption	Negligible	OEH (2019)
Gastrointestinal absorption	100%	OEH (2019); FSANZ (2017)

2.2 Exposure assessment methodology

In an exposure assessment, appropriate exposure assumptions are identified for each exposure pathway, and these are used in conjunction with exposure modelling algorithms to estimate intakes of contaminants by the exposed receptors (NEPC, 2013).

The exposure assessment inputs adopted in the derivation of the SSHILs have primarily been sourced from OEH (2019), with adjustments made as appropriate, based on information provided by SA MFS. A summary of the adopted exposure assessment inputs and the rational underpinning the selected values is provided in Attachment 1. These inputs can be summarised as follows:

- *Firefighter physiology*: The ASC NEPM Schedule B7 provides standard exposure parameters for commercial / industrial scenarios, including factors such as the body weight and inhalation characteristics of adult workers. Consistent with the approach adopted by OEH (2019), these have been adopted in the derivation of SSHILs, as SA MFS firefighters will typically be physiologically consistent with the general population.
- *Exposure frequency and time onsite*: Information provided by SA MFS has been used to select appropriate input assumptions around exposure frequency and time spent onsite, as detailed in Section 2.2.1
- *Exposure to PFAS from external sources*: PFAS is present in a variety of domestic products and commercial applications and is ubiquitous in urban settings. Hence, SA MFS firefighters are likely to be exposed to PFAS from a variety of sources external to the fire stations, such as food, air, water and consumer products. The TRVs detailed in Section 2.1 are relevant to the PFAS intake from all sources. The HIL D presented in the PFAS NEMP were derived based on the conservative assumption that 80% of the exposure to PFAS experienced by workers originates from external sources, with 20% of the TRV allocated to PFAS in fire station soils. This conservative assumption has been retained in the derivation of SSHILs for SA MFS firefighters
- *Incidental soil ingestion rates*: The incidental soil ingestion rates for SA MFS firefighters have been assumed to be consistent with those experienced by adults in a residential setting (50 mg/day), rather than those adopted in the ASC NEPM and by OEH (2019) for commercial/industrial sites (25 mg/day). This approach is likely to be conservative but has been adopted to account for the extended shifts worked by firefighters in metropolitan areas and the substantial areas of unsealed ground that are present on some of the SA MFS fire stations.
- *Use of SA MFS fire stations by children*: Children have not been specifically included in the derivation of the SSHILs. It is understood that children do visit the SA MFS fire stations but that this does not occur with regularity. Hence, the SSHILs, which have been derived to be protective of firefighters employed at the fire stations, will also be adequately protective of the health children visiting less frequently.

- *Produce production and consumption*: Historically, produce gardens were present on a number of the SA MFS fire stations and it is understood that there was some concern that the time spent tending these gardens and consuming produce would be associated with increased levels of exposure to PFAS. In 2022 however, SA MFS issued a directive on advice from GHD and EPA that all fruit and vegetable plants be removed from fire stations and replaced with ornamental plants (refer to Attachment 2). Areas of ornamental landscaping are not inconsistent with the exposure assumptions underpinning the HIL D values and therefore adjustments to the exposure assumptions used to derive the SSHILs have not been made on this basis.

2.2.1 Firefighter shifts

As noted in Table 1, the generic HIL D values assume that workers spend up to 240 days a year at commercial/industrial sites: eight hours a day indoors and one hour a day outdoors. This is equivalent to a total yearly exposure of 2160 hours. Given that the shifts worked by firefighter in both urban and regional areas differ from this pattern, the specific exposure times provided by SA MFS have been adopted in the derivation of the SSHILs as follows:

- Metropolitan fire stations – SA MFS has indicated that firefighters typically work two 10-hour dayshifts and two 14-hours nightshifts followed by four days off work and that firefighters work for 6 months before taking 6 weeks of annual leave. This averages to 12-hour shifts for circa 150 days per year. This is equivalent to a total yearly exposure of 1800 hours, which is lower than the exposure assumption underpinning the generic HIL D values.
- Regional fire stations – SA MFS has indicated that firefighters can spend up to three hours a week at regional fire stations. This is equivalent to a total yearly exposure of 156 hours per year, which is substantially lower than the exposure assumption underpinning the generic HIL D.

3. Site-specific HILs for the screening of PFAS contaminated soils at SA MFS sites

The input parameters selected via the toxicity assessment and exposure assessment processes, as detailed in Sections 2.1 and 2.2 respectively, have been combined to calculate SSHILs for the screening of PFAS contaminated soils at SA MFS fire stations. The models used to calculate the SSHILs are presented in Attachment 3 and Table 3 summarises the derived SSHIL values.

Table 3 SSHILs derived for the screening of PFAS contaminated soil in urban and regional SA MFS fire stations

Fire station type	PFOS+PFHxS	PFOA*	Comment
Metropolitan	14 mg/kg	50 mg/kg	These SSHILs assumes four 12-hour shifts every eight days (i.e., four days at work and four days off)
Regional	40 mg/kg	50 mg/kg	These SSHILs assumes one 3-hour shift per week.
Notes: Although higher values were calculated using the toxicity and exposure assessment process, the SSHIL for PFOA has been set as 50 mg/kg in anticipation of the Stockholm Convention low content limit. This is consistent with the PFAS NEMP			

4. Closure

We trust that the information above is sufficient for SA MFS's purposes. Should you have any further questions on this document please do not hesitate to contact the undersigned.

Regards



Davide Menozzi
Senior Environmental Scientist
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Ben Petticrew
Technical Director
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5. References

- FSANZ. (2017). *Food Standards Australia New Zealand's (FSANZ) report on Perfluorinated Chemicals in Food*.
- HEPA. (2020). *PFAS National Environmental Management Plan - Version 2.0*.
- NEPC. (2013). *National Environment Protection (Assessment of Site Contamination) Amendment Measure*.
- OEH. (2019). *Human health soil screening criteria for PFOS, PFHxS and PFOA*.

Attachments

Attachment 1

**Summary of exposure assessment
inputs**

Summary of SA MFS sites - unsealed areas

Location (metro)	Unsealed area (m^2)	Total area (m^2)	% unsealed
Angle park	111254	153034	73%
Adelaide	115	20000	1%
St Marys	1229	4543	27%
Largs	1163	3316	35%
Woodville	141	2172	6%
Christie Downs	710	2321	31%
Camden Park	531	2771	19%
Oakden	1302	4802	27%
Port Adelaide	449	4349	10%
O'Halloran Hill	2959	7300	41%
Brooklyn Park	1090	3710	29%
Beulah Park	335	2791	12%
Elizabeth	100	3256	3%
Gawler	1300	3457	38%
Glen Osmond	180	3152	6%
Golden Grove	1172	3994	29%
Paradise	680	4090	17%
Prospect	580	2820	21%
Salisbury	2442	12607	19%
Seaford	2300	7450	31%
Mount Barker	362	2110	17%
	Unsealed Average	Total Area Average	% average
	815	4,913	17%
Max	111254	153034	73%
Min	100	2110	1%

Location (regional)	Unsealed area (m^2)	Total area (m^2)	% unsealed
Loxton	987	2154	46%
Moonta	1	920	0%
Whyalla	6224	11054	56%
Mt Gambier	1506	3884	39%
Kapunda	1	395	0%
Peterborough	519	994	52%
Port Pirie	7875	19297	41%
Port Augusta	961	2461	39%
Murray Bridge	796	2005	40%
Berri	583	3065	19%
Kadina	1	577	0%
Port Lincoln	420	6058	7%
Renmark	70	3573	2%
Tanunda	168	1438	12%
Victor Harbor	400	1847	22%
Walleroo	1032	1600	65%
	Unsealed Average	Total Area Average	% average
	222	2,276	10%
Max	7875	19297	65%
Min	1	395	0%

Summary of exposure parameters

Summary of Exposure Parameters	units	Parameter			Rationale
		HIL D	SA MFS SSHIL - Urban	SA MFS SSHIL - Regional	
Soil and Dust Ingestion Rate	mg/day	25	50	50	HIL D assumes that the incidental soil ingestion rate experienced by adults working for 8-hours on a commercial industrial site (25 mg/day) is likely to be ~50% of that experienced by adults in a residential setting (50 mg/day), given that waking hours are typically ~16-hours per day. The ASC NEPM residential soil ingestion rate has been adopted for SA MFS firefighters, given that substantial areas of unsealed ground are present on some of the SA MFS fire stations and firefighters may spend significant periods of time outdoors. This assumption is likely to be conservative for firefighters in regional settings, who typically spend less time onsite
Time Spent Outdoors	hours	1	4	2	HIL D assumes a standard 8-hour working day, with minimal time spent outdoors. MFS SA has indicated that:
Time Spent Indoors	hours	8	8	1	- firefighters in metropolitan locations typically work 12-hour shifts - firefighters in regional locations typically work 3-hour shifts It has also been assumed that firefighters may spend significant amounts of time outdoors, undertaking activities such as training and equipment and facility maintenance
Lung Retention Factor	-	0.375	0.375	0.375	ASC NEPM default, as detailed in Schedule B7. Describes the percentage of dust that is small enough to be inhaled.
Particulate Emission Factor	(m ³ /kg)	3.70E+10	9.7E+09	9.7E+09	Calculated as described in Schedule B7 of the ASC NEPM. For HIL D, up to 20% of the site is assumed to be open ground. For the SA MFS fire stations up to 75% of the site is assumed to be open ground
Indoor Air Dust Factor	(m ³ /kg)	2.6E+07	2.6E+07	2.6E+07	ASC NEPM default, as described in Schedule B7. The indoor dust concentration is assumed to be equal to the 95th percentile from Australian data (enHealth 2012; 39 µg/m ³), noting that indoor air can be enriched with dust compared to the outdoor environment, due to the movement of dust indoors on clothing, footwear etc.
Fraction of indoor dust comprised of outdoor soil	-	0.5	0.5	0.5	ASC NEPM default, as described in Schedule B7. Assume 50% of indoor dust is comprised of soil tracked into the building
Body weight	kg	70	70	70	ASC NEPM default, as described in Schedule B7.
Exposure Frequency	days/year	240	140	52	HIL D assumes a 5-day working week for 48 weeks per year. MFS has indicated that - firefighters in metropolitan stations typically work four shifts every eight days - firefighters in regional stations typically work one 3-hour shift per week
Exposure Duration	years	30	30	30	ASC NEPM default, as described in Schedule B7. Note that this parameter does not influence the derived HIL for threshold chemicals, as exposure is averaged over the exposure duration.
Averaging Time (ingestion)	days	10950	10950	10950	Calculated based on the exposure duration. Multiplied by 24 hours for the assessment of inhalation exposures
Averaging Time (inhalation)	hours	262800	262800	262800	

Attachment 2

**SA MFS directive on the removal of
produce**



29 September 2022

FRUIT AND VEGETABLE GARDEN REMOVAL FROM ALL MFS STATIONS

MFS is directing all MFS stations to remove all fruit and vegetable gardens from MFS stations.

This is required to be completed by the **31st of October 2022**.

Garden waste can be disposed of as per the normal station procedures to dispose of this sort of waste. Where this is not practicable due to volume, please contact your Commander to arrange for an alternative solution, such as the provision of the high sided/skip pod.

If the fruit and vegetable garden cannot be removed by station personnel, please advise via the mfspfas@sa.gov.au. That email is to contain an audit of all fruit/vegetable trees that require removal by external contractors prior to 21 October 2022. The MFS will then arrange for these to be removed.

All fruit and vegetable gardens are required to be removed as the EPA see the presence of fruit and vegetable trees on fire stations as a possible human receptor to PFAS (even if you are not consuming the fruit and vegetables from them).

The MFS will provide ornamental plants and vegetation to replace the plants pulled out up to a value of \$100 on application. Applications from each station can be sent to mfspfas@sa.gov.au. Approval will then be forwarded to the relevant Metropolitan/Regional Commander to use their credit card to purchase the goods.

Metropolitan and Regional Commanders are to ensure that there are no fruit and vegetable gardens remaining at their relevant stations after the 31st of October 2022.

C Shift is responsible under the Station Management System - Station Administration, to ensure that this document is read, signed, placed on the Notice Board and filed.

Staff are reminded that the current SAPs, SOPs, Policies, SP Forms, Memorandums, Service Directives and Operational Procedures are available on the Members Only Website (MOW). This is a directive from the Chief Officer.

SIGNED

M. Morgan
**CHIEF OFFICER and
CHIEF EXECUTIVE**

ACTION	DATE	SIGN
Instruction received at Station		
Instruction read to "A" Shift		
Instruction read to "B" Shift		
Instruction read to "C" Shift		
Instruction read to "D" Shift		
Instruction read to Retained Staff		
Instruction read to OTR		
Placed on Notice Board		
Filed in Station File		

Attachment 3

SSHILs modelling inputs and outputs.

Derivation of Site specific health investigation levels

Firefighters at regional fire stations - South Australian Metropolitan Fire Service

Summary of Exposure Parameters			References/Notes	
Compound	Parameter	units	Abbreviation	
Soil and Dust Ingestion Rate	50	mg/day	IR _{SD}	Site-specific assumption: Consistent with assumption adopted for adults in residential settings
Time Spent Outdoors	1	hours	ET _O	Site-specific assumption; 3-hour shifts during which 1 hour is spent outdoors.
Time Spent Indoors	2	hours	ET _I	Site-specific assumption; 3-hour shifts during which 2 hours are spent indoors.
Lung Retention Factor	0.375	-	RF	ASC NEPM default assumption
Particulate Emission Factor	9.7E+09	(m ³ /kg)	PE _{Fo}	Calculated: Based on the site-specific assumption that up to 75% of individual sites is open ground
Indoor Air Dust Factor	2.6E+07	(m ³ /kg)	PE _{FI}	ASC NEPM default assumption
Fraction of indoor dust comprised of outdoor soil	0.5	-	TF	ASC NEPM default
Body weight:	70	kg	BW _c	ASC NEPM default
Exposure Frequency	52	days/year	EF	Site-specific assumption: One shift per week
Exposure Duration	30	years	ED _c	ASC NEPM default assumption
Averaging Time (non-carcinogenic)	ED*365	days	AT _T	Calculated based on ED for each relevant age group, multiplied by 24 hours for the assessment of inhalation exposures

Threshold Calculations – Adult Worker											
Compound	Toxicity Reference Value Oral (TRV _o) (mg/kg/day)	GI Absorption (GAF) (unitless)	Toxicity Reference Value Dermal (TRV _d) (mg/kg/day)	Oral Bioavailability BA _o (%)	Dermal Absorption Factor (DAF) (unitless)	Background Oral/Dermal Intake (BI _o) (% of TDI)	Toxicity Reference Value Inhalation (TRV _i) (mg/m ³)	Background Intake Inhalation (BI _i) (% of TC)	Pathway Specific HILs (mg/kg)		Derived Soil HIL (not rounded) (mg/kg)
									Soil Ingestion	Dust	
PFOS+PFHxS	0.00002	1	0.00002	100%	-	80%	0.00007	0%	3.9E+01	NA	39
PFOA	0.00016	1	0.00016	100%	-	80%	0.00056	0%	3.1E+02	NA	314
NA									Pathway not of significance for chemical assessed		

Derivation of Site specific health investigation levels
Fire fighters at metropolitan fire stations - South Australian Metropolitan Fire Service

Summary of Exposure Parameters			References/Notes	
Soil and Dust Ingestion Rate	- Adults	IR _{SA}	Parameter	50
Time Spent Outdoors		ET _O	units	mg/day
Time Spent Indoors		ET _I		hours
Lung Retention Factor		RF		hours
Particulate Emission Factor		PE _{Fo}		8
Indoor Air Dust Factor		PE _{FI}		0.375
Fraction of indoor dust comprised of outdoor soil		TF		9.7E+09
Body weight	- Adults	BW _C		2.6E+07
Exposure Frequency		EF		0.5
Exposure Duration	- Adults	ED _C		70
Averaging Time (non-carcinogenic)		AT _T		146
				30
				ED*365

Threshold Calculations - Adult Worker												
Compound	Toxicity Reference Value Oral (TRV _O) (mg/kg/day)	GI Absorption (GAF) (unitless)	Toxicity Reference Value Dermal (TRV _D) (mg/kg/day)	Oral Bioavailability BA _O (%)	Dermal Absorption Factor (DAF) (unitless)	Background Intake Oral/Dermal (BI _O) (% of TDI)	Toxicity Reference Value Inhalation (TRV _I) (mg/m ³)	Background Intake Inhalation (BI _I) (% of TC)	Pathway Specific HILs (mg/kg)			Derived Soil HIL (not rounded) (mg/kg)
									Soil Ingestion	Dermal	Dust	
PFOA+PFHxS	0.00002	1	0.00002	100%	-	80%	0.00007	0%	1.4E+01	NA	7.2E+04	14
PFOA	0.00016	1	0.00016	100%	-	80%	0.00056	0%	1.1E+02	NA	5.7E+05	112
NA												

Appendix F

Laboratory Reports



CHAIN OF CUSTODY RECORD

Eurofins | Environment Testing ABN 50 005 085 521

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

Brisbane Laboratory
Unit 1 21 Smallwood Place Murarie QLD 4172
07 3502 4600 EnviroSampleQLD@eurofins.com

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

Melbourne Laboratory
6 Monterey Road Dandenong South VIC 3175
03 8564 5000 EnviroSampleVic@eurofins.com

Company	GHD			Project No	12612725				Project Manager	Tom Duncan				Sampler(s)	Terrence Wilson (TW)															
Address	Level 4, 211 Victoria Square, Adelaide			Project Name	MFS Christie Downs DSI				EDD Format ESSal, EQUS etc	ESdat				Handed over by	Terrence Wilson															
Contact Name	Terrence Wilson			Analyses While metals are requested, please specify "Total" or "Filtered" SUITE code must be used to avoid SUITE pricing.	PFAS - Extended Suite (Standard LOR)	HOLD													Email for Invoice	accountspayableAU@ghd.com										
Phone No	0467034756						Email for Results	GHDLabReports@ghd.com Ben.Petticrew@ghd.com																						
Special Directions																			Containers Change container type & size if necessary.		Required Turnaround Time (TAT) Default will be 5 days if not ticked:									
Purchase Order																			500mL Plastic	250mL Plastic	125mL Plastic	200mL Amber Glass	40mL VOA vial	500mL PFAS Bottle	Jar (Glass or HDPE)	Other (Asbestos AS4954, WA Guidelines)	♦ Surcharge will apply Overnight (reporting by 9am) ♦ Same day ♦ 1 day ♦ 2 days ♦ 3 days ♦ 5 days (Standard) Other()			
Quote ID No																										Sample Comments / Dangerous Goods Hazard Warning				
No	Client Sample ID			Sampled Date/Time dd/mm/yyyy hh:mm	Matrix Solid (S) Water (W)																									
1	BH01_0-0.13			19/07/23	S	×																								
2	BH01_0.4-0.5			19/07/23	S		×																					#10/0934		
3	BH01_0.85-0.95			19/07/23	S		×																					B		
4	BH01_1.2-1.3			19/07/23	S		×																							
5	BH01_1.7-1.8			19/07/23	S		×																							
6	BH01_2.2-2.3			19/07/23	S		×																							
7	BH01_2.65-2.75			19/07/23	S		×																							
8	BH01_3.2-3.3			19/07/23	S		×																							
9	BH01_3.4-3.5			19/07/23	S	×																								
10	BH02_0-0.1			19/07/23	S		×																							
Total Counts				2	8																									
Method of Shipment	Courier (#)			Hand Delivered	Postal	Name	Terrence Wilson				Signature					Date	21/07/2023				Time	1.30pm								
Laboratory Use Only	Received By			SYD BNE MEL PER ADL NTL DRW			Signature					Date					Time					Temperature								
	Received By			SYD BNE MEL PER ADL NTL DRW			Signature					Date					Time					Report No								



CHAIN OF CUSTODY RECORD

Environment | Environmental Testing | ABN 50 005 085 521

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

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

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

Melbourne Laboratory
6 Monterey Road Dandenong South VIC 3175
03 8564 5000 EnviroSampleVic@eurofins.com

Company		GHD		Project No		12612725				Project Manager		Tom Duncan				Sampler(s)		Terrence Wilson (TW)							
Address		Level 4, 211 Victoria Square, Adelaide		Project Name		MFS Christie Downs DSI				EDD Format		ESdat				Handed over by		Terrence Wilson							
Contact Name		Terrence Wilson		Analyses When media are requested, please specify "Total" or "Filtered" SULTE code must be used to attach SULTE pricing		PFAS - Extended Suite (Standard LOR)				HOLD				Email for Invoice		accounts payableAU@ghd.com									
Phone No		0467034756												Email for Results		GHDLabReports@ghd.com Ben.Petticrew@ghd.com									
Special Directions														Containers		Change container type & size if necessary.				Required Turnaround Time (TAT)		Default will be 5 days if not ticked.			
Purchase Order														500mL Plastic		250mL Plastic		125mL Plastic		200mL Amber Glass		40mL VOA vial		500mL PFAS Bottle	
Quote ID No																									
No	Client Sample ID		Sampled Date/Time dd/mm/yyyy hh:mm		Matrix Solid (S) Water (W)																		Sample Comments / Dangerous Goods Hazard Warning		
1	BH02_0.35-0.45		19/07/23		S		X																		
2	BH02_0.95-1.05		19/07/23		S				X																
3	BH02_1.5-1.6		19/07/23		S				X																
4	BH02_2.1-2.2		19/07/23		S				X																
5	BH02_2.6-2.7		19/07/23		S				X																
6	BH02_2.7-2.8		19/07/23		S		X																		
7	BH03_0.04-0.14		20/07/23		S		X																		
8	BH03_0.2-0.3		20/07/23		S				X																
9	BH03_0.4-0.5		20/07/23		S				X																
10	BH03_0.95-1.05		20/07/23		S				X																
Total Counts					3		7																		
Method of Shipment		Courier (#)		Hand Delivered		Postal		Name		Terrence Wilson		Signature		Date		21/07/2023		Time		1.30pm					
Laboratory Use Only		Received By				SYD BNE MEL PER ADL NTL DRW		Signature				Date		Time				Temperature							
		Received By				SYD BNE MEL PER ADL NTL DRW		Signature				Date		Time				Report No							



CHAIN OF CUSTODY RECORD

Eurofins | Environment Testing ABN 50 005 085 521

Sydney Laboratory
Unit F3 Bld.F 16 Mars Road Lane Cove West NSW 2065
02 9900 8400 EnviroSampleNSW@eurofins.com

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

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

Melbourne Laboratory
6 Monterey Road Dandenong South VIC 3175
03 8564 5000 EnviroSampleVic@eurofins.com

Company		GHD		Project №		12612725		Project Manager		Tom Duncan		Sampler(s)		Terrence Wilson (TW)							
Address		Level 4, 211 Victoria Square, Adelaide		Project Name		MFS Christie Downs DSI		EDD Format ESdat, EQUIS etc		ESdat		Handed over by		Terrence Wilson							
Contact Name		Terrence Wilson		Analyses Where media are requested, please specify "Total" or "Filtered". SUITE code must be used to align SUITE pricing. PFAS - Extended Suite (Standard LOR) HOLD										Email for Invoice		accounts payableAU@ghd.com					
Phone №		0467034756												Email for Results		GHDLabReports@ghd.com Ben.Petticrew@ghd.com					
Special Directions														Containers Change container type & size if necessary.				Required Turnaround Time (TAT) Default will be 5 days if not noted.			
Purchase Order														500mL Plastic				♦ Surcharge will apply Overnight (reporting by 9am) ♦ Same day ♦ 1 day ♦ 2 days ♦ 3 days ♦ 5 days (Standard) Other()			
Quote ID №																					
No	Client Sample ID		Sampled Date/Time dd/mm/yyyy hh:mm		Matrix Solid (S) Water (W)												Sample Comments / Dangerous Goods Hazard Warning				
1	BH03_1.4-1.5		20/07/23		S		X								1						
2	BH03_1.9-2.0		20/07/23		S		X								1						
3	BH03_2.1-2.2		20/07/23		S		X								1						
4	BH03_BITUMEN		20/07/23		S		X								1						
5	BH07_0.05-0.15		20/07/23		S		X								1						
6	BH07_0.55-0.65		20/07/23		S		X								1						
7	BH07_1.0-1.1		20/07/23		S		X								1						
8	BH07_1.5-1.6		20/07/23		S		X								1						
9	BH07_1.8-1.9		20/07/23		S		X								1						
10	BH07_2.0-2.1		20/07/23		S		X								1						
Total Counts					3		7								10						
Method of Shipment		Courier (#)		Hand Delivered		Postal		Name		Terrence Wilson		Signature		Date		21/07/2023		Time		1.30pm	
Laboratory Use Only		Received By				SYD BNE MEL PER ADL NTL DRW		Signature				Date				Time		Temperature			
		Received By				SYD BNE MEL PER ADL NTL DRW		Signature				Date				Time		Report №			



CHAIN OF CUSTODY RECORD

Eurofins | Environment Testing ABN 50 005 085 521

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

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

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

Melbourne Laboratory
6 Montarey Road Dandenong South VIC 3175
03 8564 5000 EnviroSampleVic@eurofins.com

Company		GHD		Project No		12612725		Project Manager		Tom Duncan		Sampler(s)		Terrence Wilson (TW)	
Address		Level 4, 211 Victoria Square, Adelaide		Project Name		MFS Christie Downs DSI		EDD Format ESdat, EQdts etc		ESdat		Handed over by		Terrence Wilson	
Contact Name		Terrence Wilson		Analyses Where initials are requested, please specify "Toilet" or "Flashed" SUITE code must be used to attract SUITE pricing.		PFAS - Extended Suite (Standard LOR)		HOLD				Email for Invoice		accounts payableAU@ghd.com	
Phone No		0467034756										Email for Results		GHDLabReports@ghd.com Ben.Petticrew@ghd.com	
Special Directions												Containers Change container type & size if necessary.		Required Turnaround Time (TAT) Default will be 5 days if not noted.	
Purchase Order															
Quote ID No															
No	Client Sample ID	Sampled Date/Time dd/mm/yyyy hh:mm	Matrix Solid (S) Water (W)												
1	BH07_2.6-2.7	20/07/23	S	X											
2	BH07_BITUMEN	20/07/23	S	X											
3	BH08_0.05-0.15	20/07/23	S	X											
4	BH08_0.35-0.45	20/07/23	S	X											
5	BH08_0.9-1.0	20/07/23	S		X										
6	BH08_1.5-1.6	20/07/23	S		X										
7	BH08_2.0-2.1	20/07/23	S		X										
8	BH08_2.5-2.6	20/07/23	S		X										
9	BH08_3.2-3.3	20/07/23	S	X											
10	BH08_BITUMEN	20/07/23	S	X											
Total Counts				6	4										
Method of Shipment		Courier (#)		Hand Delivered		Postal		Name		Terrence Wilson		Signature		Date	
														21/07/2023	
Laboratory Use Only		Received By		SYD BNE MEL PER ADL NTL DRW		Signature				Date		Time		Temperature	
		Received By		SYD BNE MEL PER ADL NTL DRW		Signature				Date		Time		Report No	



Melbourne Laboratory
6 Monterey Road Dandenong South VIC 3175
03 8564 5000 EnviroSampleVic@eurclins.com

CHAIN OF CUSTODY RECORD

Eurofins | Environment Testing ABN 50 005 085 521

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

Brisbane Laboratory
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08 9251 9600 EnviroSampleWA@eurofins.com

Melbourne Laboratory
6 Monterey Road Dandenong South VIC 3175
03 8564 5000 EnviroSampleVic@eurolins.com

Company		GHD			Project No		12612725				Project Manager		Tom Duncan				Sampler(s)		Terrence Wilson (TW)						
Address		Level 4, 211 Victoria Square, Adelaide			Project Name		MFS Christie Downs DSI				EDD Format ESdat, EQuts etc		ESdat				Handed over by		Terrence Wilson						
Contact Name		Terrence Wilson			Analyses Where metals are requested, please specify "Total" or "Filtered". SUITE code must be used to attract SUITE pricing. PFAS - Extended Suite (Standard LOR) HOLD												Email for Invoice		accounts payableAU@ghd.com						
Phone No		0467034756															Email for Results		GHDLabReports@ghd.com Ben.Petticrew@ghd.com						
Special Directions																	Containers Change container type & size if necessary.		Required Turnaround Time (TAT) Default will be 5 days if not ticked.						
Purchase Order																	500mL Plastic		250mL Plastic		125mL Plastic		200mL Amber Glass		40mL VOA vial
Quote ID No																									
No	Client Sample ID			Sampled Date/Time dd/mm/yyyy hh:mm		Matrix Solid (S) Water (W)																Sample Comments / Dangerous Goods Hazard Warning			
1	BH04_1.8-1.9			20/07/23		S		X												1					
2	BH04_2.1-2.2			20/07/23		S		X												1					
3	BH05_0.12-0.2			20/07/23		S		X												1					
4	BH05_0.2-0.3			20/07/23		S		X												1					
5	BH05_0.9-1.0			20/07/23		S		X												1					
6	BH05_1.5-1.6			20/07/23		S		X												1					
7	BH05_1.8-1.9			20/07/23		S		X												1					
8	BH05_CONCRETE			20/07/23		S		X												1					
9	BH06_0.15-0.35			20/07/23		S		X												1					
10	BH06_0.4-0.5			20/07/23		S		X												1					
Total Counts						5		5														10			
Method of Shipment		Courier (#)			Hand Delivered		Postal		Name		Terrence Wilson		Signature		Date		21/07/2023		Time		1.30pm				
Laboratory Use Only		Received By				SYD BNE MEL PER ADL NTL DRW		Signature				Date				Time				Temperature					
		Received By				SYD BNE MEL PER ADL NTL DRW		Signature				Date				Time				Report No					



CHAIN OF CUSTODY RECORD

Eurofins | Environment Testing ABN 50 005 085 521

Sydney Laboratory
Unit F3 Bld F 16 Mars Road Lane Cove West NSW 2056
02 8900 8400 EnviroSampleNSW@eurofins.com

Brisbane Laboratory
Unit 1 21 Smallwood Place Murarrie QLD 4172
07 3902 4600 EnviroSampleQLD@eurofins.com

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

Melbourne Laboratory
6 Monterey Road Dandenong South VIC 3175
03 8564 5000 EnviroSampleVic@eurofins.com

Company				GHD				Project №		12612725				Project Manager		Tom Duncan				Sampler(s)		Terrence Wilson (TW)					
Address				Level 4, 211 Victoria Square, Adelaide				Project Name		MFS Christie Downs DSI				EDD Format ESdat, EQUIS etc		ESdat				Handed over by		Terrence Wilson					
Contact Name				Terrence Wilson				Analyses When metals are requested, please specify "Total" or "Filtered". SUITE code must be used to attach SUITE pricing.		PFAS - Extended Suite (Standard LOR)				HOLD								Email for Invoice		accounts payableAU@ghd.com			
Phone №				0467034756																		Email for Results		GHDLabReports@ghd.com Ben.Petticrew@ghd.com			
Special Directions																											
Purchase Order																											
Quote ID №																											
№		Client Sample ID		Sampled Date/Time dd/mm/yy hh:mm		Matrix Solid (S) Water (W)														Containers Change container type & size if necessary.		Required Turnaround Time (TAT) Default will be 5 days if not ticked.					
																				500mL Plastic		Overnight (reporting by 9am) ♦					
1		BH06_0.9-1.0		20/07/23		S				X										250mL Plastic		Same day ♦ 1 day ♦					
2		BH06_2.0-2.2		20/07/23		S				X										125mL Plastic		2 days ♦ 3 days ♦					
3		BH06_2.4-2.5		20/07/23		S		X												200mL Amber Glass		5 days (Standard)					
4		BH06_CONCRETE		20/07/23		S		X												40mL VOA vial		Other()					
5		FD01		20/07/23		S		X												500mL PFAS Bottle							
6		FS01		20/07/23		S		X												Jar (Glass or HDPE)		Sample Comments / Dangerous Goods Hazard Warning					
7		FD02		20/07/23		S		X																			
8		FS02		20/07/23		S		X																			
9		FD03		20/07/23		S		X																			
10		FS03		20/07/23		S		X																			
Total Counts								8		2												10					
Method of Shipment		Courier (#)		Hand Delivered		Postal		Name		Terrence Wilson		Signature				Date		21/07/2023		Time		1.30pm					
Laboratory Use Only		Received By				SYD BNE MEL PER ADL NTL DRW		Signature				Date				Time				Temperature							
		Received By				SYD BNE MEL PER ADL NTL DRW		Signature				Date				Time				Report №							



CHAIN OF CUSTODY RECORD

Eurofins | Environmental Testing ABN 50 035 085 521

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

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

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

Melbourne Laboratory
6 Monterey Road Dandenong South VIC 3175
03 8564 5000 EnviroSampleVic@eurofins.com

Company		GHD		Project No		12612725		Project Manager		Tom Duncan		Sampler(s)		Terrence Wilson (TW)			
Address		Level 4, 211 Victoria Square, Adelaide		Project Name		MFS Christie Downs DSI		EDD Format ESdat, EQdat etc		ESdat		Handed over by		Terrence Wilson			
Contact Name		Terrence Wilson		Analyses Whole metals are requested, please specify "Total" or "Filtered" SUITE code must be used to attach SUITE finding PFAS - Extended Suite (Standard LOR) HOLD										Email for Invoice		accounts payableAU@ghd.com	
Email for Results		GHDLabReports@ghd.com Ben.Petticrew@ghd.com															
Special Directions																	
Purchase Order																	
Quote ID No														Containers Change container type & size if necessary		Required Turnaround Time (TAT) Default will be 5 days if not stated	
														500mL Plastic		Overnight (reporting by 9am) ♦	
														250mL Plastic		Same day ♦ 1 day ♦	
														125mL Plastic		2 days ♦ 3 days ♦	
														200mL Amber Glass		5 days (Standard)	
														40mL VOA vial		Other (	
														500mL PFAS Bottle			
														Jar (Glass or HDPE)			
														Other (Asbestos AS4984, WA Guidelines)			
																Sample Comments / Dangerous Goods Hazard Warning	
No	Client Sample ID	Sampled Date/Time dd/mm/yyyy hh:mm	Matrix Solid (S) Water (W)														
1	RB01	20/07/23	W	✗											1		
2	MW01_0.05-0.15	21/07/23	S	✗											1		
3	MW01_0.2-0.3	21/07/23	S		✗										1		
4	MW01_0.4-0.5	21/07/23	S		✗										1		
5	MW01_0.9-1.0	21/07/23	S		✗										1		
6	MW01_1.5-1.6	21/07/23	S		✗										1		
7	MW01_1.9-2.0	21/07/23	S		✗										1		
8	MW01_2.0-2.1	21/07/23	S	✗											1		
9	BH11_0.12-0.22	21/07/23	S	✗											1		
10	BH11_0.5-0.7	21/07/23	S		✗										1		
Total Counts				4	6										1	9	
Method of Shipment		Courier (#)		Hand Delivered		Postal		Name		Terrence Wilson		Signature		Date		21/07/2023	
																Time	
																1.30pm	
Laboratory Use Only		Received By		SYD BNE MEL PER ADL NTL DRW		Signature				Date		Time		Temperature			
		Received By		SYD BNE MEL PER ADL NTL DRW		Signature				Date		Time		Report No			



CHAIN OF CUSTODY RECORD

Eurofins | Environment Testing ABN 50 005 085 521

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

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

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

Melbourne Laboratory
6 Monterey Road Dandenong South VIC 3175
03 8564 5000 EnviroSampleVic@eurofins.com

Company		GHD		Project No		12612725				Project Manager		Tom Duncan				Sampler(s)		Terrence Wilson (TW)													
Address		Level 4, 211 Victoria Square, Adelaide		Project Name		MFS Christie Downs DSI				EDD Format ESdat, ESdatS etc		ESdat				Handed over by		Terrence Wilson													
Contact Name		Terrence Wilson		Analyses Where multiple are requested, please specify "Total" or "Filtered" SUITE code must be used to attach SUITE pricing.		PFAS - Extended Suite (Standard LOR)				HOLD				Email for Invoice		accounts payableAU@ghd.com															
Phone No		0467034756												Email for Results		GHDLabReports@ghd.com Ben.Petticrew@ghd.com															
Special Directions														Containers Change container type & size if necessary.		Required Turnaround Time (TAT) Default will be 5 days if not ticked.															
Purchase Order														500mL Plastic		250mL Plastic		125mL Plastic		200mL Amber Glass		40mL VOA vial		500mL PFAS Bottle		Jar (Glass or HDPE)		Other (Asbestos AS41954, WA Guidelines)		◆ Surcharge will apply Overnight (reporting by 9am)◆ Same day◆ 1 day◆ 2 days◆ 3 days◆ 5 days (Standard) Other()	
Quote ID No																															
No	Client Sample ID		Sampled Date/Time dd/mm/yy hh:mm		Matrix Solid (S) Water (W)																Sample Comments / Dangerous Goods Hazard Warning										
1	BH11_0.95-1.05		21/07/23		S		X														1										
2	BH11_1.5-1.6		21/07/23		S		X														1										
3	BH11_2.1-2.3		21/07/23		S		X														1										
4	BH11_2.7-2.8		21/07/23		S		X														1										
5	BH11_2.8-2.9		21/07/23		S		X														1										
6	BH11_CONCRETE		21/07/23		S		X														1										
7	MW02_0.12-0.32		21/07/23		S		X														1										
8	MW02_0.32-0.4		21/07/23		S		X														1										
9	MW02_0.9-1.0		21/07/23		S		X														1										
10	MW02_1.3-1.4		21/07/23		S		X														1										
Total Counts					2		8														10										
Method of Shipment		Courier (#)		Hand Delivered		Postal		Name		Terrence Wilson		Signature		Date		21/07/2023		Time		1.30pm											
Laboratory Use Only		Received By				SYD BNE MEL PER ADL NTL DRW		Signature				Date		Time		Temperature															
		Received By				SYD BNE MEL PER ADL NTL DRW		Signature				Date		Time		Report No															

