Parafield Airport Limited

Parafield Airport

Off-site Groundwater Use Survey & Groundwater Investigation

September 2019

Executive summary

Introduction

Parafield Airport Limited (PAL) engaged GHD Pty Ltd (GHD) to undertake this environmental investigation in the vicinity of Parafield Airport following the identification of elevated Per- and poly-fluoroalkyl substances (PFAS) levels in groundwater at monitoring wells GW3-PFC and P33 which are located airside on the western boundary of the airport and landside in the south western extent of the airport, respectively. Groundwater samples collected at GW3_PFC and P33 reported PFAS concentrations that exceeded the adopted criteria PFAS National Environmental Management Plan (NEMP) 2018 Health Drinking Water. As a result, Adelaide Airport Limited (AAL), in consultation with the South Australian (SA) Environmental Authority (EPA) and other stakeholders, commissioned GHD to undertake an environmental investigation of off-site areas to the west and southwest of the Parafield Airport. This included a bore use survey of residential and recreational properties within the assessment area.

Background

PAL took over operations of Parafield Airport in May 1998 in a leasehold agreement with the Australian Government. PAL is pro-actively managing the response to PFAS related investigations at Parafield Airport based on guidance from Federal and State regulators including the EPA.

Historically, a PFAS containing firefighting foam called 3M Lightwater™ was used for both operational and training purposes at Parafield from the early 1970s until 1986. This period of PFAS foam use at Parafield Airport is limited compared to many other Australian airports, where the use of 3m Lightwater™ continued until 2003 and Ansulite™ was then used until 2010.

As a first step in the process, a qualitative risk assessment was undertaken on and off the airport to identify potential sources of PFAS contamination and the human and ecological receptors potentially impacted by them.

PAL then undertook groundwater and stormwater investigations to improve the understanding of the potential risks identified by the qualitative risk assessment. PAL focused their investigations on assessing potential risks to local residents. Given this focus on local residents, investigations targeted airport boundary locations, particularly those boundary locations with residential areas located down gradient.

Results of the groundwater and stormwater investigations and the qualitative risk assessment were then used by specialist environmental risk assessors to undertake a detailed on and off airport human health and ecological risk assessment (HHERA). In addition to providing an assessment of potential risks associated with PFAS contamination, the HHERA also identified a number of data gaps. PAL undertook further investigations to fill these data gaps and better understand the potential off-airport risks.

The HHERA was updated using the results of the further investigations and a Project Control Group (PCG), including the SA EPA and the Department of Infrastructure, Transport, Cities and Regional Development was established to assess potential risks and determine requirements for additional investigations.

Based on the updated HHERA, the PFAS PCG determined that an off airport groundwater investigation and groundwater use survey were necessary within Bridges Estate (Mawson Lakes) and an area within Parafield Gardens.

In November 2018 PAL engaged GHD to undertake groundwater bore use survey of residential and recreational properties adjacent to the southern boundary (Mawson Lakes) and the western boundary (Parafield Gardens) of Parafield Airport. PAL also engaged GHD to carry out further groundwater investigations within these off-site survey areas and on the airport grounds.

Objectives

The objective of the environmental investigation was to further assess the extent of PFAS impacted groundwater off airport and down hydraulic gradient of existing monitoring wells GWP3-PFC and P33. The study also examined water use at properties within the investigation area.

Scope of Work

The environmental investigation presented in this report consisted of two phases.

Phase 1 investigation included:

- Installation of two on site monitoring wells (P34 and P35) and four off site groundwater monitoring wells (P36 to P39).
- A groundwater monitoring event (GME) including gauging and sampling of one existing monitoring wells (P9) and six newly installed monitoring wells (P34 to P39).
- A groundwater use survey to the south (Area 1) and west (Area 2) of the airport. Area 1 included properties to the north of Elder Smith Road and Mawson Lakes that border the south western boundary of the Airport. Area 2 included properties along the Bardsley Avenue boundary to determine if any users of groundwater from unregistered well existed in these two areas. .

Based on PFAS concentrations above the groundwater acceptance criteria (GAC), as defined in Section 3.1, within the Parafield Gardens investigation area, the groundwater use survey and groundwater investigation were extended. Conversely, PFAS concentrations within the Bridges Estate (Mawson Lakes) survey area were below the GAC (defined in Section 3.1) and other than on-going monitoring, no further investigations were deemed necessary.

Phase 2 investigation included:

- Installation of one on site monitoring wells (P44) and four off site groundwater monitoring wells (P40 to P43)), to improve understanding of potential off-airport risks associated with the former waste oil sump on the airport.
- A GME including gauging and sampling of off-site monitoring wells P40 to P43 and on site monitoring well P44.
- Drilling and sampling of one soil borehole using a hand auger (HA) located on site adjacent to P44 to determine if a localised PFAS source was responsible for the PFAS concentrations observed in monitoring well P44.
- A groundwater use survey of additional properties to the west of the airport boundary (Area 3) which include the Parafield Gardens Soccer and Sports Club, to Kellaway, Mailey and Woodfull and Bradman Streets to Hilditch Drive.
- A groundwater use survey of additional properties to the west of the airport boundary (Area 3) which include the Parafield Gardens Soccer and Sports Club, to Kellaway, Mailey and Woodfull and Bradman Streets to Hilditch Drive.
- A resampling GME was undertaken in March 2019, however due to some discrepancies in the laboratory data a subsequent resampling event was undertaken by GHD in May 2019.

A limited sampling round on three selected wells was also undertaken by Environmental Projects in April 2019 for results comparison.

Report Findings and Conclusions

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

- The first regional aquifer is located at depths ranging between 2.567 metres below ground level (mBGL) (P9) and 6.046 mBGL (GWP1-PFC), and groundwater elevations across the site range between 2.622 metres above height datum (mAHD) (P40) and 8.718 mAHD (P44), as of March 2019.
- Groundwater flow direction was inferred to flow towards the south west towards the Gulf of St. Vincent.
- Review of the WaterConnect bore records indicated that for 62 bores within 2 km radius with available total dissolved solids (TDS) records, TDS values were below 1,200 mg/L for 16 operational bores; however, these bores were either constructed before 1985 and unlikely to be functional, or were drilled to >120 m depth to tertiary aquifer associated with the Managed Aquifer Recharge (MAR) scheme.
- Within the on-airport and off-airport investigation area TDS values (recorded between November 2018 and May 2019) ranged between 997 mg/L (P33) and 13,052 mg/L (P39). An assessment of groundwater salinity indicated that saline groundwater in the vicinity of the site is of poor quality and is unlikely to be suitable for potable use and/or for irrigation of vegetable gardens, recreational use and maintenance of aquatic ecosystems (both fresh and marine).
- The dry weight and leachable PFAS concentrations detected in shallow soil adjacent to P44 did not indicate a significant localised residual source in shallow soil to be present at this location, however detectable leachable PFAS concentrations were detected in shallow soils at this location. PFAS concentrations in soil at this location are not considered to represent a contamination risk to the adjacent stormwater harvesting infrastructure associated with the MAR scheme. This was also confirmed by the results of sampling undertaken by Salisbury Water (provided by AAL) which indicated that stormwater PFAS concentrations were below the drinking water guideline values.
- The current and historical groundwater investigation results indicated presence of potentially two on airport sources contributing to PFAS in groundwater: former firefighting training ground and an unidentified localised source in the northern portion of the airport.
- The extent of PFAS was delineated to the drinking water criterion to the south and to the south-west of the Airport.
- The extent of PFAS has not been delineated to the drinking water criterion to the west of on Airport monitoring well GWP3_PFC. Investigations have not yet been undertaken to the west of P44 and the extent of PFAS to the west of this well location has not been determined. There was some inconsistency of the off-airport results down hydraulic gradient of GWP3-PFC, as no significant decrease in PFAS concentrations have been observed down the hydraulic gradient to the west.
- Off-airport water use survey undertaken for the 122 properties within the Mawson Lakes area indicated that all property owners use mains water for consumption, and only one resident used groundwater bore only for irrigation of lawns, suggesting that there is no pathway for residents to be exposed to PFAS within the Mawson Lakes assessment area.
- Water use survey within the Parafield Gardens area revealed that one residential property and the Parafield Gardens soccer club represented recreational groundwater users,

providing a reliable representation of groundwater use in this investigation area. Both water bores were reported to be registered, in working condition and used for irrigating the lawn. Survey respondents confirmed that groundwater was not plumbed into buildings. Neither of the respondents indicated that they have rainwater tanks that could have been used to store groundwater.

- The CSM indicates that potentially complete exposure pathways may exist via irrigation of vegetable gardens with shallow groundwater, via uptake of shallow groundwater by fruiting trees, which are then consumed and via migration of contaminated groundwater to nearby water bodies. However, the water use survey confirmed that no residents were using water for irrigation of vegetable gardens or fruit trees. Therefore there is not considered to be a pathway for residents to be exposed to PFAS within the water use survey area.

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1. Introduction

1.1 Background

Parafield Airport Limited (PAL) took over operations of Parafield Airport in May 1998 in a leasehold agreement with the Australian Government. Parafield Airport Limited (PAL) is pro-actively managing the response to per- and poly- fluoroalkyl substances' (PFAS)-related investigations at Parafield Airport based on guidance from Federal and State regulators including the Environment Protection Authority.

Historically, a PFAS containing firefighting foam called 3M Lightwater™ was used for both operational and training purposes at Parafield from the early 1970s until 1986. This period of PFAS foam use at Parafield Airport is limited compared to many other Australian airports, where the use of 3M Lightwater™ continued until 2003 and Ansulite™ was then used until 2010.

The process undertaken in assessing potential risks associated with PFAS at Parafield Airport is depicted in Figure 1-1.

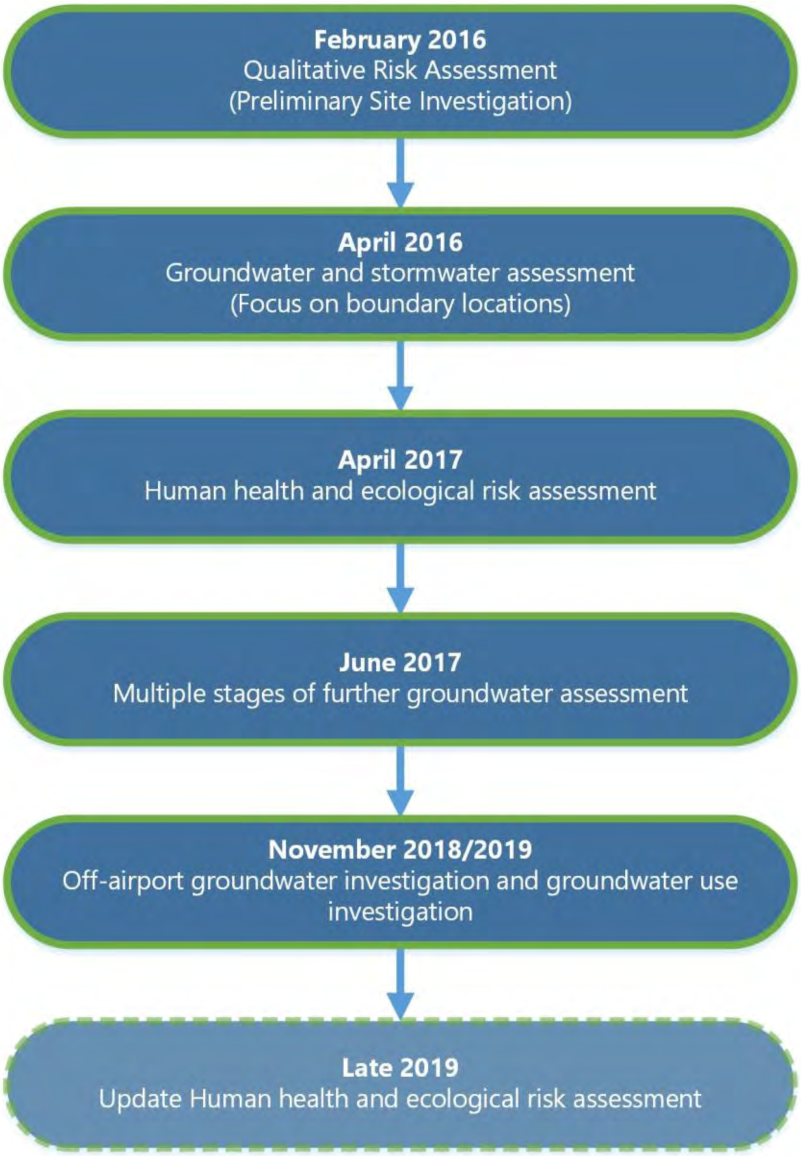


Figure 1-1 – Investigation Process

As a first step in the process, a qualitative risk assessment was undertaken on and off the airport to identify potential sources of PFAS contamination and the human and ecological receptors potentially impacted by them.

PAL then undertook groundwater and stormwater investigations to improve the understanding of the potential risks identified by the qualitative risk assessment. PAL focused their investigations on assessing potential risks to local residents. Given this focus on local residents, investigations targeted airport boundary locations, particularly those boundary locations with residential areas located down gradient.

Results of the groundwater and stormwater investigations and the qualitative risk assessment were then used by specialist environmental risk assessors to undertake a detailed on and off airport human health and ecological risk assessment (HHERA). In addition to providing an assessment of potential risks associated with PFAS contamination, the HHERA also identified a number of data gaps. PAL undertook further investigations to fill these data gaps and better understand the potential off-airport risks.

The HHERA was updated using the results of the further investigations and a project control group (PCG), including the South Australian (SA) Environment Protection Authority (EPA) and the Department of Infrastructure, Transport, Cities and Regional Development was established to assess potential risks and determine requirements for additional investigations.

Based on the updated HHERA, the PFAS PCG determined that an off airport groundwater investigation and groundwater use survey were necessary within Bridges Estate (Mawson Lakes) and an area within Parafield Gardens.

In November 2018 PAL engaged GHD Pty Ltd (GHD) to undertake groundwater bore use survey of residential and recreational properties adjacent to the southern boundary (Mawson Lakes) and the western boundary (Parafield Gardens) of Parafield Airport. PAL also engaged GHD to carry out further groundwater investigations within these off-site survey areas and on the airport grounds.

This report documents the methodology and findings of the water use surveys and groundwater sampling program that were undertaken on-site and in off-site areas to the west and southwest of the Parafield Airport between November 2018 and May 2019.

This report is subject to, and must be read in conjunction with, the limitations set out in Section 1.6 and GHD proposals dated 14 November 2018 and 6 March 2019.

1.2 Previous Investigations Results

1.2.1 General

The following previous environmental investigations have been undertaken at the Parafield Airport site and reviewed by GHD:

- Golder Associates (2016), Site History and Qualitative Risk Assessment of Perfluorinated Chemical Sources – Parafield Airport for Adelaide Airport Limited, Ref 1546945-002-R-Rev1, May 2016
- LBW / Environmental Projects (2016), Adelaide and Parafield Airports PFAS Investigation, 10 August 2016
- GHD Pty Ltd (2016a), Proposed Northern Adelaide Food Park (NAFP) Contamination Site Investigation for Adelaide Airport Limited, Ref 3318216, September 2016
- GHD Pty Ltd (2016b), Parafield Airport Groundwater Well Installation and Sampling Report for Adelaide Airport Limited, Ref 3318216, September 2016

- GHD Pty Ltd (2016c), Proposed Northern Adelaide Food Park Groundwater Investigation for Adelaide Airport Limited, Ref 3318216, December 2016
- Golder Associates (2017), Groundwater Sampling Analysis, Parafield Airport, South Australia for Adelaide Airport Limited, Ref 1784148-001-R-Rev2, 10 August 2017
- GHD Pty Ltd (2018), Proposed Northern Adelaide Food Park Well Installation and Groundwater Monitoring Report for Adelaide Airport Limited, Ref 3318216, January 2018
- Environmental Projects (2018a), Adelaide and Parafield Airports Desktop Review of Current Off-airport Groundwater Use for Adelaide Airport Limited, 7 March 2018
- Environmental Projects (2018b), Parafield Airport Monitoring Well Installation and Sampling for Adelaide Airport Limited, 6 June 2018
- Environmental Risk Sciences Pty Ltd (2018), Human Health and Ecological Risk Assessment for PFAS: Parafield Airport for Adelaide Airport Limited, Ref AALPA/17/R001, 7 August 2018
- Golder Associates (2018) Adelaide and Parafield Airport Groundwater Monitoring for Adelaide Airport Limited, 12 September 2018

1.2.2 Summaries of Previous Investigation

Summaries of the previous investigations undertaken at the site are provided in Table 1.1. Summary of results of historical investigations is provided in Section 10.

Table 1-1 Summary of Previous Investigations

Item	Content
Golder Associates (2016), Site History and Qualitative Risk Assessment of Perfluorinated Chemical Sources – Parafield Airport	
Scope of work	A desktop site history assessment and a qualitative assessment of potential human health and ecological risk associated with identified PFAS sources at Parafield Airport and surrounding properties was undertaken for the purpose of developing an initial understanding of potential PFAS related risks which can be used to guide future intrusive site investigations in areas of potential elevated risk. The scope of works included: • A literature review of known PFAS uses in industry, particularly uses on airports and industrial operations • A kerbside inspection of properties in the immediate vicinity of the airport to assess likely nature of operations on these properties • A review of Sands and McDougall reverse directories to identify owners and activities historically undertaken on adjacent properties • A review of available regional and site-specific hydrogeological information and groundwater bore search • A review of historical fire-fighting training records • A search of the Safework SA Dangerous Goods register to assess records of potential former or current chemical storage on the site • A review of historical environmental reports pertaining to PFCs • A review of AAL tenant responses to a survey of current PFC storage and use, as provided by AAL.
Findings	• Nine onsite areas of interest were identified to contain potential PFAS sources, which could have the potential to pose a risk to human health or the environment if released into the environment (via leak and/or spill, leading to PFC migration beneath the site). These properties are shown on Golder (2016) Figure 2 - Site Layout & Features of Interest (attached in Figures at the end of the report) and included: • Aeroservices Pty Ltd - potential PFC containing hydraulic oil storage in Hangar building

Item	Content
	• Flight Training Adelaide - potential PFC containing hydraulic oil storage • Stark Aviation - potential PFC containing hydraulic oil storage in fuel depot • North Former Fire Fighting Training Ground - historical disposal of sump oil and waste hydraulic fluids • West Former Fire Fighting Training Ground - historical fire-fighting activities • South-East Former Fire Fighting Training Ground - historical fire-fighting activities • Former Fire Station – historical storage of Aqueous Film Forming Foam (AFFF)PFH • Former Landfill Bunker - identified impacts to soil from historical disposal of fire-fighting training waste and possible disposal of AFFF-impacted waste incl. hydraulic fluid • Former Landfill – disposal of waste materials including drums of tar/oil, paints and solvents, demolition waste, scrap metals and timber, tyres, electrical cables and general rubbish; PFCs containing waste including waste hydraulic fluid, coated metals, treated paper and packaging. • The significance of potential on-site risks ranged from low to moderate, with two properties (Former Fire Station and Former Landfill recording “moderate’ risk. • Thirteen (13) offsite properties of interest (within 500 m of the site) were identified to contain potential PFAS sources. Based on their distance from the site (greater than 100 m) and/or their cross gradient location from the site, most properties of interest were not considered to pose a significant risk to the airport site. • Three (3) offsite properties were identified as posing a potential concern, with respect to potential PFAS releases that may impact the airport site through migration within groundwater. These properties included: • Stevenson AC - storage and use of metal plating, coating additives, cleaning products, paper and packaging containing PFC • Adelaide All Clean Carpet Cleaning – storage and use of cleaning products, stain repellents, paper and packaging containing PFC • Blacksilver Painters - storage and use of stain repellents, cleaning products, paper and packaging.
LBW / Environmental Projects (2016), Adelaide and Parafield Airports PFAS Investigation, 10 August 2016	
Scope of work	The objective of this investigation was to assess off airport risks from PFAS, with reference to the regulatory environment. In March 2016, the following scope of works was completed: • Area A (up-hydraulic gradient zone located along the eastern boundary) gauging and sampling of two existing groundwater monitoring wells BGW1 and BGW2 • Area B (down-hydraulic gradient zone located along the western boundary): o gauging and sampling of well P8 in the western corner o gauging and sampling of four newly installed monitoring wells (installed by AAL) GWP1--PFC – GWP4-PFC. • Analysis of all groundwater (GW) samples for the 20 PFAS analytical suite
Findings and Recommendations	• PFAS concentrations were recorded in all GW samples except sample BGW1. • All samples had concentrations below adopted criteria of enHealth Interim National Guidance on human health reference values for

Item	Content
	(PFOS+PFHxS) for Drinking Water (0.5 ug/L) and Recreational Water Quality Guidelines (5 ug/L). • Area A - PFAS concentrations were detected in BGW2, one of two background wells located up-hydraulic gradient of the airport, suggesting a possible off-airport source. This concentration may be due to historic application of AFFF near up-gradient areas around the eastern airport boundary. The scope of investigations couldn't conclusively determine the source. • Area B - Wells located near the western airport boundary, down-gradient of sites of potential historic AFFF use, reported PFAS concentrations below Australian drinking water criteria and well below draft ecological criteria, suggesting that on-airport activities may have contributed to PFAS contamination. • Depth to groundwater indicated a low potential for groundwater to be interacting with surface water at Parafield airport. The following was recommended: • re-sampling of wells sampled using low flow methodology • inclusion of PFAS assessment into the annual groundwater monitoring program.
Summary	The findings of this report initiated further groundwater investigations of PFAS in this portion of the Airport.
GHD (2016a), Proposed Northern Adelaide Food Parl Contamination Site Investigation	
Scope of work	This investigation was undertaken in June 2016 at the proposed Parafield Airport Cross Keys Precinct, Northern Adelaide Food Park (NAFP), which was an undeveloped grassland immediately north of Elder Smith road. This investigation was undertaken to assess possible impacts from the former landfill located at the centre of the NAFP site and potentially contaminants associated with fire training, which occurred adjacent to the site. The scope of works included: • Desktop site history review of the current and past site activities of potential concern • Assessment of contamination status of soil and groundwater at the site through a grid based sampling program • Assessment of contamination status of the development areas for the purpose of identifying significant contamination, threatening future development prospects • Providing baseline data and initial waste classification of soils encountered • Collection of 65 grid based soil samples across the NAFP site up to 3 m below ground level (bgl) and laboratory analysis of CEC, metals, hexavalent chromium, PAH, OCP, OPP, TRH, BTEXN, VOC and PFAS • Groundwater sampling from three (3) existing site monitoring wells (P2, P3 and P6) located in the south-western part of the airport and laboratory analysis of PFAS, TRH, BTEXN, PAH, pH field screening, dissolved metals and the Victorian EPA suite.
Findings	The main findings of the contaminated land investigation were as follows: • The results of the desktop assessment indicated that the site was used as an airport since 1927. Prior to this the site was agricultural land. • Soil was predominantly reworked and natural material to the depth of excavation; two locations identified former landfill with building rubble and fill material. • Concentrations of manganese in two (2) soil samples and barium in one sample exceeded the Airports area of environmental significance guideline values. • Asbestos was not detected in surface soil samples analysed. • Standing water level of groundwater was 2.5 - 2.8 m bgl and groundwater was inferred to be flowing in a south westerly direction.

Item	Content
	• The environmental value for groundwater protection was fresh water aquatic ecosystems based on potential water use and salinity. • Groundwater returned results below the adopted criteria with the exception of chromium (III and VI) (P3), mercury (P3), molybdenum (P2), selenium (P3 and P6), zinc (P2 and P6), PFOS (P3 and P6) and PFHxS (P6).
Recommendations	Based on the above findings further investigations for PFOS, PFOA and PFHxS were recommended if construction was likely to impact groundwater.
Summary	The findings of this report initiated further groundwater investigations of PFAS in this portion of the Airport.
GHD Pty Ltd (2016b), Parafield Airport Groundwater Well Installation and Sampling Report	
Scope of work	A groundwater well installation and monitoring round was conducted in August 2016 to further investigate groundwater PFAS contamination previously identified at the NAFP site and to assess the possible up gradient and cross gradient groundwater PFAS contamination which might have impacted the proposed North Adelaide Food Park Precinct. The scope involved the following: • Installation of seven (7) new groundwater wells (P9 to P11, GWP5_PFC, GWP6_PFC, BGW3 and BGW4) across the airport. • Sampling of the seven (7) new groundwater wells and two (2) existing groundwater wells P6 and P8. • Submission of groundwater samples for laboratory analysis of PFOS, PFOA, 6:2 FtS, 8:2 FtS, TDS, major anions/cations, metals, TOC, PAH, TRH, BTEX, hexavalent chromium and nutrients. • Collection of 73 soil samples from soil boreholes drilled during the well installation to a maximum depth of 8.5 m bgl. • Submission of selected soil and groundwater samples for laboratory analysis of a combination of PFOS, PFOA, 6:2 FtS, 8:2 FtS, PAH, TRH, BTEX, metals, TOC, TIC, major anions/cations and pH. • Assess the range, location and potential for contaminants to be present in groundwater beneath the proposed Northern Adelaide Food Bank • Assess the concentrations of PFAS in groundwater beneath the proposed Northern Adelaide Food Park. • Provide recommendations for further works that may be required on the site
Findings	• Soil pH ranged between 7.9 and 9.1, indicating alkaline nature of soil. • All metal, TRH/BTEX, PAH and PFAS results in soil were reported below the adopted guideline levels. • Groundwater was encountered at depths of 0.7 m to 8.5 m bgl. • The SWL of the groundwater monitoring wells during the August 2016 GME ranged between 0.4 m bToC (P10) and 7.9 m bToC (GWP5-PFC). • TDS results of the groundwater samples ranged from 1,310 mg/L to 8,840 mg/L, indicating high salinity. • Dissolved chromium (III + VI) concentrations exceeded the Airports (1997) Fresh Water Guidelines in two samples (BGW3, 0.01 mg/L and P78, 0.015 mg/L). • Dissolved copper concentrations exceeded the Airports (1997) Fresh Water Guidelines in eight samples (BGW3, BGW4, GWP5-PFC, P10, P11, P6, P8 and P9). • Total iron concentrations exceeded the Airports (1997) Fresh Water Guidelines in four samples (BGW3, BGW4, GWP5-PFC, and P11). • Dissolved zinc concentrations exceeded the Airports (1997) Fresh Water Guidelines in seven samples (BGW3, BGW4, GWP5-PFC, P10, P11, P8 and P9).

Item	Content
	- PFOS exceeded the adopted EISL (toxicity effects on aquatic organisms) in one sample (GW6-PFC, 72.8 µg/L). - PFOS exceeded the adopted HISL (drinking water) in two samples (P11, 3.44 µg/L and P6, 4.35 µg/L). - PFOA exceeded the adopted HISL (consumption of fish) in two samples (P8, 0.01 µg/L and P9, 0.02 µg/L). - PFOA exceeded the adopted HISL (consumption of fish) and HISL (drinking water) in one sample (GW6-PFC).
Summary	The findings of this report initiated further groundwater investigations of PFAS in this portion of the Airport to address identified data gaps and inform the contamination status of groundwater including sampling of GWP3_PFC located on the western boundary of the airport and proposed NAFP.
GHD Pty Ltd (2016c), Proposed Northern Adelaide Food Park Groundwater Investigation	
Scope of work	A groundwater well installation and monitoring round was conducted in November 2016 at the Northern Adelaide Food Park to better inform the master planning for the Northern Adelaide Food Park and close out data gaps from the previous investigation. The scope of works included: - Drilling, sampling, conversion and gauging of 10 soil bores into groundwater monitoring bores. - Gauging and sampling of the new groundwater monitoring wells and the nine (9) existing groundwater monitoring wells. - Soil samples were collected from each of the soil boreholes to a maximum depth of 8.5 m bgl. - Groundwater samples were submitted for laboratory analysis of a combination of PFOS, PFOA, 6:2 FtS, 8:2 FtS, TDS, major anions/cations, metals, TOC, PAH, TRH, BTEX, hexavalent chromium and nutrients. - Soil samples were submitted for laboratory analysis of a combination of PFOS, PFOA, 6:2 FtS, 8:2 FtS, PAH, TRH, BTEX, metals, TOC, TIC, major anions/cations and pH.
Findings	- The pH of the soil ranged between 7.3 and 9.1. - All metal results in soil were reported below the adopted guideline values. - All TRH/BTEX results in soil were reported below the adopted guideline levels except TRH C10 – C40 in one surface soil sample from location P12, which was considered be a localised occurrence. - All PAH results in soil were reported below the adopted guideline levels. - All PFAS results in soil were reported below the adopted guideline levels. - The SWL of the groundwater monitoring wells ranged between 0.622 m bTOC (P10) to 2.488 m bTOC (BGW3). - TDS results of the groundwater samples ranged from 1,104 mg/L to 25,115 mg/L. - Dissolved chromium (III + VI), copper and zinc concentrations exceeded the Airports (1997) Fresh Water Guidelines at several locations. - Dissolved copper concentrations exceeded the Airports (1997) Fresh Water Guidelines at 14 locations (P6, P8-P11, P15, P17-P21, BGW3, BGW4 and GWP5_PFC). - Dissolved zinc concentrations exceeded the Airports (1997) Fresh Water Guidelines at 16 locations (P1, P8-P11, P13-P15, P17-P21, BGW3, BGW4 and GWP5_PFC). - Dissolved zinc concentrations exceeded the NEPM GIL for Fresh Water at nine locations (P8-P11, P13, P15, P20, BGW3 and GWP5_PFC). - All TRH/BTEX and PAHs results in groundwater were reported below the adopted guideline levels.

Item	Content
	• PFHxS + PFOS concentrations exceeded the enHealth interim human health drinking water guideline at 11 locations (P1, P3, P6, P11 - P16, P18 and GWP6_PFC). • PFHxS + PFOS concentrations exceeded the enHealth interim human health recreational water guideline at nine locations (P1, P6, P11 - P13, P15, P16, P18 and GWP6_PFC). • PFOA concentrations exceeded the Airservices HISLs consumption of fish guideline at three locations (P12, P13 and GWP6_PFC). • PFOA concentrations exceeded the Airservices HISLs drinking water guideline at three locations (P12, P13 and GWP6_PFC). • PFOS concentrations exceeded the Airservices HISLs consumption of fish guideline at 15 locations (P1, P3, P6, P8-P16, P18, BGW3 and GWP6_PFC). • PFOS concentrations exceeded the Airservices HISLs drinking water guideline at 11 locations (P1, P3, P6, P11-P13, P14-P16, P18, and GWP6_PFC).
Conclusions and Recommendations	Based on PFAS contamination identified in soils and groundwater at the site, the CSM was developed as follows: • There was unlikely to be a human health risk from the identified contamination for onsite workers for the proposed land use. • There was a potential risk to construction workers during site development, however this could be mitigated by planning of excavation locations and good hygiene practices. The main risk was considered to be through incidental ingestion of water or soils. Dermal exposure has not been identified as a dominant exposure pathway for PFAS. • Treatment and disposal of PFAS contaminated soils was considered to be an option and as soil contamination was limited to the soil/groundwater interface in the vicinity of the adjacent historic fire training ground, excavated material could be managed to separate contaminated/non contaminated material, reducing overall soil management or disposal costs. • Treatment and disposal of extracted groundwater (most likely for dewatering excavations) was considered possible. Any water extracted during the construction phase needs to be managed in accordance with current best practice to ensure no release to the environment of PFAS contaminated groundwater. • A soil and dewatering management plan in accordance with the construction management plan (CEMP) could be developed for the site to mitigate any environmental impacts from the construction site.
Summary	The findings of this investigation initiated a limited sampling round of selected monitoring wells to confirm PFAS concentrations at these locations
Golder Associates (2017), Groundwater Sampling Analysis, Parafield Airport	
Objective and Scope of work	The objectives of the investigation conducted in August 2017 was to assess the groundwater wells located at the peripherals of the proposed NAFP site. The scope of investigation included sampling of groundwater from five (5) existing groundwater wells (P11, P14, P15, P18 and GWP3_PFC) and laboratory analysis of PFAS and heavy metals.

Findings	• No physical evidence of contamination (i.e. hydrocarbon odour, sheen) or presence of non-aqueous phase liquid was detected in groundwater.
	• Elevated concentrations of the following dissolved-phase contaminants exceeded the adopted screening guidelines in one or more monitoring wells:
	  • zinc in the five monitoring wells assessed
	  • cadmium and lead in one monitoring well (P11)

Item	Content
	• chromium in one monitoring well (P15) • PFOS and PFHxS was reported in four monitoring wells (P11, P14, P15 and P18).
Summary	The resampling event showed some temporal fluctuations in PFAS concentrations in groundwater at some locations compared with the previous monitoring round.
GHD Pty Ltd (2018), Proposed Northern Adelaide Food Park Well Installation and Groundwater Monitoring Report	
Objectives and Scope of work	Groundwater monitoring well installation and sampling event was conducted in January 2018 on the southern portion of Parafield Airport in order to assess the contamination status of soil and groundwater and geotechnical conditions within the proposed Enterprise Precinct, to inform the proposed development. The scope included: • The drilling and environmental and geotechnical sampling of 11 soil bores to depths ranging between 4.5 m and 5.7 m bgl. • All soil bores were converted to groundwater monitoring wells (P22 to P32). • Sampling of 11 new groundwater wells and 13 existing wells. • Laboratories analysis of soil samples for a combination of Suite 28 PFAS, TRH, BTEXN, Metals and PFAS Leachability test. • Laboratories analysis of groundwater samples for metals, PFAS, TRH, BTEXN, major anions/cations, TDS and TOC.
Findings	• Soils across the site were observed to consist of natural clayey material with some limited bands of coarser sandy and gravelly material in localised areas. • Chemical concentrations in soil were either below the laboratory LOR or below the nominated assessment criteria. • Leachable concentrations of PFAS in soil were below the laboratory LOR. • Concentrations of PFAS exceeded the nominated site criteria at 10 of the existing wells (GWP6_PFC, P1, P6, P10, P12 to P16 and P18) and eight of the newly installed wells (P24 to P26 and P28 to P32) • Concentrations of PFAS compounds were reported in groundwater at concentrations that may pose an unacceptable risk to sensitive receptors onsite and/or offsite.

Conclusions and Recommendations	• As the current lateral and vertical extent of PFAS impacts have not been delineated down the hydraulic gradient, the risk profile of offsite sensitive receptors have not be confirmed at this stage.
	• The PFAS impacted groundwater underlying the site was not considered to impact the proposed future development providing:
	  • excavation works, undertaken as part of the development, did not extend into saturated soils associated with the first quaternary aquifer
	  • groundwater was not extracted for any beneficial uses as part of future site operations.

Summary	The elevated PFAS concentrations identified on the southern and western boundary of the airport instigated further offsite investigations including an assessment of groundwater use.
Environmental Projects (2018a), Adelaide and Parafield Airports Desktop Review of Current Off-airport Groundwater Use	
Scope of work	A desktop review of off-site groundwater use was conducted to allow evaluation of risk to off-site users from potential groundwater contaminant migration. This included: • Previous investigations desktop review

Item	Content
	• Department of Environment, Water and Natural Resources (DEWNR) licensed bore information considering more detailed data such as well construction logs and geology where available • Historical aerial photographs to establish likely location of wells in the current urban landscape • Locality inspection to assess likelihood of groundwater extraction and use, where warranted • Any likely or known managed aquifer recharge (MAR) activities near or on airport that might affect hydrogeology • Identification of any groundwater extraction activities (such as irrigation of the Adelaide Shores golf course) that might affect hydrogeology • EPA library search for any reports that may be relevant to the review.
Findings	• Approximately 95 wells were located within a 1 km radius of the airport, a subset of which were located within approximately 800m down-hydraulic gradient of the Parafield Airport (westerly to south west direction). • Based on the data available and on probability assumptions such as for example older wells being no longer operational due to casing failure, no wells were found to be likely to be present within 800m of the Airport and in a down hydraulic gradient direction, with potential to be impacted by airport activities and possibility of being in active use.
Recommendations	• The review also suggested that there were no wells likely to be present within 800m of Parafield Airport in a down hydraulic gradient direction, with potential to be impacted by airport activities.
Environmental Projects (2018b), Parafield Airport Monitoring Well Installation and Sampling	
Scope of work	• The scope undertaken in June 2018 included installation and sampling of a single groundwater well near the southern boundary of the site to determine the baseline groundwater condition at that location. • Samples were submitted for laboratory analysis of PFAS
Findings	A baseline of contamination status has been established based on works undertaken, with the laboratory analysis results indicating that the groundwater at location P33 had concentrations of: • PFOS compounds and combined PFHxS + PFOS concentrations exceeding the PFAS NEMP 2018 health-based guideline for drinking and recreational waters. • Groundwater samples collected at GW3_PFC and P33 reported PFAS concentrations that exceeded the adopted criteria PFAS NEMP 2018 Health Drinking Water. • Mercury and zinc concentrations exceeding the AEPR 1997 criteria for freshwater.
Summary	The elevated PFAS concentration reported at well P33 initiated further offsite investigations including a groundwater bore use survey and offsite delineation of PFAS in groundwater.
Environmental Risk Sciences Pty Ltd (2018), Human Health and Ecological Risk Assessment for PFAS: Parafield Airport	
Scope of work	A human health and ecological risk assessment (HHERA) relating to the presence of PFAS at Parafield Airport was conducted. The scope of works included: • The assessment of risks to human health associated with potential direct contact exposures with PFAS compounds in soil, groundwater and surface water. This included consideration of airport workers who may come into direct contact with PFAS impacted soil or water and any airport tenants.

Item	Content
	• Qualitative assessment of risks to on-site environments (aquatic and terrestrial) where relevant. • Identification of data gaps to assist in refining the assessment of risk or in considering additional risk management measures. • Preliminary evaluation of the potential risks to human health and the environment in off-site areas including exposure to public users of off-site bores and surface water and impacts to the aquatic environment from PFAS impacts potentially sourced from the site. For the off-site area: identification of exposure pathways and off-site receptors of concern, any recommendations for additional assessment, and the provision of an updated conceptual site model.
Findings	On-site findings were as follows: • Risk to workers who may contact PFAS contaminated media in the south-west corner of the site were low and acceptable. • With the exception of Vernal Pools Conservation Zone (VPCZ) and some remnant indigenous vegetation outside of the conservation zone, the site had limited ecological value and lacks sensitive environmental receptors. Off-site findings were as follows: • Concentrations of PFOS + PFHxS and PFOA in groundwater on the western and southern boundary of the site, and in downstream surface water sampling locations, were below the screening guidelines for incidental contact, which was relevant to the use of surface water bodies down gradient of the site for secondary contact recreation. • With the exception of locations P18 and SWP2 / SW-DS1, concentrations of PFOS and PFOA in groundwater or surface water that may be discharging off-site were below the Draft ANZECC 80%, 90% and 95% levels for the protection of freshwater systems. Other issues: • The Stormwater Harvesting Facility appeared to have been leased to the City of Salisbury for the purpose of collecting and cleansing stormwater before injecting it into underground aquifers and then reticulating the water for irrigation and use by local businesses, however this was outside the scope of the HHERA. Based on the available information the land use within the NAFP was indicated to be commercial / industrial setting, however confirmation was required that no more sensitive land uses including agricultural or good production land uses were proposed.
Recommendations	• It was recommended that AAL initiate discussions with SA EPA to confirm the relevant protection level for ecosystems within Mawson Lakes and Dry Creek. If the 90%, 95% or 99% protection levels were determined to be relevant, a higher level (quantitative) environmental risk assessment could then be undertaken to further assess risks. • PFAS risk issues were recommended to be considered during the future planning, design, commissioning and/or use of the Stormwater Harvesting Facility by AAL and City of Salisbury (as appropriate). More detailed information was required relating to the proposed land use within the NAFP.

Current GHD investigations followed previous environmental investigations which identified elevated PFAS levels in groundwater at monitoring wells located airside on the western boundary of the airport and landside in the south western extent of the airport, respectively.

The locality of the assessment areas are presented in Figure 1 at the end of this report.

1.3 PFAS Investigations Timeline 2008 – 2019 and development of guideline values

This section provides a summary of the timeline of PFAS Investigations and development of PFAS guidelines from 2008 to 2019, as shown in a diagram in Appendix K and summarised below:

- From 2009 to 2012 Airservices Australia and the Department of Defence encouraged regulators to develop a set of Australian guidelines for PFAS.
- In August 2009 PFOS was added to Annex A of the Stockholm Convention on Persistent Organic Pollutants.
- In August 2010 Airservices advised the SA EPA of the presence of PFAS contamination at Adelaide Airport via the national roadshow.
- In February 2012 PFAS was identified as a first-tier priority contaminant at the Cooperative Research Centre for Contamination and Remediation of the Environment (CRC CARE) forum of regulators and end users (including Airservices).
- Between 2013 and 2015 the CRC CARE Policy Advisory Committee (PAC) considered the available PFAS data and guidance within Australia and overseas and established a PFAS Project Advisory Group (PAG) for existing PFAS guidance and guidance needs. The PAC then established a PFAS Technical Working Group to oversee the development of PFAS guidance.
- In March 2015 a meeting was conducted between CRC CARE PFAS TWG, Airservices and AAL representatives, where the Adelaide Airport Preliminary PFAS report was reviewed.
- In June 2015 Airservices and GHD Managing PFC [PFAS] Contamination at Airports developed the Interim Contamination Management Strategy and Decision Framework.
- Following the emergence of PFAS as a global pollutant of concern, and the development of the Decision Framework and the guidelines, in February 2016 AAL engaged Golder to undertake a Site History and qualitative risk assessment at Parafield Airport in order to develop an understanding of the potential PFAS related risks present on and off of site and to guide future site investigations at areas of elevated potential risk. This desktop review identified a number of potential onsite and offsite locations of PFAS sources which may pose a risk to human health or the environment if released.
- In May 2016 AAL commissioned Golder Associates to conduct a qualitative assessment of potential human health and ecological risk associated with identified PFAS sources at Parafield Airport and surrounding properties. A number of on-site properties were identified to contain potential PFAS sources, which posed potential risk rating of low to moderate. A number of off-site properties were identified to contain potential PFAS sources however were not considered to pose significant risk due to location and distance from site.
- In June 2016 Interim PFAS health based guideline values were released by enHealth (PFOS drinking water guideline value 0.5 ug/L).
- In August 2016 AAL provided a briefing to SA EPA on the findings of the Golder (2016) desktop Qualitative Risk Assessment for the Adelaide Airport, which identified several medium and high risk potential PFAS source areas which have the potential to pose a risk to human health or the environment if released. These included current and historical fire training areas and former onsite landfill.
- In June 2016 GHD was commissioned by AAL to undertake an investigation for the proposed Parafield Airport Cross Keys Precinct, Northern Adelaide Food Park (NAFP) located in the southern portion of the Parafield Airport Precinct, to inform the master planning phase of the precinct and to provide a baseline investigation for future developments. The desktop study

indicated that the site had been in use as an airport since 1927, and was agricultural land prior to this. The soil and groundwater investigations showed some minor statistically insignificant exceedances for metal contamination in the soil. Groundwater results showed exceedances for some metals, PFOS and PFHxS, concluding that PFAS may require further investigation if construction was likely to impact groundwater. The findings of this report initiated further groundwater investigations of PFAS in this portion of the Airport.

- In August 2016 further groundwater investigations were undertaken by GHD to assess the extent of PFAS groundwater contamination identified at the site, and any associated impact to the proposed NAFP plan. While the soil investigation reported PFAS levels below the adopted guidelines, the GME of a total of 9 wells (7 newly installed wells and 2 existing) showed exceedances of PFOS and PFOA above the adopted drinking water guidelines.
- In November 2016 GHD conducted an additional groundwater well installation and GME to further assess the extent of PFAS impacts in the groundwater beneath the proposed NAFP, in particular, relating to the former fire training areas. PFAS contamination was again identified in soils and groundwater at the site. It was concluded that there was unlikely to be a human health risk from the identified contamination for onsite workers for the proposed land use, however there was a potential risk to construction workers during site development, which could be mitigated through planning of excavation locations and good hygiene practices. Similarly, correct management of the treatment and disposal of extracted contaminated soils and groundwater was recommended.
- Between January and April 2017 AAL engaged enRisks to use all Airservices and AAL data to undertake a Human Health and Ecological Risks Assessment, following which additional assessment was undertaken at both airports.
- In August 2017 Golder conducted a GME for groundwater wells located at the peripherals of the proposed NAFP site. Contamination levels above adopted guidelines were observed for some metals, PFOS and PFHxS.
- In January 2018 GHD conducted additional well installation and GME on wells located on the proposed NAFP site, to assess the status of soil and groundwater and geotechnical conditions to further inform the proposed development. Soil still consistently reported contamination levels below adopted criteria. PFAS concentrations in groundwater were found at concentrations which may pose an unacceptable risk to sensitive receptors both onsite and offsite. Notably, the groundwater PFAS impacts had not yet been delineated down the hydraulic gradient, resulting in an inability to confirm the risk to offsite sensitive receptors.
- In order to further assess groundwater use offsite, and identify the risk from potential groundwater contaminant migration to these potential offsite receptors, Environmental Projects was commissioned by AAL to conduct a desktop study. This study identified 95 wells present within a 1 km radius of Parafield airport, a subset of which were located 800 m down hydraulic gradient (west to south westerly direction). It was concluded that none of these wells were found to be likely to be present within 800 m from Parafield Airport in a down hydraulic gradient direction, with potential to be impacted by airport activities.
- In June 2018 AAL commissioned Environmental Projects to conduct an installation and GME of a single groundwater well near the southern boundary of the site to determine the baseline groundwater condition at that location. The results of the investigation indicated PFAS contamination above adopted PFAS NEMP 2018 Health Drinking Water guidelines.
- In August 2018 AAL commissioned Environmental Risk Sciences Pty Ltd to conduct a human health and ecological risk assessment relating to the presence of PFAS at Parafield Airport. The results indicated that risk to human health and ecological receptors were generally low, with some recommendations and need for further consideration.

- In October 2018 Airservices, AAL, DoIRDC and the SA EPA reviewed the results of on-airport investigations and determined the requirement for off-airport water surveys at Adelaide and Parafield Airports. A PFAS project control group (PCG) was established on the 30 October 2018 including GHD, SA Water, Salisbury Council, SA EPA, DoIRD, Airservices, SA Health and AAL.
- In November 2018 following the meeting with AAL, local councils and elected state / federal MPs regarding elevated PFAS results at the Adelaide and Parafield airports, AAL commissioned the Phase 1 groundwater use survey and off-airport investigations in the two areas down-hydraulic gradient at the properties adjacent to the southern boundary (Mawson Lakes) and the western boundary (Parafield Gardens) of Parafield Airport.
- The results were presented by GHD to the PCG in December 2018 and indicated PFAS impact in off-site wells located down-hydraulic gradient (south-west) of the airport.
- In January 2019, based on the results of the Phase 1 PFAS investigations, a Phase 2 groundwater survey and off-airport investigation was undertaken in the area located to the west of the airport at Parafield Gardens. The Phase 2 results were received and presented to PACC, PFAS PCG and AACC in February 2019. The results indicated PFAS impact in off-site wells extended further down-hydraulic gradient (south-west) of the airport.
- In March 2019 the PFAS NEMP 2.0 was released for consultation and the PFAS PCG meeting was conducted.
- Given the variability of the Phase 2 PFAS results groundwater resampling investigations were conducted by GHD in March 2019 and in May 2019 for the 12 on-site and off-site wells.

1.4 Project objective

The objective of the two phases of the environmental investigations was to further assess the extent of PFAS impacted groundwater off airport and down hydraulic gradient of existing monitoring wells GWP3-PFC located on the western boundary and well P33 located on the southern boundary. The study also examined water use at properties within the investigation areas.

1.5 Scope of works

The environmental investigation presented in this report consisted of two (2) phases.

Phase 1 investigation

- Installation of two on site monitoring wells (P34 and P35) and four off airport groundwater monitoring wells (P36 to P39).
- A groundwater monitoring event (GME) including gauging and sampling of one existing monitoring wells (P9) and six newly installed monitoring wells (P34 to P39).
- A groundwater use survey in water survey to the south (Area 1) and west (Area 2) of the airport. Area 1 includes properties to the north of Elder Smith Road and Mawson Lakes that border the south western boundary of the Airport. Area 2 includes properties along the Bardsley Avenue boundary to determine if any users of groundwater from unregistered well existed in these two areas. .

Based on PFAS concentrations above the groundwater acceptance criteria (defined in Section 3.1) within the Parafield Gardens investigation area, the groundwater use survey and groundwater investigation were extended. Conversely, PFAS concentrations within the Bridges Estate (Mawson Lakes) survey area were below the GAC (defined in Section 3.1) and other than on-going monitoring, no further investigations were deemed necessary.

Phase 2 investigation

- Installation of one on-site monitoring well (P44) and four off airport groundwater monitoring wells (P40 to P43), to improve understanding of potential off-airport risks associated with the former waste oil sump on the airport (refer to Golder (2016) Figure 2 Site Layout & Features of Interest appended to this report).
- A GME including gauging and sampling of off-site monitoring wells P40 to P43 and on site monitoring well P44.
- Drilling and sampling of one (1) soil borehole using a hand auger (HA) located on site adjacent to P44 to determine if a localised PFAS source was responsible for the PFAS concentrations observed in monitoring well P44.
- A groundwater use survey of additional properties to the west of the airport boundary (Area 3) which include the Parafield Gardens Soccer and Sports Club, to Kellaway, Mailey and Woodfull and Bradman Streets to Hilditch Drive.
- A resampling GME was undertaken in March 2019, however due to some discrepancies in the laboratory data a subsequent resampling event was undertaken in May 2019. A limited sampling round on three selected wells was also undertaken by Environmental Projects in April 2019.

The monitoring well locations are presented in Figure 2. The survey areas are presented in Figure 3 at the end of this report.

The fieldwork program completed by GHD as part of this environmental investigation is summarised in Table 1-2.

Table 1-2 Summary of fieldwork program

Project Phase	Date	Activity
1	15 November 2018	Gauging and sampling of existing groundwater monitoring well, P9.
	16-21 November 2018	Door knock of 374 properties in water survey areas 1 (Mawson Lakes) and 2 (Parafield Gardens)
	28 – 29 November 2018	An underground service survey was undertaken by a professional service clearance contractor (Pipeline Technology Services) to establish the location(s) of underground services using DBYD (Dial-Before-You-Dig) plans. Six (6) groundwater monitoring wells (P34 to P39) were installed by Geochem Technologies Pty Ltd.
	6 December 2018	Gauging and sampling of the six (6) groundwater monitoring wells (P34–P39). Installed on the 28 and 29 November 2018. A survey of all newly installed wells to Australian Height Datum (AHDm) and Map Grid Australia (MGA) zone 54 in Geocentric Datum of Australia (GDA 94) was undertaken by SKS Surveys to enable the update of groundwater flow directions. Groundwater Survey Data is presented in Appendix A.
2	29 – 30 January 2019	An underground service survey was undertaken by a professional service clearance contractor (Pipeline Technology Services) to establish the location(s) of underground services using DBYD (Dial-Before-You-Dig) plans. Five (5) groundwater monitoring wells (P40 to P44) were installed by WB Drilling Pty Ltd. Door knock of 206 property occupants in survey area 3

Project Phase	Date	Activity
	07 February 2019	Gauging and sampling of the five (5) groundwater monitoring wells (P40 to P44. Gauging of existing groundwater monitoring wells GWP3_PFC, P9, P17, P18 and P33 to P39. A survey of all newly installed wells to AHDm and Map Grid Australia (MGA) zone 54 in Geocentric Datum of Australia (GDA 94) was undertaken by SKS Surveys to enable the update of groundwater flow directions. Groundwater Survey Data is presented in Appendix A.
	14 March 2019	Gauging and sampling of twelve (12) groundwater monitoring wells (GWP1-PFC, GWP2-PFC, GWP3-PFC, P9, P34, P35, P36, P40, P41, P42, P43 and P44). Drilling and sampling of one (1) soil borehole (HA).
	13 May 2019	Gauging and sampling of twelve (12) groundwater monitoring wells (GWP1-PFC, GWP2-PFC, GWP3-PFC, P34, P35, P36, P37, P40, P41, P42, P43 and P44).

1.6 Limitations

This report: has been prepared by GHD for Parafield Airport Limited and may only be used and relied on by Parafield Airport Limited for the purpose agreed between GHD and the Parafield Airport Limited as set out in Section 1.1 of this report.

GHD otherwise disclaims responsibility to any person other than Parafield Airport Limited arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

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

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

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

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

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

Site conditions (including the presence of hazardous substances and/or site contamination) may change after the date of this report. GHD does not accept responsibility arising from, or in connection with, any change to the site conditions. GHD is also not responsible for updating this report if the site conditions change.

2. Assessment area details

2.1 Description of assessment area

The off airport investigation area targeted Parafield Gardens situated to the west of the airport boundary and The Bridges in Mawson Lakes situated to the south west of the airport boundary.

Phase 1 of the investigation targeted:

- Parafield Gardens; the assessment area extended to a distance of approximately 150 m from the western boundary of the airport and targeted the residential area bound by Bradman Road.
- Mawson Lakes; the assessment area extended to a distance of approximately 450 m from the south western boundary of the airport and targeted the residential area entitled The Bridges which is bound by Elder Smith Road.

Phase 2 of the investigation targeted:

- Parafield Gardens; the assessment area was extended to a distance of approximately 500 m from the western airport boundary and targeted the residential area west of Bradman Road.

The locality of the assessment areas are presented in Figure 1 attached to this report.

2.2 Geology and hydrogeology

2.2.1 Regional geology

The Adelaide 1:100,000 geological map sheet (South Australian Department for Mining and Energy, 2013) indicates that the investigation area is underlain by the Pooraka Formation. This is described as clay, sand and carbonate earth, silty sediments with gravel lenses.

2.2.2 Local geology

Based on observations made through this investigation, the site geology was found to contain varying combinations of clayey sand and fine - grain silty clay, often containing trace gravel and organic materials, from the surface to a depth of approximately 0.2 – 0.5 m. This was generally underlain with pale brown to red brown medium to high plasticity clay of –medium to high plasticity. The local geology was considered to be consistent with the regional geology.

The soil field observations are presented in the borehole logs contained in Appendix B.

2.2.3 Regional hydrogeology

The Parafield Airport and surrounding suburbs are classified under Zone 3 by the DWLBC Report (Gerges, 2006).

This zone contains 5 to 6 Quaternary aquifers and 3 to 4 Tertiary aquifers. The first and second Tertiary aquifers are the most productive and contain relatively low salinity levels. As such, the first Tertiary aquifer is the principal source of groundwater abstraction for industrial and recreational use in the area.

The regional groundwater flow direction is towards the south west (Gulf St Vincent).

A search of registered groundwater bores within a 2 km radius of the airport indicated the following:

- A total of 173 registered bores were present within the 2km zone.

- The status of the registered bores were:
    - 23 wells were listed as either not in use, backfilled, abandoned or dry.
    - 134 wells were listed as unknown or blank
    - 16 wells were listed as operational
- The purposes of the registered bores were:
    - 73 were identified as investigation bores
    - 11 were identified as observation bores
    - 10 were identified as irrigation bores
    - 9 were identified as managed aquifer recharge
    - 6 were identified as environmental bores
    - 5 were identified as irrigation/stock watering
    - 5 were identified as monitoring bores
    - 3 were identified as managed aquifer recharge/monitoring bores
    - 2 were identified as investigation/managed aquifer recharge
    - 2 were identified as drainage bores
    - 2 were identified as domestic bores
    - 2 were identified as domestic/irrigation/stock watering
    - 2 were identified as investigation/observation bores
    - 1 was identified for irrigation/observation
    - 1 was identified for domestic/irrigation
    - 1 was identified for exploration/investigation
    - 1 was identified for investigation/observation/managed aquifer recharge
    - 1 was identified for managed aquifer recharge/observation
    - 1 was identified for observation/stock watering
    - 1 was identified for stock watering
    - No purpose information was available for 34 registered bores.

A WaterConnect search summary and plan showing the registered bores within a 2 km radius is presented in Appendix C.

Total dissolved solids (TDS) recorded for 62 bores within 2 km radius indicated TDS values below 1,200 mg/L for 16 operational bores, however, these bores were either constructed before 1985, or drilled to >120 m depth to tertiary aquifer associated with the Managed Aquifer Recharge (MAR) scheme.

Information obtained from the EP Report (2018a) Desktop Review of Current Off-airport Groundwater Use, approximately 95 wells were located within a 1 km radius of the airport, but greater than 800 m of the airport. Review of the status and the locations of the bores indicated that the bores with potential domestic / irrigation uses recorded high salinity (>2,500 uS/cm EC, (human groundwater use unlikely) and were construction before 1985, i.e. unlikely to be functional.

Based on the WaterConnect data review, and assuming that older wells were no longer operational due to casing failure, no wells were considered to be present within 800 m of the Parafield airport and in a down hydraulic gradient direction, with potential to be impacted by airport activities and possibility of being in active use.

Information obtained from the EP Report (2018a) is summarised in Table 2-1 below.