CHAIN OF CUSTODY RECORD

Eurofile | Eurochem | Testing **ABN 50 005 085 521**

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

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

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

Melbourne Laboratory
6 Monterey Road Dandenong South VIC 3175
03 8564 5000 EnviroSampleVic@eurofins.com

Company		GHD		Project No		12612725				Project Manager		Tom Duncan				Sampler(s)		Terrence Wilson (TW)					
Address		Level 4, 211 Victoria Square, Adelaide		Project Name		MFS Christie Downs DSI				EDD Format		ESdat				Handed over by		Terrence Wilson					
Contact Name		Terrence Wilson		Analyses Where notes are requested, please specify "Total" or "Filtered". SUITE code must be used to attach SUITE pricing		PFAS - Extended Suite (Standard LOR)		HOLD										Email for Invoice		accounts payableAU@ghd.com			
Phone No		0467034756																Email for Results		GHDLabReports@ghd.com Ben.Petticrew@ghd.com			
Special Directions																		Containers		Required Turnaround Time (TAT)			
Purchase Order																		Change container type & size if necessary		Default will be 5 days if not ticked			
Quote ID No																		500mL Plastic		250mL Plastic		125mL Plastic	
No	Client Sample ID		Sampled Date/Time dd/mm/yyyy hh:mm		Matrix Solid (S) Water (W)														Sample Comments / Dangerous Goods Hazard Warning				
1	MW02_1.6-1.7		21/07/23		S		X												1				
2	MW02_2.2-2.3		21/07/23		S		X												1				
3	MW02_3.3-3.5		21/07/23		S		X												1				
4	BH10_0.12-0.3		21/07/23		S		X												1				
5	BH10_0.4-0.5		21/07/23		S		X												1				
6	BH10_0.65-0.75		21/07/23		S		X												1				
7	BH10_1.0-1.1		21/07/23		S		X												1				
8	BH10_2.1-2.3		21/07/23		S		X												1				
9	BH10_2.3-2.4		21/07/23		S		X												1				
10	MW03_0.12-0.22		21/07/23		S		X												1				
Total Counts					4		6												10				
Method of Shipment		Courier (#)		Hand Delivered		Postal		Name		Terrence Wilson		Signature		Date		21/07/2023		Time		1.30pm			
Laboratory Use Only		Received By				SYD BNE MEL PER ADL NTL DRW		Signature				Date		Time				Temperature					
		Received By				SYD BNE MEL PER ADL NTL DRW		Signature				Date		Time				Report No					



CHAIN OF CUSTODY RECORD

Eurofins | Environment Testing ABN 50 005 085 521

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

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

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

Melbourne Laboratory
6 Monterey Road Dandenong South VIC 3175
03 8564 5000 EnviroSampleVic@eurofins.com

Company		GHD		Project №		12612725		Project Manager		Tom Duncan		Sampler(s)		Terrence Wilson (TW)																															
Address		Level 4, 211 Victoria Square, Adelaide		Project Name		MFS Christie Downs DSI		EDD Format		ESdat		Handed over by		Terrence Wilson																															
Contact Name		Terrence Wilson		Analyses When metals are requested, please specify "Total" or "Filtered". SUITE code must be used to allow SUITE pricing. PFAS - Extended Suite (Standard LOR) HOLD										Email for Invoice		accounts payableAU@ghd.com																													
Email for Results		GHDLabReports@ghd.com Ben.Petticrew@ghd.com																																											
Containers Change container type & size if necessary.														Required Turnaround Time (TAT) Default will be 5 days if not ticked.																															
500mL Plastic														250mL Plastic				125mL Plastic				200mL Amber Glass				40mL VOA vial				500mL PFAS Bottle				Jar (Glass or HDPE)				Other (Asbestos AS4984, WA Guidelines)				◆ Surcharge will apply Overnight (reporting by 9am)◆ Same day◆ 1 day◆ 2 days◆ 3 days◆ 5 days (Standard) Other()			
Special Directions														Sample Comments / Dangerous Goods Hazard Warning																															
Purchase Order																																													
Quote ID №																																													
№	Client Sample ID		Sampled Date/Time dd/mm/yyyy hh:mm		Matrix Solid (S) Water (W)																																								
1	MW03_0.3-0.4		21/07/23		S		X										1																												
2	MW03_0.65-0.75		21/07/23		S		X										1																												
3	MW03_0.9-1.0		21/07/23		S		X										1																												
4	MW03_1.3-1.4		21/07/23		S		X										1																												
5	MW03_2.2-2.3		21/07/23		S		X										1																												
6	MW03_3.0-3.1		21/07/23		S		X										1																												
7	MW03_3.4-3.5		21/07/23		S		X										1																												
8	SS01		21/07/23		S		X										1																												
9	SS02		21/07/23		S		X										1																												
10	FD04		21/07/23		S		X										1																												
Total Counts					4		6										10																												
Method of Shipment		Courier (#)		Hand Delivered		Postal		Name		Terrence Wilson		Signature		Date		21/07/2023		Time		1.30pm																									
Laboratory Use Only		Received By				SYD BNE MEL PER ADL NTL DRW		Signature				Date		Time				Temperature																											
		Received By				SYD BNE MEL PER ADL NTL DRW		Signature				Date		Time				Report №																											



Melbourne Laboratory
6 Monterey Road Dandenong South VIC 3175
03 8564 5000 EnviroSampleVic@eurofins.com

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

Tyrone Gowans

From: Amy Meunier
Sent: Tuesday, 25 July 2023 9:24 PM
To: #AU_CAU001_EnviroSampleVic
Subject: FW: 12612725_COC
Attachments: 12612725_Eurofins COC_20230719.xlsx

Follow Up Flag: Follow up
Flag Status: Completed

INFO: INTERNAL EMAIL - Sent from your own Eurofins email domain.

Hi Tyrone – COC attached thanks.

Kind regards,

Amy Meunier

Analytical Services Manager
Mobile : +61 477 574 867
Email : AmyMeunier@eurofins.com

Eurofins
6 Monterey Road,
Dandenong VIC 3175
Australia

My office hours are 9am to 5:30pm (Monday to Friday)

If you require sample receipt outside these hours please email envirosamplevic@eurofins.com



From: Terrence Wilson <Terrence.Wilson@ghd.com>
Sent: Tuesday, 25 July 2023 5:44 PM
To: Parimal Acharya <ParimalAcharya@eurofins.com>; Amy Meunier <AmyMeunier@eurofins.com>
Cc: Tom Duncan <Thomas.Duncan@ghd.com>
Subject: 12612725_COC

CAUTION: EXTERNAL EMAIL - Sent from an email domain that is not formally trusted by Eurofins.

Do not click on links or open attachments unless you recognise the sender and are certain that the content is safe.

Hi Parimal / Amy,

Please find attached COC for the samples dropped off on Friday 21 July.

Thanks and regards,

Terrence Wilson
Environmental Scientist

GHD

CHAIN OF CUSTODY RECORD

Eurofins | Environment Testing ABN 50 005 085 521

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

Brisbane Laboratory
Unit 1 21 Smallwood Place Murarrie QLD 4172
07 3902 4600 EnviroSampleQLD@eurofins.com

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

Melbourne Laboratory
6 Monterey Road Dandenong South VIC 3175
03 8564 5000 EnviroSampleVic@eurolys.com

Company		GHD		Project No		12612725		Project Manager		Tom Duncan		Sampler(s)		Terrence Wilson (TW)																	
Address		Level 4, 211 Victoria Square, Adelaide		Project Name		MFS Christie Downs DSI		EDD Format ESdat, EQUIS etc.		ESdat		Handed over by		Terrence Wilson																	
Contact Name		Terrence Wilson		Analyses Where metals are requested, please specify 'Total' or 'Filtered'. SUITE code must be used to attract SUITE pricing.		PFAS - Extended Suite (Standard LOR)		HOLD						Email for Invoice		accounts payableAU@ghd.com															
Phone No		0467034756												Email for Results		GHDLabReports@ghd.com Ben.Petticrew@ghd.com															
Special Directions														Containers Change container type & size if necessary.		Required Turnaround Time (TAT) Default will be 5 days if not boxed.															
Purchase Order												500mL Plastic		250mL Plastic		125mL Plastic		200mL Amber Glass		40mL VOA vial		500mL PFAS Bottle		Jar (Glass or HDPE)		Other (Asbestos AS4964, WA Guidelines)		◆ Surcharge will apply Overnight (reporting by 9am)◆ Same day◆ 1 day◆ 2 days◆ 3 days◆ 5 days (Standard) Other(			
Quote ID No																															
No		Client Sample ID		Sampled Date/Time dd/mm/yyyy hh:mm		Matrix Soil (S) Water (W)																								Sample Comments / Dangerous Goods Hazard Warning	
1		BH06_0.9-1.0		20/07/23		S				X																1					
2		BH06_2.0-2.2		20/07/23		S				X																1					
3		BH06_2.4-2.5		20/07/23		S		X																		1					
4		BH06_CONCRETE		20/07/23		S		X																		1					
5		FD01		20/07/23		S		X																		1					
6		FS01		20/07/23		S		X																		1		Please forward to ALS			
7		FD02		20/07/23		S		X																		1					
8		FS02		20/07/23		S		X																		1		Please forward to ALS			
9		FD03		20/07/23		S		X																		1					
10		FS03		20/07/23		S		X																		1		Please forward to ALS			
Total Counts						8		2																		10					
Method of Shipment		Courier (#)		Hand Delivered		Postal		Name		Terrence Wilson		Signature		Date		21/07/2023		Time		1.30pm											
Laboratory Use Only		Received By				SYD BNE MEL PER ADL NTL DRW		Signature				Date		Time				Temperature													
		Received By				SYD BNE MEL PER ADL NTL DRW		Signature				Date		Time				Report No													

CHAIN OF CUSTODY RECORD

Eurofins | Environment Testing ABN 50 005 085 521

Sydney Laboratory

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

Brisbane Laboratory

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

Perth Laboratory

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

Melbourne Laboratory

6 Monterey Road Dandenong South VIC 3175
03 8564 5000 EnviroSampleVic@eurofins.com

Melbourne Laboratory
6 Monterey Road Dandenong South VIC 3175
03 8564 5000 EnviroSampleVic@eurofins.com

Company		GHD		Project No		12612725		Project Manager		Tom Duncan		Sampler(s)		Terrence Wilson (TW)									
Address		Level 4, 211 Victoria Square, Adelaide		Project Name		MFS Christie Downs DSI		EDD Format ESdut, ESdus etc		ESdat		Handed over by		Terrence Wilson									
Contact Name		Terrence Wilson		Analyses When metals are requested, please specify 'Total' or 'Filtered' SUITE code must be used to affect SUITE pricing		PFAS - Extended Suite (Standard LOR)		HOLD						Email for Invoice		accounts payableAU@ghd.com							
Phone No		0467034756												Email for Results		GHDLabReports@ghd.com Ben.Petticrew@ghd.com							
Special Directions														Containers Change container type & size if necessary		Required Turnaround Time (TAT) Default will be 5 days if not ticked.							
Purchase Order														500mL Plastic		250mL Plastic		125mL Plastic		200mL Amber Glass		40mL VOA vial	
Quote ID No																							
No	Client Sample ID		Sampled Date/Time dd/mm/yyyy hh:mm		Matrix Solid (S) Water (W)																Sample Comments / Dangerous Goods Hazard Warning		
1	FS04		21/07/23		S		✗												1		Please forward to ALS		
2	FD05		21/07/23		S		✗												1				
3	FS05		21/07/23		S		✗												1		Please forward to ALS		
4	RB02		21/07/23		W		✗												1				
5																			1				
6																			1				
7																			1				
8																			1				
9																			1				
10																			1				
Total Counts					4														1		9		
Method of Shipment		Courier (#)		Hand Delivered		Postal		Name		Terrence Wilson		Signature		Date		21/07/2023		Time		1.30pm			
Laboratory Use Only		Received By				SYD BNE MEL PER ADL NTL DRW		Signature				Date		Time				Temperature					
		Received By				SYD BNE MEL PER ADL NTL DRW		Signature				Date		Time				Report No					



Environment Testing

PROJECT INFORMATION

Date Received: 21/07/2023

Company: GHD

Contact person: TERENCE WILSON

Contact Number: 0467 034 756

Contact E-mail: Terrence.Wilson@GHD.Com

Project Name/site: MFS CHRISTIE DOWNS DSI

Project Number: 12612725

COC: Attached ☐

E-mailed ☐

Not received ☐

Last modified on: 16 October 2019	Approved on: 16 October 2019	Version: QS1039_R2
Last modified by: H. Le	Approver: M. Makarios	Page 1 of 1
Editorial Committee: T. Lakeland, F. Sanjaya, H. Le, M. Makarios		Next required review date: 16 October 2022

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Sample Receipt Advice

Company name:	GHD Pty Ltd SA
Contact name:	- ALL SRAs/COCs/Reports
Project name:	MFS Christie Downs DSI
Project ID:	12612725
Turnaround time:	5 Day
Date/Time received	Jul 25, 2023 9:24 PM
Eurofins reference	1010934

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

Samples received by the laboratory after 5.30pm are deemed to have been received the following working day.

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 - ALL SRAs/COCs/Reports - GHDLabReports@ghd.com.

Note: A copy of these results will also be delivered to the general GHD Pty Ltd SA email address.



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

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

Project Name: MFS Christie Downs DSI
Project ID: 12612725

Order No.:
Report #: 1010934
Phone: 08 8111 6600
Fax: 08 8111 6699

Received: Jul 25, 2023 9:24 PM
Due: Aug 2, 2023
Priority: 5 Day
Contact Name: - ALL SRAs/COCs/Reports

Eurofins Analytical Services Manager : Amy Meunier

Sample Detail						HOLD	Moisture Set	Per- and Polyfluoralkyl Substances (PFASs)
Melbourne Laboratory - NATA # 1261 Site # 1254						X	X	X
External Laboratory								
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID			
1	BH01_0-0.13	Jul 19, 2023		Soil	M23-JI0055815		X	X
2	BH01_3.4-3.5	Jul 19, 2023		Soil	M23-JI0055816		X	X
3	BH02_0.35-0.45	Jul 19, 2023		Soil	M23-JI0055817		X	X
4	BH02_2.7-2.8	Jul 19, 2023		Soil	M23-JI0055818		X	X
5	BH03_0.04-0.14	Jul 20, 2023		Soil	M23-JI0055819		X	X
6	BH03_2.1-2.2	Jul 20, 2023		Soil	M23-JI0055820		X	X
7	BH03_BITUM EN	Jul 20, 2023		Soil	M23-JI0055821		X	X
8	BH07_1.0-1.1	Jul 20, 2023		Soil	M23-JI0055822		X	X
9	BH07_2.6-2.7	Jul 20, 2023		Soil	M23-JI0055823		X	X
10	BH07_BITUM EN	Jul 20, 2023		Soil	M23-JI0055824		X	X



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

Project Name: MFS Christie Downs DSI
Project ID: 12612725

Order No.:
Report #: 1010934
Phone: 08 8111 6600
Fax: 08 8111 6699

Received: Jul 25, 2023 9:24 PM
Due: Aug 2, 2023
Priority: 5 Day
Contact Name: - ALL SRAs/COCs/Reports

Eurofins Analytical Services Manager : Amy Meunier

Sample Detail

HOLD

Moisture Set

Per- and Polyfluoroalkyl Substances (PFASs)

Melbourne Laboratory - NATA # 1261 Site # 1254

						X	X	X
11	BH08_0.05-0.15	Jul 20, 2023		Soil	M23-JI0055825		X	X
12	BH08_0.35-0.45	Jul 20, 2023		Soil	M23-JI0055826		X	X
13	BH08_3.2-3.3	Jul 20, 2023		Soil	M23-JI0055827		X	X
14	BH08_BITUMEN	Jul 20, 2023		Soil	M23-JI0055828		X	X
15	BH09_0-0.15	Jul 20, 2023		Soil	M23-JI0055829		X	X
16	BH09_3.4-3.5	Jul 20, 2023		Soil	M23-JI0055830		X	X
17	BH04_0.4-0.5	Jul 20, 2023		Soil	M23-JI0055831		X	X
18	BH04_2.1-2.2	Jul 20, 2023		Soil	M23-JI0055832		X	X
19	BH05_0.12-0.2	Jul 20, 2023		Soil	M23-JI0055833		X	X
20	BH05_1.8-1.9	Jul 20, 2023		Soil	M23-JI0055834		X	X
21	BH05_CONCRETE	Jul 20, 2023		Soil	M23-JI0055835		X	X
22	BH06_0.15-0.35	Jul 20, 2023		Soil	M23-JI0055836		X	X



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Company Name: GHD Pty Ltd SA
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Project Name: MFS Christie Downs DSI
Project ID: 12612725

Order No.:
Report #: 1010934
Phone: 08 8111 6600
Fax: 08 8111 6699

Received: Jul 25, 2023 9:24 PM
Due: Aug 2, 2023
Priority: 5 Day
Contact Name: - ALL SRAs/COCs/Reports

Eurofins Analytical Services Manager : Amy Meunier

Sample Detail						HOLD	Moisture Set	Per- and Polyfluoralkyl Substances (PFASs)
Melbourne Laboratory - NATA # 1261 Site # 1254						X	X	X
23	BH06_2.4-2.5	Jul 20, 2023		Soil	M23-JI0055837		X	X
24	BH06_CONCR ETE	Jul 20, 2023		Soil	M23-JI0055838		X	X
25	FD01	Jul 20, 2023		Soil	M23-JI0055839		X	X
26	FD02	Jul 20, 2023		Soil	M23-JI0055840		X	X
27	FD03	Jul 20, 2023		Soil	M23-JI0055841		X	X
28	RB01	Jul 20, 2023		Water	M23-JI0055842			X
29	MW01_0.05-0.15	Jul 21, 2023		Soil	M23-JI0055843		X	X
30	MW01_2.0-2.1	Jul 21, 2023		Soil	M23-JI0055844		X	X
31	BH11_0.12-0.22	Jul 21, 2023		Soil	M23-JI0055845		X	X
32	BH11_1.5-1.6	Jul 21, 2023		Soil	M23-JI0055846		X	X
33	MW02_0.12-0.32	Jul 21, 2023		Soil	M23-JI0055847		X	X
34	MW02_2.2-2.3	Jul 21, 2023		Soil	M23-JI0055848		X	X
35	BH10_0.12-0.3	Jul 21, 2023		Soil	M23-JI0055849		X	X



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Project Name: MFS Christie Downs DSI
Project ID: 12612725

Order No.:
Report #: 1010934
Phone: 08 8111 6600
Fax: 08 8111 6699

Received: Jul 25, 2023 9:24 PM
Due: Aug 2, 2023
Priority: 5 Day
Contact Name: - ALL SRAs/COCs/Reports

Eurofins Analytical Services Manager : Amy Meunier

Sample Detail						HOLD	Moisture Set	Per- and Polyfluoralkyl Substances (PFASs)
Melbourne Laboratory - NATA # 1261 Site # 1254						X	X	X
36	BH10_1.0-1.1	Jul 21, 2023		Soil	M23-JI0055850		X	X
37	MW03_0.12-0.22	Jul 21, 2023		Soil	M23-JI0055851		X	X
38	MW03_3.4-3.5	Jul 21, 2023		Soil	M23-JI0055852		X	X
39	SS01	Jul 21, 2023		Soil	M23-JI0055853		X	X
40	SS02	Jul 21, 2023		Soil	M23-JI0055854		X	X
41	FD04	Jul 21, 2023		Soil	M23-JI0055855		X	X
42	FD05	Jul 21, 2023		Soil	M23-JI0055856		X	X
43	RB02	Jul 21, 2023		Water	M23-JI0055857			X
44	BH01_0.4-0.5	Jul 19, 2023		Soil	M23-JI0055858	X		
45	BH01_0.85-0.95	Jul 19, 2023		Soil	M23-JI0055859	X		
46	BH01_1.2-1.3	Jul 19, 2023		Soil	M23-JI0055860	X		
47	BH01_1.7-1.8	Jul 19, 2023		Soil	M23-JI0055861	X		
48	BH01_2.2-2.3	Jul 19, 2023		Soil	M23-JI0055862	X		
49	BH01_2.65-2.75	Jul 19, 2023		Soil	M23-JI0055863	X		



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Project ID: 12612725

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Received: Jul 25, 2023 9:24 PM
Due: Aug 2, 2023
Priority: 5 Day
Contact Name: - ALL SRAs/COCs/Reports

Eurofins Analytical Services Manager : Amy Meunier

Sample Detail						HOLD	Moisture Set	Per- and Polyfluorinated Substances (PFASs)
Melbourne Laboratory - NATA # 1261 Site # 1254						X	X	X
50	BH01_3.2-3.3	Jul 19, 2023		Soil	M23-JI0055864	X		
51	BH02_0-0.1	Jul 19, 2023		Soil	M23-JI0055865	X		
52	BH02_0.95-1.05	Jul 19, 2023		Soil	M23-JI0055866	X		
53	BH02_1.5-1.6	Jul 19, 2023		Soil	M23-JI0055867	X		
54	BH02_2.1-2.2	Jul 19, 2023		Soil	M23-JI0055868	X		
55	BH02_2.6-2.7	Jul 19, 2023		Soil	M23-JI0055869	X		
56	BH03_0.2-0.3	Jul 20, 2023		Soil	M23-JI0055870	X		
57	BH03_0.4-0.5	Jul 20, 2023		Soil	M23-JI0055871	X		
58	BH03_0.95-1.05	Jul 20, 2023		Soil	M23-JI0055872	X		
59	BH03_1.4-1.5	Jul 20, 2023		Soil	M23-JI0055873	X		
60	BH03_1.9-2.0	Jul 20, 2023		Soil	M23-JI0055874	X		
61	BH07_0.05-0.15	Jul 20, 2023		Soil	M23-JI0055875	X		
62	BH07_0.55-0.65	Jul 20, 2023		Soil	M23-JI0055876	X		



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Received: Jul 25, 2023 9:24 PM
Due: Aug 2, 2023
Priority: 5 Day
Contact Name: - ALL SRAs/COCs/Reports

Eurofins Analytical Services Manager : Amy Meunier

Sample Detail

HOLD

Moisture Set

Per- and Polyfluoroalkyl Substances (PFASs)

Melbourne Laboratory - NATA # 1261 Site # 1254

						X	X	X
63	BH07_1.5-1.6	Jul 20, 2023		Soil	M23-JI0055877	X		
64	BH07_1.8-1.9	Jul 20, 2023		Soil	M23-JI0055878	X		
65	BH07_2.0-2.1	Jul 20, 2023		Soil	M23-JI0055879	X		
66	BH08_0.9-1.0	Jul 20, 2023		Soil	M23-JI0055880	X		
67	BH08_1.5-1.6	Jul 20, 2023		Soil	M23-JI0055881	X		
68	BH08_2.0-2.1	Jul 20, 2023		Soil	M23-JI0055882	X		
69	BH08_2.5-2.6	Jul 20, 2023		Soil	M23-JI0055883	X		
70	BH09_0.35-0.45	Jul 20, 2023		Soil	M23-JI0055884	X		
71	BH09_0.9-1.0	Jul 20, 2023		Soil	M23-JI0055885	X		
72	BH09_2.0-2.1	Jul 20, 2023		Soil	M23-JI0055886	X		
73	BH09_2.4-2.5	Jul 20, 2023		Soil	M23-JI0055887	X		
74	BH04_0-0.15	Jul 20, 2023		Soil	M23-JI0055888	X		
75	BH04_0.7-0.8	Jul 20, 2023		Soil	M23-JI0055889	X		
76	BH04_1.2-1.3	Jul 20, 2023		Soil	M23-JI0055890	X		
77	BH04_1.8-1.9	Jul 20, 2023		Soil	M23-JI0055891	X		



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Company Name: GHD Pty Ltd SA
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SA 5001

Project Name: MFS Christie Downs DSI
Project ID: 12612725

Order No.:
Report #: 1010934
Phone: 08 8111 6600
Fax: 08 8111 6699

Received: Jul 25, 2023 9:24 PM
Due: Aug 2, 2023
Priority: 5 Day
Contact Name: - ALL SRAs/COCs/Reports

Eurofins Analytical Services Manager : Amy Meunier

Sample Detail

HOLD

Moisture Set

Per- and Polyfluoroalkyl Substances (PFASs)

Melbourne Laboratory - NATA # 1261 Site # 1254

						X	X	X
78	BH05_0.2-0.3	Jul 20, 2023		Soil	M23-JI0055892	X		
79	BH05_0.9-1.0	Jul 20, 2023		Soil	M23-JI0055893	X		
80	BH05_1.5-1.6	Jul 20, 2023		Soil	M23-JI0055894	X		
81	BH06_0.4-0.5	Jul 20, 2023		Soil	M23-JI0055895	X		
82	BH06_0.9-1.0	Jul 20, 2023		Soil	M23-JI0055896	X		
83	BH06_2.0-2.2	Jul 20, 2023		Soil	M23-JI0055897	X		
84	MW01_0.2-0.3	Jul 21, 2023		Soil	M23-JI0055898	X		
85	MW01_0.4-0.5	Jul 21, 2023		Soil	M23-JI0055899	X		
86	MW01_0.9-1.0	Jul 21, 2023		Soil	M23-JI0055900	X		
87	MW01_1.5-1.6	Jul 21, 2023		Soil	M23-JI0055901	X		
88	MW01_1.9-2.0	Jul 21, 2023		Soil	M23-JI0055902	X		
89	BH11_0.5-0.7	Jul 21, 2023		Soil	M23-JI0055903	X		
90	BH11_0.95-1.05	Jul 21, 2023		Soil	M23-JI0055904	X		
91	BH11_2.1-2.3	Jul 21, 2023		Soil	M23-JI0055905	X		
92	BH11_2.7-2.8	Jul 21, 2023		Soil	M23-JI0055906	X		



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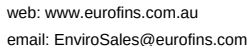
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Eurofins Analytical Services Manager : Amy Meunier

Sample Detail						HOLD	Moisture Set	Per- and Polyfluoroalkyl Substances (PFASs)
Melbourne Laboratory - NATA # 1261 Site # 1254						X	X	X
93	BH11_2.8-2.9	Jul 21, 2023		Soil	M23-JI0055907	X		
94	BH11_CONCR ETE	Jul 21, 2023		Soil	M23-JI0055908	X		
95	MW02_0.32-0.4	Jul 21, 2023		Soil	M23-JI0055909	X		
96	MW02_0.9-1.0	Jul 21, 2023		Soil	M23-JI0055910	X		
97	MW02_1.3-1.4	Jul 21, 2023		Soil	M23-JI0055911	X		
98	MW02_1.6-1.7	Jul 21, 2023		Soil	M23-JI0055912	X		
99	MW02_3.3-3.5	Jul 21, 2023		Soil	M23-JI0055913	X		
100	BH10_0.4-0.5	Jul 21, 2023		Soil	M23-JI0055914	X		
101	BH10_0.65-0.75	Jul 21, 2023		Soil	M23-JI0055915	X		
102	BH10_2.1-2.3	Jul 21, 2023		Soil	M23-JI0055916	X		
103	BH10_2.3-2.4	Jul 21, 2023		Soil	M23-JI0055917	X		
104	MW03_0.3-0.4	Jul 21, 2023		Soil	M23-JI0055918	X		
105	MW03_0.65-0.75	Jul 21, 2023		Soil	M23-JI0055919	X		



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Contact Name: - ALL SRAs/COCs/Reports

Eurofins Analytical Services Manager : Amy Meunier

Sample Detail							HOLD	Moisture Set	Per- and Polyfluoroalkyl Substances (PFASs)
Melbourne Laboratory - NATA # 1261 Site # 1254							X	X	X
106	MW03_0.9-1.0	Jul 21, 2023		Soil		M23-JI0055920	X		
107	MW03_1.3-1.4	Jul 21, 2023		Soil		M23-JI0055921	X		
108	MW03_2.2-2.3	Jul 21, 2023		Soil		M23-JI0055922	X		
109	MW03_3.0-3.1	Jul 21, 2023		Soil		M23-JI0055923	X		
Test Counts							66	41	43

GHD Pty Ltd
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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: - ALL SRAs/COCs/Reports

Report 1010934-S
Project name MFS Christie Downs DSI
Project ID 12612725
Received Date Jul 25, 2023

Client Sample ID			BH01_0-0.13	BH01_3.4-3.5	BH02_0.35-0.45	BH02_2.7-2.8
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M23-JI0055815	M23-JI0055816	M23-JI0055817	M23-JI0055818
Date Sampled			Jul 19, 2023	Jul 19, 2023	Jul 19, 2023	Jul 19, 2023
Test/Reference	LOR	Unit				
Sample Properties						
% Moisture	1	%	5.0	10	16	7.6
Perfluoroalkyl carboxylic acids (PFCAs)						
Perfluorobutanoic acid (PFBA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoropentanoic acid (PFPeA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorohexanoic acid (PFHxA) ^{N11}	5	ug/kg	< 5	< 5	15	6.4
Perfluoroheptanoic acid (PFHpA) ^{N11}	5	ug/kg	< 5	< 5	N096.3	< 5
Perfluorooctanoic acid (PFOA) ^{N11}	5	ug/kg	< 5	< 5	N0924	< 5
Perfluorononanoic acid (PFNA) ^{N11}	5	ug/kg	< 5	< 5	5.4	N0991
Perfluorodecanoic acid (PFDA) ^{N11}	5	ug/kg	< 5	< 5	12	< 5
Perfluoroundecanoic acid (PFUnDA) ^{N11}	5	ug/kg	< 5	< 5	N09370	< 5
Perfluorododecanoic acid (PFDoDA) ^{N11}	5	ug/kg	< 5	< 5	N097.6	< 5
Perfluorotridecanoic acid (PFTeDA) ^{N15}	5	ug/kg	< 5	< 5	N0972	< 5
Perfluorotetradecanoic acid (PFTeDA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
13C4-PFBA (surr.)	1	%	97	66	90	59
13C5-PFPeA (surr.)	1	%	107	93	100	87
13C5-PFHxA (surr.)	1	%	108	100	106	96
13C4-PFHpA (surr.)	1	%	109	105	109	106
13C8-PFOA (surr.)	1	%	107	113	106	111
13C5-PFNA (surr.)	1	%	110	109	110	102
13C6-PFDA (surr.)	1	%	109	101	79	99
13C2-PFUnDA (surr.)	1	%	109	111	102	107
13C2-PFDoDA (surr.)	1	%	108	111	99	109
13C2-PFTeDA (surr.)	1	%	111	113	86	110
Perfluoroalkyl sulfonamido substances						
Perfluorooctane sulfonamide (FOSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA) ^{N11}	10	ug/kg	< 10	< 10	< 10	< 10
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA) ^{N11}	10	ug/kg	< 10	< 10	< 10	< 10

Client Sample ID			BH01_0-0.13	BH01_3.4-3.5	BH02_0.35-0.45	BH02_2.7-2.8
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M23-JI0055815	M23-JI0055816	M23-JI0055817	M23-JI0055818
Date Sampled			Jul 19, 2023	Jul 19, 2023	Jul 19, 2023	Jul 19, 2023
Test/Reference	LOR	Unit				
Perfluoroalkyl sulfonamido substances						
13C8-FOSA (surr.)	1	%	98	97	90	97
D3-N-MeFOSA (surr.)	1	%	132	131	128	133
D5-N-EtFOSA (surr.)	1	%	131	128	128	125
D7-N-MeFOSE (surr.)	1	%	99	103	93	101
D9-N-EtFOSE (surr.)	1	%	92	101	89	98
D5-N-EtFOSAA (surr.)	1	%	125	110	90	95
D3-N-MeFOSAA (surr.)	1	%	124	107	65	98
Perfluoroalkyl sulfonic acids (PFASs)						
Perfluorobutanesulfonic acid (PFBS) ^{N11}	5	ug/kg	< 5	< 5	< 5	^{N09} 13
Perfluorononanesulfonic acid (PFNS) ^{N15}	5	ug/kg	< 5	< 5	^{N09} 25	< 5
Perfluoropropanesulfonic acid (PFPrS) ^{N15}	5	ug/kg	< 5	< 5	< 5	5.9
Perfluoropentanesulfonic acid (PFPeS) ^{N15}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorohexanesulfonic acid (PFHxS) ^{N11}	5	ug/kg	< 5	< 5	^{N09} 78	< 5
Perfluoroheptanesulfonic acid (PFHpS) ^{N15}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorooctanesulfonic acid (PFOS) ^{N11}	5	ug/kg	13	< 5	^{N09} 3600	< 5
Perfluorodecanesulfonic acid (PFDS) ^{N15}	5	ug/kg	< 5	< 5	< 5	< 5
13C3-PFBS (surr.)	1	%	117	117	116	112
18O2-PFHxS (surr.)	1	%	109	110	106	110
13C8-PFOS (surr.)	1	%	99	96	130	97
n:2 Fluorotelomer sulfonic acids (n:2 FTSA)						
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA) ^{N11}	10	ug/kg	< 10	< 10	< 10	< 10
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA) ^{N11}	5	ug/kg	< 5	< 5	33	< 5
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA) ^{N11}	5	ug/kg	< 5	< 5	8.1	< 5
13C2-4:2 FTSA (surr.)	1	%	112	113	134	112
13C2-6:2 FTSA (surr.)	1	%	104	129	134	135
13C2-8:2 FTSA (surr.)	1	%	103	113	83	102
13C2-10:2 FTSA (surr.)	1	%	106	107	84	101
PFASs Summations						
Sum (PFHxS + PFOS)*	5	ug/kg	13	< 5	3678	< 5
Sum of US EPA PFAS (PFOS + PFOA)*	5	ug/kg	13	< 5	3624	< 5
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	5	ug/kg	13	< 5	3702	< 5
Sum of WA DWER PFAS (n=10)*	10	ug/kg	13	< 10	3756.3	19.4
Sum of PFASs (n=30)*	50	ug/kg	< 50	< 50	4256.4	116.3

Client Sample ID			BH03_0.04-0.14 Soil M23-JI0055819 Jul 20, 2023	BH03_2.1-2.2 Soil M23-JI0055820 Jul 20, 2023	BH03_BITUME N Soil M23-JI0055821 Jul 20, 2023	BH07_1.0-1.1 Soil M23-JI0055822 Jul 20, 2023
Sample Matrix						
Eurofins Sample No.						
Date Sampled						
Test/Reference	LOR	Unit				
Sample Properties						
% Moisture	1	%	< 1	12	< 1	9.5
Perfluoroalkyl carboxylic acids (PFCAs)						
Perfluorobutanoic acid (PFBA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoropentanoic acid (PFPeA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorohexanoic acid (PFHxA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoroheptanoic acid (PFHpA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorooctanoic acid (PFOA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorononanoic acid (PFNA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorodecanoic acid (PFDA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoroundecanoic acid (PFUnDA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorododecanoic acid (PFDoDA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorotridecanoic acid (PFTeDA) ^{N15}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorotetradecanoic acid (PFTeDA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
13C4-PFBA (surr.)	1	%	98	99	100	99
13C5-PFPeA (surr.)	1	%	110	106	108	110
13C5-PFHxA (surr.)	1	%	114	110	114	111
13C4-PFHpA (surr.)	1	%	111	111	111	108
13C8-PFOA (surr.)	1	%	116	111	116	111
13C5-PFNA (surr.)	1	%	119	113	122	114
13C6-PFDA (surr.)	1	%	109	111	113	110
13C2-PFUnDA (surr.)	1	%	111	114	115	122
13C2-PFDoDA (surr.)	1	%	120	117	116	119
13C2-PFTeDA (surr.)	1	%	129	126	134	128
Perfluoroalkyl sulfonamido substances						
Perfluorooctane sulfonamide (FOSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA) ^{N11}	10	ug/kg	< 10	< 10	< 10	< 10
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA) ^{N11}	10	ug/kg	< 10	< 10	< 10	< 10
13C8-FOSA (surr.)	1	%	103	103	103	107
D3-N-MeFOSA (surr.)	1	%	138	136	136	138
D5-N-EtFOSA (surr.)	1	%	131	129	134	133
D7-N-MeFOSE (surr.)	1	%	105	99	106	107
D9-N-EtFOSE (surr.)	1	%	97	99	97	106
D5-N-EtFOSAA (surr.)	1	%	130	136	126	136
D3-N-MeFOSAA (surr.)	1	%	129	137	127	134
Perfluoroalkyl sulfonic acids (PFSA)						
Perfluorobutanesulfonic acid (PFBS) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorononanesulfonic acid (PFNS) ^{N15}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoropropanesulfonic acid (PFPrS) ^{N15}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoropentanesulfonic acid (PFPeS) ^{N15}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorohexanesulfonic acid (PFHxS) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoroheptanesulfonic acid (PFHpS) ^{N15}	5	ug/kg	< 5	< 5	< 5	< 5

Client Sample ID			BH03_0.04-0.14	BH03_2.1-2.2	BH03_BITUME N	BH07_1.0-1.1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M23-JI0055819	M23-JI0055820	M23-JI0055821	M23-JI0055822
Date Sampled			Jul 20, 2023	Jul 20, 2023	Jul 20, 2023	Jul 20, 2023
Test/Reference	LOR	Unit				
Perfluoroalkyl sulfonic acids (PFASs)						
Perfluorooctanesulfonic acid (PFOS) ^{N11}	5	ug/kg	10.0	< 5	< 5	< 5
Perfluorodecanesulfonic acid (PFDS) ^{N15}	5	ug/kg	< 5	< 5	< 5	< 5
13C3-PFBS (surr.)	1	%	121	123	120	118
18O2-PFHxS (surr.)	1	%	115	113	111	110
13C8-PFOS (surr.)	1	%	100	99	101	103
n:2 Fluorotelomer sulfonic acids (n:2 FTSA)						
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA) ^{N11}	10	ug/kg	< 10	< 10	< 10	< 10
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
13C2-4:2 FTSA (surr.)	1	%	120	111	111	106
13C2-6:2 FTSA (surr.)	1	%	114	107	117	103
13C2-8:2 FTSA (surr.)	1	%	116	117	113	104
13C2-10:2 FTSA (surr.)	1	%	116	118	115	115
PFASs Summations						
Sum (PFHxS + PFOS)*	5	ug/kg	10	< 5	< 5	< 5
Sum of US EPA PFAS (PFOS + PFOA)*	5	ug/kg	10	< 5	< 5	< 5
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	5	ug/kg	10	< 5	< 5	< 5
Sum of WA DWER PFAS (n=10)*	10	ug/kg	10	< 10	< 10	< 10
Sum of PFASs (n=30)*	50	ug/kg	< 50	< 50	< 50	< 50

Client Sample ID			BH07_2.6-2.7	BH07_BITUME N	BH08_0.05-0.15	BH08_0.35-0.45
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M23-JI0055823	M23-JI0055824	M23-JI0055825	M23-JI0055826
Date Sampled			Jul 20, 2023	Jul 20, 2023	Jul 20, 2023	Jul 20, 2023
Test/Reference	LOR	Unit				
Sample Properties						
% Moisture	1	%	5.6	< 1	< 1	1.3
Perfluoroalkyl carboxylic acids (PFCAs)						
Perfluorobutanoic acid (PFBA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoropentanoic acid (PFPeA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorohexanoic acid (PFHxA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoroheptanoic acid (PFHpA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorooctanoic acid (PFOA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorononanoic acid (PFNA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorodecanoic acid (PFDA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoroundecanoic acid (PFUnDA) ^{N11}	5	ug/kg	< 5	< 5	< 5	8.5
Perfluorododecanoic acid (PFDoDA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorotridecanoic acid (PFTriDA) ^{N15}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorotetradecanoic acid (PFTeDA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
13C4-PFBA (surr.)	1	%	99	97	98	98
13C5-PFPeA (surr.)	1	%	109	109	109	109
13C5-PFHxA (surr.)	1	%	112	108	113	111
13C4-PFHpA (surr.)	1	%	110	107	110	109

Client Sample ID			BH07_2.6-2.7 Soil M23-JI0055823 Jul 20, 2023	BH07_BITUME N Soil M23-JI0055824 Jul 20, 2023	BH08_0.05- 0.15 Soil M23-JI0055825 Jul 20, 2023	BH08_0.35- 0.45 Soil M23-JI0055826 Jul 20, 2023
Sample Matrix						
Eurofins Sample No.						
Date Sampled						
Test/Reference	LOR	Unit				
Perfluoroalkyl carboxylic acids (PFCAs)						
13C8-PFOA (surr.)	1	%	110	112	117	113
13C5-PFNA (surr.)	1	%	112	122	122	112
13C6-PFDA (surr.)	1	%	113	109	111	112
13C2-PFUnDA (surr.)	1	%	117	116	121	120
13C2-PFDoDA (surr.)	1	%	120	119	118	115
13C2-PFTeDA (surr.)	1	%	127	129	126	129
Perfluoroalkyl sulfonamido substances						
Perfluorooctane sulfonamide (FOSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA) ^{N11}	10	ug/kg	< 10	< 10	< 10	< 10
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA) ^{N11}	10	ug/kg	< 10	< 10	< 10	< 10
13C8-FOSA (surr.)	1	%	105	107	105	107
D3-N-MeFOSA (surr.)	1	%	138	143	144	142
D5-N-EtFOSA (surr.)	1	%	130	132	135	133
D7-N-MeFOSE (surr.)	1	%	107	103	109	111
D9-N-EtFOSE (surr.)	1	%	103	94	106	107
D5-N-EtFOSAA (surr.)	1	%	138	137	135	135
D3-N-MeFOSAA (surr.)	1	%	140	137	136	135
Perfluoroalkyl sulfonic acids (PFSA's)						
Perfluorobutanesulfonic acid (PFBS) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorononanesulfonic acid (PFNS) ^{N15}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoropropanesulfonic acid (PFPrS) ^{N15}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoropentanesulfonic acid (PFPeS) ^{N15}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorohexanesulfonic acid (PFHxS) ^{N11}	5	ug/kg	< 5	< 5	< 5	^{N09} 6.4
Perfluoroheptanesulfonic acid (PFHpS) ^{N15}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorooctanesulfonic acid (PFOS) ^{N11}	5	ug/kg	< 5	< 5	^{N09} 6.4	^{N09} 44
Perfluorodecanesulfonic acid (PFDS) ^{N15}	5	ug/kg	< 5	< 5	< 5	< 5
13C3-PFBS (surr.)	1	%	120	119	121	116
18O2-PFHxS (surr.)	1	%	111	115	117	113
13C8-PFOS (surr.)	1	%	99	105	100	98
n:2 Fluorotelomer sulfonic acids (n:2 FTSA's)						
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA) ^{N11}	10	ug/kg	< 10	< 10	< 10	< 10
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
13C2-4:2 FTSA (surr.)	1	%	105	106	109	108
13C2-6:2 FTSA (surr.)	1	%	105	123	114	111
13C2-8:2 FTSA (surr.)	1	%	108	121	112	105
13C2-10:2 FTSA (surr.)	1	%	114	121	118	115

Client Sample ID			BH07_2.6-2.7	BH07_BITUME N	BH08_0.05-0.15	BH08_0.35-0.45
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M23-JI0055823	M23-JI0055824	M23-JI0055825	M23-JI0055826
Date Sampled			Jul 20, 2023	Jul 20, 2023	Jul 20, 2023	Jul 20, 2023
Test/Reference	LOR	Unit				
PFASs Summations						
Sum (PFHxS + PFOS)*	5	ug/kg	< 5	< 5	6.4	50.4
Sum of US EPA PFAS (PFOS + PFOA)*	5	ug/kg	< 5	< 5	6.4	44
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	5	ug/kg	< 5	< 5	6.4	50.4
Sum of WA DWER PFAS (n=10)*	10	ug/kg	< 10	< 10	< 10	50.4
Sum of PFASs (n=30)*	50	ug/kg	< 50	< 50	< 50	58.9

Client Sample ID			BH08_3.2-3.3	BH08_BITUME N	BH09_0-0.15	BH09_3.4-3.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M23-JI0055827	M23-JI0055828	M23-JI0055829	M23-JI0055830
Date Sampled			Jul 20, 2023	Jul 20, 2023	Jul 20, 2023	Jul 20, 2023
Test/Reference	LOR	Unit				
Sample Properties						
% Moisture	1	%	6.5	< 1	12	12
Perfluoroalkyl carboxylic acids (PFCAs)						
Perfluorobutanoic acid (PFBA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoropentanoic acid (PFPeA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorohexanoic acid (PFHxA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoroheptanoic acid (PFHpA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorooctanoic acid (PFOA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorononanoic acid (PFNA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorodecanoic acid (PFDA) ^{N11}	5	ug/kg	< 5	< 5	27	< 5
Perfluoroundecanoic acid (PFUnDA) ^{N11}	5	ug/kg	< 5	< 5	77	< 5
Perfluorododecanoic acid (PFDoDA) ^{N11}	5	ug/kg	< 5	< 5	^{N09} 18	< 5
Perfluorotridecanoic acid (PFTrDA) ^{N15}	5	ug/kg	< 5	< 5	140	< 5
Perfluorotetradecanoic acid (PFTeDA) ^{N11}	5	ug/kg	< 5	< 5	5.0	< 5
13C4-PFBA (surr.)	1	%	95	100	96	97
13C5-PFPeA (surr.)	1	%	109	111	104	106
13C5-PFHxA (surr.)	1	%	102	112	114	109
13C4-PFHpA (surr.)	1	%	103	110	107	107
13C8-PFOA (surr.)	1	%	106	120	91	113
13C5-PFNA (surr.)	1	%	107	126	84	112
13C6-PFDA (surr.)	1	%	104	112	78	105
13C2-PFUnDA (surr.)	1	%	110	114	87	107
13C2-PFDoDA (surr.)	1	%	114	116	54	116
13C2-PFTeDA (surr.)	1	%	120	135	51	115
Perfluoroalkyl sulfonamido substances						
Perfluorooctane sulfonamide (FOSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA) ^{N11}	10	ug/kg	< 10	< 10	< 10	< 10
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA) ^{N11}	10	ug/kg	< 10	< 10	< 10	< 10

Client Sample ID			BH08_3.2-3.3	BH08_BITUME N	BH09_0-0.15	BH09_3.4-3.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M23-JI0055827	M23-JI0055828	M23-JI0055829	M23-JI0055830
Date Sampled			Jul 20, 2023	Jul 20, 2023	Jul 20, 2023	Jul 20, 2023
Test/Reference	LOR	Unit				
Perfluoroalkyl sulfonamido substances						
13C8-FOSA (surr.)	1	%	103	108	53	99
D3-N-MeFOSA (surr.)	1	%	133	147	114	136
D5-N-EtFOSA (surr.)	1	%	125	136	121	129
D7-N-MeFOSE (surr.)	1	%	105	103	80	102
D9-N-EtFOSE (surr.)	1	%	104	97	80	102
D5-N-EtFOSAA (surr.)	1	%	138	133	42	136
D3-N-MeFOSAA (surr.)	1	%	129	133	28	130
Perfluoroalkyl sulfonic acids (PFASs)						
Perfluorobutanesulfonic acid (PFBS) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorononanesulfonic acid (PFNS) ^{N15}	5	ug/kg	< 5	< 5	^{N09} 6.1	< 5
Perfluoropropanesulfonic acid (PFPrS) ^{N15}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoropentanesulfonic acid (PFPeS) ^{N15}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorohexanesulfonic acid (PFHxS) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoroheptanesulfonic acid (PFHpS) ^{N15}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorooctanesulfonic acid (PFOS) ^{N11}	5	ug/kg	< 5	< 5	^{N09} 350	< 5
Perfluorodecanesulfonic acid (PFDS) ^{N15}	5	ug/kg	< 5	< 5	< 5	< 5
13C3-PFBS (surr.)	1	%	112	126	125	118
18O2-PFHxS (surr.)	1	%	110	116	98	110
13C8-PFOS (surr.)	1	%	96	105	78	96
n:2 Fluorotelomer sulfonic acids (n:2 FTSA)						
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA) ^{N11}	10	ug/kg	< 10	< 10	< 10	< 10
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA) ^{N11}	5	ug/kg	< 5	< 5	43	< 5
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA) ^{N11}	5	ug/kg	< 5	< 5	380	< 5
13C2-4:2 FTSA (surr.)	1	%	98	118	132	102
13C2-6:2 FTSA (surr.)	1	%	105	124	95	109
13C2-8:2 FTSA (surr.)	1	%	118	113	55	132
13C2-10:2 FTSA (surr.)	1	%	110	123	84	113
PFASs Summations						
Sum (PFHxS + PFOS)*	5	ug/kg	< 5	< 5	350	< 5
Sum of US EPA PFAS (PFOS + PFOA)*	5	ug/kg	< 5	< 5	350	< 5
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	5	ug/kg	< 5	< 5	350	< 5
Sum of WA DWER PFAS (n=10)*	10	ug/kg	< 10	< 10	393	< 10
Sum of PFASs (n=30)*	50	ug/kg	< 50	< 50	1046.1	< 50

Client Sample ID			BH04_0.4-0.5	BH04_2.1-2.2	BH05_0.12-0.2	BH05_1.8-1.9
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M23-JI0055831	M23-JI0055832	M23-JI0055833	M23-JI0055834
Date Sampled			Jul 20, 2023	Jul 20, 2023	Jul 20, 2023	Jul 20, 2023
Test/Reference	LOR	Unit				
Sample Properties						
% Moisture	1	%	17	7.5	3.5	9.2

Client Sample ID			BH04_0.4-0.5	BH04_2.1-2.2	BH05_0.12-0.2	BH05_1.8-1.9
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M23-JI0055831	M23-JI0055832	M23-JI0055833	M23-JI0055834
Date Sampled			Jul 20, 2023	Jul 20, 2023	Jul 20, 2023	Jul 20, 2023
Test/Reference	LOR	Unit				
Perfluoroalkyl carboxylic acids (PFCAs)						
Perfluorobutanoic acid (PFBA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoropentanoic acid (PFPeA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorohexanoic acid (PFHxA) ^{N11}	5	ug/kg	< 5	< 5	< 5	5.8
Perfluoroheptanoic acid (PFHpA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorooctanoic acid (PFOA) ^{N11}	5	ug/kg	^{N09} 7.9	< 5	< 5	< 5
Perfluorononanoic acid (PFNA) ^{N11}	5	ug/kg	5.6	^{N09} 30	< 5	< 5
Perfluorodecanoic acid (PFDA) ^{N11}	5	ug/kg	13	< 5	< 5	< 5
Perfluoroundecanoic acid (PFUnDA) ^{N11}	5	ug/kg	^{N09} 210	< 5	< 5	< 5
Perfluorododecanoic acid (PFDoDA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorotridecanoic acid (PFTrDA) ^{N15}	5	ug/kg	^{N09} 16	< 5	< 5	< 5
Perfluorotetradecanoic acid (PFTeDA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
13C4-PFBA (surr.)	1	%	95	98	98	99
13C5-PFPeA (surr.)	1	%	107	108	108	108
13C5-PFHxA (surr.)	1	%	106	109	107	106
13C4-PFHpA (surr.)	1	%	106	108	108	109
13C8-PFOA (surr.)	1	%	106	109	109	113
13C5-PFNA (surr.)	1	%	110	105	111	113
13C6-PFDA (surr.)	1	%	102	104	108	107
13C2-PFUnDA (surr.)	1	%	112	107	115	115
13C2-PFDoDA (surr.)	1	%	114	114	115	117
13C2-PFTeDA (surr.)	1	%	123	115	124	127
Perfluoroalkyl sulfonamido substances						
Perfluorooctane sulfonamide (FOSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA) ^{N11}	10	ug/kg	< 10	< 10	< 10	< 10
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA) ^{N11}	10	ug/kg	< 10	< 10	< 10	< 10
13C8-FOSA (surr.)	1	%	102	100	101	105
D3-N-MeFOSA (surr.)	1	%	133	131	136	141
D5-N-EtFOSA (surr.)	1	%	126	125	130	128
D7-N-MeFOSE (surr.)	1	%	100	106	107	103
D9-N-EtFOSE (surr.)	1	%	100	103	102	101
D5-N-EtFOSAA (surr.)	1	%	128	126	136	137
D3-N-MeFOSAA (surr.)	1	%	119	125	131	138
Perfluoroalkyl sulfonic acids (PFSAs)						
Perfluorobutanesulfonic acid (PFBS) ^{N11}	5	ug/kg	< 5	< 5	< 5	5.2
Perfluorononanesulfonic acid (PFNS) ^{N15}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoropropanesulfonic acid (PFPrS) ^{N15}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoropentanesulfonic acid (PFPeS) ^{N15}	5	ug/kg	< 5	< 5	< 5	5.3
Perfluorohexanesulfonic acid (PFHxS) ^{N11}	5	ug/kg	^{N09} 16	^{N09} 19	< 5	^{N09} 7.9
Perfluoroheptanesulfonic acid (PFHpS) ^{N15}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorooctanesulfonic acid (PFOS) ^{N11}	5	ug/kg	^{N09} 460	^{N09} 29	^{N09} 9.9	< 5
Perfluorodecanesulfonic acid (PFDS) ^{N15}	5	ug/kg	< 5	< 5	< 5	< 5
13C3-PFBS (surr.)	1	%	118	117	118	117

Client Sample ID			BH04_0.4-0.5	BH04_2.1-2.2	BH05_0.12-0.2	BH05_1.8-1.9
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M23-JI0055831	M23-JI0055832	M23-JI0055833	M23-JI0055834
Date Sampled			Jul 20, 2023	Jul 20, 2023	Jul 20, 2023	Jul 20, 2023
Test/Reference	LOR	Unit				
Perfluoroalkyl sulfonic acids (PFSA)						
18O2-PFHxS (surr.)	1	%	108	107	111	111
13C8-PFOS (surr.)	1	%	118	84	99	99
n:2 Fluorotelomer sulfonic acids (n:2 FTSA)						
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA) ^{N11}	10	ug/kg	< 10	< 10	< 10	< 10
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA) ^{N11}	5	ug/kg	29	< 5	< 5	< 5
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA) ^{N11}	5	ug/kg	11	< 5	< 5	< 5
13C2-4:2 FTSA (surr.)	1	%	114	118	109	109
13C2-6:2 FTSA (surr.)	1	%	104	112	110	103
13C2-8:2 FTSA (surr.)	1	%	112	109	124	117
13C2-10:2 FTSA (surr.)	1	%	115	104	116	115
PFASs Summations						
Sum (PFHxS + PFOS)*	5	ug/kg	476	48	9.9	7.9
Sum of US EPA PFAS (PFOS + PFOA)*	5	ug/kg	467.9	29	9.9	< 5
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	5	ug/kg	483.9	48	9.9	7.9
Sum of WA DWER PFAS (n=10)*	10	ug/kg	512.9	48	< 10	18.9
Sum of PFASs (n=30)*	50	ug/kg	768.5	78	< 50	< 50

Client Sample ID			BH05_CONCR ETE	BH06_0.15-0.35	BH06_2.4-2.5	BH06_CONCR ETE
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M23-JI0055835	M23-JI0055836	M23-JI0055837	M23-JI0055838
Date Sampled			Jul 20, 2023	Jul 20, 2023	Jul 20, 2023	Jul 20, 2023
Test/Reference	LOR	Unit				
Sample Properties						
% Moisture	1	%	2.2	2.8	8.3	2.2
Perfluoroalkyl carboxylic acids (PFCA)						
Perfluorobutanoic acid (PFBA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoropentanoic acid (PFPeA) ^{N11}	5	ug/kg	< 5	< 5	< 5	12
Perfluorohexanoic acid (PFHxA) ^{N11}	5	ug/kg	37	6.0	< 5	76
Perfluoroheptanoic acid (PFHpA) ^{N11}	5	ug/kg	^{N09} 6.1	< 5	< 5	^{N09} 9.5
Perfluorooctanoic acid (PFOA) ^{N11}	5	ug/kg	^{N09} 17	< 5	< 5	^{N09} 7.9
Perfluorononanoic acid (PFNA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorodecanoic acid (PFDA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoroundecanoic acid (PFUnDA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorododecanoic acid (PFDoDA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorotridecanoic acid (PFTeDA) ^{N15}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorotetradecanoic acid (PFTeDA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
13C4-PFBA (surr.)	1	%	98	95	98	94
13C5-PFPeA (surr.)	1	%	104	106	108	102
13C5-PFHxA (surr.)	1	%	107	107	111	103
13C4-PFHpA (surr.)	1	%	110	108	109	108
13C8-PFOA (surr.)	1	%	110	109	113	113
13C5-PFNA (surr.)	1	%	113	110	114	116
13C6-PFDA (surr.)	1	%	100	104	112	125

Client Sample ID			BH05_CONCR ETE Soil	BH06_0.15- 0.35 Soil	BH06_2.4-2.5 Soil	BH06_CONCR ETE Soil
Sample Matrix						
Eurofins Sample No.			M23-JI0055835	M23-JI0055836	M23-JI0055837	M23-JI0055838
Date Sampled			Jul 20, 2023	Jul 20, 2023	Jul 20, 2023	Jul 20, 2023
Test/Reference	LOR	Unit				
Perfluoroalkyl carboxylic acids (PFCAs)						
13C2-PFUnDA (surr.)	1	%	113	113	115	117
13C2-PFDoDA (surr.)	1	%	114	116	119	116
13C2-PFTeDA (surr.)	1	%	118	117	125	114
Perfluoroalkyl sulfonamido substances						
Perfluorooctane sulfonamide (FOSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA) ^{N11}	10	ug/kg	< 10	< 10	< 10	< 10
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA) ^{N11}	10	ug/kg	< 10	< 10	< 10	< 10
13C8-FOSA (surr.)	1	%	102	101	105	104
D3-N-MeFOSA (surr.)	1	%	136	135	137	129
D5-N-EtFOSA (surr.)	1	%	127	125	128	138
D7-N-MeFOSE (surr.)	1	%	100	106	108	98
D9-N-EtFOSE (surr.)	1	%	100	105	102	95
D5-N-EtFOSAA (surr.)	1	%	132	136	136	111
D3-N-MeFOSAA (surr.)	1	%	128	131	134	107
Perfluoroalkyl sulfonic acids (PFSA's)						
Perfluorobutanesulfonic acid (PFBS) ^{N11}	5	ug/kg	^{N09} 12	< 5	< 5	^{N09} 32
Perfluorononanesulfonic acid (PFNS) ^{N15}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoropropanesulfonic acid (PFPrS) ^{N15}	5	ug/kg	< 5	< 5	< 5	7.9
Perfluoropentanesulfonic acid (PFPeS) ^{N15}	5	ug/kg	^{N09} 15	< 5	< 5	^{N09} 33
Perfluorohexanesulfonic acid (PFHxS) ^{N11}	5	ug/kg	^{N09} 150	^{N09} 15	< 5	^{N09} 110
Perfluoroheptanesulfonic acid (PFHpS) ^{N15}	5	ug/kg	^{N09} 13	< 5	< 5	< 5
Perfluorooctanesulfonic acid (PFOS) ^{N11}	5	ug/kg	^{N09} 230	^{N09} 130	< 5	^{N09} 24
Perfluorodecanesulfonic acid (PFDS) ^{N15}	5	ug/kg	< 5	< 5	< 5	< 5
13C3-PFBS (surr.)	1	%	114	115	117	109
18O2-PFHxS (surr.)	1	%	100	109	110	109
13C8-PFOS (surr.)	1	%	95	92	99	105
n:2 Fluorotelomer sulfonic acids (n:2 FTSA's)						
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA) ^{N11}	10	ug/kg	24	< 10	< 10	< 10
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
13C2-4:2 FTSA (surr.)	1	%	126	104	104	100
13C2-6:2 FTSA (surr.)	1	%	122	104	111	115
13C2-8:2 FTSA (surr.)	1	%	122	112	109	142
13C2-10:2 FTSA (surr.)	1	%	113	110	114	116

Client Sample ID			BH05_CONCR ETE	BH06_0.15-0.35	BH06_2.4-2.5	BH06_CONCR ETE
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M23-JI0055835	M23-JI0055836	M23-JI0055837	M23-JI0055838
Date Sampled			Jul 20, 2023	Jul 20, 2023	Jul 20, 2023	Jul 20, 2023
Test/Reference	LOR	Unit				
PFASs Summations						
Sum (PFHxS + PFOS)*	5	ug/kg	380	145	< 5	134
Sum of US EPA PFAS (PFOS + PFOA)*	5	ug/kg	247	130	< 5	31.9
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	5	ug/kg	397	145	< 5	141.9
Sum of WA DWER PFAS (n=10)*	10	ug/kg	476.1	151	< 10	271.4
Sum of PFASs (n=30)*	50	ug/kg	504.1	151	< 50	312.3

Client Sample ID			FD01	FD02	FD03	MW01_0.05-0.15
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M23-JI0055839	M23-JI0055840	M23-JI0055841	M23-JI0055843
Date Sampled			Jul 20, 2023	Jul 20, 2023	Jul 20, 2023	Jul 21, 2023
Test/Reference	LOR	Unit				
Sample Properties						
% Moisture	1	%	< 1	< 1	2.3	< 1
Perfluoroalkyl carboxylic acids (PFCAs)						
Perfluorobutanoic acid (PFBA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoropentanoic acid (PFPeA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorohexanoic acid (PFHxA) ^{N11}	5	ug/kg	< 5	< 5	< 5	NO9 < 5
Perfluoroheptanoic acid (PFHpA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorooctanoic acid (PFOA) ^{N11}	5	ug/kg	< 5	< 5	< 5	NO9 < 5
Perfluorononanoic acid (PFNA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorodecanoic acid (PFDA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoroundecanoic acid (PFUnDA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorododecanoic acid (PFDoDA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorotridecanoic acid (PFTrDA) ^{N15}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorotetradecanoic acid (PFTeDA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
13C4-PFBA (surr.)	1	%	99	88	100	90
13C5-PFPeA (surr.)	1	%	110	98	111	100
13C5-PFHxA (surr.)	1	%	114	99	114	105
13C4-PFHpA (surr.)	1	%	112	95	109	106
13C8-PFOA (surr.)	1	%	114	97	110	102
13C5-PFNA (surr.)	1	%	121	101	111	110
13C6-PFDA (surr.)	1	%	132	120	131	128
13C2-PFUnDA (surr.)	1	%	122	108	120	111
13C2-PFDoDA (surr.)	1	%	116	101	120	111
13C2-PFTeDA (surr.)	1	%	122	106	114	109
Perfluoroalkyl sulfonamido substances						
Perfluorooctane sulfonamide (FOSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA) ^{N11}	10	ug/kg	< 10	< 10	< 10	< 10
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA) ^{N11}	10	ug/kg	< 10	< 10	< 10	< 10

Client Sample ID			FD01 Soil	FD02 Soil	FD03 Soil	MW01_0.05-0.15 Soil
Sample Matrix			M23-JI0055839	M23-JI0055840	M23-JI0055841	M23-JI0055843
Eurofins Sample No.			Jul 20, 2023	Jul 20, 2023	Jul 20, 2023	Jul 21, 2023
Date Sampled						
Test/Reference	LOR	Unit				
Perfluoroalkyl sulfonamido substances						
13C8-FOSA (surr.)	1	%	109	95	108	102
D3-N-MeFOSA (surr.)	1	%	134	113	132	124
D5-N-EtFOSA (surr.)	1	%	143	121	139	130
D7-N-MeFOSE (surr.)	1	%	99	95	104	97
D9-N-EtFOSE (surr.)	1	%	88	86	101	91
D5-N-EtFOSAA (surr.)	1	%	123	108	129	103
D3-N-MeFOSAA (surr.)	1	%	118	105	127	101
Perfluoroalkyl sulfonic acids (PFSA's)						
Perfluorobutanesulfonic acid (PFBS) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorononanesulfonic acid (PFNS) ^{N15}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoropropanesulfonic acid (PFPrS) ^{N15}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoropentanesulfonic acid (PFPeS) ^{N15}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorohexanesulfonic acid (PFHxS) ^{N11}	5	ug/kg	< 5	< 5	^{N09} 11	^{N09} < 5
Perfluoroheptanesulfonic acid (PFHpS) ^{N15}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorooctanesulfonic acid (PFOS) ^{N11}	5	ug/kg	< 5	^{N09} 10	^{N09} 94	^{N09} < 5
Perfluorodecanesulfonic acid (PFDS) ^{N15}	5	ug/kg	< 5	< 5	< 5	< 5
13C3-PFBS (surr.)	1	%	120	106	113	108
18O2-PFHxS (surr.)	1	%	120	103	112	109
13C8-PFOS (surr.)	1	%	109	95	100	97
n:2 Fluorotelomer sulfonic acids (n:2 FTSA's)						
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA) ^{N11}	10	ug/kg	< 10	< 10	< 10	< 10
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
13C2-4:2 FTSA (surr.)	1	%	88	82	93	100
13C2-6:2 FTSA (surr.)	1	%	112	83	90	89
13C2-8:2 FTSA (surr.)	1	%	138	103	105	113
13C2-10:2 FTSA (surr.)	1	%	121	105	118	111
PFASs Summations						
Sum (PFHxS + PFOS)*	5	ug/kg	< 5	10	105	< 5
Sum of US EPA PFAS (PFOS + PFOA)*	5	ug/kg	< 5	10	94	< 5
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	5	ug/kg	< 5	10	105	< 5
Sum of WA DWER PFAS (n=10)*	10	ug/kg	< 10	10	105	< 10
Sum of PFASs (n=30)*	50	ug/kg	< 50	< 50	105	< 50

Client Sample ID			MW01_2.0-2.1	BH11_0.12-0.22	BH11_1.5-1.6	MW02_0.12-0.32
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M23-JI0055844	M23-JI0055845	M23-JI0055846	M23-JI0055847
Date Sampled			Jul 21, 2023	Jul 21, 2023	Jul 21, 2023	Jul 21, 2023
Test/Reference	LOR	Unit				
Sample Properties						
% Moisture	1	%	8.1	4.3	13	2.7
Perfluoroalkyl carboxylic acids (PFCAs)						
Perfluorobutanoic acid (PFBA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoropentanoic acid (PFPeA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorohexanoic acid (PFHxA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoroheptanoic acid (PFHpA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorooctanoic acid (PFOA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorononanoic acid (PFNA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorodecanoic acid (PFDA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoroundecanoic acid (PFUnDA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorododecanoic acid (PFDoDA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorotridecanoic acid (PFTTrDA) ^{N15}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorotetradecanoic acid (PFTeDA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
13C4-PFBA (surr.)	1	%	92	101	89	93
13C5-PFPeA (surr.)	1	%	97	113	98	101
13C5-PFHxA (surr.)	1	%	100	116	99	104
13C4-PFHpA (surr.)	1	%	95	111	95	99
13C8-PFOA (surr.)	1	%	96	111	93	98
13C5-PFNA (surr.)	1	%	96	113	96	101
13C6-PFDA (surr.)	1	%	113	135	117	119
13C2-PFUnDA (surr.)	1	%	103	121	106	108
13C2-PFDoDA (surr.)	1	%	94	123	108	109
13C2-PFTeDA (surr.)	1	%	96	121	113	106
Perfluoroalkyl sulfonamido substances						
Perfluorooctane sulfonamide (FOSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA) ^{N11}	10	ug/kg	< 10	< 10	< 10	< 10
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA) ^{N11}	10	ug/kg	< 10	< 10	< 10	< 10
13C8-FOSA (surr.)	1	%	93	109	97	97
D3-N-MeFOSA (surr.)	1	%	109	132	112	118
D5-N-EtFOSA (surr.)	1	%	114	140	121	128
D7-N-MeFOSE (surr.)	1	%	81	104	86	93
D9-N-EtFOSE (surr.)	1	%	80	106	82	93
D5-N-EtFOSAA (surr.)	1	%	108	129	110	116
D3-N-MeFOSAA (surr.)	1	%	106	123	107	111
Perfluoroalkyl sulfonic acids (PFSA's)						
Perfluorobutanesulfonic acid (PFBS) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorononanesulfonic acid (PFNS) ^{N15}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoropropanesulfonic acid (PFPrS) ^{N15}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoropentanesulfonic acid (PFPeS) ^{N15}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorohexanesulfonic acid (PFHxS) ^{N11}	5	ug/kg	< 5	< 5	N0954	N097.9
Perfluoroheptanesulfonic acid (PFHpS) ^{N15}	5	ug/kg	< 5	< 5	< 5	< 5

Client Sample ID			MW01_2.0-2.1	BH11_0.12-0.22	BH11_1.5-1.6	MW02_0.12-0.32
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M23-JI0055844	M23-JI0055845	M23-JI0055846	M23-JI0055847
Date Sampled			Jul 21, 2023	Jul 21, 2023	Jul 21, 2023	Jul 21, 2023
Test/Reference	LOR	Unit				
Perfluoroalkyl sulfonic acids (PFASs)						
Perfluorooctanesulfonic acid (PFOS) ^{N11}	5	ug/kg	< 5	^{N09} 8.0	^{N09} 64	^{N09} 54
Perfluorodecanesulfonic acid (PFDS) ^{N15}	5	ug/kg	< 5	< 5	< 5	< 5
13C3-PFBS (surr.)	1	%	103	118	103	106
18O2-PFHxS (surr.)	1	%	100	124	96	102
13C8-PFOS (surr.)	1	%	89	110	92	92
n:2 Fluorotelomer sulfonic acids (n:2 FTSA)						
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA) ^{N11}	10	ug/kg	< 10	< 10	< 10	< 10
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
13C2-4:2 FTSA (surr.)	1	%	81	92	81	87
13C2-6:2 FTSA (surr.)	1	%	80	97	82	86
13C2-8:2 FTSA (surr.)	1	%	112	126	98	107
13C2-10:2 FTSA (surr.)	1	%	99	119	110	110
PFASs Summations						
Sum (PFHxS + PFOS)*	5	ug/kg	< 5	8	118	61.9
Sum of US EPA PFAS (PFOS + PFOA)*	5	ug/kg	< 5	8	64	54
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	5	ug/kg	< 5	8	118	61.9
Sum of WA DWER PFAS (n=10)*	10	ug/kg	< 10	< 10	118	61.9
Sum of PFASs (n=30)*	50	ug/kg	< 50	< 50	118	61.9

Client Sample ID			MW02_2.2-2.3	BH10_0.12-0.3	BH10_1.0-1.1	MW03_0.12-0.22
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M23-JI0055848	M23-JI0055849	M23-JI0055850	M23-JI0055851
Date Sampled			Jul 21, 2023	Jul 21, 2023	Jul 21, 2023	Jul 21, 2023
Test/Reference	LOR	Unit				
Sample Properties						
% Moisture	1	%	10	1.6	11	3.9
Perfluoroalkyl carboxylic acids (PFCAs)						
Perfluorobutanoic acid (PFBA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoropentanoic acid (PFPeA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorohexanoic acid (PFHxA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoroheptanoic acid (PFHpA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorooctanoic acid (PFOA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorononanoic acid (PFNA) ^{N11}	5	ug/kg	< 5	^{N09} 24	< 5	^{N09} 60
Perfluorodecanoic acid (PFDA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoroundecanoic acid (PFUnDA) ^{N11}	5	ug/kg	< 5	< 5	< 5	^{N09} 33
Perfluorododecanoic acid (PFDoDA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorotridecanoic acid (PFTriDA) ^{N15}	5	ug/kg	< 5	< 5	< 5	^{N09} 21
Perfluorotetradecanoic acid (PFTeDA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
13C4-PFBA (surr.)	1	%	89	94	61	89
13C5-PFPeA (surr.)	1	%	98	105	86	98
13C5-PFHxA (surr.)	1	%	99	108	96	104
13C4-PFHpA (surr.)	1	%	94	105	100	100

Client Sample ID			MW02_2.2-2.3	BH10_0.12-0.3	BH10_1.0-1.1	MW03_0.12-0.22
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M23-JI0055848	M23-JI0055849	M23-JI0055850	M23-JI0055851
Date Sampled			Jul 21, 2023	Jul 21, 2023	Jul 21, 2023	Jul 21, 2023
Test/Reference	LOR	Unit				
Perfluoroalkyl carboxylic acids (PFCAs)						
13C8-PFOA (surr.)	1	%	92	105	100	101
13C5-PFNA (surr.)	1	%	92	105	103	98
13C6-PFDA (surr.)	1	%	109	122	118	118
13C2-PFUnDA (surr.)	1	%	97	110	107	109
13C2-PFDoDA (surr.)	1	%	101	112	104	106
13C2-PFTeDA (surr.)	1	%	95	109	103	109
Perfluoroalkyl sulfonamido substances						
Perfluorooctane sulfonamide (FOSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA) ^{N11}	10	ug/kg	< 10	< 10	< 10	< 10
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA) ^{N11}	10	ug/kg	< 10	< 10	< 10	< 10
13C8-FOSA (surr.)	1	%	91	100	96	100
D3-N-MeFOSA (surr.)	1	%	107	122	115	112
D5-N-EtFOSA (surr.)	1	%	112	129	122	122
D7-N-MeFOSE (surr.)	1	%	83	95	88	87
D9-N-EtFOSE (surr.)	1	%	81	95	85	84
D5-N-EtFOSAA (surr.)	1	%	106	121	88	109
D3-N-MeFOSAA (surr.)	1	%	105	118	86	107
Perfluoroalkyl sulfonic acids (PFSA's)						
Perfluorobutanesulfonic acid (PFBS) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorononanesulfonic acid (PFNS) ^{N15}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoropropanesulfonic acid (PFPrS) ^{N15}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoropentanesulfonic acid (PFPeS) ^{N15}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorohexanesulfonic acid (PFHxS) ^{N11}	5	ug/kg	< 5	^{N09} 9.3	< 5	^{N09} 12
Perfluoroheptanesulfonic acid (PFHpS) ^{N15}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorooctanesulfonic acid (PFOS) ^{N11}	5	ug/kg	< 5	^{N09} 54	< 5	^{N09} 73
Perfluorodecanesulfonic acid (PFDS) ^{N15}	5	ug/kg	< 5	< 5	< 5	< 5
13C3-PFBS (surr.)	1	%	102	108	104	105
18O2-PFHxS (surr.)	1	%	97	100	105	103
13C8-PFOS (surr.)	1	%	88	97	91	95
n:2 Fluorotelomer sulfonic acids (n:2 FTSA's)						
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA) ^{N11}	10	ug/kg	< 10	< 10	< 10	< 10
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
13C2-4:2 FTSA (surr.)	1	%	82	84	97	87
13C2-6:2 FTSA (surr.)	1	%	81	85	117	87
13C2-8:2 FTSA (surr.)	1	%	94	110	115	118
13C2-10:2 FTSA (surr.)	1	%	97	109	110	107