Table 2-1 Summary of Wells Reviewed – Off-site Parafield Airport (EP 2018a)

Well use	Well status / purpose	Aquifer targeted	Approx. no. of wells	No. wells not considered	No. wells with potential for PFAS in groundwater	No. wells within 800m down hydraulic gradient of site	No. wells within 800m of site – with potential for PFAS in groundwater	Comment/reason for not considering further (change in status)
Wells considered to be on-site	NA	Q	16	16	NA	90	NA	Not included in review. One well not down hydraulic gradient, remainder are considered as on-site
Backfilled	BKF / INV or not indicated	Q	2	2	0		0	No longer in use.
Abandoned	ABD / INV		2	2	0		0	Review of historical aerial photographs suggest the location of wells has been built on.
Tertiary Aquifer	OPR, OPQ, NIU, unknown	T	26	26	0		0	Tertiary aquifer is too deep to be at risk from shallow aquifer contaminants (DNAPL excepted). Wells are expected to be cased through the Quaternary aquifer(s).
Service Station related	INV	Q	21	21	0		0	Coles Express Parafield Gardens, BP Investigation wells on a service station site, exposure of general population to groundwater unlikely.
Golf Course & Uni SA	ENG, UNK	Q	16	16	0		0	Purpose not stated but assumed in part for irrigation, exposure of general population to groundwater unlikely, though players could be exposed to irrigation water.
Wetland and Rail Corridor – Mawson Lakes	INV	Q	3	3	0		0	Located along the wetland rail corridor of Mawson Lakes development and in areas of parkland, assume for irrigation in part or monitoring of surface water influence on groundwater. Exposure of general population to groundwater unlikely.
Domestic	OPR, not indicated	Q	2	2	0		0	High salinity (>2,500uS/cm EC) – human groundwater use unlikely. Age of well construction (older than 1985) – unlikely to be functional.
Unknown	UNK or not indicated INV, MON, TWS, not indicated	Q	4	4	0		0	High salinity (>2,500uS/cm EC) – human groundwater use unlikely. Age of well construction (older than 1985) – unlikely to be functional. TDS, SWL and yield not recorded suggesting purpose other than water supply (where TDS and yield are usually measured). Low yield (<0.2 L/s) bores in Hindmarsh Clay are unlikely to have been drilled for water supply.

2.2.4 Local hydrogeology

Using gauging data collected as part the groundwater investigations undertaken between November 2018 and May 2019, Table 2-2 provides a summary of the local hydrogeology. The results are relatively consistent between the sampling rounds.

Table 2-2 Summary of local hydrogeology

Feature	Details
Groundwater Occurrence and Depth to Groundwater	The first regional aquifer is located at depths ranging between 2.56 mBGL (P9) and 6.046 mBGL (GWP1-PFC). Groundwater elevations across the site range between 2.622 mAHD (P40) and 8.718 mAHD (P44).
Groundwater Flow Direction	Groundwater flow direction was inferred to flow towards the south-west (Gulf St Vincent).
Groundwater Gradient	The groundwater gradient was calculated between P34 (4.457 mAHD) and P40 (2.768 mAHD) to be 0.003 m/m.
Effective Porosity	The effective porosity of the clay lithology was assumed to be 0.06.
Seepage Velocity	The seepage velocity of groundwater beneath the site was calculated to range between 1.7 X 10^{-5} m/year and 8.2 X 10^{-3} m/year, with a median / likely of 1.6 X 10^{-3} m/year.
Groundwater Salinity	Total dissolved solids (TDS) in groundwater within a 2 km radius of the Parafield airport site has been reported at concentrations below 1,200 mg/L for 16 operational bores, however, these bores were either constructed before 1985, or drilled to >120 m depth, i.e. to tertiary aquifer associated with the Managed Aquifer Recharge (MAR) scheme. Within the on-airport and off-airport investigation area TDS values (recorded between November 2018 and May 2019) ranged between 997 mg/L (in on-site well P33 located on southern boundary, Feb 2019) and 13,052 mg/L (in off-site well P39, located within Mawson Lakes survey area, Dec 2018).

The groundwater occurrence levels and TDS values in March and May were generally lower than in December, January and February. It should be noted that different combinations of wells were sampled in each round, and a record of the sampling history can be seen in the Analytical Results Summary Tables at the end of this report.

3. Assessment criteria

PFAS was the key contaminant of enquiry as part of this environmental investigation. As such, the assessment criteria adopted for this investigation have been derived from the following guideline document:

- HEPA, 2018. PFAS National Environmental Management Plan, January 2018.

The values for the adopted screening/investigation levels from this contaminant of concern, which are considered to protect identified environmental values, are summarised in Table 3.1 (Groundwater) and Table 3.2 (Soil).

3.1 Groundwater

To assess the contamination status of groundwater at a site, the SA EPA provides a four step process to determine the environmental values of groundwater and to determine if actual or potential harm to groundwater that is not trivial has occurred. The four step process described in the Guideline on the assessment and remediation of site contamination (SA EPA, 2018) is described in Table 3-1.

Table 3-1 Four step process for determining harm to groundwater

Process	Assessment
Step 1: Apply Table 3 of Schedule 1 of the 2015 Water Quality Environment Protection Policy (WQEPP) based on total dissolved solids (TDS) ranges	TDS within the investigation area (recorded between November 2018 and May 2019) ranged between 997 mg/L (in on-site well P33 located on southern boundary, Feb 2019) and 13,052 mg/L (in off-site well P39, located within Mawson Lakes survey area, Dec 2018). The groundwater data in the WaterConnect data base (Step 3) indicated that lower pockets of salinity below 1,200 mg/L are present adjacent to the airport.
Step 2: Assess and identify surface water bodies within a 2 km buffer of the site	Dry Creek is located approximately 740 m to the south east of the airport, which drains into Greenfield Wetlands which are located approximately 1.6 km to the south west of the Site. Dry Creek is considered to represent a freshwater ecosystem and Greenfield Wetland is considered to represent a marine ecosystem.
Step 3: Review registered groundwater users in the WaterConnect database	The registered bore search identified 16 operational bores and 134 bores with unknown status. Registered bores had a variety of purposes and these are listed in Section 2.2.3 above. Remaining bores were either abandoned, not in use, backfilled or dry.
Step 4: Application of the EPA recognised criteria for the most sensitive environmental value	The most sensitive environmental value to be applied to the site is aquatic ecosystem (freshwater).

Based on the above assessment of environmental values for the site, the Australian and New Zealand Guidelines for Fresh and Marine Water Quality Volume 2 and Volume 3 (ANZECC, 2018) will be applied.

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

- Protect users of groundwater for human consumption (where salinity is sufficiently low)
- Protect users, should groundwater be extracted to irrigate vegetable gardens and / or fruit trees with which they grow produce for consumption.

- Protect recreational users, should groundwater be extracted to fill swimming pools within the residential area adjacent and west of the Airport and/or users of nearby surface water bodies.
- Protect freshwater and marine ecosystems.
    - The Dry Creek drainage on the plains from Mawson Lakes into Barker Inlet has been channelised throughout and receives various inputs from stormwater, therefore it is considered to be a moderately to highly modified environment for the purposes of this assessment. Similarly, the northern drainage into the Little Para catchment comprises channelized segments and receives numerous stormwater inflows, therefore it is also considered to be highly modified ecosystem.
    - The Dry Creek and Greenfield Wetland are considered to represent moderately to highly modified environment ecosystems, however, the ANZECC Guidelines (2000) recommend applying for the highly modified environment ecosystems the same guideline as for slightly-moderately disturbed system, therefore, the 95% Species Protection value has been selected to assess the effects of PFAS chemicals on aquatic organisms.

Table 3-2 Adopted PFAS interim screening criteria (Groundwater)

Exposure Scenario	PFOS/PFHxS	PFOA	Source
PFAS NEMP 2018 Freshwater and interim Marine 95% Species Protection – Slightly to Moderately modified ecosystems	0.13 µg/L (PFOS)	220 µg/L	HEPA, 2018
PFAS NEMP 2018 Drinking Water	0.07 µg/L	0.56 µg/L	HEPA, 2018
PFAS NEMP 2018 Health Recreational Water	0.7 µg/L	5.6 µg/L	HEPA, 2018

3.2 Soil

Limited soil samples collected on the airport have been compared to the following assessment criteria based on land use. Soil leachate results have been compared to drinking water criteria as this is the most sensitive use of groundwater adjacent to where the soil samples were collected. The soil criteria are summarised in Table 3-3.

Table 3-3 Adopted PFAS screening criteria (Soil)

Exposure Scenario	PFOS / PFHxS	PFOA	Source
PFAS NEMP 2018 Human Health Screening Values Industrial / Commercial	20 mg/kg	50 mg/kg	HEPA, 2018
PFAS NEMP 2018 Drinking Water	0.7 µg/L	0.56 µg/L	HEPA, 2018

4. Methodology

4.1 Groundwater well installation methodology

Eleven (11) groundwater monitoring wells were installed as part of this environmental investigation. Well installation details are provided in Table 4-1.

Table 4-1 Groundwater well installation methodology

Activity	Details
Underground services locating	Pipeline Technology Services cleared underground services using radio-detection and ground penetrating radar with reference to utility plans provided by Dial Before You Dig (DBYD) prior to any sub-surface works being undertaken.
Well construction	Groundwater Well Permits were obtained from the Department of Environment, Water and Natural Resources (DEWNR). These are contained in Appendix D. The monitoring wells were installed in accordance with the Minimum Construction Requirements for Water Bores in Australia, Edition 3 (2012) and were constructed using 50 mm ID uPVC, Class 18, acid washed threaded standpipe with machine slotted (0.4 mm) screened section. Groundwater monitoring wells, P34 and P36 to P44, were drilled to a depth of 6.0 metres below ground level (mBGL) in order to target the first quaternary aquifer (Q1). Groundwater monitoring well, P35, was drilled to a depth of 7.0 mBGL to ensure sufficient penetration into the Q1 aquifer. The wells were drilled using solid augers. Clean augers were used to drill each well. Wells P34 and P36 to P44 were installed with a 4 m screen from 2.0 to 6.0 mBGL, while P35 was installed with a 4 m screen from 3.0 to 7.0 mBGL. Graded and washed filter sand was installed around and slightly above (0.3 m) the screened interval. Monitoring wells were completed to surface with bentonite and grout. Wells were completed at the surface with either flush mounted gatic covers or standpipes (P34). Details of the monitoring wells construction are provided in the borehole logs in Appendix E.
Well survey	The top of each well casing was surveyed to Australian Height Datum (AHD) Map Grid Australia (MGA) zone 54 in Geocentric Datum of Australia (GDA 94). In the instance where the top of casing was not evenly cut, the highest point of the top of casing was surveyed. The survey data (with reference level at top of casing) is presented in Appendix A.
Well development	The wells were developed following construction by disposable bailer method using a dedicated bailer for each well. GHD considers the development procedure undertaken adequate to prepare the wells for collection of representative groundwater samples.
Purge water disposal	Purged water from the well development was disposed of in a sealed Cleanaway drum and placed in a secure area for disposal off site to a licensed facility.
Soil cuttings	NDD waste and soil cuttings from drilling activities were disposed of in a sealed drum and placed at the Parafield Airport for disposal off site to a licensed facility by Cleanaway.

4.2 Groundwater monitoring and sampling methodology

Details of groundwater monitoring and sampling methodologies are summarised in Table 4-2.

Table 4-2 Groundwater monitoring and sampling methodology

Activity	Details
Well gauging	The standing water level (SWL) and bore depth were gauged and recorded using an Oil / Water Interface Probe. The measurement was taken from the top of the bore casing (TOC). Groundwater parameters (pH, temperature, dissolved oxygen (DO), oxidation-reduction potential (ORP) and electrical conductivity (EC)) were monitored and recorded using a Multi Parameter Water Meter. Well gauging data, as well as, groundwater parameters were recorded on a Groundwater Gauging Sheet and Purging and Sampling Records. The Groundwater Gauging Sheet and Purging and Sampling Records are presented in Appendix B. Equipment Calibration Certificates are contained in Appendix F.
Groundwater sampling	All monitoring wells were sampled using high density Hydrasleeves™ (suitable for PFAS sampling). Groundwater samples were collected directly from the Hydrasleeve™ in laboratory supplied containers (pre-preserved where appropriate) and filled up to minimise headspace.
Sample preservation and transport	Post collection, samples were immediately stored on ice in an insulated cooler. Samples were delivered to the laboratory by GHD Field Staff under Chain of Custody (COC) documentation. COC documentation is presented in Appendix G.
Decontamination	Decontamination of the Oil / Water Interface Meter and sampling equipment was undertaken through a three stage approach. The first stage involved cleaning the equipment using a mixture of pH neutral phosphate free detergent (Decon® Neutracon) in water, followed by a deionised water wash and a final rinse stage. Hydrasleeves™ were disposed of after each use.
QA/QC	Quality control samples were collected at a minimum rate of one replicate pair per 20 primary samples. The replicate pair included one intra-laboratory sample and one inter-laboratory sample. Rinsate samples were collected once per sampling day to assess the potential for cross contamination on reusable sampling equipment.
Purge water disposal	Excess water was disposed of in a sealed drum and placed in a secure area for disposal off site to a licensed facility by Cleanaway.

4.1 Soil sampling methodology

The soil sampling methodology is summarised in Table 4-3.

Table 4-3 Soil sampling methodology

Activity	Details
Sampling	The soil bore was drilled using a hand auger to a maximum depth of 0.2 mBGL. Soil samples were collected directly into a laboratory supplied jars using jar to grab the sample directly from the soil bore and / or hand auger. Soil samples were collected at depths of 0 mBGL to 0.1 mBGL and 0.1 mBGL to 0.2 mBGL. Sampling depths and collection were adjusted for changes in lithology, and visual and olfactory evidence of contamination (where present).
Soil logging	Soils encountered at each sample location were described and recorded on Borehole Logs. Borehole Logs are presented in Appendix E.

Activity	Details
Sample preservation and transport	Post collection, samples were immediately stored on ice in an insulated cooler. Samples were delivered to the laboratory (MGT Eurofins) by GHD Field Staff under Chain of Custody (COC) documentation. COC documentation is presented in Appendix G.
Decontamination	Decontamination of the hand auger used to collect samples was undertaken through a three stage approach. The first stage involved cleaning the equipment using a mixture of pH neutral phosphate free detergent (Decon® Neutracon) in water, followed by a deionised water wash and a final rinse stage.

4.2 Departures from the SAQP

There were no departures from the SAQP (Sampling and Analysis Quality Plan).

4.3 Work health and safety

GHD prepared a project-specific Job Safety and Environmental Analysis (JSEA) for the site works in accordance with Work Health and Safety (WHS) legislation and associated Codes of Practice. The JSEA consisted of a summary of relevant site activities and specific job-related tasks; a hazard register that identifies all foreseeable hazards; risk ranking and risk management measures for each identified hazard; and procedures for monitoring and/or implementing remedial actions to manage all project-based risks. Prior to undertaking the fieldworks, the GHD field representatives and all subcontractors held a pre-start meeting on site. Daily GHD forms were completed before commencement of work each day.

4.4 Laboratory analysis program

4.4.1 Analytical laboratories

GHD consigned all primary groundwater, soil, rinsate and associated intra-laboratory field duplicate (blind) and inter-laboratory duplicate (split) samples to National Measurement Institute (NMI) and ALS Group for analysis.

Certified laboratory documentation including chain of custody records, sample receipt notifications, certificates of analysis and laboratory QA / QC reports are provided in Appendix G.

4.4.2 Sample analysis

Groundwater samples were analysed for PFAS (Full Suite), whereas soil samples were analysed for PFAS (Dry Weight and Leachate).

Table 4.4 summarises the sampling and analysis undertaken for groundwater and soil.

Table 4-4 Laboratory analytical schedule

Sample type	No. primary samples		No. QA samples		Analytical suite
	Collected	Analysed	Collected	Analysed	
Water					
Groundwater	24	24	7	7	PFAS (Full Suite)
Groundwater	12	12	3	3	PFAS (Short Suite)
Soil					

Sample type	No. primary samples		No. QA samples		Analytical suite
	Collected	Analysed	Collected	Analysed	
Soil	2	2	0	0	PFAS (Dry Weight and Leachate)

4.5 Water use survey

The investigation area for the water use survey covers segments of Parafield Gardens and Mawson Lakes in the City of Salisbury that adjoin the airport. Key profile characteristics of these suburbs are presented in Table 4-5.

Table 4-5 Profile of key characteristics of Mawson Lakes and Parafield Gardens

Characteristic	Mawson Lakes		Parafield Gardens	
Population	13,297		16,945	
Median weekly household income	$1,666		$1,140	
Dwelling type				
-separate house	2,771	(59.0%)	5,128	(89.1%)
Semi-detached, row or terrace house, townhouse etc	1,212	(25.8%)	481	(8.4%)
Flat or apartment	703	(15.0%)	141	(2.4%)
Other dwelling	3	(0.1%)	-	-
Rented dwelling	1,922	(41.0%)	1,584	(27.5%)
Internet connection from dwelling	4,351	(92.7%)	4,625	(80.4%)

Source: Australian Bureau of Statistics 2016, Census of Population and Housing

While no registered groundwater bores were located within the investigation area, through an abundance of caution and due to the characteristics of the investigation area, a groundwater use survey was undertaken to determine if there were any users of groundwater from unregistered wells. The survey was designed to capture off-site water use (groundwater, rainwater and mains) of occupants of residential, commercial and recreational properties. Information collected from the survey was used to determine the extent of bore use in the area, how bores are being used and whether additional sampling needs to be conducted to better understand the hydrogeological characteristics of the investigation area adjacent to the south-western boundary of Parafield Airport.

The survey was structured in 3 sections:

1. Demographic- collection of property type and respondent details with the option to provide email or phone details
2. Property water supply source- data on the source of water to the main dwelling/ building and source of water for outdoor/ non-household use
3. Bore water use- data on any groundwater bore, its condition, storage, distribution and use.

A copy of the water use survey is attached in Appendix I.

A survey team door knocked properties in the investigation area to inform occupants of the groundwater investigations and provide the opportunity to participate in the water use survey. Participation in the survey was voluntary. People were also informed that their responses would be private and that information may be shared with Parafield Airport Limited’s technical advisors, the Commonwealth Government, and relevant SA government agencies, organisations, and entities responsible for groundwater regulation.

For people who were present at the time of the doorknock, and willing to participate, survey responses were recorded by the survey team using mobile phones or tablets. In cases where occupants chose not to participate in the survey at the time of the doorknock, a letter and frequently asked questions (FAQ) sheet were provided. Similarly, the letter to residents and FAQ sheet were dropped in letterboxes at properties where no one was home. The letter to residents provided details of the survey providing the opportunity for people to complete it online. The first phase of the online survey was open from 16 November to 21 December 2018 and the second phase from 29 January- 28 February 2019. Residents were also provided the option to call the 1800 hotline for help with the online survey or to ask questions.

5. Results

The following sections summarise the field observations and analytical results of the Preliminary Sampling. Sample locations are shown in Figure 2 at the end of this report. Interpretation and discussion of the results is provided in Section 7.

5.1 Groundwater

5.1.1 Field observations and parameters

Groundwater field physicochemical parameters (pH, electrical conductivity (EC), dissolved oxygen (DO), Redox and temperature) were recorded during the gauging and sampling process. The results were recorded on Purging and Sampling Records, which are presented in Appendix B. The groundwater field physicochemical results recorded at each groundwater monitoring event were relatively consistent, but ranges did vary slightly between events. Results from the March 2019 groundwater monitoring event are summarised as follows:

- The groundwater pH results ranged between pH 7.32 (P44) to pH 8.12 (P42) indicating slightly alkaline groundwater conditions.
- Field EC (recorded between November 2018 and May 2019) ranged from 1,534 µS/cm (P33, Feb 2019) to 20,081 µS/cm (P39, Dec 2018). The calculated TDS values indicated a minimum salinity of 997 mg/L (in on-site well P33 located on southern boundary, Feb 2019) and 13,052 mg/L (in off-site well P39, located within Mawson Lakes survey area, Dec 2018).
- Dissolved oxygen ranged between 1.06 mg/L (P9) and 10.02 mg/L (P44).
- Standard hydrogen electrode (SHE) redox ranged between -107.1 mV (P44) and 174.4 mV (P35).
- Temperature ranged between 20.7 ˚C (P40) and 22.6 ˚C (P34) which are considered within normal ranges for autumn.

5.1.2 Analytical results

The tabulated analytical groundwater results are presented at the end of this report and laboratory reports are provided in Appendix G. Thirty six (36) primary groundwater samples were submitted for laboratory analysis with the results presented below in Table 5-1.

A figure showing groundwater and surface water PFOS concentrations is included as Figure 4 at the end of this report.

Table 5-1 Summary of groundwater analytical results

No. Primary Samples	Analyte	Min Conc. (µg/L)	Max Conc. (µg/L)	Samples exceeding criteria
Phase 1 – December 2018				
PFAS NEMP 2018 Health Recreational Water				
7	PFOS/PFHxS	0.04	0.15	Nil
	PFOS	0.0035	0.055	Nil
	PFOA	<0.001	0.024	Nil
PFAS NEMP 2018 Freshwater/Interim Marine 95% Species Protection – Slightly to Moderately Disturbed Ecosystems				
7	PFOS/PFHxS	0.04	0.15	No applicable criteria
	PFOS	0.0035	0.055	Nil
	PFOA	<0.001	0.024	Nil
PFAS NEMP 2018 Drinking Water				
7	PFOS/PFHxS	0.04	0.15	P34, P36, P37
	PFOS	0.0035	0.055	Nil
	PFOA	<0.001	0.024	Nil
Phase 2 – February 2019				
PFAS NEMP 2018 Health Recreational Water				
5	PFOS/PFHxS	0.057	1.372	P44
	PFOS	0.020	0.24	Nil
	PFOA	0.0031	0.051	Nil
PFAS NEMP 2018 Freshwater/Interim Marine 95% Species Protection – Slightly to Moderately Disturbed Ecosystems				
5	PFOS/PFHxS	0.057	1.372	No applicable criteria
	PFOS	0.020	0.24	P43
	PFOA	0.0031	0.051	Nil
PFAS NEMP 2018 Drinking Water				
5	PFOS/PFHxS	0.057	1.372	P41, P42, P43, P44
	PFOS	0.020	0.24	P43, P44
	PFOA	0.0031	0.051	Nil
Phase 2 – March 2019 Resampling				
PFAS NEMP 2018 Health Recreational Water				
12	PFOS/PFHxS	0.0245	1.658	P44
	PFOS	0.0057	0.058	Nil
	PFOA	<0.001	0.05	Nil
PFAS NEMP 2018 Freshwater/Interim Marine 95% Species Protection – Slightly to Moderately Disturbed Ecosystems				
12	PFOS/PFHxS	0.0245	1.658	No applicable criteria
	PFOS	0.0057	0.058	Nil
	PFOA	<0.001	0.05	Nil
PFAS NEMP 2018 Drinking Water				
12	PFOS/PFHxS	0.0245	1.658	GWP2-PFC, P34, P36, P40, P41, P42, P44
	PFOS	0.0057	0.058	Nil
	PFOA	<0.001	0.05	Nil
Phase 2 – May 2019 Resampling				
PFAS NEMP 2018 Health Recreational Water				
12	PFOS/PFHxS	0.03	1.87	P44
	PFOS	0.02	0.13	Nil

No. Primary Samples	Analyte	Min Conc. (µg/L)	Max Conc. (µg/L)	Samples exceeding criteria
	PFOA	<0.01	0.08	Nil
PFAS NEMP 2018 Freshwater/Interim Marine 95% Species Protection – Slightly to Moderately Disturbed Ecosystems				
12	PFOS/PFHxS	0.03	1.87	No applicable criteria
	PFOS	0.02	0.13	Nil
	PFOA	<0.01	0.08	Nil
PFAS NEMP 2018 Drinking Water				
12	PFOS/PFHxS	0.03	1.87	GWP3-PFC, P34, P36, P37, P41, P42, P44
	PFOS	0.02	0.13	P44
	PFOA	<0.01	0.08	Nil

5.1.1 Limited Resampling by Environmental Projects

Environmental Projects was engaged to resample three (3) groundwater wells: GWP2-PFC, GWP3-PFC and P44. The full report is provided in Appendix J. A summary of the results is presented below in Table 5-2.

Table 5-2 Environmental Projects Resampling Results

No. Primary Samples	Analyte	Min Conc. (µg/L)	Max Conc. (µg/L)	Samples exceeding criteria
PFAS NEMP 2018 Health Recreational Water				
3	PFOS/PFHxS	0.0361	0.121	Nil
	PFOS	0.0162	0.0514	Nil
	PFOA	0.0033	0.004	Nil
PFAS NEMP 2018 Freshwater/Interim Marine 95% Species Protection – Slightly to Moderately Disturbed Ecosystems				
3	PFOS/PFHxS	0.0361	0.121	No applicable criteria
	PFOS	0.0162	0.0514	Nil
	PFOA	0.0033	0.004	Nil
PSAF NEMP 2018 Drinking Water				
3	PFOS/PFHxS	0.0361	0.121	GWP3-PFC
	PFOS	0.0162	0.0514	Nil
	PFOA	0.0033	0.004	Nil

5.2 Soil

5.2.1 Field observations

Based on observations made through this investigation, the site geology was found to contain varying combinations of clayey sand and fine - grain silt, often containing trace gravel and organic materials, from the surface to a depth of approximately 0.2 – 0.5 m. This was generally underlain with pale brown to red brown clay of medium to high plasticity.

The soil field observations are presented in the borehole logs contained in Appendix E.

5.2.2 Analytical results

The tabulated analytical soil results are presented at the end of this report and laboratory reports are provided in Appendix G. Two (2) primary soil samples collected HA01 were submitted for laboratory analysis with the results presented below in Table 5-3.

Table 5-3 Summary of soil analytical results

No. Primary Samples	Sample Type	Analyte	Min Conc.	Max Con.	Samples exceeding criteria
2	Leachate	PFOS / PFHxS	<0.02 µg/L	0.024 µg/L	nil
		PFOA	<0.01 µg/L	<0.01 µg/L	nil
	Dry - Weight	PFOS / PFHxS	<0.002 mg/kg	<0.002 mg/kg	nil
		PFOA	<0.001 mg/kg	<0.001 mg/kg	nil

5.3 Water use

5.3.1 Participation in the survey

The water use survey was conducted in two phases. The initial phase was conducted over 16 to 21 November 2018 in Areas 1 and 2 to the southern-western boundary of the airport where 78 occupants participated in the survey from a total 374 households that were door-knocked. A further 2 surveys were completed by residents online.

The second phase of properties door-knocked extended beyond the Area 2 going further west away from the Airport boundary. The second phase of the survey doorknocked an additional 263 properties and was conducted over 29 to 30 January 2019. The second phase of the survey had 11 respondents participated in the survey. Another 7 surveys were completed by residents online following the door knock and letter drop.

The survey results presented in this report are the aggregated results of the 122 online and face-to-face responses from the doorknock of a total of 637 properties in the investigation area.

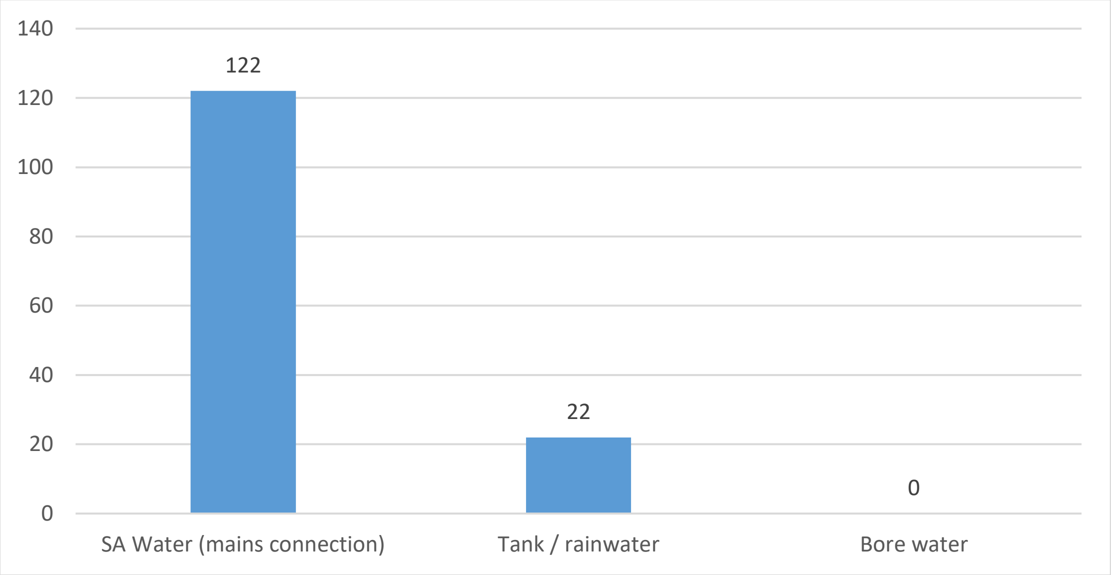
5.3.2 Property type

The vast majority of respondents were private residential property owners a single response from a recreational property occupants, the Parafield Gardens Soccer and Sports Club which uses the Bradman Oval.

5.3.3 Water supply to dwellings or buildings

All survey respondents indicated they had mains water connected to their dwelling or building in the case of the Sports Club. A small number of respondents (n=22) also have tank/ rainwater connected to their house. These results are illustrated in Figure 5-1.

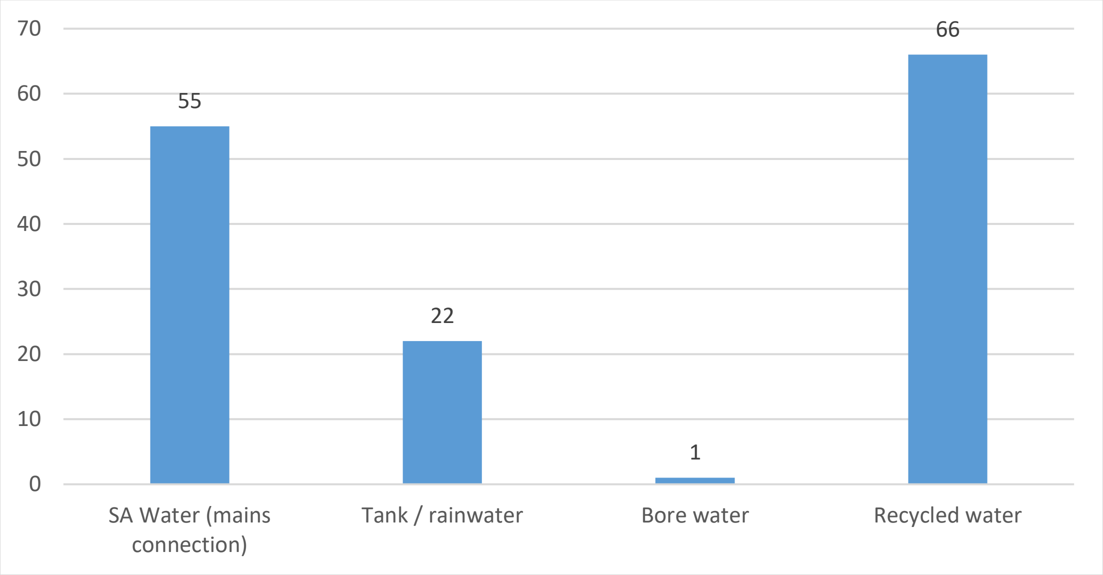
Figure 5-1 Source of water supply to dwelling/ building(s)



5.3.4 Water supply for non-household/ outdoor use

The vast majority of respondents indicated that water supplied for outdoor / non-household use is either recycled (Mawson Lakes) or mains water (Parafield Gardens) with 22 respondents indicating that they also use tank/ rainwater. One respondent indicated they use bore water as illustrated in Figure 5-2.

Figure 5-2 Source of water supply for non-household/ outdoor use



5.3.5 Respondents with groundwater extraction bores

Of the 122 survey participants, 1 respondent indicated they have a groundwater bore on their residential property. In addition, Parafield Gardens Soccer and Sports Club indicated that 2 bores are operated by Council to irrigate the sports grounds. Council have confirmed that these bores extract water from the tertiary aquifer associated with the Managed Aquifer Recharge (MAR) scheme and not associated with shallow groundwater, which is the subject of this investigation.

The participation in the survey is representative of registered bore users in the investigation area with one (1) registered residential bore user, and 10 recreational / community bores.

5.3.6 Bore water use

Both the residential and recreational water bores were reported to be registered, in working condition and used for irrigating the lawn. Survey respondents confirmed that groundwater was not plumbed into buildings. Neither of the respondents indicated that they have rainwater tanks that could have been used to store groundwater.

6. Quality Assurance and Quality Control

Data Quality Indicators (DQIs), Field QA/QC, Laboratory QA/QC and Field QC Results are presented in Appendix H.

GHD considers the data to be valid and of sufficient quality for the purposes of this Environmental Investigation.

7. Discussion

7.1 Variability between Sampling Rounds

Exceedances for Phase 1 and 2 sampling, thus far, have been detected for PFHxS and PFOS/PFHxS whilst no exceedances have been detected for PFOA.

Phase 1 November 2018 Sampling Round

The results for Phase 1 GME in November 2018 showed the following:

- Exceedances of the NEMP Drinking Water Guidelines in on-site well P34 and wells P36 and P37 located off-site to the west of the site.
- There were no exceedances of the Freshwater/Interim Marine Guidelines (95% Species Protection – Slightly to Moderately Disturbed Ecosystems) or NEMP Recreational Water Guidelines in any of the groundwater wells.

Phase 2 February 2019 Sampling Round

The results for Phase 2 sampling in February 2019 showed the following:

- Exceedances of the NEMP Drinking Water Guidelines for P41, P42, P43 and P44 located off-site down hydraulic gradient of P34, P36 and P37 sampled in Phase 1.
- An exceedance of the Freshwater/Interim Marine Guidelines (95% Species Protection – Slightly to Moderately Disturbed Ecosystems) for P43 located off-site, to the west of the site.
- Well P44 located on the north western boundary of the site showed a notably high impact (PFOS/PFHxS of 1.372 ug/L) exceeding the NEMP Recreational Guideline (0.7 ug/L).

Phase 2 March 2019 Sampling Round

Resampling of selected wells undertaken in March 2019 to confirm the results of the Phase 2 sampling round indicated the following:

- Results for P34, P36, P40, P41, P42 and P44 showed exceedances consistent with previous results of the NEMP Drinking Water Guidelines.
- Results for newly sampled well GWP2-PFC located on the north western boundary of the site also exceeded the NEMP Drinking Water Guidelines, however this is not consistent with previous sampling round results. GWP3-PFC was below the NEMP Drinking Water Guidelines which was also not consistent with previous historical results. This is likely due to an administrative error on the part of the consultant, and the concentrations in GWP2-PFC may apply to GWP3-PFC and vice versa. Future sampling rounds may give an indication if this is likely to have occurred.
- The results at GWP1-PFC were below the NEMP drinking water guideline which was consistent with previous rounds.
- Well P44 showed a high impact (PFOS/PFHxS of 1.658 ug/L) exceeding the NEMP Recreational Guideline, consistent with the previous February 2019 sampling round.
- The results at locations GWP2-PFC, GWP3-PFC and P44 were perceived as anomalous based on a comparison with historical results or based on the known spatial distribution of PFAS on the western boundary of the airport (P44).
- No exceedances were observed for the Freshwater/Interim Marine Guidelines (95% Species Protection – Slightly to Moderately Disturbed Ecosystems) for any of the wells.

April 2019 Sampling Round (EP)

In April 2019, Environmental Projects conducted a GME which showed the following:

- Detectable PFAS concentrations were below the Drinking Water guidelines at adjacent wells P44 and GWP2-PFC, which was not consistent with the GHD (March 2019) results.
- GWP3-PFC exceeded Drinking Water guidelines which was consistent with historical results (LBW/EP 2016, Golder (2017 and 2018) and GHD 2016), but not consistent with GHD (March 2019) which was below Drinking Water guidelines.

Phase 2 May 2019 Sampling Round

Due to the anomalous nature of the April 2019 results at P44, an additional sampling round was conducted in May 2019 to eliminate any possibility of error. Additional measures were undertaken during this round to ensure sample label error and laboratory error could not be contributing factors in the results.

This sampling round indicated the following:

- Elevated PFAS concentrations at P44 above the recreational criteria were consistent with previous GHD (2019) results.
- Well GWP1-PFC results were below the guidelines, consistent with previous results.
- Well GWP2-PFC results were consistent with EP (April 2019) results and Golder (2018) results, but not with the GHD (March 2019) anomalous results which exceeded the Drinking Water Guidelines

Overall, a review of the broader temporal groundwater data set does indicate some variability between sampling rounds, environmental consultants and analytical laboratories by up to an order of magnitude, suggesting there may be short term influencing factors affecting PFAS concentrations in groundwater at some locations on the airport. This being said locations such as GWP1-PFC, GWP2-PFC (with the exception of the anomalous March sampling result) GWP3-PFC (with the exception of the anomalous March sampling result), P34 and P36 are reporting consistent results between sampling rounds.

7.2 PFAS in soil adjacent monitoring well P44

The dry weight and leachable PFAS concentrations detected in shallow soil adjacent to P44 did not indicate a gross localised residual source in shallow soil to be present at this location. A detectable leachable PFOS concentrations was detected at a depth range of 0.1 to 0.2 m bgl suggesting that a weathered localised source may be present at this location or PFAS has been transported to this area via surface water transport. It is considered unlikely that soil in this portion of the Airport is contributing significant PFAS contaminant mass to the surface drain located adjacent the Airport boundary, which provides stormwater to the MAR. The source of PFAS at P44 has not yet been confirmed and is likely be a localised source present adjacent to or up hydraulic gradient of this location and within the Airport boundary.

7.3 Distribution of PFAS impacted Groundwater

The current and historical groundwater data indicates there are potentially two on airport areas contributing to PFAS in groundwater:

- Former firefighting training ground and
- Unidentified localised source in the northern portion of the airport.

Temporal groundwater sampling has indicated elevated PFAS concentrations on the boundary of the airport at GWP3_PFC which are similar to offsite PFAS concentrations to the west of the airport, however the distribution of PFAS down the hydraulic gradient does not show decreasing concentrations along the gradient. The current investigation has confirmed elevated PFAS concentrations at newly installed well P44.

PFOS and PFHxS did not extend to the south of the Airport beneath Mawson Lakes, so it has been delineated in this direction by wells P38 and P39 to the adopted criteria.

PFOS and PFHxS concentrations, to the drinking water criterion, were delineated to the south west of the airport by off-site well P40.

PFOS and PFHxS was identified to extend to the west of GWP3_PFC at concentrations exceeding the drinking water criterion up to 440 m from the Airport’s boundary and has not been delineated in this direction. No significant decrease in PFAS concentrations have been observed down the hydraulic gradient to the west.

No wells have been installed to the west of P44 at this stage and the extent of PFAS chemicals in groundwater migrating off airport has not been determined.

7.4 Off-airport water use on other properties

All property owners surveyed use mains water for consumption inside their dwelling or building. Recycled water is commonly used outdoors in Mawson Lakes which is a newer development. Some respondents (18%) supplement reticulated water with tank/ rain water for outdoor use in Parafield Gardens. A small proportion (2 from 122 respondents) indicated that they have a groundwater bore which is only used for irrigation of lawns. These results suggest there is no pathway for residents to be exposed to PFAS within the assessment area.

The Parafield Gardens Soccer and Sport Club which uses Bradman Oval uses groundwater for irrigating the turf. The Council is the registered owner of the bores. It has been confirmed that the bore sources water from the Managed Aquifer Recharge (MAR) which is independent from the Quaternary Aquifer (Q1) that is the subject of PFAS investigations.

The single residential respondent who has a bore and the Parafield Gardens soccer club, as a recreational groundwater user provides a reliable representation of groundwater use in the investigation area.

7.5 Conceptual Site Model (CSM)

Table 7-1 Conceptual Site Model (CSM)

Potential source	Receptor	Pathway	Pathway present?
PFAS migrating in groundwater from on airport residual sources to off-site extraction points	Agriculture: crops	Crops irrigated with contaminated groundwater	No cropping is located adjacent to the site.
	Down gradient off-site maintenance workers that contact PFAS contaminated soil, sediment, surface water and / or groundwater	Direct dermal contact or incidental ingestion of contaminated soil, sediment, surface water and / or groundwater.	Unlikely Whilst it's possible that off-site maintenance workers could incidentally ingest contaminated soil, sediment, surface and / or groundwater, it's unlikely that they'll ingest quantities detrimental to their health.
	People using groundwater for: domestic and drinking purposes	Consumption of contaminated groundwater.	Unlikely Although some pockets of lower salinity groundwater was identified in the registered bore survey, the salinity did exceed the NHMRC 2011 (updated 2018) aesthetic criterion for TDS. As such it is considered unlikely consumption of poor quality groundwater would constitute a primary drinking water source, especially considering the presence of a reticulated water supply.
	People using groundwater for: irrigation of vegetable gardens and / or fruit trees with which they grow produce for consumption.	Consumption of fruit and vegetables irrigated by contaminated groundwater.	Possible The average calculated TDS value (2,921.49 mg/L) indicates brackish groundwater beneath the area of investigation which is considered suitable for domestic and primary irrigation purposes (SA EPA, 2015). However, the water use survey completed as part of the current investigations confirmed that no residents were using water for vegetable gardens or fruit trees irrigation. Therefore there is not considered to be a pathway for residents to be exposed to PFAS within the water use survey area.
	People using groundwater for recreational purposes such as filling of swimming pools	Incidental ingestion of contaminated groundwater.	No Groundwater used for recreational purposes such as filling of swimming pools is considered unlikely (SA EPA, 2015). Whilst it's possible people could use groundwater for recreational purposes such as filling a swimming pool, the off – site groundwater monitoring well results do not exceed the adopted criteria PFAS NEMP 2018 Health Recreational Water.

Potential source	Receptor	Pathway	Pathway present?
PFAS migrating in groundwater from on airport residual sources offsite and interacting with root zones of fruiting plants	People consuming fruiting plants	Consumption of fruit, nuts and other plant matter which has taken up PFAS from the groundwater.	Possible The depth to groundwater may be in range of some larger fruit and/or nut trees root systems, it is unlikely that groundwater is within the root zone of annual vegetable crops. It is not known if the concentrations detected in groundwater, if taken up by edible plants is sufficient to result in accumulation of PFAS in edible plant material.
PFAS migrating in groundwater from on airport residual sources offsite to fresh and marine water bodies	Freshwater and marine water bodies	Migration through porous media and discharge to water bodies	No PFAS exceedance of the Freshwater/Interim Marine Guidelines (95% Species Protection – Slightly to Moderately Disturbed Ecosystems) was reported in one off-site well P43 located to the west of the site (February 2019 Sampling Round), however, there were no exceedance in the subsequent rounds. Therefore, based on the latest groundwater results there is no risk to nearby waterbodies.

7.6 Data Gaps

Based on the review of the results of current and previous investigations as outlined in Section 1.2 and the CSM, the following data gaps remain:

- A localised PFAS contamination source in the northern portion of the airport (near well P44) is not identified.
- Delineation of the PFAS impacts (above the drinking water criterion) in the groundwater migrating down hydraulic gradient off the north-western part of the airport (well P44) has not been achieved.
- The extent of PFAS has not been delineated to the drinking water criterion to the south-west of off-site wells P41 and P42 located in residential areas.

Based on the identified data gaps, it is considered that additional groundwater data is required to delineate the off-site extent of PFAS contamination in groundwater north-west and south-west of the airport and further assess the potential risk to offsite sensitive receptors.

7.7 Uncertainty assessment

While the investigations have been completed in accordance with the current industry guidance on PFAS and prevailing EPA and HEPA guidelines, however, there are inherent limitations associated with environmental investigations which are invariably based on intrusive investigation and sampling data from a number of discrete locations. There is always an element of uncertainty associated with interpolating conditions between the data points, due to the natural seasonal variation and the micro and macro variation in the distribution of chemical substances that might have been introduced to a site. This is also complicated by the potential for the nature and extent of impacts to change over time.

While the CSM identified that potentially complete exposure pathways may exist via irrigation of vegetable gardens with shallow groundwater, there are some uncertainties over the potential risk to sensitive receptors via uptake of shallow groundwater by fruiting trees. There is an uncertainty over what amount of PFAS would accumulate in edible plant material, if they are irrigated with contaminated groundwater.

There was also inconsistency of the off-airport results down hydraulic gradient of GWP3-PFC, as no significant decrease in PFAS concentrations have been observed down the hydraulic gradient to the west.

Overall, variability between the sampling rounds, environmental consultants and analytical laboratories by up to an order of magnitude at some locations indicates some uncertainty of some short term influencing factors affecting PFAS concentrations in groundwater at some locations on the airport. This being said locations such as GWP1-PFC, GWP2-PFC (with the exception of the anomalous March sampling result), GWP3-PFC (with the exception of the anomalous March sampling result), P34 and P36 are reporting consistent results between sampling rounds.

8. Conclusions

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

- The first regional aquifer is located at depths ranging between 2.567 mBGL (P9) and 6.046 mBGL (GWP1-PFC), and groundwater elevations across the site range between 2.622 mAHD (P40) and 8.718 mAHD (P44), as of March 2019.
- Groundwater flow direction was inferred to flow towards the south west towards the Gulf of St. Vincent.
- Review of the WaterConnect bore records indicated that for 62 bores within 2 km radius with available TDS records, TDS values were below 1,200 mg/L for 16 operational bores; however, these bores were either constructed before 1985 and unlikely to be functional, or were drilled to >120 m depth to tertiary aquifer associated with the Managed Aquifer Recharge (MAR) scheme.
- Within the on-airport and off-airport investigation area TDS values (recorded between November 2018 and May 2019) ranged between 997 mg/L (P33) and 13,052 mg/L (P39). An assessment of groundwater salinity indicated that saline groundwater in the vicinity of the site is of poor quality and is unlikely to be suitable for potable use and/or for irrigation of vegetable gardens, recreational use and maintenance of aquatic ecosystems (both fresh and marine).
- The dry weight and leachable PFAS concentrations detected in shallow soil adjacent to P44 did not indicate a significant localised residual source in shallow soil to be present at this location, however detectable leachable PFAS concentrations were detected in shallow soils at this location. PFAS concentrations in soil at this location are not considered to represent a contamination risk to the adjacent stormwater harvesting infrastructure associated with the MAR scheme. This was also confirmed by the results of sampling undertaken by Salisbury Water (provided by AAL) which indicated that stormwater PFAS concentrations were below the drinking water guideline values.
- The current and historical groundwater investigation results indicated presence of potentially two on airport sources contributing to PFAS in groundwater: former firefighting training ground and an unidentified localised source in the northern portion of the airport.
- The extent of PFAS was delineated to the drinking water criterion to the south and to the south-west of the Airport.
- The extent of PFAS has not been delineated to the drinking water criterion to west of on Airport monitoring well GWP3_PFC. Investigations have not yet been undertaken to the west of P44 and the extent of PFAS to the west of this well location has not been determined. There was some inconsistency of the off-airport results down hydraulic gradient of GWP3-PFC, as no significant decrease in PFAS concentrations have been observed down the hydraulic gradient to the west.
- Off-airport water use survey undertaken for the 122 properties within the Mawson Lakes area indicated that all property owners use mains water for consumption, and only one resident used groundwater bore only for irrigation of lawns, suggesting that there is no pathway for residents to be exposed to PFAS within the Mawson Lakes assessment area.
- Water use survey within the Parafield Gardens area revealed that one residential property and the Parafield Gardens soccer club represented recreational groundwater users, providing a reliable representation of groundwater use in this investigation area. Both water bores were reported to be registered, in working condition and used for irrigating the lawn.

Survey respondents confirmed that groundwater was not plumbed into buildings. Neither of the respondents indicated that they have rainwater tanks that could have been used to store groundwater.

- The CSM indicates that potentially complete exposure pathways may exist via irrigation of vegetable gardens with shallow groundwater, via uptake of shallow groundwater by fruiting trees, which are then consumed and via migration of contaminated groundwater to nearby water bodies. However, the water use survey confirmed that no residents were using water for irrigation of vegetable gardens or fruit trees. Therefore there is not considered to be a pathway for residents to be exposed to PFAS within the water use survey area.

9. References

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10. Analytical Results Tables

Analytical Results Tables
Table 1 - Phase 1 Groundwater Results

				PFAS											
				Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecanesulfonic acid (PFDS)	Perfluoro-n-hexadecanoic acid (PFHxDA)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL				0.001	0.001	0.001	0.001	0.002	0.001	0.002	0.005	0.002	0.001	0.001	0.001
PFAS NEMP 2018 Freshwater 95%								0.13							220
PFAS NEMP 2018 Health Drinking Water						0.07		0.07							0.56
PFAS NEMP 2018 Health Recreational Water						0.7		0.7							5.6
Date	**Field ID**	**Sample Type**	**Matrix Type**												
15/11/2018	P9	Normal	Water	0.004	0.0016	0.027	<0.001	0.013	<0.001	<0.002	<0.005	<0.002	<0.001	<0.001	<0.001
6/12/2018	P34	Normal	Water	0.014	0.014	0.12	0.0017	0.030	<0.001	<0.002	<0.005	0.0024	0.015	0.0014	0.0023
6/12/2018	P35	Normal	Water	0.0042	0.0030	0.027	<0.001	0.037	<0.001	<0.002	0.0075	<0.002	0.0028	0.0014	0.0063
6/12/2018	P36	Normal	Water	0.015	0.0078	0.085	0.0013	0.055	<0.001	<0.002	0.017	0.019	0.021	0.012	0.024
6/12/2018	P37	Normal	Water	0.0052	0.0043	0.037	<0.001	0.043	<0.001	<0.002	<0.005	<0.002	0.0037	0.0025	0.0028
6/12/2018	P38	Normal	Water	0.011	0.0027	0.019	<0.001	0.013	<0.001	<0.002	0.013	0.0023	0.0035	0.0022	0.0041
6/12/2018	P39	Normal	Water	0.0048	0.0015	0.0094	<0.001	0.0035	<0.001	<0.002	0.010	0.021	0.029	0.0066	0.0098

Analytical Results Tables
Table 1 - Phase 1 Groundwater Results

				PFAS											
				Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Methyl perfluorooctane sulfonamidoethanol (MEFOSE)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL				0.001	0.001	0.001	0.001	0.002	0.002	0.001	0.002	0.002	0.005	0.005	0.002
PFAS NEMP 2018 Freshwater 95%															
PFAS NEMP 2018 Health Drinking Water															
PFAS NEMP 2018 Health Recreational Water															
Date	**Field ID**	**Sample Type**	**Matrix Type**												
15/11/2018	P9	Normal	Water	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.001	<0.002	<0.002	<0.005	<0.005	<0.002
6/12/2018	P34	Normal	Water	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.001	<0.002	<0.002	<0.005	<0.005	<0.002
6/12/2018	P35	Normal	Water	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.001	<0.002	<0.002	<0.005	<0.005	<0.002
6/12/2018	P36	Normal	Water	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.001	<0.002	<0.002	<0.005	<0.005	<0.002
6/12/2018	P37	Normal	Water	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.001	<0.002	<0.002	<0.005	<0.005	<0.002
6/12/2018	P38	Normal	Water	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.001	<0.002	<0.002	<0.005	<0.005	<0.002
6/12/2018	P39	Normal	Water	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.001	<0.002	<0.002	<0.005	<0.005	<0.002

Analytical Results Tables

Table 1 - Phase 1 Groundwater Results

				PFAS						
				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	Perfluorooctadecanoic acid (PFODA)
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL				0.002	0.001	0.001	0.001	0.001	0.001	0.005
PFAS NEMP 2018 Freshwater 95%										
PFAS NEMP 2018 Health Drinking Water									0.07	
PFAS NEMP 2018 Health Recreational Water									0.7	
Date	**Field ID**	**Sample Type**	**Matrix Type**							
15/11/2018	P9	Normal	Water	<0.002	<0.001	<0.001	<0.001	<0.001	0.04	<0.005
6/12/2018	P34	Normal	Water	<0.002	<0.001	0.048	<0.001	<0.001	0.15	<0.005
6/12/2018	P35	Normal	Water	<0.002	<0.001	0.044	<0.001	<0.001	0.064	<0.005
6/12/2018	P36	Normal	Water	<0.002	<0.001	0.013	<0.001	<0.001	0.14	<0.005
6/12/2018	P37	Normal	Water	<0.002	<0.001	0.086	<0.001	<0.001	0.08	<0.005
6/12/2018	P38	Normal	Water	<0.002	<0.001	0.093	<0.001	<0.001	0.032	<0.005
6/12/2018	P39	Normal	Water	<0.002	<0.001	0.13	<0.001	<0.001	0.0129	<0.005

Analytical Results Tables

Table 2 - Phase 2 (February) Groundwater Results

				PFAS											
				Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecanesulfonic acid (PFDS)	Perfluoro-n-hexadecanoic acid (PFHxDA)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL				0.001	0.001	0.001	0.001	0.002	0.001	0.002	0.005	0.002	0.001	0.001	0.001
PFAS NEMP 2018 Freshwater 95%								0.13							220
PFAS NEMP 2018 Health Drinking Water						0.07		0.07							0.56
PFAS NEMP 2018 Health Recreational Water						0.7		0.7							5.6
Date	**Sample ID**	**Sample Type**	**Matrix Type**												
7/02/2019	P40	Normal	Water	0.0037	0.0029	0.037	<0.002	0.020	<0.001	<0.002	0.018	0.024	0.035	0.013	0.030
7/02/2019	P41	Normal	Water	0.0092	0.0095	0.074	<0.002	0.032	<0.001	<0.002	0.0084	0.0076	0.010	0.0036	0.0048
7/02/2019	P42	Normal	Water	0.0074	0.0072	0.075	<0.002	0.043	<0.001	<0.002	0.026	0.0079	0.014	0.0037	0.0055
7/02/2019	P43	Normal	Water	0.0039	0.0040	0.050	0.0033	0.24	<0.001	<0.002	0.0071	<0.002	0.0047	<0.002	0.0031
7/02/2019	P44	Normal	Water	0.11	0.16	1.3	0.013	0.072	<0.001	<0.002	0.029	0.038	0.26	0.033	0.051

Analytical Results Tables
Table 2 - Phase 2 (February) Groundwater Results

				PFAS											
				Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Methyl perfluorooctane sulfonamidoethanol (MEFOSE)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL				0.001	0.001	0.001	0.001	0.002	0.002	0.001	0.002	0.002	0.005	0.005	0.002
PFAS NEMP 2018 Freshwater 95%															
PFAS NEMP 2018 Health Drinking Water															
PFAS NEMP 2018 Health Recreational Water															
Date	**Sample ID**	**Sample Type**	**Matrix Type**												
7/02/2019	P40	Normal	Water	<0.002	<0.001	<0.001	<0.001	<0.002	<0.002	<0.001	<0.002	<0.002	<0.005	<0.005	<0.002
7/02/2019	P41	Normal	Water	<0.002	<0.001	<0.001	<0.001	<0.002	<0.002	<0.001	<0.002	<0.002	<0.005	<0.005	<0.002
7/02/2019	P42	Normal	Water	<0.002	<0.001	<0.001	<0.001	<0.002	<0.002	<0.001	<0.002	<0.002	<0.005	<0.005	<0.002
7/02/2019	P43	Normal	Water	<0.002	<0.001	<0.001	<0.001	<0.002	<0.002	<0.001	<0.002	<0.002	<0.005	<0.005	<0.002
7/02/2019	P44	Normal	Water	<0.002	<0.001	<0.001	<0.001	<0.002	<0.002	<0.001	<0.002	<0.002	<0.005	<0.005	<0.002

Analytical Results Tables

Table 2 - Phase 2 (February) Groundwater Results

				PFAS						
				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	Perfluorooctadecanoic acid (PFODA)
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL				0.002	0.001	0.001	0.001	0.001	0.001	0.005
PFAS NEMP 2018 Freshwater 95%										
PFAS NEMP 2018 Health Drinking Water									0.07	
PFAS NEMP 2018 Health Recreational Water									0.7	
Date	**Sample ID**	**Sample Type**	**Matrix Type**							
7/02/2019	P40	Normal	Water	<0.002	<0.001	0.020	<0.001	<0.001	0.057	<0.005
7/02/2019	P41	Normal	Water	<0.002	<0.001	0.033	<0.001	<0.001	0.106	<0.005
7/02/2019	P42	Normal	Water	<0.002	<0.001	0.0043	<0.001	<0.001	0.118	<0.005
7/02/2019	P43	Normal	Water	<0.002	<0.001	0.13	<0.001	<0.001	0.29	<0.005
7/02/2019	P44	Normal	Water	<0.002	<0.001	0.017	<0.001	<0.001	1.372	<0.005

Analytical Results Tables

Table 3 - Phase 2 (March) Groundwater Results

				PFAS										
				PFNS (68259-12-1)	8:2 Polyfluoroalkyl phosphate diester (8:2 diPAP)	FOUEA (2H-Perfluoro-2-decenoic acid (8:2))	Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecanesulfonic acid (PFDS)	Perfluoro-n-hexadecanoic acid (PFHxDA)	Perfluorobutanoic acid (PFBA)
				ug/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL					0.002	0.001	0.001	0.001	0.001	0.001	0.002	0.001	0.002	0.005
PFAS NEMP 2018 Freshwater 95%											0.13			
PFAS NEMP 2018 Health Drinking Water									0.07		0.07			
PFAS NEMP 2018 Health Recreational Water									0.7		0.7			
Date	**Sample ID**	**Sample Type**	**Matrix Type**											
14/03/2019	GWP1-PFC	Normal	Water	<0.001	<0.02	<0.001	0.0056	0.0051	0.039	<0.001	0.011	<0.001	<0.002	<0.005
14/03/2019	GWP2-PFC	Normal	Water	<0.001	<0.02	<0.001	0.0082	0.0075	0.068	<0.001	0.039	<0.001	<0.002	<0.005
14/03/2019	GWP3-PFC	Normal	Water	<0.001	<0.02	<0.001	0.0018	0.0011	0.0065	<0.001	0.018	<0.001	<0.002	0.0083
14/03/2019	P9	Normal	Water	<0.001	<0.02	<0.001	0.0037	0.0017	0.019	<0.001	0.0057	<0.001	<0.002	<0.005
14/03/2019	P34	Normal	Water	<0.001	<0.02	<0.001	0.018	0.017	0.14	0.0019	0.025	<0.001	<0.02	<0.005
14/03/2019	P35	Normal	Water	<0.01	<0.02	<0.01	<0.01	<0.01	0.024	<0.01	0.037	<0.01	<0.02	<0.05
14/03/2019	P36	Normal	Water	<0.001	<0.02	<0.001	0.015	0.0088	0.084	0.0012	0.05	<0.001	<0.002	0.016
14/03/2019	P40	Normal	Water	<0.001	<0.02	<0.001	0.0035	0.0027	0.038	<0.001	0.032	<0.001	<0.02	0.018
14/03/2019	P41	Normal	Water	<0.001	<0.02	<0.001	0.0097	0.0096	0.082	0.0011	0.021	<0.001	<0.02	0.0081
14/03/2019	P42	Normal	Water	<0.001	<0.05	<0.001	0.0084	0.0077	0.077	0.0016	0.035	<0.001	<0.02	0.0068
14/03/2019	P43	Normal	Water	<0.001	<0.02	<0.001	0.0035	0.0034	0.023	<0.001	0.029	<0.001	<0.02	<0.005
14/03/2019	P44	Normal	Water	<0.001	<0.02	<0.001	0.12	0.17	1.6	0.017	0.058	<0.001	<0.02	0.028