Client Sample ID			MW02_2.2-2.3	BH10_0.12-0.3	BH10_1.0-1.1	MW03_0.12-0.22
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M23-JI0055848	M23-JI0055849	M23-JI0055850	M23-JI0055851
Date Sampled			Jul 21, 2023	Jul 21, 2023	Jul 21, 2023	Jul 21, 2023
Test/Reference	LOR	Unit				
PFASs Summations						
Sum (PFHxS + PFOS)*	5	ug/kg	< 5	63.3	< 5	85
Sum of US EPA PFAS (PFOS + PFOA)*	5	ug/kg	< 5	54	< 5	73
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	5	ug/kg	< 5	63.3	< 5	85
Sum of WA DWER PFAS (n=10)*	10	ug/kg	< 10	63.3	< 10	85
Sum of PFASs (n=30)*	50	ug/kg	< 50	87.3	< 50	199

Client Sample ID			MW03_3.4-3.5	SS01	SS02	FD04
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M23-JI0055852	M23-JI0055853	M23-JI0055854	M23-JI0055855
Date Sampled			Jul 21, 2023	Jul 21, 2023	Jul 21, 2023	Jul 21, 2023
Test/Reference	LOR	Unit				
Sample Properties						
% Moisture	1	%	12	30	11	2.1
Perfluoroalkyl carboxylic acids (PFCAs)						
Perfluorobutanoic acid (PFBA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoropentanoic acid (PFPeA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorohexanoic acid (PFHxA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoroheptanoic acid (PFHpA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorooctanoic acid (PFOA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorononanoic acid (PFNA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorodecanoic acid (PFDA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoroundecanoic acid (PFUnDA) ^{N11}	5	ug/kg	< 5	^{N09} 54	^{N09} 7.6	< 5
Perfluorododecanoic acid (PFDoDA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorotridecanoic acid (PFTeDA) ^{N15}	5	ug/kg	< 5	^{N09} 67	^{N09} 13	< 5
Perfluorotetradecanoic acid (PFTeDA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
13C4-PFBA (surr.)	1	%	84	85	89	93
13C5-PFPeA (surr.)	1	%	97	87	97	105
13C5-PFHxA (surr.)	1	%	102	96	106	106
13C4-PFHpA (surr.)	1	%	98	93	97	104
13C8-PFOA (surr.)	1	%	101	101	96	105
13C5-PFNA (surr.)	1	%	100	101	101	103
13C6-PFDA (surr.)	1	%	116	112	117	121
13C2-PFUnDA (surr.)	1	%	107	83	98	111
13C2-PFDoDA (surr.)	1	%	102	86	93	111
13C2-PFTeDA (surr.)	1	%	100	89	99	113
Perfluoroalkyl sulfonamido substances						
Perfluorooctane sulfonamide (FOSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
N-ethylperfluorooctanesulfonamidoacetic acid (N-EtFOSAA) ^{N11}	10	ug/kg	< 10	< 10	< 10	< 10
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA) ^{N11}	10	ug/kg	< 10	< 10	< 10	< 10
13C8-FOSA (surr.)	1	%	96	84	94	101

Client Sample ID			MW03_3.4-3.5	SS01	SS02	FD04
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M23-JI0055852	M23-JI0055853	M23-JI0055854	M23-JI0055855
Date Sampled			Jul 21, 2023	Jul 21, 2023	Jul 21, 2023	Jul 21, 2023
Test/Reference	LOR	Unit				
Perfluoroalkyl sulfonamido substances						
D3-N-MeFOSA (surr.)	1	%	114	108	112	123
D5-N-EtFOSA (surr.)	1	%	125	120	121	129
D7-N-MeFOSE (surr.)	1	%	91	74	82	96
D9-N-EtFOSE (surr.)	1	%	85	68	74	95
D5-N-EtFOSAA (surr.)	1	%	103	75	93	121
D3-N-MeFOSAA (surr.)	1	%	98	72	86	110
Perfluoroalkyl sulfonic acids (PFSA's)						
Perfluorobutanesulfonic acid (PFBS) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorononanesulfonic acid (PFNS) ^{N15}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoropropanesulfonic acid (PFPrS) ^{N15}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoropentanesulfonic acid (PFPeS) ^{N15}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorohexanesulfonic acid (PFHxS) ^{N11}	5	ug/kg	< 5	6.8	< 5	^{N09} 7.9
Perfluoroheptanesulfonic acid (PFHpS) ^{N15}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorooctanesulfonic acid (PFOS) ^{N11}	5	ug/kg	< 5	^{N09} 66	^{N09} 6.4	^{N09} 57
Perfluorodecanesulfonic acid (PFDS) ^{N15}	5	ug/kg	< 5	< 5	< 5	< 5
13C3-PFBS (surr.)	1	%	106	102	105	109
18O2-PFHxS (surr.)	1	%	106	96	98	106
13C8-PFOS (surr.)	1	%	92	89	95	93
n:2 Fluorotelomer sulfonic acids (n:2 FTSA's)						
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA) ^{N11}	10	ug/kg	< 10	< 10	< 10	< 10
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
13C2-4:2 FTSA (surr.)	1	%	99	117	95	85
13C2-6:2 FTSA (surr.)	1	%	95	116	94	91
13C2-8:2 FTSA (surr.)	1	%	123	126	111	107
13C2-10:2 FTSA (surr.)	1	%	106	88	96	116
PFASs Summations						
Sum (PFHxS + PFOS)*	5	ug/kg	< 5	72.8	6.4	64.9
Sum of US EPA PFAS (PFOS + PFOA)*	5	ug/kg	< 5	66	6.4	57
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	5	ug/kg	< 5	72.8	6.4	64.9
Sum of WA DWER PFAS (n=10)*	10	ug/kg	< 10	72.8	< 10	64.9
Sum of PFASs (n=30)*	50	ug/kg	< 50	193.8	< 50	64.9

Client Sample ID			FD05
Sample Matrix			Soil
Eurofins Sample No.			M23-JI0055856
Date Sampled			Jul 21, 2023
Test/Reference	LOR	Unit	
Sample Properties			
% Moisture	1	%	29

Client Sample ID			FD05
Sample Matrix			Soil
Eurofins Sample No.			M23-JI0055856
Date Sampled			Jul 21, 2023
Test/Reference	LOR	Unit	
Perfluoroalkyl carboxylic acids (PFCAs)			
Perfluorobutanoic acid (PFBA) ^{N11}	5	ug/kg	< 5
Perfluoropentanoic acid (PFPeA) ^{N11}	5	ug/kg	< 5
Perfluorohexanoic acid (PFHxA) ^{N11}	5	ug/kg	< 5
Perfluoroheptanoic acid (PFHpA) ^{N11}	5	ug/kg	< 5
Perfluorooctanoic acid (PFOA) ^{N11}	5	ug/kg	< 5
Perfluorononanoic acid (PFNA) ^{N11}	5	ug/kg	5.1
Perfluorodecanoic acid (PFDA) ^{N11}	5	ug/kg	< 5
Perfluoroundecanoic acid (PFUnDA) ^{N11}	5	ug/kg	^{N09} 59
Perfluorododecanoic acid (PFDoDA) ^{N11}	5	ug/kg	< 5
Perfluorotridecanoic acid (PFTrDA) ^{N15}	5	ug/kg	^{N09} 58
Perfluorotetradecanoic acid (PFTeDA) ^{N11}	5	ug/kg	< 5
13C4-PFBA (surr.)	1	%	81
13C5-PFPeA (surr.)	1	%	81
13C5-PFHxA (surr.)	1	%	95
13C4-PFHpA (surr.)	1	%	100
13C8-PFOA (surr.)	1	%	98
13C5-PFNA (surr.)	1	%	96
13C6-PFDA (surr.)	1	%	110
13C2-PFUnDA (surr.)	1	%	68
13C2-PFDoDA (surr.)	1	%	80
13C2-PFTeDA (surr.)	1	%	84
Perfluoroalkyl sulfonamido substances			
Perfluorooctane sulfonamide (FOSA) ^{N11}	5	ug/kg	< 5
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA) ^{N11}	5	ug/kg	< 5
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA) ^{N11}	5	ug/kg	< 5
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE) ^{N11}	5	ug/kg	< 5
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE) ^{N11}	5	ug/kg	< 5
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA) ^{N11}	10	ug/kg	< 10
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA) ^{N11}	10	ug/kg	< 10
13C8-FOSA (surr.)	1	%	82
D3-N-MeFOSA (surr.)	1	%	110
D5-N-EtFOSA (surr.)	1	%	120
D7-N-MeFOSE (surr.)	1	%	72
D9-N-EtFOSE (surr.)	1	%	67
D5-N-EtFOSAA (surr.)	1	%	62
D3-N-MeFOSAA (surr.)	1	%	58
Perfluoroalkyl sulfonic acids (PFSAs)			
Perfluorobutanesulfonic acid (PFBS) ^{N11}	5	ug/kg	< 5
Perfluorononanesulfonic acid (PFNS) ^{N15}	5	ug/kg	< 5
Perfluoropropanesulfonic acid (PFPrS) ^{N15}	5	ug/kg	< 5
Perfluoropentanesulfonic acid (PFPeS) ^{N15}	5	ug/kg	< 5
Perfluorohexanesulfonic acid (PFHxS) ^{N11}	5	ug/kg	^{N09} 11
Perfluoroheptanesulfonic acid (PFHpS) ^{N15}	5	ug/kg	< 5
Perfluorooctanesulfonic acid (PFOS) ^{N11}	5	ug/kg	^{N09} 70
Perfluorodecanesulfonic acid (PFDS) ^{N15}	5	ug/kg	< 5
13C3-PFBS (surr.)	1	%	96

Client Sample ID			FD05
Sample Matrix			Soil
Eurofins Sample No.			M23-JI0055856
Date Sampled			Jul 21, 2023
Test/Reference	LOR	Unit	
Perfluoroalkyl sulfonic acids (PFSA)			
18O2-PFHxS (surr.)	1	%	100
13C8-PFOS (surr.)	1	%	90
n:2 Fluorotelomer sulfonic acids (n:2 FTSA)			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA) ^{N11}	5	ug/kg	< 5
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA) ^{N11}	10	ug/kg	< 10
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA) ^{N11}	5	ug/kg	< 5
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA) ^{N11}	5	ug/kg	< 5
13C2-4:2 FTSA (surr.)	1	%	130
13C2-6:2 FTSA (surr.)	1	%	117
13C2-8:2 FTSA (surr.)	1	%	120
13C2-10:2 FTSA (surr.)	1	%	82
PFASs Summations			
Sum (PFHxS + PFOS)*	5	ug/kg	81
Sum of US EPA PFAS (PFOS + PFOA)*	5	ug/kg	70
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	5	ug/kg	81
Sum of WA DWER PFAS (n=10)*	10	ug/kg	81
Sum of PFASs (n=30)*	50	ug/kg	203.1

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
% Moisture	Melbourne	Jul 26, 2023	14 Days
- Method: LTM-GEN-7080 Moisture			
Per- and Polyfluoroalkyl Substances (PFASs)			
Perfluoroalkyl carboxylic acids (PFCAs)	Melbourne	Jul 28, 2023	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonamido substances	Melbourne	Jul 28, 2023	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonic acids (PFSAs)	Melbourne	Jul 28, 2023	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)	Melbourne	Jul 28, 2023	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
PFASs Summations	Melbourne	Jul 26, 2023	
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			

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

Project Name: MFS Christie Downs DSI
Project ID: 12612725

Order No.:
Report #: 1010934
Phone: 08 8111 6600
Fax: 08 8111 6699

Received: Jul 25, 2023 9:24 PM
Due: Aug 2, 2023
Priority: 5 Day
Contact Name: - ALL SRAs/COCs/Reports

Eurofins Analytical Services Manager : Amy Meunier

Sample Detail						HOLD	Moisture Set	Per- and Polyfluorinated Substances (PFASs)
Melbourne Laboratory - NATA # 1261 Site # 1254						X	X	X
External Laboratory								
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID			
1	BH01_0-0.13	Jul 19, 2023		Soil	M23-JI0055815		X	X
2	BH01_3.4-3.5	Jul 19, 2023		Soil	M23-JI0055816		X	X
3	BH02_0.35-0.45	Jul 19, 2023		Soil	M23-JI0055817		X	X
4	BH02_2.7-2.8	Jul 19, 2023		Soil	M23-JI0055818		X	X
5	BH03_0.04-0.14	Jul 20, 2023		Soil	M23-JI0055819		X	X
6	BH03_2.1-2.2	Jul 20, 2023		Soil	M23-JI0055820		X	X
7	BH03_BITUMEN	Jul 20, 2023		Soil	M23-JI0055821		X	X
8	BH07_1.0-1.1	Jul 20, 2023		Soil	M23-JI0055822		X	X
9	BH07_2.6-2.7	Jul 20, 2023		Soil	M23-JI0055823		X	X
10	BH07_BITUMEN	Jul 20, 2023		Soil	M23-JI0055824		X	X

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Eurofins Analytical Services Manager : Amy Meunier

Sample Detail						HOLD	Moisture Set	Per- and Polyfluoralkyl Substances (PFASs)
Melbourne Laboratory - NATA # 1261 Site # 1254						X	X	X
11	BH08_0.05-0.15	Jul 20, 2023		Soil	M23-JI0055825		X	X
12	BH08_0.35-0.45	Jul 20, 2023		Soil	M23-JI0055826		X	X
13	BH08_3.2-3.3	Jul 20, 2023		Soil	M23-JI0055827		X	X
14	BH08_BITUMEN	Jul 20, 2023		Soil	M23-JI0055828		X	X
15	BH09_0-0.15	Jul 20, 2023		Soil	M23-JI0055829		X	X
16	BH09_3.4-3.5	Jul 20, 2023		Soil	M23-JI0055830		X	X
17	BH04_0.4-0.5	Jul 20, 2023		Soil	M23-JI0055831		X	X
18	BH04_2.1-2.2	Jul 20, 2023		Soil	M23-JI0055832		X	X
19	BH05_0.12-0.2	Jul 20, 2023		Soil	M23-JI0055833		X	X
20	BH05_1.8-1.9	Jul 20, 2023		Soil	M23-JI0055834		X	X
21	BH05_CONCRETE	Jul 20, 2023		Soil	M23-JI0055835		X	X
22	BH06_0.15-0.35	Jul 20, 2023		Soil	M23-JI0055836		X	X

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Eurofins Analytical Services Manager : Amy Meunier

Sample Detail						HOLD	Moisture Set	Per- and Polyfluoralkyl Substances (PFASs)
Melbourne Laboratory - NATA # 1261 Site # 1254						X	X	X
23	BH06_2.4-2.5	Jul 20, 2023		Soil	M23-JI0055837		X	X
24	BH06_CONCR ETE	Jul 20, 2023		Soil	M23-JI0055838		X	X
25	FD01	Jul 20, 2023		Soil	M23-JI0055839		X	X
26	FD02	Jul 20, 2023		Soil	M23-JI0055840		X	X
27	FD03	Jul 20, 2023		Soil	M23-JI0055841		X	X
28	RB01	Jul 20, 2023		Water	M23-JI0055842			X
29	MW01_0.05-0.15	Jul 21, 2023		Soil	M23-JI0055843		X	X
30	MW01_2.0-2.1	Jul 21, 2023		Soil	M23-JI0055844		X	X
31	BH11_0.12-0.22	Jul 21, 2023		Soil	M23-JI0055845		X	X
32	BH11_1.5-1.6	Jul 21, 2023		Soil	M23-JI0055846		X	X
33	MW02_0.12-0.32	Jul 21, 2023		Soil	M23-JI0055847		X	X
34	MW02_2.2-2.3	Jul 21, 2023		Soil	M23-JI0055848		X	X
35	BH10_0.12-0.3	Jul 21, 2023		Soil	M23-JI0055849		X	X

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Eurofins Analytical Services Manager : Amy Meunier

Sample Detail						HOLD	Moisture Set	Per- and Polyfluoralkyl Substances (PFASs)
Melbourne Laboratory - NATA # 1261 Site # 1254						X	X	X
36	BH10_1.0-1.1	Jul 21, 2023		Soil	M23-JI0055850		X	X
37	MW03_0.12-0.22	Jul 21, 2023		Soil	M23-JI0055851		X	X
38	MW03_3.4-3.5	Jul 21, 2023		Soil	M23-JI0055852		X	X
39	SS01	Jul 21, 2023		Soil	M23-JI0055853		X	X
40	SS02	Jul 21, 2023		Soil	M23-JI0055854		X	X
41	FD04	Jul 21, 2023		Soil	M23-JI0055855		X	X
42	FD05	Jul 21, 2023		Soil	M23-JI0055856		X	X
43	RB02	Jul 21, 2023		Water	M23-JI0055857			X
44	BH01_0.4-0.5	Jul 19, 2023		Soil	M23-JI0055858	X		
45	BH01_0.85-0.95	Jul 19, 2023		Soil	M23-JI0055859	X		
46	BH01_1.2-1.3	Jul 19, 2023		Soil	M23-JI0055860	X		
47	BH01_1.7-1.8	Jul 19, 2023		Soil	M23-JI0055861	X		
48	BH01_2.2-2.3	Jul 19, 2023		Soil	M23-JI0055862	X		
49	BH01_2.65-2.75	Jul 19, 2023		Soil	M23-JI0055863	X		

Company Name: GHD Pty Ltd SA
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Project Name: MFS Christie Downs DSI
Project ID: 12612725

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Received: Jul 25, 2023 9:24 PM
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Priority: 5 Day
Contact Name: - ALL SRAs/COCs/Reports

Eurofins Analytical Services Manager : Amy Meunier

Sample Detail

HOLD

Moisture Set

Per- and Polyfluorinated Substances (PFASs)

Melbourne Laboratory - NATA # 1261 Site # 1254

						X	X	X
50	BH01_3.2-3.3	Jul 19, 2023		Soil	M23-JI0055864	X		
51	BH02_0-0.1	Jul 19, 2023		Soil	M23-JI0055865	X		
52	BH02_0.95-1.05	Jul 19, 2023		Soil	M23-JI0055866	X		
53	BH02_1.5-1.6	Jul 19, 2023		Soil	M23-JI0055867	X		
54	BH02_2.1-2.2	Jul 19, 2023		Soil	M23-JI0055868	X		
55	BH02_2.6-2.7	Jul 19, 2023		Soil	M23-JI0055869	X		
56	BH03_0.2-0.3	Jul 20, 2023		Soil	M23-JI0055870	X		
57	BH03_0.4-0.5	Jul 20, 2023		Soil	M23-JI0055871	X		
58	BH03_0.95-1.05	Jul 20, 2023		Soil	M23-JI0055872	X		
59	BH03_1.4-1.5	Jul 20, 2023		Soil	M23-JI0055873	X		
60	BH03_1.9-2.0	Jul 20, 2023		Soil	M23-JI0055874	X		
61	BH07_0.05-0.15	Jul 20, 2023		Soil	M23-JI0055875	X		
62	BH07_0.55-0.65	Jul 20, 2023		Soil	M23-JI0055876	X		

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

Project Name: MFS Christie Downs DSI
Project ID: 12612725

Order No.:
Report #: 1010934
Phone: 08 8111 6600
Fax: 08 8111 6699

Received: Jul 25, 2023 9:24 PM
Due: Aug 2, 2023
Priority: 5 Day
Contact Name: - ALL SRAs/COCs/Reports

Eurofins Analytical Services Manager : Amy Meunier

Sample Detail						HOLD	Moisture Set	Per- and Polyfluoroalkyl Substances (PFASs)
Melbourne Laboratory - NATA # 1261 Site # 1254						X	X	X
63	BH07_1.5-1.6	Jul 20, 2023		Soil	M23-JI0055877	X		
64	BH07_1.8-1.9	Jul 20, 2023		Soil	M23-JI0055878	X		
65	BH07_2.0-2.1	Jul 20, 2023		Soil	M23-JI0055879	X		
66	BH08_0.9-1.0	Jul 20, 2023		Soil	M23-JI0055880	X		
67	BH08_1.5-1.6	Jul 20, 2023		Soil	M23-JI0055881	X		
68	BH08_2.0-2.1	Jul 20, 2023		Soil	M23-JI0055882	X		
69	BH08_2.5-2.6	Jul 20, 2023		Soil	M23-JI0055883	X		
70	BH09_0.35-0.45	Jul 20, 2023		Soil	M23-JI0055884	X		
71	BH09_0.9-1.0	Jul 20, 2023		Soil	M23-JI0055885	X		
72	BH09_2.0-2.1	Jul 20, 2023		Soil	M23-JI0055886	X		
73	BH09_2.4-2.5	Jul 20, 2023		Soil	M23-JI0055887	X		
74	BH04_0-0.15	Jul 20, 2023		Soil	M23-JI0055888	X		
75	BH04_0.7-0.8	Jul 20, 2023		Soil	M23-JI0055889	X		
76	BH04_1.2-1.3	Jul 20, 2023		Soil	M23-JI0055890	X		
77	BH04_1.8-1.9	Jul 20, 2023		Soil	M23-JI0055891	X		

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Eurofins Analytical Services Manager : Amy Meunier

Sample Detail

HOLD

Moisture Set

Per- and Polyfluoroalkyl Substances (PFASs)

Melbourne Laboratory - NATA # 1261 Site # 1254

						X	X	X
78	BH05_0.2-0.3	Jul 20, 2023		Soil	M23-JI0055892	X		
79	BH05_0.9-1.0	Jul 20, 2023		Soil	M23-JI0055893	X		
80	BH05_1.5-1.6	Jul 20, 2023		Soil	M23-JI0055894	X		
81	BH06_0.4-0.5	Jul 20, 2023		Soil	M23-JI0055895	X		
82	BH06_0.9-1.0	Jul 20, 2023		Soil	M23-JI0055896	X		
83	BH06_2.0-2.2	Jul 20, 2023		Soil	M23-JI0055897	X		
84	MW01_0.2-0.3	Jul 21, 2023		Soil	M23-JI0055898	X		
85	MW01_0.4-0.5	Jul 21, 2023		Soil	M23-JI0055899	X		
86	MW01_0.9-1.0	Jul 21, 2023		Soil	M23-JI0055900	X		
87	MW01_1.5-1.6	Jul 21, 2023		Soil	M23-JI0055901	X		
88	MW01_1.9-2.0	Jul 21, 2023		Soil	M23-JI0055902	X		
89	BH11_0.5-0.7	Jul 21, 2023		Soil	M23-JI0055903	X		
90	BH11_0.95-1.05	Jul 21, 2023		Soil	M23-JI0055904	X		
91	BH11_2.1-2.3	Jul 21, 2023		Soil	M23-JI0055905	X		
92	BH11_2.7-2.8	Jul 21, 2023		Soil	M23-JI0055906	X		

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Eurofins Analytical Services Manager : Amy Meunier

Sample Detail						HOLD	Moisture Set	Per- and Polyfluoroalkyl Substances (PFASs)
Melbourne Laboratory - NATA # 1261 Site # 1254						X	X	X
93	BH11_2.8-2.9	Jul 21, 2023		Soil	M23-JI0055907	X		
94	BH11_CONCR ETE	Jul 21, 2023		Soil	M23-JI0055908	X		
95	MW02_0.32-0.4	Jul 21, 2023		Soil	M23-JI0055909	X		
96	MW02_0.9-1.0	Jul 21, 2023		Soil	M23-JI0055910	X		
97	MW02_1.3-1.4	Jul 21, 2023		Soil	M23-JI0055911	X		
98	MW02_1.6-1.7	Jul 21, 2023		Soil	M23-JI0055912	X		
99	MW02_3.3-3.5	Jul 21, 2023		Soil	M23-JI0055913	X		
100	BH10_0.4-0.5	Jul 21, 2023		Soil	M23-JI0055914	X		
101	BH10_0.65-0.75	Jul 21, 2023		Soil	M23-JI0055915	X		
102	BH10_2.1-2.3	Jul 21, 2023		Soil	M23-JI0055916	X		
103	BH10_2.3-2.4	Jul 21, 2023		Soil	M23-JI0055917	X		
104	MW03_0.3-0.4	Jul 21, 2023		Soil	M23-JI0055918	X		
105	MW03_0.65-0.75	Jul 21, 2023		Soil	M23-JI0055919	X		

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Sample Detail						HOLD	Moisture Set	Per- and Polyfluoroalkyl Substances (PFASs)
Melbourne Laboratory - NATA # 1261 Site # 1254						X	X	X
106	MW03_0.9-1.0	Jul 21, 2023		Soil	M23-JI0055920	X		
107	MW03_1.3-1.4	Jul 21, 2023		Soil	M23-JI0055921	X		
108	MW03_2.2-2.3	Jul 21, 2023		Soil	M23-JI0055922	X		
109	MW03_3.0-3.1	Jul 21, 2023		Soil	M23-JI0055923	X		
Test Counts						66	41	43

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 (<i>bis</i> -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. SVOCs recoveries 20 – 150%

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 carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	ug/kg	< 5			5	Pass	
Perfluoropentanoic acid (PFPeA)	ug/kg	< 5			5	Pass	
Perfluorohexanoic acid (PFHxA)	ug/kg	< 5			5	Pass	
Perfluoroheptanoic acid (PFHpA)	ug/kg	< 5			5	Pass	
Perfluorooctanoic acid (PFOA)	ug/kg	< 5			5	Pass	
Perfluorononanoic acid (PFNA)	ug/kg	< 5			5	Pass	
Perfluorodecanoic acid (PFDA)	ug/kg	< 5			5	Pass	
Perfluoroundecanoic acid (PFUnDA)	ug/kg	< 5			5	Pass	
Perfluorododecanoic acid (PFDoDA)	ug/kg	< 5			5	Pass	
Perfluorotridecanoic acid (PFTTrDA)	ug/kg	< 5			5	Pass	
Perfluorotetradecanoic acid (PFTeDA)	ug/kg	< 5			5	Pass	
Method Blank							
Perfluoroalkyl sulfonamido substances							
Perfluorooctane sulfonamide (FOSA)	ug/kg	< 5			5	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	ug/kg	< 5			5	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	ug/kg	< 5			5	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	ug/kg	< 5			5	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	ug/kg	< 5			5	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	ug/kg	< 10			10	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	ug/kg	< 10			10	Pass	
Method Blank							
Perfluoroalkyl sulfonic acids (PFSA's)							
Perfluorobutanesulfonic acid (PFBS)	ug/kg	< 5			5	Pass	
Perfluorononanesulfonic acid (PFNS)	ug/kg	< 5			5	Pass	
Perfluoropropanesulfonic acid (PFPrS)	ug/kg	< 5			5	Pass	
Perfluoropentanesulfonic acid (PFPeS)	ug/kg	< 5			5	Pass	
Perfluorohexanesulfonic acid (PFHxS)	ug/kg	< 5			5	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	ug/kg	< 5			5	Pass	
Perfluorooctanesulfonic acid (PFOS)	ug/kg	< 5			5	Pass	
Perfluorodecanesulfonic acid (PFDS)	ug/kg	< 5			5	Pass	
Method Blank							
n:2 Fluorotelomer sulfonic acids (n:2 FTSA's)							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	ug/kg	< 5			5	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	ug/kg	< 10			10	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	ug/kg	< 5			5	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	ug/kg	< 5			5	Pass	
LCS - % Recovery							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	%	70			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	69			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	76			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	75			50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	76			50-150	Pass	
Perfluorononanoic acid (PFNA)	%	81			50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	76			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	%	78			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	%	74			50-150	Pass	
Perfluorotridecanoic acid (PFTTrDA)	%	59			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	68			50-150	Pass	

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
LCS - % Recovery									
Perfluoroalkyl sulfonamido substances									
Perfluorooctane sulfonamide (FOSA)			%	67			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)			%	75			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)			%	79			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)			%	77			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)			%	73			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)			%	75			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)			%	72			50-150	Pass	
LCS - % Recovery									
Perfluoroalkyl sulfonic acids (PFSA's)									
Perfluorobutanesulfonic acid (PFBS)			%	69			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)			%	72			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)			%	66			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)			%	62			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)			%	70			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)			%	79			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)			%	72			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)			%	75			50-150	Pass	
LCS - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSA's)									
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)			%	70			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)			%	75			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)			%	84			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)			%	66			50-150	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Perfluoroalkyl carboxylic acids (PFCAs)									
				Result 1					
Perfluorobutanoic acid (PFBA)	M23-JI0055824	CP	%	101			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	M23-JI0055824	CP	%	95			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	M23-JI0055824	CP	%	107			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	M23-JI0055824	CP	%	105			50-150	Pass	
Perfluorooctanoic acid (PFOA)	M23-JI0055824	CP	%	111			50-150	Pass	
Perfluorononanoic acid (PFNA)	M23-JI0055824	CP	%	110			50-150	Pass	
Perfluorodecanoic acid (PFDA)	M23-JI0055824	CP	%	111			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	M23-JI0055824	CP	%	111			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	M23-JI0055824	CP	%	103			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	M23-JI0055824	CP	%	86			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	M23-JI0055824	CP	%	93			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonamido substances									
				Result 1					
Perfluorooctane sulfonamide (FOSA)	M23-JI0055824	CP	%	95			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	M23-JI0055824	CP	%	110			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	M23-JI0055824	CP	%	104			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	M23-JI0055824	CP	%	112			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	M23-JI0055824	CP	%	100			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	M23-JI0055824	CP	%	109			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	M23-JI0055824	CP	%	105			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonic acids (PFSA's)				Result 1					
Perfluorobutanesulfonic acid (PFBS)	M23-JI0055824	CP	%	92			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	M23-JI0055824	CP	%	102			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	M23-JI0055824	CP	%	88			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	M23-JI0055824	CP	%	85			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	M23-JI0055824	CP	%	100			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	M23-JI0055824	CP	%	114			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	M23-JI0055824	CP	%	101			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	M23-JI0055824	CP	%	107			50-150	Pass	
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSA's)				Result 1					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	M23-JI0055824	CP	%	98			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	M23-JI0055824	CP	%	102			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	M23-JI0055824	CP	%	117			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	M23-JI0055824	CP	%	94			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1					
Perfluorobutanoic acid (PFBA)	M23-JI0055834	CP	%	101			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	M23-JI0055834	CP	%	100			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	M23-JI0055834	CP	%	105			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	M23-JI0055834	CP	%	105			50-150	Pass	
Perfluorooctanoic acid (PFOA)	M23-JI0055834	CP	%	109			50-150	Pass	
Perfluorononanoic acid (PFNA)	M23-JI0055834	CP	%	110			50-150	Pass	
Perfluorodecanoic acid (PFDA)	M23-JI0055834	CP	%	109			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	M23-JI0055834	CP	%	113			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	M23-JI0055834	CP	%	110			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	M23-JI0055834	CP	%	84			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	M23-JI0055834	CP	%	107			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonamido substances				Result 1					
Perfluorooctane sulfonamide (FOSA)	M23-JI0055834	CP	%	96			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	M23-JI0055834	CP	%	110			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	M23-JI0055834	CP	%	102			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	M23-JI0055834	CP	%	106			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	M23-JI0055834	CP	%	104			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	M23-JI0055834	CP	%	110			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	M23-JI0055834	CP	%	106			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonic acids (PFSA's)				Result 1					
Perfluorobutanesulfonic acid (PFBS)	M23-JI0055834	CP	%	91			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	M23-JI0055834	CP	%	102			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	M23-JI0055834	CP	%	91			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	M23-JI0055834	CP	%	85			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	M23-JI0055834	CP	%	95			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	M23-JI0055834	CP	%	114			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	M23-JI0055834	CP	%	100			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	M23-JI0055834	CP	%	106			50-150	Pass	
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSA's)				Result 1					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	M23-JI0055834	CP	%	100			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	M23-JI0055834	CP	%	104			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	M23-JI0055834	CP	%	116			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	M23-JI0055834	CP	%	98			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl carboxylic acids (PFCA's)				Result 1					
Perfluorobutanoic acid (PFBA)	M23-JI0055845	CP	%	100			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	M23-JI0055845	CP	%	91			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	M23-JI0055845	CP	%	108			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	M23-JI0055845	CP	%	103			50-150	Pass	
Perfluorooctanoic acid (PFOA)	M23-JI0055845	CP	%	105			50-150	Pass	
Perfluorononanoic acid (PFNA)	M23-JI0055845	CP	%	106			50-150	Pass	
Perfluorodecanoic acid (PFDA)	M23-JI0055845	CP	%	107			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	M23-JI0055845	CP	%	110			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	M23-JI0055845	CP	%	102			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	M23-JI0055845	CP	%	93			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	M23-JI0055845	CP	%	103			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonamido substances				Result 1					
Perfluorooctane sulfonamide (FOSA)	M23-JI0055845	CP	%	95			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	M23-JI0055845	CP	%	100			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	M23-JI0055845	CP	%	102			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	M23-JI0055845	CP	%	110			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	M23-JI0055845	CP	%	97			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	M23-JI0055845	CP	%	104			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	M23-JI0055845	CP	%	101			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1					
Perfluorobutanesulfonic acid (PFBS)	M23-JI0055845	CP	%	89			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	M23-JI0055845	CP	%	101			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	M23-JI0055845	CP	%	85			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	M23-JI0055845	CP	%	81			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	M23-JI0055845	CP	%	96			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	M23-JI0055845	CP	%	108			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	M23-JI0055845	CP	%	107			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	M23-JI0055845	CP	%	100			50-150	Pass	
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSA)				Result 1					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	M23-JI0055845	CP	%	96			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	M23-JI0055845	CP	%	111			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	M23-JI0055845	CP	%	108			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	M23-JI0055845	CP	%	96			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1					
Perfluorobutanoic acid (PFBA)	M23-JI0055856	CP	%	106			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	M23-JI0055856	CP	%	110			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	M23-JI0055856	CP	%	112			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	M23-JI0055856	CP	%	114			50-150	Pass	
Perfluorooctanoic acid (PFOA)	M23-JI0055856	CP	%	114			50-150	Pass	
Perfluorononanoic acid (PFNA)	M23-JI0055856	CP	%	109			50-150	Pass	
Perfluorodecanoic acid (PFDA)	M23-JI0055856	CP	%	112			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	M23-JI0055856	CP	%	80			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	M23-JI0055856	CP	%	118			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	M23-JI0055856	CP	%	122			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonamido substances				Result 1					

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Perfluorooctane sulfonamide (FOSA)	M23-JI0055856	CP	%	97			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	M23-JI0055856	CP	%	109			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	M23-JI0055856	CP	%	107			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	M23-JI0055856	CP	%	113			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	M23-JI0055856	CP	%	102			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	M23-JI0055856	CP	%	115			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	M23-JI0055856	CP	%	110			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonic acids (PFSA's)				Result 1					
Perfluorobutanesulfonic acid (PFBS)	M23-JI0055856	CP	%	97			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	M23-JI0055856	CP	%	99			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	M23-JI0055856	CP	%	92			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	M23-JI0055856	CP	%	92			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	M23-JI0055856	CP	%	86			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	M23-JI0055856	CP	%	117			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	M23-JI0055856	CP	%	99			50-150	Pass	
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSA's)				Result 1					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	M23-JI0055856	CP	%	108			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	M23-JI0055856	CP	%	117			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	M23-JI0055856	CP	%	116			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	M23-JI0055856	CP	%	109			50-150	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Sample Properties				Result 1	Result 2	RPD			
% Moisture	M23-JI0055815	CP	%	5.0	5.7	14	30%	Pass	
Duplicate									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1	Result 2	RPD			
Perfluorobutanoic acid (PFBA)	M23-JI0055823	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	M23-JI0055823	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorohexanoic acid (PFHxA)	M23-JI0055823	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	M23-JI0055823	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	M23-JI0055823	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorononanoic acid (PFNA)	M23-JI0055823	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorodecanoic acid (PFDA)	M23-JI0055823	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnDA)	M23-JI0055823	CP	ug/kg	< 5	< 5	<1	30%	Pass	

Duplicate								
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1	Result 2	RPD		
Perfluorododecanoic acid (PFDoDA)	M23-JI0055823	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluorotridecanoic acid (PFTrDA)	M23-JI0055823	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluorotetradecanoic acid (PFTeDA)	M23-JI0055823	CP	ug/kg	< 5	< 5	<1	30%	Pass
Duplicate								
Perfluoroalkyl sulfonamido substances				Result 1	Result 2	RPD		
Perfluorooctane sulfonamide (FOSA)	M23-JI0055823	CP	ug/kg	< 5	< 5	<1	30%	Pass
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	M23-JI0055823	CP	ug/kg	< 5	< 5	<1	30%	Pass
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	M23-JI0055823	CP	ug/kg	< 5	< 5	<1	30%	Pass
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	M23-JI0055823	CP	ug/kg	< 5	< 5	<1	30%	Pass
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	M23-JI0055823	CP	ug/kg	< 5	< 5	<1	30%	Pass
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	M23-JI0055823	CP	ug/kg	< 10	< 10	<1	30%	Pass
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	M23-JI0055823	CP	ug/kg	< 10	< 10	<1	30%	Pass
Duplicate								
Perfluoroalkyl sulfonic acids (PFSA's)				Result 1	Result 2	RPD		
Perfluorobutanesulfonic acid (PFBS)	M23-JI0055823	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluorononanesulfonic acid (PFNS)	M23-JI0055823	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluoropropanesulfonic acid (PFPrS)	M23-JI0055823	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluoropentanesulfonic acid (PFPeS)	M23-JI0055823	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluorohexanesulfonic acid (PFHxS)	M23-JI0055823	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluoroheptanesulfonic acid (PFHpS)	M23-JI0055823	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluorooctanesulfonic acid (PFOS)	M23-JI0055823	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluorodecanesulfonic acid (PFDS)	M23-JI0055823	CP	ug/kg	< 5	< 5	<1	30%	Pass
Duplicate								
n:2 Fluorotelomer sulfonic acids (n:2 FTSA's)				Result 1	Result 2	RPD		
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	M23-JI0055823	CP	ug/kg	< 5	< 5	<1	30%	Pass
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	M23-JI0055823	CP	ug/kg	< 10	< 10	<1	30%	Pass
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	M23-JI0055823	CP	ug/kg	< 5	< 5	<1	30%	Pass
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	M23-JI0055823	CP	ug/kg	< 5	< 5	<1	30%	Pass
Duplicate								
Sample Properties				Result 1	Result 2	RPD		
% Moisture	M23-JI0055825	CP	%	< 1	< 1	<1	30%	Pass

Duplicate								
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1	Result 2	RPD		
Perfluorobutanoic acid (PFBA)	M23-JI0055833	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluoropentanoic acid (PFPeA)	M23-JI0055833	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluorohexanoic acid (PFHxA)	M23-JI0055833	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluoroheptanoic acid (PFHpA)	M23-JI0055833	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluorooctanoic acid (PFOA)	M23-JI0055833	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluorononanoic acid (PFNA)	M23-JI0055833	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluorodecanoic acid (PFDA)	M23-JI0055833	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluoroundecanoic acid (PFUnDA)	M23-JI0055833	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluorododecanoic acid (PFDoDA)	M23-JI0055833	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluorotridecanoic acid (PFTrDA)	M23-JI0055833	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluorotetradecanoic acid (PFTeDA)	M23-JI0055833	CP	ug/kg	< 5	< 5	<1	30%	Pass
Duplicate								
Perfluoroalkyl sulfonamido substances				Result 1	Result 2	RPD		
Perfluorooctane sulfonamide (FOSA)	M23-JI0055833	CP	ug/kg	< 5	< 5	<1	30%	Pass
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	M23-JI0055833	CP	ug/kg	< 5	< 5	<1	30%	Pass
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	M23-JI0055833	CP	ug/kg	< 5	< 5	<1	30%	Pass
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	M23-JI0055833	CP	ug/kg	< 5	< 5	<1	30%	Pass
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	M23-JI0055833	CP	ug/kg	< 5	< 5	<1	30%	Pass
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	M23-JI0055833	CP	ug/kg	< 10	< 10	<1	30%	Pass
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	M23-JI0055833	CP	ug/kg	< 10	< 10	<1	30%	Pass
Duplicate								
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1	Result 2	RPD		
Perfluorobutanesulfonic acid (PFBS)	M23-JI0055833	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluorononanesulfonic acid (PFNS)	M23-JI0055833	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluoropropanesulfonic acid (PFPrS)	M23-JI0055833	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluoropentanesulfonic acid (PFPeS)	M23-JI0055833	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluorohexanesulfonic acid (PFHxS)	M23-JI0055833	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluoroheptanesulfonic acid (PFHpS)	M23-JI0055833	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluorooctanesulfonic acid (PFOS)	M23-JI0055833	CP	ug/kg	9.9	13	26	30%	Pass
Perfluorodecanesulfonic acid (PFDS)	M23-JI0055833	CP	ug/kg	< 5	< 5	<1	30%	Pass
Duplicate								
n:2 Fluorotelomer sulfonic acids (n:2 FTSA)				Result 1	Result 2	RPD		
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	M23-JI0055833	CP	ug/kg	< 5	< 5	<1	30%	Pass
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	M23-JI0055833	CP	ug/kg	< 10	< 10	<1	30%	Pass
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	M23-JI0055833	CP	ug/kg	< 5	< 5	<1	30%	Pass
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	M23-JI0055833	CP	ug/kg	< 5	< 5	<1	30%	Pass

Duplicate								
Sample Properties				Result 1	Result 2	RPD		
% Moisture	M23-JI0055835	CP	%	2.2	2.1	3.1	30%	Pass
Duplicate								
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1	Result 2	RPD		
Perfluorobutanoic acid (PFBA)	M23-JI0055843	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluoropentanoic acid (PFPeA)	M23-JI0055843	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluorohexanoic acid (PFHxA)	M23-JI0055843	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluoroheptanoic acid (PFHpA)	M23-JI0055843	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluorooctanoic acid (PFOA)	M23-JI0055843	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluorononanoic acid (PFNA)	M23-JI0055843	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluorodecanoic acid (PFDA)	M23-JI0055843	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluoroundecanoic acid (PFUnDA)	M23-JI0055843	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluorododecanoic acid (PFDoDA)	M23-JI0055843	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluorotridecanoic acid (PFTrDA)	M23-JI0055843	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluorotetradecanoic acid (PFTeDA)	M23-JI0055843	CP	ug/kg	< 5	< 5	<1	30%	Pass
Duplicate								
Perfluoroalkyl sulfonamido substances				Result 1	Result 2	RPD		
Perfluorooctane sulfonamide (FOSA)	M23-JI0055843	CP	ug/kg	< 5	< 5	<1	30%	Pass
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	M23-JI0055843	CP	ug/kg	< 5	< 5	<1	30%	Pass
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	M23-JI0055843	CP	ug/kg	< 5	< 5	<1	30%	Pass
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	M23-JI0055843	CP	ug/kg	< 5	< 5	<1	30%	Pass
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	M23-JI0055843	CP	ug/kg	< 5	< 5	<1	30%	Pass
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	M23-JI0055843	CP	ug/kg	< 10	< 10	<1	30%	Pass
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	M23-JI0055843	CP	ug/kg	< 10	< 10	<1	30%	Pass
Duplicate								
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1	Result 2	RPD		
Perfluorobutanesulfonic acid (PFBS)	M23-JI0055843	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluorononanesulfonic acid (PFNS)	M23-JI0055843	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluoropropanesulfonic acid (PFPrS)	M23-JI0055843	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluoropentanesulfonic acid (PFPeS)	M23-JI0055843	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluorohexanesulfonic acid (PFHxS)	M23-JI0055843	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluoroheptanesulfonic acid (PFHpS)	M23-JI0055843	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluorooctanesulfonic acid (PFOS)	M23-JI0055843	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluorodecanesulfonic acid (PFDS)	M23-JI0055843	CP	ug/kg	< 5	< 5	<1	30%	Pass

Duplicate								
n:2 Fluorotelomer sulfonic acids (n:2 FTSA)				Result 1	Result 2	RPD		
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	M23-JI0055843	CP	ug/kg	< 5	< 5	<1	30%	Pass
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	M23-JI0055843	CP	ug/kg	< 10	< 10	<1	30%	Pass
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	M23-JI0055843	CP	ug/kg	< 5	< 5	<1	30%	Pass
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	M23-JI0055843	CP	ug/kg	< 5	< 5	<1	30%	Pass
Duplicate								
Sample Properties				Result 1	Result 2	RPD		
% Moisture	M23-JI0055847	CP	%	2.7	3.1	12	30%	Pass
Duplicate								
Perfluoroalkyl carboxylic acids (PFCA)				Result 1	Result 2	RPD		
Perfluorobutanoic acid (PFBA)	M23-JI0055855	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluoropentanoic acid (PFPeA)	M23-JI0055855	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluorohexanoic acid (PFHxA)	M23-JI0055855	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluoroheptanoic acid (PFHpA)	M23-JI0055855	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluorooctanoic acid (PFOA)	M23-JI0055855	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluorononanoic acid (PFNA)	M23-JI0055855	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluorodecanoic acid (PFDA)	M23-JI0055855	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluoroundecanoic acid (PFUnDA)	M23-JI0055855	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluorododecanoic acid (PFDoDA)	M23-JI0055855	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluorotridecanoic acid (PFTrDA)	M23-JI0055855	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluorotetradecanoic acid (PFTeDA)	M23-JI0055855	CP	ug/kg	< 5	< 5	<1	30%	Pass
Duplicate								
Perfluoroalkyl sulfonamido substances				Result 1	Result 2	RPD		
Perfluorooctane sulfonamide (FOSA)	M23-JI0055855	CP	ug/kg	< 5	< 5	<1	30%	Pass
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	M23-JI0055855	CP	ug/kg	< 5	< 5	<1	30%	Pass
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	M23-JI0055855	CP	ug/kg	< 5	< 5	<1	30%	Pass
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	M23-JI0055855	CP	ug/kg	< 5	< 5	<1	30%	Pass
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	M23-JI0055855	CP	ug/kg	< 5	< 5	<1	30%	Pass
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	M23-JI0055855	CP	ug/kg	< 10	< 10	<1	30%	Pass
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	M23-JI0055855	CP	ug/kg	< 10	< 10	<1	30%	Pass
Duplicate								
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1	Result 2	RPD		
Perfluorobutanesulfonic acid (PFBS)	M23-JI0055855	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluorononanesulfonic acid (PFNS)	M23-JI0055855	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluoropropanesulfonic acid (PFPrS)	M23-JI0055855	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluoropentanesulfonic acid (PFPeS)	M23-JI0055855	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluorohexanesulfonic acid (PFHxS)	M23-JI0055855	CP	ug/kg	7.9	7.8	<1	30%	Pass

Duplicate								
Perfluoroalkyl sulfonic acids (PFSA's)				Result 1	Result 2	RPD		
Perfluoroheptanesulfonic acid (PFHpS)	M23-JI0055855	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluorooctanesulfonic acid (PFOS)	M23-JI0055855	CP	ug/kg	57	58	<1	30%	Pass
Perfluorodecanesulfonic acid (PFDS)	M23-JI0055855	CP	ug/kg	< 5	< 5	<1	30%	Pass
Duplicate								
n:2 Fluorotelomer sulfonic acids (n:2 FTSA's)				Result 1	Result 2	RPD		
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	M23-JI0055855	CP	ug/kg	< 5	< 5	<1	30%	Pass
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	M23-JI0055855	CP	ug/kg	< 10	< 10	<1	30%	Pass
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	M23-JI0055855	CP	ug/kg	< 5	< 5	<1	30%	Pass
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	M23-JI0055855	CP	ug/kg	< 5	< 5	<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:

Callum McEwan	Analytical Services Manager
Edward Lee	Senior Analyst-PFAS
Joseph Edouard	Senior Analyst-PFAS



Glenn Jackson
Managing Director

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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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: - ALL SRAs/COCs/Reports

Report 1010934-W
Project name MFS Christie Downs DSI
Project ID 12612725
Received Date Jul 25, 2023

Client Sample ID			RB01	RB02
Sample Matrix			Water	Water
Eurofins Sample No.			M23-JI0055842	M23-JI0055857
Date Sampled			Jul 20, 2023	Jul 21, 2023
Test/Reference	LOR	Unit		
Perfluoroalkyl carboxylic acids (PFCAs)				
Perfluorobutanoic acid (PFBA) ^{N11}	0.05	ug/L	< 0.05	< 0.05
Perfluoropentanoic acid (PFPeA) ^{N11}	0.01	ug/L	< 0.01	< 0.01
Perfluorohexanoic acid (PFHxA) ^{N11}	0.01	ug/L	< 0.01	< 0.01
Perfluoroheptanoic acid (PFHpA) ^{N11}	0.01	ug/L	< 0.01	< 0.01
Perfluorooctanoic acid (PFOA) ^{N11}	0.01	ug/L	< 0.01	< 0.01
Perfluorononanoic acid (PFNA) ^{N11}	0.01	ug/L	< 0.01	< 0.01
Perfluorodecanoic acid (PFDA) ^{N11}	0.01	ug/L	< 0.01	< 0.01
Perfluoroundecanoic acid (PFUnDA) ^{N11}	0.01	ug/L	< 0.01	< 0.01
Perfluorododecanoic acid (PFDoDA) ^{N11}	0.01	ug/L	< 0.01	< 0.01
Perfluorotridecanoic acid (PFTrDA) ^{N15}	0.01	ug/L	< 0.01	< 0.01
Perfluorotetradecanoic acid (PFTeDA) ^{N11}	0.01	ug/L	< 0.01	< 0.01
13C4-PFBA (surr.)	1	%	99	101
13C5-PFPeA (surr.)	1	%	114	119
13C5-PFHxA (surr.)	1	%	121	126
13C4-PFHpA (surr.)	1	%	108	114
13C8-PFOA (surr.)	1	%	105	112
13C5-PFNA (surr.)	1	%	104	112
13C6-PFDA (surr.)	1	%	110	106
13C2-PFUnDA (surr.)	1	%	93	89
13C2-PFDoDA (surr.)	1	%	99	76
13C2-PFTeDA (surr.)	1	%	90	65
Perfluoroalkyl sulfonamido substances				
Perfluorooctane sulfonamide (FOSA) ^{N11}	0.05	ug/L	< 0.05	< 0.05
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA) ^{N11}	0.05	ug/L	< 0.05	< 0.05
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA) ^{N11}	0.05	ug/L	< 0.05	< 0.05
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE) ^{N11}	0.05	ug/L	< 0.05	< 0.05
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE) ^{N11}	0.05	ug/L	< 0.05	< 0.05
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA) ^{N11}	0.05	ug/L	< 0.05	< 0.05
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA) ^{N11}	0.05	ug/L	< 0.05	< 0.05
13C8-FOSA (surr.)	1	%	96	116
D3-N-MeFOSA (surr.)	1	%	10	64
D5-N-EtFOSA (surr.)	1	%	10	63

Client Sample ID			RB01	RB02
Sample Matrix			Water	Water
Eurofins Sample No.			M23-JI0055842	M23-JI0055857
Date Sampled			Jul 20, 2023	Jul 21, 2023
Test/Reference	LOR	Unit		
Perfluoroalkyl sulfonamido substances				
D7-N-MeFOSE (surr.)	1	%	50	90
D9-N-EtFOSE (surr.)	1	%	45	98
D5-N-EtFOSAA (surr.)	1	%	120	76
D3-N-MeFOSAA (surr.)	1	%	118	86
Perfluoroalkyl sulfonic acids (PFSA's)				
Perfluorobutanesulfonic acid (PFBS) ^{N11}	0.01	ug/L	< 0.01	< 0.01
Perfluorononanesulfonic acid (PFNS) ^{N15}	0.01	ug/L	< 0.01	< 0.01
Perfluoropropanesulfonic acid (PFPrS) ^{N15}	0.01	ug/L	< 0.01	< 0.01
Perfluoropentanesulfonic acid (PFPeS) ^{N15}	0.01	ug/L	< 0.01	< 0.01
Perfluorohexanesulfonic acid (PFHxS) ^{N11}	0.01	ug/L	< 0.01	< 0.01
Perfluoroheptanesulfonic acid (PFHpS) ^{N15}	0.01	ug/L	< 0.01	< 0.01
Perfluorooctanesulfonic acid (PFOS) ^{N11}	0.01	ug/L	< 0.01	< 0.01
Perfluorodecanesulfonic acid (PFDS) ^{N15}	0.01	ug/L	< 0.01	< 0.01
13C3-PFBS (surr.)	1	%	113	111
18O2-PFHxS (surr.)	1	%	106	108
13C8-PFOS (surr.)	1	%	86	93
n:2 Fluorotelomer sulfonic acids (n:2 FTSA's)				
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA) ^{N11}	0.01	ug/L	< 0.01	< 0.01
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA) ^{N11}	0.05	ug/L	< 0.05	< 0.05
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA) ^{N11}	0.01	ug/L	< 0.01	< 0.01
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA) ^{N11}	0.01	ug/L	< 0.01	< 0.01
13C2-4:2 FTSA (surr.)	1	%	86	114
13C2-6:2 FTSA (surr.)	1	%	55	81
13C2-8:2 FTSA (surr.)	1	%	86	92
13C2-10:2 FTSA (surr.)	1	%	118	76
PFASs Summations				
Sum (PFHxS + PFOS)*	0.01	ug/L	< 0.01	< 0.01
Sum of US EPA PFAS (PFOS + PFOA)*	0.01	ug/L	< 0.01	< 0.01
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.01	ug/L	< 0.01	< 0.01
Sum of WA DWER PFAS (n=10)*	0.05	ug/L	< 0.05	< 0.05
Sum of PFASs (n=30)*	0.1	ug/L	< 0.1	< 0.1

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)			
Perfluoroalkyl carboxylic acids (PFCAs)	Melbourne	Jul 26, 2023	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonamido substances	Melbourne	Jul 26, 2023	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonic acids (PFASs)	Melbourne	Jul 26, 2023	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)	Melbourne	Jul 26, 2023	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
PFASs Summations	Melbourne	Jul 26, 2023	
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			

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

Project Name: MFS Christie Downs DSI
Project ID: 12612725

Order No.:
Report #: 1010934
Phone: 08 8111 6600
Fax: 08 8111 6699

Received: Jul 25, 2023 9:24 PM
Due: Aug 2, 2023
Priority: 5 Day
Contact Name: - ALL SRAs/COCs/Reports

Eurofins Analytical Services Manager : Amy Meunier

Sample Detail						HOLD	Moisture Set	Per- and Polyfluorinated Substances (PFASs)
Melbourne Laboratory - NATA # 1261 Site # 1254						X	X	X
External Laboratory								
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID			
1	BH01_0-0.13	Jul 19, 2023		Soil	M23-JI0055815		X	X
2	BH01_3.4-3.5	Jul 19, 2023		Soil	M23-JI0055816		X	X
3	BH02_0.35-0.45	Jul 19, 2023		Soil	M23-JI0055817		X	X
4	BH02_2.7-2.8	Jul 19, 2023		Soil	M23-JI0055818		X	X
5	BH03_0.04-0.14	Jul 20, 2023		Soil	M23-JI0055819		X	X
6	BH03_2.1-2.2	Jul 20, 2023		Soil	M23-JI0055820		X	X
7	BH03_BITUM EN	Jul 20, 2023		Soil	M23-JI0055821		X	X
8	BH07_1.0-1.1	Jul 20, 2023		Soil	M23-JI0055822		X	X
9	BH07_2.6-2.7	Jul 20, 2023		Soil	M23-JI0055823		X	X
10	BH07_BITUM EN	Jul 20, 2023		Soil	M23-JI0055824		X	X

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Sample Detail						HOLD	Moisture Set	Per- and Polyfluoralkyl Substances (PFASs)
Melbourne Laboratory - NATA # 1261 Site # 1254						X	X	X
11	BH08_0.05-0.15	Jul 20, 2023		Soil	M23-JI0055825		X	X
12	BH08_0.35-0.45	Jul 20, 2023		Soil	M23-JI0055826		X	X
13	BH08_3.2-3.3	Jul 20, 2023		Soil	M23-JI0055827		X	X
14	BH08_BITUMEN	Jul 20, 2023		Soil	M23-JI0055828		X	X
15	BH09_0-0.15	Jul 20, 2023		Soil	M23-JI0055829		X	X
16	BH09_3.4-3.5	Jul 20, 2023		Soil	M23-JI0055830		X	X
17	BH04_0.4-0.5	Jul 20, 2023		Soil	M23-JI0055831		X	X
18	BH04_2.1-2.2	Jul 20, 2023		Soil	M23-JI0055832		X	X
19	BH05_0.12-0.2	Jul 20, 2023		Soil	M23-JI0055833		X	X
20	BH05_1.8-1.9	Jul 20, 2023		Soil	M23-JI0055834		X	X
21	BH05_CONCRETE	Jul 20, 2023		Soil	M23-JI0055835		X	X
22	BH06_0.15-0.35	Jul 20, 2023		Soil	M23-JI0055836		X	X

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Sample Detail						HOLD	Moisture Set	Per- and Polyfluoralkyl Substances (PFASs)
Melbourne Laboratory - NATA # 1261 Site # 1254						X	X	X
23	BH06_2.4-2.5	Jul 20, 2023		Soil	M23-JI0055837		X	X
24	BH06_CONCR ETE	Jul 20, 2023		Soil	M23-JI0055838		X	X
25	FD01	Jul 20, 2023		Soil	M23-JI0055839		X	X
26	FD02	Jul 20, 2023		Soil	M23-JI0055840		X	X
27	FD03	Jul 20, 2023		Soil	M23-JI0055841		X	X
28	RB01	Jul 20, 2023		Water	M23-JI0055842			X
29	MW01_0.05-0.15	Jul 21, 2023		Soil	M23-JI0055843		X	X
30	MW01_2.0-2.1	Jul 21, 2023		Soil	M23-JI0055844		X	X
31	BH11_0.12-0.22	Jul 21, 2023		Soil	M23-JI0055845		X	X
32	BH11_1.5-1.6	Jul 21, 2023		Soil	M23-JI0055846		X	X
33	MW02_0.12-0.32	Jul 21, 2023		Soil	M23-JI0055847		X	X
34	MW02_2.2-2.3	Jul 21, 2023		Soil	M23-JI0055848		X	X
35	BH10_0.12-0.3	Jul 21, 2023		Soil	M23-JI0055849		X	X

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Contact Name: - ALL SRAs/COCs/Reports

Eurofins Analytical Services Manager : Amy Meunier

Sample Detail						HOLD	Moisture Set	Per- and Polyfluoralkyl Substances (PFASs)
Melbourne Laboratory - NATA # 1261 Site # 1254						X	X	X
36	BH10_1.0-1.1	Jul 21, 2023		Soil	M23-JI0055850		X	X
37	MW03_0.12-0.22	Jul 21, 2023		Soil	M23-JI0055851		X	X
38	MW03_3.4-3.5	Jul 21, 2023		Soil	M23-JI0055852		X	X
39	SS01	Jul 21, 2023		Soil	M23-JI0055853		X	X
40	SS02	Jul 21, 2023		Soil	M23-JI0055854		X	X
41	FD04	Jul 21, 2023		Soil	M23-JI0055855		X	X
42	FD05	Jul 21, 2023		Soil	M23-JI0055856		X	X
43	RB02	Jul 21, 2023		Water	M23-JI0055857			X
44	BH01_0.4-0.5	Jul 19, 2023		Soil	M23-JI0055858	X		
45	BH01_0.85-0.95	Jul 19, 2023		Soil	M23-JI0055859	X		
46	BH01_1.2-1.3	Jul 19, 2023		Soil	M23-JI0055860	X		
47	BH01_1.7-1.8	Jul 19, 2023		Soil	M23-JI0055861	X		
48	BH01_2.2-2.3	Jul 19, 2023		Soil	M23-JI0055862	X		
49	BH01_2.65-2.75	Jul 19, 2023		Soil	M23-JI0055863	X		

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Eurofins Analytical Services Manager : Amy Meunier

Sample Detail						HOLD	Moisture Set	Per- and Polyfluorinated Substances (PFASs)
Melbourne Laboratory - NATA # 1261 Site # 1254						X	X	X
50	BH01_3.2-3.3	Jul 19, 2023		Soil	M23-JI0055864	X		
51	BH02_0-0.1	Jul 19, 2023		Soil	M23-JI0055865	X		
52	BH02_0.95-1.05	Jul 19, 2023		Soil	M23-JI0055866	X		
53	BH02_1.5-1.6	Jul 19, 2023		Soil	M23-JI0055867	X		
54	BH02_2.1-2.2	Jul 19, 2023		Soil	M23-JI0055868	X		
55	BH02_2.6-2.7	Jul 19, 2023		Soil	M23-JI0055869	X		
56	BH03_0.2-0.3	Jul 20, 2023		Soil	M23-JI0055870	X		
57	BH03_0.4-0.5	Jul 20, 2023		Soil	M23-JI0055871	X		
58	BH03_0.95-1.05	Jul 20, 2023		Soil	M23-JI0055872	X		
59	BH03_1.4-1.5	Jul 20, 2023		Soil	M23-JI0055873	X		
60	BH03_1.9-2.0	Jul 20, 2023		Soil	M23-JI0055874	X		
61	BH07_0.05-0.15	Jul 20, 2023		Soil	M23-JI0055875	X		
62	BH07_0.55-0.65	Jul 20, 2023		Soil	M23-JI0055876	X		

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

Project Name: MFS Christie Downs DSI
Project ID: 12612725

Order No.:
Report #: 1010934
Phone: 08 8111 6600
Fax: 08 8111 6699

Received: Jul 25, 2023 9:24 PM
Due: Aug 2, 2023
Priority: 5 Day
Contact Name: - ALL SRAs/COCs/Reports

Eurofins Analytical Services Manager : Amy Meunier

Sample Detail						HOLD	Moisture Set	Per- and Polyfluoroalkyl Substances (PFASs)
Melbourne Laboratory - NATA # 1261 Site # 1254						X	X	X
63	BH07_1.5-1.6	Jul 20, 2023		Soil	M23-JI0055877	X		
64	BH07_1.8-1.9	Jul 20, 2023		Soil	M23-JI0055878	X		
65	BH07_2.0-2.1	Jul 20, 2023		Soil	M23-JI0055879	X		
66	BH08_0.9-1.0	Jul 20, 2023		Soil	M23-JI0055880	X		
67	BH08_1.5-1.6	Jul 20, 2023		Soil	M23-JI0055881	X		
68	BH08_2.0-2.1	Jul 20, 2023		Soil	M23-JI0055882	X		
69	BH08_2.5-2.6	Jul 20, 2023		Soil	M23-JI0055883	X		
70	BH09_0.35-0.45	Jul 20, 2023		Soil	M23-JI0055884	X		
71	BH09_0.9-1.0	Jul 20, 2023		Soil	M23-JI0055885	X		
72	BH09_2.0-2.1	Jul 20, 2023		Soil	M23-JI0055886	X		
73	BH09_2.4-2.5	Jul 20, 2023		Soil	M23-JI0055887	X		
74	BH04_0-0.15	Jul 20, 2023		Soil	M23-JI0055888	X		
75	BH04_0.7-0.8	Jul 20, 2023		Soil	M23-JI0055889	X		
76	BH04_1.2-1.3	Jul 20, 2023		Soil	M23-JI0055890	X		
77	BH04_1.8-1.9	Jul 20, 2023		Soil	M23-JI0055891	X		

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Sample Detail

HOLD

Moisture Set

Per- and Polyfluoroalkyl Substances (PFASs)

Melbourne Laboratory - NATA # 1261 Site # 1254

						X	X	X
78	BH05_0.2-0.3	Jul 20, 2023		Soil	M23-JI0055892	X		
79	BH05_0.9-1.0	Jul 20, 2023		Soil	M23-JI0055893	X		
80	BH05_1.5-1.6	Jul 20, 2023		Soil	M23-JI0055894	X		
81	BH06_0.4-0.5	Jul 20, 2023		Soil	M23-JI0055895	X		
82	BH06_0.9-1.0	Jul 20, 2023		Soil	M23-JI0055896	X		
83	BH06_2.0-2.2	Jul 20, 2023		Soil	M23-JI0055897	X		
84	MW01_0.2-0.3	Jul 21, 2023		Soil	M23-JI0055898	X		
85	MW01_0.4-0.5	Jul 21, 2023		Soil	M23-JI0055899	X		
86	MW01_0.9-1.0	Jul 21, 2023		Soil	M23-JI0055900	X		
87	MW01_1.5-1.6	Jul 21, 2023		Soil	M23-JI0055901	X		
88	MW01_1.9-2.0	Jul 21, 2023		Soil	M23-JI0055902	X		
89	BH11_0.5-0.7	Jul 21, 2023		Soil	M23-JI0055903	X		
90	BH11_0.95-1.05	Jul 21, 2023		Soil	M23-JI0055904	X		
91	BH11_2.1-2.3	Jul 21, 2023		Soil	M23-JI0055905	X		
92	BH11_2.7-2.8	Jul 21, 2023		Soil	M23-JI0055906	X		

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Eurofins Analytical Services Manager : Amy Meunier

Sample Detail

HOLD

Moisture Set

Per- and Polyfluoroalkyl Substances (PFASs)

Melbourne Laboratory - NATA # 1261 Site # 1254

						X	X	X
93	BH11_2.8-2.9	Jul 21, 2023		Soil	M23-JI0055907	X		
94	BH11_CONCR ETE	Jul 21, 2023		Soil	M23-JI0055908	X		
95	MW02_0.32-0.4	Jul 21, 2023		Soil	M23-JI0055909	X		
96	MW02_0.9-1.0	Jul 21, 2023		Soil	M23-JI0055910	X		
97	MW02_1.3-1.4	Jul 21, 2023		Soil	M23-JI0055911	X		
98	MW02_1.6-1.7	Jul 21, 2023		Soil	M23-JI0055912	X		
99	MW02_3.3-3.5	Jul 21, 2023		Soil	M23-JI0055913	X		
100	BH10_0.4-0.5	Jul 21, 2023		Soil	M23-JI0055914	X		
101	BH10_0.65-0.75	Jul 21, 2023		Soil	M23-JI0055915	X		
102	BH10_2.1-2.3	Jul 21, 2023		Soil	M23-JI0055916	X		
103	BH10_2.3-2.4	Jul 21, 2023		Soil	M23-JI0055917	X		
104	MW03_0.3-0.4	Jul 21, 2023		Soil	M23-JI0055918	X		
105	MW03_0.65-0.75	Jul 21, 2023		Soil	M23-JI0055919	X		

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Sample Detail

HOLD

Moisture Set

Per- and Polyfluoroalkyl Substances (PFASs)

Melbourne Laboratory - NATA # 1261 Site # 1254

106	MW03_0.9-1.0	Jul 21, 2023		Soil	M23-JI0055920	X	X	X
107	MW03_1.3-1.4	Jul 21, 2023		Soil	M23-JI0055921	X		
108	MW03_2.2-2.3	Jul 21, 2023		Soil	M23-JI0055922	X		
109	MW03_3.0-3.1	Jul 21, 2023		Soil	M23-JI0055923	X		

Test Counts						66	41	43
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Internal Quality Control Review and Glossary

General

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

Holding Times

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

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

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

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

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

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 (<i>bis</i> -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. SVOCs recoveries 20 – 150%

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

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

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	ug/L	< 0.05			0.05	Pass	
Perfluoropentanoic acid (PFPeA)	ug/L	< 0.01			0.01	Pass	
Perfluorohexanoic acid (PFHxA)	ug/L	< 0.01			0.01	Pass	
Perfluoroheptanoic acid (PFHpA)	ug/L	< 0.01			0.01	Pass	
Perfluorooctanoic acid (PFOA)	ug/L	< 0.01			0.01	Pass	
Perfluorononanoic acid (PFNA)	ug/L	< 0.01			0.01	Pass	
Perfluorodecanoic acid (PFDA)	ug/L	< 0.01			0.01	Pass	
Perfluoroundecanoic acid (PFUnDA)	ug/L	< 0.01			0.01	Pass	
Perfluorododecanoic acid (PFDoDA)	ug/L	< 0.01			0.01	Pass	
Perfluorotridecanoic acid (PFTTrDA)	ug/L	< 0.01			0.01	Pass	
Perfluorotetradecanoic acid (PFTeDA)	ug/L	< 0.01			0.01	Pass	
Method Blank							
Perfluoroalkyl sulfonamido substances							
Perfluorooctane sulfonamide (FOSA)	ug/L	< 0.05			0.05	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	ug/L	< 0.05			0.05	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	ug/L	< 0.05			0.05	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	ug/L	< 0.05			0.05	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	ug/L	< 0.05			0.05	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	ug/L	< 0.05			0.05	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	ug/L	< 0.05			0.05	Pass	
Method Blank							
Perfluoroalkyl sulfonic acids (PFSA's)							
Perfluorobutanesulfonic acid (PFBS)	ug/L	< 0.01			0.01	Pass	
Perfluorononanesulfonic acid (PFNS)	ug/L	< 0.01			0.01	Pass	
Perfluoropropanesulfonic acid (PFPrS)	ug/L	< 0.01			0.01	Pass	
Perfluoropentanesulfonic acid (PFPeS)	ug/L	< 0.01			0.01	Pass	
Perfluorohexanesulfonic acid (PFHxS)	ug/L	< 0.01			0.01	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	ug/L	< 0.01			0.01	Pass	
Perfluorooctanesulfonic acid (PFOS)	ug/L	< 0.01			0.01	Pass	
Perfluorodecanesulfonic acid (PFDS)	ug/L	< 0.01			0.01	Pass	
Method Blank							
n:2 Fluorotelomer sulfonic acids (n:2 FTSA's)							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	ug/L	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	ug/L	< 0.05			0.05	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	ug/L	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	ug/L	< 0.01			0.01	Pass	
LCS - % Recovery							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	%	106			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	95			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	111			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	98			50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	110			50-150	Pass	
Perfluorononanoic acid (PFNA)	%	107			50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	95			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	%	110			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	%	119			50-150	Pass	
Perfluorotridecanoic acid (PFTTrDA)	%	148			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	119			50-150	Pass	

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
LCS - % Recovery									
Perfluoroalkyl sulfonamido substances									
Perfluorooctane sulfonamide (FOSA)			%	87			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)			%	108			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)			%	99			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)			%	99			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)			%	129			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)			%	108			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)			%	115			50-150	Pass	
LCS - % Recovery									
Perfluoroalkyl sulfonic acids (PFSA's)									
Perfluorobutanesulfonic acid (PFBS)			%	106			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)			%	99			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)			%	111			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)			%	85			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)			%	108			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)			%	104			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)			%	103			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)			%	92			50-150	Pass	
LCS - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSA's)									
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)			%	99			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)			%	112			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)			%	106			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)			%	111			50-150	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Perfluoroalkyl carboxylic acids (PFCAs)									
				Result 1					
Perfluorobutanoic acid (PFBA)	M23-JI0055842	CP	%	107			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	M23-JI0053496	NCP	%	100			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	M23-JI0055842	CP	%	114			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	M23-JI0055842	CP	%	106			50-150	Pass	
Perfluorooctanoic acid (PFOA)	M23-JI0055842	CP	%	118			50-150	Pass	
Perfluorononanoic acid (PFNA)	M23-JI0055842	CP	%	113			50-150	Pass	
Perfluorodecanoic acid (PFDA)	M23-JI0055842	CP	%	93			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	M23-JI0055842	CP	%	106			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	M23-JI0055842	CP	%	121			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	M23-JI0053496	NCP	%	53			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	M23-JI0055842	CP	%	126			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonamido substances									
				Result 1					
Perfluorooctane sulfonamide (FOSA)	M23-JI0055842	CP	%	95			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	M23-JI0054592	NCP	%	102			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	M23-JI0054592	NCP	%	96			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	M23-JI0055842	CP	%	101			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	M23-JI0055842	CP	%	133			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	M23-JI0055842	CP	%	111			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	M23-JI0055842	CP	%	120			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonic acids (PFSA's)				Result 1					
Perfluorobutanesulfonic acid (PFBS)	M23-JI0055842	CP	%	109			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	M23-JI0055842	CP	%	97			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	M23-JI0055842	CP	%	115			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	M23-JI0055842	CP	%	89			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	M23-JI0055842	CP	%	114			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	M23-JI0055842	CP	%	102			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	M23-JI0055842	CP	%	107			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	M23-JI0055842	CP	%	87			50-150	Pass	
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSA's)				Result 1					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	M23-JI0055842	CP	%	97			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	M23-JI0055842	CP	%	113			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	M23-JI0055842	CP	%	102			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	M23-JI0055842	CP	%	117			50-150	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1	Result 2	RPD			
Perfluorobutanoic acid (PFBA)	M23-JI0054739	NCP	ug/L	0.12	0.13	3.7	30%	Pass	
Perfluoropentanoic acid (PFPeA)	M23-JI0052962	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorohexanoic acid (PFHxA)	M23-JI0052962	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	M23-JI0052962	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	M23-JI0054739	NCP	ug/L	0.01	0.01	1.5	30%	Pass	
Perfluorononanoic acid (PFNA)	M23-JI0054739	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorodecanoic acid (PFDA)	M23-JI0054739	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnDA)	M23-JI0054739	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorododecanoic acid (PFDoDA)	M23-JI0054739	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotridecanoic acid (PFTrDA)	M23-JI0054739	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	M23-JI0054739	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	

Duplicate								
Perfluoroalkyl sulfonamido substances				Result 1	Result 2	RPD		
Perfluorooctane sulfonamide (FOSA)	M23-JI0054739	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	M23-JI0054739	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	M23-JI0054739	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	M23-JI0054739	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	M23-JI0054739	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	M23-JI0054739	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	M23-JI0054739	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
Duplicate								
Perfluoroalkyl sulfonic acids (PFSA's)				Result 1	Result 2	RPD		
Perfluorobutanesulfonic acid (PFBS)	M23-JI0053004	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorononanesulfonic acid (PFNS)	M23-JI0054739	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoropropanesulfonic acid (PFPrS)	M23-JI0053004	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoropentanesulfonic acid (PFPeS)	M23-JI0053004	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorohexanesulfonic acid (PFHxS)	M23-JI0053004	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoroheptanesulfonic acid (PFHpS)	M23-JI0054739	NCP	ug/L	0.04	0.07	<1	30%	Pass
Perfluorooctanesulfonic acid (PFOS)	M23-JI0051283	NCP	ug/L	0.74	0.74	<1	30%	Pass
Perfluorodecanesulfonic acid (PFDS)	M23-JI0054739	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Duplicate								
n:2 Fluorotelomer sulfonic acids (n:2 FTSA's)				Result 1	Result 2	RPD		
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	M23-JI0054591	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	M23-JI0054591	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	M23-JI0054739	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	M23-JI0054739	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass

Comments

Sample Integrity

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

Qualifier Codes/Comments

Code	Description
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:

Callum McEwan	Analytical Services Manager
Joseph Edouard	Senior Analyst-PFAS



Glenn Jackson
Managing Director

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 RECORD

Eurofins | Environment Testing ABN 50 005 085 521

Sydney Laboratory

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

Brisbane Laboratory

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

Perth Laboratory

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

Melbourne Laboratory

6 Monterey Road Dandenong South VIC 3175
03 8564 5000 EnviroSampleVic@eurofins.com

[illegible]

CHAIN OF CUSTODY RECORD

Eurofins | Environment Testing ABN 50 005 085 521

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

Brisbane Laboratory
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07 3902 4600 EnviroSampleQLD@eurofins.com

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

Melbourne Laboratory
8 Monterey Road Dandenong South VIC 3175
03 8564 5000 EnviroSampleVic@irofins.com

EC

[illegible]

Tyrone Gowans

From: Amy Meunier
Sent: Tuesday, 5 September 2023 10:07 AM
To: Louise.Wright@ghd.com
Cc: Parimal Acharya; #AU_CAU001_EnviroSampleVic
Subject: FW: 12612725_Soil Samples (PFAS)_COC
Attachments: 12612725_Eurofins COC_20230904.xlsx

Follow Up Flag: Follow up
Flag Status: Completed

INFO: INTERNAL EMAIL - Sent from your own Eurofins email domain.