Analytical Results Tables
Table 3 - Phase 2 (March) Groundwater Results

				PFAS											
			Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)
			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL			0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.002	0.001	0.002	0.002
PFAS NEMP 2018 Freshwater 95%						220									
PFAS NEMP 2018 Health Drinking Water						0.56									
PFAS NEMP 2018 Health Recreational Water						5.6									
Date	**Sample ID**	**Sample Type**													
14/03/2019	GWP1-PFC	Normal	<0.002	0.0037	<0.001	0.0011	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.001	<0.02	<0.02
14/03/2019	GWP2-PFC	Normal	<0.002	0.0033	0.0011	0.0015	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.001	<0.002	<0.002
14/03/2019	GWP3-PFC	Normal	<0.002	<0.001	<0.001	0.0015	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.001	<0.02	<0.02
14/03/2019	P9	Normal	<0.002	<0.001	0.0063	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.001	<0.02	<0.02
14/03/2019	P34	Normal	0.0029	0.015	0.0011	0.0012	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.001	<0.002	<0.02
14/03/2019	P35	Normal	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.02	<0.01	<0.02	<0.02
14/03/2019	P36	Normal	0.023	0.027	0.019	0.019	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.001	<0.002	<0.002
14/03/2019	P40	Normal	0.028	0.037	0.012	0.028	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.001	<0.002	<0.02
14/03/2019	P41	Normal	0.0096	0.0097	0.0072	0.004	<0.001	<0.001	<0.001	<0.001	<0.002	<0.02	<0.001	<0.02	<0.02
14/03/2019	P42	Normal	0.0059	0.011	0.0036	0.0074	<0.001	<0.001	<0.001	<0.001	<0.002	<0.02	<0.001	<0.02	<0.02
14/03/2019	P43	Normal	<0.002	<0.001	<0.001	0.0013	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.001	<0.02	<0.02
14/03/2019	P44	Normal	0.043	0.29	0.035	0.05	<0.001	<0.001	<0.001	<0.001	<0.002	<0.02	<0.001	<0.02	<0.02

Analytical Results Tables
Table 3 - Phase 2 (March) Groundwater Results

				PFAS								
			N-Methyl perfluorooctane sulfonamidoethanol (MEFOSE)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	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	Perfluorooctadecanoic acid (PFODA)
			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL			0.005	0.005	0.002	0.002	0.001	0.001	0.001	0.001	0.002	0.005
PFAS NEMP 2018 Freshwater 95%												
PFAS NEMP 2018 Health Drinking Water											0.07	
PFAS NEMP 2018 Health Recreational Water											0.7	
Date	**Sample ID**	**Sample Type**										
14/03/2019	GWP1-PFC	Normal	<0.005	<0.005	<0.002	<0.002	<0.001	0.0057	<0.001	<0.001	0.05	<0.005
14/03/2019	GWP2-PFC	Normal	<0.005	<0.005	<0.002	<0.002	<0.001	0.019	<0.001	<0.001	0.107	<0.005
14/03/2019	GWP3-PFC	Normal	<0.005	<0.005	<0.002	<0.002	<0.001	0.023	<0.001	<0.001	0.0245	<0.005
14/03/2019	P9	Normal	<0.005	<0.005	<0.002	<0.002	<0.001	0.0078	<0.001	<0.001	0.0247	<0.005
14/03/2019	P34	Normal	<0.005	<0.005	<0.002	<0.002	<0.001	0.0087	<0.001	<0.001	0.165	<0.005
14/03/2019	P35	Normal	<0.05	<0.05	<0.01	<0.01	<0.01	0.065	<0.01	<0.01	0.061	<0.05
14/03/2019	P36	Normal	<0.005	<0.005	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	0.134	<0.005
14/03/2019	P40	Normal	<0.005	<0.005	<0.002	<0.002	<0.001	0.25	<0.001	<0.001	0.07	<0.005
14/03/2019	P41	Normal	<0.005	<0.005	<0.002	<0.002	<0.001	0.19	<0.001	<0.001	0.103	<0.005
14/03/2019	P42	Normal	<0.005	<0.05	<0.002	<0.02	<0.001	0.024	<0.001	<0.001	0.112	<0.05
14/03/2019	P43	Normal	<0.005	<0.005	<0.002	<0.002	<0.001	0.0061	<0.001	<0.001	0.052	<0.05
14/03/2019	P44	Normal	<0.005	<0.005	<0.002	<0.002	<0.001	0.031	<0.001	<0.001	1.658	<0.05

Analytical Results Tables
Table 4 - Phase 2 (May) Groundwater Results

				PFAS													
				Perfluorobutane sulfonic acid (PFBS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	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	PFAS (Sum of Total)(WA DER List)
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL				0.02	0.02	0.01	0.1	0.02	0.02	0.02	0.01	0.05	0.05	0.05	0.05	0.01	0.01
PFAS NEMP 2018 Freshwater 95%						0.13					220						
PFAS NEMP 2018 Health Drinking Water						0.07					0.56					0.07	
PFAS NEMP 2018 Health Recreational Water						0.7					5.6					0.7	
Date	**Sample ID**	**Sample Type**	**Matrix Type**														
13/05/2019	GWP1-PFC	Normal	water	<0.02	0.04	0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.05	<0.05	<0.05	<0.05	0.06	0.06
13/05/2019	GWP2-PFC	Normal	water	<0.02	<0.02	0.03	<0.1	<0.02	<0.02	<0.02	<0.01	<0.05	<0.05	<0.05	<0.05	0.03	0.03
13/05/2019	GWP3-PFC	Normal	water	<0.02	0.07	0.05	<0.1	<0.02	<0.02	<0.02	<0.01	<0.05	<0.05	<0.05	<0.05	0.12	0.12
13/05/2019	P34	Normal	water	0.03	0.14	0.04	<0.1	<0.02	0.02	<0.02	<0.01	<0.05	<0.05	<0.05	<0.05	0.18	0.23
13/05/2019	P35	Normal	water	<0.02	0.03	0.04	<0.1	<0.02	<0.02	<0.02	<0.01	<0.05	<0.05	<0.05	<0.05	0.07	0.07
13/05/2019	P36	Normal	water	0.03	0.10	0.07	<0.1	0.02	0.03	<0.02	0.02	<0.05	<0.05	<0.05	<0.05	0.17	0.27
13/05/2019	P37	Normal	water	<0.02	0.04	0.04	<0.1	<0.02	<0.02	<0.02	<0.01	<0.05	<0.05	<0.05	<0.05	0.08	0.08
13/05/2019	P40	Normal	water	<0.02	0.03	0.03	<0.1	0.03	0.05	<0.02	0.05	<0.05	<0.05	<0.05	<0.05	0.06	0.19
13/05/2019	P41	Normal	water	0.02	0.12	0.05	<0.1	<0.02	<0.02	<0.02	<0.01	<0.05	<0.05	<0.05	<0.05	0.17	0.19
13/05/2019	P42	Normal	water	0.02	0.09	0.07	<0.1	<0.02	<0.02	<0.02	0.02	<0.05	<0.05	<0.05	<0.05	0.16	0.20
13/05/2019	P43	Normal	water	<0.02	0.03	0.04	<0.1	<0.02	<0.02	<0.02	<0.01	<0.05	<0.05	<0.05	<0.05	0.07	0.07
13/05/2019	P44	Normal	water	0.14	1.74	0.13	<0.1	0.05	0.37	0.05	0.08	<0.05	<0.05	<0.05	<0.05	1.87	2.56

Groundwater Gauging Results

Site Location:	Parafield Airport	Client:	Adelaide Airport Limited (AAL)
Job Number:	3319051	Latest GME:	13/05/2019
Entered By:	VB	Date:	14/05/2019

Groundwater Monitoring Well I.D	Gauging Date	TOC Elevation surveyed	SWL (mbTOC)	Depth to base of well (m bTOC)	RWL (mAHD)	Comments / field observations
GWP1-PFC	14/03/2019		6.046	9.423		Sampled. Unable to ascertain survey data.
	13/05/2019		5.802	9.935		Sampled. Unable to ascertain survey data.
GWP2-PFC	14/03/2019		3.710	6.713		Sampled. Unable to ascertain survey data.
	13/05/2019		3.417	6.820		Sampled. Unable to ascertain survey data.
GWP3-PFC	7/12/2016		2.744	5.253		N/A
	7/02/2019		3.748	5.241		Standpipe. No sample.
	14/03/2019		3.909	5.283		Sampled. Unable to ascertain survey data.
	13/05/2019		3.819	5.375		Sampled. Unable to ascertain survey data.
P9	18/08/2016	6.460	1.078	5.8	5.382	N/A
	23/11/2016		1.322	5.899	5.138	N/A
	15/11/2018		1.817	6	4.643	Sampled. QA01.
	6/12/2018		1.771	5.962	4.689	Sampled. Sample not analysed
	7/02/2019		2.391	5.914	4.069	Gatic. No sample.
	14/03/2019		2.567	5.926	3.893	Sampled.
P17	24/11/2016	6.924	1.338	4.401	5.586	N/A
	7/02/2019		2.432	4.333	4.492	Gatic. No sample.

P18	24/11/2016	7.271	0.956	3.682	6.315	N/A
	7/02/2019		2.331		4.940	Gatic. No sample. Well annulus blocked.
P33	10/01/2018		3.668	6.37	-3.668	N/A
	7/02/2019		3.163	5.451	-3.163	Standpipe. No sample. Unable to ascertain survey data.
P34	6/12/2018	8.383	3.361	5.871	5.022	Sampled. QA02.
	7/02/2019		3.926	5.709	4.457	Standpipe. No sample.
	14/03/2019		4.079	5.647	4.304	Sampled.
	13/05/2019		3.915	5.852		
P35	6/12/2018	10.081	3.046	7.108	7.035	Sampled. QA01.
	16/01/2019		3.439	6.072	6.642	N/A.
	7/02/2019		3.554	7.101	6.527	Gatic. No sample.
	14/03/2019		4.813	7.141	5.268	Sampled.
	13/05/2019		3.718	7.137		
P36	6/12/2018	7.625	2.721	5.291	4.904	Sampled.
	7/02/2019		3.193	6.281	4.432	Gatic. No sample.
	14/03/2019		3.333	5.268	4.292	Sampled.
	13/05/2019		3.220	6.222		
P37	6/12/2018	6.772	2.491	5.991	4.281	Sampled.
	7/02/2019		2.959	6.971	3.813	Gatic. No sample.
	13/05/2019		2.915	5.955		
P38	6/12/2018	7.521	2.284	5.317	5.237	Sampled.
	7/02/2019		2.814	5.267	4.707	Gatic. No sample.
P39	6/12/2018	6.695	1.284	5.968	5.411	Sampled.
	7/02/2019		1.679	5.979	5.016	Gatic. No sample.
P40	7/02/2019	5.754	2.986	5.908	2.768	Gatic. Sampled.
	14/03/2019		3.132	5.923	2.622	Sampled.
	13/05/2019		2.953	5.93		
P41	7/02/2019	6.274	3.317	5.843	2.957	Gatic. Sampled.
	14/03/2019		3.429	5.776	2.845	Sampled.
	13/05/2019		3.34	5.88		
P42	7/02/2019	7.442	3.476	5.948	3.966	Gatic. Sampled. QA01 & QA02.
	14/03/2019		3.634	5.927	3.808	Sampled.
	13/05/2019		3.601	5.93		

P43	7/02/2019	8.957	3.931	5.604	5.026	Gatic. Sampled.
	14/03/2019		4.079		4.878	Sampled. Well annulus blocked. Unable to record bore depth.
	13/05/2019		4.007	4.86		
P44	7/02/2019	12.735	3.887	6.028	8.848	Gatic. Sampled.
	14/03/2019		4.017	5.941	8.718	Sampled.
	13/05/2019		3.832		5.938	

Analytical Results Tables
Table 6 - Soil Results

			Inorganics				Metal	PFAS					
			pH (Initial)	pH (Final)	TCLP Fluid	Soil pH	Total Solids	PFNS (68259-12-1)		8:2 Polyfluoroalkyl phosphate diester (8:2 diPAP)		FOUEA (2H-Perfluoro-2-decenoic acid (8:2))	
			pH Units	pH Units	PH	PH	mg/kg	mg/kg	ug/L	mg/kg	µg/L	mg/kg	µg/L
EQL							1,000			0.002		0.001	
PFAS NEMP 2018 Health Drinking Water													
PFAS NEMP 2018 Health Industrial/Commercial													
Location Code	**Date**	**Field ID**											
HA01	14/03/2019	HA-0-0.1	5	5	4.93	5	948,000	<0.001	<0.01	<0.002	<0.02	<0.001	<0.01
HA01	14/03/2019	HA-0.1-0.2	5	5	4.93	5	928,000	<0.001	<0.01	<0.002	<0.02	<0.001	<0.01

Analytical Results Tables
Table 6 - Soil Results

			Perfluorobutane sulfonic acid (PFBS)		Perfluoropentane sulfonic acid (PFPeS)		Perfluorohexane sulfonic acid (PFHxS)		Perfluoroheptane sulfonic acid (PFHpS)		Perfluorooctane sulfonic acid (PFOS)		Perfluorodecanesulfonic
			mg/kg	µg/L	mg/kg	µg/L	mg/kg	µg/L	mg/kg	µg/L	mg/kg	µg/L	mg/kg
EQL			0.001		0.001		0.001		0.001		0.002		
PFAS NEMP 2018 Health Drinking Water								0.07				0.07	
PFAS NEMP 2018 Health Industrial/Commercial							20				20		
Location Code	**Date**	**Field ID**											
HA01	14/03/2019	HA-0-0.1	<0.001	<0.01	<0.001	<0.01	<0.001	<0.01	<0.001	<0.01	<0.002	<0.02	<0.001
HA01	14/03/2019	HA-0.1-0.2	<0.001	<0.01	<0.001	<0.01	<0.001	<0.01	<0.001	<0.01	<0.002	0.024	<0.001

Analytical Results Tables
Table 6 - Soil Results

			PFAS										
			acid (PFDS)	Perfluoro-n-hexadecanoic acid (PFHxDA)		Perfluorobutanoic acid (PFBA)		Perfluoropentanoic acid (PFPeA)		Perfluorohexanoic acid (PFHxA)		Perfluoroheptanoic acid (PFHpA)	
			µg/L	mg/kg	µg/L	mg/kg	µg/L	mg/kg	µg/L	mg/kg	µg/L	mg/kg	µg/L
EQL				0.002				0.002		0.001		0.001	
PFAS NEMP 2018 Health Drinking Water													
PFAS NEMP 2018 Health Industrial/Commercial													
Location Code	**Date**	**Field ID**											
HA01	14/03/2019	HA-0-0.1	<0.01	<0.002	<0.02	<0.002	<0.05	<0.002	<0.02	<0.001	<0.01	<0.001	<0.01
HA01	14/03/2019	HA-0.1-0.2	<0.01	<0.002	<0.02	0.0027	<0.05	<0.002	<0.02	<0.001	<0.01	<0.001	<0.01

Analytical Results Tables
Table 6 - Soil Results

			PF										
			Perfluorooctanoic acid (PFOA)		Perfluorononanoic acid (PFNA)		Perfluorodecanoic acid (PFDA)		Perfluoroundecanoic acid (PFUnDA)		Perfluorododecanoic acid (PFDoDA)		Perfluorotridecanoic acid
			mg/kg	µg/L	mg/kg	µg/L	mg/kg	µg/L	mg/kg	µg/L	mg/kg	µg/L	mg/kg
EQL			0.001		0.001		0.001		0.002		0.002		0.002
PFAS NEMP 2018 Health Drinking Water				0.56									
PFAS NEMP 2018 Health Industrial/Commercial			50										
Location Code	**Date**	**Field ID**											
HA01	14/03/2019	HA-0-0.1	<0.001	<0.01	<0.001	<0.01	<0.001	<0.01	<0.002	<0.01	<0.002	<0.01	<0.002
HA01	14/03/2019	HA-0.1-0.2	<0.001	<0.01	<0.001	<0.01	<0.001	<0.01	<0.002	<0.01	<0.002	<0.01	<0.002

Analytical Results Tables
Table 6 - Soil Results

			AS										
			(PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)		Perfluorooctane sulfonamide (FOSA)		N-Methyl perfluorooctane sulfonamide (MeFOSA)		N-Ethyl perfluorooctane sulfonamide (EtFOSA)		N-Methyl perfluorooctane sulfonamidoethanol (MEFOSE)	
			µg/L	mg/kg	µg/L	mg/kg	µg/L	mg/kg	µg/L	mg/kg	µg/L	mg/kg	µg/L
EQL				0.002		0.001		0.002		0.002		0.005	
PFAS NEMP 2018 Health Drinking Water													
PFAS NEMP 2018 Health Industrial/Commercial													
Location Code	**Date**	**Field ID**											
HA01	14/03/2019	HA-0-0.1	<0.02	<0.002	<0.02	<0.001	<0.01	<0.002	<0.02	<0.002	<0.02	<0.005	<0.05
HA01	14/03/2019	HA-0.1-0.2	<0.02	<0.002	<0.02	<0.001	<0.01	<0.002	<0.02	<0.002	<0.02	<0.005	<0.05

Analytical Results Tables
Table 6 - Soil Results

			PFAS										
			N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)		N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)		N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)		4:2 Fluorotelomer sulfonic acid (4:2 FTS)		6:2 Fluorotelomer Sulfonate (6:2 FTS)		8:2 Fluorotelomer
			mg/kg	µg/L	mg/kg	µg/L	mg/kg	µg/L	mg/kg	µg/L	mg/kg	µg/L	mg/kg
EQL			0.005		0.002		0.002		0.001		0.001		0.001
PFAS NEMP 2018 Health Drinking Water													
PFAS NEMP 2018 Health Industrial/Commercial													
Location Code	**Date**	**Field ID**											
HA01	14/03/2019	HA-0-0.1	<0.005	<0.05	<0.002	<0.01	<0.002	<0.01	<0.001	<0.01	<0.001	<0.01	<0.001
HA01	14/03/2019	HA-0.1-0.2	<0.005	<0.05	<0.002	<0.01	<0.002	<0.01	<0.001	<0.01	<0.001	<0.01	<0.001

			sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)		Sum of PFHxS and PFOS		Perfluorooctadecanoic acid (PFODA)	
			µg/L	mg/kg	µg/L	mg/kg	µg/L	mg/kg	µg/L
EQL				0.002				0.005	
PFAS NEMP 2018 Health Drinking Water							0.07		
PFAS NEMP 2018 Health Industrial/Commercial						20			
Location Code	**Date**	**Field ID**							
HA01	14/03/2019	HA-0-0.1	<0.01	<0.002	<0.01	<0.002	<0.02	<0.005	<0.05
HA01	14/03/2019	HA-0.1-0.2	<0.01	<0.002	<0.01	<0.002	0.024	<0.005	<0.05

Analytical Results Tables
Table 7 - QA/QC Groundwater Results

					NA															
				PFNS (68259-12-1)	8:2 Polyfluoroalkyl phosphate diester (8:2 diPAP)	FOUEA (2H-Perfluoro-2-decenoic acid (8:2))	Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecanesulfonic acid (PFDS)	Perfluoro-n-hexadecanoic acid (PFHxDA)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)
				ug/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL				0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.002	0.001	0.002	0.005	0.002	0.001	0.001	0.001	0.001	0.001
Date	**Field ID**	**Interlab or Intralab**	**Matrix Type**																	
6/12/2018	P34	Intralab	water	<0.001	<0.002	<0.001	0.014	0.014	0.12	0.0017	0.030	<0.001	<0.002	<0.005	0.0024	0.015	0.0014	0.0023	<0.001	<0.001
	QA02			<0.001	<0.002	<0.001	0.014	0.013	0.12	0.0016	0.031	<0.001	<0.002	<0.005	0.0025	0.014	0.0011	0.0021	<0.001	<0.001
RPD				0	0	0	0	7	0	6	3	0	0	0	4	7	24	9	0	0
6/12/2018	P35	Intralab	water	<0.001	<0.002	<0.001	0.0042	0.0030	0.027	<0.001	0.037	<0.001	<0.002	0.0075	<0.002	0.0028	0.0014	0.0063	<0.001	<0.001
	QA01			<0.001	<0.002	<0.001	0.0038	0.0029	0.026	<0.001	0.037	<0.001	<0.002	0.0078	<0.002	0.0029	0.0014	0.0057	<0.001	<0.001
RPD				0	0	0	10	3	4	0	0	0	0	4	0	4	0	10	0	0
14/03/2019	P40	Intralab	water	<0.001	<0.02	<0.001	0.0035	0.0027	0.038	<0.001	0.032	<0.001	<0.02	0.018	0.028	0.037	0.012	0.028	<0.001	<0.001
	QA01			<0.001	<0.05	<0.001	0.0032	0.0026	0.035	<0.001	0.024	<0.001	<0.02	0.018	0.029	0.037	0.013	0.029	<0.001	<0.001
RPD				0	0	0	9	4	8	0	29	0	0	0	4	0	8	4	0	0
13/05/2019	GWP2-PFC	Intralab	water				<0.02		<0.02		0.03			<0.1	<0.02	<0.02	<0.02	<0.01		
	FD02						<0.02		<0.02		0.03			<0.1	<0.02	<0.02	<0.02	<0.01		
RPD							0		0		0			0	0	0	0	0		
13/05/2019	GWP3-PFC	Intralab	water				<0.02		0.07		0.05			<0.1	<0.02	<0.02	<0.02	<0.01		
	FD03						<0.02		0.08		0.05			<0.1	<0.02	<0.02	<0.02	<0.01		
RPD							0		13		0			0	0	0	0	0		
13/05/2019	P44	Intralab	water				0.14		1.74		0.13			<0.1	0.05	0.37	0.05	0.08		
	FD01						0.15		1.79		0.14			<0.1	0.05	0.37	0.04	0.07		
RPD							7		3		7			0	0	0	22	13		

Analytical Results Tables
Table 7 - QA/QC Groundwater Results

				PFAS																
				Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Methyl perfluorooctane sulfonamidoethanol (MEFOSE)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	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	PFAS (Sum of Total)(WA DER List)
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL				0.001	0.001	0.002	0.002	0.001	0.002	0.002	0.005	0.005	0.002	0.002	0.001	0.001	0.001	0.001	0.01	0.01
Date	**Field ID**	**Interlab or Intralab**	**Matrix Type**																	
6/12/2018	P34	Intralab	water	<0.001	<0.001	<0.002	<0.002	<0.001	<0.002	<0.002	<0.005	<0.005	<0.002	<0.002	<0.001	0.048	<0.001	<0.001		
	QA02			<0.001	<0.001	<0.002	<0.002	<0.001	<0.002	<0.002	<0.005	<0.005	<0.002	<0.002	<0.001	0.036	<0.001	<0.001		
RPD				0	0	0	0	0	0	0	0	0	0	0	0	29	0	0		
6/12/2018	P35	Intralab	water	<0.001	<0.001	<0.002	<0.002	<0.001	<0.002	<0.002	<0.005	<0.005	<0.002	<0.002	<0.001	0.044	<0.001	<0.001		
	QA01			<0.001	<0.001	<0.002	<0.002	<0.001	<0.002	<0.002	<0.005	<0.005	<0.002	<0.002	<0.001	0.040	<0.001	<0.001		
RPD				0	0	0	0	0	0	0	0	0	0	0	0	10	0	0		
14/03/2019	P40	Intralab	water	<0.001	<0.001	<0.002	<0.002	<0.001	<0.002	<0.02	<0.005	<0.005	<0.002	<0.002	<0.001	0.25	<0.001	<0.001		
	QA01			<0.001	<0.001	<0.002	<0.02	<0.001	<0.02	<0.02	<0.005	<0.005	<0.002	<0.002	<0.001	0.38	<0.001	<0.001		
RPD				0	0	0	0	0	0	0	0	0	0	0	0	41	0	0		
13/05/2019	GWP2-PFC	Intralab	water												<0.05	<0.05	<0.05	<0.05	0.03	0.03
	FD02														<0.05	<0.05	<0.05	<0.05	0.03	0.03
RPD															0	0	0	0	0	0
13/05/2019	GWP3-PFC	Intralab	water												<0.05	<0.05	<0.05	<0.05	0.12	0.12
	FD03														<0.05	<0.05	<0.05	<0.05	0.13	0.13
RPD															0	0	0	0	8	8
13/05/2019	P44	Intralab	water												<0.05	<0.05	<0.05	<0.05	1.87	2.56
	FD01														<0.05	<0.05	<0.05	<0.05	1.93	2.61
RPD															0	0	0	0	3	2

Analytical Results Tables
Table 7 - QA/QC Groundwater Results

Date	Field ID	Interlab or Intralab	Matrix Type	Perfluorooctadecanoic acid (PFODA)
				µg/L
EQL				0.005
	P34			<0.005
6/12/2018	QA02	Intralab	water	<0.005
RPD				0
	P35			<0.005
6/12/2018	QA01	Intralab	water	<0.005
RPD				0
	P40			<0.005
14/03/2019	QA01	Intralab	water	0.0055
RPD				10
	GWP2-PFC			
13/05/2019	FD02	Intralab	water	
RPD				
	GWP3-PFC			
13/05/2019	FD03	Intralab	water	
RPD				
	P44			
13/05/2019	FD01	Intralab	water	
RPD				

Analytical Results Tables

Table 8 - Rinsate Results

					NA														
					PFNS (68259-12-1)	8:2 Polyfluoroalkyl phosphate diester (8:2 diPAP)	FOUEA (2H-Perfluoro-2-decenoic acid (8:2))	Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecanesulfonic acid (PFDS)	Perfluoro-n-hexadecanoic acid (PFHxDA)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)
					ug/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL					0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.002	0.001	0.002	0.005	0.002	0.001	0.001	0.001
Location Code	**Date**	**Field ID**	**Sample Type**	**Matrix Type**															
	14/03/2019	RB01	Rinsate	water	<0.001	<0.02	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.001	<0.002	<0.005	<0.002	<0.001	<0.001	<0.001
RB	13/05/2019	RB	Rinsate	water				<0.02		<0.02		<0.01			<0.1	<0.02	<0.02	<0.02	<0.01
RB01	6/12/2018	RB01	Rinsate	water	<0.001	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.001	<0.002	<0.005	<0.002	<0.001	<0.001	<0.001

					PFAS														
					Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Methyl perfluorooctane sulfonamidoethanol (MEFOSE)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer Sulfonate (6:2 FTS)
					µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL					0.001	0.001	0.001	0.001	0.002	0.002	0.001	0.002	0.002	0.005	0.005	0.002	0.002	0.001	0.001
Location Code	**Date**	**Field ID**	**Sample Type**	**Matrix Type**															
	14/03/2019	RB01	Rinsate	water	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.001	<0.002	<0.002	<0.005	<0.005	<0.002	<0.002	<0.001	<0.001
RB	13/05/2019	RB	Rinsate	water														<0.05	<0.05
RB01	6/12/2018	RB01	Rinsate	water	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.001	<0.002	<0.002	<0.005	<0.005	<0.002	<0.002	<0.001	<0.001

Analytical Results Tables
Table 8 - Rinsate Results

Location Code	Date	Field ID	Sample Type	Matrix Type	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Sum of PFHxS and PFOS	PFAS (Sum of Total)(WA DER List)	Perfluorooctadecanoic acid (PFODA)
					µg/L	µg/L	µg/L	µg/L	µg/L
EQL					0.001	0.001	0.01	0.01	0.005
	14/03/2019	RB01	Rinsate	water	<0.001	<0.001			<0.005
RB	13/05/2019	RB	Rinsate	water	<0.05	<0.05	<0.01	<0.01	
RB01	6/12/2018	RB01	Rinsate	water	<0.001	<0.001			<0.005

Analytical Results Tables
Table 9 - Historical Groundwater Results

			PFOS/PFHxS (µg/L)	PFOS (µg/L)	PFOA (µg/L)
Criteria	**NEMP Drinking Water**		**0.07**		**0.56**
	NEMP Recreational		**0.7**		**5.6**
	Interim Freshwater 95%			**0.13**	**220**
Well I.D.	**Date**	**Firm**			
BGW3	15/08/2016	GHD	<0.01	<0.01	<0.01
	23/11/2016	GHD	0.01	0.01	<0.01
BGW4	15/08/2016	GHD	0.03*	<0.01	<0.01
GWP1-PFC	27/05/2016	EP	0.061	0.014	<0.005
	31/08/2018	Golder	0.058*	<0.02	<0.01
	14/03/2019	GHD	0.05	0.011	0.0011
	13/05/2019	GHD	0.06	0.02	0.02
GWP2-PFC	27/05/2016	EP	0.055	0.044	<0.005
	31/08/2018	Golder	0.042*	0.032	<0.01
	14/03/2019	GHD	0.107	0.039	0.0015
	24/04/2019	EP	0.0361		0.0036
	13/05/2019	GHD	0.03	0.03	0.03
GWP3-PFC	27/05/2016	EP	0.102	0.03	<0.005
	7/12/2016	GHD	0.11	0.04	<0.01
	13/07/2017	Golder	0.11	0.04	<0.02
	31/08/2018	Golder	0.114*	0.032	<0.01
	14/03/2019	GHD	0.0245	0.018	0.0015
	24/04/2019	EP	0.121		0.004
	13/05/2019	GHD	0.12	0.05	0.05
GWP4-PFC	27/05/2016	EP	0.0057	<0.005	<0.005
GWP5-PFC	15/08/2016	GHD	0.03*	<0.01	<0.01
GWP6-PFC	15/08/2016	GHD	97.7	72.8	1.28
	15/08/2016	GHD	97.7	72.8	1.28
	23/11/2019	GHD	88.7	67.3	1.36
	5/12/2017	GHD	226	180	2.7
P1	14/06/2016	GHD	0.11*	<0.01	0.09
	22/11/2016	GHD	7.99	5.33	0.08
	4/12/2017	GHD	0.51	0.41	<0.01
P3	14/06/2016	GHD	0.25	0.04	<0.01
	22/11/2016	GHD	0.55	0.25	<0.01
P6	14/06/2016	GHD	1.68	0.48	0.05
	15/08/2016	GHD	6.58	4.35	0.05
	23/11/2016	GHD	5.27	3.63	0.05
	4/12/2017	GHD	6.3	4.5	0.07
P8	17/03/2016	EP	0.081	0.013	<0.005
	15/08/2016	GHD	0.07	0.01	<0.01
	22/11/2016	GHD	0.11	0.04	<0.01
P9	15/08/2016	GHD	0.06	0.02	<0.01
	23/11/2016	GHD	0.12	0.06	<0.01
	31/08/2018	Golder	0.04*	<0.02	<0.01
	6/12/2018	GHD	0.04	0.013	<0.001
	14/03/2019	GHD	0.0247	0.0057	<0.001

Analytical Results Tables

Table 9 - Historical Groundwater Results

			PFOS/PFHxS (µg/L)	PFOS (µg/L)	PFOA (µg/L)
Criteria	**NEMP Drinking Water**		**0.07**		**0.56**
	NEMP Recreational		**0.7**		**5.6**
	Interim Freshwater 95%			**0.13**	**220**
Well I.D.	**Date**	**Firm**			
P10	15/08/2016	GHD	<0.05	<0.05	<0.05
	22/11/2016	GHD	0.1	0.02	<0.01
	5/12/2017	GHD	0.08	<0.01	<0.01
P11	15/08/2016	GHD	7.35	3.44	0.06
	23/11/2016	GHD	15.1	5.65	0.2
	13/07/2017	Golder	5.7	2.8	0.049
P12	24/11/2016	GHD	80.9	65.7	0.79
	5/12/2017	GHD	83	70	0.54
P13	24/11/2016	GHD	33	22.7	0.67
	5/12/2017	GHD	10.1	6.5	0.19
P14	24/11/2016	GHD	3.52	1.52	0.08
	13/07/2017	Golder	1.7	0.84	0.034
	5/12/2017	GHD	1.84	0.91	0.05
P15	24/11/2016	GHD	11.3	6.44	0.16
	13/07/2017	Golder	3.64	0.84	0.066
	6/12/2017	GHD	5.5	2.1	0.11
P16	24/11/2016	GHD	5.22	3.72	0.06
	4/12/2017	GHD	3.7	2.6	0.04
P17	24/11/2016	GHD	<0.01	<0.01	<0.01
	31/08/2018	Golder	0.03*	<0.02	<0.01
P18	24/11/2016	GHD	5.24	3.51	0.05
	13/07/2017	Golder	1.38	0.84	0.022
	4/12/2017	GHD	1.48	1.1	0.03
	31/08/2018	Golder	0.91	0.52	<0.01
P19	5/12/2017	GHD	<0.01	<0.01	<0.01
	31/08/2018	Golder	0.041*	0.031	<0.01
	24/11/2019	GHD	<0.05	<0.05	<0.05
P20	25/11/2016	GHD	<0.05	<0.05	<0.05
	5/12/2017	GHD	<0.01	<0.01	<0.01
P21	25/11/2019	GHD	<0.05	<0.05	<0.05
	5/12/2017	GHD	<0.01	<0.01	<0.01
P22	6/12/2017	GHD	<0.01	<0.01	<0.01
P23	6/12/2017	GHD	<0.01	<0.01	<0.01
P24	5/12/2017	GHD	1.43	0.65	0.04
P25	5/12/2017	GHD	2.9	1.5	0.07
P26	5/12/2017	GHD	6.5	1.9	0.1
P27	5/12/2017	GHD	<0.01	<0.01	<0.01
P28	5/12/2017	GHD	<0.01	<0.01	<0.01
P29	6/12/2017	GHD	<0.01	<0.01	<0.01
P30	6/12/2017	GHD	<0.01	<0.01	<0.01
P31	6/12/2017	GHD	0.27	0.05	<0.01
P32	5/12/2017	GHD	0.39	0.05	<0.01

Analytical Results Tables
Table 9 - Historical Groundwater Results

			PFOS/PFHxS (µg/L)	PFOS (µg/L)	PFOA (µg/L)
Criteria	**NEMP Drinking Water**		**0.07**		**0.56**
	NEMP Recreational		**0.7**		**5.6**
	Interim Freshwater 95%			**0.13**	**220**
Well I.D.	**Date**	**Firm**			
P33	3/05/2018	EP	0.84	0.57	0.023
	31/08/2018	Golder	0.57	0.29	<0.01
P34	6/12/2018	GHD	0.15	0.03	0.0023
	14/03/2019	GHD	0.165	0.025	0.0012
	13/05/2019	GHD	0.18	0.04	0.04
P35	6/12/2018	GHD	0.064	0.037	0.0063
	14/03/2019	GHD	0.061	0.037	<0.01
	13/05/2019	GHD	0.07	0.04	0.04
P36	6/12/2018	GHD	0.14	0.055	0.024
	14/03/2019	GHD	0.134	0.05	0.019
	13/05/2019	GHD	0.17	0.07	0.07
P37	6/12/2018	GHD	0.08	0.043	0.0028
	13/05/2019	GHD	0.08	0.04	0.04
P38	6/12/2018	GHD	0.032	0.013	0.0041
P39	6/12/2018	GHD	0.0129	0.0035	0.0098
P40	7/02/2019	GHD	0.057	0.02	0.03
	14/03/2019	GHD	0.07	0.032	0.028
	13/05/2019	GHD	0.06	0.03	0.03
P41	7/02/2019	GHD	0.106	0.032	0.0048
	14/03/2019	GHD	0.103	0.021	0.004
	13/05/2019	GHD	0.17	0.05	0.05
P42	7/02/2019	GHD	0.118	0.043	0.0055
	14/03/2019	GHD	0.112	0.035	0.0074
	13/05/2019	GHD	0.16	0.07	0.07
P43	7/02/2019	GHD	0.29	0.24	0.0031
	14/03/2019	GHD	0.052	0.029	0.0013
	13/05/2019	GHD	0.07	0.04	0.04
P44	7/02/2019	GHD	1.372	0.072	0.051
	14/03/2019	GHD	1.658	0.058	0.05
	24/04/2019	EP	0.057		<0.001
	13/05/2019	GHD	1.87	0.13	0.13

* = One or more results reported below LOR. Results below LOR were given the value of the LOR.

11. Figures

LEGEND

- Roads
- Railways
- Watercourses

Paper Size A3

0 130 260 520

Metres

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

N

Parafield Airport

Adelaide Airport Limited
Offsite Groundwater Bore Use Survey and
Additional Groundwater Investigation

Job Number	33-19051
Revision	A
Date	28 Mar 2019

Investigation Area

Figure 1

N:\AU\Sydney\GIS\Admin\Temp\KatrinaVelasco\Projects\3319051\GIS\Maps\Deliverables\33_19051_Z010_InvestigationArea.mxd

Level 15, 133 Castlereagh Street Sydney NSW 2000 Australia **T** 61 2 9239 7100 **F** 61 2 9239 7199 **E** sydmail@ghd.com **W** www.ghd.com

Data source: Aerial Imagery - Esri Imagery Basemap (Extracted 12 November 2018). Adelaide Airport Limited, Lot boundaries and Showroom and Convenience Supermarket Building locations, 2016. Created by:dbbanatin

LEGEND

● Phase 1 Groundwater Monitoring Wells
○ Phase 2 Groundwater Monitoring Wells
⊕ Existing Groundwater Wells
— Roads
— Railways
— Watercourses

Paper Size A3
0 130 260 520
Metres
Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 54

N

GHD

Parafield Airport

Adelaide Airport Limited
Offsite Groundwater Bore Use Survey and
Additional Groundwater Investigation

Job Number	33-19051
Revision	A
Date	29 Mar 2019

Groundwater Monitoring Well Locations

Figure 2

N:\AU\Adelaide\Projects\33\19051\GIS\Maps\Deliverables\33_19051_Z005_GroundwaterMonitoringWellLocations.mxd

Level 15, 133 Castlereagh Street Sydney NSW 2000 Australia **T** 61 2 9239 7100 **F** 61 2 9239 7199 **E** sydmail@ghd.com **W** www.ghd.com

Data source: Aerial Imagery - Esri Imagery Basemap (Extracted 12 November 2018). Adelaide Airport Limited, Lot boundaries and Showroom and Convenience Supermarket Building locations, 2016. Created by:dbbanatin

LEGEND

🟨 Parafield Airport
🟩 Off-Site Investigation Area
— Roads
—+— Railways
— Watercourses

Paper Size A3
0 125 250 500
Metres
Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 54

N

GHD
Adelaide Airport

Adelaide Airport Limited
Offsite Groundwater Bore Use Survey and
Additional Groundwater Investigation

Job Number	33-19051
Revision	A
Date	28 Mar 2019

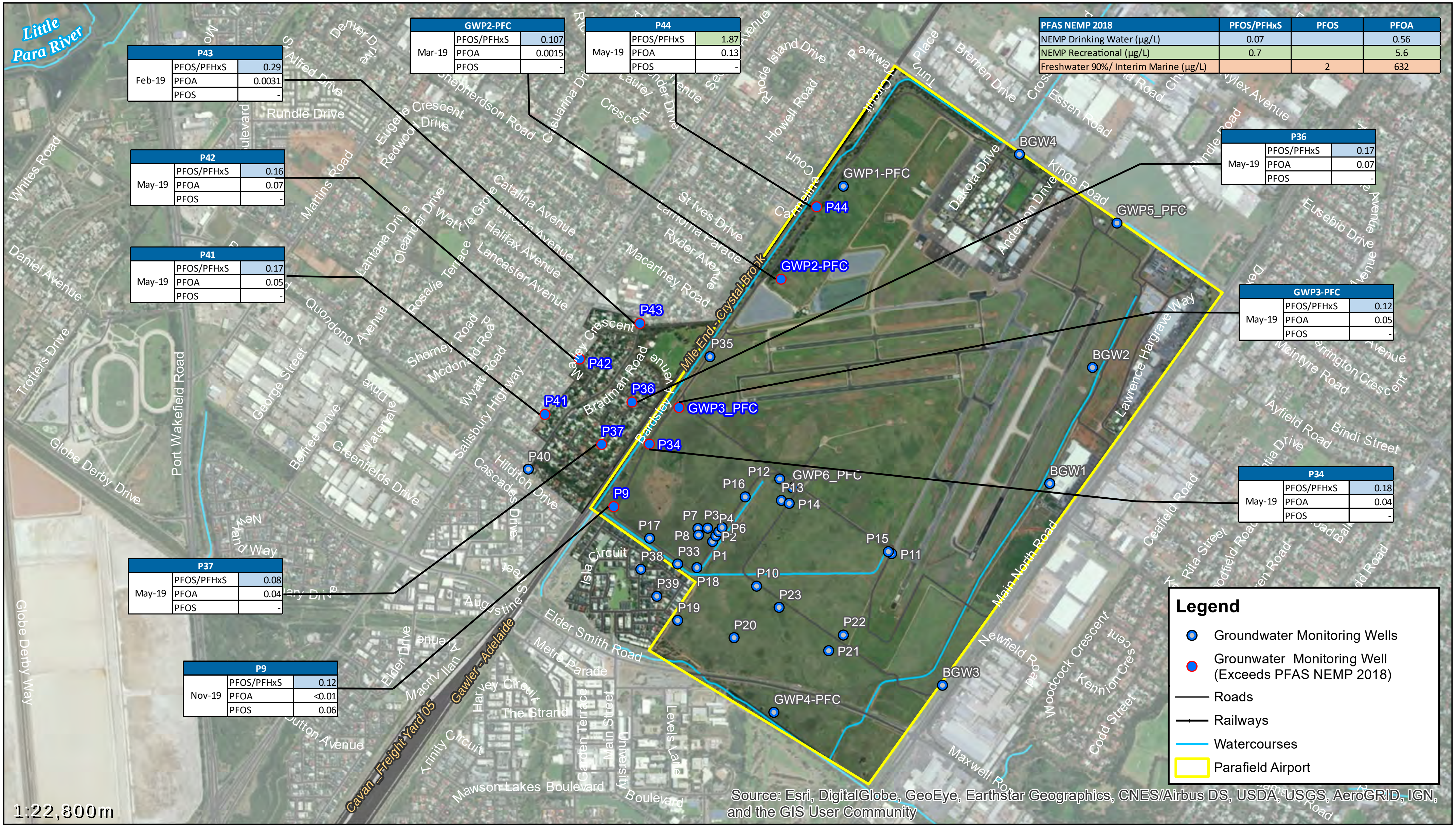
Water Survey Area Locations

Figure 3

N:\AU\Sydney\GIS\Admin\Temp\KatrinaVelasco\Projects\3319051\GIS\Maps\Deliverables\33_19051_Z001_WaterSurveyAreaLocations.mxd

Level 15, 133 Castlereagh Street Sydney NSW 2000 Australia **T** 61 2 9239 7100 **F** 61 2 9239 7199 **E** sydmail@ghd.com **W** www.ghd.com

Data source: Aerial Imagery - Esri Imagery Basemap (Extracted 12 November 2018). Adelaide Airport Limited, Lot boundaries and Showroom and Convenience Supermarket Building locations, 2016. Created by:dbbanatin



PFAS NEMP 2018	PFOS/PFHxS	PFOS	PFOA
NEMP Drinking Water (µg/L)	0.07		0.56
NEMP Recreational (µg/L)	0.7		5.6
Freshwater 90%/ Interim Marine (µg/L)		2	632

P43

Feb-19	PFOS/PFHxS	0.29
	PFOA	0.0031
	PFOS	-

GWP2-PFC

Mar-19	PFOS/PFHxS	0.107
	PFOA	0.0015
	PFOS	-

P44

May-19	PFOS/PFHxS	1.87
	PFOA	0.13
	PFOS	-

P42

May-19	PFOS/PFHxS	0.16
	PFOA	0.07
	PFOS	-

P36

May-19	PFOS/PFHxS	0.17
	PFOA	0.07
	PFOS	-

P41

May-19	PFOS/PFHxS	0.17
	PFOA	0.05
	PFOS	-

GWP3-PFC

May-19	PFOS/PFHxS	0.12
	PFOA	0.05
	PFOS	-

P34

May-19	PFOS/PFHxS	0.18
	PFOA	0.04
	PFOS	-

P37

May-19	PFOS/PFHxS	0.08
	PFOA	0.04
	PFOS	-

P9

Nov-19	PFOS/PFHxS	0.12
	PFOA	<0.01
	PFOS	0.06

Legend

●	Groundwater Monitoring Wells
●	Grounwater Monitoring Well (Exceeds PFAS NEMP 2018)
—	Roads
—	Railways
—	Watercourses
☐	Parafield Airport

Paper Size A4

0 250 500 1,000

Metres

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

N

GHD

Parafield Airport

Adelaide Airport Limited
Offsite Groundwater Bore Use Survey and
Additional Groundwater Investigation

Job Number	33-19051
Revision	A
Date	28 Jun 2019

PFOA and PFHxS / PFOS Exceedances

Note: Most recent exceedance displayed

Figure 4

N:\AU\Sydney\GIS\Admin\Temp\KatrinaVelasco\Projects\3319051\GIS\Maps\Deliverables\33_19051_Z011_PARAFIELD_PFOAandSumOfPFHxS&PFOS_Exceedances_Pre2019.mxd

Level 15, 133 Castlereagh Street Sydney NSW 2000 Australia T 61 2 9239 7100 F 61 2 9239 7199 E sydmail@ghd.com W www.ghd.com

Data source: Aerial Imagery - Esri Imagery Basemap (Extracted 12 November 2018). Adelaide Airport Limited, Lot boundaries and Showroom and Convenience Supermarket Building locations, 2016. Created by:dbbanatin

LEGEND

- ● Phase 1 Groundwater Monitoring Wells
- ○ Phase 2 Groundwater Monitoring Wells
- ⊕ Existing Groundwater Wells
- - - Groundwater Contours (mAHD)
- — Roads
- ━ Railways
- — Watercourses

Paper Size A3

0 130 260 520

Metres

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

N

GHD

Parafield Airport

Adelaide Airport Limited
Offsite Groundwater Bore Use Survey and
Additional Groundwater Investigation

Job Number	33-19051
Revision	A
Date	28 Mar 2019

Groundwater Contour Plan

Figure 5

N:\AU\Sydney\GIS\Admin\Temp\KatrinaVelasco\Projects\3319051\GIS\Maps\Deliverables\33_19051_Z008_GWContours_March19GME.mxd

Level 15, 133 Castlereagh Street Sydney NSW 2000 Australia T 61 2 9239 7100 F 61 2 9239 7199 E sydmail@ghd.com W www.ghd.com

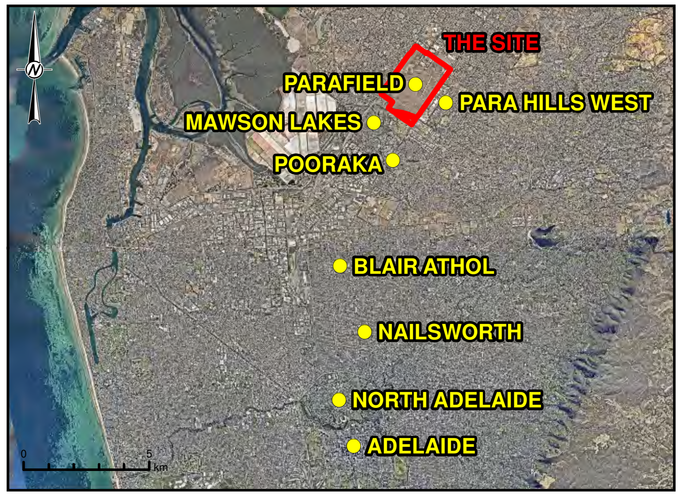
Data source: Aerial Imagery - Esri Imagery Basemap (Extracted 12 November 2018). Adelaide Airport Limited, Lot boundaries and Showroom and Convenience Supermarket Building locations, 2016. Created by:dbbanatin

ID No.	Current Off-Site Features of Interest
1	Antrum Upholstery
2	Coolchem (Automotive Fluids Distribution)
3	GM Hosking & EC Stainless Steel Welding/Aluminium Supplier
4	Superior Stainless (Stel Fabrication)
5	Griffin Press (Book Manufacturer)
6	CAS Supreme Canvas & Vinyl Products
7	Powder Coating/Crash Repair
8	Stevenson AC (Air Conditioning Servicing)
9	Adelaide All Clean Carpet Cleaning
10	Tri Metal Engineering
11	Blacksilver Painters
12	NOV Tuboscope
13	Carpet Selection Centre

ID No.	Current On-Site Features of Interest
1	Aeroservices Pty Ltd
2	Flight Training Adelaide
3	Stark Aviation
4	North Former Fire Fighting Training Ground
5	West Former Fire Fighting Training Ground
6	South-East Former Fire Fighting Training Ground
7	Former Fire Station
8	Former Landfill Bunker
9	Former Landfill

Path: S:\1. Active\3. Project\1546945 AAL&PAL_Site History & GME_Adelaide\Project\Deliverable\Production Fig\002 - PAL\REV1\1546945-002-R-F0002-Rev1.mxd

LOCATION MAP



LEGEND

- ● Current On-Site Features of Interest (Approximate Location)
- ● Current Off-Site Features of Interest (Approximate Location)
- Approximate Fire Station / Fire Services Location

Potential PFC Risk

- 🟥 High Risk
- 🟧 Moderate Risk
- 🟨 Low Risk
- 🟦 Very Low Risk
- ☐ Approximate Site Boundary

COPYRIGHT

1. Aerial image sourced from Nearmap Pty. Ltd, aerial dated 27.12.2015, sourced 11.02.2016.
2. Roads data sourced from DPTI, Department for Transport Energy and Infrastructure, South Australian Government, sourced http://www.dptiapps.com.au/dataportal/Roads.zip, sourced 19.06.2014.
3. Suburb and road data sourced from MapInfo StreetPro.

0 200 400 600 800 1,000
METRES

REFERENCE SCALE: 1:15,000 (at A3)

PROJECTION: GDA 1994 MGA Zone 54

CLIENT
ADELAIDE AIRPORT LIMITED

PROJECT
SITE HISTORY AND QUALITATIVE RISK ASSESSMENT OF PERFLUORINATED CHEMICAL SOURCES - PARAFIELD AIRPORT

TITLE
SITE LAYOUT AND FEATURES OF INTEREST

CONSULTANT
Golder Associates

YYYY-MM-DD	2016-05-26
PREPARED	KB
DESIGN	-
REVIEW	MP
APPROVED	JC

PROJECT No.	CONTROL	Rev.	FIGURE
1546945	002-R	1	2

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM:
25mm
0

Appendices

Appendix A - Groundwater Survey Data

PARAFIELD AIRPORT
Tigermoth Lane, Parafield
Ground Water Observation Wells

SKS SURVEYS

Job No 246916

Well Id	Easting	Northing	TOC	Description
P11	283242.89	6146375.31	10.14	Observation Well
GWP6_PFC	282802.40	6146667.91	8.95	Observation Well
P9	282009.20	6146584.13	6.46	Observation Well
P10	282642.92	6146231.68	7.58	Observation Well
BGW3	283468.20	6145791.79	10.21	Observation Well
P8	282384.63	6146458.67	8.41	Observation Well
P6	282489.79	6146491.77	8.52	Observation Well
GWP5	284242.14	6147844.59	18.84	Observation Well
BGW4	283809.30	6148148.96	17.44	Observation Well

Notes
Coordinates are based on MGA 94 Zone 54 GNSS SURVEY
Elevations are based on AHD
TOC refers to top of PVC
Date of survey 15/08/2016
Surveyor: Jonathan Morton

PARAFIELD AIRPORT
Tigermoth Lane, Parafield
Ground Water Observation Wells 2

SKS SURVEYS

Job No 246916

Well Id	Easting	Northing	TOC	Description
P15	283228.510	6146384.790	9.773	Flush Well
P21	282963.077	6145945.269	8.805	Flush Well
P20	282542.625	6146002.116	6.768	Flush Well
P19	282291.903	6146078.955	6.322	Flush Well
P13	282752.542	6146612.618	8.799	Flush Well
P14	282787.834	6146598.440	9.026	Flush Well
P12	282746.296	6146707.166	9.001	Flush Well
P7	282381.650	6146487.693	8.384	Monument Well
	282381.359	6146487.539	7.466	Ground level at P7
P3	282425.701	6146489.236	7.917	Monument Well
	282425.661	6146489.084	7.674	Ground level at P3
P18	282378.231	6146314.112	7.271	Flush Well
P1	282448.107	6146429.085	7.938	Monument Well
	282448.173	6146429.212	7.693	Ground level at P1
P2	282462.646	6146453.860	8.256	Monument Well
	282462.704	6146454.056	7.886	Ground level at P2
P4	282475.281	6146473.418	8.357	Monument Well
	282475.007	6146473.331	7.890	Ground level at P4
P17	282168.469	6146444.067	6.924	Flush Well
P16	282592.056	6146627.919	8.357	Flush Well

Notes
Coordinates are based on MGA 94 Zone 54 GNSS SURVEY
Elevations are based on AHD
TOC refers to top of PVC
Date of survey 22/11/2016
Surveyor: Sam Barrera

PARAFIELD AIRPORT OBSERVATION WELLS

SURVEY DATE 06/12/2018
SURVEYOR - JON MORTON
METHOD - GPS
COORDS - MGA / AHD
DATUM - PSM 6628/38566

WELL ID	EAST	NORTH	RL
P39	282244.5	6146188	6.695
P38	282139.6	6146311	7.521
P37	281933.5	6146865	6.772
P36	282088.9	6147033	7.625
P35	282437.6	6147258	10.081
P34	282162.7	6146861	8.383

LINKUP
CONSTRUCTION SURVEYS PTY LTD

To: **Joel Kirk**
Company: **GHD**
Phone: **8111 6586**

From: **Lincoln Jeffery**
Phone: **0414 840 569**
Fax: **8351 4247**
Email: **Lincoln@linkupconstructionsurveys.com.au**

Date: **8/2/2019**

Monitoring well coordinates –
Parafield Airport

Well or Bore	Easting	Northing	R.L. Top of Casing	Natural Surface
No.	MGA94	MGA94	A.H.D.	A.H.D.
P40	281667.639	6146800.292	5.754	5.871
P41	281695.915	6146991.474	6.274	6.396
P42	281866.499	6147234.411	7.442	7.539
P43	282123.957	6147364.447	8.957	9.104
P44	282870.572	6147852.135	12.735	12.847

All Survey information was based from the MGA94 grid system and Australian Height Datum(AHD), Triangulated from Network Survey Marks on the area.

Appendix B – Field Notes

Phase 1

Groundwater Samples

Client: Adelaide Airport Limited

Project: Parafiel Airport GW Investigation and Survey

Job No.: 3319051

Location: Parafield Gardens

WL Meter Type: Int.Fce

Location ID	Sample Date	Standing Water Level (SWL) (mbgl)	Depth of Well (mbgl)	pH	EC (us/cm)	TDS (mg/L)	DO (mg/L)	Redox (mV)	SHE Redox (mV)	Temperature (˚C)	Sample Description
P9	6/12/2018	1.771	5.962	7.63	2873	1867.45	0.4	121.8	320.8	19.1	No odour/sheen, pale brown/straw, high turbidity, trace organic matter
P34	6/12/2018	3.361	5.871	7.41	4175	2713.75	2.24	85.9	284.9	19.6	No odour/sheen, pale-mid brown/orange, fine-medium sand in bottom of hydrasleeve, high turbidity
P35	6/12/2018	3.046	7.108	7.2	2816	1830.4	2.43	84.6	283.6	19.7	No odour/sheen, pale brown, course sand in bottom of hydrasleeve, high turbidity, trace organic matter
P36	6/12/2018	2.721	5.291	7.15	4401	2860.65	1.8	102	301	21.7	No odour/sheen, pale brown/orange, fine sand in bottom of hydrasleeve, moderate turbidity
P37	6/12/2018	2.491	5.991	7.19	4925	3201.25	2.21	122.4	321.4	21.4	No odour/sheen, pale brown/orange, fine sand in bottom of hydrasleeve, moderate turbidity, trace organic matter
P38	6/12/2018	2.284	5.317	7.99	6904	4487.6	1.54	77.9	276.9	20.2	No odour/sheen, pale brown/orange, fine sand in bottom of hydrasleeve, high turbidity
P39	6/12/2018	1.284	5.968	7.83	20081	13052.65	3.98	96.3	295.3	20.2	No odour/sheen, pale brown/orange, course sand in bottom of hydrasleeve, high turbidity

GHD MANAGEMENT ENGINEERING ENVIRONMENT

Purging and Sampling Record

1·894 m bgL

Bore ID: P9

Job Information

Client: Adelaide Airport Ltd
Project: Parafield Airport
Proj. No.: 3319051
Site: Parafield Airport P9
Sampler: Vera Biermann

Sampling Information Hydrasleeve

Sample Method: ~~Submersible pump~~
WQ Meter Type: YSI Pro ✓
Flow Cell: Y
Pump Depth: ....m
WLevel Meter Type: IP
NAPL Check: None present

Bore Information

SWL: 1·817 mbTOC m
Logic Check: ....
Date: 15-11-2018
Time: 10:25
Ref.datum: ....
Stick Up: .... m
Bore Depth: 6 mbgL m
Bore Diam.: 50 mm
Screen From: ....to.......... m
Well Cap Secure? ✓

Time (..........)	Volume (L)	Temp (°C)	Dis.Oxygen (..%...mg/L)	Elec.Cond (µS/cm)	pH (pH units)	Ox-Red Pt. (± mV)	SWL (m)	(..........)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable when (3 consecutive readings):		-	+/- 10%	+/- 3%	+/- 0.05 pH	+/- 10 mV	stable		
11:06		19·1	9·0/[illegible]	2607	7·42	209·0			brown-red sediment, turbid water no sheen or odour
11·10		19·1	7·7% 0·71mg/L	2914/2590	7·42	203·2			some brown-red sediment, slight turbidity no sheen or odour
				SpC C					

Field QA Checks:

Air bubbles in vials? Y [✓ N] Any violent reactions? Y / [✓ N]
Decontamination as per GHD procedure? [✓ Y] / N

Was sampling equipment pre-cleaned? [✓ Y] / N
COC updated? [✓ Y] / N Field Filtered? Y / [✓ N]

Well Volume Calculations

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

Total Well Depth ______ m (-) Water Level ______ m (=) Water Column ______ m

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

= 3 well vols

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

Lab supplied bottles
Samples collected: P9, QA01

Purge Volumes

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

*Double for gravel pack

GHD MANAGEMENT ENGINEERING ENVIRONMENT

Purging and Sampling Record

Bore ID: P9

Job Information

Client: Adelaide Airport Limited

Project: —

Proj. No.: 3319051

Site: Airport (Landside)

Sampler: Joel Chance

Sampling Information

Sample Method: HS ~~Submersible pump~~

WQ Meter Type: YSI Pro ✓

Flow Cell: Y

Pump Depth: — m

WLevel Meter Type: IP ✓

NAPL Check: N/A

Bore Information

SWL: 1.771 m

Logic Check: —

Date: 6-12-18

Time: 11:37

Ref.datum: —

Stick Up: — m

Bore Depth: 5.962 m

Bore Diam.: — mm

Screen From: ? to ? m

Well Cap Secure?

Time (..........)	Volume (L)	Temp (°C)	Dis.Oxygen (..........)	Elec.Cond (..........)	pH (pH units)	Ox-Red Pt. (± mV)	SWL (m)	(..........)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable when (3 consecutive readings):		-	*+/- 10%*	*+/- 3%*	*+/- 0.05 pH*	*+/- 10 mV*	*stable*		
11:37	—	14.1	3.4%	2873 spc	7.63	121.8	—	—	Pale brown / straw.
			0.4 mg/L	2534 c					
									trace organic matter.
									no sediment
									High turbidity
									no sheen / odour

Field QA Checks:

Air bubbles in vials? Y / [✓ N] Any violent reactions? Y / [✓ N]

Decontamination as per GHD procedure? [✓ Y] / N

Was sampling equipment pre-cleaned? [✓ Y] / N

COC updated? [✓ Y] / N Field Filtered? Y / [✓ N]

Well Volume Calculations

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

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

________ m (-) ________ m (=) ________ m

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

________ m (x) ________ m (=) ________ m

= 3 well vols

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

1 x PFAS bottle (MGT).

Purge Volumes

Casing Int. Dia (mm)		100	150
Vol (L/m of casing)	2..	7.9	17.7

*Double for gravel pack

GHD MANAGEMENT ENGINEERING ENVIRONMENT

Purging and Sampling Record

Bore ID: P34

Job Information

Client: Adelaide Airport Limited.
Project:
Proj. No.: 3319051
Site: Airport (landside)
Sampler: Joel Chance.

Sampling Information H/S.

Sample Method: ~~Submersible~~ pump
WQ Meter Type: YSI Pro ✓
Flow Cell: Y
Pump Depth: — m
WLevel Meter Type: IP ✓
NAPL Check: N/A.

Bore Information

SWL: 3.361 m
Logic Check: —
Date: 6-12-18
Time: 11:25
Ref.datum: —
Stick Up: — m
Bore Depth: 5.871 m
Bore Diam.: — mm
Screen From: 2 to 6 m
Well Cap Secure? yes.

Time (..........)	Volume (L)	Temp (°C)	Dis.Oxygen (..........)	Elec.Cond (..........)	pH (pH units)	Ox-Red Pt. (± mV)	SWL (m)	(..........)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable when (3 consecutive readings):		-	+/- 10%	+/- 3%	+/- 0.05 pH	+/- 10 mV	stable		
11.25.		19.6	26.2%	4175 spc	7.41	85.9			Pale - medium brown /
			2.24 mg/L	3766 c					orange
									Sediment - fine / medium
									Sand in bottom of
									H/S
									High turbidity
									no odour / sheen.

Field QA Checks:

Air bubbles in vials? Y [✓ N] Any violent reactions? Y [✓ N]
Decontamination as per GHD procedure? [✓ Y] / N

Was sampling equipment pre-cleaned? [✓ Y] / N
COC updated? [✓ Y] / N Field Filtered? Y / [✓ N]

Well Volume Calculations

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

Total Well Depth (-) Water Level (=) Water Column
________ m (-) ________ m (=) ________ m

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

= 3 well vols

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

QA02.

2 x PFAS bottles (MGT).

Purge Volumes

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

*Double for gravel pack

Purging and Sampling Record

Bore ID: P35.

Job Information

Client: Adelaide Airport Limited.
Project: —
Proj. No.: 3319051.
Site: Airport (Airside)
Sampler: Joel Chance

Sampling Information HS.

Sample Method: ~~Submersible pump~~
WQ Meter Type: YSI Pro ✓
Flow Cell: Y
Pump Depth: — m
WLevel Meter Type: IP ✓
NAPL Check: N/A.

Bore Information

SWL: 3.046 m
Logic Check: —
Date: 6-12-18
Time: 10.50
Ref.datum: —
Stick Up: — m
Bore Depth: 7.108 m
Bore Diam.: — mm
Screen From: 3 **to** 7 m
Well Cap Secure? yes.

Time (...........)	Volume (L)	Temp (°C)	Dis.Oxygen (%)	Elec.Cond (SpC)	pH (pH units)	Ox-Red Pt. (± mV)	SWL (m)	(...........)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable when (3 consecutive readings):		-	*+/- 10%*	*+/- 3%*	*+/- 0.05 pH*	*+/- 10 mV*	*stable*		
10.50	—	19.7	25.9	2816	7.2	84.6	—	—	Pale brown.
			2.43	2543					
			mg/L	Ⓒ					Sediment - fine/medium
									Coarse grain Sand
									@ bottom of HS.
									trace organic matter.
									No odour / Sheen
									High turbidity.

Field QA Checks:

Air bubbles in vials? Y / [✓ N] Any violent reactions? Y / [✓ N]
Decontamination as per GHD procedure? [✓ Y] / N

Was sampling equipment pre-cleaned? [✓ Y] / N
COC updated? [✓ Y] / N Field Filtered? Y / [✓ N]

Well Volume Calculations

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

Total Well Depth (-) Water Level (=) Water Column
________ m (-) ________ m (=) ________ m

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

= 3 well vols

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

QA01

Purge Volumes

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

*Double for gravel pack

2x PFAS bottles (MGT).

Purging and Sampling Record

Bore ID: T36

Job Information	*Sampling Information*	*Bore Information*
Client: Adelaide Airport Limited	**Sample Method:** HS ~~Submersible~~ pump	**SWL:** 2.721 m **Logic Check:** –
Project: –	**WQ Meter Type:** ✓ YSI Pro ✓	**Date:** 6-12-18 **Time:** 12:30
Proj. No.: 3319051	**Flow Cell:** Y ✓ **Pump Depth:** – m	**Ref.datum:** – **Stick Up:** – m
Site: Barnes Cres	**WLevel Meter Type:** IP ✓	**Bore Depth:** 5.291 m **Bore Diam.:** – mm
Sampler: Joel Chance	**NAPL Check:** N/A	**Screen From:** 2 to 6 m **Well Cap Secure?** Yes

Time (..........)	Volume (L)	Temp (°C)	Dis.Oxygen (..........)	Elec.Cond (..........)	pH (pH units)	Ox-Red Pt. (± mV)	SWL (m)	(..........)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable when (3 consecutive readings):	-	*+/- 10%*	*+/- 3%*	*+/- 0.05 pH*	*+/- 10 mV*	*stable*			
12:30	-	21.7	21.8%. 1.8 mg/L	4401SPC 4130C	7.15	102.0	—	—	Pale brown / orange.
									Med. turbidity -
									sediment - fine sand
									in bottom of HS.
									No odour / sheen.
									1 x HS.

Field QA Checks:

Air bubbles in vials? Y / [✓ N] Any violent reactions? Y / [✓ N]

Decontamination as per GHD procedure? [✓ Y] / N

Was sampling equipment pre-cleaned? [✓ Y] / N

COC updated? [✓ Y] / N Field Filtered? Y / [✓ N]

Well Volume Calculations

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

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

______ m (-) ______ m (=) ______ m

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

______ m (x) ______ m (=) ______ m

= 3 well vols

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

1 x PFAS bottle (MGT).

Purge Volumes

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

*Double for gravel pack

GHD MANAGEMENT ENGINEERING ENVIRONMENT

Purging and Sampling Record

Bore ID: P37.

Job Information

Client: Adelaide Airport Limited.
Project:
Proj. No.: 3319051
Site: Mackay cres
Sampler: Joel Chance.

Sampling Information

Sample Method: ~~Submersible pump~~ HS.
WQ Meter Type: YSI Pro ✓
Flow Cell: Y
Pump Depth: - m
WLevel Meter Type: IP ✓
NAPL Check: N/A.

Bore Information

SWL: 2.491 m
Logic Check: -
Date: 6-12-18
Time: 12.15.
Ref.datum: -
Stick Up: - m
Bore Depth: 5.991 m
Bore Diam.: - mm
Screen From: 2 to 6 m
Well Cap Secure? yes

Time (..........)	Volume (L)	Temp (°C)	Dis.Oxygen (..........)	Elec.Cond (..........)	pH (pH units)	Ox-Red Pt. (± mV)	SWL (m)	(..........)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable when (3 consecutive readings):		-	+/- 10%	+/- 3%	+/- 0.05 pH	+/- 10 mV	stable		
12.15		21.4c	26.3%	4925 spc	7.19	122-4			Pale brown / orange.
			2.21 mg/L	4619 c					
									trace organic matter.
									Sediment - fine sand in bottom of HS.
									No odour / sheen
									Medium turbidity.
									1 x HS.

Field QA Checks:

Air bubbles in vials? Y [✓ N] Any violent reactions? Y [✓ N]
Decontamination as per GHD procedure? [✓ Y] N

Was sampling equipment pre-cleaned? [✓ Y] N
COC updated? [✓ Y] N Field Filtered? Y [✓ N]

Well Volume Calculations

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

Total Well Depth (-) Water Level (=) Water Column
__________ m (-) __________ m (=) __________ m

Water Column (x) Conversion Factor (=) Litres per 1 Well Volume
__________ m (x) __________ m (=) __________ m
= 3 well vols

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

1 x PFAS bottle (MGT).

Purge Volumes

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

*Double for gravel pack

MANAGEMENT
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Purging and Sampling Record

Bore ID: P38

Job Information

Client: Adelaide Airport Limited
Project: –
Proj. No.: 3319051.
Site: Bimini Cres (11)
Sampler: Joel Chance

Sampling Information HS.

Sample Method: ~~Submersible~~ pump
WQ Meter Type: YSI Pro ✓
Flow Cell: Y
Pump Depth: – m
WLevel Meter Type: IP ✓
NAPL Check: N/A

Bore Information

SWL: 2.284 m **Logic Check:** –
Date: 6-12-18 **Time:** 09.45
Ref.datum: – **Stick Up:** – m
Bore Depth: 5.317 m **Bore Diam.:** – mm
Screen From: 2 **to** 6 m **Well Cap Secure?** Yes

Time (...........)	Volume (L)	Temp (°C)	Dis.Oxygen (%)	Elec.Cond (Spc)	pH (pH units)	Ox-Red Pt. (± mV)	SWL (m)	(...........)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable when (3 consecutive readings):	-	+/- 10%	+/- 3%	+/- 0.05 pH	+/- 10 mV	stable			
09.45	–	20.2	18%. 1.54 mg/L	6904 6278(C)	7.99	77.9	–	–	Pale brown / orange.
									High turbidity.
									Sediment – fine sand
									in bottom of HS.
									No odour / sheen
									1 x HS.

Field QA Checks:

Air bubbles in vials? Y / [✓ N] Any violent reactions? Y / [✓ N]
Decontamination as per GHD procedure? [✓ Y] / N

Was sampling equipment pre-cleaned? [✓ Y] / N
COC updated? [✓ Y] / N Field Filtered? Y / [✓ N]

Well Volume Calculations

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

Total Well Depth (-) Water Level (=) Water Column
________ m (-) ________ m (=) ________ m

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

= 3 well vols

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

1 x PFAS bottle (MGT).

Purge Volumes

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

*Double for gravel pack

GHD MANAGEMENT ENGINEERING ENVIRONMENT

Purging and Sampling Record

Bore ID: P39

Job Information

Client: Adelaide Airport Limited.
Project: –
Proj. No.: 3319051
Site: Bimini cres (46).
Sampler: Joel Chance.

Sampling Information HS.

Sample Method: ~~Submersible~~ pump
WQ Meter Type: YSI Pro ✓
Flow Cell: Y
Pump Depth: – m
WLevel Meter Type: IP ✓
NAPL Check: N/A.

Bore Information

SWL: 1.284 m
Logic Check: –
Date: 6-12-18
Time: 09:30.
Ref.datum: –
Stick Up: – m
Bore Depth: 5.968 m
Bore Diam.: – mm
Screen From: 1.5 to 6. m
Well Cap Secure? Yes.

Time (..........)	Volume (L)	Temp (°C)	Dis.Oxygen (..........)	Elec.Cond (..........)	pH (pH units)	Ox-Red Pt. (± mV)	SWL (m)	(..........)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable when (3 consecutive readings):		-	+/- 10%	+/- 3%	+/- 0.05 pH	+/- 10 mV	stable		
09.30		20.2	48.71.	SPC 20081	7.83	96.3	–	–	Pale brown / orange
			3.98 mg/L	18298 Ⓒ					
									High turbidity.
									Sediment – fine / medium
									Coarse grain sand in
									bottom of HS.
									No odour / sheen.
									1 x HS.

Field QA Checks:

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

Well Volume Calculations

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

Total Well Depth (-) Water Level (=) Water Column
________ m (-) ________ m (=) ________ m

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

= 3 well vols

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

1 x PFAS bottle (MGT).

Purge Volumes

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

*Double for gravel pack

Phase 2
Groundwater Samples

Client: Adelaide Airport Limited

Project: Parafiel Airport GW Investigation and Survey

Job No.: 3319051

Location: Parafield Gardens

WL Meter Type: Int.Fce

Location ID	Sample Date	Standing Water Level (SWL) (mbgl)	Depth of Well (mbgl)	pH	EC (us/cm)	TDS (mg/L)	DO (mg/L)	Redox (mV)	SHE Redox (mV)	Temperature (℃)	Sample Description
GWP3_PFC	7/02/2019	3.748	5.241	7.16	3713	2413.45	2.54	86.9	285.9	20.3	No sample
P9	7/02/2019	2.391	5.914	7.33	3498	2273.7	0.03	95.5	294.5	20.3	No sample
P17	7/02/2019	2.432	4.333	7.28	5237	3404.05	0	64.1	263.1	21	No sample
P33	7/02/2019	3.163	5.451	7.45	1534	997.1	0.01	86.3	285.3	19.1	No sample
P34	7/02/2019	3.926	5.709	7.1	3851	2503.15	1.47	87.5	286.5	20.3	No sample
P35	7/02/2019	3.554	7.101	7.31	2852	1853.8	0.31	26	225	20.6	No sample
P36	7/02/2019	3.193	6.281	7.27	4464	2901.6	0.19	78.1	277.1	21.8	No sample
P37	7/02/2019	2.959	6.971	7.21	4773	3102.45	0.49	115.3	314.3	22.5	No sample
P38	7/02/2019	2.814	5.267	7.87	6771	4401.15	0.33	74.9	273.9	22.2	No sample
P39	7/02/2019	1.679	5.979	6.27	12490	8118.5	6.43	96.9	295.9	25.5	No sample
P40	7/02/2019	2.986	5.908	7.59	4398	2858.7	1.57	97.6	296.6	21.3	No odour/sheen, pale brown, fine sand in bottom of hydrasleeve, low-moderate turbidity
P41	7/02/2019	3.317	5.843	7.36	3754	2440.1	0	106.4	305.4	21.5	No odour/sheen, pale brown clay, fine sand in bottom of hydrasleeve, low-moderate turbidity
P42	7/02/2019	3.476	5.948	7.18	2142	1392.3	2.57	137.2	336.2	22.5	No odour/sheen, pale brown clay, fine sediment in bottom of hydrasleeve, low-moderate turbidity
P43	7/02/2019	3.931	5.604	6.86	4609	2995.85	0.53	104.4	303.4	21.4	No odour/sheen, pale brown clay, low turbidity
P44	7/02/2019	8.848	6.028	7.45	3333	2166.45	1.58	90.2	289.2	20.3	No odour/sheen, pale brown/straw, fine orange sand in bottom of hydrasleeve, low-moderate turbidity

GWP1_PFC	14/03/2019	6.046	9.423	7.9	2631	1710.15	4.51	125.4	324.4	20.8	No odour / sheen, clear / pale brown, fine sand in bottom of hydrasleeve, moderate turbidity
GWP2_PFC	14/03/2019	3.71	6.713	7.73	2110	1371.5	1.15	121.8	320.8	22.6	No odour / sheen, clear / yellow, fine sand in bottom of hydrasleeve, low turbidity
GWP3_PFC	14/03/2019	3.909	5.283	7.81	3619	2352.35	3.25	154	353	22.4	No odour / sheen, clear / pale brown, low sediment load / turbidity
P9	14/03/2019	2.567	5.926	7.94	3417	2221.05	1.06	94.6	293.6	22	No odour / sheen, clear / pale brown, low sediment load / turbidity
P34	14/03/2019	4.079	5.647	7.9			3.44	153.8	352.8	22.6	No odour / sheen, pale brown, fine sand in bottom of hydrasleeve, moderate turbidity
P35	14/03/2019	4.813	7.141	8.08	1431	930.15	2.54	174.4	373.4	21.8	No odour / sheen, clear / pale brown, fine sand in bottom of hydrasleeve, moderate turbidity
P36	14/03/2019	3.333	5.268	7.65	4173	2712.45	1.19	125.3	324.3	22.2	No odour / sheen, pale brown, fine sand in bottom of hydrasleeve, low turbidity
P40	14/03/2019	3.132	5.923	7.86	4056	2636.4	1.61	152.5	351.5	20.7	No odour / sheen, pale brown, fine sand in bottom of hydrasleeve, high turbidity
P41	14/03/2019	3.429	5.776	7.73	3287	2136.55	1.77	155	354	21.3	No odour / sheen, pale - medium brown, fine sand in bottom of hydrasleeve, low turbidity
P42	14/03/2019	3.634	5.927	8.12	1848	1201.2	3.64	155.5	354.5	22.3	No odour / sheen, pale brown, fine sand in bottom of hydrasleeve, low-moderate turbidity
P43	14/03/2019	4.079		7.55	4244	2758.6	2.03	152.6	351.6	22	Well annulus blocked. No odour / sheen, pale brown, high sediment load / turbidity
P44	14/03/2019	4.017	5.941	7.32			10.02	-107.1	91.9	21.4	No odour / sheen, clear / yellow, fine sand in bottom of hydrasleeve, low turbidity

Purging and Sampling Record

Bore ID: GWP3-PFC

Job Information

Client: Parafield Airport
Project:
Proj. No.: 3319051
Site:
Sampler: Joel Chance

Sampling Information N/A

Sample Method: Submersible pump
WQ Meter Type: YSI Pro
Flow Cell: Y
Pump Depth:..........m
WLevel Meter Type: IP
NAPL Check:................. ....

Bore Information

SWL: 3.748 m
Logic Check: ....
Date: 7-2-18
Time: 145 PM
Ref.datum: ....
Stick Up: .... m
Bore Depth: 5.241 m
Bore Diam.: .... mm
Screen From: ? to ? m
Well Cap Secure? Yes

Time (..........)	Volume (L)	Temp (°C)	Dis.Oxygen (..........)	Elec.Cond (..........)	pH (pH units)	Ox-Red Pt. (± mV)	SWL (m)	(..........)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable when (3 consecutive readings):		-	+/- 10%	+/- 3%	+/- 0.05 pH	+/- 10 mV	stable		
1.45		20.3	29.2%	3713	7.16	86.9	—	—	standpipe.
				(spc)					
									NO sample.
			2.54	3383					
			mg/L	(C)					

Field QA Checks:

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

Well Volume Calculations

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

Total Well Depth (-) Water Level (=) Water Column
________ m (-) ________ m (=) ________ m

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

= 3 well vols

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

NO Sample

Purge Volumes

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

*Double for gravel pack

GHD MANAGEMENT ENGINEERING ENVIRONMENT

Purging and Sampling Record

Bore ID: P9

Job Information

Client: Parafield Airport
Project:
Proj. No.: 3319051
Site:
Sampler: Joel Chance

Sampling Information N/A

Sample Method: ~~Submersible~~ pump
WQ Meter Type: YSI Pro
Flow Cell: Y
Pump Depth:..........m
WLevel Meter Type: IP
NAPL Check:................. ....

Bore Information

SWL: 2.391 m
Logic Check: ....
Date: 7-2-19
Time: 2:00 PM
Ref.datum: ....
Stick Up: .... m
Bore Depth: 5.914 m
Bore Diam.: .... mm
Screen From:............**to**.......... m
Well Cap Secure?.............

Time (..........)	Volume (L)	Temp (°C)	Dis.Oxygen (..........)	Elec.Cond (..........)	pH (pH units)	Ox-Red Pt. (± mV)	SWL (m)	(..........)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable when (3 consecutive readings):		-	+/- 10%	+/- 3%	+/- 0.05 pH	+/- 10 mV	stable		
2.00		20.3	0.4%	3498	7.33	95.5			
				SpC					NO Sample
			0.03						
			mg/L	3172					gatic
				C					

Field QA Checks:

Air bubbles in vials? Y / N Any violent reactions? Y / N
Decontamination as per GHD procedure? Y / N

Was sampling equipment pre-cleaned? Y / N
COC updated? Y / N Field Filtered? Y / N

Well Volume Calculations

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

Total Well Depth (-) Water Level (=) Water Column
_____________ m (-) _____________ m (=) _____________ m

Water Column (x) Conversion Factor (=) Litres per 1 Well Volume
_____________ m (x) _____________ m (=) _____________ m
= 3 well vols

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

NO Sample

Purge Volumes

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

*Double for gravel pack

GHD MANAGEMENT ENGINEERING ENVIRONMENT

Purging and Sampling Record

Bore ID: P17

Job Information

Client: Parafield Airport
Project:
Proj. No.: 3319051
Site:
Sampler: Joel Chance

Sampling Information

Sample Method: Submersible pump
WQ Meter Type: YSI Pro
Flow Cell: Y
Pump Depth:..........m
WLevel Meter Type: IP
NAPL Check:.................

Bore Information

SWL: 2.432 m
Logic Check: ....
Date: 7-2-19
Time: 2-10 PM
Ref.datum: ....
Stick Up: .... m
Bore Depth: 4.333 m
Bore Diam.: .... mm
Screen From:............to........... m
Well Cap Secure? Yes

Time (..........)	Volume (L)	Temp (°C)	Dis.Oxygen (..........)	Elec.Cond (..........)	pH (pH units)	Ox-Red Pt. (± mV)	SWL (m)	(..........)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable when (3 consecutive readings):		-	*+/- 10%*	*+/- 3%*	*+/- 0.05 pH*	*+/- 10 mV*	*stable*		
2.10PM		21	-0.7%	5231	7.28	64.1			Gatic.
				(spc)					
									no Sample
				4834					
				(c)					

Field QA Checks:

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

Well Volume Calculations

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

Total Well Depth (-) Water Level (=) Water Column
_____________ m (-) _____________ m (=) _____________ m

Water Column (x) Conversion Factor (=) Litres per 1 Well Volume
_____________ m (x) _____________ m (=) _____________ m
= 3 well vols

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

no Sampl.

Purge Volumes

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

*Double for gravel pack

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Purging and Sampling Record

Bore ID: P18

Job Information

Client: Parafield Airport
Project:
Proj. No.: 3319051
Site:
Sampler: Joel Chance

Sampling Information N/A

Sample Method: Submersible pump
WQ Meter Type: YSI Pro
Flow Cell: Y
Pump Depth:..........m
WLevel Meter Type: IP
NAPL Check:..................

Bore Information

SWL: 2.331 m
Logic Check: ....
Date: 7-2-18
Time: 2:45 PM
Ref.datum: ....
Stick Up: .... m
Bore Depth: .... m
Bore Diam.: .... mm
Screen From:..........to.......... m
Well Cap Secure?..........

Time (..........)	Volume (L)	Temp (°C)	Dis.Oxygen (..........)	Elec.Cond (..........)	pH (pH units)	Ox-Red Pt. (± mV)	SWL (m)	(..........)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable when (3 consecutive readings):	-	*+/- 10%*	*+/- 3%*	*+/- 0.05 pH*	*+/- 10 mV*	*stable*			
2.45									gatic
									no sample
									well annulus blocked
									unable to determine
									bore depth or
									field parameters -

Field QA Checks:

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

Well Volume Calculations

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

Total Well Depth (-) Water Level (=) Water Column
________ m (-) ________ m (=) ________ m
Water Column (x) Conversion Factor (=) Litres per 1 Well Volume
________ m (x) ________ m (=) ________ m
= 3 well vols

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

NO Sampl

Purge Volumes

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

*Double for gravel pack

Purging and Sampling Record

Bore ID: P33

Job Information

Client: Parafield Airport
Project:
Proj. No.: 3319051
Site:
Sampler: Joel Chance

Sampling Information NA

Sample Method: Submersible pump
WQ Meter Type: YSI Pro
Flow Cell: Y
Pump Depth:..........m
WLevel Meter Type: IP
NAPL Check:................. ....

Bore Information

SWL: 3.163 m
Logic Check: ....
Date: 7-2-18
Time: 2.30 PM
Ref.datum: ....
Stick Up: .... m
Bore Depth: 5.451 m
Bore Diam.: .... mm
Screen From:............to.......... m
Well Cap Secure? yes

Time (..........)	Volume (L)	Temp (°C)	Dis.Oxygen (..........)	Elec.Cond (..........)	pH (pH units)	Ox-Red Pt. (± mV)	SWL (m)	(..........)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable when (3 consecutive readings):		-	*+/- 10%*	*+/- 3%*	*+/- 0.05 pH*	*+/- 10 mV*	*stable*		
2.30		19.1	0.2%	1534	7.45	86.3			No sample
				(spc)					
									Standpipe
				1364					
				(C)					

Field QA Checks:

Air bubbles in vials? Y / N Any violent reactions? Y / N
Decontamination as per GHD procedure? Y / N

Was sampling equipment pre-cleaned? Y / N
COC updated? Y / N Field Filtered? Y / N

Well Volume Calculations

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

Total Well Depth (-) Water Level (=) Water Column
______________ m (-) ______________ m (=) ______________ m

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

= 3 well vols

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

No Sample

Purge Volumes

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

*Double for gravel pack

GHD MANAGEMENT ENGINEERING ENVIRONMENT

Purging and Sampling Record

Bore ID: P34

Job Information

Client: Parafield Airport
Project:
Proj. No.: 3319051
Site:
Sampler: Joel Chace

Sampling Information n/A

Sample Method: Submersible pump
WQ Meter Type: YSI Pro
Flow Cell: Y
Pump Depth:..........m
WLevel Meter Type: IP
NAPL Check:...............

Bore Information

SWL: 3.926 m
Logic Check:
Date: 7-2-19
Time: 1:50
Ref.datum:
Stick Up: .... m
Bore Depth: 5.709 m
Bore Diam.: .... mm
Screen From:..........to.......... m
Well Cap Secure?...........

Time (..........)	Volume (L)	Temp (°C)	Dis.Oxygen (..........)	Elec.Cond (..........)	pH (pH units)	Ox-Red Pt. (± mV)	SWL (m)	(..........)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable when (3 consecutive readings):		-	+/- 10%	+/- 3%	+/- 0.05 pH	+/- 10 mV	stable		
1.50		20.3	17.2%	3851	7.10	87.5			Standpipe
				(Spc)					
			1.47						No sample
			mg/L	3362					
				(C)					

Field QA Checks:

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

Well Volume Calculations

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

Total Well Depth (-) Water Level (=) Water Column
______ m (-) ______ m (=) ______ m
Water Column (x) Conversion Factor (=) Litres per 1 Well Volume
______ m (x) ______ m (=) ______ m
= 3 well vols

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

No sample

Purge Volumes

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

*Double for gravel pack

GHD | MANAGEMENT ENGINEERING ENVIRONMENT

Purging and Sampling Record

Bore ID: P35 -

Job Information

Client: Parafield Airport
Project: 331905 1
Proj. No.:
Site:
Sampler: Joel Chance

Sampling Information N/A

Sample Method: Submersible pump
WQ Meter Type: YSI Pro ✓
Flow Cell: Y ✓
Pump Depth:..........m
WLevel Meter Type: IP
NAPL Check: Yes.

Bore Information

SWL: 3.554 m
Logic Check: ....
Date: 12-19.
Time: 1.30 PM
Ref.datum: ....
Stick Up: .... m
Bore Depth: 7.101 m
Bore Diam.: .... mm
Screen From:............**to**.......... m
Well Cap Secure?..........

Time (..........)	Volume (L)	Temp (°C)	Dis.Oxygen (..........)	Elec.Cond (..........)	pH (pH units)	Ox-Red Pt. (± mV)	SWL (m)	(..........)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable when (3 consecutive readings):		-	*+/- 10%*	*+/- 3%*	*+/- 0.05 pH*	*+/- 10 mV*	*stable*		
1.30		20.6	3.2%c	2852	7.31	26.			DNAPL - 4.298 - 7.101 -
			0.31mg/L	(SPC)					Lo ip.
				2610					NO Sample.
				(C)					

Field QA Checks:

Air bubbles in vials? Y / N Any violent reactions? Y / N
Decontamination as per GHD procedure? Y / N

Was sampling equipment pre-cleaned? Y / N
COC updated? Y / N Field Filtered? Y / N

Well Volume Calculations

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

Total Well Depth (-) Water Level (=) Water Column
________ m (-) ________ m (=) ________ m

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

= 3 well vols

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

NO Sample

Purge Volumes

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

*Double for gravel pack

GHD MANAGEMENT ENGINEERING ENVIRONMENT

Purging and Sampling Record

Bore ID: P36.

Job Information	*Sampling Information* n/A	*Bore Information*
Client: Project: 3319051 Proj. No.: Site: Sampler: JC	Sample Method: ~~Submersible~~ pump WQ Meter Type: YSI Pro Flow Cell: Y Pump Depth:..........m WLevel Meter Type: IP NAPL Check:................	SWL: 3.193 m Logic Check: .... Date: 7.2.19 Time: 3.45 Ref.datum: .... Stick Up: .... m Bore Depth: 6.281 m Bore Diam.: .... mm Screen From:............to.......... m Well Cap Secure?............

Time (..........)	Volume (L)	Temp (°C)	Dis.Oxygen (..........)	Elec.Cond (..........)	pH (pH units)	Ox-Red Pt. (± mV)	SWL (m)	(..........)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable when (3 consecutive readings):		-	*+/- 10%*	*+/- 3%*	*+/- 0.05 pH*	*+/- 10 mV*	*stable*		
3.45		21.8	2.7 1. .19 mg/L	4464 SPC 4177 C	7.27	78.1			No sample Gastric.

Field QA Checks:

~~Air bubbles in vials? Y / N Any violent reactions? Y / N~~

~~Decontamination as per GHD procedure? Y / N~~

~~Was sampling equipment pre-cleaned? Y / N~~

~~COC updated? Y / N Field Filtered? Y / N~~

Well Volume Calculations

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

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

________________ m (-) ________________ m (=) ________________ m

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

________________ m (x) ________________ m (=) ________________ m

= 3 well vols

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

No Sample

Purge Volumes

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

*Double for gravel pack

GHD MANAGEMENT ENGINEERING ENVIRONMENT

Purging and Sampling Record N/A ·

Bore ID: P37

Job Information

Client:
Project:
Proj. No.: 3319051
Site:
Sampler: ....

Sampling Information

Sample Method: Submersible pump
WQ Meter Type: YSI Pro
Flow Cell: Y
Pump Depth:..........m
WLevel Meter Type: IP
NAPL Check:...............

Bore Information

SWL: 2.959 m
Logic Check: ....
Date: 7-2-19
Time: 4 PM
Ref.datum: ....
Stick Up: .... m
Bore Depth: 6.971 m
Bore Diam.: .... mm
Screen From:...........to.......... m
Well Cap Secure?.............

Time (...........)	Volume (L)	Temp (°C)	Dis.Oxygen (...........)	Elec.Cond (...........)	pH (pH units)	Ox-Red Pt. (± mV)	SWL (m)	(...........)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable when (3 consecutive readings):	-		+/- 10%	+/- 3%	+/- 0.05 pH	+/- 10 mV	stable		
4		22.5	6.1	4773	7.21	115.3			
			·1.						
				SpC					
			.49						
				45[illegible]					
			mg/L						
				C					

Field QA Checks:

Air bubbles in vials? Y / N Any violent reactions? Y / N
Decontamination as per GHD procedure? Y / N

Was sampling equipment pre-cleaned? Y / N
COC updated? Y / N Field Filtered? Y / N

Well Volume Calculations

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

Total Well Depth (-) Water Level (=) Water Column
__________ m (-) __________ m (=) __________ m

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

= 3 well vols

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

No Sample

Purge Volumes

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

*Double for gravel pack

GHD MANAGEMENT ENGINEERING ENVIRONMENT

Purging and Sampling Record

Bore ID: P38

Job Information

Client:
Project:
Proj. No.: 3319051
Site:
Sampler: JC

Sampling Information N/A.

Sample Method: ~~Submersible pump~~
WQ Meter Type: YSI Pro
Flow Cell: Y
Pump Depth:..........m
WLevel Meter Type: IP
NAPL Check:

Bore Information

SWL: 2.814 m
Date: 7-2-19
Ref.datum:
Bore Depth: 5.267 m
Screen From: .... to .... m
Logic Check:
Time: 3.50
Stick Up: .... m
Bore Diam.: .... mm
Well Cap Secure? y

Time (..........)	Volume (L)	Temp (°C)	Dis.Oxygen (..........)	Elec.Cond (..........)	pH (pH units)	Ox-Red Pt. (± mV)	SWL (m)	(..........)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable when (3 consecutive readings):		-	+/- 10%	+/- 3%	+/- 0.05 pH	+/- 10 mV	stable		
3.50		22.2	4.1	6771	7.87	74.9			No sample
			.1.	Spc					
			.33	6416					Gatic.
			mg/L	C					

Field QA Checks:

Air bubbles in vials? Y / N Any violent reactions? Y / N
Decontamination as per GHD procedure? Y / N

Was sampling equipment pre-cleaned? Y / N
COC updated? Y / N Field Filtered? Y / N

Well Volume Calculations

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

Total Well Depth (-) Water Level (=) Water Column
__________ m (-) __________ m (=) __________ m

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

= 3 well vols

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

No Sample

Purge Volumes

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

*Double for gravel pack

Purging and Sampling Record

Bore ID: P39

Job Information

Client:
Project:
Proj. No.: 3319051
Site:
Sampler: JC.

Sampling Information N/A

Sample Method: ~~Submersible pump~~
WQ Meter Type: ~~YSI Pro~~
Flow Cell: Y
Pump Depth:..........m
WLevel Meter Type: IP
NAPL Check:................

Bore Information

SWL: 1.679 m
Logic Check: ....
Date: 7-2-19
Time: ....
Ref.datum: ....
Stick Up: .... m
Bore Depth: 5.979 m
Bore Diam.: .... mm
Screen From:...........to.......... m
Well Cap Secure?..............

Time (...........)	Volume (L)	Temp (°C)	Dis.Oxygen (...........)	Elec.Cond (...........)	pH (pH units)	Ox-Red Pt. (± mV)	SWL (m)	(...........)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable when (3 consecutive readings):		-	+/- 10%	+/- 3%	+/- 0.05 pH	+/- 10 mV	stable		
		25.5	88.3	12,990	6.57	96.9			
			%.	SPC					No Sample
			6.43	12,163					Gatic
			mg/l						
				C					

Field QA Checks:

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

Well Volume Calculations

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

Total Well Depth (-) Water Level (=) Water Column
________ m (-) ________ m (=) ________ m

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

= 3 well vols

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

No Sample.

Purge Volumes

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

*Double for gravel pack

GHD | MANAGEMENT ENGINEERING ENVIRONMENT

Purging and Sampling Record

Bore ID: P40

Job Information

Client: Parafield Airport
Project:
Proj. No.: 3319051
Site:
Sampler: Joel Chance

Sampling Information

Sample Method: ~~Submersible pump~~ HS
WQ Meter Type: YSI Pro ✓
Flow Cell: Y ✓
Pump Depth:..........m
WLevel Meter Type: IP -
NAPL Check: yes

Bore Information

SWL: 2.986 m
Logic Check: ....
Date: 7-2-18
Time: 12:30 PM
Ref.datum: —
Stick Up: .... m
Bore Depth: 5.908 m
Bore Diam.: .... mm
Screen From:............to........... m
Well Cap Secure? yes

Time (..........)	Volume (L)	Temp (°C)	Dis.Oxygen (..........)	Elec.Cond (..........)	pH (pH units)	Ox-Red Pt. (± mV)	SWL (m)	(..........)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable when (3 consecutive readings):		-	+/- 10%	+/- 3%	+/- 0.05 pH	+/- 10 mV	stable		
12:30		21.3	17.2%	4398	7.59	97.6		—	DNAPL 3.724 – 5.908
				(SpC)					LD ip.
			1.57						
			mg/L	4094					Bailer check - no visual
				(C)					evidence of DNAPL.
									no odor / sheen
									Palebrown
									fine sand in bottom of HS
									low-med turbidity

Field QA Checks:

Air bubbles in vials? Y / [✓ N] Any violent reactions? Y / [✓ N]
Decontamination as per GHD procedure? [✓ Y] / N

Was sampling equipment pre-cleaned? [✓ Y] / N
COC updated? [✓ Y] / N Field Filtered? Y / [✓ N]

Well Volume Calculations

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

Total Well Depth (-) Water Level (=) Water Column
__________ m (-) __________ m (=) __________ m

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

= 3 well vols

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

1 x PFAS

Purge Volumes

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

*Double for gravel pack

GHD MANAGEMENT ENGINEERING ENVIRONMENT

Purging and Sampling Record

Bore ID: P4-1

Job Information

Client: Parafield Airport
Project:
Proj. No.: 3319051
Site:
Sampler: Joel Chance

Sampling Information

Sample Method: ~~Submersible~~ HS ~~pump~~
WQ Meter Type: YSI Pro ✓
Flow Cell: Y ✓
Pump Depth:..........m
WLevel Meter Type: IP
NAPL Check:

Bore Information

SWL: 3.317 m
Date: 7-2-19
Ref.datum: –
Bore Depth: 5.843 m
Screen From:............**to**........... m
Logic Check: –
Time: 12.00PM
Stick Up: .... m
Bore Diam.: .... mm
Well Cap Secure? yes

Time (..........)	Volume (L)	Temp (°C)	Dis.Oxygen (..........)	Elec.Cond (..........)	pH (pH units)	Ox-Red Pt. (± mV)	SWL (m)	(..........)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable when (3 consecutive readings):	-		+/- 10%	+/- 3%	+/- 0.05 pH	+/- 10 mV	stable		
12.00		21.5	-0.9%.	3754	7.36	16.4			DNAPL - 4.062 - 5.843
				(SPC)					w ip.
									Bailer Check. no evidence
				3503					(visual) of DNAPL.
				(C)					
									No odour / Sheen.
									Pale brown clay.
									Fine Sand in bottom of HS.
									low-med turbidity.

Field QA Checks:

Air bubbles in vials? Y / [✓ N] Any violent reactions? Y / [✓ N]
Decontamination as per GHD procedure? [✓ Y] / N

Was sampling equipment pre-cleaned? [✓ Y] / N
COC updated? [✓ Y] / N Field Filtered? Y / [✓ N]

Well Volume Calculations

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

Total Well Depth (-) Water Level (=) Water Column
______________ m (-) ______________ m (=) ______________ m

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

= 3 well vols

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

1X PFAS bottle (Envirolab)

Purge Volumes

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

*Double for gravel pack

MANAGEMENT
ENGINEERING
ENVIRONMENT

Purging and Sampling Record

Bore ID: P42.

Job Information

Client: Parafield Airport
Project:
Proj. No.: 3319051
Site:
Sampler: Joel Chance.

Sampling Information

Sample Method: ~~Submersible pump~~ HS
WQ Meter Type: YSI Pro
Flow Cell: Y ✓
~~Pump Depth:..........m~~
WLevel Meter Type: IP
NAPL Check: Yes

Bore Information

SWL: 3.476 m
Logic Check: —
Date: 7-2-19
Time: 11.40AM
Ref.datum: —
Stick Up: .... m
Bore Depth: 5.948 m
Bore Diam.: .... mm
Screen From:..........to.......... m
Well Cap Secure? Yes

Time (..........)	Volume (L)	Temp (°C)	Dis.Oxygen (..........)	Elec.Cond (..........)	pH (pH units)	Ox-Red Pt. (± mV)	SWL (m)	(..........)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable when (3 consecutive readings):		-	*+/- 10%*	*+/- 3%*	*+/- 0.05 pH*	*+/- 10 mV*	*stable*		
11.40		22.5	30.4%	2142 spc	7.18	137.2			
									DNAPL 4.226 – 5.948
			2.57						w IP.
			mg/L	2002					Bailer Check – no evidence
				c					(visual) of DNAPL.
									NO odour.
									low-med turbidity
									Pale brown – clay
									low sediment load – fine
									sand in bottom of HS.

Field QA Checks:

Air bubbles in vials? Y / [✓ N] Any violent reactions? Y / [✓ N]
Decontamination as per GHD procedure? Y / [✓ N]

Was sampling equipment pre-cleaned? [✓ Y] / N
COC updated? [✓ Y] / N Field Filtered? Y / [✓ N]

Well Volume Calculations

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

Total Well Depth (-) Water Level (=) Water Column
__________ m (-) __________ m (=) __________ m

Water Column (x) Conversion Factor (=) Litres per 1 Well Volume
__________ m (x) __________ m (=) __________ m
= 3 well vols

Comment: Duplicate samples collected, bottles used, access, condition of headworks etc
3x PFAS bottles (Envirolab) QA01 + QA02 collected

Purge Volumes

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

*Double for gravel pack

GHD MANAGEMENT ENGINEERING ENVIRONMENT

Purging and Sampling Record

Bore ID: P43

Job Information		*Sampling Information* HS.		*Bore Information*			
Client:	Parafield Airport	**Sample Method:**	~~Submersible~~ pump	**SWL:**	3.931 m	**Logic Check:**	–
Project:		**WQ Meter Type:**	YSI Pro ✓	**Date:**	7-2-19	**Time:**	11.10 AM
Proj. No.:	3319051	**Flow Cell:** Y	**Pump Depth:** ……m	**Ref.datum:**	–	**Stick Up:**	m
Site:		**WLevel Meter Type:**	IP ✓	**Bore Depth:**	5.604 m	**Bore Diam.:**	mm
Sampler:	Joel Chance	**NAPL Check:**	Yes	**Screen From:**	……to…… m	**Well Cap Secure?**	Yes.

Time (……)	Volume (L)	Temp (°C)	Dis.Oxygen (……)	Elec.Cond (……)	pH (pH units)	Ox-Red Pt. (± mV)	SWL (m)	(……)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable when (3 consecutive readings):		-	+/- 10%	+/- 3%	+/- 0.05 pH	+/- 10 mV	stable		
11.10		21.4	9.04.	4609	6.86	104.4.			DNAPL - 4.681 - 5.604 (BD)
		~~00~~	0.53	SPC					Recorded by ip 3
			Mg/L						
									Bailer Checked - unable
			~~4560~~	4306					to visually confirm presence
				C					of DNAPL.
									No odour / sheen
									Pale brown - clay
									low sediment load / turbidity.

Field QA Checks:

Air bubbles in vials? Y / [✓ N] Any violent reactions? Y / [✓ N]

Decontamination as per GHD procedure? [✓ Y] / N

Was sampling equipment pre-cleaned? [✓ Y] / N

COC updated? [✓ Y] / N Field Filtered? Y / [✓ N]

Well Volume Calculations

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

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

______ m (-) ______ m (=) ______ m

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

______ m (x) ______ m (=) ______ m

= 3 well vols

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

1 x PFAS bottle (Envirolab).

Purge Volumes

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

*Double for gravel pack

GHD | MANAGEMENT ENGINEERING ENVIRONMENT

Purging and Sampling Record

Bore ID: P44

Job Information

Client: Parafield Airport
Project:
Proj. No.: 3319051
Site:
Sampler: Jael Chance

Sampling Information HS

Sample Method: ~~Submersible~~ pump
WQ Meter Type: YSI Pro
Flow Cell: Y ✓
Pump Depth:..........m
WLevel Meter Type: IP ✓
NAPL Check: yes

Bore Information

SWL: 3.887 m
Logic Check:
Date: 7-2-19
Time: 1:00 PM
Ref.datum:
Stick Up: m
Bore Depth: 6.028 m
Bore Diam.: mm
Screen From:............to........... m
Well Cap Secure? yes

Time (..........)	Volume (L)	Temp (°C)	Dis.Oxygen (..........)	Elec.Cond (..........)	pH (pH units)	Ox-Red Pt. (± mV)	SWL (m)	(..........)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable when (3 consecutive readings):	-		+/- 10%	+/- 3%	+/- 0.05 pH	+/- 10 mV	stable		
		20·3	17·9	3333	7·45	90·2			DNAPL - 4.626 - 6.028
			%	(SpC)					w IP .
									Bailer Check - no visual
			1·58	3031					evidence of DNAPL .
			mg/L	(C)					
									Pale brown / straw
									no odour / sheen -
									fine orange sand in bottom of HS
									low - med turbidity .

Field QA Checks:

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

Well Volume Calculations

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

Total Well Depth (-) Water Level (=) Water Column
______________ m (-) ______________ m (=) ______________ m

Water Column (x) Conversion Factor (=) Litres per 1 Well Volume
______________ m (x) ______________ m (=) ______________ m
= 3 well vols

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

1 x PFAS bottle (Envirolab).

Purge Volumes

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

*Double for gravel pack

GHD MANAGEMENT ENGINEERING ENVIRONMENT

Purging and Sampling Record

Bore ID: GWP1 - PFC

Job Information

Client: Parafield Airport
Project: GME
Proj. No.: 3319051
Sampler: JC / TW

Sampling Information

Sample Method: HS
WQ Meter Type: Flow cell
Flow Cell: [✓ Y] / N **Pump Depth:** N/A m
WLevel Meter Type: Dip / Fox / Int.Fce / Gge
NAPL Check: yes

Bore Information

SWL: 6.046 m **Logic Check:** -
Date: 14-3-19 **Time:** 12:00 PM
Ref.datum: - **Stick Up:** - m
Bore Depth: 9.423 m **Bore Diam.:** 50 mm
Screen From: 3 to 6 m **Well Cap Secure?**

Time (..........)	Volume (L)	Temp (°C)	pH (pH units)	Elec.Cond (SPC)	Dis.Oxygen (..........)	Ox-Red Pt. (± mV)	SWL (m)	(..........)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable when (3 consecutive readings):		-	+/- 0.05 pH	+/- 3%	+/- 10%	+/- 10 mV	stable		
11.59		20.8	7.9	2631	51.4%	125.4			Standpipe.
					4.51 mg/L				Pale brown / clear
									Sediment at bottom of H/S
									medium turbidity
									NO odour

Field QA Checks:

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

Well Volume Calculations

r = 0.025m H =
R = 0.05 m h =
H = height of water col (m) R = Bore Radius
h = thickness of sat. filterpack (m) r = PVC radius (m)

PV = [(H x π x r²) + 0.2 (h x π x (R² - r²))] x 1000
PV =
=
= = 1 well volume = 3 well vols

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

1x PFAS Envirolab bottle.

Purge Volumes

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

*Double for gravel pack

GHD MANAGEMENT ENGINEERING ENVIRONMENT

Purging and Sampling Record

Bore ID: GWP2-PFC

Job Information

Client: Parafield Airport
Project: GME
Proj. No.: 339051
Sampler: JC | TW

Sampling Information

Sample Method:
WQ Meter Type:
Flow Cell: Y / N **Pump Depth:** ....m
WLevel Meter Type: Dip / Fox / Int.Fce / Gge
NAPL Check:

Bore Information

SWL: 3.71 m **Logic Check:**
Date: 14-3-19 **Time:** 12:15 PM
Ref.datum: **Stick Up:** ..... m
Bore Depth: 6.713 m **Bore Diam.:** 50 mm
Screen From: 3 to 6 m **Well Cap Secure?** yes

Time (..........)	Volume (L)	Temp (°C)	pH (pH units)	Elec.Cond (SpC)	Dis.Oxygen (..........)	Ox-Red Pt. (± mV)	SWL (m)	(..........)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable when (3 consecutive readings):		-	+/- 0.05 pH	+/- 3%	+/- 10%	+/- 10 mV	stable		
12.15		22.6	7.73	2110	14.29%	121.8	—	—	Standpipe.
					1.15 mg/l				
									Clear / yellow
									fine sediment in bottom
									of HS.
									No odour / sheen
									Low turbidity.

Field QA Checks:

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

Well Volume Calculations

r = 0.025m H =
R = 0.05 m h =
H = height of water col (m) R = Bore Radius
h = thickness of sat. filterpack (m) r = PVC radius (m)

PV = [(H x π x r²) + 0.2 (h x π x (R² - r²))] x 1000
PV =
=
= = 1 well volume = 3 well vols

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

1 x PFAS Envirolab bottle.

Purge Volumes

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

*Double for gravel pack

GHD | MANAGEMENT ENGINEERING ENVIRONMENT

Purging and Sampling Record

Bore ID: GWP3-PFC

Job Information

Client: Parafield Airport

Project: GME

Proj. No.: 3319051

Sampler: JC / TW

Sampling Information

Sample Method: HS

WQ Meter Type: Flow cell

Flow Cell: [✓ Y] / N   **Pump Depth:** N/A m

WLevel Meter Type: Dip / Fox / Int.Fce / Gge

NAPL Check: Yes

Bore Information

SWL: 3.909 m   **Logic Check:** —

Date: 14-3-19   **Time:** 11.15 AM

Ref.datum: —   **Stick Up:** — m

Bore Depth: 5.283 m   **Bore Diam.:** 50 mm

Screen From: 3 to 6 m   **Well Cap Secure?** Yes

Time (..........)	Volume (L)	Temp (°C)	pH (pH units)	Elec.Cond (SPC)	Dis.Oxygen (..........)	Ox-Red Pt. (± mV)	SWL (m)	(..........)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable when (3 consecutive readings):		-	+/- 0.05 pH	+/- 3%	+/- 10%	+/- 10 mV	stable		
11.15		22.4	7.81	3619	40.3%	154.0	—	—	Standpipe.
					3.25mg/l				
									Clear / pale brown
									low turbidity / Sediment
									No odour / Sheen.

Field QA Checks:

Air bubbles in vials? Y / [✓ N]   Any violent reactions? Y / [✓ N]

Decontamination as per GHD procedure? [✓ Y] / N

Was sampling equipment pre-cleaned? [✓ Y] / N

COC updated? [✓ Y] / N   Field Filtered? [✓ Y] / N

Well Volume Calculations

r = 0.025m   H =

R = 0.05 m   h =

H = height of water col (m)   R = Bore Radius

h = thickness of sat. filterpack (m)   r = PVC radius (m)

$PV = [(H \times \pi \times r^2) + 0.2 (h \times \pi \times (R^2 - r^2))] \times 1000$

PV =

=

= = 1 well volume = 3 well vols

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

1x PFAS bottle.

Purge Volumes

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

*Double for gravel pack

GHD MANAGEMENT ENGINEERING ENVIRONMENT

Purging and Sampling Record

Bore ID: P9

Job Information

Client: Parafield airport
Project: GME
Proj. No.: 331905
Sampler: JC / TW

Sampling Information

Sample Method: HS
WQ Meter Type: Flow Cell
Flow Cell [✓ Y] / N **Pump Depth:** N/A m
WLevel Meter Type: Dip / Fox / Int.Fce / Gge
NAPL Check: yes

Bore Information

SWL: 2.567 m **Logic Check:** –
Date: 14-3-19 **Time:** 11.36am
Ref.datum: – **Stick Up:** m
Bore Depth: 6.926 m **Bore Diam.:** 50 mm
Screen From: 3 **to** 6 m **Well Cap Secure?** yes

Time (..........)	Volume (L)	Temp (°C)	pH (pH units)	Elec.Cond (SpC)	Dis.Oxygen (..........)	Ox-Red Pt. (± mV)	SWL (m)	(..........)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable when (3 consecutive readings):		-	+/- 0.05 pH	+/- 3%	+/- 10%	+/- 10 mV	stable		
11:30		22	7.94	3417	14.21	94.6	—	—	Pale brown | clear
					1.06 mg				
									low turbidity | sediment
									load
									No odor | sheen

Field QA Checks:

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

Well Volume Calculations

r = 0.025m H =
R = 0.05 m h =
H = height of water col (m) R = Bore Radius
h = thickness of sat. filterpack (m) r = PVC radius (m)

$PV = [(H \times \pi \times r^2) + 0.2 (h \times \pi \times (R^2 - r^2))] \times 1000$
PV =
=
= = 1 well volume = 3 well vols

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

1x PFAS bottle.

Purge Volumes

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

*Double for gravel pack

4.079-SWL 5.647 - Bore depth

Purging and Sampling Record

Bore ID: P34

Job Information

Client: Parafield Airport
Project: GME
Proj. No.: 3319051
Sampler: JC / TW

Sampling Information

Sample Method: HS
WQ Meter Type: Flow Cell
Flow Cell: [✓ Y] / N **Pump Depth:** N/A m
WLevel Meter Type: Dip / Fox / Int.Fce / Gge
NAPL Check: yes

Bore Information

SWL: 4.079 m **Logic Check:** –
Date: 14-3-19 **Time:** 11:32am
Ref.datum: – **Stick Up:** – m
Bore Depth: 5.647 m **Bore Diam.:** 50 mm
Screen From: 3 to 6 m **Well Cap Secure?** yes

Time (11:32 am)	Volume (L)	Temp (°C)	pH (pH units)	Elec.Cond (SPC)	Dis.Oxygen (...........)	Ox-Red Pt. (± mV)	SWL (m)	(...........)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable when (3 consecutive readings):		-	+/- 0.05 pH	+/- 3%	+/- 10%	+/- 10 mV	stable		
11:34am		22.6	7.9	2.65	41.6%	153.8			Stand pipe
					3.44 mg/L				Pale brown
									sediment load at bottom of H/s
									medium turbitity
									NO sheen or odour

Field QA Checks:

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

Well Volume Calculations

r = 0.025m H =
R = 0.05 m h =
H = height of water col (m) R = Bore Radius
h = thickness of sat. filterpack (m) r = PVC radius (m)

PV = [(H x π x r²) + 0.2 (h x π x (R² - r²))] x 1000
PV =
=
= = 1 well volume = 3 well vols

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

Purge Volumes

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

*Double for gravel pack

GHD MANAGEMENT ENGINEERING ENVIRONMENT

Purging and Sampling Record

Bore ID: P35

Job Information

Client: Parafield Airport
Project: GME
Proj. No.: 3319051
Sampler: JC / TW

Sampling Information

Sample Method: H/S
WQ Meter Type: Flow Cell
Flow Cell [✓ Y] / N **Pump Depth:** N/A m
WLevel Meter Type: Dip / Fox / Int.Fce / Gge
NAPL Check:

Bore Information

SWL: 4.813 m **Logic Check:** –
Date: 14-3-19 **Time:**
Ref.datum: – **Stick Up:** – m
Bore Depth: 7.141 m **Bore Diam.:** mm
Screen From: 3 to 6 m **Well Cap Secure?**

Time (..........)	Volume (L)	Temp (°C)	pH (pH units)	Elec.Cond (SPC)	Dis.Oxygen (%)	Ox-Red Pt. (± mV)	SWL (m)	(..........)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable when (3 consecutive readings):		-	*+/- 0.05 pH*	*+/- 3%*	*+/- 10%*	*+/- 10 mV*	*stable*		
11AM		21.8	8.08	1431%	30%	174.4			Pale brown / clear
					2.54 mg/L				medium turbitity
									fine sand at bottom of H/S
									No odour or sheen

Field QA Checks:

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

Well Volume Calculations

r = 0.025m H =
R = 0.05 m h =
H = height of water col (m) R = Bore Radius
h = thickness of sat. filterpack (m) r = PVC radius (m)

PV = [(H x π x r²) + 0.2 (h x π x (R² - r²))] x 1000
PV =
=
= = 1 well volume = 3 well vols

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

1x PFAS bottle.

Purge Volumes

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

*Double for gravel pack

GHD MANAGEMENT ENGINEERING ENVIRONMENT

Purging and Sampling Record

Bore ID: P36

Job Information

Client: Parafield Airport
Project: GME
Proj. No.: 3319051
Sampler: JC/TW

Sampling Information

Sample Method: H/S
WQ Meter Type: Flow cell
Flow Cell: [✓ Y] / N **Pump Depth:** N/A m
WLevel Meter Type: Dip / Fox / Int.Fce / Gge
NAPL Check: yes

Bore Information

SWL: 3.333 m **Logic Check:** –
Date: 14-3-19 **Time:** 10:30
Ref.datum: – **Stick Up:** – m
Bore Depth: 5.268 m **Bore Diam.:** 50 mm
Screen From: 3 to 6 m **Well Cap Secure?** yes

Time (..........)	Volume (L)	Temp (°C)	pH (pH units)	Elec.Cond (SPC)	Dis.Oxygen (%)	Ox-Red Pt. (± mV)	SWL (m)	(..........)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable when (3 consecutive readings):		*-*	*+/- 0.05 pH*	*+/- 3%*	*+/- 10%*	*+/- 10 mV*	*stable*		
10.30		22.2	7.65	41731	14%	125.3			Pale brown.
					1.19 mg/L				
									low turbidity
									Sediment load - fine H/S.
									in bottom of H/S.
									no odour / sheen.