Hi Louise,

Thanks for sending through.

Tyrone – COC attached

Kind regards,

Amy Meunier

Analytical Services Manager

Mobile : +61 477 574 867

Email : AmyMeunier@eurofins.com

Eurofins

6 Monterey Road,
Dandenong VIC 3175
Australia

*My office hours are 9am to 5:30pm (Monday to Friday)
If you require sample receipt outside these hours please email envirosamplevic@eurofins.com*



Total Sulfur in Soils by LECO, NATA Accredited

LEARN
MORE

From: Louise Wright <Louise.Wright@ghd.com>
Sent: Tuesday, 5 September 2023 10:02 AM
To: Amy Meunier <AmyMeunier@eurofins.com>
Cc: Parimal Acharya <ParimalAcharya@eurofins.com>
Subject: 12612725_Soil Samples (PFAS)_COC

CAUTION: EXTERNAL EMAIL - Sent from an email domain that is not formally trusted by Eurofins.

Do not click on links or open attachments unless you recognise the sender and are certain that the content is safe.

Hi Amy,

Please find attached COC for samples submitted on Monday 4 September.

#1023122
6/9/23



Environment Testing

PROJECT INFORMATION

Date Received:

04/09/23

Company:

QHD.

Contact person:

Ben, P.

Contact Number:

0460 830 524

Contact E-mail:

Project Name/site:

Project Number:

12612725

COC: Attached ☐

E-mailed ☒

Not received ☐

19.9°C
- 0.3°C
19.6°C
Notice.

#1023/22
92
B/a/m

Last modified on: 16 October 2019	Approved on: 16 October 2019	Version: QS1039_R2
Last modified by: H. Le	Approver: M. Makarios	Page 1 of 1
Editorial Committee: T. Lakeland, F. Sanjaya, H. Le, M. Makarios		
Next required review date: 16 October 2022		

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NZBN: 9429046024954

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Sample Receipt Advice

Company name:	GHD Pty Ltd SA
Contact name:	Tom Duncan
Project name:	MFS Christie Downs DSI
Project ID:	12612725
Turnaround time:	5 Day
Date/Time received	Sep 5, 2023 10:07 AM
Eurofins reference	1023122

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 Tom Duncan - tom.duncan@ghd.com.

Note: A copy of these results will also be delivered to the general GHD Pty Ltd SA email address.



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
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Company Name:

Address:

Project Name:

Project ID:

GHD Pty Ltd SA
GPO Box 2052
Adelaide
SA 5001

MFS Christie Downs DSI
12612725

Order No.:

Report #:

Phone:

Fax:

1023122
08 8111 6600
08 8111 6699

Received:

Due:

Priority:

Contact Name:

Sep 5, 2023 10:07 AM
Sep 12, 2023
5 Day
Tom Duncan

Eurofins Analytical Services Manager : Amy Meunier

Sample Detail						Moisture Set	Per- and Polyfluoroalkyl Substances (PFASs)
Melbourne Laboratory - NATA # 1261 Site # 1254						X	X
External Laboratory							
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID		
1	MW01_ 4.5-5.0	Sep 04, 2023		Soil	M23-Se0008073	X	X
2	MW01_ 10.0	Sep 04, 2023		Soil	M23-Se0008074	X	X
3	MW01_ 15.0	Sep 04, 2023		Soil	M23-Se0008075	X	X
4	MW01_ 20.0	Sep 04, 2023		Soil	M23-Se0008076	X	X
5	SS03	Sep 04, 2023		Soil	M23-Se0008077	X	X
6	SS04	Sep 04, 2023		Soil	M23-Se0008078	X	X
7	SS05	Sep 04, 2023		Soil	M23-Se0008079	X	X
8	SS06	Sep 04, 2023		Soil	M23-Se0008080	X	X
9	FD01	Sep 04, 2023		Soil	M23-Se0008081	X	X
Test Counts						9	9

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: **Tom Duncan**

Report **1023122-S**
Project name **MFS Christie Downs DSI**
Project ID **12612725**
Received Date **Sep 05, 2023**

Client Sample ID			MW01_4.5-5.0	MW01_10.0	MW01_15.0	MW01_20.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M23-Se0008073	M23-Se0008074	M23-Se0008075	M23-Se0008076
Date Sampled			Sep 04, 2023	Sep 04, 2023	Sep 04, 2023	Sep 04, 2023
Test/Reference	LOR	Unit				
Sample Properties						
% Moisture	1	%	7.4	7.9	1.1	< 1
Perfluoroalkyl carboxylic acids (PFCAs)						
Perfluorobutanoic acid (PFBA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoropentanoic acid (PFPeA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorohexanoic acid (PFHxA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoroheptanoic acid (PFHpA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorooctanoic acid (PFOA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorononanoic acid (PFNA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorodecanoic acid (PFDA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoroundecanoic acid (PFUnDA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorododecanoic acid (PFDoDA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorotridecanoic acid (PFTTrDA) ^{N15}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorotetradecanoic acid (PFTeDA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
13C4-PFBA (surr.)	1	%	94	90	92	124
13C5-PFPeA (surr.)	1	%	99	91	98	103
13C5-PFHxA (surr.)	1	%	108	98	109	114
13C4-PFHpA (surr.)	1	%	89	83	91	94
13C8-PFOA (surr.)	1	%	91	83	90	100
13C5-PFNA (surr.)	1	%	88	78	90	94
13C6-PFDA (surr.)	1	%	86	77	89	99
13C2-PFUnDA (surr.)	1	%	72	56	69	83
13C2-PFDoDA (surr.)	1	%	91	76	90	102
13C2-PFTeDA (surr.)	1	%	89	80	95	105
Perfluoroalkyl sulfonamido substances						
Perfluorooctane sulfonamide (FOSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA) ^{N11}	10	ug/kg	< 10	< 10	< 10	< 10
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA) ^{N11}	10	ug/kg	< 10	< 10	< 10	< 10

Client Sample ID			MW01_4.5-5.0	MW01_10.0	MW01_15.0	MW01_20.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M23-Se0008073	M23-Se0008074	M23-Se0008075	M23-Se0008076
Date Sampled			Sep 04, 2023	Sep 04, 2023	Sep 04, 2023	Sep 04, 2023
Test/Reference	LOR	Unit				
Perfluoroalkyl sulfonamido substances						
13C8-FOSA (surr.)	1	%	62	53	59	100
D3-N-MeFOSA (surr.)	1	%	86	75	93	111
D5-N-EtFOSA (surr.)	1	%	88	86	105	131
D7-N-MeFOSE (surr.)	1	%	76	67	77	102
D9-N-EtFOSE (surr.)	1	%	77	65	79	94
D5-N-EtFOSAA (surr.)	1	%	129	116	136	130
D3-N-MeFOSAA (surr.)	1	%	156	116	136	123
Perfluoroalkyl sulfonic acids (PFASs)						
Perfluorobutanesulfonic acid (PFBS) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorononanesulfonic acid (PFNS) ^{N15}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoropropanesulfonic acid (PFPrS) ^{N15}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoropentanesulfonic acid (PFPeS) ^{N15}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorohexanesulfonic acid (PFHxS) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoroheptanesulfonic acid (PFHpS) ^{N15}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorooctanesulfonic acid (PFOS) ^{N11}	5	ug/kg	^{N09} < 5	^{N09} < 5	< 5	< 5
Perfluorodecanesulfonic acid (PFDS) ^{N15}	5	ug/kg	< 5	< 5	< 5	< 5
13C3-PFBS (surr.)	1	%	92	89	94	101
18O2-PFHxS (surr.)	1	%	90	76	87	92
13C8-PFOS (surr.)	1	%	63	57	63	105
n:2 Fluorotelomer sulfonic acids (n:2 FTSA)						
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA) ^{N11}	10	ug/kg	< 10	< 10	< 10	< 10
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
13C2-4:2 FTSA (surr.)	1	%	84	45	50	110
13C2-6:2 FTSA (surr.)	1	%	93	54	57	107
13C2-8:2 FTSA (surr.)	1	%	134	70	85	90
13C2-10:2 FTSA (surr.)	1	%	183	95	124	125
PFASs Summations						
Sum (PFHxS + PFOS)*	5	ug/kg	< 5	< 5	< 5	< 5
Sum of US EPA PFAS (PFOS + PFOA)*	5	ug/kg	< 5	< 5	< 5	< 5
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	5	ug/kg	< 5	< 5	< 5	< 5
Sum of WA DWER PFAS (n=10)*	10	ug/kg	< 10	< 10	< 10	< 10
Sum of PFASs (n=30)*	50	ug/kg	< 50	< 50	< 50	< 50

Client Sample ID			SS03	SS04	SS05	SS06
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M23-Se0008077	M23-Se0008078	M23-Se0008079	M23-Se0008080
Date Sampled			Sep 04, 2023	Sep 04, 2023	Sep 04, 2023	Sep 04, 2023
Test/Reference	LOR	Unit				
Sample Properties						
% Moisture	1	%	18	6.7	24	3.7
Perfluoroalkyl carboxylic acids (PFCAs)						
Perfluorobutanoic acid (PFBA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoropentanoic acid (PFPeA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorohexanoic acid (PFHxA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoroheptanoic acid (PFHpA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorooctanoic acid (PFOA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorononanoic acid (PFNA) ^{N11}	5	ug/kg	6.8	^{N09} < 5	< 5	< 5
Perfluorodecanoic acid (PFDA) ^{N11}	5	ug/kg	14	< 5	11	< 5
Perfluoroundecanoic acid (PFUnDA) ^{N11}	5	ug/kg	79	38	49	6.3
Perfluorododecanoic acid (PFDoDA) ^{N11}	5	ug/kg	8.4	< 5	9.8	< 5
Perfluorotridecanoic acid (PFTrDA) ^{N15}	5	ug/kg	210	100	330	< 5
Perfluorotetradecanoic acid (PFTeDA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
13C4-PFBA (surr.)	1	%	75	81	78	91
13C5-PFPeA (surr.)	1	%	85	89	89	97
13C5-PFHxA (surr.)	1	%	100	98	101	107
13C4-PFHpA (surr.)	1	%	71	79	82	90
13C8-PFOA (surr.)	1	%	70	75	79	93
13C5-PFNA (surr.)	1	%	60	64	73	86
13C6-PFDA (surr.)	1	%	59	59	75	88
13C2-PFUnDA (surr.)	1	%	43	34	59	75
13C2-PFDoDA (surr.)	1	%	30	26	42	89
13C2-PFTeDA (surr.)	1	%	45	55	79	94
Perfluoroalkyl sulfonamido substances						
Perfluorooctane sulfonamide (FOSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA) ^{N11}	10	ug/kg	< 10	< 10	< 10	< 10
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA) ^{N11}	10	ug/kg	< 10	< 10	< 10	< 10
13C8-FOSA (surr.)	1	%	30	30	41	60
D3-N-MeFOSA (surr.)	1	%	55	61	63	92
D5-N-EtFOSA (surr.)	1	%	56	65	69	93
D7-N-MeFOSE (surr.)	1	%	43	47	61	80
D9-N-EtFOSE (surr.)	1	%	42	47	55	79
D5-N-EtFOSAA (surr.)	1	%	56	52	81	122
D3-N-MeFOSAA (surr.)	1	%	44	38	67	139
Perfluoroalkyl sulfonic acids (PFSA)						
Perfluorobutanesulfonic acid (PFBS) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorononanesulfonic acid (PFNS) ^{N15}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoropropanesulfonic acid (PFPrS) ^{N15}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoropentanesulfonic acid (PFPeS) ^{N15}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorohexanesulfonic acid (PFHxS) ^{N11}	5	ug/kg	^{N09} 5.3	< 5	^{N09} < 5	< 5
Perfluoroheptanesulfonic acid (PFHpS) ^{N15}	5	ug/kg	< 5	< 5	< 5	< 5

Client Sample ID Sample Matrix Eurofins Sample No. Date Sampled Test/Reference	LOR	Unit	SS03 Soil M23- Se0008077 Sep 04, 2023	SS04 Soil M23- Se0008078 Sep 04, 2023	SS05 Soil M23- Se0008079 Sep 04, 2023	SS06 Soil M23- Se0008080 Sep 04, 2023
Perfluoroalkyl sulfonic acids (PFASs)						
Perfluorooctanesulfonic acid (PFOS) ^{N11}	5	ug/kg	^{N09} 250	^{N09} 30	^{N09} 91	^{N09} < 5
Perfluorodecanesulfonic acid (PFDS) ^{N15}	5	ug/kg	< 5	< 5	< 5	< 5
13C3-PFBS (surr.)	1	%	83	93	89	87
18O2-PFHxS (surr.)	1	%	66	74	78	92
13C8-PFOS (surr.)	1	%	53	53	55	74
n:2 Fluorotelomer sulfonic acids (n:2 FTSA)						
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA) ^{N11}	10	ug/kg	< 10	< 10	< 10	< 10
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA) ^{N11}	5	ug/kg	10	7.3	15	< 5
13C2-4:2 FTSA (surr.)	1	%	107	107	118	94
13C2-6:2 FTSA (surr.)	1	%	126	94	147	97
13C2-8:2 FTSA (surr.)	1	%	68	71	111	121
13C2-10:2 FTSA (surr.)	1	%	54	54	122	160
PFASs Summations						
Sum (PFHxS + PFOS)*	5	ug/kg	255.3	30	91	< 5
Sum of US EPA PFAS (PFOS + PFOA)*	5	ug/kg	250	30	91	< 5
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	5	ug/kg	255.3	30	91	< 5
Sum of WA DWER PFAS (n=10)*	10	ug/kg	255.3	30	91	< 10
Sum of PFASs (n=30)*	50	ug/kg	583.5	175.3	505.8	< 50

Client Sample ID Sample Matrix Eurofins Sample No. Date Sampled Test/Reference	LOR	Unit	FD01 Soil M23- Se0008081 Sep 04, 2023
Sample Properties			
% Moisture	1	%	5.8
Perfluoroalkyl carboxylic acids (PFCAs)			
Perfluorobutanoic acid (PFBA) ^{N11}	5	ug/kg	< 5
Perfluoropentanoic acid (PFPeA) ^{N11}	5	ug/kg	< 5
Perfluorohexanoic acid (PFHxA) ^{N11}	5	ug/kg	< 5
Perfluoroheptanoic acid (PFHpA) ^{N11}	5	ug/kg	< 5
Perfluorooctanoic acid (PFOA) ^{N11}	5	ug/kg	< 5
Perfluorononanoic acid (PFNA) ^{N11}	5	ug/kg	< 5
Perfluorodecanoic acid (PFDA) ^{N11}	5	ug/kg	< 5
Perfluoroundecanoic acid (PFUnDA) ^{N11}	5	ug/kg	< 5
Perfluorododecanoic acid (PFDoDA) ^{N11}	5	ug/kg	< 5
Perfluorotridecanoic acid (PFTTrDA) ^{N15}	5	ug/kg	< 5
Perfluorotetradecanoic acid (PFTeDA) ^{N11}	5	ug/kg	< 5
13C4-PFBA (surr.)	1	%	78
13C5-PFPeA (surr.)	1	%	77
13C5-PFHxA (surr.)	1	%	85
13C4-PFHpA (surr.)	1	%	69

Client Sample ID			FD01
Sample Matrix			Soil
Eurofins Sample No.			M23-Se0008081
Date Sampled			Sep 04, 2023
Test/Reference	LOR	Unit	
Perfluoroalkyl carboxylic acids (PFCAs)			
13C8-PFOA (surr.)	1	%	64
13C5-PFNA (surr.)	1	%	59
13C6-PFDA (surr.)	1	%	55
13C2-PFUnDA (surr.)	1	%	45
13C2-PFDoDA (surr.)	1	%	58
13C2-PFTeDA (surr.)	1	%	55
Perfluoroalkyl sulfonamido substances			
Perfluorooctane sulfonamide (FOSA) ^{N11}	5	ug/kg	< 5
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA) ^{N11}	5	ug/kg	< 5
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA) ^{N11}	5	ug/kg	< 5
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE) ^{N11}	5	ug/kg	< 5
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE) ^{N11}	5	ug/kg	< 5
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA) ^{N11}	10	ug/kg	< 10
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA) ^{N11}	10	ug/kg	< 10
13C8-FOSA (surr.)	1	%	42
D3-N-MeFOSA (surr.)	1	%	53
D5-N-EtFOSA (surr.)	1	%	59
D7-N-MeFOSE (surr.)	1	%	48
D9-N-EtFOSE (surr.)	1	%	48
D5-N-EtFOSAA (surr.)	1	%	88
D3-N-MeFOSAA (surr.)	1	%	99
Perfluoroalkyl sulfonic acids (PFASs)			
Perfluorobutanesulfonic acid (PFBS) ^{N11}	5	ug/kg	< 5
Perfluorononanesulfonic acid (PFNS) ^{N15}	5	ug/kg	< 5
Perfluoropropanesulfonic acid (PFPrS) ^{N15}	5	ug/kg	< 5
Perfluoropentanesulfonic acid (PFPeS) ^{N15}	5	ug/kg	< 5
Perfluorohexanesulfonic acid (PFHxS) ^{N11}	5	ug/kg	< 5
Perfluoroheptanesulfonic acid (PFHpS) ^{N15}	5	ug/kg	< 5
Perfluorooctanesulfonic acid (PFOS) ^{N11}	5	ug/kg	^{N09} < 5
Perfluorodecanesulfonic acid (PFDS) ^{N15}	5	ug/kg	< 5
13C3-PFBS (surr.)	1	%	75
18O2-PFHxS (surr.)	1	%	61
13C8-PFOS (surr.)	1	%	49
n:2 Fluorotelomer sulfonic acids (n:2 FTSA)			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA) ^{N11}	5	ug/kg	< 5
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA) ^{N11}	10	ug/kg	< 10
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA) ^{N11}	5	ug/kg	< 5
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA) ^{N11}	5	ug/kg	< 5
13C2-4:2 FTSA (surr.)	1	%	76
13C2-6:2 FTSA (surr.)	1	%	84
13C2-8:2 FTSA (surr.)	1	%	82
13C2-10:2 FTSA (surr.)	1	%	101

Client Sample ID			FD01
Sample Matrix			Soil
Eurofins Sample No.			M23-Se0008081
Date Sampled			Sep 04, 2023
Test/Reference	LOR	Unit	
PFASs Summations			
Sum (PFHxS + PFOS)*	5	ug/kg	< 5
Sum of US EPA PFAS (PFOS + PFOA)*	5	ug/kg	< 5
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	5	ug/kg	< 5
Sum of WA DWER PFAS (n=10)*	10	ug/kg	< 10
Sum of PFASs (n=30)*	50	ug/kg	< 50

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
% Moisture	Melbourne	Sep 05, 2023	14 Days
- Method: LTM-GEN-7080 Moisture			
Per- and Polyfluoroalkyl Substances (PFASs)			
Perfluoroalkyl carboxylic acids (PFCAs)	Melbourne	Sep 05, 2023	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonamido substances	Melbourne	Sep 05, 2023	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonic acids (PFSAs)	Melbourne	Sep 05, 2023	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)	Melbourne	Sep 05, 2023	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
PFASs Summations	Melbourne	Sep 05, 2023	
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			

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

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

Project Name: MFS Christie Downs DSI
Project ID: 12612725

Order No.:
Report #: 1023122
Phone: 08 8111 6600
Fax: 08 8111 6699

Received: Sep 5, 2023 10:07 AM
Due: Sep 12, 2023
Priority: 5 Day
Contact Name: Tom Duncan

Eurofins Analytical Services Manager : Amy Meunier

Sample Detail						Moisture Set	Per- and Polyfluoroalkyl Substances (PFASs)
Melbourne Laboratory - NATA # 1261 Site # 1254						X	X
External Laboratory							
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID		
1	MW01_4.5-5.0	Sep 04, 2023		Soil	M23-Se0008073	X	X
2	MW01_10.0	Sep 04, 2023		Soil	M23-Se0008074	X	X
3	MW01_15.0	Sep 04, 2023		Soil	M23-Se0008075	X	X
4	MW01_20.0	Sep 04, 2023		Soil	M23-Se0008076	X	X
5	SS03	Sep 04, 2023		Soil	M23-Se0008077	X	X
6	SS04	Sep 04, 2023		Soil	M23-Se0008078	X	X
7	SS05	Sep 04, 2023		Soil	M23-Se0008079	X	X
8	SS06	Sep 04, 2023		Soil	M23-Se0008080	X	X
9	FD01	Sep 04, 2023		Soil	M23-Se0008081	X	X
Test Counts						9	9

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 (<i>bis</i> -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. SVOCs recoveries 20 – 150%

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 carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	ug/kg	< 5			5	Pass	
Perfluoropentanoic acid (PFPeA)	ug/kg	< 5			5	Pass	
Perfluorohexanoic acid (PFHxA)	ug/kg	< 5			5	Pass	
Perfluoroheptanoic acid (PFHpA)	ug/kg	< 5			5	Pass	
Perfluorooctanoic acid (PFOA)	ug/kg	< 5			5	Pass	
Perfluorononanoic acid (PFNA)	ug/kg	< 5			5	Pass	
Perfluorodecanoic acid (PFDA)	ug/kg	< 5			5	Pass	
Perfluoroundecanoic acid (PFUnDA)	ug/kg	< 5			5	Pass	
Perfluorododecanoic acid (PFDoDA)	ug/kg	< 5			5	Pass	
Perfluorotridecanoic acid (PFTTrDA)	ug/kg	< 5			5	Pass	
Perfluorotetradecanoic acid (PFTeDA)	ug/kg	< 5			5	Pass	
Method Blank							
Perfluoroalkyl sulfonamido substances							
Perfluorooctane sulfonamide (FOSA)	ug/kg	< 5			5	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	ug/kg	< 5			5	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	ug/kg	< 5			5	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	ug/kg	< 5			5	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	ug/kg	< 5			5	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	ug/kg	< 10			10	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	ug/kg	< 10			10	Pass	
Method Blank							
Perfluoroalkyl sulfonic acids (PFSA's)							
Perfluorobutanesulfonic acid (PFBS)	ug/kg	< 5			5	Pass	
Perfluorononanesulfonic acid (PFNS)	ug/kg	< 5			5	Pass	
Perfluoropropanesulfonic acid (PFPrS)	ug/kg	< 5			5	Pass	
Perfluoropentanesulfonic acid (PFPeS)	ug/kg	< 5			5	Pass	
Perfluorohexanesulfonic acid (PFHxS)	ug/kg	< 5			5	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	ug/kg	< 5			5	Pass	
Perfluorooctanesulfonic acid (PFOS)	ug/kg	< 5			5	Pass	
Perfluorodecanesulfonic acid (PFDS)	ug/kg	< 5			5	Pass	
Method Blank							
n:2 Fluorotelomer sulfonic acids (n:2 FTSA's)							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	ug/kg	< 5			5	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	ug/kg	< 10			10	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	ug/kg	< 5			5	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	ug/kg	< 5			5	Pass	
LCS - % Recovery							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	%	79			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	83			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	80			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	88			50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	82			50-150	Pass	
Perfluorononanoic acid (PFNA)	%	81			50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	93			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	%	90			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	%	83			50-150	Pass	
Perfluorotridecanoic acid (PFTTrDA)	%	85			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	85			50-150	Pass	

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
LCS - % Recovery									
Perfluoroalkyl sulfonamido substances									
Perfluorooctane sulfonamide (FOSA)			%	86			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)			%	87			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)			%	91			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)			%	99			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)			%	88			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)			%	88			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)			%	92			50-150	Pass	
LCS - % Recovery									
Perfluoroalkyl sulfonic acids (PFSA's)									
Perfluorobutanesulfonic acid (PFBS)			%	85			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)			%	76			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)			%	76			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)			%	85			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)			%	88			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)			%	106			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)			%	93			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)			%	88			50-150	Pass	
LCS - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSA's)									
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)			%	91			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)			%	87			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)			%	85			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)			%	76			50-150	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Perfluoroalkyl carboxylic acids (PFCAs)									
				Result 1					
Perfluorobutanoic acid (PFBA)	M23-Se0008076	CP	%	88			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	M23-Se0008076	CP	%	92			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	M23-Se0008076	CP	%	90			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	M23-Se0008076	CP	%	97			50-150	Pass	
Perfluorooctanoic acid (PFOA)	M23-Se0008076	CP	%	93			50-150	Pass	
Perfluorononanoic acid (PFNA)	M23-Se0008076	CP	%	88			50-150	Pass	
Perfluorodecanoic acid (PFDA)	M23-Se0008076	CP	%	93			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	M23-Se0008076	CP	%	97			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	M23-Se0008076	CP	%	94			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	M23-Se0008076	CP	%	103			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	M23-Se0008076	CP	%	97			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonamido substances									
				Result 1					
Perfluorooctane sulfonamide (FOSA)	M23-Se0008076	CP	%	102			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	M23-Se0008076	CP	%	96			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	M23-Se0008076	CP	%	97			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	M23-Se0008076	CP	%	110			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	M23-Se0008076	CP	%	102			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	M23-Se0008076	CP	%	104			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	M23-Se0008076	CP	%	99			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonic acids (PFSA's)				Result 1					
Perfluorobutanesulfonic acid (PFBS)	M23-Se0008076	CP	%	97			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	M23-Se0008076	CP	%	77			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	M23-Se0008076	CP	%	91			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	M23-Se0008076	CP	%	92			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	M23-Se0008076	CP	%	97			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	M23-Se0008076	CP	%	108			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	M23-Se0008076	CP	%	95			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	M23-Se0008076	CP	%	85			50-150	Pass	
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSA's)				Result 1					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	M23-Se0008076	CP	%	94			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	M23-Se0008076	CP	%	99			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	M23-Se0008076	CP	%	103			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	M23-Se0008076	CP	%	82			50-150	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Sample Properties				Result 1	Result 2	RPD			
% Moisture	M23-Se0008074	CP	%	7.9	7.9	<1	30%	Pass	
Duplicate									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1	Result 2	RPD			
Perfluorobutanoic acid (PFBA)	M23-Se0008075	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	M23-Se0008075	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorohexanoic acid (PFHxA)	M23-Se0008075	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	M23-Se0008075	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	M23-Se0008075	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorononanoic acid (PFNA)	M23-Se0008075	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorodecanoic acid (PFDA)	M23-Se0008075	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnDA)	M23-Se0008075	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorododecanoic acid (PFDoDA)	M23-Se0008075	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorotridecanoic acid (PFTeDA)	M23-Se0008075	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	M23-Se0008075	CP	ug/kg	< 5	< 5	<1	30%	Pass	

Duplicate								
Perfluoroalkyl sulfonamido substances				Result 1	Result 2	RPD		
Perfluorooctane sulfonamide (FOSA)	M23-Se0008075	CP	ug/kg	< 5	< 5	<1	30%	Pass
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	M23-Se0008075	CP	ug/kg	< 5	< 5	<1	30%	Pass
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	M23-Se0008075	CP	ug/kg	< 5	< 5	<1	30%	Pass
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	M23-Se0008075	CP	ug/kg	< 5	< 5	<1	30%	Pass
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	M23-Se0008075	CP	ug/kg	< 5	< 5	<1	30%	Pass
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	M23-Se0008075	CP	ug/kg	< 10	< 10	<1	30%	Pass
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	M23-Se0008075	CP	ug/kg	< 10	< 10	<1	30%	Pass
Duplicate								
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1	Result 2	RPD		
Perfluorobutanesulfonic acid (PFBS)	M23-Se0008075	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluorononanesulfonic acid (PFNS)	M23-Se0008075	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluoropropanesulfonic acid (PFPrS)	M23-Se0008075	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluoropentanesulfonic acid (PFPeS)	M23-Se0008075	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluorohexanesulfonic acid (PFHxS)	M23-Se0008075	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluoroheptanesulfonic acid (PFHpS)	M23-Se0008075	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluorooctanesulfonic acid (PFOS)	M23-Se0008075	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluorodecanesulfonic acid (PFDS)	M23-Se0008075	CP	ug/kg	< 5	< 5	<1	30%	Pass
Duplicate								
n:2 Fluorotelomer sulfonic acids (n:2 FTSA)				Result 1	Result 2	RPD		
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	M23-Se0008075	CP	ug/kg	< 5	< 5	<1	30%	Pass
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	M23-Se0008075	CP	ug/kg	< 10	< 10	<1	30%	Pass
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	M23-Se0008075	CP	ug/kg	< 5	< 5	<1	30%	Pass
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	M23-Se0008075	CP	ug/kg	< 5	< 5	<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:

Catherine Wilson Analytical Services Manager
 Carroll Lee Senior Analyst-PFAS



Glenn Jackson
Managing Director

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

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

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

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



SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : EM2313591

Client	: GHD PTY LTD	Laboratory	: Environmental Division Melbourne
Contact	: TOM DUNCAN	Contact	: Shirley LeCornu
Address	: Level 4, 211 VICTORIA SQUARE ADELAIDE SA, AUSTRALIA 5000	Address	: 4 Westall Rd Springvale VIC Australia 3171
E-mail	: tom.duncan@ghd.com	E-mail	: shirley.lecornu@Alsglobal.com
Telephone	: ----	Telephone	: +6138549 9630
Facsimile	: ----	Facsimile	: +61-3-8549 9626
Project	: 12612725	Page	: 1 of 3
Order number	: 12612725	Quote number	: EM2020GHDSE0069 (ME/875/20 B - SECONDARY WORK ONLY)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: TW		

Dates

Date Samples Received	: 27-Jul-2023 11:30	Issue Date	: 28-Jul-2023
Client Requested Due Date	: 03-Aug-2023	Scheduled Reporting Date	: 03-Aug-2023

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 1	Temperature	: 6.2°C - Ice present
Receipt Detail	:	No. of samples received / analysed	: 5 / 5

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.

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- ### Summary of Sample(s) and Requested Analysis

Matrix: SOIL

Laboratory sample ID	Sampling date / time	Sample ID	SOIL - E Moisture	SOIL - E PFAS
EM2313591-001	20-Jul-2023 00:00	FS01	✓	✓
EM2313591-002	20-Jul-2023 00:00	FS02	✓	✓
EM2313591-003	20-Jul-2023 00:00	FS03	✓	✓
EM2313591-004	21-Jul-2023 00:00	FS04	✓	✓
EM2313591-005	21-Jul-2023 00:00	FS05	✓	✓

Sample(s) have been received within the recommended holding times for the requested analysis.