Field QA Checks:

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

Well Volume Calculations

r = 0.025m H =
R = 0.05 m h =
H = height of water col (m) R = Bore Radius
h = thickness of sat. filterpack (m) r = PVC radius (m)

PV = [(H x π x r²) + 0.2 (h x π x (R² - r²))] x 1000
PV =
=
= = 1 well volume = 3 well vols

Comment: Duplicate samples collected, bottles used, access, condition of headworks etc
1 x PFAS Envirolab bottle

Purge Volumes

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

*Double for gravel pack

GHD MANAGEMENT ENGINEERING ENVIRONMENT

Purging and Sampling Record

Bore ID: P40

Job Information

Client: Parafield Airport
Project: GME
Proj. No.: 3319051
Sampler: JC / TW

Sampling Information

Sample Method: HS.
WQ Meter Type: Flow cell
Flow Cell: [✓ Y] / N **Pump Depth:** N/A m
WLevel Meter Type: Dip / Fox / Int.Fce / Gge
NAPL Check: Yes.

Bore Information

SWL: 3.132 m **Logic Check:** –
Date: 14-3-19 **Time:** 8:30 AM
Ref.datum: – **Stick Up:** – m
Bore Depth: 5.923 m **Bore Diam.:** 50 mm
Screen From: 3.0 to 6.0 m **Well Cap Secure?** Yes.

Time (..........)	Volume (L)	Temp (°C)	pH (pH units)	Elec.Cond (Spc)	Dis.Oxygen (..........)	Ox-Red Pt. (± mV)	SWL (m)	(..........)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable when (3 consecutive readings):		-	+/- 0.05 pH	+/- 3%	+/- 10%	+/- 10 mV	stable		
8:30		20.7	7.86	4056	18.8%.	152.5	–	–	
									Pale brown.
					1.61				
					mg/L				Sediment load - fine
									sand in bottom of HS.
									High turbidity.
									No odour / sheen.

Field QA Checks:

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

Well Volume Calculations

r = 0.025m H =
R = 0.05 m h =
H = height of water col (m) R = Bore Radius
h = thickness of sat. filterpack (m) r = PVC radius (m)

PV = [(H x π x r²) + 0.2 (h x π x (R² - r²))] x 1000
PV =
=
= = 1 well volume = 3 well vols

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

3x PFAS Envirolab bottles. QA01 + QA02.

Purge Volumes

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

*Double for gravel pack

GHD MANAGEMENT ENGINEERING ENVIRONMENT

Purging and Sampling Record

Bore ID: P41

Job Information

Client: Parafield Airport
Project: GME
Proj. No.: 3319051
Sampler: JC / TW

Sampling Information

Sample Method: HS
WQ Meter Type: Flow cell
Flow Cell: [✓ Y] / N **Pump Depth:** N/A m
WLevel Meter Type: Dip / Fox / Int.Fce / Gge
NAPL Check: Yes

Bore Information

SWL: 3.429 m **Logic Check:**
Date: 14-3-19 **Time:** 9 AM
Ref.datum: - **Stick Up:** - m
Bore Depth: 5.776 m **Bore Diam.:** 50 mm
Screen From: 3 to 6 m **Well Cap Secure?** Yes

Time (..........)	Volume (L)	Temp (°C)	pH (pH units)	Elec.Cond (SPC)	Dis.Oxygen (..........)	Ox-Red Pt. (± mV)	SWL (m)	(..........)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable when (3 consecutive readings):		-	*+/- 0.05 pH*	*+/- 3%*	*+/- 10%*	*+/- 10 mV*	*stable*		
9AM		21.3	7.73	3287	20%	155			Pale - medium brown
					1.77%				
									No odour / sheen
									Sediment load - fine sands
									in bottom of H/S.
									Low turbidity

Field QA Checks:

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

Well Volume Calculations

r = 0.025m H =
R = 0.05 m h =
H = height of water col (m) R = Bore Radius
h = thickness of sat. filterpack (m) r = PVC radius (m)

$PV = [(H \times \pi \times r^2) + 0.2 (h \times \pi \times (R^2 - r^2))] \times 1000$
PV =
=
= = 1 well volume = 3 well vols

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

1x PFAS Envirolab bottle

Purge Volumes

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

*Double for gravel pack

MANAGEMENT
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ENVIRONMENT

Purging and Sampling Record

Bore ID: P4-2

Job Information

Client: Parafield Airport
Project: GME
Proj. No.: 3319051
Sampler: JC | TW

Sampling Information

Sample Method: HS
WQ Meter Type: flow cell
Flow Cell: [✓ Y] / N **Pump Depth:** N/A m
WLevel Meter Type: Dip / Fox / Int.Fce / Gge
NAPL Check: yes

Bore Information

SWL: 3.634 m **Logic Check:**
Date: 14/3/18 **Time:** 9.30 AM
Ref.datum: – **Stick Up:** m
Bore Depth: 5.927 m **Bore Diam.:** 50 mm
Screen From: 3 to 6 m **Well Cap Secure?** yes

Time (..........)	Volume (L)	Temp (°C)	pH (pH units)	Elec.Cond (SpC)	Dis.Oxygen (..../....)	Ox-Red Pt. (± mV)	SWL (m)	(..........)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable when (3 consecutive readings):		-	+/- 0.05 pH	+/- 3%	+/- 10%	+/- 10 mV	stable		
9.30		22.3	8.12	1848	42.9	155.5	—	—	Pale brown
					3.64				No odor / sheen
					mg/L				
									Sediment load - fine sand
									in bottom of HS
									low-medium turbidity

Field QA Checks:

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

Well Volume Calculations

r = 0.025m H =
R = 0.05 m h =
H = height of water col (m) R = Bore Radius
h = thickness of sat. filterpack (m) r = PVC radius (m)

PV = [(H x π x r²) + 0.2 (h x π x (R² - r²))] x 1000
PV =
=
= = 1 well volume = 3 well vols

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

1x PFAS Envirolab bottle

Purge Volumes

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

*Double for gravel pack

GHD MANAGEMENT ENGINEERING ENVIRONMENT

Purging and Sampling Record

Bore ID: P43

Job Information

Client: Parafield Airport
Project: GME
Proj. No.: 3319051
Sampler: JC | TW

Sampling Information

Sample Method: disp bailer
WQ Meter Type: N/A
Flow Cell: [✓ Y] / N **Pump Depth:** N/A m
WLevel Meter Type: Dip / Fox / Int.Fce / Gge
NAPL Check: yes

Bore Information

SWL: 4.079 m **Logic Check:**
Date: 14-3-19 **Time:** 10 AM
Ref.datum: **Stick Up:** m
Bore Depth: N/A See comments m **Bore Diam.:** 50 mm
Screen From: 3 to 6 m **Well Cap Secure?** yes

Time (..........)	Volume (L)	Temp (°C)	pH (pH units)	Elec.Cond (µS)	Dis.Oxygen (%)	Ox-Red Pt. (± mV)	SWL (m)	(..........)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable when (3 consecutive readings):		-	+/- 0.05 pH	+/- 3%	+/- 10%	+/- 10 mV	stable		
10AM		22	7.55	4744	24.7	152 6	—	—	well annulus blocked
									unable to determine
					203				bore depth.
					mg/L				
									disp bailer.
									pale brown
									no odour | sheen.
									high turbidity
									high sediment load.

Field QA Checks:

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

Well Volume Calculations

r = 0.025m H =
R = 0.05 m h =
H = height of water col (m) R = Bore Radius
h = thickness of sat. filterpack (m) r = PVC radius (m)

PV = [(H x π x r²) + 0.2 (h x π x (R² - r²))] x 1000
PV =
=
= = 1 well volume = 3 well vols

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

1 x PFAS Envirolab bottle.

Purge Volumes

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

*Double for gravel pack

GHD MANAGEMENT ENGINEERING ENVIRONMENT

Purging and Sampling Record

Bore ID: P44

Job Information

Client: Parafield Airport
Project: GME
Proj. No.: 3319051
Sampler: JC/TW

Sampling Information

Sample Method: HS
WQ Meter Type: Flow Cell
Flow Cell: [✓ Y] / N **Pump Depth:** N/A m
WLevel Meter Type: Dip / Fox / Int.Fce / Gge
NAPL Check: yes

Bore Information

SWL: 4.017 m **Logic Check:** –
Date: 14-3-19 **Time:** 12.45 pm
Ref.datum: – **Stick Up:** m
Bore Depth: 5.941 m **Bore Diam.:** 50 mm
Screen From: 3 to 6 m **Well Cap Secure?** yes

Time (……….)	Volume (L)	Temp (°C)	pH (pH units)	Elec.Cond (SPC)	Dis.Oxygen (……….)	Ox-Red Pt. (± mV)	SWL (m)	(……….)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable when (3 consecutive readings):	-	*+/- 0.05 pH*	*+/- 3%*	*+/- 10%*	*+/- 10 mV*	*stable*			
12.50		21.4	7.32	9.2	114.1%	-107.1			clear / yellow
					10.02 mg/L				low turbitity
									sediment at bottom of H/S
									No odour or sheen

Field QA Checks:

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

Well Volume Calculations

r = 0.025m H =
R = 0.05 m h =
H = height of water col (m) R = Bore Radius
h = thickness of sat. filterpack (m) r = PVC radius (m)

PV = [(H x π x r²) + 0.2 (h x π x (R² - r²))] x 1000
PV =
=
= = 1 well volume = 3 well vols

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

1x PFAS

Purge Volumes

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

*Double for gravel pack

GHD CLIENTS | PEOPLE | PERFORMANCE

Daily Record Sheet

001

Client: Parafield Airport (AAL)		**Job No:** 3319051	
Job Name: Parafield Airport GW survey & investigation		**Date:** 13/05/2019	
GHD Representative:	Vera Biermann	**Arrival Time:** 10 AM	**Departure Time:** 18:06

Weather Conditions: (Please circle) [✓ Fine Overcast] Light Rain Heavy Rain Other max. 20°C mostly sunny

Works Being Undertaken: GW gauging and sampling (GME)

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

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

Location	Time	Record of Activities / Issues Encountered / Discussions with Client/Contractors / Sketch / Notes
GWP1-PFC	12.30	Photos; yellow stand pipe not in line w/ helipad; too far south, does not
	13.00	match map; could not find any other well in line w/ helipad
P44	10.30	Field duplicate(s) photos; name of bore written on casing & cover
	-11.00	FD01, SD01
GWP2-PFC	11.30	Field duplicate (only FD01) yellow stand pipe location doesn't
	12.00	quite match map; could not find any other well; FD02
P35	13.15	photo of bottle w/ gatic cover w/ well name on it
	13.40	
GWP3-PFC	13.50	Field duplicates; yellow stand pipe; photo w/ samples in lid
	14.20	FD03, SD03
P34	14.23	Yellow Standpipe at bend in Rd.
P43	15.20	29 Bradman Rd, Parafield Gdns SA 5107, W road verge photo
	-15.50	→ opposite on oval side
P42	16.00	31 Mailey Cres, Parafield Gdns SA 5107, NW road verge photo
	16.19	↳ opposite side of Rd
P36	16.22	1 Barnes Cres, Parafield Gdns SA 5107, NW road verge other side of road photo
	16.40	
P37	16.46	~~7~~ 18 MacKay Cres, Parafiel Gdns SA 5107, N road verge other side of Rd in front of
	17.10	# 18 photo w/ sample Rinsate blank RB
P41	17.13	17 Woodfull St, Parafield Gdns SA 5107, NW road verge Opposite side of Rd
	17.40	photo w/ sample
P40	17.43 18.06	91 Bradman Rd, Green Fields SA 5107, NW road verge eastern side in green strip verge

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

Provide Details:

Further Inspection and/or Testing Required on above Work: → PFAS analysis of water samples

Are there any H&S requirements to be considered for future works? No

Has the site been reinstated suitably (left clean and tidy)? Yes

Hydrasleeve Sampling Record

Project number:	3319051	**Sampler initials**	VB
Client:	Parafield Airport (AAL)	**PM initials**	DV
Site location:	Parafield Airport, Parafield Gardens		1of4

Well ID	P44	**Depth to Groundwater (mBTOC)**	3.832
Date	13-05-2019	**Depth to top of sampler (mBTOC)**	4.5
QC sample	FD01, SD01 3x PFAS Bottles	**Well depth (mBTOC)**	5,938

In situ downhole parameters (collect post sampling – ensure parameters have stabilised)

YSI Professional multi WQM

Time	**pH**	**Temp (C)**	**EC (uS/cm)** SPC EC	**Redox (mV)**	**DO (mg/L)**
11.00	7.07	21.3	3072 2851	145.7	0.41 (4.7%)

Comments (odour, colour, turbidity,sheen)

LNAPL ~~Check~~ Y ☐ N ☒ NO NAPL	clear, no odour, no turbidity not filtered, no bubbles, no reaction

Well ID	GWP2-PFC	**Depth to Groundwater (mBTOC)**	3.417
Date	13-05-2019	**Depth to top of sampler (mBTOC)**	4.5
QC sample	FD02, ~~[illegible]~~, 2x PFAS bottles	**Well depth (mBTOC)**	6.820

In situ downhole parameters (collect post sampling – ensure parameters have stabilised)

Time	**pH**	**Temp (C)**	**EC (uS/cm)** SPC EC	**Redox (mV)**	**DO (mg/L)**
12.00 pm	6.94	21.3	2041 1895	154.5	0.13 (1.5%)

Comments (odour, colour, turbidity,sheen)

LNAPL ~~Check~~ Y ☐ N ☒ No Napl	Silt at bottom of well slight turbidity, no odour, no sheen yellow standpipe not filtered no bubbles no reaction

Well ID	GWP1-PFC	**Depth to Groundwater (mBTOC)**	5.802
Date	13-05-2019	**Depth to top of sampler (mBTOC)**	6.0
QC sample		**Well depth (mBTOC)**	~~9.900~~ 9.935

In situ downhole parameters (collect post sampling – ensure parameters have stabilised)

Time	**pH**	**Temp (C)**	**EC (uS/cm)** SPC EC	**Redox (mV)**	**DO (mg/L)**
12.55	6.77	20.2	4848 4417	161.0	5.01 (56.2%)

Comments (odour, colour, turbidity,sheen)

LNAPL Check Y ☐ N ☒ No Napl	No sheen, no odour, no turbidity; bottom of well silty yellow standpipe not filtered, no bubbles, no reaction

Hydrasleeve Sampling Record

Project number:	3319051	**Sampler initials**	VB
Client:	Parafield Airport (AAL)	**PM initials**	DV
Site location:	Parafield Airport, Parafield Gardens		2 of 4

Well ID	P35	**Depth to Groundwater (mBTOC)**	3.718
Date	13-05-2019	**Depth to top of sampler (mBTOC)**	4.50
QC sample	N/A 1 PFAS bottle	**Well depth (mBTOC)**	~~[illegible]~~ 7.137

In situ downhole parameters (collect post sampling – ensure parameters have stabilised)

Time	**pH**	**Temp (C)**	**EC (uS/cm)** SPC EC	**Redox (mV)**	**DO (mg/L)**
13.35	6.89	21.5	2643 | 2463	159.6	(-1.7%) 0

Comments (odour, colour, turbidity,sheen)

LNAPL Check **Y** ☐ **N** ☒ No NAPL	No odour, no sheen, no turbidity No bubbles, no reaction, not filtered

Well ID	GWP3-PFC	**Depth to Groundwater (mBTOC)**	3.819
Date	13-05-2019 3 PFAS bottles	**Depth to top of sampler (mBTOC)**	4.5
QC sample	~~N/A~~ FD03, SD03	**Well depth (mBTOC)**	5.375

In situ downhole parameters (collect post sampling – ensure parameters have stabilised)

Time	**pH**	**Temp (C)**	**EC (uS/cm)** SPC	**Redox (mV)**	**DO (mg/L)**
14.15	6.91	22.0	~~3679~~ 3472	148.0	1.81 (20.9%)

Comments (odour, colour, turbidity,sheen)

LNAPL Check **Y** ☐ **N** ☒ No NAPL	yellow stand pipe in line w/ runway No sheen, no odour slight turbidity (silty) No bubbles, no reaction, not filtered

Well ID	P34	**Depth to Groundwater (mBTOC)**	3.915
Date	13-05-2019	**Depth to top of sampler (mBTOC)**	4.5
QC sample	N/A	**Well depth (mBTOC)**	5.852

In situ downhole parameters (collect post sampling – ensure parameters have stabilised)

Time	**pH**	**Temp (C)**	**EC (uS/cm)** SPC EC	**Redox (mV)**	**DO (mg/L)**
14.45	7.02	22.0	4137 3903	147.8	2.62 (30.3%)

Comments (odour, colour, turbidity,sheen)

LNAPL Check **Y** ☐ **N** ☒ No NAPL	Silty bottom (length of 1P sonde) Yellow standpipe no odour, no sheen, medium turbidity no bubbles, no reaction, not filtered

Hydrasleeve Sampling Record

Project number:	3319051	**Sampler initials**	VB
Client:	Parafield Airport (AAL)	**PM initials**	DV
Site location:	Parafield Airport, Parafield Gardens		3 of 4

Well ID	P43	**Depth to Groundwater (mBTOC)**	4.007
Date	13-05-2019	**Depth to top of sampler (mBTOC)**	4.1
QC sample	N/A	**Well depth (mBTOC)**	4.86

In situ downhole parameters (collect post sampling – ensure parameters have stabilised)

Time	pH	Temp (C)	EC (uS/cm) SPC EC	Redox (mV)	DO (mg/L)
15.45	~~7.94~~ 6.90	~~22.5~~ 22.3	4542 4308	~~[illegible]~~ 156.3	~~7.48 (86.5%)~~ 1.06 (12.2%)

Comments (odour, colour, turbidity,sheen)

LNAPL Check Y ☐ N ☒ No NAPL	No odour, no sheen high turbidity Gate opposite 29 Bradman Rd (Oval side) no bubbles, no reaction, not filtered

Well ID	P42	**Depth to Groundwater (mBTOC)**	3.601
Date	13-05-2019	**Depth to top of sampler (mBTOC)**	4.5
QC sample	N/A	**Well depth (mBTOC)**	5.930

In situ downhole parameters (collect post sampling – ensure parameters have stabilised)

Time	pH	Temp (C)	EC (uS/cm) SPC EC	Redox (mV)	DO (mg/L)
16.15	7.16	23.3	2093 2028	142.1	2.45 (28.7%)

Comments (odour, colour, turbidity,sheen)

LNAPL Check Y ☐ N ☒ No NAPL	Silty bottom @ well medium-high turbidity opposite road side no odour, no sheen not filtered, no bubbles, no reaction

Well ID	P36	**Depth to Groundwater (mBTOC)**	3.220
Date	13-05-2019	**Depth to top of sampler (mBTOC)**	4.5
QC sample	N/A	**Well depth (mBTOC)**	6.222

In situ downhole parameters (collect post sampling – ensure parameters have stabilised)

Time	pH	Temp (C)	EC (uS/cm) SPC	Redox (mV)	DO (mg/L)
16.38	6.93	23.4	4337 4202	103.5	0.19 (2.3%)

Comments (odour, colour, turbidity,sheen)

LNAPL Check Y ☐ N ☒	Opposite Road side medium turbidity no sheen no odour not filtered no reaction no bubbles

Hydrasleeve Sampling Record

Project number:	3319051	**Sampler initials**	VB
Client:	Parafield Airport (AAL)	**PM initials**	DV
Site location:	Parafield Airport, Parafield Gardens		4 of 4

Well ID	P37	**Depth to Groundwater (mBTOC)**	2,915
Date	13-05-2019	**Depth to top of sampler (mBTOC)**	4,5
QC sample	~~NA~~ RB	**Well depth (mBTOC)**	5.955

In situ downhole parameters (collect post sampling – ensure parameters have stabilised)

Time	pH	Temp (C)	EC (uS/cm)	Redox (mV)	DO (mg/L)
			SPC		
17,10	6.96	24,2	4407 4340	116.7	0,95 (11,4%)

Comments (odour, colour, turbidity,sheen)

LNAPL Check Y ☐ N ☒ No NAPL	Light turbidity opposite 18 no bubbles, no reaction, not filtered

Well ID P41	P41	**Depth to Groundwater (mBTOC)**	3,340
Date	13-05-2019	**Depth to top of sampler (mBTOC)**	
QC sample		**Well depth (mBTOC)**	5,880

In situ downhole parameters (collect post sampling – ensure parameters have stabilised)

Time	pH	Temp (C)	EC (uS/cm)	Redox (mV)	DO (mg/L)
			SPC EC		
17,32	7.01	23,1	3617 3482	121,9	0.22 (2,7%)

Comments (odour, colour, turbidity,sheen)

LNAPL Check Y ☐ N ☒ No NAPL	Opposite 17 Woodfull St silty well bottom Root fibres (?) on IP sonde high turbidity no odour No reaction, no bubbles, not filtered no sheen

Well ID P	P40	**Depth to Groundwater (mBTOC)**	2.953
Date	13-05-2019	**Depth to top of sampler (mBTOC)**	
QC sample		**Well depth (mBTOC)**	5,930

In situ downhole parameters (collect post sampling – ensure parameters have stabilised)

Time	pH	Temp (C)	EC (uS/cm)	Redox (mV)	DO (mg/L)
18.00	6,98	22,4	4144 3939	85,4	0,0

Comments (odour, colour, turbidity,sheen)

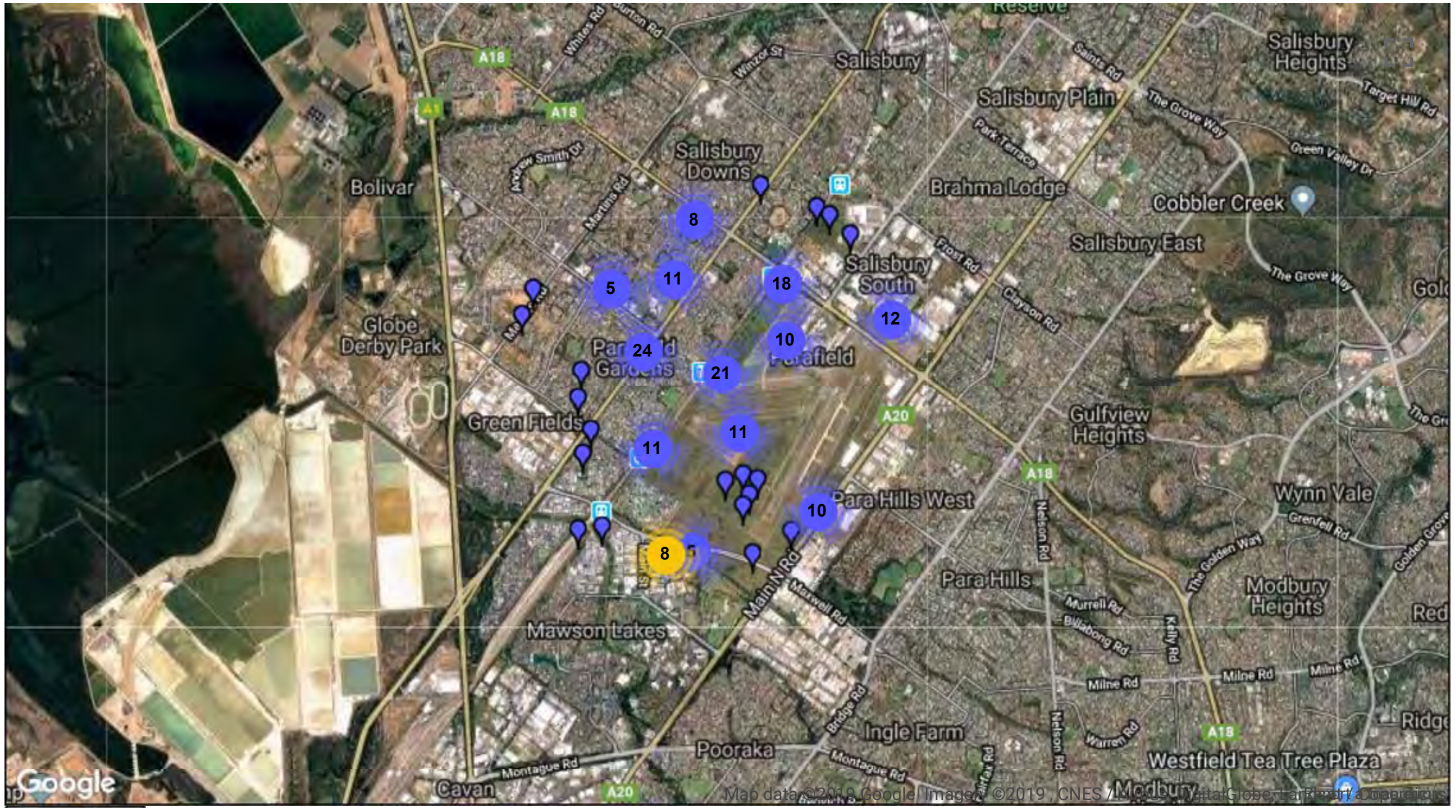
LNAPL Check Y ☐ N ☒	On East side in Road reserve of Park / Green Strip medium turbidity no sheen, no odour not filtered, no Rx, no bubbles

Appendix C – Registered Bore Search

Government
of South Australia

WaterConnect

Circle Centre -34.79382,138.624375, Radius 2.000km



Groundwater Data Report

Circle Centre -34.79382,138.624375, Radius 2.000km

Unit No	Obs No	Date	Cased To (m)	Max Depth (m)	Latest Depth (m)	SWL (m)	SWL Date	Yield (L/sec)	Yield Date	TDS (mg/L)	TDS Date	Purpose	Aquifer	Status	Permit No	SWL Status	Salinity Status
6628-3301	YAT017	01/06/1941	110.95	124.97	124.97	32.8	11/01/1975	7.58	14/04/1967	805	15/07/1949	OBS	Tomw(T1)				
6628-5151				32.31	32.31			0.63		1690	13/04/1964	DOM	Qpah				
6628-5152				27.43	27.43			5.68	09/04/1959	1443	09/04/1959	DOM	Qpah				
6628-5153				20.73	20.73							INV	Qpah	ABD			
6628-5154		26/09/1947		152.4	152.4	1.22	26/09/1947	8.84	26/09/1947	1386	13/02/1961	IRR	Tomw(T1)				
6628-5155			119.79	119.79		16.2	19/03/1974			2111	22/02/1930	OBS	Tomw(T2)				
6628-5156				15.95	15.95	4.27	07/03/1969	11.37	26/01/1933	1900	07/02/1969	IRR	Qpah				
6628-5157		09/05/1955	127.1	151.18		0	09/05/1955	5.81	09/05/1955	959	09/05/1955	IRR	Tomw(T1)	ABD	95316		
6628-5158				32.92	32.92			1.26		1002	02/12/1940	DOM	Qpah				
6628-5159				6.4	6.4	6.1	10/03/1934	0.63	10/03/1934	2427	10/03/1934	INV	Qpah				
6628-5162				15.85	10.67	2.74	06/02/1969			2251	05/02/1969	STK	Qpah	OPR			
6628-5163	YAT023	26/05/1969	60.43	64.01	64.01	10.64	28/02/1989	0.88	02/05/1969	539	20/08/1976	OBS	Qpah(Q4)	UKN		H	H
6628-5164				108.89	0	3.66	08/04/1983	6.31	08/04/1983	3423	15/01/1969	DOM	Tomw(T1)	BKF	9735		
6628-5165				7.01	7.01	4.57		0.51				INV	Qpah				
6628-5166				22.86	22.86	7.62	20/01/1940	0.38	20/01/1940	1444	20/01/1940	INV	Qpah				
6628-5167		01/01/1958		141.73	141.73	12.24	08/03/1967	15.15	08/03/1967	1218	01/05/2016	IRR	Tomw(T1)			N	C
6628-5168		01/01/1960		81.38	0			0.63	01/01/1969	617	01/03/2001	IRR	Qpah(Q4)	BKF	66173		
6628-5194				9.14	9.14	6.4							Qpah				
6628-5195				7.62	7.62	6.4							Qpah				
6628-5196				6.1	6.1	5.79	11/05/1934			2435	11/05/1934		Qpah				
6628-5197		02/03/1951	117.81	132.59	132.59	12.19	05/02/1951	3.79	01/01/1969	972	11/10/1967	IRR	Tomw(T1)				
6628-5198				21.34	21.34								Qpah	ABD			
6628-5199				15.85	15.85			1.26	09/05/1955	1965	09/05/1955	IRR	Qpah				
6628-5200				30.5	30.5			1.89	09/05/1955	890	09/05/1955	IRR	Qpah				
6628-5201				28.65	28.65							IRR	Qpah				
6628-5202				39.62	39.62			1.01	01/01/1954	596	03/12/1954	DOM	Qpah				
6628-5203																	
6628-5204				7.01	7.01			1		2137			Qpah				
6628-5205		01/01/1962	18.29	36.58				8	07/02/1969	2471	06/03/1969	IRR	Qpah				
6628-5206				24.38	24.38			5				IRR	Qpah				
6628-5207				24.38	24.38			5				IRR	Qpah				
6628-5208		01/01/1948		237.74	0									BKF	101335		
6628-5209		11/10/1968		6.71	6.71							INV					
6628-5210	YAT019	01/04/1969	36.58	45.72	45.72	3.09	13/02/1979	1	20/05/1976	545	20/08/1976	INV	Qpah(Q2)	UKN		H	H
6628-5211		11/10/1968		8.08	8.08	3.45	11/10/1968					INV	Qpah				
6628-5212		11/10/1968		5.79	5.79	2.39	11/10/1968					INV	Qpah				
6628-5213		11/10/1968		5.18	5.18	3.45	11/10/1968					INV	Qpah				

Unit No	Obs No	Date	Cased To (m)	Max Depth (m)	Latest Depth (m)	SWL (m)	SWL Date	Yield (L/sec)	Yield Date	TDS (mg/L)	TDS Date	Purpose	Aquifer	Status	Permit No	SWL Status	Salinity Status
6628-5214		11/10/1968		5.79	5.79	5.59	11/10/1968					INV	Qpah				
6628-5215				12.19	12.19	6.71	11/04/1934			1165	11/04/1934		Qpah				
6628-5236	YAT025	19/08/1947	125.88	156.97	156.97	3.27	24/05/1974	12.63	19/08/1947	716	28/02/1974	IRR	Tomw(T1)	OPR		H	N
6628-5237		01/01/1969		7.62	7.62	4.57	26/02/1969			2530	25/02/1969		Qpah				
6628-5238		25/08/1954		184.4	0			7.58	25/08/1954	1552	19/11/1996	IRR	Tomw(T2)	BKF			
6628-5239												DRN		OPR			
6628-5240		23/03/1950		45.57	45.57							EXP					
6628-5241	YAT097	24/06/1977		175	0	14.82	05/03/1999	4	24/06/1977	1467	24/06/1977	OBS	Tomw(T1)	BKF	49416	H	N
6628-5243		01/01/1934		6.1	6.1					3084	16/04/1934		Qpah				
6628-5244		02/11/1935	17.88	21.03	21.03							DRN		OPR			
6628-5248				7.32	7.32			0.63		429			Qpah	ABD			
6628-5249				6.86	6.86			2.53		1709			Qpah				
6628-6933				4.88	4.88	2.74	09/05/1934	0.38	09/05/1934	2144	09/05/1934		Qpah				
6628-6934				2.74	2.74	2.44							Qpah				
6628-6935				6.1	6.1	3.05				3517			Qpah				
6628-6936				2.74	2.74	2.44							Qpah				
6628-6937		18/10/1966		12.22	12.22									UKN			
6628-6938		14/11/1969		12.19	12.19									UKN			
6628-6939		14/11/1969		12.19	12.19									UKN			
6628-6940		14/11/1969		10.97	10.97									UKN			
6628-6941		14/11/1969		8.84	8.84									UKN			
6628-6942		14/11/1969		9.14	9.14									UKN			
6628-10969	YAT098	15/05/1979		81	0	4.92	21/09/1991			661	15/05/1979	OBS	Qpah	BKF	49417	H	N
6628-14630		31/01/1985		10.5	10.5							INV		ABD			
6628-17013				2.5	2.5												
6628-18143		30/11/1995	116	124	124			15	30/11/1995	1222	12/12/2001	IRR	Tomw(T1)	OPR	35648		
6628-18546		15/06/1997	164.5	186.5	186.5	7.74	04/12/2001	8	15/06/1997	1951	19/11/1999	MAR	Tomw(T2)	NIU	41411		
6628-18936		16/10/1997	5.6	5.6	5.6	1.99	16/10/1997					INV	Qpah		42925		
6628-18937		16/10/1997		5.6	0	2	16/10/1997					INV	Qpah	BKF	212471		
6628-18938		16/10/1997	5.6	5.6	5.6	2.04	16/10/1997					INV	Qpah		42937		
6628-20328	YAT129	15/09/2000	163	212	191	11.29	05/02/2019	10	15/09/2000	1939	05/05/2005	INV	Tomw(T2)	OPQ	53463	C	N
6628-20329	YAT130	21/09/2000	128	145	145	4.52	05/02/2019	10	21/09/2000	1228	14/05/2001	INV	Tomw(T1)	NIU	53576	C	H
6628-20614		10/10/1998	30	30	30	13	10/10/1998	0.5	10/10/1998	12861	10/10/1998	IRR	Qpah		46549		
6628-20739		18/12/2001	20.5	20.5	20.5	2.71	18/12/2001			2545	04/09/2008	MON	Qpah		56858		
6628-20741		06/12/2001	173.7	216	216	4.54	06/12/2001	6	06/12/2001	175	04/09/2008	OBS	Tomw(T2)		56856		
6628-20742		11/12/2001	126.6	150	150	7	11/12/2001	6	11/12/2001	2290	04/09/2008	OBS	Tomw(T1)		56857		
6628-20743		12/12/2001		198	198	4.5	01/03/2002	5	12/12/2001	187	20/04/2004	MAR	Tomw(T2)	OPR	56888		
6628-20943		02/05/2002	171	180	180					2008	30/05/2002	MAR	Tomw(T2)	OPR	56887		
6628-21082		18/12/2002	0.5	6	6							INV	Qpah		60598		
6628-21114		12/02/2003	3	4	4	2.3	12/02/2003	0	12/02/2003	3782	04/09/2008	OBS	Qpah		61088		
6628-21115		12/02/2003	3	4	4	2.4	12/02/2003			827	04/09/2008	OBS	Qpah		61089		
6628-21116		13/02/2003	21	24	24	2.4	13/02/2003	1	13/02/2003	2014	12/07/2006	OBS	Qpah		61090		

Unit No	Obs No	Date	Cased To (m)	Max Depth (m)	Latest Depth (m)	SWL (m)	SWL Date	Yield (L/sec)	Yield Date	TDS (mg/L)	TDS Date	Purpose	Aquifer	Status	Permit No	SWL Status	Salinity Status
6628-21117		14/02/2003	3	4	4					1457	04/09/2008	OBS	Qpah		61123		
6628-21118		14/02/2003		22	22	2.3	14/02/2003			1990	04/09/2008	OBS	Qpah		61124		
6628-21213		06/02/2003	2.3	5.3	5.3	3.2	06/02/2003					MON	Qpah		61145		
6628-21214		06/02/2003	2.4	5.3	5.3	3.4	06/02/2003					MON	Qpah		61146		
6628-21215		06/02/2003	2.9	5.9	5.9	3.7	06/02/2003					MON	Qpah		61147		
6628-21495		11/07/2003	0.5	3.5	3.5							MON	Qpah		62716		
6628-21984		18/09/2004	162	222	222	-4	18/09/2004	90	18/09/2004	477	18/09/2004	MAR	Tomw(T2)	NIU	64633		
6628-22405		12/05/2004		8.6	8.6								Qpah		64034		
6628-22406		13/05/2004		8	8								Qpah		64035		
6628-22407		13/05/2004		7.5	7.5								Qpah		64036		
6628-22408		13/05/2004		8.5	8.5								Qpah		64037		
6628-22409		22/07/2004		9	9								Qpah		64038		
6628-22532		12/05/2006	164	180	180	4	12/05/2006	12.5	12/05/2006	2075	22/06/2006	MAR	Tomw(T2)	OPR	117712		
6628-22533		29/05/2006	168	183	183	4.4	29/05/2006	12.5	29/05/2006	2097	27/06/2006	MAR	Tomw(T2)	OPQ	119379		
6628-22535		22/05/2006	165	182	182	5	22/05/2006	12.5	22/05/2006	2097	26/06/2006	MAR	Tomw(T2)	OPQ	117711		
6628-22608				198.25	0									BKF	111057		
6628-22617		29/08/2006	3	6	6	4.57	29/08/2006					INV	Qpah		121624		
6628-22762					0									BKF			
6628-22789		20/12/2006	3	6	6	3.7	20/12/2006					INV	Qpah		125466		
6628-22790		19/12/2006	3	6	6	3.9	19/12/2006					INV	Qpah		125465		
6628-22791		19/12/2006	4.75	7.8	7.8	4	19/12/2006					INV	Qpah		125464		
6628-22792		20/12/2006	3	6	6	4	20/12/2006					INV	Qpah		125463		
6628-22793		19/12/2006	2.5	7	7	3.9	19/12/2006					INV	Qpah		125462		
6628-22923		05/04/2007	3	7	7	5.3	05/04/2007					INV	Qpah		129181		
6628-22924		05/04/2007	3	7	7	5.3	05/04/2007					INV	Qpah		129182		
6628-22925		05/04/2007	3	7	7	5.3	05/04/2007					INV	Qpah		129183		
6628-22926		06/04/2007	3	7	7	5.3	06/04/2007					INV	Qpah		129184		
6628-22927		07/04/2007	3	7	7	5.3	07/04/2007					INV	Qpah		129185		
6628-22928		08/04/2007	3	7	7	5.3	08/04/2007					INV	Qpah		129186		
6628-23045		05/02/2007	165	184	184	10.5	05/02/2007	18	05/02/2007	1917	05/02/2007	INV	Tomw(T2)	OPR	126355		
6628-23047		15/01/2007	165	184	184	10.5	15/01/2007	18	15/01/2007	1883	15/01/2007	INV	Tomw(T2)	OPR	126353		
6628-23053		22/01/2007	165	184	184	10.5	22/01/2007	18	22/01/2007	1917	21/01/2007	MAR	Tomw(T2)	OPR	126354		
6628-23489		08/02/2008	117	132	132	11	08/02/2008	12	08/02/2008	2596	21/02/2008		Tomw(T1)		142602		
6628-23706		16/04/2008	3	7	7	5.4	16/04/2008					INV	Qpah		144933		
6628-23707		16/04/2008	3	7	7							INV	Qpah		144932		
6628-23708		16/04/2008	3	7	7	5.4	16/04/2008					INV	Qpah		144931		
6628-23709		16/04/2008	3	7	7	5.3	16/04/2008					INV	Qpah		144930		
6628-24537		25/07/2008	167.5	171.5	171.5	3	25/07/2008	3	25/07/2008	338	25/07/2008	MAR	Tomw(T2)		149448		
6628-24538		31/07/2008	168	171	171	3.8	31/07/2008	2	31/07/2008	171	30/07/2008	MAR	Tomw(T2)		149450		
6628-24539		18/07/2008	209	228	214	4.1	18/07/2008	1.5	18/07/2008	2352	18/07/2008	MAR	Tomw(T2)		149449		
6628-25261		13/10/2009	3	8	8	7.35	13/10/2009					INV	Qpah		183010		
6628-25262		13/10/2009	3	8	8	7.58	13/10/2009					INV	Qpah		183011		

Unit No	Obs No	Date	Cased To (m)	Max Depth (m)	Latest Depth (m)	SWL (m)	SWL Date	Yield (L/sec)	Yield Date	TDS (mg/L)	TDS Date	Purpose	Aquifer	Status	Permit No	SWL Status	Salinity Status
6628-25263		13/10/2009	3	8	8							INV	Qpah		183012		
6628-25264		14/10/2009	3	9	9	8.27	14/10/2009					INV	Qpah		183013		
6628-25265		14/10/2009	4	10	10	8.79	14/10/2009					INV	Qpah		183018		
6628-25421		15/10/2009	10	10	10	8.73	15/10/2009					INV	Qpah		183015		
6628-25422		15/10/2009	3.8	9.8	9.8	9.1	15/10/2009					INV	Qpah		183016		
6628-25423		16/10/2009	10	10	10							INV	Qpah		183017		
6628-25434		16/09/2010	174	210	210	1	16/09/2010			1647	16/09/2010	MAR	Tomw(T2)	OPR	188053		
6628-25583		11/10/2010	11.5	16	16	10.5	11/10/2010					INV	Qpah		195824		
6628-25590		15/10/2010	10.5	15	15	10	15/10/2010					INV	Qpah		195831		
6628-25591		15/10/2010	10.5	15.65	15.65	10.8	15/10/2010					INV	Qpah		195832		
6628-25592		18/10/2010	12.5	17	17	12.7	18/10/2010					INV	Qpah		195833		
6628-27347			174	210	210	1	03/06/2014	80	03/06/2014	1541	03/06/2014	MAR	Tomw(T2)	OPR	231390	N	C
6628-28347		13/10/2015	3.5	8	8	5.3	13/10/2015					INV	Qpah		253332		
6628-28348		13/10/2015	3.5	8	8	5.6	13/10/2015					INV	Qpah		253331		
6628-28349		13/10/2015	3.5	8	8	5	13/10/2015					INV	Qpah		253333		
6628-28350		13/10/2015	3.5	8	8	5.2	13/10/2015					INV	Qpah		253330		
6628-28405		23/05/2016	3.5	9.5	9.5	6.5	23/05/2016					INV	Qpah		262884		
6628-28407		23/05/2016	3.5	6.5	6.5	3.8	23/05/2016					INV	Qpah		262886		
6628-28411		23/05/2016	7.5	7.5	7.5	2.9	23/05/2016					INV	Qpah		262885		
6628-28588		10/08/2016	3.5	8	8	4.9	10/08/2016								271494		
6628-28589		10/08/2016	8	8	8	5	10/08/2016					INV			271493		
6628-28597		09/08/2016	3	6	6	3	09/08/2016					INV			271484		
6628-28598		11/08/2016	7	10	10	8	11/08/2016					INV			271490		
6628-28599		09/08/2016	7	10	10	8.5	09/08/2016					INV			271491		
6628-28600		08/08/2016	4	4	4	1	08/08/2016					INV			271485		
6628-28601		08/08/2016	3	6	6	2	08/08/2016					INV			271483		
6628-28602		08/08/2016	2.7	2.7	2.7	0.7	08/08/2016					INV			271486		
6628-28603		09/08/2016	4	4	4	1.5	09/08/2016					INV			271487		
6628-28687		16/06/2016	3.5	8	8	4.9	16/06/2016					INV			264406		
6628-28688		16/06/2016	3.5	8	8	5.14	16/06/2016								264408		
6628-28689		15/06/2016	4.2	8.7	8.7	5	15/06/2016					INV			262182		
6628-28690		17/06/2016	3.5	8	8	5.01	17/06/2016								262183		
6628-28691		17/06/2016	4.5	9	9	4.8	17/06/2016					INV			262184		
6628-28867		30/05/2017	3.5	8	8	5.4	30/05/2017					INV			281845		
6628-29388		29/11/2017	1.5	5.7	5.7	2	29/11/2017					INV			291645		
6628-29389		28/11/2017	2.5	5.7	5.7	1.45	28/11/2017					INV			291646		
6628-29390		28/11/2017	2	5.2	5.2	1.4	28/11/2017					INV			291647		
6628-29391			5	5.2	5.2	1.4	28/11/2017					INV			291648		
6628-29392		28/11/2017	2	5	5	2.5	28/11/2017					INV			291649		
6628-29393		28/11/2017	2	5	5	2.6	28/11/2017					INV			291650		
6628-29394		28/11/2017	1.5	4.5	4.5	1.5	28/11/2017					INV			291651		
6628-29395		29/11/2017	2	5	5	3.9	29/11/2017					INV			291652		

Unit No	Obs No	Date	Cased To (m)	Max Depth (m)	Latest Depth (m)	SWL (m)	SWL Date	Yield (L/sec)	Yield Date	TDS (mg/L)	TDS Date	Purpose	Aquifer	Status	Permit No	SWL Status	Salinity Status
6628-29396		29/11/2017	2	5.2	5.2	1.9	29/11/2017					INV			291653		
6628-29397		29/11/2017	2	5	5	1.65	29/11/2017					INV			291654		
6628-29398		29/11/2017	2	5	5	1.9	29/11/2017					INV			291655		
6628-29438		16/04/2018	2.5	5.5	5.5							INV			303631		
6628-29905		29/11/2018		5.5	5.5		29/11/2018					ENV		DRY	338170		
6628-29945		28/11/2018		6	6		28/11/2018					ENV		DRY	338176		
6628-29946		28/11/2018		6	6		28/11/2018					ENV		DRY	338175		
6628-29947		28/11/2018		6	6		28/11/2018					ENV		DRY	338173		
6628-29948		28/11/2018		6	6		28/11/2018					ENV		DRY	338174		
6628-29949		29/11/2018		6	6		29/11/2018					ENV		DRY	338172		

173 records

Appendix D – Well Permits

GOVERNMENT OF SOUTH AUSTRALIA

DEPARTMENT FOR ENVIRONMENT AND WATER

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

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 135 of the *Natural Resources Management Act 2004*

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:	338170
Expiry Date:	26/11/2019

Permission is hereby granted to:

GHD PTY LTD
LEVEL 4, 211 VICTORIA SQUARE
ADELAIDE SA 5000
ACN 008 488 373

To undertake the following water affecting activity:

Activity: Well Construction

Well Use: Investigation

CONDITIONS:

1. The activity authorised by this permit must only be undertaken on the land described below:

   CT 6156/211
   Allotment 17 in Filed Plan 114106
   Hundred of Yatala

2. Well Construction must be in accordance with the General Specification for Well Construction, Modification and Abandonment in South Australia (or any subsequent or related policy), as provided by the relevant authority
3. If the well is considered unsatisfactory, it may be abandoned and a replacement well may then be constructed provided that the abandoned well is backfilled prior to the drill rig leaving the site.
4. 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.
5. Water samples are required from all wells drilled in respect of this permit.
6. 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.
7. Strata samples are not required.
8. This work may be subject to inspection by the Department's Drilling Inspectors.
9. The licensed well driller must forward with his report a plan obtained from the permit holder, who must mark thereon the location of all wells drilled in respect of this permit.

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 135 of the *Natural Resources Management Act 2004*

WELL PERMIT

10. 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 Third 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.
11. All wells must be drilled vertical unless written permission is obtained from the Minister.
12. All groundwater extracted during sampling and/or purging must be contained and disposed of in an appropriate manner to minimise risk to health and the environment.
13. A lithological log is to be submitted with the drillers well construction report from all wells drilled in respect of this permit in accordance with National Environmental Protection (assessment of Site Contamination) measure 1999.
14. Wells are to be backfilled when no longer required for ongoing monitoring and investigation purposes.
15. The well is to be completed only in the Quaternary aquifer Q1.
16. Where a well passes or will pass through two or more aquifers, an impervious seal shall be made and maintained between the aquifers to prevent leakage between the aquifers.
17. A well shall only be drilled where it will not cause, or will not be likely to cause, salt mobilisation or a rising water table.
18. Due to known soil/groundwater contamination in the sediments and aquifers above, caution should be taken in the drilling and cementing of this well.

NOTES:

1. It is recommended that all drilling equipment be decontaminated prior to construction of a new well or rehabilitation of an existing well to prevent the introduction or transfer of iron bacteria. Similar precautions should also be taken with pump installation equipment.
2. Under section 202(1)(b)(ii) of the Natural Resources Management Act 2004, you have a right of appeal to the Environment, Resources and Development Court against the imposition of any condition on this permit. The appeal must be instituted within six weeks of the date of permit issue. The appeal must also be served upon this department within that time.
3. This permit is not transferable.
4. This well construction permit is not an authorisation for a person to enter private property and prior authority must be obtained from the land owner in all circumstances.
5. The issue of this permit does not negate the requirement to comply with the provisions of other Acts that may impact on the activity undertaken pursuant to this permit.
6. This permit is not an approval to clear native vegetation.
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.

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 135 of the *Natural Resources Management Act 2004*

WELL PERMIT

9. If the extracted groundwater supply is required for human consumption, it is recommended that the water be quality tested.
10. To minimise the risk of contamination, the well should be sited as far as practicable, preferably further than 50 metres from any septic or waste disposal area.

TAKE NOTE that the permit holder, or a person acting on behalf of the permit holder, who contravenes or fails to comply with a condition of this permit is guilty of an offence, and such acts or ommisions may result in the variation, suspension or revocation of the permit.

Date: 26/11/2018

Sonya Knight
Water Licensing Officer
Delegate of Minister for Environment and Water

GOVERNMENT OF SOUTH AUSTRALIA

DEPARTMENT FOR ENVIRONMENT AND WATER

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

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 135 of the *Natural Resources Management Act 2004*

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:	338172
Expiry Date:	26/11/2019

Permission is hereby granted to:

GHD PTY LTD
LEVEL 4, 211 VICTORIA SQUARE
ADELAIDE SA 5000
ACN 008 488 373

To undertake the following water affecting activity:

Activity: Well Construction

Well Use: Investigation

CONDITIONS:

1. The activity authorised by this permit must only be undertaken on the land described below:

   CT 6156/211
   Allotment 16 in Filed Plan 114106
   Hundred of Yatala

2. Well Construction must be in accordance with the General Specification for Well Construction, Modification and Abandonment in South Australia (or any subsequent or related policy), as provided by the relevant authority
3. If the well is considered unsatisfactory, it may be abandoned and a replacement well may then be constructed provided that the abandoned well is backfilled prior to the drill rig leaving the site.
4. 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.
5. Water samples are required from all wells drilled in respect of this permit.
6. 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.
7. Strata samples are not required.
8. This work may be subject to inspection by the Department's Drilling Inspectors.
9. The licensed well driller must forward with his report a plan obtained from the permit holder, who must mark thereon the location of all wells drilled in respect of this permit.

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 135 of the *Natural Resources Management Act 2004*

WELL PERMIT

10. 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 Third 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.
11. All wells must be drilled vertical unless written permission is obtained from the Minister.
12. All groundwater extracted during sampling and/or purging must be contained and disposed of in an appropriate manner to minimise risk to health and the environment.
13. A lithological log is to be submitted with the drillers well construction report from all wells drilled in respect of this permit in accordance with National Environmental Protection (assessment of Site Contamination) measure 1999.
14. Wells are to be backfilled when no longer required for ongoing monitoring and investigation purposes.
15. The well is to be completed only in the Quaternary aquifer Q1.
16. Where a well passes or will pass through two or more aquifers, an impervious seal shall be made and maintained between the aquifers to prevent leakage between the aquifers.
17. A well shall only be drilled where it will not cause, or will not be likely to cause, salt mobilisation or a rising water table.
18. Due to known soil/groundwater contamination in the sediments and aquifers above, caution should be taken in the drilling and cementing of this well.

NOTES:

1. It is recommended that all drilling equipment be decontaminated prior to construction of a new well or rehabilitation of an existing well to prevent the introduction or transfer of iron bacteria. Similar precautions should also be taken with pump installation equipment.
2. Under section 202(1)(b)(ii) of the Natural Resources Management Act 2004, you have a right of appeal to the Environment, Resources and Development Court against the imposition of any condition on this permit. The appeal must be instituted within six weeks of the date of permit issue. The appeal must also be served upon this department within that time.
3. This permit is not transferable.
4. This well construction permit is not an authorisation for a person to enter private property and prior authority must be obtained from the land owner in all circumstances.
5. The issue of this permit does not negate the requirement to comply with the provisions of other Acts that may impact on the activity undertaken pursuant to this permit.
6. This permit is not an approval to clear native vegetation.
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.

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 135 of the *Natural Resources Management Act 2004*

WELL PERMIT

9. If the extracted groundwater supply is required for human consumption, it is recommended that the water be quality tested.
10. To minimise the risk of contamination, the well should be sited as far as practicable, preferably further than 50 metres from any septic or waste disposal area.

TAKE NOTE that the permit holder, or a person acting on behalf of the permit holder, who contravenes or fails to comply with a condition of this permit is guilty of an offence, and such acts or ommisions may result in the variation, suspension or revocation of the permit.

smknight

Date: 26/11/2018

Sonya Knight
Water Licensing Officer
Delegate of Minister for Environment and Water

GOVERNMENT OF SOUTH AUSTRALIA

DEPARTMENT FOR ENVIRONMENT AND WATER

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

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 135 of the *Natural Resources Management Act 2004*

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:	338175
Expiry Date:	26/11/2019

Permission is hereby granted to:

GHD PTY LTD
LEVEL 4, 211 VICTORIA SQUARE
ADELAIDE SA 5000
ACN 008 488 373

To undertake the following water affecting activity:

Activity: Well Construction

Well Use: Investigation

CONDITIONS:

1. The activity authorised by this permit must only be undertaken on the land described below:

   CT 6000/122
   Allotment 907 in Deposited Plan 75744
   Hundred of Yatala

2. Well Construction must be in accordance with the General Specification for Well Construction, Modification and Abandonment in South Australia (or any subsequent or related policy), as provided by the relevant authority
3. If the well is considered unsatisfactory, it may be abandoned and a replacement well may then be constructed provided that the abandoned well is backfilled prior to the drill rig leaving the site.
4. 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.
5. Water samples are required from all wells drilled in respect of this permit.
6. 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.
7. Strata samples are not required.
8. This work may be subject to inspection by the Department's Drilling Inspectors.
9. The licensed well driller must forward with his report a plan obtained from the permit holder, who must mark thereon the location of all wells drilled in respect of this permit.

10. 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 Third 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.
11. All wells must be drilled vertical unless written permission is obtained from the Minister.
12. All groundwater extracted during sampling and/or purging must be contained and disposed of in an appropriate manner to minimise risk to health and the environment.
13. A lithological log is to be submitted with the drillers well construction report from all wells drilled in respect of this permit in accordance with National Environmental Protection (assessment of Site Contamination) measure 1999.
14. Wells are to be backfilled when no longer required for ongoing monitoring and investigation purposes.
15. The well is to be completed only in the Quaternary aquifer Q1.
16. Where a well passes or will pass through two or more aquifers, an impervious seal shall be made and maintained between the aquifers to prevent leakage between the aquifers.
17. A well shall only be drilled where it will not cause, or will not be likely to cause, salt mobilisation or a rising water table.
18. Due to known soil/groundwater contamination in the sediments and aquifers above, caution should be taken in the drilling and cementing of this well.
19. This permit authorises the construction of a well on the portion of road adjacent to the land parcel described above.

NOTES:

1. It is recommended that all drilling equipment be decontaminated prior to construction of a new well or rehabilitation of an existing well to prevent the introduction or transfer of iron bacteria. Similar precautions should also be taken with pump installation equipment.
2. Under section 202(1)(b)(ii) of the Natural Resources Management Act 2004, you have a right of appeal to the Environment, Resources and Development Court against the imposition of any condition on this permit. The appeal must be instituted within six weeks of the date of permit issue. The appeal must also be served upon this department within that time.
3. This permit is not transferable.
4. This well construction permit is not an authorisation for a person to enter private property and prior authority must be obtained from the land owner in all circumstances.
5. The issue of this permit does not negate the requirement to comply with the provisions of other Acts that may impact on the activity undertaken pursuant to this permit.
6. This permit is not an approval to clear native vegetation.
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.
10. To minimise the risk of contamination, the well should be sited as far as practicable, preferably further than 50 metres from any septic or waste disposal area.

TAKE NOTE that the permit holder, or a person acting on behalf of the permit holder, who contravenes or fails to comply with a condition of this permit is guilty of an offence, and such acts or ommisions may result in the variation, suspension or revocation of the permit.

Date: 26/11/2018

Sonya Knight
Water Licensing Officer
Delegate of Minister for Environment and Water

GOVERNMENT OF SOUTH AUSTRALIA

DEPARTMENT FOR ENVIRONMENT AND WATER

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

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 135 of the *Natural Resources Management Act 2004*

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:	338176
Expiry Date:	26/11/2019

Permission is hereby granted to:

GHD PTY LTD
LEVEL 4, 211 VICTORIA SQUARE
ADELAIDE SA 5000
ACN 008 488 373

To undertake the following water affecting activity:

Activity: Well Construction

Well Use: Investigation

CONDITIONS:

1. The activity authorised by this permit must only be undertaken on the land described below:

   CT 5919/69
   Allotment 113 in Deposited Plan 64973
   Hundred of Yatala

2. Well Construction must be in accordance with the General Specification for Well Construction, Modification and Abandonment in South Australia (or any subsequent or related policy), as provided by the relevant authority
3. If the well is considered unsatisfactory, it may be abandoned and a replacement well may then be constructed provided that the abandoned well is backfilled prior to the drill rig leaving the site.
4. 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.
5. Water samples are required from all wells drilled in respect of this permit.
6. 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.
7. Strata samples are not required.
8. This work may be subject to inspection by the Department's Drilling Inspectors.
9. The licensed well driller must forward with his report a plan obtained from the permit holder, who must mark thereon the location of all wells drilled in respect of this permit.