Email accountspayableAU@ghd.com

[illegible][illegible][illegible]

Issue Date : 28-Jul-2023
Page : 3 of 3
Work Order : EM2313591 Amendment 0
Client : GHD PTY LTD



CHAIN OF CUSTODY RECORD

Eurofins | Environment Testing, ABN 50 005 085 521

Sydney Laboratory

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

Brisbane Laboratory

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

Perth Laboratory

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

Melbourne Laboratory

6 Monterey Road Dandenong South VIC 3175
03 8564 5000 EnviroSampleVic@eurofins.com

Company	GHD	Project No	12612725	Project Manager	Tom Duncan	Sampler(s)	Terrence Wilson (TW)							
Address	Level 4, 211 Victoria Square, Adelaide	Project Name	MFS Christie Downs DSI	EDD Format ESdat, EQulS etc	ESdat	Handed over by	Terrence Wilson							
Contact Name	Terrence Wilson	Analyses Where metals are requested, please specify "Total" or "Filtered". SUITE code must be used to attach SUITE pricing.	PFAS - Extended Suite (Standard LOR)	HOLD		Email for Invoice	accountspayableAU@ghd.com							
Phone No	0467034756					Email for Results	GHDLabReports@ghd.com Ben.Petticrew@ghd.com							
Special Directions						Containers Change container type & size if necessary.		Required Turnaround Time (TAT) Default will be 5 days if not ticked.						
Purchase Order						500mL Plastic	250mL Plastic	125mL Plastic	200mL Amber Glass	40mL VOA vial	500mL PFAS Bottle	Jar (Glass or HDPE)	Other (Asbestos AS4954, WA Guidelines)	• Surcharge will apply Overnight (reporting by 9am) ♦ Same day ♦ 1 day ♦ 2 days ♦ 3 days ♦ 5 days (Standard) Other()
Quote ID No														
No	Client Sample ID	Sampled Date/Time dd/mm/yyyy hh:mm	Matrix Solid (S) Water (W)	Environmental Division Melbourne Work Order Reference EM2313591				Sample Comments / Dangerous Goods Hazard Warning						
1	BH06_0.9-1.0	20/07/23	S	×						1	REMOVED BY: CLAUDE G. 27/7/23 8AM			
2	BH06_2.0-2.2	20/07/23	S	×						1				
3	BH06_2.4-2.5	20/07/23	S	×						1				
4	BH06_CONCRETE	20/07/23	S	×						1				
5	FD01	20/07/23	S	×						1				
6	FS01 ①	20/07/23	S	×						1	Please forward to ALS			
7	FD02	20/07/23	S	×						1				
8	FS02 ②	20/07/23	S	×						1	Please forward to ALS			
9	FD03	20/07/23	S	×						1				
10	FS03 ③	20/07/23	S	×						1	Please forward to ALS			
Total Counts				8	2						10			
Method of Shipment	Courier (#)	Hand Delivered	Postal	Name	Terrence Wilson	Signature	Date	21/07/2023	Time	1.30pm				
Laboratory Use Only	Received By		SYD BNE MEL PER ADL NTL DRW	Signature	Date	Time	Temperature							
	Received By		SYD BNE MEL PER ADL NTL DRW	Signature	Date	Time	Report No							

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th VIC 3175
@eurolms.com

Company		GHD		Project №		12612725		Project Manager		Tom Duncan		Sampler(s)		Terrence Wilson (TW)			
Address		Level 4, 211 Victoria Square, Adelaide		Project Name		MFS Christie Downs DSI		EDD Format		ESdat		Handed over by		Terrence Wilson			
Contact Name		Terrence Wilson		Analyses Where metals are requested, please specify "Total" or "Filtered". SUITE code must be used to attach SUITE pricing.		PFAS - Extended Suite (Standard LOR)		HOLD						Email for Invoice		accountspayableAU@ghd.com	
Phone №		0467034756												Email for Results		GHDLabReports@ghd.com Ben.Petticrew@ghd.com	
Special Directions														Containers		Required Turnaround Time (TAT)	
Purchase Order														Change container type & size if necessary.		Default will be 5 days if not ticked.	
Quote ID №																	
№		Client Sample ID		Sampled Date/Time		Matrix											
				dd/mm/yyyy hh:mm		Solid (S) Water (W)											
1		FS04		21/07/23		S		X									
2		FD05		21/07/23		S		X									
3		FS05		21/07/23		S		X									
4		RB02		21/07/23		W		X									
5																	
6																	
7																	
8																	
9																	
10																	
Total Counts						4								1		9	
Method of Shipment		Courier (#		Hand Delivered		Postal		Name		Terrence Wilson		Signature		Date		21/07/2023	
Laboratory Use Only		Received By				SYD BNE MEL PER ADL NTL DRW		Signature				Date		Time		Temperature	
		Received By		[Signature]		SYD BNE MEL PER ADL NTL DRW		Signature				Date		Time		Report №	



CERTIFICATE OF ANALYSIS

Work Order : EM2313591
Client : GHD PTY LTD
Contact : TOM DUNCAN
Address : Level 4, 211 VICTORIA SQUARE
ADELAIDE SA, AUSTRALIA 5000
Telephone : ----
Project : 12612725
Order number : 12612725
C-O-C number : ----
Sampler : TW
Site : ----
Quote number : ME/875/20 B - SECONDARY WORK ONLY
No. of samples received : 5
No. of samples analysed : 5

Page : 1 of 5
Laboratory : Environmental Division Melbourne
Contact : Shirley LeCornu
Address : 4 Westall Rd Springvale VIC Australia 3171
Telephone : +6138549 9630
Date Samples Received : 27-Jul-2023 11:30
Date Analysis Commenced : 28-Jul-2023
Issue Date : 02-Aug-2023 15:49



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
Nancy Wang	2IC Organic Chemist	Melbourne Organics, Springvale, VIC
Scott Beddoes	Senior Chemist - Inorganics	Melbourne Inorganics, 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: Poor matrix spike recovery for sample EM2313591-002 due to sample matrix interference.
- 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	FS01	FS02	FS03	FS04	FS05
Sampling date / time					20-Jul-2023 00:00	20-Jul-2023 00:00	20-Jul-2023 00:00	21-Jul-2023 00:00	21-Jul-2023 00:00
Compound	CAS Number	LOR	Unit		EM2313591-001	EM2313591-002	EM2313591-003	EM2313591-004	EM2313591-005
					Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	0.1	%		0.2	1.4	1.7	2.5	28.6
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg		<0.0002	<0.0002	0.0022	<0.0002	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg		<0.0002	<0.0002	0.0031	0.0002	0.0003
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg		<0.0002	0.0016	0.0149	0.0080	0.0047
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg		<0.0002	<0.0002	0.0019	0.0004	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg		0.0004	0.0113	0.114	0.0506	0.0386
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg		<0.0002	<0.0002	0.0003	0.0006	0.0008
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg		<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg		<0.0002	0.0009	0.0007	<0.0002	0.0006
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg		<0.0002	0.0016	0.0068	0.0023	0.0004
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg		<0.0002	<0.0002	0.0006	<0.0002	0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg		<0.0002	<0.0002	0.0021	0.0006	0.0006
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg		<0.0002	0.0007	0.0005	0.0019	0.0025
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	0.0002	0.0011
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		<0.0002	0.0019	0.0005	0.0036	0.0329
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	0.0020
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.0002	mg/kg		<0.0002	<0.0002	0.0002	0.0013	0.0447
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg		<0.0002	<0.0002	0.0005	<0.0002	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Sample ID

				FS01	FS02	FS03	FS04	FS05
Sampling date / time				20-Jul-2023 00:00	20-Jul-2023 00:00	20-Jul-2023 00:00	21-Jul-2023 00:00	21-Jul-2023 00:00
Compound	CAS Number	LOR	Unit	EM2313591-001	EM2313591-002	EM2313591-003	EM2313591-004	EM2313591-005
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<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	<0.0005	<0.0005	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.0012	<0.0005	<0.0005	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231P: PFAS Sums								
Sum of PFAS	----	0.0002	mg/kg	0.0004	0.0192	0.148	0.0697	0.129
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	0.0004	0.0129	0.129	0.0586	0.0433
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	0.0004	0.0166	0.141	0.0615	0.0451
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	106	104	102	105	132
13C8-PFOA	----	0.0002	%	104	98.2	95.8	99.8	92.0



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	: EM2313591	Page	: 1 of 6
Client	: GHD PTY LTD	Laboratory	: Environmental Division Melbourne
Contact	: TOM DUNCAN	Contact	: Shirley LeCornu
Address	: Level 4, 211 VICTORIA SQUARE ADELAIDE SA, AUSTRALIA 5000	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: ----	Telephone	: +6138549 9630
Project	: 12612725	Date Samples Received	: 27-Jul-2023
Order number	: 12612725	Date Analysis Commenced	: 28-Jul-2023
C-O-C number	: ----	Issue Date	: 02-Aug-2023
Sampler	: TW		
Site	: ----		
Quote number	: ME/875/20 B - SECONDARY WORK ONLY		
No. of samples received	: 5		
No. of samples analysed	: 5		



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
Nancy Wang	2IC Organic Chemist	Melbourne Organics, Springvale, VIC
Scott Beddoes	Senior Chemist - Inorganics	Melbourne Inorganics, 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**

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: 5202034)									
EM2313588-001	Anonymous	EA055: Moisture Content	----	0.1	%	11.7	12.2	4.3	0% - 50%
EM2313597-002	Anonymous	EA055: Moisture Content	----	0.1	%	11.6	12.1	4.3	0% - 50%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 5204338)									
EM2313591-001	FS01	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	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: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0004	0.0002	51.6	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 5204338)									
EM2313591-001	FS01	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: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 5204338)									
EM2313591-001	FS01	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: <i>Compound</i>	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 5204338) - continued									
EM2313591-001	FS01	EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 5204338)									
EM2313591-001	FS01	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: 5204338)									
EM2313591-001	FS01	EP231X: Sum of PFAS	----	0.0002	mg/kg	0.0004	0.0002	66.7	No Limit
		EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	0.0004	0.0002	66.7	No Limit
		EP231X: Sum of PFAS (WA DER List)	----	0.0002	mg/kg	0.0004	0.0002	66.7	No Limit

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.

Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
	Spike Concentration	Spike Recovery (%)	Acceptable Limits (%)		
		LCS	Low	High	
Result					
<0.0002	0.00111 mg/kg	87.8	72.0	128	
<0.0002	0.00118 mg/kg	99.2	73.0	123	
<0.0002	0.00114 mg/kg	94.9	67.0	130	
<0.0002	0.00119 mg/kg	92.7	70.0	132	
<0.0002	0.00116 mg/kg	97.5	68.0	136	
<0.0002	0.00121 mg/kg	98.0	59.0	134	
<0.001	0.00625 mg/kg	88.6	71.0	135	
<0.0002	0.00125 mg/kg	95.2	69.0	132	
<0.0002	0.00125 mg/kg	88.8	70.0	132	
<0.0002	0.00125 mg/kg	93.6	71.0	131	
<0.0002	0.00125 mg/kg	96.1	69.0	133	
<0.0002	0.00125 mg/kg	95.0	72.0	129	
<0.0002	0.00125 mg/kg	91.4	69.0	133	
<0.0002	0.00125 mg/kg	90.9	64.0	136	
<0.0002	0.00125 mg/kg	104	69.0	135	
<0.0002	0.00125 mg/kg	95.6	66.0	139	
<0.0005	0.00312 mg/kg	94.9	69.0	133	
<0.0002	0.00125 mg/kg	90.6	67.0	137	
<0.0005	0.00312 mg/kg	97.2	70.0	130	
<0.0005	0.00312 mg/kg	96.6	70.0	130	
<0.0005	0.00312 mg/kg	91.1	70.0	130	
<0.0005	0.00312 mg/kg	100	70.0	130	
<0.0002	0.00125 mg/kg	90.6	63.0	144	
<0.0002	0.00125 mg/kg	78.6	61.0	139	



Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit			LCS	Low	High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5204338) - continued								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00117 mg/kg	95.4	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	99.1	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	95.4	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	88.8	70.0	130
EP231P: PFAS Sums (QCLot: 5204338)								
EP231X: Sum of PFAS	----	0.0002	mg/kg	<0.0002	----	----	----	----
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: 5204338)							
EM2313591-002	FS02	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00111 mg/kg	80.2	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00118 mg/kg	# 69.6	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00114 mg/kg	# 60.9	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00119 mg/kg	98.6	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00116 mg/kg	# Not Determined	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00121 mg/kg	92.9	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5204338)							
EM2313591-002	FS02	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	89.1	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	72.6	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	# 52.5	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	85.3	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	93.7	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	73.4	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	90.3	69.0	133
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	# 60.2	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	99.9	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.00125 mg/kg	93.2	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	92.3	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
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5204338)							
EM2313591-002	FS02	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	91.8	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	112	70.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	85.7	70.0	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	94.4	70.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	96.8	70.0	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	77.0	63.0	144
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	82.4	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5204338)							
EM2313591-002	FS02	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00117 mg/kg	93.2	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00119 mg/kg	71.2	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0012 mg/kg	91.8	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00121 mg/kg	# 67.6	70.0	130



QA/QC Compliance Assessment to assist with Quality Review

Work Order : **EM2313591**

Page : 1 of 5

Client : **GHD PTY LTD**
Contact : **TOM DUNCAN**
Project : **12612725**
Site : **----**
Sampler : **TW**
Order number : **12612725**

Laboratory : **Environmental Division Melbourne**
Telephone : **+6138549 9630**
Date Samples Received : **27-Jul-2023**
Issue Date : **02-Aug-2023**
No. of samples received : **5**
No. of samples analysed : **5**

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							
EP231A: Perfluoroalkyl Sulfonic Acids	EM2313591--002	FS02	Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	69.6 %	73.0-123%	Recovery less than lower data quality objective
EP231A: Perfluoroalkyl Sulfonic Acids	EM2313591--002	FS02	Perfluorohexane sulfonic acid (PFHxS)	355-46-4	60.9 %	67.0-130%	Recovery less than lower data quality objective
EP231A: Perfluoroalkyl Sulfonic Acids	EM2313591--002	FS02	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	EM2313591--002	FS02	Perfluorohexanoic acid (PFHxA)	307-24-4	52.5 %	70.0-132%	Recovery less than lower data quality objective
EP231B: Perfluoroalkyl Carboxylic Acids	EM2313591--002	FS02	Perfluoroundecanoic acid (PFUnDA)	2058-94-8	60.2 %	64.0-136%	Recovery less than lower data quality objective
EP231D: (n:2) Fluorotelomer Sulfonic Acids	EM2313591--002	FS02	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	67.6 %	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	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EA055: Moisture Content (Dried @ 105-110°C)								
HDPE Soil Jar (EA055) FS01, FS03	FS02,	20-Jul-2023	----	----	----	28-Jul-2023	03-Aug-2023	✓
HDPE Soil Jar (EA055) FS04,	FS05	21-Jul-2023	----	----	----	28-Jul-2023	04-Aug-2023	✓



Matrix: SOIL Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE Soil Jar (EP231X) FS01, FS03	FS02,	20-Jul-2023	31-Jul-2023	16-Jan-2024	✓	01-Aug-2023	09-Sep-2023	✓
HDPE Soil Jar (EP231X) FS04,	FS05	21-Jul-2023	31-Jul-2023	17-Jan-2024	✓	01-Aug-2023	09-Sep-2023	✓
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE Soil Jar (EP231X) FS01, FS03	FS02,	20-Jul-2023	31-Jul-2023	16-Jan-2024	✓	01-Aug-2023	09-Sep-2023	✓
HDPE Soil Jar (EP231X) FS04,	FS05	21-Jul-2023	31-Jul-2023	17-Jan-2024	✓	01-Aug-2023	09-Sep-2023	✓
EP231C: Perfluoroalkyl Sulfonamides								
HDPE Soil Jar (EP231X) FS01, FS03	FS02,	20-Jul-2023	31-Jul-2023	16-Jan-2024	✓	01-Aug-2023	09-Sep-2023	✓
HDPE Soil Jar (EP231X) FS04,	FS05	21-Jul-2023	31-Jul-2023	17-Jan-2024	✓	01-Aug-2023	09-Sep-2023	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE Soil Jar (EP231X) FS01, FS03	FS02,	20-Jul-2023	31-Jul-2023	16-Jan-2024	✓	01-Aug-2023	09-Sep-2023	✓
HDPE Soil Jar (EP231X) FS04,	FS05	21-Jul-2023	31-Jul-2023	17-Jan-2024	✓	01-Aug-2023	09-Sep-2023	✓
EP231P: PFAS Sums								
HDPE Soil Jar (EP231X) FS01, FS03	FS02,	20-Jul-2023	31-Jul-2023	16-Jan-2024	✓	01-Aug-2023	09-Sep-2023	✓
HDPE Soil Jar (EP231X) FS04,	FS05	21-Jul-2023	31-Jul-2023	17-Jan-2024	✓	01-Aug-2023	09-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)							
Moisture Content	EA055	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	10	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	10	10.00	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.

<i>Analytical Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
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.
<i>Preparation Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
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.



SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : EM2315993

Client : **GHD PTY LTD**
Contact : **TOM DUNCAN**
Address : **Level 4, 211 VICTORIA SQUARE
ADELAIDE SA, AUSTRALIA 5000**

E-mail : **tom.duncan@ghd.com**
Telephone : **----**
Facsimile : **----**

Project : **12612725**
Order number : **----**
C-O-C number : **----**
Site : **----**
Sampler : **BP, LW, NP**

Laboratory : **Environmental Division Melbourne**
Contact : **Peter Ravlic**
Address : **4 Westall Rd Springvale VIC Australia
3171**

E-mail : **peter.ravlic@alsglobal.com**
Telephone : **+6138549 9645**
Facsimile : **+61-3-8549 9626**

Page : **1 of 3**
Quote number : **EB2020GHDSE0038 (EN/005)**
QC Level : **NEPM 2013 B3 & ALS QC Standard**

Dates

Date Samples Received : **06-Sep-2023 12:00**
Client Requested Due : **13-Sep-2023**
Date

Issue Date : **06-Sep-2023**
Scheduled Reporting Date : **13-Sep-2023**

Delivery Details

Mode of Delivery : **Carrier**
No. of coolers/boxes : **1**
Receipt Detail :

Security Seal : **Not Available**
Temperature : **6.1°C - Ice Bricks present**
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 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 - EP231X (solids) PFAS - Full Suite (28 analytes)
EM2315993-001	03-Sep-2023 00:00	FS01	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

ACCOUNTS PAYABLE

Email accountspayableAU@ghd.com

Email accountspayableAU@ghd.com

Email ben.petticrew@ghd.com

Email ben.petticrew@ghd.com

Email ben.petticrew@ghd.com

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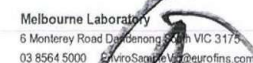
Email tom.duncan@ghd.com

Email tom.duncan@ghd.com

Email tom.duncan@ghd.com

Email tom.duncan@ghd.com

Email tom.duncan@ghd.com



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



CERTIFICATE OF ANALYSIS

Work Order : EM2315993
Client : GHD PTY LTD
Contact : TOM DUNCAN
Address : Level 4, 211 VICTORIA SQUARE
ADELAIDE SA, AUSTRALIA 5000
Telephone : ----
Project : 12612725
Order number : ----
C-O-C number : ----
Sampler : BP, LW, NP
Site :
Quote number : EN/005
No. of samples received : 1
No. of samples analysed : 1

Page : 1 of 5
Laboratory : Environmental Division Melbourne
Contact : Peter Ravlic
Address : 4 Westall Rd Springvale VIC Australia 3171
Telephone : +6138549 9645
Date Samples Received : 06-Sep-2023 12:00
Date Analysis Commenced : 11-Sep-2023
Issue Date : 12-Sep-2023 13:46



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: Poor matrix spike recovery for sample EM2315814-017 due to sample matrix interference.
- 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

				FS01	----	----	----	----
Sampling date / time				03-Sep-2023 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	EM2315993-001	-----	-----	-----	-----
Result				-----	-----	-----	-----	-----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	30.8	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	0.0008	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0037	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	0.0025	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	----	----	----	----



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	FS01	----	----	----	----
Sampling date / time					03-Sep-2023 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		EM2315993-001	-----	-----	-----	-----
				Result	----	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	----	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg		<0.0005	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<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	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	----	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		0.0070	----	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		0.0045	----	----	----	----
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		0.0045	----	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		106	----	----	----	----
13C8-PFOA	----	0.0002	%		104	----	----	----	----



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 : **EM2315993**

Page : 1 of 7

Client : **GHD PTY LTD**

Laboratory : Environmental Division Melbourne

Contact : **TOM DUNCAN**

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 : 12612725

Date Samples Received : 06-Sep-2023

Order number : ----

Date Analysis Commenced : 11-Sep-2023

C-O-C number : ----

Issue Date : 12-Sep-2023

Sampler : BP, LW, NP

Site :

Quote number : EN/005

No. of samples received : 1

No. of samples analysed : 1



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: 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: 5288367)									
EM2315993-001	FS01	EA055: Moisture Content	----	0.1	%	30.8	31.6	2.4	0% - 20%
EM2316199-009	Anonymous	EA055: Moisture Content	----	0.1	%	7.5	7.7	2.1	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 5288082)									
EM2315814-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	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: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	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
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EM2316163-002	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	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: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0007	0.0008	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 5288082)									
EM2315814-001	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: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	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 (%)
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 5288082) - continued									
EM2315814-001	Anonymous	EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EM2316163-002	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: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 5288082)									
EM2315814-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EM2316163-002	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	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: 5288082)									
EM2315814-001	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
EM2316163-002	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: 5288082)									
EM2315814-001	Anonymous	EP231X: Sum of PFAS	----	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		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
EM2316163-002	Anonymous	EP231X: Sum of PFAS	----	0.0002	mg/kg	0.0007	0.0008	13.3	No Limit
		EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	0.0007	0.0008	13.3	No Limit
		EP231X: Sum of PFAS (WA DER List)	----	0.0002	mg/kg	0.0007	0.0008	13.3	No Limit

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.

Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
	Spike Concentration	Spike Recovery (%)	Acceptable Limits (%)	
		LCS	Low	High
Result				
<0.0002	0.00111 mg/kg	88.2	72.0	128
<0.0002	0.00118 mg/kg	99.9	73.0	123
<0.0002	0.00114 mg/kg	96.4	67.0	130
<0.0002	0.00119 mg/kg	109	70.0	132
<0.0002	0.00116 mg/kg	90.5	68.0	136
<0.0002	0.00121 mg/kg	97.2	59.0	134
<0.001	0.00625 mg/kg	93.2	71.0	135
<0.0002	0.00125 mg/kg	96.1	69.0	132
<0.0002	0.00125 mg/kg	90.3	70.0	132
<0.0002	0.00125 mg/kg	97.7	71.0	131
<0.0002	0.00125 mg/kg	101	69.0	133
<0.0002	0.00125 mg/kg	99.2	72.0	129
<0.0002	0.00125 mg/kg	98.5	69.0	133
<0.0002	0.00125 mg/kg	101	64.0	136
<0.0002	0.00125 mg/kg	99.8	69.0	135
<0.0002	0.00125 mg/kg	93.1	66.0	139
<0.0005	0.00312 mg/kg	102	69.0	133
<0.0002	0.00125 mg/kg	93.1	67.0	137
<0.0005	0.00312 mg/kg	105	70.0	130
<0.0005	0.00312 mg/kg	101	70.0	130
<0.0005	0.00312 mg/kg	101	70.0	130
<0.0005	0.00312 mg/kg	102	70.0	130
<0.0002	0.00125 mg/kg	105	63.0	144
<0.0002	0.00125 mg/kg	105	61.0	139

Matrix Spike (MS) Report

Sub-Matrix: SOIL

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: 5288082)							
EM2315814-017	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00111 mg/kg	93.0	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00118 mg/kg	105	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00114 mg/kg	96.2	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00119 mg/kg	111	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00116 mg/kg	88.0	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00121 mg/kg	66.1	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5288082)							
EM2315814-017	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	94.0	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	97.3	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	88.3	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	96.2	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	102	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	100	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	98.3	69.0	133
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	103	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	97.1	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.00125 mg/kg	138	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTTeDA)	376-06-7	0.00312 mg/kg	99.4	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5288082)							



Sub-Matrix: SOIL				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5288082) - continued							
EM2315814-017	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	99.1	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	104	70.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	101	70.0	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	119	70.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	99.6	70.0	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	105	63.0	144
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	85.0	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5288082)							
EM2315814-017	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00117 mg/kg	108	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00119 mg/kg	107	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0012 mg/kg	101	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00121 mg/kg	# 43.5	70.0	130



QA/QC Compliance Assessment to assist with Quality Review

Work Order : EM2315993

Page : 1 of 4

Client : GHD PTY LTD
Contact : TOM DUNCAN
Project : 12612725
Site :
Sampler : BP, LW, NP
Order number : ----

Laboratory : Environmental Division Melbourne
Telephone : +6138549 9645
Date Samples Received : 06-Sep-2023
Issue Date : 12-Sep-2023
No. of samples received : 1
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

- **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	EM2315814--017	Anonymous	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	43.5 %	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	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content (Dried @ 105-110°C)							
HDPE Soil Jar (EA055) FS01	03-Sep-2023	----	----	----	11-Sep-2023	17-Sep-2023	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE Soil Jar (EP231X) FS01	03-Sep-2023	11-Sep-2023	01-Mar-2024	✓	12-Sep-2023	21-Oct-2023	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE Soil Jar (EP231X) FS01	03-Sep-2023	11-Sep-2023	01-Mar-2024	✓	12-Sep-2023	21-Oct-2023	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE Soil Jar (EP231X) FS01	03-Sep-2023	11-Sep-2023	01-Mar-2024	✓	12-Sep-2023	21-Oct-2023	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE Soil Jar (EP231X) FS01	03-Sep-2023	11-Sep-2023	01-Mar-2024	✓	12-Sep-2023	21-Oct-2023	✓
EP231P: PFAS Sums							
HDPE Soil Jar (EP231X) FS01	03-Sep-2023	11-Sep-2023	01-Mar-2024	✓	12-Sep-2023	21-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: **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	14	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	12	16.67	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	12	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	12	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	12	8.33	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.

Appendix G

Tabulated Analytical Results



Appendix G
Table 1
Soil Tabulated Analytical Results

SA MFS
MFS Christie Downs DSI

Misc.	PFAS - Perfluoroalkyl Sulfonic Acids								PFAS - Perfluoroalkyl Carboxylic Acids										
	% Moisture	Perfluoropropanesulfonic acid (PFPrS)	Perfluorobutanesulfonic acid (PFBS)	Perfluoropentanesulfonic acid (PFPeS)	Perfluorohexanesulfonic acid (PFHxS)	Perfluorohexanesulfonic acid (PFHpS)	Perfluorooctanesulfonic acid (PFOS)	Perfluorodecanesulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluorooheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTriDA)	Perfluorotetradecanoic acid (PFTeDA)
EQL	1	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
PFAS NEMP 2.0 2020 Ecological direct exposure							1						10						
PFAS NEMP 2.0 2020 Ecological indirect exposure – Developed sites							0.14 ^{#1}												
PFAS NEMP 2.0 2020 Industrial/ commercial (HIL D)					20		20						50						
PFAS NEMP 2.0 2020 Public open space (HIL C)					1		1						10						
PFAS NEMP 2.0 2020 Residential w/ min opportunities for soil access (HIL B)					2		2						20						
PFAS NEMP 2.0 2020 Residential with garden/accessible soil (HIL A)					0.01		0.01						0.1						
SA MFS Site Specific Criteria - Metropolitan (Staffed)													50						

Location Code	Field ID	Depth	Date	Lab Report Number																			
BH01	BH01 0-0.13	0 - 0.13	19 Jul 2023	1010934	5.0	<0.005	<0.005	<0.005	<0.005	<0.005	0.013	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
	BH01 3.4-3.5	3.4 - 3.5	19 Jul 2023	1010934	10	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
BH02	BH02 0.35-0.45	0.35 - 0.45	19 Jul 2023	1010934	16	<0.005	<0.005	<0.005	0.078	<0.005	3.6	<0.005	<0.005	<0.005	<0.005	0.015	0.0063	0.024	0.0054	0.012	0.37	0.0076	0.072
	BH02 2.7-2.8	2.7 - 2.8	19 Jul 2023	1010934	7.6	0.0059	0.013	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.0064	<0.005	<0.005	0.0091	<0.005	<0.005	<0.005	<0.005
BH03	BH03 0.04-0.14	0.04 - 0.14	20 Jul 2023	1010934	<1	<0.005	<0.005	<0.005	<0.005	<0.005	0.0100	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
	BH03 2.1-2.2	2.1 - 2.2	20 Jul 2023	1010934	12	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
	BH03 BITUMEN	0	20 Jul 2023	1010934	<1	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
BH04/MW01	BH04 0.4-0.5	0.4 - 0.5	20 Jul 2023	1010934	17	<0.005	<0.005	<0.005	0.016	<0.005	0.46	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.0079	0.0056	0.013	0.21	<0.005	0.016
	BH04 2.1-2.2	2.1 - 2.2	20 Jul 2023	1010934	7.5	<0.005	<0.005	<0.005	0.019	<0.005	0.029	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.03	<0.005	<0.005	<0.005	
	MW01 4.5-5.0	4.5 - 5	04 Sep 2023	1023122	7.4	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
	MW01 10.0	10	04 Sep 2023	1023122	7.9	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
	MW01 15.0	15	04 Sep 2023	1023122	1.1	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
	MW01 20.0	20	04 Sep 2023	1023122	<1	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
BH05	BH05 0.12-0.2	0.12 - 0.2	20 Jul 2023	1010934	3.5	<0.005	<0.005	<0.005	<0.005	<0.005	0.0099	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
	BH05 1.8-1.9	1.8 - 1.9	20 Jul 2023	1010934	9.2	<0.005	0.0052	0.0053	0.0079	<0.005	<0.005	<0.005	<0.005	<0.005	0.0058	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
	BH05 CONCRETE	0	20 Jul 2023	1010934	2.2	<0.005	0.012	0.015	0.15	0.013	0.23	<0.005	<0.005	<0.005	<0.005	0.037	0.0061	0.017	<0.005	<0.005	<0.005	<0.005	
BH06	BH06 0.15-0.35	0.15 - 0.35	20 Jul 2023	1010934	2.8	<0.005	<0.005	<0.005	0.015	<0.005	0.13	<0.005	<0.005	<0.005	<0.005	0.0060	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
	BH06 2.4-2.5	2.4 - 2.5	20 Jul 2023	1010934	8.3	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
	BH06 CONCRETE	0	20 Jul 2023	1010934	2.2	0.0079	0.032	0.033	0.11	<0.005	0.024	<0.005	<0.005	0.012	0.076	0.0095	0.0079	<0.005	<0.005	<0.005	<0.005	<0.005	
BH07	BH07 1.0-1.1	1 - 1.1	20 Jul 2023	1010934	9.5	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
	BH07 2.6-2.7	2.6 - 2.7	20 Jul 2023	1010934	5.6	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
	BH07 BITUMEN	0	20 Jul 2023	1010934	<1	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
BH08	BH08 0.05-0.15	0.05 - 0.15	20 Jul 2023	1010934	<1	<0.005	<0.005	<0.005	<0.005	<0.005	0.0064	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
	BH08 0.35-0.45	0.35 - 0.45	20 Jul 2023	1010934	1.3	<0.005	<0.005	<0.005	0.0064	<0.005	0.044	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.0085	<0.005	<0.005	
	BH08 3.2-3.3	3.2 - 3.3	20 Jul 2023	1010934	6.5	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
	BH08 BITUMEN	0	20 Jul 2023	1010934	<1	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
BH09	BH09 0-0.15	0 - 0.15	20 Jul 2023	1010934	12	<0.005	<0.005	<0.005	<0.005	<0.005	0.35	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.027	0.077	0.018	0.14	
	BH09 3.4-3.5	3.4 - 3.5	20 Jul 2023	1010934	12	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
BH10	BH10 0.12-0.3	0.12 - 0.3	21 Jul 2023	1010934	1.6	<0.005	<0.005	<0.005	0.0093	<0.005	0.054	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.024	<0.005	<0.005	<0.005	
	BH10 1.0-1.1	1 - 1.1	21 Jul 2023	1010934	11	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0			



Appendix G
Table 1
Soil Tabulated Analytical Results

SA MFS
MFS Christie Downs DSI

	PFAS - Perfluoroalkyl Sulfonamide							PFAS - Fluorotelomer Sulfonic Acids				PFAS - Sums					PFAS
	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)	Perfluorononane sulfonate (PFNS)
EQL	0.005	0.005	0.005	0.01	0.005	0.005	0.01	0.005	0.01	0.005	0.005	0.005	0.005	0.05	0.005	0.01	0.005
PFAS NEMP 2.0 2020 Ecological direct exposure																	
PFAS NEMP 2.0 2020 Ecological indirect exposure – Developed sites																	
PFAS NEMP 2.0 2020 Industrial/ commercial (HIL D)												20					
PFAS NEMP 2.0 2020 Public open space (HIL C)												1					
PFAS NEMP 2.0 2020 Residential w/ min opportunities for soil access (HIL B)												2 ^{#2}					
PFAS NEMP 2.0 2020 Residential with garden/accessible soil (HIL A)												0.01 ^{#2}					
SA MFS Site Specific Criteria - Metropolitan (Staffed)												14					

Location Code	Field ID	Depth	Date	Lab Report Number															
BH01	BH01 0-0.13	0 - 0.13	19 Jul 2023	1010934	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.005	<0.01	<0.005	<0.005	0.013	0.013	<0.05	0.013
	BH01 3.4-3.5	3.4 - 3.5	19 Jul 2023	1010934	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.005	<0.01	<0.005	<0.005	<0.005	<0.05	<0.005	<0.01
BH02	BH02 0.35-0.45	0.35 - 0.45	19 Jul 2023	1010934	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.005	<0.01	0.033	0.0081	3.678	3.624	4.2564	3.702
	BH02 2.7-2.8	2.7 - 2.8	19 Jul 2023	1010934	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.005	<0.01	<0.005	<0.005	<0.005	<0.005	0.1163	<0.005
BH03	BH03 0.04-0.14	0.04 - 0.14	20 Jul 2023	1010934	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.005	<0.01	<0.005	<0.005	0.01	0.01	<0.05	0.01
	BH03 2.1-2.2	2.1 - 2.2	20 Jul 2023	1010934	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.005	<0.01	<0.005	<0.005	<0.005	<0.05	<0.005	<0.01
BH04/MW01	BH03 BITUMEN	0	20 Jul 2023	1010934	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.005	<0.01	<0.005	<0.005	<0.005	<0.05	<0.005	<0.01
	BH04 0.4-0.5	0.4 - 0.5	20 Jul 2023	1010934	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.005	<0.01	0.029	0.011	0.476	0.4679	0.7685	0.4839
	BH04 2.1-2.2	2.1 - 2.2	20 Jul 2023	1010934	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.005	<0.01	<0.005	<0.005	0.048	0.029	0.078	0.048
	MW01 4.5-5.0	4.5 - 5	04 Sep 2023	1023122	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.005	<0.01	<0.005	<0.005	<0.005	<0.05	<0.005	<0.01
	MW01 10.0	10	04 Sep 2023	1023122	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.005	<0.01	<0.005	<0.005	<0.005	<0.05	<0.005	<0.01
	MW01 15.0	15	04 Sep 2023	1023122	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.005	<0.01	<0.005	<0.005	<0.005	<0.05	<0.005	<0.01
	MW01 20.0	20	04 Sep 2023	1023122	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.005	<0.01	<0.005	<0.005	<0.005	<0.05	<0.005	<0.01
BH05	BH05 0.12-0.2	0.12 - 0.2	20 Jul 2023	1010934	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.005	<0.01	<0.005	<0.005	0.0099	0.0099	<0.05	0.0099
	BH05 1.8-1.9	1.8 - 1.9	20 Jul 2023	1010934	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.005	<0.01	<0.005	<0.005	0.0079	<0.005	<0.05	0.0079
	BH05 CONCRETE	0	20 Jul 2023	1010934	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.005	<0.01	<0.005	<0.005	0.38	0.247	0.5041	0.397
BH06	BH06 0.15-0.35	0.15 - 0.35	20 Jul 2023	1010934	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.005	<0.01	<0.005	<0.005	0.145	0.13	0.151	0.145
	BH06 2.4-2.5	2.4 - 2.5	20 Jul 2023	1010934	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.005	<0.01	<0.005	<0.005	<0.005	<0.05	<0.005	<0.01
	BH06 CONCRETE		20 Jul 2023	1010934	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.005	<0.01	<0.005	<0.005	0.134	0.0319	0.3123	0.1419
BH07	BH07 1.0-1.1	1 - 1.1	20 Jul 2023	1010934	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.005	<0.01	<0.005	<0.005	<0.005	<0.05	<0.005	<0.01
	BH07 2.6-2.7	2.6 - 2.7	20 Jul 2023	1010934	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.005	<0.01	<0.005	<0.005	<0.005	<0.05	<0.005	<0.01
	BH07 BITUMEN	0	20 Jul 2023	1010934	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.005	<0.01	<0.005	<0.005	<0.005	<0.05	<0.005	<0.01
BH08	BH08 0.05-0.15	0.05 - 0.15	20 Jul 2023	1010934	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.005	<0.01	<0.005	<0.005	0.0064	0.0064	<0.05	0.0064
	BH08 0.35-0.45	0.35 - 0.45	20 Jul 2023	1010934	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.005	<0.01	<0.005	<0.005	0.0504	0.044	0.0589	0.0504
	BH08 3.2-3.3	3.2 - 3.3	20 Jul 2023	1010934	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.005	<0.01	<0.005	<0.005	<0.005	<0.05	<0.005	<0.01
BH09	BH08 BITUMEN	0	20 Jul 2023	1010934	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.005	<0.01	<0.005	<0.005	<0.005	<0.05	<0.005	<0.01
	BH09 0-0.15	0 - 0.15	20 Jul 2023	1010934	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.005	<0.01	0.043	0.38	0.35	0.35	1.0461	0.35
	BH09 3.4-3.5	3.4 - 3.5	20 Jul 2023	1010934	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.005	<0.01	<0.005	<0.005	<0.005	<0.05	<0.005	<0.01
BH10	BH10 0.12-0.3	0.12 - 0.3	21 Jul 2023	1010934	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.005	<0.01	<0.005	<0.005	0.0633	0.054	0.0873	0.0633
	BH10 1.0-1.1	1 - 1.1	21 Jul 2023	1010934	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.005	<0.01	<0.005	<0.005	<0.005	<0.05	<0.005	<0.01
BH11	BH11 0.12-0.22	0.12 - 0.22	21 Jul 2023	1010934	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.005	<0.01	<0.005	<0.005	0.008	0.008	<0.05	0.008
	BH11 1.5-1.6	1.5 - 1.6	21 Jul 2023	1010934	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.005	<0.01	<0.005	<0.005	0.118	0.064	0.118	0.118
MW01	MW01 0.05-0.15	0.05 - 0.15	21 Jul 2023	1010934	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.005	<0.01	<0.005	<0.005	<0.005	<0.05	<0.005	<0.01
	MW01 2.0-2.1	2 - 2.1	21 Jul 2023	1010934	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.005	<0.01	<0.005	<0.005	<0.005	<0.05	<0.005	<0.01
MW02	MW02 0.12-0.32	0.12 - 0.32	21 Jul 2023	1010934	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.005	<0.01	<0.005	<0.005	0.0619	0.054	0.0619	0.0619
	MW02 2.2-2.3	2.2 - 2.3	21 Jul 2023	1010934	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.005	<0.01	<0.005	<0.005	<0.005	<0.05	<0.005	<0.01
MW03	MW03 0.12-0.22	0.12 - 0.22	21 Jul 2023	1010934	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.005	<0.01	<0.005	<0.005	0.085	0.073	0.199	0.085
	MW03 3.4-3.5	3.4 - 3.5	21 Jul 2023	1010934	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.005	<0.01	<0.005	<0.005	<0.005	<0.05	<0.005	<0.01
SS01	SS01	0 - 0.1	21 Jul 2023	1010934	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.005	<0.01	<0.005	<0.005	0.0728	0.066	0.1938	0.0728
SS02	SS02	0 - 0.1	21 Jul 2023	1010934	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.005	<0.01	<0.005	<0.005	0.0064	0.0064	<0.05	0.0064
SS03	SS03	0 - 0.1	04 Sep 2023	1023122	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.005	<0.01	<0.005	<0.005	0.01	0.2553	0.25	0.5835
SS04	SS04	0 - 0.1	04 Sep 2023	1023122	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.005	<0.01	<0.005	<0.005	0.0073	0.03	0.1753	0.03
SS05	SS05	0 - 0.1	04 Sep 2023	1023122	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.005	<0.01	<0.005	<0.005	0.015	0.091	0.5058	0.091
SS06	SS06	0 - 0.1	04 Sep 2023	1023122	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.005	<0.01	<0.005	<0.005	<0.005	<0.05	<0.005	<0.01

Comments
#1 This is the higher criterion for (the existing ecological indirect exposure) intensely developed sites with no second:
#2 If the concentration of PFHxS > PFOS this guideline value needs to be adjusted accordingly. Please refer to Section

Environmental Standards
HEPA, Jan 2020, PFAS NEMP 2.0 2020 Ecological direct exposure
HEPA, Jan 2020

Appendix H

Well Permits

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:	441219
Expiry Date:	22/06/2024

Permission is hereby granted to: SOUTH AUSTRALIAN METROPOLITAN FIRE SERVICE
99 WAKEFIELD STREET
ADELAIDE SA 5000

To undertake the following water affecting activity:

Activity: Well Construction

Well Use: Monitoring

CONDITIONS:

1. The activity authorised by this permit must only be undertaken on the land described below:
CT 5534/90
Allotment 121 in Deposited Plan 10165
Hundred of Noarlunga
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.