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 135 of the *Natural Resources Management Act 2004*

WELL PERMIT

10. 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 Third 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.
11. All wells must be drilled vertical unless written permission is obtained from the Minister.
12. All groundwater extracted during sampling and/or purging must be contained and disposed of in an appropriate manner to minimise risk to health and the environment.
13. A lithological log is to be submitted with the drillers well construction report from all wells drilled in respect of this permit in accordance with National Environmental Protection (assessment of Site Contamination) measure 1999.
14. Wells are to be backfilled when no longer required for ongoing monitoring and investigation purposes.
15. The well is to be completed only in the Quaternary aquifer Q1.
16. Where a well passes or will pass through two or more aquifers, an impervious seal shall be made and maintained between the aquifers to prevent leakage between the aquifers.
17. A well shall only be drilled where it will not cause, or will not be likely to cause, salt mobilisation or a rising water table.
18. Due to known soil/groundwater contamination in the sediments and aquifers above, caution should be taken in the drilling and cementing of this well.
19. This permit authorises the construction of a well on the portion of road adjacent to the land parcel described above.

NOTES:

1. It is recommended that all drilling equipment be decontaminated prior to construction of a new well or rehabilitation of an existing well to prevent the introduction or transfer of iron bacteria. Similar precautions should also be taken with pump installation equipment.
2. Under section 202(1)(b)(ii) of the Natural Resources Management Act 2004, you have a right of appeal to the Environment, Resources and Development Court against the imposition of any condition on this permit. The appeal must be instituted within six weeks of the date of permit issue. The appeal must also be served upon this department within that time.
3. This permit is not transferable.
4. This well construction permit is not an authorisation for a person to enter private property and prior authority must be obtained from the land owner in all circumstances.
5. The issue of this permit does not negate the requirement to comply with the provisions of other Acts that may impact on the activity undertaken pursuant to this permit.
6. This permit is not an approval to clear native vegetation.
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.

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 135 of the *Natural Resources Management Act 2004*

WELL PERMIT

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.
10. To minimise the risk of contamination, the well should be sited as far as practicable, preferably further than 50 metres from any septic or waste disposal area.

TAKE NOTE that the permit holder, or a person acting on behalf of the permit holder, who contravenes or fails to comply with a condition of this permit is guilty of an offence, and such acts or ommisions may result in the variation, suspension or revocation of the permit.

smKnight

Date: 26/11/2018

Sonya Knight
Water Licensing Officer
Delegate of Minister for Environment and Water

GOVERNMENT OF SOUTH AUSTRALIA

DEPARTMENT FOR ENVIRONMENT AND WATER

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

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 135 of the *Natural Resources Management Act 2004*

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:	338173
Expiry Date:	26/11/2019

Permission is hereby granted to:

GHD PTY LTD
LEVEL 4, 211 VICTORIA SQUARE
ADELAIDE SA 5000
ACN 008 488 373

To undertake the following water affecting activity:

Activity: Well Construction

Well Use: Investigation

CONDITIONS:

1. The activity authorised by this permit must only be undertaken on the land described below:

   CT 5585/896
   Allotment 493 in Deposited Plan 7818
   Hundred of Yatala

2. Well Construction must be in accordance with the General Specification for Well Construction, Modification and Abandonment in South Australia (or any subsequent or related policy), as provided by the relevant authority
3. If the well is considered unsatisfactory, it may be abandoned and a replacement well may then be constructed provided that the abandoned well is backfilled prior to the drill rig leaving the site.
4. 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.
5. Water samples are required from all wells drilled in respect of this permit.
6. 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.
7. Strata samples are not required.
8. This work may be subject to inspection by the Department's Drilling Inspectors.
9. The licensed well driller must forward with his report a plan obtained from the permit holder, who must mark thereon the location of all wells drilled in respect of this permit.

10. 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 Third 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.
11. All wells must be drilled vertical unless written permission is obtained from the Minister.
12. All groundwater extracted during sampling and/or purging must be contained and disposed of in an appropriate manner to minimise risk to health and the environment.
13. A lithological log is to be submitted with the drillers well construction report from all wells drilled in respect of this permit in accordance with National Environmental Protection (assessment of Site Contamination) measure 1999.
14. Wells are to be backfilled when no longer required for ongoing monitoring and investigation purposes.
15. The well is to be completed only in the Quaternary aquifer Q1.
16. Where a well passes or will pass through two or more aquifers, an impervious seal shall be made and maintained between the aquifers to prevent leakage between the aquifers.
17. A well shall only be drilled where it will not cause, or will not be likely to cause, salt mobilisation or a rising water table.
18. Due to known soil/groundwater contamination in the sediments and aquifers above, caution should be taken in the drilling and cementing of this well.
19. This permit authorises the construction of a well on the portion of road adjacent to the land parcel described above.

NOTES:

1. It is recommended that all drilling equipment be decontaminated prior to construction of a new well or rehabilitation of an existing well to prevent the introduction or transfer of iron bacteria. Similar precautions should also be taken with pump installation equipment.
2. Under section 202(1)(b)(ii) of the Natural Resources Management Act 2004, you have a right of appeal to the Environment, Resources and Development Court against the imposition of any condition on this permit. The appeal must be instituted within six weeks of the date of permit issue. The appeal must also be served upon this department within that time.
3. This permit is not transferable.
4. This well construction permit is not an authorisation for a person to enter private property and prior authority must be obtained from the land owner in all circumstances.
5. The issue of this permit does not negate the requirement to comply with the provisions of other Acts that may impact on the activity undertaken pursuant to this permit.
6. This permit is not an approval to clear native vegetation.
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.

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 135 of the *Natural Resources Management Act 2004*

WELL PERMIT

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.
10. To minimise the risk of contamination, the well should be sited as far as practicable, preferably further than 50 metres from any septic or waste disposal area.

TAKE NOTE that the permit holder, or a person acting on behalf of the permit holder, who contravenes or fails to comply with a condition of this permit is guilty of an offence, and such acts or ommisions may result in the variation, suspension or revocation of the permit.

SmKnight

Date: 26/11/2018

Sonya Knight
Water Licensing Officer
Delegate of Minister for Environment and Water

GOVERNMENT OF SOUTH AUSTRALIA

DEPARTMENT FOR ENVIRONMENT AND WATER

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

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 135 of the *Natural Resources Management Act 2004*

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:	338174
Expiry Date:	26/11/2019

Permission is hereby granted to:

GHD PTY LTD
LEVEL 4, 211 VICTORIA SQUARE
ADELAIDE SA 5000
ACN 008 488 373

To undertake the following water affecting activity:

Activity: Well Construction

Well Use: Investigation

CONDITIONS:

1. The activity authorised by this permit must only be undertaken on the land described below:

   CT 5901/359
   Allotment 1 in Deposited Plan 62381
   Hundred of Yatala

2. Well Construction must be in accordance with the General Specification for Well Construction, Modification and Abandonment in South Australia (or any subsequent or related policy), as provided by the relevant authority
3. If the well is considered unsatisfactory, it may be abandoned and a replacement well may then be constructed provided that the abandoned well is backfilled prior to the drill rig leaving the site.
4. 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.
5. Water samples are required from all wells drilled in respect of this permit.
6. 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.
7. Strata samples are not required.
8. This work may be subject to inspection by the Department's Drilling Inspectors.
9. The licensed well driller must forward with his report a plan obtained from the permit holder, who must mark thereon the location of all wells drilled in respect of this permit.

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 135 of the *Natural Resources Management Act 2004*

WELL PERMIT

10. 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 Third 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.
11. All wells must be drilled vertical unless written permission is obtained from the Minister.
12. All groundwater extracted during sampling and/or purging must be contained and disposed of in an appropriate manner to minimise risk to health and the environment.
13. A lithological log is to be submitted with the drillers well construction report from all wells drilled in respect of this permit in accordance with National Environmental Protection (assessment of Site Contamination) measure 1999.
14. Wells are to be backfilled when no longer required for ongoing monitoring and investigation purposes.
15. The well is to be completed only in the Quaternary aquifer Q1.
16. Where a well passes or will pass through two or more aquifers, an impervious seal shall be made and maintained between the aquifers to prevent leakage between the aquifers.
17. A well shall only be drilled where it will not cause, or will not be likely to cause, salt mobilisation or a rising water table.
18. Due to known soil/groundwater contamination in the sediments and aquifers above, caution should be taken in the drilling and cementing of this well.
19. This permit authorises the construction of a well on the portion of road adjacent to the land parcel described above.

NOTES:

1. It is recommended that all drilling equipment be decontaminated prior to construction of a new well or rehabilitation of an existing well to prevent the introduction or transfer of iron bacteria. Similar precautions should also be taken with pump installation equipment.
2. Under section 202(1)(b)(ii) of the Natural Resources Management Act 2004, you have a right of appeal to the Environment, Resources and Development Court against the imposition of any condition on this permit. The appeal must be instituted within six weeks of the date of permit issue. The appeal must also be served upon this department within that time.
3. This permit is not transferable.
4. This well construction permit is not an authorisation for a person to enter private property and prior authority must be obtained from the land owner in all circumstances.
5. The issue of this permit does not negate the requirement to comply with the provisions of other Acts that may impact on the activity undertaken pursuant to this permit.
6. This permit is not an approval to clear native vegetation.
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.

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 135 of the *Natural Resources Management Act 2004*

WELL PERMIT

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.
10. To minimise the risk of contamination, the well should be sited as far as practicable, preferably further than 50 metres from any septic or waste disposal area.

TAKE NOTE that the permit holder, or a person acting on behalf of the permit holder, who contravenes or fails to comply with a condition of this permit is guilty of an offence, and such acts or ommisions may result in the variation, suspension or revocation of the permit.

SmKnight

Date: 26/11/2018

Sonya Knight
Water Licensing Officer
Delegate of Minister for Environment and Water

GOVERNMENT OF SOUTH AUSTRALIA

DEPARTMENT FOR ENVIRONMENT AND WATER

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

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 135 of the *Natural Resources Management Act 2004*

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:	338997
Expiry Date:	11/01/2020

Permission is hereby granted to: GHD PTY LTD
LEVEL 4, 211 VICTORIA SQUARE
ADELAIDE SA 5000
ACN 008 488 373

To undertake the following water affecting activity:

Activity: Well Construction

Well Use: Investigation

CONDITIONS:

1. The activity authorised by this permit must only be undertaken on the land described below:

   CT 5120/565
   Allotment 8 in Deposited Plan 36686
   Hundred of Yatala

2. Well Construction must be in accordance with the General Specification for Well Construction, Modification and Abandonment in South Australia (or any subsequent or related policy), as provided by the relevant authority
3. If the well is considered unsatisfactory, it may be abandoned and a replacement well may then be constructed provided that the abandoned well is backfilled prior to the drill rig leaving the site.
4. 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.
5. Water samples are required from all wells drilled in respect of this permit.
6. 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.
7. Strata samples are not required.
8. This work may be subject to inspection by the Department's Drilling Inspectors.
9. The licensed well driller must forward with his report a plan obtained from the permit holder, who must mark thereon the location of all wells drilled in respect of this permit.

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 135 of the *Natural Resources Management Act 2004*

WELL PERMIT

10. 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 Third 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.
11. All wells must be drilled vertical unless written permission is obtained from the Minister.
12. All groundwater extracted during sampling and/or purging must be contained and disposed of in an appropriate manner to minimise risk to health and the environment.
13. A lithological log is to be submitted with the drillers well construction report from all wells drilled in respect of this permit in accordance with National Environmental Protection (assessment of Site Contamination) measure 1999.
14. Wells are to be backfilled when no longer required for ongoing monitoring and investigation purposes.
15. The well is to be completed only in either the Quaternary aquifer Q1 or the Quaternary aquifer Q2. If completed in the Quaternary aquifer Q2 the aquifer above is to be cased off and pressure cemented.
16. Where a well passes or will pass through two or more aquifers, an impervious seal shall be made and maintained between the aquifers to prevent leakage between the aquifers.
17. A well shall only be drilled where it will not cause, or will not be likely to cause, salt mobilisation or a rising water table.
18. Due to known nearby soil/groundwater contamination in the sediments and aquifers above, caution should be taken in the drilling and cementing of this well(s).
19. This permit authorises the construction of a well on the portion of road adjacent to the land parcel described above.

NOTES:

1. It is recommended that all drilling equipment be decontaminated prior to construction of a new well or rehabilitation of an existing well to prevent the introduction or transfer of iron bacteria. Similar precautions should also be taken with pump installation equipment.
2. Under section 202(1)(b)(ii) of the Natural Resources Management Act 2004, you have a right of appeal to the Environment, Resources and Development Court against the imposition of any condition on this permit. The appeal must be instituted within six weeks of the date of permit issue. The appeal must also be served upon this department within that time.
3. This permit is not transferable.
4. This well construction permit is not an authorisation for a person to enter private property and prior authority must be obtained from the land owner in all circumstances.
5. The issue of this permit does not negate the requirement to comply with the provisions of other Acts that may impact on the activity undertaken pursuant to this permit.
6. This permit is not an approval to clear native vegetation.

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 135 of the *Natural Resources Management Act 2004*

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.
10. To minimise the risk of contamination, the well should be sited as far as practicable, preferably further than 50 metres from any septic or waste disposal area.

TAKE NOTE that the permit holder, or a person acting on behalf of the permit holder, who contravenes or fails to comply with a condition of this permit is guilty of an offence, and such acts or ommisions may result in the variation, suspension or revocation of the permit.

SmKnight

Date: 11/01/2019

Sonya Knight
Water Licensing Officer
Delegate of Minister for Environment and Water

GOVERNMENT OF SOUTH AUSTRALIA

DEPARTMENT FOR ENVIRONMENT AND WATER

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

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 135 of the *Natural Resources Management Act 2004*

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:	338998
Expiry Date:	11/01/2020

Permission is hereby granted to:

GHD PTY LTD
LEVEL 4, 211 VICTORIA SQUARE
ADELAIDE SA 5000
ACN 008 488 373

To undertake the following water affecting activity:

Activity: Well Construction

Well Use: Investigation

CONDITIONS:

1. The activity authorised by this permit must only be undertaken on the land described below:

   CT 5245/443
   Allotment 204 in Deposited Plan 7815
   Hundred of Yatala

2. Well Construction must be in accordance with the General Specification for Well Construction, Modification and Abandonment in South Australia (or any subsequent or related policy), as provided by the relevant authority
3. If the well is considered unsatisfactory, it may be abandoned and a replacement well may then be constructed provided that the abandoned well is backfilled prior to the drill rig leaving the site.
4. 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.
5. Water samples are required from all wells drilled in respect of this permit.
6. 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.
7. Strata samples are not required.
8. This work may be subject to inspection by the Department's Drilling Inspectors.
9. The licensed well driller must forward with his report a plan obtained from the permit holder, who must mark thereon the location of all wells drilled in respect of this permit.

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 135 of the *Natural Resources Management Act 2004*

WELL PERMIT

10. 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 Third 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.
11. All wells must be drilled vertical unless written permission is obtained from the Minister.
12. All groundwater extracted during sampling and/or purging must be contained and disposed of in an appropriate manner to minimise risk to health and the environment.
13. A lithological log is to be submitted with the drillers well construction report from all wells drilled in respect of this permit in accordance with National Environmental Protection (assessment of Site Contamination) measure 1999.
14. Wells are to be backfilled when no longer required for ongoing monitoring and investigation purposes.
15. The well is to be completed only in either the Quaternary aquifer Q1 or the Quaternary aquifer Q2. If completed in the Quaternary aquifer Q2 the aquifer above is to be cased off and pressure cemented.
16. Where a well passes or will pass through two or more aquifers, an impervious seal shall be made and maintained between the aquifers to prevent leakage between the aquifers.
17. A well shall only be drilled where it will not cause, or will not be likely to cause, salt mobilisation or a rising water table.
18. Due to known nearby soil/groundwater contamination in the sediments and aquifers above, caution should be taken in the drilling and cementing of this well(s).
19. This permit authorises the construction of a well on the portion of road adjacent to the land parcel described above.

NOTES:

1. It is recommended that all drilling equipment be decontaminated prior to construction of a new well or rehabilitation of an existing well to prevent the introduction or transfer of iron bacteria. Similar precautions should also be taken with pump installation equipment.
2. Under section 202(1)(b)(ii) of the Natural Resources Management Act 2004, you have a right of appeal to the Environment, Resources and Development Court against the imposition of any condition on this permit. The appeal must be instituted within six weeks of the date of permit issue. The appeal must also be served upon this department within that time.
3. This permit is not transferable.
4. This well construction permit is not an authorisation for a person to enter private property and prior authority must be obtained from the land owner in all circumstances.
5. The issue of this permit does not negate the requirement to comply with the provisions of other Acts that may impact on the activity undertaken pursuant to this permit.
6. This permit is not an approval to clear native vegetation.

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 135 of the *Natural Resources Management Act 2004*

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.
10. To minimise the risk of contamination, the well should be sited as far as practicable, preferably further than 50 metres from any septic or waste disposal area.

TAKE NOTE that the permit holder, or a person acting on behalf of the permit holder, who contravenes or fails to comply with a condition of this permit is guilty of an offence, and such acts or ommisions may result in the variation, suspension or revocation of the permit.

SmKnight

Date: 11/01/2019

Sonya Knight
Water Licensing Officer
Delegate of Minister for Environment and Water

GOVERNMENT OF SOUTH AUSTRALIA

DEPARTMENT FOR ENVIRONMENT AND WATER

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

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 135 of the *Natural Resources Management Act 2004*

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:	338999
Expiry Date:	11/01/2020

Permission is hereby granted to:

GHD PTY LTD
LEVEL 4, 211 VICTORIA SQUARE
ADELAIDE SA 5000
ACN 008 488 373

To undertake the following water affecting activity:

Activity: Well Construction

Well Use: Investigation

CONDITIONS:

1. The activity authorised by this permit must only be undertaken on the land described below:

   CT 5376/429
   Allotment 355 in Deposited Plan 7818
   Hundred of Yatala

2. Well Construction must be in accordance with the General Specification for Well Construction, Modification and Abandonment in South Australia (or any subsequent or related policy), as provided by the relevant authority
3. If the well is considered unsatisfactory, it may be abandoned and a replacement well may then be constructed provided that the abandoned well is backfilled prior to the drill rig leaving the site.
4. 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.
5. Water samples are required from all wells drilled in respect of this permit.
6. 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.
7. Strata samples are not required.
8. This work may be subject to inspection by the Department's Drilling Inspectors.
9. The licensed well driller must forward with his report a plan obtained from the permit holder, who must mark thereon the location of all wells drilled in respect of this permit.

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 135 of the *Natural Resources Management Act 2004*

WELL PERMIT

10. 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 Third 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.
11. All wells must be drilled vertical unless written permission is obtained from the Minister.
12. All groundwater extracted during sampling and/or purging must be contained and disposed of in an appropriate manner to minimise risk to health and the environment.
13. A lithological log is to be submitted with the drillers well construction report from all wells drilled in respect of this permit in accordance with National Environmental Protection (assessment of Site Contamination) measure 1999.
14. Wells are to be backfilled when no longer required for ongoing monitoring and investigation purposes.
15. The well is to be completed only in either the Quaternary aquifer Q1 or the Quaternary aquifer Q2. If completed in the Quaternary aquifer Q2 the aquifer above is to be cased off and pressure cemented.
16. Where a well passes or will pass through two or more aquifers, an impervious seal shall be made and maintained between the aquifers to prevent leakage between the aquifers.
17. A well shall only be drilled where it will not cause, or will not be likely to cause, salt mobilisation or a rising water table.
18. Due to known nearby soil/groundwater contamination in the sediments and aquifers above, caution should be taken in the drilling and cementing of this well(s).
19. This permit authorises the construction of a well on the portion of road adjacent to the land parcel described above.

NOTES:

1. It is recommended that all drilling equipment be decontaminated prior to construction of a new well or rehabilitation of an existing well to prevent the introduction or transfer of iron bacteria. Similar precautions should also be taken with pump installation equipment.
2. Under section 202(1)(b)(ii) of the Natural Resources Management Act 2004, you have a right of appeal to the Environment, Resources and Development Court against the imposition of any condition on this permit. The appeal must be instituted within six weeks of the date of permit issue. The appeal must also be served upon this department within that time.
3. This permit is not transferable.
4. This well construction permit is not an authorisation for a person to enter private property and prior authority must be obtained from the land owner in all circumstances.
5. The issue of this permit does not negate the requirement to comply with the provisions of other Acts that may impact on the activity undertaken pursuant to this permit.
6. This permit is not an approval to clear native vegetation.

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 135 of the *Natural Resources Management Act 2004*

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.
10. To minimise the risk of contamination, the well should be sited as far as practicable, preferably further than 50 metres from any septic or waste disposal area.

TAKE NOTE that the permit holder, or a person acting on behalf of the permit holder, who contravenes or fails to comply with a condition of this permit is guilty of an offence, and such acts or ommisions may result in the variation, suspension or revocation of the permit.

SMKnight

Date: 11/01/2019

Sonya Knight
Water Licensing Officer
Delegate of Minister for Environment and Water

GOVERNMENT OF SOUTH AUSTRALIA

DEPARTMENT FOR ENVIRONMENT AND WATER

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

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 135 of the *Natural Resources Management Act 2004*

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:	339000
Expiry Date:	11/01/2020

Permission is hereby granted to:

GHD PTY LTD
LEVEL 4, 211 VICTORIA SQUARE
ADELAIDE SA 5000
ACN 008 488 373

To undertake the following water affecting activity:

Activity: Well Construction

Well Use: Investigation

CONDITIONS:

1. The activity authorised by this permit must only be undertaken on the land described below:

   CT 5587/407
   Allotment 409 in Deposited Plan 7819
   Hundred of Yatala

2. Well Construction must be in accordance with the General Specification for Well Construction, Modification and Abandonment in South Australia (or any subsequent or related policy), as provided by the relevant authority
3. If the well is considered unsatisfactory, it may be abandoned and a replacement well may then be constructed provided that the abandoned well is backfilled prior to the drill rig leaving the site.
4. 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.
5. Water samples are required from all wells drilled in respect of this permit.
6. 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.
7. Strata samples are not required.
8. This work may be subject to inspection by the Department's Drilling Inspectors.
9. The licensed well driller must forward with his report a plan obtained from the permit holder, who must mark thereon the location of all wells drilled in respect of this permit.

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 135 of the *Natural Resources Management Act 2004*

WELL PERMIT

10. 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 Third 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.
11. All wells must be drilled vertical unless written permission is obtained from the Minister.
12. All groundwater extracted during sampling and/or purging must be contained and disposed of in an appropriate manner to minimise risk to health and the environment.
13. A lithological log is to be submitted with the drillers well construction report from all wells drilled in respect of this permit in accordance with National Environmental Protection (assessment of Site Contamination) measure 1999.
14. Wells are to be backfilled when no longer required for ongoing monitoring and investigation purposes.
15. The well is to be completed only in either the Quaternary aquifer Q1 or the Quaternary aquifer Q2. If completed in the Quaternary aquifer Q2 the aquifer above is to be cased off and pressure cemented.
16. Where a well passes or will pass through two or more aquifers, an impervious seal shall be made and maintained between the aquifers to prevent leakage between the aquifers.
17. A well shall only be drilled where it will not cause, or will not be likely to cause, salt mobilisation or a rising water table.
18. Due to known nearby soil/groundwater contamination in the sediments and aquifers above, caution should be taken in the drilling and cementing of this well(s).
19. This permit authorises the construction of a well on the portion of road adjacent to the land parcel described above.

NOTES:

1. It is recommended that all drilling equipment be decontaminated prior to construction of a new well or rehabilitation of an existing well to prevent the introduction or transfer of iron bacteria. Similar precautions should also be taken with pump installation equipment.
2. Under section 202(1)(b)(ii) of the Natural Resources Management Act 2004, you have a right of appeal to the Environment, Resources and Development Court against the imposition of any condition on this permit. The appeal must be instituted within six weeks of the date of permit issue. The appeal must also be served upon this department within that time.
3. This permit is not transferable.
4. This well construction permit is not an authorisation for a person to enter private property and prior authority must be obtained from the land owner in all circumstances.
5. The issue of this permit does not negate the requirement to comply with the provisions of other Acts that may impact on the activity undertaken pursuant to this permit.
6. This permit is not an approval to clear native vegetation.

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 135 of the *Natural Resources Management Act 2004*

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.
10. To minimise the risk of contamination, the well should be sited as far as practicable, preferably further than 50 metres from any septic or waste disposal area.

TAKE NOTE that the permit holder, or a person acting on behalf of the permit holder, who contravenes or fails to comply with a condition of this permit is guilty of an offence, and such acts or ommisions may result in the variation, suspension or revocation of the permit.

smKnight

Date: 11/01/2019

Sonya Knight
Water Licensing Officer
Delegate of Minister for Environment and Water

GOVERNMENT OF SOUTH AUSTRALIA

DEPARTMENT FOR ENVIRONMENT AND WATER

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

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 135 of the *Natural Resources Management Act 2004*

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:	339012
Expiry Date:	11/01/2020

Permission is hereby granted to:
GHD PTY LTD
LEVEL 4, 211 VICTORIA SQUARE
ADELAIDE SA 5000
ACN 008 488 373

To undertake the following water affecting activity:

Activity: Well Construction

Well Use: Investigation

CONDITIONS:

1. The activity authorised by this permit must only be undertaken on the land described below:
   CT 6156/211
   Allotment 15 in Filed Plan 114106
   Hundred of Yatala
2. Well Construction must be in accordance with the General Specification for Well Construction, Modification and Abandonment in South Australia (or any subsequent or related policy), as provided by the relevant authority
3. If the well is considered unsatisfactory, it may be abandoned and a replacement well may then be constructed provided that the abandoned well is backfilled prior to the drill rig leaving the site.
4. 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.
5. Water samples are required from all wells drilled in respect of this permit.
6. 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.
7. Strata samples are not required.
8. This work may be subject to inspection by the Department's Drilling Inspectors.
9. The licensed well driller must forward with his report a plan obtained from the permit holder, who must mark thereon the location of all wells drilled in respect of this permit.

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 135 of the *Natural Resources Management Act 2004*

WELL PERMIT

10. 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 Third 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.
11. All wells must be drilled vertical unless written permission is obtained from the Minister.
12. All groundwater extracted during sampling and/or purging must be contained and disposed of in an appropriate manner to minimise risk to health and the environment.
13. A lithological log is to be submitted with the drillers well construction report from all wells drilled in respect of this permit in accordance with National Environmental Protection (assessment of Site Contamination) measure 1999.
14. Wells are to be backfilled when no longer required for ongoing monitoring and investigation purposes.
15. The well is to be completed only in either the Quaternary aquifer Q1 or the Quaternary aquifer Q2. If completed in the Quaternary aquifer Q2 the aquifer above is to be cased off and pressure cemented.
16. Where a well passes or will pass through two or more aquifers, an impervious seal shall be made and maintained between the aquifers to prevent leakage between the aquifers.
17. A well shall only be drilled where it will not cause, or will not be likely to cause, salt mobilisation or a rising water table.
18. Due to known soil/groundwater contamination in the sediments and aquifers above, caution should be taken in the drilling and cementing of this well.

NOTES:

1. It is recommended that all drilling equipment be decontaminated prior to construction of a new well or rehabilitation of an existing well to prevent the introduction or transfer of iron bacteria. Similar precautions should also be taken with pump installation equipment.
2. Under section 202(1)(b)(ii) of the Natural Resources Management Act 2004, you have a right of appeal to the Environment, Resources and Development Court against the imposition of any condition on this permit. The appeal must be instituted within six weeks of the date of permit issue. The appeal must also be served upon this department within that time.
3. This permit is not transferable.
4. This well construction permit is not an authorisation for a person to enter private property and prior authority must be obtained from the land owner in all circumstances.
5. The issue of this permit does not negate the requirement to comply with the provisions of other Acts that may impact on the activity undertaken pursuant to this permit.
6. This permit is not an approval to clear native vegetation.
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.

PERMIT to undertake a WATER AFFECTING ACTIVITY

pursuant to section 135 of the *Natural Resources Management Act 2004*

WELL PERMIT

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.
10. To minimise the risk of contamination, the well should be sited as far as practicable, preferably further than 50 metres from any septic or waste disposal area.

TAKE NOTE that the permit holder, or a person acting on behalf of the permit holder, who contravenes or fails to comply with a condition of this permit is guilty of an offence, and such acts or ommisions may result in the variation, suspension or revocation of the permit.

SmKnight

Date: 11/01/2019

Sonya Knight
Water Licensing Officer
Delegate of Minister for Environment and Water

Appendix E – Borehole Logs

GEO_BOREHOLE 3319051_PARAFIELD AIRPORT 29-30.1.2019.GPJ GHD_GEO_TEMPLATE.GDT 3/4/19

BOREHOLE LOG SHEET

Client : Airservices
Project : Parafield Aiport GW Survey and Investigation
Location : Parafield Airport, SA

HOLE No. HA01

SHEET 1 OF 1

Position : MGA94 54/2 **Surface RL:** **Angle from Horiz. :** 90° **Processed :** RW
Rig Type : **Mounting:** **Contractor :** **Driller :** SW **Checked :** JH
Date Started : 14/2/2019 **Date Completed :** 14/2/2019 **Logged by :** JC **Date:**

Note: * indicates signatures on original issue of log or last revision of log

DRILLING					MATERIAL						
SCALE (m)	Drilling Method	Hole Support \ Casing	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	**Description** SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength	Moisture Condition	Consistency / Density Index	**Comments/ Observations**
	Hand Auger	Nil	NE		0.10	▨	CL	Silty CLAY; low plasticity, pale brown	D	VS	
					0.20	▨	CL	As above but medium plasticity	D	VS	
								End of borehole at 0.2 metres. Target Depth			

See standard sheets for details of abbreviations & basis of descriptions

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CONSULTING GEOTECHNICAL ENGINEERS AND GEOLOGISTS

Job No.
3319051

BOREHOLE LOG SHEET

Client : Airservices
Project : Parafield Airport GW Survey and Investigation
Location : , SA

HOLE No. P34

SHEET 1 OF 1

Position : MGA94 54/2	**Surface RL:**	**Angle from Horiz. :** 90°		**Processed :** RW
Rig Type : Geoprobe	**Mounting:** Land Rover	**Contractor :** Geochemtech	**Driller :**	**Checked :** JH
Date Started : 29/11/2018	**Date Completed :** 29/11/2018		**Logged by :** JC	**Date:** 2/4/2019

Note: * indicates signatures on original issue of log or last revision of log

SCALE (m)	Drilling Method	Hole Support \ Casing	Water	Samples & Tests	Depth / (RL) metres	USC Symbol	Description: SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength	Moisture Condition	Consistency / Density Index	Comments/ Observations	BOREHOLE Components
	Hand Auger					SC	Clayey SAND; fine grained, poorly sorted, dark brown, medium plasticity clay, trace gravel, silt	D	S		Grout backfill
					0.40	SC	Clayey SAND; fine grained, well sorted, pale brown, medium plasticity clay	D	S		
					0.50	CL	CLAY; high plasticity, pale brown, mottled orange, trace fine sand	D	S		Bentonite
1					1.00	CL	as above, but no longer mottled	D	S		Sand Pack
2					2.00	CL	as above with trace gravel	D	F		
			GO								
3	Solid Flight Auger	Nil			3.00	CL	as above but slightly moist	SM	F		
4			GE	P34 (4 m)	4.00	CL	as above but wet	W	S		4 m slotted screen
5					5.00	SP	SAND; fine to medium grained, pale brown	W	VS		
6					6.00		End of borehole at 6 metres. Target Depth				
7											

See standard sheets for details of abbreviations & basis of descriptions

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Job No. **3319051**

BOREHOLE LOG SHEET

Client : Airservices
Project : Parafield Airport GW Survey and Investigation
Location : , SA

HOLE No. P35

SHEET 1 OF 1

Position : MGA94 54/2
Surface RL:
Angle from Horiz. : 90°
Processed : RW
Rig Type : Geoprobe
Mounting: Land Rover
Contractor : Geochemtech
Driller :
Checked : JH
Date Started : 29/11/2018
Date Completed : 29/11/2018
Logged by : JC
Date: 2/4/2019

Note: * indicates signatures on original issue of log or last revision of log

Drilling Method	Hole Support \ Casing	Water	Samples & Tests	Depth / (RL) metres	USC Symbol	Description	Moisture Condition	Consistency / Density Index	Comments/ Observations	BOREHOLE Components
Hand Auger	Nil				SC	Clayey SAND; fine grained, poorly sorted, pale brown, no plasticity silt, trace organics	D	S		Grout backfill
				0.20	CL	CLAY; medium plasticity, pale brown, trace gravel, cobbles	D	S		
Solid Flight Auger				0.50	CL	as above but stiff	D	St		Bentonite
				1.00	CL	as above but firm, trace gravel, organics	D	F		
				1.20	CI	CLAY; high plasticity, dark brown	D	F		
				1.50	CL	CLAY; high plasticity, pale brown, fine grained sand, trace gravel/, cobbles	D	S		
				2.00	CL	CLAY; high plasticity, reddish brown	M	St		Sand Pack
				3.00	CL	CLAY; high plasticity, pale brown,	M	St		
		GE	P35 (4 m)	4.00	CL	CLAY; high plasticity, pale brown, reddish brown, mottled grey	W	St		
		GO		5.00	CI	as above but meduim plasticity, trace gravel	W	F		4 m slotted screen
				6.00	CI	as above but mottled grey/orange	W	F		
				7.00		End of borehole at 7 metres. Target Depth				

See standard sheets for details of abbreviations & basis of descriptions

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CONSULTING GEOTECHNICAL ENGINEERS AND GEOLOGISTS

Job No.
3319051

BOREHOLE LOG SHEET

Client : Airservices
Project : Parafield Airport GW Survey and Investigation
Location : , SA

HOLE No. P36

SHEET 1 OF 1

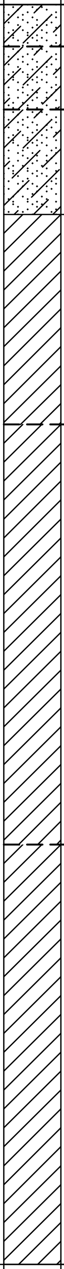
Position : MGA94 54/2
Surface RL:
Angle from Horiz. : 90°
Processed : RW
Rig Type : Geoprobe
Mounting: Land Rover
Contractor : Geochemtech
Driller :
Checked : JH
Date Started : 28/11/2018
Date Completed : 29/11/2018
Logged by : JC
Date: 2/4/2019

Note: * indicates signatures on original issue of log or last revision of log

DRILLING

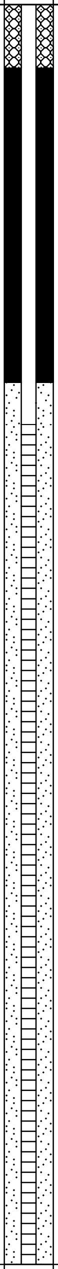
SCALE (m)	Drilling Method	Hole Support \ Casing	Water	Samples & Tests
0 – 1.5	Hand Auger	Nil		
1.5 – 6	Solid Flight Auger		GO (approx. 3.2)	
6			GE	P36 (6 m)

MATERIAL



Depth / (RL) metres	USC Symbol	Description SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength	Moisture Condition	Consistency / Density Index	Comments/ Observations
	SC	Clayey SAND; fine grained, poorly sorted, medium brown, medium plasticity clay, trace silt, organics	D	S	
0.20	SC	as above with gravel, cobbles	D	S	
0.50	SC	as above but pale brown/orange	D	S	
1.00	CI	CLAY; high plasticity, pale brown/orange	D	S	
2.00	CI	as above with gravel, cobbles	D	VSt	
4.00	CI	as above but mottled grey	D	St	
6.00		End of borehole at 6 metres. Target Depth			

BOREHOLE



BOREHOLE Log	Components
	Grout backfill
	Bentonite
	Sand Pack
	4 m slotted screen

See standard sheets for details of abbreviations & basis of descriptions

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Job No.
3319051

BOREHOLE LOG SHEET

Client : Airservices
Project : Parafield Airport GW Survey and Investigation
Location : , SA

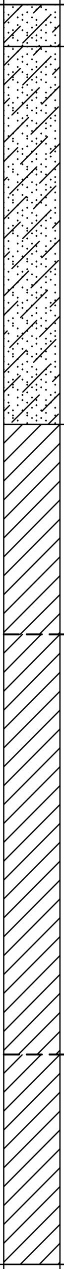
HOLE No. P37

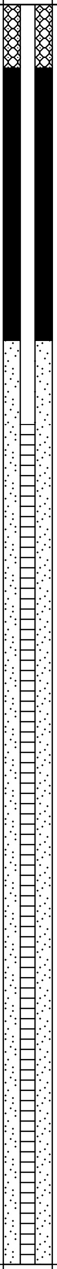
SHEET 1 OF 1

Position : MGA94 54/2	**Surface RL:**	**Angle from Horiz. :** 90°	**Processed :** RW
Rig Type : Geoprobe **Mounting:** Land Rover	**Contractor :** Geochemtech	**Driller :**	**Checked :** JH
Date Started : 28/11/2018	**Date Completed :** 29/11/2018	**Logged by :** JC	**Date:** 2/4/2019

Note: * indicates signatures on original issue of log or last revision of log

DRILLING				MATERIAL							BOREHOLE	
Drilling Method	**Hole Support \ Casing**	**Water**	**Samples & Tests**	**Depth / (RL) metres**	**Graphic Log**	**USC Symbol**	**Description** SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength	**Moisture Condition**	**Consistency / Density Index**	**Comments/ Observations**	**BOREHOLE Log**	**Components**
Hand Auger (0.0–1.5)	Nil					SC	Clayey SAND; fine grained, poorly sorted, dark brown, low plasticity clay, trace organics	D	VS			Grout backfill
				0.20		SC	Clayey SAND; fine grained, well sorted, pale brown, medium plasticity clay, trace gravel, cobbles	D	VS			Bentonite Sand Pack
Solid Flight Auger (1.5–6.0)				2.00		CL	CLAY; high plasticity, medium brown	SM	VSt			Slotted Screen
				3.00		CL	as above but mottled orange, trace stones	SM	VSt			
		GO										
		GE	P37 (5 m)	5.00		CL	as above but mottled grey	SM	VSt			
				6.00			End of borehole at 6 metres. Target Depth					





See standard sheets for details of abbreviations & basis of descriptions

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CONSULTING GEOTECHNICAL ENGINEERS AND GEOLOGISTS

Job No. 3319051

GEO_BOREHOLE 3319051_PARAFIELD AIRPORT 28-29.11.2018.GPJ GHD_GEO_TEMPLATE.GDT 2/4/19

BOREHOLE LOG SHEET

Client : Airservices
Project : Parafield Airport GW Survey and Investigation
Location : , SA

HOLE No. P38

SHEET 1 OF 1

Position : MGA94 54/2	**Surface RL:**	**Angle from Horiz. :** 90°		**Processed :** RW
Rig Type : Geoprobe	**Mounting:** Land Rover	**Contractor :** Geochemtech	**Driller :**	**Checked :** JH
Date Started : 28/11/2018	**Date Completed :** 29/11/2018	**Logged by :** JC		**Date:** 2/4/2019

Note: * indicates signatures on original issue of log or last revision of log

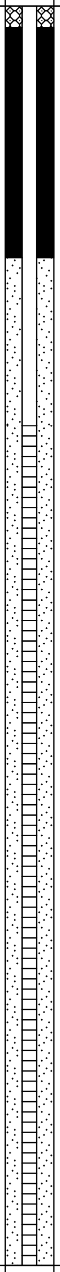
DRILLING

SCALE (m)	Drilling Method	Hole Support \ Casing	Water	Samples & Tests
0–1.5	Hand Auger	Nil		
1.5–6	Solid Flight Auger	Nil		
2.6			GO	
4			GE	P38 (4 m)

MATERIAL

Depth / (RL) metres	USC Symbol	Description SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength	Moisture Condition	Consistency / Density Index	Comments/ Observations
0.50	SC	Clayey SAND; medium grained, poorly sorted, yellow, orange, medium plasticity clay, trace gravel, organics	SM	S	
1.00	SC	Clayey SAND; medium grained, poorly sorted, dark brown, mottled orange, high plasticity clay	SM	St	
	CI	CLAY; high plasticity, pale brown, mottled orange	SM	F	
2.00	CI	CLAY; high plasticity, dark grey	SM	F	
3.00	CH	CLAY; high plasticity, pale brown	SM	S	
4.00	CI	as above but medium plasticity, trace gravel	SM	St	
6.00	CI	as above but soft	M	F	
		End of borehole at 6 metres. Target Depth			

BOREHOLE



BOREHOLE Log	Components
	Grout backfill
	Bentonite
	Sand Pack
	4 m slotted screen

See standard sheets for details of abbreviations & basis of descriptions

BOREHOLE LOG SHEET

Client : Airservices
Project : Parafield Airport GW Survey and Investigation
Location : , SA

HOLE No. P39

SHEET 1 OF 1

Position : MGA94 54/2
Surface RL:
Angle from Horiz. : 90°
Processed : RW
Rig Type : Geoprobe
Mounting: Land Rover
Contractor : Geochemtech
Driller :
Checked : JH
Date Started : 28/11/2018
Date Completed : 29/11/2018
Logged by : JC
Date: 2/4/2019

Note: * indicates signatures on original issue of log or last revision of log

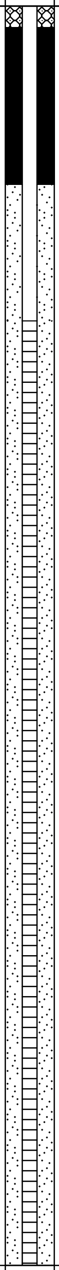
DRILLING

SCALE (m)	Drilling Method	Hole Support \ Casing	Water	Samples & Tests
0–1.5	Hand Auger			
1.5–6	Solid Flight Auger	Nil	GO (approx. 1.8); GE (3)	P39 (3m)

MATERIAL

Depth / (RL) metres	USC Symbol	Description: SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength	Moisture Condition	Consistency / Density Index	Comments/ Observations
0.00	CL	CLAY, medium plasticity, mottled dark brown/orange, trace gravel	SM	F	
0.20	CI	CLAY, meudim plasticity, medium grey, mottled orange	D	VSt	
0.50	CI	CLAY, high plasticity, brown/orange	SM	F	
1.00	CH	as above but meduim plasticity	SM	F	
2.00	CI	as above but high plasticity	D	H	
3.00	CI	CLAY, high plasticity, dark brown	M	VSt	
5.00	CH	CLAY, medium to high plasticity, pale/medium brown	W	VSt	
6.00		End of borehole at 6 metres. Target Depth			

BOREHOLE



BOREHOLE Log	Components
0–0.1	Grout backfill
0.1–0.85	Bentonite
0.85–6.0	Sand Pack
1.5–6.0	4.5 m slotted screen

See standard sheets for details of abbreviations & basis of descriptions

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GEO_BOREHOLE 3319051_PARAFIELD AIRPORT 29-30.1.2019.GPJ GHD_GEO_TEMPLATE.GDT 2/4/19

BOREHOLE LOG SHEET

Client : Airservices
Project : Parafield Aiport GW Survey and Investigation
Location : Parafield Airport, SA

HOLE No. P40

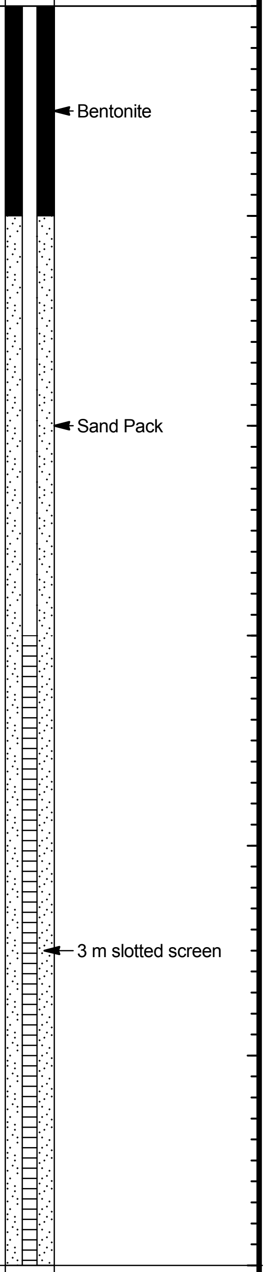
SHEET 1 OF 1

Position : MGA94 54/2 **Surface RL:** - **Angle from Horiz. :** 90° **Processed :** RW
Rig Type : **Mounting:** Land Rover **Contractor :** WB Drilling **Driller :** DW **Checked :**
Date Started : 29/1/2019 **Date Completed :** 29/1/2019 **Logged by :** JC **Date:**

Note: * indicates signatures on original issue of log or last revision of log

SCALE (m)	Drilling Method	Hole Support \ Casing	Water	Samples & Tests	Depth / (RL) metres	USC Symbol	Description SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength	Moisture Condition	Consistency / Density Index	Comments/ Observations
	Hand Auger					GM	Silty GRAVEL; fine grained, poorly sorted, pale brown, no plasticity silt, trace organics	D	L	
					0.20	CL	CLAY; high plasticity, dark brown	D	H	
	Solid Flight Auger	Nil			0.50	CL	CLAY; medium plasticity, black	D	H	
1					1.00	CL	CLAY; high plasticity, pale brown, trace gravel	D	H	
2					2.00	SC	Clayey SAND; fine grained, pale brown, mottled light grey, meduim plasticity clay	D	H	
					2.50	SC	as above but mottled orange	D	H	
3			∇ GE	P40 (3.3m)	3.00	CL	CLAY; high plasticity, pale brown, mottled orange	D	VSt	
4					4.00	CL	as above but medium plasicity, mottled orange/grey	M	H	
5					5.00	CL	as above but high plasicity	M	S	
6					6.00		End of borehole at 6 metres. Target Depth			
7										

BOREHOLE



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Job No.
3319051

BOREHOLE LOG SHEET

Client : Airservices
Project : Parafield Aiport GW Survey and Investigation
Location : Parafield Airport, SA

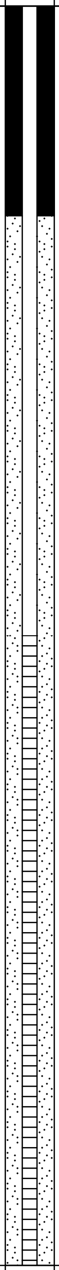
HOLE No. P41

SHEET 1 OF 1

Position :	MGA94 54/2	**Surface RL:**		**Angle from Horiz. :** 90°	**Processed :** RW
Rig Type :	**Mounting:** Land Rover	**Contractor :** WB Drilling		**Driller :** SW	**Checked :**
Date Started : 29/1/2019		**Date Completed :** 29/1/2019		**Logged by :** JC	**Date:**

Note: * indicates signatures on original issue of log or last revision of log

DRILLING					MATERIAL							BOREHOLE	
SCALE (m)	Drilling Method	Hole Support \ Casing	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	**Description** SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength	Moisture Condition	Consistency / Density Index	**Comments/ Observations**	BOREHOLE Log	**Components**
	Hand Auger				0.20		GM	Silty GRAVEL; fine grained, well sorted, pale brown, no plasticity silt, trace organics	D	Fr			
							CL	Silty CLAY; high plasticity, pale brown, mottled orange, trace gravel	D	Fr			Bentonite
1	Solid Flight Auger												
2					2.00		CI	CLAY; high plasticity, medium brown, mottled orange/grey	D	St			Sand Pack
3		Nil											
			▽ GE◀	P41 (3.5)	3.50		CI	as above but moist	M	St			
4													3m slotted screen
5													
6					6.00			End of borehole at 6 metres. Target Depth					
7													



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BOREHOLE LOG SHEET

Client : Airservices
Project : Parafield Aiport GW Survey and Investigation
Location : Parafield Airport, SA

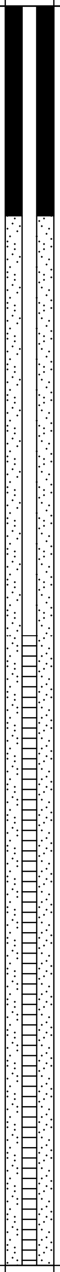
HOLE No. P42

SHEET 1 OF 1

Position : MGA94 54/2	**Surface RL:**	**Angle from Horiz. :** 90°	**Processed :** RW
Rig Type : **Mounting:** Land Rover	**Contractor :** WB Drilling	**Driller :** SW	**Checked :**
Date Started : 29/1/2019	**Date Completed :** 29/1/2019	**Logged by :** JC	**Date:**

Note: * indicates signatures on original issue of log or last revision of log

DRILLING					MATERIAL							BOREHOLE	
SCALE (m)	Drilling Method	Hole Support \ Casing	Water	Samples & Tests	Depth / (RL) metres	Graphic Log	USC Symbol	**Description** SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength	Moisture Condition	Consistency / Density Index	**Comments/ Observations**	BOREHOLE Log	**Components**
	Hand Auger				0.20		MH	SILT; low plasticity, dark brown, trace organics	D	H			
					0.30		CI	CLAY; medium plasticity, pale brown	D	S			
					0.50		CI		D	H			Bentonite
							CH	as above but high plasticity, hard, trace gravel as above but medium plasticity	D	H			
1					1.00		CI	as above but high plasticity, mottled orange	D	H			
2													Sand Pack
3	Solid Flight Auger	Nil											
			▽ GE	P42 (3.5m)									
4													3 m slotted screen
5													
6					6.00			End of borehole at 6 metres. Target Depth					
7													



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BOREHOLE LOG SHEET

Client : Airservices
Project : Parafield Aiport GW Survey and Investigation
Location : Parafield Airport, SA

HOLE No. P43

SHEET 1 OF 1

Position : MGA94 54/2 **Surface RL:** **Angle from Horiz. :** 90° **Processed :** RW
Rig Type : **Mounting:** Land Rover **Contractor :** WB Drilling **Driller :** SW **Checked :**
Date Started : 30/1/2019 **Date Completed :** 30/1/2019 **Logged by :** JC **Date:**

Note: * indicates signatures on original issue of log or last revision of log

DRILLING				MATERIAL						BOREHOLE
Drilling Method	Hole Support \ Casing	Water	Samples & Tests	Depth / (RL) metres	USC Symbol	Description SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength	Moisture Condition	Consistency / Density Index	Comments/ Observations	Components
Solid Flight Auger (0–6 m)	Nil				MH	SILT, low plasticity, pale/meduim brown, fine grained gravel, trace organics	D			Bentonite
				0.20	GP-GM	Gravely SILT; fine grained, pale brown	D	H		
				0.50	GC	clayey GRAVEL, fine grained, pale brown	D	H		
				1.30	CL	CLAY, high plasticity, pale brown	D			Sand Pack
				2.00	CL	becomes moist	M			
		GE	P43 (3.5 m)	3.00	CL-CI	becomes medium plasticity, firm	M	F		3 m slotted screen
				4.00	CL	becomes high plasticity, mottled orange, trace rocks	M	St		
				6.00		End of borehole at 6 metres. Target Depth				

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3319051

GEO_BOREHOLE 3319051_PARAFIELD AIRPORT 29-30.1.2019.GPJ GHD_GEO_TEMPLATE.GDT 2/4/19

BOREHOLE LOG SHEET

Client : Airservices
Project : Parafield Aiport GW Survey and Investigation
Location : Parafield Airport, SA

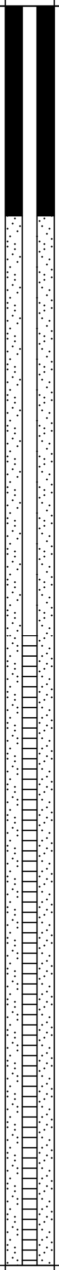
HOLE No. P44

SHEET 1 OF 1

Position : MGA94 54/2
Surface RL:
Angle from Horiz. : 90°
Processed : RW
Rig Type :
Mounting: Land Rover
Contractor : WB Drilling
Driller : SW
Checked :
Date Started : 30/1/2019
Date Completed : 30/1/2019
Logged by : JC
Date:

Note: * indicates signatures on original issue of log or last revision of log

DRILLING				MATERIAL						BOREHOLE
Drilling Method	Hole Support \ Casing	Water	Samples & Tests	Depth / (RL) metres	USC Symbol	Description SOIL TYPE, colour, structure, minor components (origin), and ROCK TYPE, colour, grain size, structure, weathering, strength	Moisture Condition	Consistency / Density Index	Comments/ Observations	Components
Hand Auger					MH	SILT, low plasticity, pale brown, trace gravel	D	S		
				0.20	CL	CLAY, meduim plasticity, red	D	S		
Solid Flight Auger				0.50	CL	CLAY, high plasticity, pale brown, red, grey, trace gravel, calcrete	D	St		Bentonite
				1.00	CL	becomes mottled dark brown, grey	D	St		
				2.00	CL	becomes mottled orange	D	St		Sand Pack
	Nil			3.00	CL	becomes very stiff	D	VSt		
		GE	P44 (3.4 m)							
				4.00	CL	becomes stiff	D	St		
		▽								3 m slotted screen
				6.00		End of borehole at 6 metres. Target Depth				



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Job No.
3319051

Appendix F – Calibration Certificates

Solinst Model 122 Interface Meter

Instrument	**Interface Meter (30M)**
Serial No.	**312512**

airmet

Air-Met Scientific Pty Ltd
1300 137 067

Item	Test	Pass	Comments
Battery	Compartment	✓	
	Capacity	✓	8.8V
Probe	Cleaned/Decon.	✓	
	Operation	✓	
Connectors	Condition	✓	
		✓	
Tape Check	Cleaned	✓	
Connectors	Checked for cuts	✓	
Instrument Test	At surface level	✓	

Certificate of Calibration

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

Calibrated by: James Draper

Calibration date: 9/11/2018

Next calibration due: 8/01/2019

Multi Parameter Water Meter

airmet
Air-Met Scientific Pty Ltd
1300 137 067

Instrument YSI Quatro Pro Plus
Serial No. 18D102941

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

Certificate of Calibration

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

Sensor	Serial no	Standard Solutions	Certified	Solution Bottle Number	Instrument Reading
1. D.O		0 ppm		5656	0 ppm
2. Conductivity		2760uS		312321	2760
3. pH7		pH 7.00		307928	pH 7.01
4. pH4		pH 4.00		307927	pH 4.00
5. ORP mV		231mV		314446/312984	229 mV
7. Temp °C		21.1		Multimeter	22

Calibrated by: Wilma Fouché

Calibration date: 14-Nov-18

Next calibration due: 13-May-19

Solinst Model 122 Interface Meter

airmet
Air-Met Scientific Pty Ltd
1300 137 067

Instrument Interface Meter (30M)
Serial No. 312523

Item	Test	Pass	Comments
Battery	Compartment	✓	
	Capacity	✓	8.7V
Probe	Cleaned/Decon.	✓	
	Operation	✓	
Connectors	Condition	✓	
		✓	
Tape Check	Cleaned	✓	
Connectors	Checked for cuts	✓	
Instrument Test	At surface level	✓	

Certificate of Calibration

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

Calibrated by: Giovanni Pambuan

Calibration date: 5/12/2018

Next calibration due: 3/02/2019

Multi Parameter Water Meter

airmet
Air-Met Scientific Pty Ltd
1300 137 067

Instrument YSI Quatro Pro Plus
Serial No. 18J104342

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

Certificate of Calibration

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

Sensor	Serial no	Standard Solutions	Certified	Solution Bottle Number	Instrument Reading
1. D.O		0 ppm		5656	0 ppm
2. Conductivity		2760uS		312321	2760
3. pH7		pH 7.00		307928	pH 7.01
4. pH4		pH 4.00		307927	pH 4.00
5. ORP mV		231mV		314446/312984	227.5mV
7. Temp °C		21.1		Multimeter	23

Calibrated by: Wilma Fouché

Calibration date: 5-Dec-18

Next calibration due: 3-Jun-19

Solinst Model 122 Interface Meter

airmet
Air-Met Scientific Pty Ltd
1300 137 067

Instrument Interface Meter (30M)
Serial No. 312359

Item	Test	Pass	Comments
Battery	Compartment	✓	
	Capacity	✓	8.6V
Probe	Cleaned/Decon.	✓	
	Operation	✓	
Connectors	Condition	✓	
		✓	
Tape Check	Cleaned	✓	
Connectors	Checked for cuts	✓	
Instrument Test	At surface level	✓	

Certificate of Calibration

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

Calibrated by: James Draper

Calibration date: 7/03/2019

Next calibration due: 6/05/2019

Multi Parameter Water Meter

airmet
Air-Met Scientific Pty Ltd
1300 137 067

Instrument YSI Quatro Pro Plus
Serial No. 18J104323

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

Certificate of Calibration

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

Sensor	Serial no	Standard Solutions	Certified	Solution Bottle Number	Instrument Reading
1. D.O		0 ppm		5656	0 ppm
2. Conductivity		2760uS		324347	2760
3. pH7		pH 7.00		320613	pH 7.01
4. pH4		pH 4.00		324985	pH 4.00
5. ORP mV		231mV		314446/312984	227.2 mV
7. Temp °C		22.4		Multimeter	22.6

Calibrated by: James Draper

Calibration date: 7-Mar-19

Next calibration due: 3-Sep-19

Appendix G – Laboratory Reports and COCs

NMI CHAIN OF CUSTODY (SAMPLE SUBMISSION) FORM

ENVIRONMENTAL SAMPLES to be submitted to:

NMI: 105 Delhi Rd, North Ryde NSW 2113 Ph: 1300 722 845 email: customerservice@measurement.gov.au

SENT FROM:

Company Name: GHD PTY LTD

Address: LEVEL 4 , 211 Victoria Square Adelaide , SA 5000 GPO Box 2052 Adelaide, South Australia 5001

Contact: Dilara Valiff

Phone: 08 8111 6572

ABN: 39 008 488 373

Contact email: dilara.valiff@ghd.com

Additional email(s) for reports (if required):

Additional email(s) for invoice (if required):

Internal use only

NMI Quote Number: GHDxxA-TL1811N **Valid until:** October 31, 2019

LIMS Reference: QT-02018 0

TURN AROUND TIME REQUESTED (Working days):

24 hrs	48 hrs	3-4	5-7	10-15	other (please specify)
100%	**50%**	**25%**	Soil & Water	Biota + Serum	
not available					

***Fast TATs are not available for all tests and MUST be agreed to prior to sample submission**

If a PO number is required on your invoice, it must be provided at sample submission. PO's received after sample submisison will not appear on final invoice

Purchase order required: Y / N **PO Number:** 3319051

NMI LRN (NMI USE ONLY - please do not write in this column)	**SAMPLE REFERENCE (Sample ID / Description / Number)**	**DATE & TIME SAMPLED**	**SAMPLE MATRIX (water / soil / biota)**	PFAS Low Level Suite	TDS	**Tests Required - please specify**	**COMMENTS**
	P9	15-11-18 11:00	Water	✓	✓		
	QA01	15-11-18 11:00	Water	✓	✓		
DO							
NOT							
FILL							
NMI							
USE							
ONLY							

Relinquished by:
Print Name: Vera Biermann
Date & Time: 15 / 11 / 18 13 : 00 hrs
Signature:

Received at NMI laboratory by:
Print Name:
Date & Time: / / : hrs
Signature:

PAGE No: 1 **of** 1 **PAGES**

If multiple pages, ensure ALL pages are stapled together

CHAIN OF CUSTODY RECORD

GHD

GHD Adelaide
211 Victoria Square, Adelaide SA 5000
Telephone. 618 8111 6600 Facsimile 618 8111 6699
Email adlmail@ghd.com.au

GHD Mt Gambier
2A Helen St, Mt Gambier SA 5290
Telephone 618 8721 0800 Facsimile 618 8721 0899

GHD Roxby Downs
1/14 Tutop St, Roxby Downs SA
Telephone 618 8671 4000 Facsimile 618 8671 4099

Turnaround Requirement.
☑ STANDARD
☐ NON-STANDARD ______

Job Number: 3319051
GHD Office: Adelaide
Project:
GHD Project Manager: Dilara Valiff
GHD Contact:
Email Reports to: dilara.valiff@ghd.com.
Quote:

Relinquished By:	Received By:	Relinquished By:	Received By:
Date/Time:	Date/Time:	Date/Time:	Date/Time:

SEND TO:

☐ **ALS Laboratories**
2-4 Westall Rd, SPRINGVALE, VIC 3171
Ph 03 8549 9600
Contact

☐ **MGT LabMark**
2-5 Kingston Town Close, OAKLEIGH VIC 3166
Ph 03 9564 7055
Contact

☐ **SGS**
16/33 Maddox St, ALEXANDRIA NSW 2015
Ph 02 8594 0400
Contact:

☐ **BUREAU VERTIAS AMDEL**
2/35 Cormack Rd, WINGFIELD SA 5013
Ph 08 8440 7100
Contact

Analyses Required

Sample I.D.	Date	Time	Sample Matrix S: Soil SL: Sludge W: Water A: Air	Container Type J: Jar, B: Bag, V: Vial, G: Glass bottle, P: Plastic bottle	PFAS (Full Suite)																	Remarks
P34	6/12/18	–	W	P.	✓																	
P35					✓																	
P36					✓																	
P37					✓																	
P38					✓																	
P39.					✓																	
P9.					✓																	
QA01					✓																	
QA02.					✓																	
RB01					✓																	

Remarks:

NMI CHAIN OF CUSTODY (SAMPLE SUBMISSION) FORM

ENVIRONMENTAL SAMPLES to be submitted to:

NMI: 105 Delhi Rd, North Ryde NSW 2113 Ph: 1300 722 845 email: customerservice@measurement.gov.au

SENT FROM:

Company Name:	GHD PTY LTD	
Address:	LEVEL 4 , 211 Victoria Square Adelaide , SA 5000	GPO Box 2052 Adelaide, South Australia 5001
Contact:	Dilara Valiff	**Additional email(s) for reports (if required):**
Phone:	08 8111 6572	
ABN:	39 008 488 373	Additional email(s) for invoice (if required):
Contact email:	dilara.valiff@ghd.com	

Internal use only

NMI Quote Number: GHDxxA-TL1811N **Valid until:** October 31, 2019

LIMS Reference: QT-02018 0

TURN AROUND TIME REQUESTED (Working days):

24 hrs	48 hrs	3-4	5-7	10-15	other (please specify)
100%	**50%**	**25%**	Soil & Water	Biota + Serum	
not available					

***Fast TATs are not available for all tests and MUST be agreed to prior to sample submission**

If a PO number is required on your invoice, it must be provided at sample submission. PO's received after sample submisison will not appear on final invoice

Purchase order required: Y / N **PO Number:**__________________

NMI LRN (NMI USE ONLY - please do not write in this column)	**SAMPLE REFERENCE (Sample ID / Description / Number)**	**DATE & TIME SAMPLED**	**SAMPLE MATRIX (water / soil / biota)**	PFAS (Full Suite)	**Tests Required - please specify**	**COMMENTS**
	P42	7/02/2019	water	✓		
	P43	7/02/2019	water	✓		
DO	P41	7/02/2019	water	✓		
NOT	P40	7/02/2019	water	✓		
FILL	P44	7/02/2019	water	✓		
NMI	RB01	7/02/2019	water	✓		
USE	QA01	7/02/2019	water	✓		
ONLY	QA02	7/02/2019	water	✓		

Relinquished by:

Print Name: Joel Chance

Date & Time: 12/02/2019 14 : 30 hrs

Signature:

Received at NMI laboratory by:

Print Name:

Date & Time: / / : hrs

Signature:

PAGE No: 1 of 1 **PAGES**

If multiple pages, ensure ALL pages are stapled together

NMI CHAIN OF CUSTODY (SAMPLE SUBMISSION) FORM

ENVIRONMENTAL SAMPLES to be submitted to:

NMI: 105 Delhi Rd, North Ryde NSW 2113 Ph: 1300 722 845 email: customerservice@measurement.gov.au

SENT FROM:

Company Name: GHD PTY LTD

Address: LEVEL 4 , 211 Victoria Square Adelaide , SA 5000 GPO Box 2052 Adelaide, South Australia 5001

Contact: Dilara Valiff

Phone: 08 8111 6572

ABN: 39 008 488 373

Contact email: dilara.valiff@ghd.com

Additional email(s) for reports (if required):

Additional email(s) for invoice (if required):

Internal use only

NMI Quote Number: GHDxxA-TL1811N Valid until: October 31, 019

LIMS Reference: QT-02018 0

TURN AROUND TIME REQUESTED (Working days):

24 hrs	48 hrs	3-4	5-7	10-15	other (please specify)
100%	50%	25%	Soil & Water	Biota + Serum	
not available					

*Fast TATs are not available for all tests and MUST be agreed to prior to sample submission

If a PO number is required on your invoice, it must be provided at sample submission. PO's received after sample submisison will not appear on final invoice Purchase order required: Y / N PO Number: 3319051

NMI LRN (NMI USE ONLY - please do not write in this column)	SAMPLE REFERENCE (Sample ID / Description / Number)	DATE & TIME SAMPLED	SAMPLE MATRIX (water / soil / biota)	PFAS (Full Suite)	Tests Required - please specify	OMMENTS
	RB01	14-3-19	Water	X		
	QA01	↓	↓	X		
	QA02			X		Forward to ALS.
	P9			X		
	P34			X		
	P35			X		
	P36			X		
	P40			X		
	P41			X		
	P42			X		
	P43			X		
	P44			X		

Relinquished by:
Print Name: Joel Chance
Date & Time: 14/3/19 : hrs
Signature:

Received at NMI laboratory by:
Print Name:
Date & Time: / / : hrs
Signature:

PAGE No: 1 of 2 PAGES

If multiple pages, ensure ALL pages are stapled together

Notes: please send ESDAT format

NMI CHAIN OF CUSTODY (SAMPLE SUBMISSION) FORM

ENVIRONMENTAL SAMPLES to be submitted to:

NMI: 105 Delhi Rd, North Ryde NSW 2113 Ph: 1300 722 845 email: customerservice@measurement.gov.au

SENT FROM:

Company Name: GHD PTY LTD

Address: LEVEL 4 , 211 Victoria Square Adelaide , SA 5000 GPO Box 2052 Adelaide, South Australia 5001

Contact: Dilara Valiff

Phone: 08 8111 6572

ABN: 39 008 488 373

Contact email: dilara.valiff@ghd.com

Additional email(s) for reports (if required):

Additional email(s) for invoice (if required):

Internal use only

NMI Quote Number: GHDxxA-TL1811N Valid until: October 31, 2019

LIMS Reference: QT-02018 0

TURN AROUND TIME REQUESTED (Working days):

24 hrs	48 hrs	3-4	5-7	10-15	other (please specify)
100%	50%	25%	Soil & Water	Biota + Serum	
not available					

*Fast TATs are not available for all tests and MUST be agreed to prior to sample submission

If a PO number is required on your invoice, it must be provided at sample submission. PO's received after sample submisison will not appear on final invoice Purchase order required: Y / N PO Number: 3319651

NMI LRN (NMI USE ONLY - please do not write in this column)	SAMPLE REFERENCE (Sample ID / Description / Number)	DATE & TIME SAMPLED	SAMPLE MATRIX (water / soil / biota)	PFAS (Full Suite)	PFAS (long Suite)	PFAS (long Suite) + Leachable	Tests Required - please specify	COMMENTS
	GWP1-PFC	14-3-19	Water	X				
	GWP2-PFC	↓	↓	X				
	GWP3-PFC	↓	↓	X				
	HA_0-0.1	↓	Soil		X	X		
	HA_0.1-0.2	↓	↓		X	X		

Relinquished by:

Print Name: Joel Chance

Date & Time: 14/3/19 hrs

Signature:

Received at NMI laboratory by:

Print Name:

Date & Time: / / hrs

Signature:

PAGE No: 2 of 2 PAGES

If multiple pages, ensure ALL pages are stapled together

CHAIN OF CUSTODY RECORD

GHD

GHD Adelaide
211 Victoria Square, Adelaide SA 5000
Telephone: 618 8111 6600 Facsimile: 618 8111 6699
Email: adlmail@ghd.com.au

GHD Mt Gambier
2A Helen St, Mt Gambier SA 5290
Telephone: 618 8721 0800 Facsimile: 618 8721 0899

GHD Roxby Downs
1/14 Tutop St, Roxby Downs SA
Telephone: 618 8671 4000 Facsimile: 618 8671 4099

Turnaround Requirement:
☒ STANDARD
☐ NON-STANDARD ______

Page ______ of ______

Job Number: 3315565
GHD Office: Adelaide
Project: Parafield Airport GW investigation
GHD Project Manager: Dilara Valiff
GHD Contact: Julian Howard
Email Reports to: dilara.valiff@ghd.com
Quote: as per email 07/05/19

Relinquished By:	Received By:	Relinquished By:	Received By:
Vera Biermann			
Date/Time: 14-05-2019 11 AM	Date/Time:	Date/Time:	Date/Time:

SEND TO:

☒ **ALS Laboratories**
2-4 Westall Rd, SPRINGVALE, VIC 3171
Ph: 03 8549 9600
Contact:

☐ **MGT LabMark**
2-5 Kingston Town Close, OAKLEIGH VIC 3166
Ph: 03 9564 7055
Contact:

☐ **SGS**
16/33 Maddox St, ALEXANDRIA NSW 2015
Ph: 02 8594 0400
Contact:

☐ **BUREAU VERTIAS AMDEL**
2/35 Cormack Rd, WINGFIELD SA 5013
Ph: 08 8440 7100
Contact:

Analyses Required

Sample I.D.	Date	Time	Sample Matrix S: Soil SL: Sludge W: Water A: Air	Container Type J: Jar; B: Bag; V: Vial; G: Glass bottle; P: Plastic bottle	PFAS Short suite	EP231	Remarks
RB01	13-5-19		W	P	X		
P34	13-5-19		W	P	X		
P35	13-5-19		W	P	X		
P36	13-5-19		W	P	X		
P37	13-5-19		W	P	X		
P40	13-5-19		W	P	X		
P41	13-5-19		W	P	X		
P42	13-5-19		W	P	X		
P43	13-5-19		W	P	X		
P44	13-5-19		W	P	X		
GWP1-PFC	13-5-19		W	P	X		
GWP2-PFC	13-5-19		W	P	X		
GWP3-PFC	13-5-19		W	P	X		
FD01	13-5-19		W	P	X		
FD02	13-5-19		W	P	X		
FD03	13-5-19		W	P	X		
SD01	13-5-19		W	P	X		Please forward to Envirolab for PFAS analysis
SD03	13-5-19		W	P	X		

Remarks: Please forward SD01 and SD03 to EnviroLab for PFAS analysis.

Australian Government

Department of Industry, Innovation and Science

National Measurement Institute

NATA

REPORT OF ANALYSIS

Report No. RN1215175

Client	: GHD PTY LTD LEVEL 4, 211 VICTORIA SQUARE ADELAIDE SA 5000	**Job No.**	: GHD15/181116
		Quote No.	: QT-02018
		Order No.	: 3319051
		Date Received	: 16-NOV-2018
Attention	: DILARA VALIFF	**Sampled By**	: CLIENT
Project Name	:		
Your Client Services Manager	:	**Phone**	: (02) 94490161

Lab Reg No.	Sample Ref	Sample Description
N18/032151	P9	WATER 15-11-18 11:00
N18/032152	QA01	WATER 15-11-18 11:00

Lab Reg No.		**N18/032151**	**N18/032152**			
Date Sampled		**15-NOV-2018**	**15-NOV-2018**			
Sample Reference	**Units**	**P9**	**QA01**			**Method**
Perfluoronated Compounds						
PFBA (375-22-4)	ug/L	<0.005	<0.005			NR70
PFPeA (2706-90-3)	ug/L	<0.002	<0.002			NR70
PFHxA (307-24-4)	ug/L	<0.001	<0.001			NR70
PFHpA (375-85-9)	ug/L	<0.001	<0.001			NR70
PFOA (335-67-1)	ug/L	<0.001	<0.001			NR70
PFNA (375-95-1)	ug/L	<0.001	<0.001			NR70
PFDA (335-76-2)	ug/L	<0.001	<0.001			NR70
PFUdA (2058-94-8)	ug/L	<0.001	<0.001			NR70
PFDoA (307-55-1)	ug/L	<0.001	<0.001			NR70
PFTrDA (72629-94-8)	ug/L	<0.002	<0.002			NR70
PFTeDA (376-06-7)	ug/L	<0.002	<0.002			NR70
PFHxDA (67905-19-5)	ug/L	<0.002	<0.002			NR70
PFODA (16517-11-6)	ug/L	<0.005	<0.005			NR70
FOUEA (70887-84-2)	ug/L	<0.001	<0.001			NR70
PFBS (375-73-5)	ug/L	0.0040	0.0049			NR70
PFPeS (2706-91-4)	ug/L	0.0016	0.0020			NR70
PFHxS (355-46-4)	ug/L	0.027	0.027			NR70
PFHpS (375-92-8)	ug/L	<0.001	<0.001			NR70
PFOS (1763-23-1)	ug/L	0.013	0.017			NR70
PFNS (68259-12-1)	ug/L	<0.001	<0.001			NR70
PFDS (335-77-3)	ug/L	<0.001	<0.001			NR70
PFOSA (754-91-6)	ug/L	<0.001	<0.001			NR70
N-MeFOSA (31506-32-8)	ug/L	<0.002	<0.002			NR70
N-EtFOSA (4151-50-2)	ug/L	<0.002	<0.002			NR70
N-MeFOSAA (2355-31-9)	ug/L	<0.002	<0.002			NR70
N-EtFOSAA(2991-50-6)	ug/L	<0.002	<0.002			NR70
N-MeFOSE (24448-09-7)	ug/L	<0.005	<0.005			NR70
N-EtFOSE (1691-99-2)	ug/L	<0.005	<0.005			NR70

REPORT OF ANALYSIS

Lab Reg No.		**N18/032151**	**N18/032152**			
Date Sampled		**15-NOV-2018**	**15-NOV-2018**			
Sample Reference	**Units**	**P9**	**QA01**			**Method**
Perfluoronated Compounds						
4:2 FTS (757124-72-4)	ug/L	<0.001	<0.001			NR70
6:2 FTS (27619-97-2)	ug/L	<0.001	<0.001			NR70
8:2 FTS (39108-34-4)	ug/L	<0.001	<0.001			NR70
10:2 FTS (120226-60-0)	ug/L	<0.001	<0.001			NR70
8:2 diPAP (678-41-1)	ug/L	<0.002	<0.002			NR70
PFBA (Surrogate Recovery)	%	99	103			NR70
PFPeA (Surrogate Recovery)	%	104	119			NR70
PFHxA (Surrogate Recovery)	%	94	98			NR70
PFHpA (Surrogate Recovery)	%	102	115			NR70
PFOA (Surrogate Recovery)	%	99	107			NR70
PFNA (Surrogate Recovery)	%	98	88			NR70
PFDA (Surrogate Recovery)	%	98	93			NR70
PFUdA (Surrogate Recovery)	%	101	93			NR70
PFDoA (Surrogate Recovery)	%	84	79			NR70
PFTeDA (Surrogate Recovery)	%	85	80			NR70
PFHxDA (Surrogate Recovery)	%	93	98			NR70
FOUEA (Surrogate Recovery)	%	97	102			NR70
PFBS (Surrogate Recovery)	%	96	98			NR70
PFHxS (Surrogate Recovery)	%	102	105			NR70
PFOS (Surrogate Recovery)	%	95	108			NR70
PFOSA (Surrogate Recovery)	%	76	62			NR70
N-MeFOSA (Surrogate Recovery)	%	50	64			NR70
N-EtFOSA (Surrogate Recovery)	%	48	65			NR70
N-MeFOSAA (Surrogate Recovery)	%	96	87			NR70
N-EtFOSAA (Surrogate Recovery)	%	72	85			NR70
N-MeFOSE (Surrogate Recovery)	%	65	66			NR70
N-EtFOSE (Surrogate Recovery)	%	49	52			NR70
4:2 FTS (Surrogate Recovery)	%	106	136			NR70
6:2 FTS (Surrogate Recovery)	%	152	230			NR70
8:2 FTS (Surrogate Recovery)	%	80	71			NR70
8:2 diPAP (Surrogate Recovery)	%	39	56			NR70
Dates						
Date extracted		26-NOV-2018	26-NOV-2018			
Date analysed		27-NOV-2018	27-NOV-2018			

N18/032151
to
N18/032152:

REPORT OF ANALYSIS

PFOS is quantified using a combined branched and linear standard,
linear and branched isomers are totalled for reporting.
All results corrected for labelled surrogate recoveries.
Selected PFAS surrogate recoveries are biased due to matrix effects.

Danny Slee, Section Manager
Organic - NSW
Accreditation No. 198

27-NOV-2018

Lab Reg No.		**N18/032151**	**N18/032152**			
Date Sampled		**15-NOV-2018**	**15-NOV-2018**			
Sample Reference	**Units**	**P9**	**QA01**			**Method**
Miscellaneous						
Dissolved Solids - Total	mg/L	2060	1940			NW_B10A

Wei Huang, Analyst
Inorganics - NSW
Accreditation No. 198

27-NOV-2018

NATA
ACCREDITED FOR
TECHNICAL
COMPETENCE

Accredited for compliance with ISO/IEC 17025 - Testing.
This report shall not be reproduced except in full.
Results relate only to the sample(s) tested.

REPORT OF ANALYSIS

This Report supersedes reports: *RN1215146* *RN1215173*

Measurement Uncertainty is available upon request.
Chemical Accreditation 198: 105 Delhi Road, North Ryde, NSW, 2113

Australian Government

National Measurement Institute

QUALITY ASSURANCE REPORT

Client: GHD PTY LTD

NMI QA Report No: GHD15/181116 **Sample Matrix:** liquid

Analyte	Method	LOR	Blank	Sample Duplicates			Recoveries	
				Sample	Duplicate	RPD	LCS	Matrix Spike
		ug/L	ug/L	ug/L	ug/L	%	%	%
PFBA (375-22-4)	NR70	0.005	<0.005	NA	NA	NA	106	NA
PFPeA (2706-90-3)	NR70	0.002	<0.002	NA	NA	NA	98	NA
PFHxA (307-24-4)	NR70	0.001	<0.001	NA	NA	NA	101	NA
PFHpA (375-85-9)	NR70	0.001	<0.001	NA	NA	NA	98	NA
PFOA (335-67-1)	NR70	0.001	<0.001	NA	NA	NA	107	NA
PFNA (375-95-1)	NR70	0.001	<0.001	NA	NA	NA	99	NA
PFDA (335-76-2)	NR70	0.001	<0.001	NA	NA	NA	91	NA
PFUdA (2058-94-8)	NR70	0.001	<0.001	NA	NA	NA	92	NA
PFDoA (307-55-1)	NR70	0.001	<0.001	NA	NA	NA	98	NA
PFTrDA (72629-94-8)	NR70	0.002	<0.002	NA	NA	NA	102	NA
PFTeDA (376-06-7)	NR70	0.002	<0.002	NA	NA	NA	103	NA
PFHxDA (67905-19-5)	NR70	0.002	<0.002	NA	NA	NA	100	NA
PFODA (16517-11-6)	NR70	0.005	<0.005	NA	NA	NA	96	NA
FOUEA (70887-84-2)	NR70	0.001	<0.001	NA	NA	NA	102	NA
PFBS (375-73-5)	NR70	0.001	<0.001	NA	NA	NA	94	NA
PFPeS (2706-91-4)	NR70	0.001	<0.001	NA	NA	NA	93	NA
PFHxS (355-46-4)	NR70	0.001	<0.001	NA	NA	NA	102	NA
PFHpS (375-92-8)	NR70	0.001	<0.001	NA	NA	NA	102	NA
PFOS (1763-23-1)	NR70	0.002	<0.002	NA	NA	NA	93	NA
PFNS (68259-12-1)	NR70	0.001	<0.001	NA	NA	NA	87	NA
PFDS (335-77-3)	NR70	0.001	<0.001	NA	NA	NA	82	NA
PFOSA (754-91-6)	NR70	0.001	<0.001	NA	NA	NA	101	NA
N-MeFOSA (31506-32-8)	NR70	0.002	<0.002	NA	NA	NA	100	NA
N-EtFOSA (4151-50-2)	NR70	0.002	<0.002	NA	NA	NA	95	NA
N-MeFOSAA (2355-31-9)	NR70	0.002	<0.002	NA	NA	NA	96	NA
N-EtFOSAA(2991-50-6)	NR70	0.002	<0.002	NA	NA	NA	104	NA
N-MeFOSE (24448-09-7)	NR70	0.005	<0.005	NA	NA	NA	103	NA
N-EtFOSE (1691-99-2)	NR70	0.005	<0.005	NA	NA	NA	107	NA
4:2 FTS (757124-72-4)	NR70	0.001	<0.001	NA	NA	NA	100	NA
6:2 FTS (27619-97-2)	NR70	0.001	<0.001	NA	NA	NA	102	NA
8:2 FTS (39108-34-4)	NR70	0.001	<0.001	NA	NA	NA	108	NA
10:2 FTS (120226-60-0)	NR70	0.001	<0.001	NA	NA	NA	100	NA
8:2 diPAP (678-41-1)	NR70	0.002	<0.002	NA	NA	NA	100	NA

Results expressed in percentage (%) or ug/L wherever appropriate.
Acceptable Spike recovery is 50-150%.
Maximum acceptable RPDs on spikes and duplicates is 40%.
'NA ' = Not Applicable.
RPD= Relative Percentage Difference.

Signed:

Danny Slee
Organics Manager, NMI-North Ryde

Date: **27/11/2018**

Australian Government
Department of Industry, Innovation and Science

National Measurement Institute

NATA

REPORT OF ANALYSIS

Report No. RN1217346

Client : GHD PTY LTD
LEVEL 4, 211 VICTORIA SQUARE
ADELAIDE SA 5000

Attention : DILARA VALIFF
Project Name :
Your Client Services Manager :

Job No. : GHD15/181210
Quote No. : QT-02018
Order No. :
Date Received : 10-DEC-2018
Sampled By : CLIENT
Phone : (02) 94490161

Lab Reg No.	Sample Ref	Sample Description
N18/035004	P34	WATER PARAFIELD AIRPORT GROUNDWATER INVESTIGATION PROJECT NUMBER 3319051
N18/035005	P35	WATER PARAFIELD AIRPORT GROUNDWATER INVESTIGATION PROJECT NUMBER 3319051
N18/035006	P36	WATER PARAFIELD AIRPORT GROUNDWATER INVESTIGATION PROJECT NUMBER 3319051
N18/035007	P37	WATER PARAFIELD AIRPORT GROUNDWATER INVESTIGATION PROJECT NUMBER 3319051

Lab Reg No.		**N18/035004**	**N18/035005**	**N18/035006**	**N18/035007**	
Date Sampled		**06-DEC-2018**	**06-DEC-2018**	**06-DEC-2018**	**06-DEC-2018**	
Sample Reference	**Units**	**P34**	**P35**	**P36**	**P37**	**Method**
Perfluoronated Compounds						
PFBA (375-22-4)	ug/L	<0.005	0.0075	0.017	<0.005	NR70
PFPeA (2706-90-3)	ug/L	0.0024	<0.002	0.019	<0.002	NR70
PFHxA (307-24-4)	ug/L	0.015	0.0028	0.021	0.0037	NR70
PFHpA (375-85-9)	ug/L	0.0014	0.0014	0.012	0.0025	NR70
PFOA (335-67-1)	ug/L	0.0023	0.0063	0.024	0.0028	NR70
PFNA (375-95-1)	ug/L	<0.001	<0.001	<0.001	<0.001	NR70
PFDA (335-76-2)	ug/L	<0.001	<0.001	<0.001	<0.001	NR70
PFUdA (2058-94-8)	ug/L	<0.001	<0.001	<0.001	<0.001	NR70
PFDoA (307-55-1)	ug/L	<0.001	<0.001	<0.001	<0.001	NR70
PFTrDA (72629-94-8)	ug/L	<0.002	<0.002	<0.002	<0.002	NR70
PFTeDA (376-06-7)	ug/L	<0.002	<0.002	<0.002	<0.002	NR70
PFHxDA (67905-19-5)	ug/L	<0.002	<0.002	<0.002	<0.002	NR70
PFODA (16517-11-6)	ug/L	<0.005	<0.005	<0.005	<0.005	NR70
FOUEA (70887-84-2)	ug/L	<0.001	<0.001	<0.001	<0.001	NR70
PFBS (375-73-5)	ug/L	0.014	0.0042	0.015	0.0052	NR70
PFPeS (2706-91-4)	ug/L	0.014	0.0030	0.0078	0.0043	NR70
PFHxS (355-46-4)	ug/L	0.12	0.027	0.085	0.037	NR70
PFHpS (375-92-8)	ug/L	0.0017	<0.001	0.0013	<0.001	NR70
PFOS (1763-23-1)	ug/L	0.030	0.037	0.055	0.043	NR70
PFNS (68259-12-1)	ug/L	<0.001	<0.001	<0.001	<0.001	NR70
PFDS (335-77-3)	ug/L	<0.001	<0.001	<0.001	<0.001	NR70
PFOSA (754-91-6)	ug/L	<0.001	<0.001	<0.001	<0.001	NR70

REPORT OF ANALYSIS

Lab Reg No.		**N18/035004**	**N18/035005**	**N18/035006**	**N18/035007**	
Date Sampled		**06-DEC-2018**	**06-DEC-2018**	**06-DEC-2018**	**06-DEC-2018**	
Sample Reference	**Units**	**P34**	**P35**	**P36**	**P37**	**Method**
Perfluoronated Compounds						
N-MeFOSA (31506-32-8)	ug/L	<0.002	<0.002	<0.002	<0.002	NR70
N-EtFOSA (4151-50-2)	ug/L	<0.002	<0.002	<0.002	<0.002	NR70
N-MeFOSAA (2355-31-9)	ug/L	<0.002	<0.002	<0.002	<0.002	NR70
N-EtFOSAA(2991-50-6)	ug/L	<0.002	<0.002	<0.002	<0.002	NR70
N-MeFOSE (24448-09-7)	ug/L	<0.005	<0.005	<0.005	<0.005	NR70
N-EtFOSE (1691-99-2)	ug/L	<0.005	<0.005	<0.005	<0.005	NR70
4:2 FTS (757124-72-4)	ug/L	<0.001	<0.001	<0.001	<0.001	NR70
6:2 FTS (27619-97-2)	ug/L	0.048	0.044	0.013	0.086	NR70
8:2 FTS (39108-34-4)	ug/L	<0.001	<0.001	<0.001	<0.001	NR70
10:2 FTS (120226-60-0)	ug/L	<0.001	<0.001	<0.001	<0.001	NR70
8:2 diPAP (678-41-1)	ug/L	<0.002	<0.002	<0.002	<0.002	NR70
PFBA (Surrogate Recovery)	%	93	101	95	98	NR70
PFPeA (Surrogate Recovery)	%	86	112	98	111	NR70
PFHxA (Surrogate Recovery)	%	94	98	105	84	NR70
PFHpA (Surrogate Recovery)	%	97	101	106	96	NR70
PFOA (Surrogate Recovery)	%	98	99	106	91	NR70
PFNA (Surrogate Recovery)	%	76	91	94	84	NR70
PFDA (Surrogate Recovery)	%	77	92	99	80	NR70
PFUdA (Surrogate Recovery)	%	61	76	77	70	NR70
PFDoA (Surrogate Recovery)	%	45	73	59	44	NR70
PFTeDA (Surrogate Recovery)	%	49	66	54	40	NR70
PFHxDA (Surrogate Recovery)	%	78	88	69	45	NR70
FOUEA (Surrogate Recovery)	%	83	89	96	81	NR70
PFBS (Surrogate Recovery)	%	108	105	118	100	NR70
PFHxS (Surrogate Recovery)	%	108	107	109	99	NR70
PFOS (Surrogate Recovery)	%	110	98	101	89	NR70
PFOSA (Surrogate Recovery)	%	62	71	73	57	NR70
N-MeFOSA (Surrogate Recovery)	%	54	60	58	36	NR70
N-EtFOSA (Surrogate Recovery)	%	43	59	54	38	NR70
N-MeFOSAA (Surrogate Recovery)	%	48	72	65	50	NR70
N-EtFOSAA (Surrogate Recovery)	%	44	78	58	40	NR70
N-MeFOSE (Surrogate Recovery)	%	63	55	66	52	NR70
N-EtFOSE (Surrogate Recovery)	%	50	59	54	41	NR70
4:2 FTS (Surrogate Recovery)	%	93	131	135	150	NR70
6:2 FTS (Surrogate Recovery)	%	89	89	88	88	NR70
8:2 FTS (Surrogate Recovery)	%	54	67	66	78	NR70
8:2 diPAP (Surrogate Recovery)	%	55	66	54	31	NR70
Dates						
Date extracted		13-DEC-2018	13-DEC-2018	13-DEC-2018	13-DEC-2018	
Date analysed		13-DEC-2018	13-DEC-2018	13-DEC-2018	13-DEC-2018	

REPORT OF ANALYSIS

N18/035004
to
N18/035012:
PFOS is quantified using a combined branched and linear standard,
linear and branched isomers are totalled for reporting.
All results corrected for labelled surrogate recoveries.
Selected PFAS surrogate recoveries are biased due to matrix effects.

Danny Slee, Section Manager
Organic - NSW
Accreditation No. 198

17-DEC-2018

REPORT OF ANALYSIS

Report No. RN1217346

Client	: GHD PTY LTD LEVEL 4, 211 VICTORIA SQUARE ADELAIDE SA 5000	**Job No.** **Quote No.** **Order No.** **Date Received**	: GHD15/181210 : QT-02018 : : 10-DEC-2018
Attention	: DILARA VALIFF	**Sampled By**	: CLIENT
Project Name	:		
Your Client Services Manager	:	**Phone**	: (02) 94490161

Lab Reg No.	**Sample Ref**	**Sample Description**
N18/035008	P38	WATER PARAFIELD AIRPORT GROUNDWATER INVESTIGATION PROJECT NUMBER 3319051
N18/035009	P39	WATER PARAFIELD AIRPORT GROUNDWATER INVESTIGATION PROJECT NUMBER 3319051
N18/035010	QA01	WATER PARAFIELD AIRPORT GROUNDWATER INVESTIGATION PROJECT NUMBER 3319051
N18/035011	QA02	WATER PARAFIELD AIRPORT GROUNDWATER INVESTIGATION PROJECT NUMBER 3319051

Lab Reg No.		**N18/035008**	**N18/035009**	**N18/035010**	**N18/035011**	
Date Sampled		**06-DEC-2018**	**06-DEC-2018**	**06-DEC-2018**	**06-DEC-2018**	
Sample Reference	**Units**	**P38**	**P39**	**QA01**	**QA02**	**Method**
Perfluoronated Compounds						
PFBA (375-22-4)	ug/L	0.013	0.010	0.0078	<0.005	NR70
PFPeA (2706-90-3)	ug/L	0.0023	0.021	<0.002	0.0025	NR70
PFHxA (307-24-4)	ug/L	0.0035	0.029	0.0029	0.014	NR70
PFHpA (375-85-9)	ug/L	0.0022	0.0066	0.0014	0.0011	NR70
PFOA (335-67-1)	ug/L	0.0041	0.0098	0.0057	0.0021	NR70
PFNA (375-95-1)	ug/L	<0.001	<0.001	<0.001	<0.001	NR70
PFDA (335-76-2)	ug/L	<0.001	<0.001	<0.001	<0.001	NR70
PFUdA (2058-94-8)	ug/L	<0.001	<0.001	<0.001	<0.001	NR70
PFDoA (307-55-1)	ug/L	<0.001	<0.001	<0.001	<0.001	NR70
PFTrDA (72629-94-8)	ug/L	<0.002	<0.002	<0.002	<0.002	NR70
PFTeDA (376-06-7)	ug/L	<0.002	<0.002	<0.002	<0.002	NR70
PFHxDA (67905-19-5)	ug/L	<0.002	<0.002	<0.002	<0.002	NR70
PFODA (16517-11-6)	ug/L	<0.005	<0.005	<0.005	<0.005	NR70
FOUEA (70887-84-2)	ug/L	<0.001	<0.001	<0.001	<0.001	NR70
PFBS (375-73-5)	ug/L	0.011	0.0048	0.0038	0.014	NR70
PFPeS (2706-91-4)	ug/L	0.0027	0.0015	0.0029	0.013	NR70
PFHxS (355-46-4)	ug/L	0.019	0.0094	0.026	0.12	NR70
PFHpS (375-92-8)	ug/L	<0.001	<0.001	<0.001	0.0016	NR70
PFOS (1763-23-1)	ug/L	0.013	0.0035	0.037	0.031	NR70
PFNS (68259-12-1)	ug/L	<0.001	<0.001	<0.001	<0.001	NR70
PFDS (335-77-3)	ug/L	<0.001	<0.001	<0.001	<0.001	NR70
PFOSA (754-91-6)	ug/L	<0.001	<0.001	<0.001	<0.001	NR70

REPORT OF ANALYSIS

Lab Reg No.		**N18/035008**	**N18/035009**	**N18/035010**	**N18/035011**	
Date Sampled		**06-DEC-2018**	**06-DEC-2018**	**06-DEC-2018**	**06-DEC-2018**	
Sample Reference	**Units**	**P38**	**P39**	**QA01**	**QA02**	**Method**
Perfluoronated Compounds						
N-MeFOSA (31506-32-8)	ug/L	<0.002	<0.002	<0.002	<0.002	NR70
N-EtFOSA (4151-50-2)	ug/L	<0.002	<0.002	<0.002	<0.002	NR70
N-MeFOSAA (2355-31-9)	ug/L	<0.002	<0.002	<0.002	<0.002	NR70
N-EtFOSAA(2991-50-6)	ug/L	<0.002	<0.002	<0.002	<0.002	NR70
N-MeFOSE (24448-09-7)	ug/L	<0.005	<0.005	<0.005	<0.005	NR70
N-EtFOSE (1691-99-2)	ug/L	<0.005	<0.005	<0.005	<0.005	NR70
4:2 FTS (757124-72-4)	ug/L	<0.001	<0.001	<0.001	<0.001	NR70
6:2 FTS (27619-97-2)	ug/L	0.093	0.13	0.040	0.036	NR70
8:2 FTS (39108-34-4)	ug/L	<0.001	<0.001	<0.001	<0.001	NR70
10:2 FTS (120226-60-0)	ug/L	<0.001	<0.001	<0.001	<0.001	NR70
8:2 diPAP (678-41-1)	ug/L	<0.002	<0.002	<0.002	<0.002	NR70
PFBA (Surrogate Recovery)	%	98	99	93	99	NR70
PFPeA (Surrogate Recovery)	%	159	195	102	89	NR70
PFHxA (Surrogate Recovery)	%	75	78	89	97	NR70
PFHpA (Surrogate Recovery)	%	90	86	95	100	NR70
PFOA (Surrogate Recovery)	%	95	94	97	104	NR70
PFNA (Surrogate Recovery)	%	88	85	88	84	NR70
PFDA (Surrogate Recovery)	%	86	78	91	67	NR70
PFUdA (Surrogate Recovery)	%	74	51	81	64	NR70
PFDoA (Surrogate Recovery)	%	48	42	68	52	NR70
PFTeDA (Surrogate Recovery)	%	35	39	70	53	NR70
PFHxDA (Surrogate Recovery)	%	59	46	86	73	NR70
FOUEA (Surrogate Recovery)	%	92	78	80	78	NR70
PFBS (Surrogate Recovery)	%	81	83	98	107	NR70
PFHxS (Surrogate Recovery)	%	96	91	95	103	NR70
PFOS (Surrogate Recovery)	%	93	88	96	96	NR70
PFOSA (Surrogate Recovery)	%	51	51	78	61	NR70
N-MeFOSA (Surrogate Recovery)	%	38	31	60	57	NR70
N-EtFOSA (Surrogate Recovery)	%	42	38	57	51	NR70
N-MeFOSAA (Surrogate Recovery)	%	73	50	76	53	NR70
N-EtFOSAA (Surrogate Recovery)	%	56	43	64	55	NR70
N-MeFOSE (Surrogate Recovery)	%	41	39	64	70	NR70
N-EtFOSE (Surrogate Recovery)	%	33	37	63	57	NR70
4:2 FTS (Surrogate Recovery)	%	182	149	123	101	NR70
6:2 FTS (Surrogate Recovery)	%	101	102	80	88	NR70
8:2 FTS (Surrogate Recovery)	%	80	51	64	55	NR70
8:2 diPAP (Surrogate Recovery)	%	40	30	63	54	NR70
Dates						
Date extracted		13-DEC-2018	13-DEC-2018	13-DEC-2018	13-DEC-2018	
Date analysed		13-DEC-2018	13-DEC-2018	13-DEC-2018	13-DEC-2018	

REPORT OF ANALYSIS

Lab Reg No.		**N18/035008**	**N18/035009**	**N18/035010**	**N18/035011**	
Date Sampled		**06-DEC-2018**	**06-DEC-2018**	**06-DEC-2018**	**06-DEC-2018**	
Sample Reference	**Units**	**P38**	**P39**	**QA01**	**QA02**	**Method**

Danny Slee, Section Manager
Organic - NSW
Accreditation No. 198

17-DEC-2018

REPORT OF ANALYSIS

Report No. RN1217346

Client	: GHD PTY LTD LEVEL 4, 211 VICTORIA SQUARE ADELAIDE SA 5000		**Job No.**	: GHD15/181210
			Quote No.	: QT-02018
			Order No.	:
			Date Received	: 10-DEC-2018
Attention	: DILARA VALIFF		**Sampled By**	: CLIENT
Project Name	:			
Your Client Services Manager	:		**Phone**	: (02) 94490161

Lab Reg No.	**Sample Ref**	**Sample Description**
N18/035012	RB01	WATER PARAFIELD AIRPORT GROUNDWATER INVESTIGATION PROJECT NUMBER 3319051

Lab Reg No.		**N18/035012**				
Date Sampled		**06-DEC-2018**				
Sample Reference	**Units**	**RB01**				**Method**
Perfluoronated Compounds						
PFBA (375-22-4)	ug/L	<0.005				NR70
PFPeA (2706-90-3)	ug/L	<0.002				NR70
PFHxA (307-24-4)	ug/L	<0.001				NR70
PFHpA (375-85-9)	ug/L	<0.001				NR70
PFOA (335-67-1)	ug/L	<0.001				NR70
PFNA (375-95-1)	ug/L	<0.001				NR70
PFDA (335-76-2)	ug/L	<0.001				NR70
PFUdA (2058-94-8)	ug/L	<0.001				NR70
PFDoA (307-55-1)	ug/L	<0.001				NR70
PFTrDA (72629-94-8)	ug/L	<0.002				NR70
PFTeDA (376-06-7)	ug/L	<0.002				NR70
PFHxDA (67905-19-5)	ug/L	<0.002				NR70
PFODA (16517-11-6)	ug/L	<0.005				NR70
FOUEA (70887-84-2)	ug/L	<0.001				NR70
PFBS (375-73-5)	ug/L	<0.001				NR70
PFPeS (2706-91-4)	ug/L	<0.001				NR70
PFHxS (355-46-4)	ug/L	<0.001				NR70
PFHpS (375-92-8)	ug/L	<0.001				NR70
PFOS (1763-23-1)	ug/L	<0.002				NR70
PFNS (68259-12-1)	ug/L	<0.001				NR70
PFDS (335-77-3)	ug/L	<0.001				NR70
PFOSA (754-91-6)	ug/L	<0.001				NR70
N-MeFOSA (31506-32-8)	ug/L	<0.002				NR70
N-EtFOSA (4151-50-2)	ug/L	<0.002				NR70
N-MeFOSAA (2355-31-9)	ug/L	<0.002				NR70
N-EtFOSAA(2991-50-6)	ug/L	<0.002				NR70
N-MeFOSE (24448-09-7)	ug/L	<0.005				NR70
N-EtFOSE (1691-99-2)	ug/L	<0.005				NR70

REPORT OF ANALYSIS

Lab Reg No.		**N18/035012**				
Date Sampled		**06-DEC-2018**				
Sample Reference	**Units**	**RB01**				**Method**
Perfluoronated Compounds						
4:2 FTS (757124-72-4)	ug/L	<0.001				NR70
6:2 FTS (27619-97-2)	ug/L	<0.001				NR70
8:2 FTS (39108-34-4)	ug/L	<0.001				NR70
10:2 FTS (120226-60-0)	ug/L	<0.001				NR70
8:2 diPAP (678-41-1)	ug/L	<0.002				NR70
PFBA (Surrogate Recovery)	%	94				NR70
PFPeA (Surrogate Recovery)	%	75				NR70
PFHxA (Surrogate Recovery)	%	94				NR70
PFHpA (Surrogate Recovery)	%	97				NR70
PFOA (Surrogate Recovery)	%	96				NR70
PFNA (Surrogate Recovery)	%	88				NR70
PFDA (Surrogate Recovery)	%	81				NR70
PFUdA (Surrogate Recovery)	%	69				NR70
PFDoA (Surrogate Recovery)	%	66				NR70
PFTeDA (Surrogate Recovery)	%	63				NR70
PFHxDA (Surrogate Recovery)	%	80				NR70
FOUEA (Surrogate Recovery)	%	73				NR70
PFBS (Surrogate Recovery)	%	101				NR70
PFHxS (Surrogate Recovery)	%	104				NR70
PFOS (Surrogate Recovery)	%	89				NR70
PFOSA (Surrogate Recovery)	%	73				NR70
N-MeFOSA (Surrogate Recovery)	%	60				NR70
N-EtFOSA (Surrogate Recovery)	%	67				NR70
N-MeFOSAA (Surrogate Recovery)	%	55				NR70
N-EtFOSAA (Surrogate Recovery)	%	67				NR70
N-MeFOSE (Surrogate Recovery)	%	65				NR70
N-EtFOSE (Surrogate Recovery)	%	63				NR70
4:2 FTS (Surrogate Recovery)	%	83				NR70
6:2 FTS (Surrogate Recovery)	%	82				NR70
8:2 FTS (Surrogate Recovery)	%	67				NR70
8:2 diPAP (Surrogate Recovery)	%	55				NR70
Dates						
Date extracted		13-DEC-2018				
Date analysed		13-DEC-2018				

REPORT OF ANALYSIS

Lab Reg No.	Units	N18/035012				Method
Date Sampled		06-DEC-2018				
Sample Reference		RB01				

Danny Slee, Section Manager
Organic - NSW
Accreditation No. 198

17-DEC-2018

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This report shall not be reproduced except in full.
Results relate only to the sample(s) tested.

This Report supersedes reports: *RN1217287*
RN1217304

Measurement Uncertainty is available upon request.
Chemical Accreditation 198: 105 Delhi Road, North Ryde, NSW, 2113

Australian Government

National Measurement Institute

QUALITY ASSURANCE REPORT

Client: GHD PTY LTD

NMI QA Report No: GHD15/181210 **Sample Matrix:** Liquid

Analyte	Method	LOR	Blank	Sample Duplicates			Recoveries	
				Sample	Duplicate	RPD	LCS	Matrix Spike
		ug/L	ug/L	ug/L	ug/L	%	%	%
PFBA (375-22-4)	NR70	0.005	<0.005	NA	NA	NA	111	NA
PFPeA (2706-90-3)	NR70	0.002	<0.002	NA	NA	NA	103	NA
PFHxA (307-24-4)	NR70	0.001	<0.001	NA	NA	NA	98	NA
PFHpA (375-85-9)	NR70	0.001	<0.001	NA	NA	NA	102	NA
PFOA (335-67-1)	NR70	0.001	<0.001	NA	NA	NA	106	NA
PFNA (375-95-1)	NR70	0.001	<0.001	NA	NA	NA	92	NA
PFDA (335-76-2)	NR70	0.001	<0.001	NA	NA	NA	90	NA
PFUdA (2058-94-8)	NR70	0.001	<0.001	NA	NA	NA	104	NA
PFDoA (307-55-1)	NR70	0.001	<0.001	NA	NA	NA	107	NA
PFTrDA (72629-94-8)	NR70	0.002	<0.002	NA	NA	NA	102	NA
PFTeDA (376-06-7)	NR70	0.002	<0.002	NA	NA	NA	96	NA
PFHxDA (67905-19-5)	NR70	0.002	<0.002	NA	NA	NA	104	NA
PFODA (16517-11-6)	NR70	0.005	<0.005	NA	NA	NA	83	NA
FOUEA (70887-84-2)	NR70	0.001	<0.001	NA	NA	NA	107	NA
PFBS (375-73-5)	NR70	0.001	<0.001	NA	NA	NA	104	NA
PFPeS (2706-91-4)	NR70	0.001	<0.001	NA	NA	NA	104	NA
PFHxS (355-46-4)	NR70	0.001	<0.001	NA	NA	NA	95	NA
PFHpS (375-92-8)	NR70	0.001	<0.001	NA	NA	NA	100	NA
PFOS (1763-23-1)	NR70	0.002	<0.002	NA	NA	NA	104	NA
PFNS (68259-12-1)	NR70	0.001	<0.001	NA	NA	NA	98	NA
PFDS (335-77-3)	NR70	0.001	<0.001	NA	NA	NA	90	NA
PFOSA (754-91-6)	NR70	0.001	<0.001	NA	NA	NA	104	NA
N-MeFOSA (31506-32-8)	NR70	0.002	<0.002	NA	NA	NA	108	NA
N-EtFOSA (4151-50-2)	NR70	0.002	<0.002	NA	NA	NA	94	NA
N-MeFOSAA (2355-31-9)	NR70	0.002	<0.002	NA	NA	NA	102	NA
N-EtFOSAA(2991-50-6)	NR70	0.002	<0.002	NA	NA	NA	100	NA
N-MeFOSE (24448-09-7)	NR70	0.005	<0.005	NA	NA	NA	116	NA
N-EtFOSE (1691-99-2)	NR70	0.005	<0.005	NA	NA	NA	98	NA
4:2 FTS (757124-72-4)	NR70	0.001	<0.001	NA	NA	NA	101	NA
6:2 FTS (27619-97-2)	NR70	0.001	<0.001	NA	NA	NA	102	NA
8:2 FTS (39108-34-4)	NR70	0.001	<0.001	NA	NA	NA	107	NA
10:2 FTS (120226-60-0)	NR70	0.001	<0.001	NA	NA	NA	86	NA
8:2 diPAP (678-41-1)	NR70	0.002	<0.002	NA	NA	NA	103	NA

Results expressed in percentage (%) or ug/L wherever appropriate.
Acceptable Spike recovery is 50-150%.
Maximum acceptable RPDs on spikes and duplicates is 40%.
'NA ' = Not Applicable.
RPD= Relative Percentage Difference.

Signed:

Danny Slee
Organics Manager, NMI-North Ryde

Date: **14/12/2018**

REPORT OF ANALYSIS

Page: 1 of 6

Report No. RN1223294

Client	: GHD PTY LTD LEVEL 4, 211 VICTORIA SQUARE ADELAIDE SA 5000	**Job No.**	: GHD15/190213
		Quote No.	: QT-02018
		Order No.	:
		Date Received	: 13-FEB-2019
Attention	: DILARA VALIFF	**Sampled By**	: CLIENT
Project Name	:		
Your Client Services Manager	:	**Phone**	: (02) 94490161

Lab Reg No.	**Sample Ref**	**Sample Description**
N19/003683	P42	WATER 7/02/2019
N19/003684	P43	WATER 7/02/2019
N19/003685	P41	WATER 7/02/2019
N19/003686	P40	WATER 7/02/2019

Lab Reg No.		**N19/003683**	**N19/003684**	**N19/003685**	**N19/003686**	
Date Sampled		**07-FEB-2019**	**07-FEB-2019**	**07-FEB-2019**	**07-FEB-2019**	
Sample Reference	**Units**	**P42**	**P43**	**P41**	**P40**	**Method**
PFAS (per-and poly-fluoroalkyl substances)						
PFBA (375-22-4)	ug/L	0.026	0.0071	0.0084	0.018	NR70
PFPeA (2706-90-3)	ug/L	0.0079	<0.002	0.0076	0.024	NR70
PFHxA (307-24-4)	ug/L	0.014	0.0047	0.010	0.035	NR70
PFHpA (375-85-9)	ug/L	0.0037	<0.002	0.0036	0.013	NR70
PFOA (335-67-1)	ug/L	0.0055	0.0031	0.0048	0.030	NR70
PFNA (375-95-1)	ug/L	<0.002	<0.002	<0.002	<0.002	NR70
PFDA (335-76-2)	ug/L	<0.001	<0.001	<0.001	<0.001	NR70
PFUdA (2058-94-8)	ug/L	<0.001	<0.001	<0.001	<0.001	NR70
PFDoA (307-55-1)	ug/L	<0.001	<0.001	<0.001	<0.001	NR70
PFTrDA (72629-94-8)	ug/L	<0.002	<0.002	<0.002	<0.002	NR70
PFTeDA (376-06-7)	ug/L	<0.002	<0.002	<0.002	<0.002	NR70
PFHxDA (67905-19-5)	ug/L	<0.002	<0.002	<0.002	<0.002	NR70
PFODA (16517-11-6)	ug/L	<0.005	<0.005	<0.005	<0.005	NR70
FOUEA (70887-84-2)	ug/L	<0.001	<0.001	<0.001	<0.001	NR70
PFBS (375-73-5)	ug/L	0.0074	0.0039	0.0092	0.0037	NR70
PFPeS (2706-91-4)	ug/L	0.0072	0.0040	0.0095	0.0029	NR70
PFHxS (355-46-4)	ug/L	0.075	0.050	0.074	0.037	NR70
PFHpS (375-92-8)	ug/L	<0.002	0.0033	<0.002	<0.002	NR70
PFOS (1763-23-1)	ug/L	0.043	0.24	0.032	0.020	NR70
PFNS (68259-12-1)	ug/L	<0.001	<0.001	<0.001	<0.001	NR70
PFDS (335-77-3)	ug/L	<0.001	<0.001	<0.001	<0.001	NR70
PFOSA (754-91-6)	ug/L	<0.001	<0.001	<0.001	<0.001	NR70
N-MeFOSA (31506-32-8)	ug/L	<0.002	<0.002	<0.002	<0.002	NR70
N-EtFOSA (4151-50-2)	ug/L	<0.002	<0.002	<0.002	<0.002	NR70
N-MeFOSAA (2355-31-9)	ug/L	<0.002	<0.002	<0.002	<0.002	NR70
N-EtFOSAA(2991-50-6)	ug/L	<0.002	<0.002	<0.002	<0.002	NR70

REPORT OF ANALYSIS

Lab Reg No.		N19/003683	N19/003684	N19/003685	N19/003686	
Date Sampled		07-FEB-2019	07-FEB-2019	07-FEB-2019	07-FEB-2019	
Sample Reference	Units	P42	P43	P41	P40	Method
PFAS (per-and poly-fluoroalkyl substances)						
N-MeFOSE (24448-09-7)	ug/L	<0.005	<0.005	<0.005	<0.005	NR70
N-EtFOSE (1691-99-2)	ug/L	<0.005	<0.005	<0.005	<0.005	NR70
4:2 FTS (757124-72-4)	ug/L	<0.001	<0.001	<0.001	<0.001	NR70
6:2 FTS (27619-97-2)	ug/L	0.0043	0.13	0.033	0.020	NR70
8:2 FTS (39108-34-4)	ug/L	<0.001	<0.001	<0.001	<0.001	NR70
10:2 FTS (120226-60-0)	ug/L	<0.001	<0.001	<0.001	<0.001	NR70
8:2 diPAP (678-41-1)	ug/L	<0.002	<0.002	<0.002	<0.002	NR70
PFBA (Surrogate Recovery)	%	116	116	120	103	NR70
PFPeA (Surrogate Recovery)	%	125	107	100	119	NR70
PFHxA (Surrogate Recovery)	%	83	91	89	80	NR70
PFHpA (Surrogate Recovery)	%	101	120	115	100	NR70
PFOA (Surrogate Recovery)	%	101	114	101	102	NR70
PFNA (Surrogate Recovery)	%	127	121	90	103	NR70
PFDA (Surrogate Recovery)	%	110	99	84	85	NR70
PFUdA (Surrogate Recovery)	%	97	98	80	101	NR70
PFDoA (Surrogate Recovery)	%	79	94	70	77	NR70
PFTeDA (Surrogate Recovery)	%	68	93	53	98	NR70
PFHxDA (Surrogate Recovery)	%	60	42	26	47	NR70
FOUEA (Surrogate Recovery)	%	80	83	83	63	NR70
PFBS (Surrogate Recovery)	%	105	104	92	95	NR70
PFHxS (Surrogate Recovery)	%	99	102	99	93	NR70
PFOS (Surrogate Recovery)	%	116	106	95	104	NR70
PFOSA (Surrogate Recovery)	%	80	98	80	81	NR70
N-MeFOSA (Surrogate Recovery)	%	47	61	30	27	NR70
N-EtFOSA (Surrogate Recovery)	%	50	66	42	28	NR70
N-MeFOSAA (Surrogate Recovery)	%	50	79	52	71	NR70
N-EtFOSAA (Surrogate Recovery)	%	71	67	47	54	NR70
N-MeFOSE (Surrogate Recovery)	%	73	87	60	77	NR70
N-EtFOSE (Surrogate Recovery)	%	65	86	74	97	NR70
4:2 FTS (Surrogate Recovery)	%	72	73	61	69	NR70
6:2 FTS (Surrogate Recovery)	%	94	125	94	83	NR70
8:2 FTS (Surrogate Recovery)	%	70	88	76	82	NR70
8:2 diPAP (Surrogate Recovery)	%	88	96	24	70	NR70
Dates						
Date extracted		14-FEB-2019	14-FEB-2019	14-FEB-2019	14-FEB-2019	
Date analysed		14-FEB-2019	14-FEB-2019	14-FEB-2019	14-FEB-2019	

N19/003683

REPORT OF ANALYSIS

to
N19/003690:
PFOS is quantified using a combined branched and linear standard,
linear and branched isomers are totalled for reporting.
All results corrected for labelled surrogate recoveries.
Selected PFAS surrogate recoveries are biased due to matrix effects.