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 omissions may result in the variation, suspension or revocation of the permit.



Date: 22/06/2023

Alicia Millhouse
Water Licensing Officer
Delegate of Minister for Climate, Environment and Water

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:	441220
Expiry Date:	22/06/2024

Permission is hereby granted to: SOUTH AUSTRALIAN METROPOLITAN FIRE SERVICE
99 WAKEFIELD STREET
ADELAIDE SA 5000

To undertake the following water affecting activity:

Activity: Well Construction

Well Use: Monitoring

CONDITIONS:

1. The activity authorised by this permit must only be undertaken on the land described below:
CT 5534/90
Allotment 121 in Deposited Plan 10165
Hundred of Noarlunga
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.
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7. The activity must not adversely affect water-dependent ecosystems nearby.
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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

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pursuant to section 112 of the Landscape South Australia Act 2019
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Date: 22/06/2023

Alicia Millhouse
Water Licensing Officer
Delegate of Minister for Climate, Environment and Water

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:	441221
Expiry Date:	22/06/2024

Permission is hereby granted to: SOUTH AUSTRALIAN METROPOLITAN FIRE SERVICE
99 WAKEFIELD STREET
ADELAIDE SA 5000

To undertake the following water affecting activity:

Activity: Well Construction

Well Use: Monitoring

CONDITIONS:

1. The activity authorised by this permit must only be undertaken on the land described below:
CT 5534/90
Allotment 121 in Deposited Plan 10165
Hundred of Noarlunga
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.
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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.

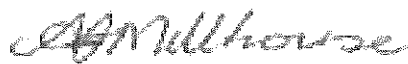
DEPARTMENT FOR ENVIRONMENT AND WATER

Mt Gambier Office | PO Box 1046 | Mt Gambier SA 5290 | [P] 8735 1134 [F] 8735 1135

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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: 22/06/2023

Alicia Millhouse
Water Licensing Officer
Delegate of Minister for Climate, Environment and Water

Appendix I

QAQC Tables

Appendix I - Quality Assurance and Quality Control Report

GHD QA/QC Assessment

1.1 Laboratories and data set

All samples recovered during the detailed site investigation (DSI) were submitted to Eurofins and ALS, both of which are National Association of Testing Authorities (NATA) accredited laboratories, accredited to perform the required analysis.

The selected laboratories conducted all the requested analyses in accordance with the guidelines outlined in NEPM 1999 (as amended 2013).

The laboratories used for sample analysis are set out in Table 1.

Table 1 Analytical laboratories and reports

Laboratory	Primary or Secondary	NATA Certified for Analysis Requested	Report No
Eurofins	Primary	Yes	1010934 1023122
ALS	Secondary	Yes	EM2313591 EM2315993

The primary results for the DSI are outlined in the Tabulated Analytical Results section of the DSI report. The laboratory certificates of analysis are located in the Laboratory Reports section of the DSI report. The QAQC results for the DSI are outlined in the tables at the end of this QAQC report

The data quality assessment detailed in the following pages refers to the data provided in these laboratory reports and the results of the QAQC analysis. Please note this QAQC report excludes results and laboratory reports from historical sampling events.

1.2 Data quality indicators

Table 2 sets out the QA/QC Data Quality Indicators (DQIs) used in the sampling investigation and outcomes for each of these for each DQI.

Table 2 Summary of QA/QC compliance for soil sampling

Item	Objective	Outcome	References
GHD Internal Procedures			
Comparison of field and analytical data	Agreement between visual and olfactory evidence with laboratory results	Achieved	Tabulated Analytical Results Certificates of Analysis Borelogs / Field Records
Calibration of field instruments	Meet calibration specifications	Not required	No on site field instruments utilised during DSI
Chain of Custody documentation	Supply Chain of Custody Documentation with all samples	Achieved	Copies of Chain of Custody Documentation.
Sample analysis and extraction holding times	Comply with holding times	Achieved	Eurofins/ALS Laboratory Quality Control Reports.

Item	Objective	Outcome	References
GHD Internal Procedures			
Analysis of inter and intra-laboratory duplicate samples	Analysis of duplicate samples in 10% of primary samples	Achieved	AS4482.1-2005 and US EPA NEPM 1999 (as amended 2013) and Eurofins/ALS certificates of analysis. PFAS NEMP 2.0
Analysis of duplicate and split samples	Frequencies and RPDs within guideline and internal laboratory limits (RPD of 0-30%)	Minor non-conformances as stated in Table 3	AS4482.1-2005 and US EPA NEPM 1999 (as amended 2013) and Eurofins/ALS certificates of analysis. PFAS NEMP 2.0
External Laboratory Procedures			
Analysis of laboratory method blanks	No contamination of blanks	Achieved	Eurofins/ALS Laboratory Quality Control Reports.
Analysis of laboratory spike recoveries	Recoveries within the laboratory specified recovery limits	Achieved, with some minor non-conformances.	Eurofins/ALS Laboratory Quality Control Reports
Analysis of laboratory internal duplicates	Frequencies and RPDs within guideline and internal laboratory limits (RPD of 0-30%)	Achieved	NEPM 1999 (as amended 2013). Eurofins/ALS Laboratory Quality Control Reports

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.
- 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 a blind duplicate samples.
- Review of results of a split duplicate samples.
- Review of results of a 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 NEMP 2.0 (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:

- 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;
- 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.
- Rinsate samples: A sample of deionised water collected from equipment used during sampling to indicate whether cross contamination occurred from equipment.
- Trip Blanks: A laboratory supplied uncontaminated (blank) deionised water sample which is placed within the ice chest with the samples. This sample is analysed at the laboratory to indicate if contamination occurred during transportation of samples.

A quantitative measure of the duplicate sample results was made using calculated relative percentage difference (RPD) values for each chemical. The RPD values were calculated using the following equation.

$$RPD(\%) = \frac{(C_o - C_s)}{\left(\frac{C_o + C_s}{2}\right)} \times 100$$

Where C_o = reported concentration of the chemical of interest from the original parent sample

C_s = reported concentration of the chemical of interest from the duplicate sample

2. GHD QA/QC

2.1 Duplicate samples

Elevated RPD values for duplicate and split samples are summarised in Table 3 and presented in full in at the end of this Appendix.

Table 3 *Blind duplicate and split duplicate RPD exceedance summary*

Primary Sample	QC Sample (and type)	Analyte	Primary result (mg/kg)	Duplicate Result (mg/kg)	Split result (mg/kg)	Highest RPD (%)
BH06	FD03 – duplicate	PFHxS	0.015	0.011	0.0149	31
		PFOS	0.13	0.094	0.114	32
	FS03 - split	Sum of PFHxS & PFOS	0.145	0.105	0.129	32
		Sum of US EPA PFAS (PFOS + PFOA)	0.13	0.094	-	32
		PFAS (Sum of total)	0.151	0.105	0.148	36
		Sum of enHealth PFAS (PFHxS + PFOS + PFOA)	0.145	0.105	-	32
		PFAS (Sum of Total) (WA DER List)	0.151	0.105	0.141	36
BH08	FD02 – duplicate	PFOS	0.0064	0.01	0.0113	55
		Sum of PFHxS and PFOS	0.0064	0.01	0.0129	67
	FS02 – Split	Sum of US EPA PFAS (PFOS + PFOA)	0.0064	0.1	-	44
		Sum of enHealth PFAS (PFHxS + PFOS + PFOA)	0.0064	0.01	-	44
		PFAS (Sum of Total) (WA DER List)	<0.01	0.01	0.0166	50
SS01	FD05 – Blind	PFHxS	0.0068	0.011	0.0047	47
	FS05 - Split	PFOS	0.066	0.07	0.0386	52
		PFUnDA	0.054	0.059	0.0329	49
		PFTTrDA	0.067	0.058	0.0447	40
		Sum of PFHxS and PFOS	0.0728	0.081	0.0433	51
		PFAS (Sum of Total)	0.1938	0.2031	0.129	40
		PFAS (Sum of Total) (WA DER List)	0.0728	0.081	0.0451	47

SS04	FD01 – Blind	PFOS	0.03	<0.005	0.0037	156
	FS01 - Split	PFUnDA	0.038	<0.005	<0.0002	198
		PFTTrDA	0.1	<0.005	<0.0002	199
		10:2 FTS	0.0073	<0.005	<0.0005	174
		Sum of PFHxS & PFOS	0.03	<0.005	0.0045	148
		Sum of US EPA PFAS (PFOS + PFOA)	0.03	<0.005	-	143
		PFAS (Sum of Total)	0.1753	<0.05	0.0070	185
		Sum of enHealth PFAS (PFHxS + PFOS + PFOA)	0.03	<0.005	-	143
		PFAS (Sum of Total) (WA DER List)	0.03	<0.01	0.0045	148

2.1.1 Soil blind duplicate and split duplicate

The majority of RPDs were calculated within acceptable limits, with the exception of some PFAS analytes in 12 duplicate samples. The elevated RPDs can be attributed to the following:

- Low analyte concentrations close to or below the LOR
- Heterogeneity of soils, particularly soils sampled within fill material

Given the heterogeneity of soils, the majority of results being within the same order of magnitude, and the relatively minor concentrations reported for the majority of elevated RPDs, GHD considers the data set to be of an acceptable quality for which to base the assessment.

2.1.2 Blind duplicate and split duplicate sample frequency

A summary of the blind and split duplicate sample frequency is presented in Table 4.

Table 4 *Blind duplicate and split duplicate frequency summary*

Primary Samples Count	Blind Duplicate Samples Count	Percentage of Primary Samples	Split Samples Count	Percentage of Primary Samples
Soil				
44	5	11.36	5	11.36

The QC rates for the samples satisfies the data quality objectives for this investigation as they are in general accordance with Australian Standard AS4482.1-2005 and the NEMP 2.0 (2020).

2.2 Rinsate blank

Two rinsate blank samples were collected during the DSI and analysed for PFAS. All concentrations of PFAS analytes were reported below the laboratory LOR for analyses carried out, meeting the Data Quality Objectives of the project. The tabulated results for rinsate samples are presented at the end of this Appendix.

3. Laboratory QA/QC

3.1 Internal duplicates

All RPDs for laboratory internal duplicates from the ALS and Eurofins reports were within the laboratory nominated acceptable ranges.

3.2 Matrix spikes

Matrix spikes from the laboratory reports were within the acceptable ranges, with the exception of those presented in Table 5.

Table 5 Matrix spike outliers

Lab report	Analyte	Laboratory comment
EM2313591	Perfluoropentane sulfonic acid (PFPeS)	Recovery less than lower data quality objective
	Perfluorohexane sulfonic acid (PFHxS)	Recovery less than lower data quality objective
	Perfluorooctane sulfonic acid (PFOS)	MS recovery not determined, background level greater than or equal to 4x spike level.
	Perfluorohexanoic acid (PFHxA)	Recovery less than lower data quality objective
	Perfluoroundecanoic (PFUnDA)	Recovery less than lower data quality objective
	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Recovery less than lower data quality objective
EM2315993	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Recovery less than lower data quality objective

3.3 Laboratory control spikes

All laboratory control spikes from the laboratory reports were within the nominated acceptable ranges.

3.4 Method blanks

All reported method blank concentrations were less than their respective laboratory LOR and indicating that potential laboratory cross contamination was unlikely to have occurred.

3.5 Compliance with holding times

All analytes were extracted and analysed within both ALS' and Eurofins' technical holding times.

3.6 Laboratory QA/QC summary

Given the relatively low number of laboratory QA/QC result outliers and the presence of matrix interference in the majority of matrix spike outliers, GHD considered the data to be of satisfactory precision on which to base the assessment.

3.7 Conclusion

Based on the QA/QC program undertaken during the sampling programs, the data obtained during the assessment is considered to be of an acceptable standard on which to base interpretations and draw conclusions regarding the environmental status of the Site.



Appendix I
Table 1
RPD Results

SA MFS
MFS Christie Downs DSI

Field or Interlab Duplicates

Lab Report Number Field ID Location Code Matrix Type Date Sample Type				1010934		RPD	1010934		EM2313591		RPD	1010934		RPD	1010934		EM2313591		RPD
				BH06_0.15-0.35	FD03		BH06_0.15-0.35	FS03	BH07_BITUMEN	FD01		BH07_BITUMEN	FS01						
				BH06	BH06		BH06	BH06	BH07	BH07		BH07	BH07						
				Soil	Soil		Soil	Soil	Soil	Soil		Soil	Soil						
				20 Jul 2023	20 Jul 2023		20 Jul 2023	20 Jul 2023	20 Jul 2023	20 Jul 2023		20 Jul 2023	20 Jul 2023						
				Normal	Field_D		Normal	Interlab_D		Normal	Field_D		Normal	Interlab_D					
	Unit	EQL	RPD																
Misc.																			
% Moisture	%	1		2.8	2.3	20	2.8	-	-	<1	<1	0	<1	-	-	-	-		
Inorganics																			
Moisture (%)	%	0.1		-	-	-	-	1.7	-	-	-	-	-	-	0.2	-	-		
PFAS - Perfluoroalkyl Sulfonic Acids																			
Perfluoropropanesulfonic acid (PFPS)	mg/kg	0.005		<0.005	<0.005	0	<0.005	-	-	<0.005	<0.005	0	<0.005	-	-	-	-		
Perfluorobutane sulfonic acid (PFBS)	mg/kg	0.0002		<0.005	<0.005	0	<0.005	0.0022	0	<0.005	<0.005	0	<0.005	<0.0002	0				
Perfluoropentane sulfonic acid (PFPeS)	mg/kg	0.0002		<0.005	<0.005	0	<0.005	0.0031	0	<0.005	<0.005	0	<0.005	<0.0002	0				
Perfluorohexane sulfonic acid (PFHxS)	mg/kg	0.0002		0.015	0.011	31	0.015	0.0149	1	<0.005	<0.005	0	<0.005	<0.0002	0				
Perfluoroheptane sulfonic acid (PFHpS)	mg/kg	0.0002		<0.005	<0.005	0	<0.005	0.0019	0	<0.005	<0.005	0	<0.005	<0.0002	0				
Perfluorooctane sulfonic acid (PFOS)	mg/kg	0.0002		0.13	0.094	32	0.13	0.114	13	<0.005	<0.005	0	<0.005	0.0004	0				
Perfluorodecanesulfonic acid (PFDS)	mg/kg	0.0002		<0.005	<0.005	0	<0.005	0.0003	0	<0.005	<0.005	0	<0.005	<0.0002	0				
PFAS - Perfluoroalkyl Carboxylic Acids																			
Perfluorobutanoic acid (PFBA)	mg/kg	0.001		<0.005	<0.005	0	<0.005	<0.001	0	<0.005	<0.005	0	<0.005	<0.001	0				
Perfluoropentanoic acid (PFPeA)	mg/kg	0.0002		<0.005	<0.005	0	<0.005	0.0007	0	<0.005	<0.005	0	<0.005	<0.0002	0				
Perfluorohexanoic acid (PFHxA)	mg/kg	0.0002		0.0060	<0.005	18	0.0060	0.0068	12	<0.005	<0.005	0	<0.005	<0.0002	0				
Perfluoroheptanoic acid (PFHpA)	mg/kg	0.0002		<0.005	<0.005	0	<0.005	0.0006	0	<0.005	<0.005	0	<0.005	<0.0002	0				
Perfluorooctanoic acid (PFOA)	mg/kg	0.0002		<0.005	<0.005	0	<0.005	0.0021	0	<0.005	<0.005	0	<0.005	<0.0002	0				
Perfluorononanoic acid (PFNA)	mg/kg	0.0002		<0.005	<0.005	0	<0.005	0.0005	0	<0.005	<0.005	0	<0.005	<0.0002	0				
Perfluorodecanoic acid (PFDA)	mg/kg	0.0002		<0.005	<0.005	0	<0.005	<0.0002	0	<0.005	<0.005	0	<0.005	<0.0002	0				
Perfluoroundecanoic acid (PFUnDA)	mg/kg	0.0002		<0.005	<0.005	0	<0.005	0.0005	0	<0.005	<0.005	0	<0.005	<0.0002	0				
Perfluorododecanoic acid (PFDoDA)	mg/kg	0.0002		<0.005	<0.005	0	<0.005	<0.0002	0	<0.005	<0.005	0	<0.005	<0.0002	0				
Perfluorotridecanoic acid (PFTrDA)	mg/kg	0.0002		<0.005	<0.005	0	<0.005	0.0002	0	<0.005	<0.005	0	<0.005	<0.0002	0				
Perfluorotetradecanoic acid (PFTeDA)	mg/kg	0.0005		<0.005	<0.005	0	<0.005	<0.0005	0	<0.005	<0.005	0	<0.005	<0.0005	0				
PFAS - Perfluoroalkyl Sulfonamide																			
Perfluorooctane sulfonamide (FOSA)	mg/kg	0.0002		<0.005	<0.005	0	<0.005	0.0005	0	<0.005	<0.005	0	<0.005	<0.0002	0				
N-Methyl perfluorooctane sulfonamide (MeFOSA)	mg/kg	0.0005		<0.005	<0.005	0	<0.005	<0.0005	0	<0.005	<0.005	0	<0.005	<0.0005	0				
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	mg/kg	0.0005		<0.005	<0.005	0	<0.005	<0.0005	0	<0.005	<0.005	0	<0.005	<0.0005	0				
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	mg/kg	0.0002		<0.01	<0.01	0	<0.01	<0.0002	0	<0.01	<0.01	0	<0.01	<0.0002	0				
N-Methyl perfluorooctane sulfonamidoethanol (MEFOSE)	mg/kg	0.0005		<0.005	<0.005	0	<0.005	<0.0005	0	<0.005	<0.005	0	<0.005	<0.0005	0				
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	mg/kg	0.0005		<0.005	<0.005	0	<0.005	<0.0005	0	<0.005	<0.005	0	<0.005	<0.0005	0				
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	mg/kg	0.0002		<0.01	<0.01	0	<0.01	<0.0002	0	<0.01	<0.01	0	<0.01	<0.0002	0				
PFAS - Fluorotelomer Sulfonic Acids																			
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	mg/kg	0.0005		<0.005	<0.005	0	<0.005	<0.0005	0	<0.005	<0.005	0	<0.005	<0.0005	0				
6:2 Fluorotelomer Sulfonate (6:2 FTS)	mg/kg	0.0005		<0.01	<0.01	0	<0.01	<0.0005	0	<0.01	<0.01	0	<0.01	<0.0005	0				
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	mg/kg	0.0005		<0.005	<0.005	0	<0.005	<0.0005	0	<0.005	<0.005	0	<0.005	<0.0005	0				
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	mg/kg	0.0005		<0.005	<0.005	0	<0.005	<0.0005	0	<0.005	<0.005	0	<0.005	<0.0005	0				
PFAS - Sums																			
Sum of PFHxS and PFOS	mg/kg	0.0002		0.145	0.105	32	0.145	0.129	12	<0.005	<0.005	0	<0.005	0.0004	0				
Sum of US EPA PFAS (PFOS + PFOA)*	mg/kg	0.005		0.13	0.094	32	0.13	-	-	<0.005	<0.005	0	<0.005	-	-				
PFAS (Sum of Total)	mg/kg	0.0002		0.151	0.105	36	0.151	0.148	2	<0.05	<0.05	0	<0.05	0.0004	0				
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	mg/kg	0.005		0.145	0.105	32	0.145	-	-	<0.005	<0.005	0	<0.005	-	-				
PFAS (Sum of Total)(WA DER List)	mg/kg	0.0002		0.151	0.105	36	0.151	0.141	7	<0.01	<0.01	0	<0.01	0.0004	0				
PFAS																			
Perfluorononane sulfonate (PFNS)	mg/kg	0.005		<0.005	<0.005	0	<0.005	-	-	<0.005	<0.005	0	<0.005	-	-				

*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: 30 (1 - 10 x EQL); 30 (10 - 30 x EQL); 30 (> 30 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



Appendix I
Table 1
RPD Results

SA MFS
MFS Christie Downs DSI

Field or Interlab Duplicates

	Unit	1010934		RPD	1010934		EM2313591	RPD	1010934		RPD	1010934		RPD
		BH08_0.05-0.15	FD02		BH08_0.05-0.15	FS02			MW02_0.12-0.32	FD04		MW02_0.12-0.32	FS04	
		BH08	BH08		BH08	BH08			MW02	MW02		MW02	MW02	
		Soil	Soil		Soil	Soil			Soil	Soil		Soil	Soil	
		20 Jul 2023	20 Jul 2023		20 Jul 2023	20 Jul 2023			21 Jul 2023	21 Jul 2023		21 Jul 2023	21 Jul 2023	
		Normal	Field_D		Normal	Interlab_D			Normal	Field_D		Normal	Interlab_D	
Misc.														
% Moisture	%	<1	<1	0	<1	-	-	-	2.7	2.1	25	2.7	-	-
Inorganics														
Moisture (%)	%	-	-	-	-	1.4	-	-	-	-	-	-	2.5	-
PFAS - Perfluoroalkyl Sulfonic Acids														
Perfluoropropanesulfonic acid (PFPrS)	mg/kg	<0.005	<0.005	0	<0.005	-	-	-	<0.005	<0.005	0	<0.005	-	-
Perfluorobutane sulfonic acid (PFBS)	mg/kg	<0.005	<0.005	0	<0.005	<0.0002	0	0	<0.005	<0.005	0	<0.005	<0.0002	0
Perfluoropentane sulfonic acid (PFPeS)	mg/kg	<0.005	<0.005	0	<0.005	<0.0002	0	0	<0.005	<0.005	0	<0.005	0.0002	0
Perfluorohexane sulfonic acid (PFHxS)	mg/kg	<0.005	<0.005	0	<0.005	0.0016	0	0	0.0079	0.0079	0	0.0079	0.0080	1
Perfluoroheptane sulfonic acid (PFHpS)	mg/kg	<0.005	<0.005	0	<0.005	<0.0002	0	0	<0.005	<0.005	0	<0.005	0.0004	0
Perfluorooctane sulfonic acid (PFOS)	mg/kg	0.0064	0.01	44	0.0064	0.0113	55	0	0.054	0.057	5	0.054	0.0506	7
Perfluorodecanesulfonic acid (PFDS)	mg/kg	<0.005	<0.005	0	<0.005	<0.0002	0	0	<0.005	<0.005	0	<0.005	0.0006	0
PFAS - Perfluoroalkyl Carboxylic Acids														
Perfluorobutanoic acid (PFBA)	mg/kg	<0.005	<0.005	0	<0.005	<0.001	0	0	<0.005	<0.005	0	<0.005	<0.001	0
Perfluoropentanoic acid (PFPeA)	mg/kg	<0.005	<0.005	0	<0.005	0.0009	0	0	<0.005	<0.005	0	<0.005	<0.0002	0
Perfluorohexanoic acid (PFHxA)	mg/kg	<0.005	<0.005	0	<0.005	0.0016	0	0	<0.005	<0.005	0	<0.005	0.0023	0
Perfluoroheptanoic acid (PFHpA)	mg/kg	<0.005	<0.005	0	<0.005	<0.0002	0	0	<0.005	<0.005	0	<0.005	<0.0002	0
Perfluorooctanoic acid (PFOA)	mg/kg	<0.005	<0.005	0	<0.005	<0.0002	0	0	<0.005	<0.005	0	<0.005	0.0006	0
Perfluorononanoic acid (PFNA)	mg/kg	<0.005	<0.005	0	<0.005	0.0007	0	0	<0.005	<0.005	0	<0.005	0.0019	0
Perfluorodecanoic acid (PFDA)	mg/kg	<0.005	<0.005	0	<0.005	<0.0002	0	0	<0.005	<0.005	0	<0.005	0.0002	0
Perfluoroundecanoic acid (PFUnDA)	mg/kg	<0.005	<0.005	0	<0.005	0.0019	0	0	<0.005	<0.005	0	<0.005	0.0036	0
Perfluorododecanoic acid (PFDoDA)	mg/kg	<0.005	<0.005	0	<0.005	<0.0002	0	0	<0.005	<0.005	0	<0.005	<0.0002	0
Perfluorotridecanoic acid (PFTrDA)	mg/kg	<0.005	<0.005	0	<0.005	<0.0002	0	0	<0.005	<0.005	0	<0.005	0.0013	0
Perfluorotetradecanoic acid (PFTeDA)	mg/kg	<0.005	<0.005	0	<0.005	<0.0005	0	0	<0.005	<0.005	0	<0.005	<0.0005	0
PFAS - Perfluoroalkyl Sulfonamide														
Perfluorooctane sulfonamide (FOSA)	mg/kg	<0.005	<0.005	0	<0.005	<0.0002	0	0	<0.005	<0.005	0	<0.005	<0.0002	0
N-Methyl perfluorooctane sulfonamide (MeFOSA)	mg/kg	<0.005	<0.005	0	<0.005	<0.0005	0	0	<0.005	<0.005	0	<0.005	<0.0005	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	mg/kg	<0.005	<0.005	0	<0.005	<0.0005	0	0	<0.005	<0.005	0	<0.005	<0.0005	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	mg/kg	<0.01	<0.01	0	<0.01	<0.0002	0	0	<0.01	<0.01	0	<0.01	<0.0002	0
N-Methyl perfluorooctane sulfonamidoethanol (MEFOSE)	mg/kg	<0.005	<0.005	0	<0.005	<0.0005	0	0	<0.005	<0.005	0	<0.005	<0.0005	0
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	mg/kg	<0.005	<0.005	0	<0.005	<0.0005	0	0	<0.005	<0.005	0	<0.005	<0.0005	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	mg/kg	<0.01	<0.01	0	<0.01	<0.0002	0	0	<0.01	<0.01	0	<0.01	<0.0002	0
PFAS - Fluorotelomer Sulfonic Acids														
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	mg/kg	<0.005	<0.005	0	<0.005	<0.0005	0	0	<0.005	<0.005	0	<0.005	<0.0005	0
6:2 Fluorotelomer Sulfonate (6:2 FTS)	mg/kg	<0.01	<0.01	0	<0.01	0.0012	0	0	<0.01	<0.01	0	<0.01	<0.0005	0
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	mg/kg	<0.005	<0.005	0	<0.005	<0.0005	0	0	<0.005	<0.005	0	<0.005	<0.0005	0
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	mg/kg	<0.005	<0.005	0	<0.005	<0.0005	0	0	<0.005	<0.005	0	<0.005	<0.0005	0
PFAS - Sums														
Sum of PFHxS and PFOS	mg/kg	0.0064	0.01	44	0.0064	0.0129	67	0	0.0619	0.0649	5	0.0619	0.0586	5
Sum of US EPA PFAS (PFOS + PFOA)*	mg/kg	0.0064	0.01	44	0.0064	-	-	0	0.054	0.057	5	0.054	-	-
PFAS (Sum of Total)	mg/kg	<0.05	<0.05	0	<0.05	0.0192	0	0	0.0619	0.0649	5	0.0619	0.0697	12
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	mg/kg	0.0064	0.01	44	0.0064	-	-	0	0.0619	0.0649	5	0.0619	-	-
PFAS (Sum of Total)(WA DER List)	mg/kg	<0.01	0.01	0	<0.01	0.0166	50	0	0.0619	0.0649	5	0.0619	0.0615	1
PFAS														
Perfluorononane sulfonate (PFNS)	mg/kg	<0.005	<0.005	0	<0.005	-	-	-	<0.005	<0.005	0	<0.005	-	-

*RPDs have only been considered where a conce
**Elevated RPDs are highlighted as per QAQC Prc
***Interlab Duplicates are matched on a per comp



Appendix I
Table 1
RPD Results

SA MFS
MFS Christie Downs DSI

Field or Interlab Duplicates

	Unit	1010934		RPD	1010934	EM2313591	RPD	1023122		RPD	1023122	EM2315993	RPD
		SS01	FD05		SS01	FS05		SS04	FD01		SS04	FS01	
		SS01	SS01		SS01	SS01		SS04			SS04		
		Soil	Soil		Soil	Soil		Soil	Soil		Soil	Soil	
		21 Jul 2023	21 Jul 2023		21 Jul 2023	21 Jul 2023		04 Sep 2023	04 Sep 2023		04 Sep 2023	03 Sep 2023	
		Normal	Field_D		Normal	Interlab_D		Normal	Field_D		Normal	Interlab_D	
Misc.													
% Moisture	%	30	29	3	30	-	-	6.7	5.8	14	6.7	-	-
Inorganics													
Moisture (%)	%	-	-	-	-	28.6	-	-	-	-	-	30.8	-
PFAS - Perfluoroalkyl Sulfonic Acids													
Perfluoropropanesulfonic acid (PFPrS)	mg/kg	<0.005	<0.005	0	<0.005	-	-	<0.005	<0.005	0	<0.005	-	-
Perfluorobutane sulfonic acid (PFBS)	mg/kg	<0.005	<0.005	0	<0.005	<0.0002	0	<0.005	<0.005	0	<0.005	<0.0002	0
Perfluoropentane sulfonic acid (PFPeS)	mg/kg	<0.005	<0.005	0	<0.005	0.0003	0	<0.005	<0.005	0	<0.005	<0.0002	0
Perfluorohexane sulfonic acid (PFHxS)	mg/kg	0.0068	0.011	47	0.0068	0.0047	37	<0.005	<0.005	0	<0.005	0.0008	0
Perfluoroheptane sulfonic acid (PFHpS)	mg/kg	<0.005	<0.005	0	<0.005	<0.0002	0	<0.005	<0.005	0	<0.005	<0.0002	0
Perfluorooctane sulfonic acid (PFOS)	mg/kg	0.066	0.07	6	0.066	0.0386	52	0.03	<0.005	143	0.03	0.0037	156
Perfluorodecanesulfonic acid (PFDS)	mg/kg	<0.005	<0.005	0	<0.005	0.0008	0	<0.005	<0.005	0	<0.005	<0.0002	0
PFAS - Perfluoroalkyl Carboxylic Acids													
Perfluorobutanoic acid (PFBA)	mg/kg	<0.005	<0.005	0	<0.005	<0.001	0	<0.005	<0.005	0	<0.005	<0.001	0
Perfluoropentanoic acid (PFPeA)	mg/kg	<0.005	<0.005	0	<0.005	0.0006	0	<0.005	<0.005	0	<0.005	<0.0002	0
Perfluorohexanoic acid (PFHxA)	mg/kg	<0.005	<0.005	0	<0.005	0.0004	0	<0.005	<0.005	0	<0.005	<0.0002	0
Perfluoroheptanoic acid (PFHpA)	mg/kg	<0.005	<0.005	0	<0.005	0.0002	0	<0.005	<0.005	0	<0.005	<0.0002	0
Perfluorooctanoic acid (PFOA)	mg/kg	<0.005	<0.005	0	<0.005	0.0006	0	<0.005	<0.005	0	<0.005	<0.0002	0
Perfluorononanoic acid (PFNA)	mg/kg	<0.005	0.0051	2	<0.005	0.0025	0	<0.005	<0.005	0	<0.005	0.0025	0
Perfluorodecanoic acid (PFDA)	mg/kg	<0.005	<0.005	0	<0.005	0.0011	0	<0.005	<0.005	0	<0.005	<0.0002	0
Perfluoroundecanoic acid (PFUnDA)	mg/kg	0.054	0.059	9	0.054	0.0329	49	0.038	<0.005	153	0.038	<0.0002	198
Perfluorododecanoic acid (PFDoDA)	mg/kg	<0.005	<0.005	0	<0.005	0.0020	0	<0.005	<0.005	0	<0.005	<0.0002	0
Perfluorotridecanoic acid (PFTrDA)	mg/kg	0.067	0.058	14	0.067	0.0447	40	0.1	<0.005	181	0.1	<0.0002	199
Perfluorotetradecanoic acid (PFTeDA)	mg/kg	<0.005	<0.005	0	<0.005	<0.0005	0	<0.005	<0.005	0	<0.005	<0.0005	0
PFAS - Perfluoroalkyl Sulfonamide													
Perfluorooctane sulfonamide (FOSA)	mg/kg	<0.005	<0.005	0	<0.005	<0.0002	0	<0.005	<0.005	0	<0.005	<0.0002	0
N-Methyl perfluorooctane sulfonamide (MeFOSA)	mg/kg	<0.005	<0.005	0	<0.005	<0.0005	0	<0.005	<0.005	0	<0.005	<0.0005	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	mg/kg	<0.005	<0.005	0	<0.005	<0.0005	0	<0.005	<0.005	0	<0.005	<0.0005	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	mg/kg	<0.01	<0.01	0	<0.01	<0.0002	0	<0.01	<0.01	0	<0.01	<0.0002	0
N-Methyl perfluorooctane sulfonamidoethanol (MEFOSE)	mg/kg	<0.005	<0.005	0	<0.005	<0.0005	0	<0.005	<0.005	0	<0.005	<0.0005	0
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	mg/kg	<0.005	<0.005	0	<0.005	<0.0005	0	<0.005	<0.005	0	<0.005	<0.0005	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	mg/kg	<0.01	<0.01	0	<0.01	<0.0002	0	<0.01	<0.01	0	<0.01	<0.0002	0
PFAS - Fluorotelomer Sulfonic Acids													
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	mg/kg	<0.005	<0.005	0	<0.005	<0.0005	0	<0.005	<0.005	0	<0.005	<0.0005	0
6:2 Fluorotelomer Sulfonate (6:2 FTS)	mg/kg	<0.01	<0.01	0	<0.01	<0.0005	0	<0.01	<0.01	0	<0.01	<0.0005	0
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	mg/kg	<0.005	<0.005	0	<0.005	<0.0005	0	<0.005	<0.005	0	<0.005	<0.0005	0
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	mg/kg	<0.005	<0.005	0	<0.005	<0.0005	0	0.0073	<0.005	37	0.0073	<0.0005	174
PFAS - Sums													
Sum of PFHxS and PFOS	mg/kg	0.0728	0.081	11	0.0728	0.0433	51	0.03	<0.005	143	0.03	0.0045	148
Sum of US EPA PFAS (PFOS + PFOA)*	mg/kg	0.066	0.07	6	0.066	-	-	0.03	<0.005	143	0.03	-	-
PFAS (Sum of Total)	mg/kg	0.1938	0.2031	5	0.1938	0.129	40	0.1753	<0.05	111	0.1753	0.0070	185
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	mg/kg	0.0728	0.081	11	0.0728	-	-	0.03	<0.005	143	0.03	-	-
PFAS (Sum of Total)(WA DER List)	mg/kg	0.0728	0.081	11	0.0728	0.0451	47	0.03	<0.01	100	0.03	0.0045	148
PFAS													
Perfluorononane sulfonate (PFNS)	mg/kg	<0.005	<0.005	0	<0.005	-	-	<0.005	<0.005	0	<0.005	-	-

*RPDs have only been considered where a conce
**Elevated RPDs are highlighted as per QAQC Prc
***Interlab Duplicates are matched on a per comp



Field Blanks

Lab Report Number Matrix Type Field ID Date			1010934	
			Water	
			RB01	RB02
			20 Jul 2023	21 Jul 2023
	Unit	EQL		
PFAS - Perfluoroalkyl Sulfonic Acids				
Perfluoropropanesulfonic acid (PFPrS)	µg/L	0.01	<0.01	<0.01
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.01	<0.01	<0.01
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.01	<0.01	<0.01
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.01	<0.01	<0.01
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.01	<0.01	<0.01
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.01	<0.01	<0.01
Perfluorodecanesulfonic acid (PFDS)	µg/L	0.01	<0.01	<0.01
PFAS - Perfluoroalkyl Carboxylic Acids				
Perfluorobutanoic acid (PFBA)	µg/L	0.05	<0.05	<0.05
Perfluoropentanoic acid (PFPeA)	µg/L	0.01	<0.01	<0.01
Perfluorohexanoic acid (PFHxA)	µg/L	0.01	<0.01	<0.01
Perfluoroheptanoic acid (PFHpA)	µg/L	0.01	<0.01	<0.01
Perfluorooctanoic acid (PFOA)	µg/L	0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	µg/L	0.01	<0.01	<0.01
Perfluorodecanoic acid (PFDA)	µg/L	0.01	<0.01	<0.01
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.01	<0.01	<0.01
Perfluorododecanoic acid (PFDoDA)	µg/L	0.01	<0.01	<0.01
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.01	<0.01	<0.01
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.01	<0.01	<0.01
PFAS - Perfluoroalkyl Sulfonamide				
Perfluorooctane sulfonamide (FOSA)	µg/L	0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MEFOSE)	µg/L	0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.05	<0.05	<0.05
PFAS - Fluorotelomer Sulfonic Acids				
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.01	<0.01	<0.01
6:2 Fluorotelomer Sulfonate (6:2 FTS)	µg/L	0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.01	<0.01	<0.01
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.01	<0.01	<0.01
PFAS - Sums				
Sum of PFHxS and PFOS	µg/L	0.01	<0.01	<0.01
Sum of US EPA PFAS (PFOS + PFOA)*	µg/L	0.01	<0.01	<0.01
PFAS (Sum of Total)	µg/L	0.1	<0.1	<0.1
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	µg/L	0.01	<0.01	<0.01
PFAS (Sum of Total)(WA DER List)	µg/L	0.05	<0.05	<0.05
PFAS				
Perfluorononane sulfonate (PFNS)	µg/L	0.01	<0.01	<0.01