Danny Slee, Section Manager
Organic - NSW
Accreditation No. 198

22-FEB-2019

REPORT OF ANALYSIS

Report No. RN1223294

Client	: GHD PTY LTD LEVEL 4, 211 VICTORIA SQUARE ADELAIDE SA 5000		**Job No.**	: GHD15/190213
			Quote No.	: QT-02018
			Order No.	:
			Date Received	: 13-FEB-2019
Attention	: DILARA VALIFF		**Sampled By**	: CLIENT
Project Name	:			
Your Client Services Manager	:		**Phone**	: (02) 94490161

Lab Reg No.	**Sample Ref**	**Sample Description**
N19/003687	P44	WATER 7/02/2019
N19/003688	RB01	WATER 7/02/2019
N19/003689	QA01	WATER 7/02/2019
N19/003690	QA02	WATER 7/02/2019

Lab Reg No.		**N19/003687**	**N19/003688**	**N19/003689**	**N19/003690**	
Date Sampled		**07-FEB-2019**	**07-FEB-2019**	**07-FEB-2019**	**07-FEB-2019**	
Sample Reference	**Units**	**P44**	**RB01**	**QA01**	**QA02**	**Method**
PFAS (per-and poly-fluoroalkyl substances)						
PFBA (375-22-4)	ug/L	0.029	<0.005	0.019	0.0072	NR70
PFPeA (2706-90-3)	ug/L	0.038	<0.002	0.0076	0.0086	NR70
PFHxA (307-24-4)	ug/L	0.26	<0.001	0.011	0.012	NR70
PFHpA (375-85-9)	ug/L	0.033	<0.002	0.0037	0.0035	NR70
PFOA (335-67-1)	ug/L	0.051	<0.001	0.0052	0.0052	NR70
PFNA (375-95-1)	ug/L	<0.002	<0.002	<0.002	<0.002	NR70
PFDA (335-76-2)	ug/L	<0.001	<0.001	<0.001	<0.001	NR70
PFUdA (2058-94-8)	ug/L	<0.001	<0.001	<0.001	<0.001	NR70
PFDoA (307-55-1)	ug/L	<0.001	<0.001	<0.001	<0.001	NR70
PFTrDA (72629-94-8)	ug/L	<0.002	<0.002	<0.002	<0.002	NR70
PFTeDA (376-06-7)	ug/L	<0.002	<0.002	<0.002	<0.002	NR70
PFHxDA (67905-19-5)	ug/L	<0.002	<0.002	<0.002	<0.002	NR70
PFODA (16517-11-6)	ug/L	<0.005	<0.005	<0.005	<0.005	NR70
FOUEA (70887-84-2)	ug/L	<0.001	<0.001	<0.001	<0.001	NR70
PFBS (375-73-5)	ug/L	0.11	<0.001	0.0084	0.0077	NR70
PFPeS (2706-91-4)	ug/L	0.16	<0.001	0.0078	0.0075	NR70
PFHxS (355-46-4)	ug/L	1.3	<0.001	0.078	0.074	NR70
PFHpS (375-92-8)	ug/L	0.013	<0.002	<0.002	<0.002	NR70
PFOS (1763-23-1)	ug/L	0.072	<0.002	0.045	0.044	NR70
PFNS (68259-12-1)	ug/L	<0.001	<0.001	<0.001	<0.001	NR70
PFDS (335-77-3)	ug/L	<0.001	<0.001	<0.001	<0.001	NR70
PFOSA (754-91-6)	ug/L	<0.001	<0.001	<0.001	<0.001	NR70
N-MeFOSA (31506-32-8)	ug/L	<0.002	<0.002	<0.002	<0.002	NR70
N-EtFOSA (4151-50-2)	ug/L	<0.002	<0.002	<0.002	<0.002	NR70
N-MeFOSAA (2355-31-9)	ug/L	<0.002	<0.002	<0.002	<0.002	NR70
N-EtFOSAA(2991-50-6)	ug/L	<0.002	<0.002	<0.002	<0.002	NR70

REPORT OF ANALYSIS

Lab Reg No.		**N19/003687**	**N19/003688**	**N19/003689**	**N19/003690**	
Date Sampled		**07-FEB-2019**	**07-FEB-2019**	**07-FEB-2019**	**07-FEB-2019**	
Sample Reference	**Units**	**P44**	**RB01**	**QA01**	**QA02**	**Method**
PFAS (per-and poly-fluoroalkyl substances)						
N-MeFOSE (24448-09-7)	ug/L	<0.005	<0.005	<0.005	<0.005	NR70
N-EtFOSE (1691-99-2)	ug/L	<0.005	<0.005	<0.005	<0.005	NR70
4:2 FTS (757124-72-4)	ug/L	<0.001	<0.001	<0.001	<0.001	NR70
6:2 FTS (27619-97-2)	ug/L	0.017	<0.002	0.0043	0.0037	NR70
8:2 FTS (39108-34-4)	ug/L	<0.001	<0.001	<0.001	<0.001	NR70
10:2 FTS (120226-60-0)	ug/L	<0.001	<0.001	<0.001	<0.001	NR70
8:2 diPAP (678-41-1)	ug/L	<0.002	<0.002	<0.002	<0.002	NR70
PFBA (Surrogate Recovery)	%	95	107	99	96	NR70
PFPeA (Surrogate Recovery)	%	91	127	115	100	NR70
PFHxA (Surrogate Recovery)	%	82	80	91	78	NR70
PFHpA (Surrogate Recovery)	%	105	93	96	101	NR70
PFOA (Surrogate Recovery)	%	106	96	103	92	NR70
PFNA (Surrogate Recovery)	%	98	136	74	108	NR70
PFDA (Surrogate Recovery)	%	87	123	73	86	NR70
PFUdA (Surrogate Recovery)	%	81	110	65	97	NR70
PFDoA (Surrogate Recovery)	%	62	133	60	79	NR70
PFTeDA (Surrogate Recovery)	%	72	166	52	54	NR70
PFHxDA (Surrogate Recovery)	%	54	82	68	38	NR70
FOUEA (Surrogate Recovery)	%	72	77	82	77	NR70
PFBS (Surrogate Recovery)	%	93	96	96	86	NR70
PFHxS (Surrogate Recovery)	%	80	84	96	90	NR70
PFOS (Surrogate Recovery)	%	98	104	107	99	NR70
PFOSA (Surrogate Recovery)	%	67	93	55	87	NR70
N-MeFOSA (Surrogate Recovery)	%	44	61	40	37	NR70
N-EtFOSA (Surrogate Recovery)	%	38	63	38	35	NR70
N-MeFOSAA (Surrogate Recovery)	%	46	111	35	74	NR70
N-EtFOSAA (Surrogate Recovery)	%	43	84	50	53	NR70
N-MeFOSE (Surrogate Recovery)	%	57	62	55	57	NR70
N-EtFOSE (Surrogate Recovery)	%	66	88	57	72	NR70
4:2 FTS (Surrogate Recovery)	%	70	69	71	66	NR70
6:2 FTS (Surrogate Recovery)	%	92	87	89	84	NR70
8:2 FTS (Surrogate Recovery)	%	94	122	62	90	NR70
8:2 diPAP (Surrogate Recovery)	%	91	101	98	38	NR70
Dates						
Date extracted		14-FEB-2019	14-FEB-2019	14-FEB-2019	14-FEB-2019	
Date analysed		14-FEB-2019	14-FEB-2019	14-FEB-2019	14-FEB-2019	

REPORT OF ANALYSIS

Lab Reg No.		**N19/003687**	**N19/003688**	**N19/003689**	**N19/003690**	
Date Sampled		**07-FEB-2019**	**07-FEB-2019**	**07-FEB-2019**	**07-FEB-2019**	
Sample Reference	**Units**	**P44**	**RB01**	**QA01**	**QA02**	**Method**

Danny Slee, Section Manager
Organic - NSW
Accreditation No. 198

22-FEB-2019

This Report supersedes reports: *RN1223291*

Measurement Uncertainty is available upon request.
Chemical Accreditation 198: 105 Delhi Road, North Ryde, NSW, 2113

Australian Government

National Measurement Institute

QUALITY ASSURANCE REPORT

Client: GHD PTY LTD

NMI QA Report No: GHD15/190213 **Sample Matrix:** Liquid

Analyte	Method	LOR	Blank	Sample Duplicates			Recoveries	
				Sample	Duplicate	RPD	LCS	Matrix Spike
		ug/L	ug/L	ug/L	ug/L	%	%	%
PFBA (375-22-4)	NR70	0.005	<0.005	NA	NA	NA	121	NA
PFPeA (2706-90-3)	NR70	0.002	<0.002	NA	NA	NA	106	NA
PFHxA (307-24-4)	NR70	0.001	<0.001	NA	NA	NA	101	NA
PFHpA (375-85-9)	NR70	0.001	<0.001	NA	NA	NA	100	NA
PFOA (335-67-1)	NR70	0.001	<0.001	NA	NA	NA	103	NA
PFNA (375-95-1)	NR70	0.001	<0.001	NA	NA	NA	111	NA
PFDA (335-76-2)	NR70	0.001	<0.001	NA	NA	NA	102	NA
PFUdA (2058-94-8)	NR70	0.001	<0.001	NA	NA	NA	109	NA
PFDoA (307-55-1)	NR70	0.001	<0.001	NA	NA	NA	95	NA
PFTrDA (72629-94-8)	NR70	0.002	<0.002	NA	NA	NA	102	NA
PFTeDA (376-06-7)	NR70	0.002	<0.002	NA	NA	NA	102	NA
PFHxDA (67905-19-5)	NR70	0.002	<0.002	NA	NA	NA	113	NA
FOUEA (70887-84-2)	NR70	0.001	<0.001	NA	NA	NA	99	NA
PFBS (375-73-5)	NR70	0.001	<0.001	NA	NA	NA	102	NA
PFPeS (2706-91-4)	NR70	0.001	<0.001	NA	NA	NA	102	NA
PFHxS (355-46-4)	NR70	0.001	<0.001	NA	NA	NA	107	NA
PFHpS (375-92-8)	NR70	0.001	<0.001	NA	NA	NA	107	NA
PFOS (1763-23-1)	NR70	0.002	<0.002	NA	NA	NA	100	NA
PFNS (68259-12-1)	NR70	0.001	<0.001	NA	NA	NA	96	NA
PFDS (335-77-3)	NR70	0.001	<0.001	NA	NA	NA	95	NA
PFOSA (754-91-6)	NR70	0.001	<0.001	NA	NA	NA	100	NA
N-MeFOSA (31506-32-8)	NR70	0.002	<0.002	NA	NA	NA	98	NA
N-EtFOSA (4151-50-2)	NR70	0.002	<0.002	NA	NA	NA	95	NA
N-MeFOSAA (2355-31-9)	NR70	0.002	<0.002	NA	NA	NA	92	NA
N-EtFOSAA(2991-50-6)	NR70	0.002	<0.002	NA	NA	NA	101	NA
N-MeFOSE (24448-09-7)	NR70	0.005	<0.005	NA	NA	NA	102	NA
N-EtFOSE (1691-99-2)	NR70	0.005	<0.005	NA	NA	NA	64	NA
4:2 FTS (757124-72-4)	NR70	0.001	<0.001	NA	NA	NA	106	NA
6:2 FTS (27619-97-2)	NR70	0.001	<0.001	NA	NA	NA	114	NA
8:2 FTS (39108-34-4)	NR70	0.001	<0.001	NA	NA	NA	125	NA
10:2 FTS (120226-60-0)	NR70	0.001	<0.001	NA	NA	NA	77	NA
8:2 diPAP (678-41-1)	NR70	0.002	<0.002	NA	NA	NA	102	NA

Results expressed in percentage (%) or ug/L wherever appropriate.
Acceptable Spike recovery is 50-150%.
Maximum acceptable RPDs on spikes and duplicates is 40%.
'NA ' = Not Applicable.
RPD= Relative Percentage Difference.

Signed:

Danny Slee
Organics Manager, NMI-North Ryde

Date: **21/02/2019**

REPORT OF ANALYSIS

Client	: GHD PTY LTD LEVEL 4, 211 VICTORIA SQUARE ADELAIDE SA 5000	**Job No.** **Quote No.** **Order No.** **Date Received**	: GHD15/190318 : QT-02018 : 3319051 : 18-MAR-2019
Attention	: DILARA VALIFF	**Sampled By**	: CLIENT
Project Name	:		
Your Client Services Manager	:	**Phone**	: (02) 94490161

Lab Reg No.	Sample Ref	Sample Description
N19/006897	HA-0-0.1	SOIL 14-3-19
N19/006898	HA-0.1-0.2	SOIL 14-3-19

Lab Reg No.		**N19/006897**	**N19/006898**			
Date Sampled		**14-MAR-2019**	**14-MAR-2019**			
Sample Reference	**Units**	**HA-0-0.1**	**HA-0.1-0.2**			**Method**
PFAS (per-and poly-fluoroalkyl substances)						
PFBA (375-22-4)	mg/kg	<0.002	0.0027			NR70
PFPeA (2706-90-3)	mg/kg	<0.002	<0.002			NR70
PFHxA (307-24-4)	mg/kg	<0.001	<0.001			NR70
PFHpA (375-85-9)	mg/kg	<0.001	<0.001			NR70
PFOA (335-67-1)	mg/kg	<0.001	<0.001			NR70
PFNA (375-95-1)	mg/kg	<0.001	<0.001			NR70
PFDA (335-76-2)	mg/kg	<0.001	<0.001			NR70
PFUdA (2058-94-8)	mg/kg	<0.002	<0.002			NR70
PFDoA (307-55-1)	mg/kg	<0.002	<0.002			NR70
PFTrDA (72629-94-8)	mg/kg	<0.002	<0.002			NR70
PFTeDA (376-06-7)	mg/kg	<0.002	<0.002			NR70
PFHxDA (67905-19-5)	mg/kg	<0.002	<0.002			NR70
PFODA (16517-11-6)	mg/kg	<0.005	<0.005			NR70
FOUEA (70887-84-2)	mg/kg	<0.001	<0.001			NR70
PFBS (375-73-5)	mg/kg	<0.001	<0.001			NR70
PFPeS (2706-91-4)	mg/kg	<0.001	<0.001			NR70
PFHxS (355-46-4)	mg/kg	<0.001	<0.001			NR70
PFHpS (375-92-8)	mg/kg	<0.001	<0.001			NR70
PFOS (1763-23-1)	mg/kg	<0.002	<0.002			NR70
PFNS (68259-12-1)	mg/kg	<0.001	<0.001			NR70
PFDS (335-77-3)	mg/kg	<0.001	<0.001			NR70
PFOSA (754-91-6)	mg/kg	<0.001	<0.001			NR70
N-MeFOSA (31506-32-8)	mg/kg	<0.002	<0.002			NR70
N-EtFOSA (4151-50-2)	mg/kg	<0.002	<0.002			NR70
N-MeFOSAA (2355-31-9)	mg/kg	<0.002	<0.002			NR70
N-EtFOSAA(2991-50-6)	mg/kg	<0.002	<0.002			NR70
N-MeFOSE (24448-09-7)	mg/kg	<0.005	<0.005			NR70
N-EtFOSE (1691-99-2)	mg/kg	<0.005	<0.005			NR70

REPORT OF ANALYSIS

Lab Reg No.		**N19/006897**	**N19/006898**			
Date Sampled		**14-MAR-2019**	**14-MAR-2019**			
Sample Reference	**Units**	**HA-0-0.1**	**HA-0.1-0.2**			**Method**
PFAS (per-and poly-fluoroalkyl substances)						
4:2 FTS (757124-72-4)	mg/kg	<0.001	<0.001			NR70
6:2 FTS (27619-97-2)	mg/kg	<0.001	<0.001			NR70
8:2 FTS (39108-34-4)	mg/kg	<0.001	<0.001			NR70
10:2 FTS (120226-60-0)	mg/kg	<0.002	<0.002			NR70
8:2 diPAP (678-41-1)	mg/kg	<0.002	<0.002			NR70
PFBA (Surrogate Recovery)	%	105	107			NR70
PFPeA (Surrogate Recovery)	%	95	98			NR70
PFHxA (Surrogate Recovery)	%	120	105			NR70
PFHpA (Surrogate Recovery)	%	122	121			NR70
PFOA (Surrogate Recovery)	%	108	109			NR70
PFNA (Surrogate Recovery)	%	102	108			NR70
PFDA (Surrogate Recovery)	%	106	98			NR70
PFUdA (Surrogate Recovery)	%	104	97			NR70
PFDoA (Surrogate Recovery)	%	98	98			NR70
PFTeDA (Surrogate Recovery)	%	114	93			NR70
PFHxDA (Surrogate Recovery)	%	96	98			NR70
FOUEA (Surrogate Recovery)	%	47	43			NR70
PFBS (Surrogate Recovery)	%	103	108			NR70
PFHxS (Surrogate Recovery)	%	106	107			NR70
PFOS (Surrogate Recovery)	%	105	107			NR70
PFOSA (Surrogate Recovery)	%	114	118			NR70
N-MeFOSA (Surrogate Recovery)	%	130	119			NR70
N-EtFOSA (Surrogate Recovery)	%	117	115			NR70
N-MeFOSAA (Surrogate Recovery)	%	80	73			NR70
N-EtFOSAA (Surrogate Recovery)	%	88	86			NR70
N-MeFOSE (Surrogate Recovery)	%	96	117			NR70
N-EtFOSE (Surrogate Recovery)	%	107	87			NR70
4:2 FTS (Surrogate Recovery)	%	62	64			NR70
6:2 FTS (Surrogate Recovery)	%	60	53			NR70
8:2 FTS (Surrogate Recovery)	%	70	62			NR70
8:2 diPAP (Surrogate Recovery)	%	56	68			NR70
Dates						
Date extracted		25-MAR-2019	25-MAR-2019			
Date analysed		26-MAR-2019	26-MAR-2019			

N19/006897
to
N19/006898:

REPORT OF ANALYSIS

PFOS is quantified using a combined branched and linear standard,
linear and branched isomers are totalled for reporting.
All results corrected for labelled surrogate recoveries.

Danny Slee, Section Manager
Organic - NSW
Accreditation No. 198

27-MAR-2019

Lab Reg No.		**N19/006897**	**N19/006898**			
Date Sampled		**14-MAR-2019**	**14-MAR-2019**			
Sample Reference	**Units**	**HA-0-0.1**	**HA-0.1-0.2**			**Method**
Trace Elements						
Total Solids	%	94.8	92.8			NT2_49

Andrew Evans, Analyst
Inorganics - NSW
Accreditation No. 198

27-MAR-2019

All results are expressed on a dry weight basis.

REPORT OF ANALYSIS

Report No. RN1226775

Client	: GHD PTY LTD LEVEL 4, 211 VICTORIA SQUARE ADELAIDE SA 5000		**Job No.** **Quote No.** **Order No.** **Date Received**	: GHD15/190318 : QT-02018 : 3319051 : 18-MAR-2019
Attention	: DILARA VALIFF		**Sampled By**	: CLIENT
Project Name	:			
Your Client Services Manager	:		**Phone**	: (02) 94490161

Lab Reg No.	**Sample Ref**	**Sample Description**
N19/006897/T	HA-0-0.1	SOIL 14-3-19 LEACHATE
N19/006898/T	HA-0.1-0.2	SOIL 14-3-19 LEACHATE

Lab Reg No.		N19/006897/T	N19/006898/T			
Date Sampled		14-MAR-2019	14-MAR-2019			
Sample Reference	**Units**	HA-0-0.1	HA-0.1-0.2			**Method**
PFAS (per-and poly-fluoroalkyl substances)						
PFBA (375-22-4)	ug/L	<0.05	<0.05			NR70
PFPeA (2706-90-3)	ug/L	<0.02	<0.02			NR70
PFHxA (307-24-4)	ug/L	<0.01	<0.01			NR70
PFHpA (375-85-9)	ug/L	<0.01	<0.01			NR70
PFOA (335-67-1)	ug/L	<0.01	<0.01			NR70
PFNA (375-95-1)	ug/L	<0.01	<0.01			NR70
PFDA (335-76-2)	ug/L	<0.01	<0.01			NR70
PFUdA (2058-94-8)	ug/L	<0.01	<0.01			NR70
PFDoA (307-55-1)	ug/L	<0.01	<0.01			NR70
PFTrDA (72629-94-8)	ug/L	<0.02	<0.02			NR70
PFTeDA (376-06-7)	ug/L	<0.02	<0.02			NR70
PFHxDA (67905-19-5)	ug/L	<0.02	<0.02			NR70
PFODA (16517-11-6)	ug/L	<0.05	<0.05			NR70
FOUEA (70887-84-2)	ug/L	<0.01	<0.01			NR70
PFDS (335-77-3)	ug/L	<0.01	<0.01			NR70
PFPeS (2706-91-4)	ug/L	<0.01	<0.01			NR70
PFHxS (355-46-4)	ug/L	<0.01	<0.01			NR70
PFHpS (375-92-8)	ug/L	<0.01	<0.01			NR70
PFOS (1763-23-1)	ug/L	<0.02	0.024			NR70
PFNS (68259-12-1)	ug/L	<0.01	<0.01			NR70
PFBS (375-73-5)	ug/L	<0.01	<0.01			NR70
PFOSA (754-91-6)	ug/L	<0.01	<0.01			NR70
N-MeFOSA (31506-32-8)	ug/L	<0.02	<0.02			NR70
N-EtFOSA (4151-50-2)	ug/L	<0.02	<0.02			NR70
N-MeFOSAA (2355-31-9)	ug/L	<0.01	<0.01			NR70
N-EtFOSAA(2991-50-6)	ug/L	<0.01	<0.01			NR70
N-MeFOSE (24448-09-7)	ug/L	<0.05	<0.05			NR70
N-EtFOSE (1691-99-2)	ug/L	<0.05	<0.05			NR70

REPORT OF ANALYSIS

Lab Reg No.			**N19/006897/T**	**N19/006898/T**			
Date Sampled			**14-MAR-2019**	**14-MAR-2019**			
Sample Reference		**Units**	**HA-0-0.1**	**HA-0.1-0.2**			**Method**
PFAS (per-and poly-fluoroalkyl substances)							
4:2 FTS (757124-72-4)		ug/L	<0.01	<0.01			NR70
6:2 FTS (27619-97-2)		ug/L	<0.01	<0.01			NR70
8:2 FTS (39108-34-4)		ug/L	<0.01	<0.01			NR70
10:2 FTS (120226-60-0)		ug/L	<0.01	<0.01			NR70
8:2 diPAP (678-41-1)		ug/L	<0.02	<0.02			NR70
PFBA (Surrogate Recovery)		%	104	96			NR70
PFPeA (Surrogate Recovery)		%	95	90			NR70
PFHxA (Surrogate Recovery)		%	108	99			NR70
PFHpA (Surrogate Recovery)		%	107	95			NR70
PFOA (Surrogate Recovery)		%	107	85			NR70
PFNA (Surrogate Recovery)		%	88	82			NR70
PFDA (Surrogate Recovery)		%	94	83			NR70
PFUdA (Surrogate Recovery)		%	78	72			NR70
PFDoA (Surrogate Recovery)		%	69	61			NR70
PFTeDA (Surrogate Recovery)		%	54	68			NR70
PFHxDA (Surrogate Recovery)		%	45	49			NR70
FOUEA (Surrogate Recovery)		%	91	79			NR70
PFBS (Surrogate Recovery)		%	106	94			NR70
PFHxS (Surrogate Recovery)		%	104	91			NR70
PFOS (Surrogate Recovery)		%	82	81			NR70
PFOSA (Surrogate Recovery)		%	71	65			NR70
N-MeFOSAA (Surrogate Recovery)		%	67	55			NR70
N-EtFOSAA (Surrogate Recovery)		%	63	58			NR70
N-MeFOSE (Surrogate Recovery)		%	55	61			NR70
N-EtFOSE (Surrogate Recovery)		%	64	66			NR70
4:2 FTS (Surrogate Recovery)		%	86	68			NR70
6:2 FTS (Surrogate Recovery)		%	89	76			NR70
8:2 FTS (Surrogate Recovery)		%	89	70			NR70
TCLP							
Soil pH			5	5			NW_SL9
pH of Initial Extract			5	5			NW_SL9
pH of Final Extract			5	5			NW_SL9
Buffer Used			PH 4.93	PH 4.93			NW_SL9
Dates							
Date extracted			20-MAR-2019	20-MAR-2019			
Date analysed			20-MAR-2019	20-MAR-2019			

N19/006897/T

REPORT OF ANALYSIS

& N19/006898/T:
PFOS is quantified using a combined branched and linear standard,
linear and branched isomers are totalled for reporting.
All results corrected for labelled surrogate recoveries.
Selected PFAS surrogate recoveries are biased due to matrix effects.
LORs raised for selected analytes due to low surrogate recoveries.

Samples were leached for 18 hours (1:20 sample:leachate) with buffer at pH 4.93 in polypropylene containers and the leachate was analysed for PFAS analytes.

Danny Slee, Section Manager
Organic - NSW
Accreditation No. 198

27-MAR-2019

REPORT OF ANALYSIS

Client : GHD PTY LTD
LEVEL 4, 211 VICTORIA SQUARE
ADELAIDE SA 5000

Attention : DILARA VALIFF
Project Name :
Your Client Services Manager :

Job No. : GHD15/190318
Quote No. : QT-02018
Order No. : 3319051
Date Received : 18-MAR-2019
Sampled By : CLIENT
Phone : (02) 94490161

Lab Reg No.	Sample Ref	Sample Description
N19/006883	RB01	WATER 14-3-19
N19/006884	QA01	WATER 14-3-19
N19/006885	P9	WATER 14-3-19
N19/006886	P34	WATER 14-3-19

Lab Reg No.		**N19/006883**	**N19/006884**	**N19/006885**	**N19/006886**	
Date Sampled		**14-MAR-2019**	**14-MAR-2019**	**14-MAR-2019**	**14-MAR-2019**	
Sample Reference	**Units**	**RB01**	**QA01**	**P9**	**P34**	**Method**
PFAS (per-and poly-fluoroalkyl substances)						
PFBA (375-22-4)	ug/L	<0.005	0.018	<0.005	<0.005	NR70
PFPeA (2706-90-3)	ug/L	<0.002	0.029	<0.002	0.0029	NR70
PFHxA (307-24-4)	ug/L	<0.001	0.037	<0.001	0.015	NR70
PFHpA (375-85-9)	ug/L	<0.001	0.013	0.0063	0.0011	NR70
PFOA (335-67-1)	ug/L	<0.001	0.029	<0.001	0.0012	NR70
PFNA (375-95-1)	ug/L	<0.001	<0.001	<0.001	<0.001	NR70
PFDA (335-76-2)	ug/L	<0.001	<0.001	<0.001	<0.001	NR70
PFUdA (2058-94-8)	ug/L	<0.001	<0.001	<0.001	<0.001	NR70
PFDoA (307-55-1)	ug/L	<0.001	<0.001	<0.001	<0.001	NR70
PFTrDA (72629-94-8)	ug/L	<0.002	<0.002	<0.002	<0.002	NR70
PFTeDA (376-06-7)	ug/L	<0.002	<0.02	<0.002	<0.002	NR70
PFHxDA (67905-19-5)	ug/L	<0.002	<0.02	<0.002	<0.02	NR70
PFODA (16517-11-6)	ug/L	<0.005	0.0055	<0.005	<0.005	NR70
FOUEA (70887-84-2)	ug/L	<0.001	<0.001	<0.001	<0.001	NR70
PFBS (375-73-5)	ug/L	<0.001	0.0032	0.0037	0.018	NR70
PFPeS (2706-91-4)	ug/L	<0.001	0.0026	0.0017	0.017	NR70
PFHxS (355-46-4)	ug/L	<0.001	0.035	0.019	0.14	NR70
PFHpS (375-92-8)	ug/L	<0.001	<0.001	<0.001	0.0019	NR70
PFOS (1763-23-1)	ug/L	<0.002	0.024	0.0057	0.025	NR70
PFNS (68259-12-1)	ug/L	<0.001	<0.001	<0.001	<0.001	NR70
PFDS (335-77-3)	ug/L	<0.001	<0.001	<0.001	<0.001	NR70
PFOSA (754-91-6)	ug/L	<0.001	<0.001	<0.001	<0.001	NR70
N-MeFOSA (31506-32-8)	ug/L	<0.002	<0.02	<0.02	<0.002	NR70
N-EtFOSA (4151-50-2)	ug/L	<0.002	<0.02	<0.02	<0.02	NR70
N-MeFOSAA (2355-31-9)	ug/L	<0.002	<0.002	<0.002	<0.002	NR70
N-EtFOSAA(2991-50-6)	ug/L	<0.002	<0.002	<0.002	<0.002	NR70

REPORT OF ANALYSIS

Lab Reg No.			N19/006883	N19/006884	N19/006885	N19/006886	
Date Sampled			**14-MAR-2019**	**14-MAR-2019**	**14-MAR-2019**	**14-MAR-2019**	
Sample Reference		**Units**	**RB01**	**QA01**	**P9**	**P34**	**Method**
PFAS (per-and poly-fluoroalkyl substances)							
N-MeFOSE (24448-09-7)		ug/L	<0.005	<0.005	<0.005	<0.005	NR70
N-EtFOSE (1691-99-2)		ug/L	<0.005	<0.005	<0.005	<0.005	NR70
4:2 FTS (757124-72-4)		ug/L	<0.001	<0.001	<0.001	<0.001	NR70
6:2 FTS (27619-97-2)		ug/L	<0.001	0.38	0.0078	0.0087	NR70
8:2 FTS (39108-34-4)		ug/L	<0.001	<0.001	<0.001	<0.001	NR70
10:2 FTS (120226-60-0)		ug/L	<0.001	<0.001	<0.001	<0.001	NR70
8:2 diPAP (678-41-1)		ug/L	<0.02	<0.05	<0.02	<0.02	NR70
PFBA (Surrogate Recovery)		%	98	108	97	100	NR70
PFPeA (Surrogate Recovery)		%	89	119	98	114	NR70
PFHxA (Surrogate Recovery)		%	102	113	103	97	NR70
PFHpA (Surrogate Recovery)		%	110	110	102	100	NR70
PFOA (Surrogate Recovery)		%	110	106	97	106	NR70
PFNA (Surrogate Recovery)		%	94	100	90	109	NR70
PFDA (Surrogate Recovery)		%	93	98	79	100	NR70
PFUdA (Surrogate Recovery)		%	81	58	65	79	NR70
PFDoA (Surrogate Recovery)		%	71	45	49	68	NR70
FOUEA (Surrogate Recovery)		%	78	81	85	91	NR70
PFBS (Surrogate Recovery)		%	104	107	102	98	NR70
PFHxS (Surrogate Recovery)		%	101	103	96	95	NR70
PFOS (Surrogate Recovery)		%	99	108	99	109	NR70
PFOSA (Surrogate Recovery)		%	90	67	69	92	NR70
N-MeFOSAA (Surrogate Recovery)		%	68	58	50	73	NR70
N-EtFOSAA (Surrogate Recovery)		%	77	52	54	62	NR70
N-MeFOSE (Surrogate Recovery)		%	83	56	50	78	NR70
N-EtFOSE (Surrogate Recovery)		%	88	49	55	68	NR70
4:2 FTS (Surrogate Recovery)		%	77	99	97	77	NR70
6:2 FTS (Surrogate Recovery)		%	74	137	73	74	NR70
8:2 FTS (Surrogate Recovery)		%	71	69	58	69	NR70
Dates							
Date extracted			21-MAR-2019	21-MAR-2019	21-MAR-2019	21-MAR-2019	
Date analysed			26-MAR-2019	26-MAR-2019	26-MAR-2019	26-MAR-2019	

N19/006883
to
N19/006896:
PFOS is quantified using a combined branched and linear standard,
linear and branched isomers are totalled for reporting.
All results corrected for labelled surrogate recoveries.

REPORT OF ANALYSIS

Selected PFAS surrogate recoveries are biased due to matrix effects.
LORs raised for selected analytes due to low surrogate recoveries.

Danny Slee, Section Manager
Organic - NSW
Accreditation No. 198

27-MAR-2019

REPORT OF ANALYSIS

Report No. RN1226775

Client : GHD PTY LTD
LEVEL 4, 211 VICTORIA SQUARE
ADELAIDE SA 5000

Attention : DILARA VALIFF
Project Name :
Your Client Services Manager :

Job No. : GHD15/190318
Quote No. : QT-02018
Order No. : 3319051
Date Received : 18-MAR-2019
Sampled By : CLIENT
Phone : (02) 94490161

Lab Reg No.	Sample Ref	Sample Description
N19/006887	P35	WATER 14-3-19
N19/006888	P36	WATER 14-3-19
N19/006889	P40	WATER 14-3-19
N19/006890	P41	WATER 14-3-19

Lab Reg No.		**N19/006887**	**N19/006888**	**N19/006889**	**N19/006890**	
Date Sampled		**14-MAR-2019**	**14-MAR-2019**	**14-MAR-2019**	**14-MAR-2019**	
Sample Reference	**Units**	**P35**	**P36**	**P40**	**P41**	**Method**
PFAS (per-and poly-fluoroalkyl substances)						
PFBA (375-22-4)	ug/L	<0.05	0.016	0.018	0.0081	NR70
PFPeA (2706-90-3)	ug/L	<0.02	0.023	0.028	0.0096	NR70
PFHxA (307-24-4)	ug/L	<0.01	0.027	0.037	0.0097	NR70
PFHpA (375-85-9)	ug/L	<0.01	0.019	0.012	0.0072	NR70
PFOA (335-67-1)	ug/L	<0.01	0.019	0.028	0.0040	NR70
PFNA (375-95-1)	ug/L	<0.01	<0.001	<0.001	<0.001	NR70
PFDA (335-76-2)	ug/L	<0.01	<0.001	<0.001	<0.001	NR70
PFUdA (2058-94-8)	ug/L	<0.01	<0.001	<0.001	<0.001	NR70
PFDoA (307-55-1)	ug/L	<0.01	<0.001	<0.001	<0.001	NR70
PFTrDA (72629-94-8)	ug/L	<0.02	<0.002	<0.002	<0.002	NR70
PFTeDA (376-06-7)	ug/L	<0.02	<0.002	<0.002	<0.02	NR70
PFHxDA (67905-19-5)	ug/L	<0.02	<0.002	<0.02	<0.02	NR70
PFODA (16517-11-6)	ug/L	<0.05	<0.005	<0.005	<0.005	NR70
FOUEA (70887-84-2)	ug/L	<0.01	<0.001	<0.001	<0.001	NR70
PFBS (375-73-5)	ug/L	<0.01	0.015	0.0035	0.0097	NR70
PFPeS (2706-91-4)	ug/L	<0.01	0.0088	0.0027	0.0096	NR70
PFHxS (355-46-4)	ug/L	0.024	0.084	0.038	0.082	NR70
PFHpS (375-92-8)	ug/L	<0.01	0.0012	<0.001	0.0011	NR70
PFOS (1763-23-1)	ug/L	0.037	0.050	0.032	0.021	NR70
PFNS (68259-12-1)	ug/L	<0.01	<0.001	<0.001	<0.001	NR70
PFDS (335-77-3)	ug/L	<0.01	<0.001	<0.001	<0.001	NR70
PFOSA (754-91-6)	ug/L	<0.01	<0.001	<0.001	<0.001	NR70
N-MeFOSA (31506-32-8)	ug/L	<0.02	<0.002	<0.002	<0.02	NR70
N-EtFOSA (4151-50-2)	ug/L	<0.02	<0.002	<0.02	<0.02	NR70
N-MeFOSAA (2355-31-9)	ug/L	<0.01	<0.002	<0.002	<0.002	NR70
N-EtFOSAA(2991-50-6)	ug/L	<0.01	<0.002	<0.002	<0.002	NR70

REPORT OF ANALYSIS

Lab Reg No.	Units	N19/006887	N19/006888	N19/006889	N19/006890	Method
Date Sampled		14-MAR-2019	14-MAR-2019	14-MAR-2019	14-MAR-2019	
Sample Reference		P35	P36	P40	P41	
PFAS (per-and poly-fluoroalkyl substances)						
N-MeFOSE (24448-09-7)	ug/L	<0.05	<0.005	<0.005	<0.005	NR70
N-EtFOSE (1691-99-2)	ug/L	<0.05	<0.005	<0.005	<0.005	NR70
4:2 FTS (757124-72-4)	ug/L	<0.01	<0.001	<0.001	<0.001	NR70
6:2 FTS (27619-97-2)	ug/L	0.065	<0.001	0.25	0.19	NR70
8:2 FTS (39108-34-4)	ug/L	<0.01	<0.001	<0.001	<0.001	NR70
10:2 FTS (120226-60-0)	ug/L	<0.01	<0.001	<0.001	<0.001	NR70
8:2 diPAP (678-41-1)	ug/L	<0.02	<0.02	<0.02	<0.02	NR70
PFBA (Surrogate Recovery)	%	98	98	109	94	NR70
PFPeA (Surrogate Recovery)	%	93	122	128	97	NR70
PFHxA (Surrogate Recovery)	%	103	110	119	126	NR70
PFHpA (Surrogate Recovery)	%	102	112	116	120	NR70
PFOA (Surrogate Recovery)	%	107	106	110	105	NR70
PFNA (Surrogate Recovery)	%	89	99	101	92	NR70
PFDA (Surrogate Recovery)	%	89	90	76	78	NR70
PFUdA (Surrogate Recovery)	%	77	78	65	61	NR70
PFDoA (Surrogate Recovery)	%	78	68	46	38	NR70
FOUEA (Surrogate Recovery)	%	82	84	91	82	NR70
PFBS (Surrogate Recovery)	%	110	104	106	110	NR70
PFHxS (Surrogate Recovery)	%	103	98	106	106	NR70
PFOS (Surrogate Recovery)	%	94	101	103	100	NR70
PFOSA (Surrogate Recovery)	%	77	79	69	61	NR70
N-MeFOSAA (Surrogate Recovery)	%	72	57	53	47	NR70
N-EtFOSAA (Surrogate Recovery)	%	61	48	42	26	NR70
N-MeFOSE (Surrogate Recovery)	%	83	56	62	33	NR70
N-EtFOSE (Surrogate Recovery)	%	93	63	51	54	NR70
4:2 FTS (Surrogate Recovery)	%	76	109	117	103	NR70
6:2 FTS (Surrogate Recovery)	%	88	73	139	106	NR70
8:2 FTS (Surrogate Recovery)	%	94	75	73	58	NR70
Dates						
Date extracted		20-MAR-2019	21-MAR-2019	21-MAR-2019	21-MAR-2019	
Date analysed		20-MAR-2019	26-MAR-2019	26-MAR-2019	26-MAR-2019	

N19/006887
PFAS LORs raised for this sample due to insufficient
sample provided for analysis.

REPORT OF ANALYSIS

Lab Reg No.			**N19/006887**	**N19/006888**	**N19/006889**	**N19/006890**	
Date Sampled			**14-MAR-2019**	**14-MAR-2019**	**14-MAR-2019**	**14-MAR-2019**	
Sample Reference		**Units**	**P35**	**P36**	**P40**	**P41**	**Method**

Danny Slee, Section Manager
Organic - NSW
Accreditation No. 198

27-MAR-2019

REPORT OF ANALYSIS

Client	: GHD PTY LTD LEVEL 4, 211 VICTORIA SQUARE ADELAIDE SA 5000	**Job No.**	: GHD15/190318
		Quote No.	: QT-02018
		Order No.	: 3319051
		Date Received	: 18-MAR-2019
Attention	: DILARA VALIFF	**Sampled By**	: CLIENT
Project Name	:		
Your Client Services Manager	:	**Phone**	: (02) 94490161

Lab Reg No.	**Sample Ref**	**Sample Description**
N19/006891	P42	WATER 14-3-19
N19/006892	P43	WATER 14-3-19
N19/006893	P44	WATER 14-3-19
N19/006894	GWP1-PFC	WATER 14-3-19

Lab Reg No.		**N19/006891**	**N19/006892**	**N19/006893**	**N19/006894**	
Date Sampled		**14-MAR-2019**	**14-MAR-2019**	**14-MAR-2019**	**14-MAR-2019**	
Sample Reference	**Units**	**P42**	**P43**	**P44**	**GWP1-PFC**	**Method**
PFAS (per-and poly-fluoroalkyl substances)						
PFBA (375-22-4)	ug/L	0.0068	<0.005	0.028	<0.005	NR70
PFPeA (2706-90-3)	ug/L	0.0059	<0.002	0.043	<0.002	NR70
PFHxA (307-24-4)	ug/L	0.011	<0.001	0.29	0.0037	NR70
PFHpA (375-85-9)	ug/L	0.0036	<0.001	0.035	<0.001	NR70
PFOA (335-67-1)	ug/L	0.0074	0.0013	0.050	0.0011	NR70
PFNA (375-95-1)	ug/L	<0.001	<0.001	<0.001	<0.001	NR70
PFDA (335-76-2)	ug/L	<0.001	<0.001	<0.001	<0.001	NR70
PFUdA (2058-94-8)	ug/L	<0.001	<0.001	<0.001	<0.001	NR70
PFDoA (307-55-1)	ug/L	<0.001	<0.001	<0.001	<0.001	NR70
PFTrDA (72629-94-8)	ug/L	<0.002	<0.002	<0.002	<0.002	NR70
PFTeDA (376-06-7)	ug/L	<0.02	<0.002	<0.02	<0.002	NR70
PFHxDA (67905-19-5)	ug/L	<0.02	<0.02	<0.02	<0.002	NR70
PFODA (16517-11-6)	ug/L	<0.05	<0.05	<0.05	<0.005	NR70
FOUEA (70887-84-2)	ug/L	<0.001	<0.001	<0.001	<0.001	NR70
PFBS (375-73-5)	ug/L	0.0084	0.0035	0.12	0.0056	NR70
PFPeS (2706-91-4)	ug/L	0.0077	0.0034	0.17	0.0051	NR70
PFHxS (355-46-4)	ug/L	0.077	0.023	1.6	0.039	NR70
PFHpS (375-92-8)	ug/L	0.0016	<0.001	0.017	<0.001	NR70
PFOS (1763-23-1)	ug/L	0.035	0.029	0.058	0.011	NR70
PFNS (68259-12-1)	ug/L	<0.001	<0.001	<0.001	<0.001	NR70
PFDS (335-77-3)	ug/L	<0.001	<0.001	<0.001	<0.001	NR70
PFOSA (754-91-6)	ug/L	<0.001	<0.001	<0.001	<0.001	NR70
N-MeFOSA (31506-32-8)	ug/L	<0.02	<0.02	<0.02	<0.02	NR70
N-EtFOSA (4151-50-2)	ug/L	<0.02	<0.02	<0.02	<0.02	NR70
N-MeFOSAA (2355-31-9)	ug/L	<0.002	<0.002	<0.002	<0.002	NR70
N-EtFOSAA(2991-50-6)	ug/L	<0.02	<0.002	<0.002	<0.002	NR70

REPORT OF ANALYSIS

Lab Reg No.		**N19/006891**	**N19/006892**	**N19/006893**	**N19/006894**	
Date Sampled		**14-MAR-2019**	**14-MAR-2019**	**14-MAR-2019**	**14-MAR-2019**	
Sample Reference	**Units**	**P42**	**P43**	**P44**	**GWP1-PFC**	**Method**
PFAS (per-and poly-fluoroalkyl substances)						
N-MeFOSE (24448-09-7)	ug/L	<0.005	<0.005	<0.005	<0.005	NR70
N-EtFOSE (1691-99-2)	ug/L	<0.05	<0.005	<0.005	<0.005	NR70
4:2 FTS (757124-72-4)	ug/L	<0.001	<0.001	<0.001	<0.001	NR70
6:2 FTS (27619-97-2)	ug/L	0.024	0.0061	0.031	0.0057	NR70
8:2 FTS (39108-34-4)	ug/L	<0.001	<0.001	<0.001	<0.001	NR70
10:2 FTS (120226-60-0)	ug/L	<0.001	<0.001	<0.001	<0.001	NR70
8:2 diPAP (678-41-1)	ug/L	<0.05	<0.02	<0.02	<0.02	NR70
PFBA (Surrogate Recovery)	%	106	94	104	104	NR70
PFPeA (Surrogate Recovery)	%	104	96	112	118	NR70
PFHxA (Surrogate Recovery)	%	116	120	104	114	NR70
PFHpA (Surrogate Recovery)	%	114	120	128	111	NR70
PFOA (Surrogate Recovery)	%	102	112	106	107	NR70
PFNA (Surrogate Recovery)	%	94	99	86	94	NR70
PFDA (Surrogate Recovery)	%	82	100	75	85	NR70
PFUdA (Surrogate Recovery)	%	58	80	43	71	NR70
PFDoA (Surrogate Recovery)	%	30	71	28	68	NR70
FOUEA (Surrogate Recovery)	%	39	78	85	82	NR70
PFBS (Surrogate Recovery)	%	46	108	105	104	NR70
PFHxS (Surrogate Recovery)	%	43	105	71	98	NR70
PFOS (Surrogate Recovery)	%	48	89	86	96	NR70
PFOSA (Surrogate Recovery)	%	30	83	53	84	NR70
N-MeFOSAA (Surrogate Recovery)	%	23	64	43	68	NR70
N-EtFOSAA (Surrogate Recovery)	%	<20	69	35	62	NR70
N-MeFOSE (Surrogate Recovery)	%	26	63	39	75	NR70
N-EtFOSE (Surrogate Recovery)	%	<20	49	40	38	NR70
4:2 FTS (Surrogate Recovery)	%	35	93	97	77	NR70
6:2 FTS (Surrogate Recovery)	%	25	69	79	66	NR70
8:2 FTS (Surrogate Recovery)	%	25	72	67	64	NR70
Dates						
Date extracted		21-MAR-2019	21-MAR-2019	21-MAR-2019	21-MAR-2019	
Date analysed		26-MAR-2019	26-MAR-2019	26-MAR-2019	26-MAR-2019	

Danny Slee, Section Manager
Organic - NSW
Accreditation No. 198

27-MAR-2019

REPORT OF ANALYSIS

Client	: GHD PTY LTD LEVEL 4, 211 VICTORIA SQUARE ADELAIDE SA 5000	**Job No.** **Quote No.** **Order No.** **Date Received**	:	GHD15/190318 QT-02018 3319051 18-MAR-2019
Attention	: DILARA VALIFF	**Sampled By**	:	CLIENT
Project Name	:			
Your Client Services Manager	:	**Phone**	:	(02) 94490161

Lab Reg No.	**Sample Ref**	**Sample Description**
N19/006895	GWP2-PFC	WATER 14-3-19
N19/006896	GWP3-PFC	WATER 14-3-19

Lab Reg No.			**N19/006895**	**N19/006896**			
Date Sampled			**14-MAR-2019**	**14-MAR-2019**			
Sample Reference		**Units**	**GWP2-PFC**	**GWP3-PFC**			**Method**
PFAS (per-and poly-fluoroalkyl substances)							
PFBA (375-22-4)		ug/L	<0.005	0.0083			NR70
PFPeA (2706-90-3)		ug/L	<0.002	<0.002			NR70
PFHxA (307-24-4)		ug/L	0.0033	<0.001			NR70
PFHpA (375-85-9)		ug/L	0.0011	<0.001			NR70
PFOA (335-67-1)		ug/L	0.0015	0.0015			NR70
PFNA (375-95-1)		ug/L	<0.001	<0.001			NR70
PFDA (335-76-2)		ug/L	<0.001	<0.001			NR70
PFUdA (2058-94-8)		ug/L	<0.001	<0.001			NR70
PFDoA (307-55-1)		ug/L	<0.001	<0.001			NR70
PFTrDA (72629-94-8)		ug/L	<0.002	<0.002			NR70
PFTeDA (376-06-7)		ug/L	<0.002	<0.002			NR70
PFHxDA (67905-19-5)		ug/L	<0.002	<0.002			NR70
PFODA (16517-11-6)		ug/L	<0.005	<0.005			NR70
FOUEA (70887-84-2)		ug/L	<0.001	<0.001			NR70
PFBS (375-73-5)		ug/L	0.0082	0.0018			NR70
PFPeS (2706-91-4)		ug/L	0.0075	0.0011			NR70
PFHxS (355-46-4)		ug/L	0.068	0.0065			NR70
PFHpS (375-92-8)		ug/L	<0.001	<0.001			NR70
PFOS (1763-23-1)		ug/L	0.039	0.018			NR70
PFNS (68259-12-1)		ug/L	<0.001	<0.001			NR70
PFDS (335-77-3)		ug/L	<0.001	<0.001			NR70
PFOSA (754-91-6)		ug/L	<0.001	<0.001			NR70
N-MeFOSA (31506-32-8)		ug/L	<0.002	<0.02			NR70
N-EtFOSA (4151-50-2)		ug/L	<0.002	<0.02			NR70
N-MeFOSAA (2355-31-9)		ug/L	<0.002	<0.002			NR70
N-EtFOSAA(2991-50-6)		ug/L	<0.002	<0.002			NR70
N-MeFOSE (24448-09-7)		ug/L	<0.005	<0.005			NR70
N-EtFOSE (1691-99-2)		ug/L	<0.005	<0.005			NR70

REPORT OF ANALYSIS

Lab Reg No.		N19/006895	N19/006896			
Date Sampled		14-MAR-2019	14-MAR-2019			
Sample Reference	Units	GWP2-PFC	GWP3-PFC			Method
PFAS (per-and poly-fluoroalkyl substances)						
4:2 FTS (757124-72-4)	ug/L	<0.001	<0.001			NR70
6:2 FTS (27619-97-2)	ug/L	0.019	0.023			NR70
8:2 FTS (39108-34-4)	ug/L	<0.001	<0.001			NR70
10:2 FTS (120226-60-0)	ug/L	<0.001	<0.001			NR70
8:2 diPAP (678-41-1)	ug/L	<0.02	<0.02			NR70
PFBA (Surrogate Recovery)	%	93	102			NR70
PFPeA (Surrogate Recovery)	%	105	105			NR70
PFHxA (Surrogate Recovery)	%	104	122			NR70
PFHpA (Surrogate Recovery)	%	109	112			NR70
PFOA (Surrogate Recovery)	%	104	105			NR70
PFNA (Surrogate Recovery)	%	97	112			NR70
PFDA (Surrogate Recovery)	%	83	95			NR70
PFUdA (Surrogate Recovery)	%	82	85			NR70
PFDoA (Surrogate Recovery)	%	72	78			NR70
FOUEA (Surrogate Recovery)	%	83	75			NR70
PFBS (Surrogate Recovery)	%	97	104			NR70
PFHxS (Surrogate Recovery)	%	93	101			NR70
PFOS (Surrogate Recovery)	%	102	102			NR70
PFOSA (Surrogate Recovery)	%	84	81			NR70
N-MeFOSAA (Surrogate Recovery)	%	69	66			NR70
N-EtFOSAA (Surrogate Recovery)	%	83	63			NR70
N-MeFOSE (Surrogate Recovery)	%	72	48			NR70
N-EtFOSE (Surrogate Recovery)	%	72	58			NR70
4:2 FTS (Surrogate Recovery)	%	75	84			NR70
6:2 FTS (Surrogate Recovery)	%	57	64			NR70
8:2 FTS (Surrogate Recovery)	%	63	76			NR70
Dates						
Date extracted		21-MAR-2019	21-MAR-2019			
Date analysed		26-MAR-2019	26-MAR-2019			

Danny Slee, Section Manager
Organic - NSW
Accreditation No. 198

27-MAR-2019

ACCREDITED FOR
TECHNICAL
COMPETENCE

Accredited for compliance with ISO/IEC 17025 - Testing.
This report shall not be reproduced except in full.
Results relate only to the sample(s) tested.

This Report supersedes reports: *RN1226772*

Measurement Uncertainty is available upon request.

Australian Government

National Measurement Institute

QUALITY ASSURANCE REPORT

Client: GHD PTY LTD

NMI QA Report No: GHD15/190318 **Sample Matrix:** Liquid

Analyte	Method	LOR	Blank	Sample Duplicates			Recoveries	
				Sample	Duplicate	RPD	LCS	Matrix Spike
		ug/L	ug/L	ug/L	ug/L	%	%	%
PFBA (375-22-4)	NR70	0.005	<0.005	NA	NA	NA	104	NA
PFPeA (2706-90-3)	NR70	0.002	<0.002	NA	NA	NA	86	NA
PFHxA (307-24-4)	NR70	0.001	<0.001	NA	NA	NA	76	NA
PFHpA (375-85-9)	NR70	0.001	<0.001	NA	NA	NA	83	NA
PFOA (335-67-1)	NR70	0.001	<0.001	NA	NA	NA	80	NA
PFNA (375-95-1)	NR70	0.001	<0.001	NA	NA	NA	86	NA
PFDA (335-76-2)	NR70	0.001	<0.001	NA	NA	NA	84	NA
PFUdA (2058-94-8)	NR70	0.001	<0.001	NA	NA	NA	93	NA
PFDoA (307-55-1)	NR70	0.001	<0.001	NA	NA	NA	86	NA
PFTrDA (72629-94-8)	NR70	0.002	<0.002	NA	NA	NA	79	NA
PFTeDA (376-06-7)	NR70	0.002	<0.002	NA	NA	NA	89	NA
PFHxDA (67905-19-5)	NR70	0.002	<0.002	NA	NA	NA	91	NA
FOUEA (70887-84-2)	NR70	0.001	<0.001	NA	NA	NA	96	NA
PFBS (375-73-5)	NR70	0.001	<0.001	NA	NA	NA	91	NA
PFPeS (2706-91-4)	NR70	0.001	<0.001	NA	NA	NA	87	NA
PFHxS (355-46-4)	NR70	0.001	<0.001	NA	NA	NA	87	NA
PFHpS (375-92-8)	NR70	0.001	<0.001	NA	NA	NA	87	NA
PFOS (1763-23-1)	NR70	0.002	<0.002	NA	NA	NA	85	NA
PFNS (68259-12-1)	NR70	0.001	<0.001	NA	NA	NA	82	NA
PFDS (335-77-3)	NR70	0.001	<0.001	NA	NA	NA	79	NA
PFOSA (754-91-6)	NR70	0.001	<0.001	NA	NA	NA	79	NA
N-MeFOSA (31506-32-8)	NR70	0.002	<0.002	NA	NA	NA	80	NA
N-EtFOSA (4151-50-2)	NR70	0.002	<0.002	NA	NA	NA	73	NA
N-MeFOSAA (2355-31-9)	NR70	0.002	<0.002	NA	NA	NA	106	NA
N-EtFOSAA(2991-50-6)	NR70	0.002	<0.002	NA	NA	NA	80	NA
N-MeFOSE (24448-09-7)	NR70	0.005	<0.005	NA	NA	NA	87	NA
N-EtFOSE (1691-99-2)	NR70	0.005	<0.005	NA	NA	NA	92	NA
4:2 FTS (757124-72-4)	NR70	0.001	<0.001	NA	NA	NA	93	NA
6:2 FTS (27619-97-2)	NR70	0.001	<0.001	NA	NA	NA	92	NA
8:2 FTS (39108-34-4)	NR70	0.001	<0.001	NA	NA	NA	92	NA
10:2 FTS (120226-60-0)	NR70	0.001	<0.001	NA	NA	NA	72	NA
8:2 diPAP (678-41-1)	NR70	0.002	<0.002	NA	NA	NA	91	NA

Results expressed in percentage (%) or ug/L wherever appropriate.
Acceptable Spike recovery is 50-150%.
Maximum acceptable RPDs on spikes and duplicates is 40%.
'NA ' = Not Applicable.
RPD= Relative Percentage Difference.

Signed:

Danny Slee
Organics Manager, NMI-North Ryde

Date: **27/03/2019**

Australian Government
National Measurement Institute

QUALITY ASSURANCE REPORT

Client: GHD PTY LTD

NMI QA Report No: GHD15/190318 **Sample Matrix:** Solid

Analyte	Method	LOR	Blank	Sample Duplicates			Recoveries	
				Sample	Duplicate	RPD	LCS	Matrix Spike
		mg/kg	mg/kg	mg/kg	mg/kg	%	%	%
				N19/006898	N19/006898			N19/006898
PFBA (375-22-4)	NR70	0.002	<0.002	0.0025	<0.002	-	112	86
PFPeA (2706-90-3)	NR70	0.002	<0.002	<0.002	<0.002	-	104	98
PFHxA (307-24-4)	NR70	0.001	<0.001	<0.001	<0.001	-	89	94
PFHpA (375-85-9)	NR70	0.001	<0.001	<0.001	<0.001	-	91	104
PFOA (335-67-1)	NR70	0.001	<0.001	<0.001	<0.001	-	86	86
PFNA (375-95-1)	NR70	0.001	<0.001	<0.001	<0.001	-	100	93
PFDA (335-76-2)	NR70	0.001	<0.001	<0.001	<0.001	-	62	72
PFUdA (2058-94-8)	NR70	0.002	<0.002	<0.002	<0.002	-	102	92
PFDoA (307-55-1)	NR70	0.002	<0.002	<0.002	<0.002	-	94	106
PFTrDA (72629-94-8)	NR70	0.002	<0.002	<0.002	<0.002	-	104	114
PFTeDA (376-06-7)	NR70	0.002	<0.002	<0.002	<0.002	-	92	95
PFHxDA (67905-19-5)	NR70	0.002	<0.002	<0.002	<0.002	-	85	89
PFODA (16517-11-6)	NR70	0.005	<0.005	<0.005	<0.005	-	95	95
FOUEA (70887-84-2)	NR70	0.001	<0.001	<0.001	<0.001	-	95	96
PFBS (375-73-5)	NR70	0.001	<0.001	<0.001	<0.001	-	97	100
PFPeS (2706-91-4)	NR70	0.001	<0.001	<0.001	<0.001	-	98	97
PFHxS (355-46-4)	NR70	0.001	<0.001	<0.001	<0.001	-	96	104
PFHpS (375-92-8)	NR70	0.001	<0.001	<0.001	<0.001	-	101	109
PFOS (1763-23-1)	NR70	0.002	<0.002	<0.002	<0.002	-	97	103
PFNS (68259-12-1)	NR70	0.001	<0.001	<0.001	<0.001	-	93	102
PFDS (335-77-3)	NR70	0.001	<0.001	<0.001	<0.001	-	100	107
PFOSA (754-91-6)	NR70	0.001	<0.001	<0.001	<0.001	-	88	93
N-MeFOSA (31506-32-8)	NR70	0.002	<0.002	<0.002	<0.002	-	91	108
N-EtFOSA (4151-50-2)	NR70	0.002	<0.002	<0.002	<0.002	-	93	95
N-MeFOSAA (2355-31-9)	NR70	0.002	<0.002	<0.002	<0.002	-	103	81
N-EtFOSAA(2991-50-6)	NR70	0.002	<0.002	<0.002	<0.002	-	95	97
N-MeFOSE (24448-09-7)	NR70	0.005	<0.005	<0.005	<0.005	-	83	100
N-EtFOSE (1691-99-2)	NR70	0.005	<0.005	<0.005	<0.005	-	110	64
4:2 FTS (757124-72-4)	NR70	0.001	<0.001	<0.001	<0.001	-	98	106
6:2 FTS (27619-97-2)	NR70	0.001	<0.001	<0.001	<0.001	-	100	99
8:2 FTS (39108-34-4)	NR70	0.001	<0.001	<0.001	<0.001	-	109	75
10:2 FTS (120226-60-0)	NR70	0.002	<0.002	<0.002	<0.002	-	104	78
8:2 diPAP (678-41-1)	NR70	0.002	<0.002	<0.002	<0.002	-	92	95

Results expressed in percentage (%) or mg/kg wherever appropriate.
Acceptable Spike recovery is 50-150%.
Maximum acceptable RPDs on spikes and duplicates is 40%.
'NA ' = Not Applicable.
RPD= Relative Percentage Difference.

Signed:

Danny Slee
Organics Manager, NMI-North Ryde

Date: **27/03/2019**

CERTIFICATE OF ANALYSIS

Work Order	: **ES1908229**	Page	: 1 of 5
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: DILARA VALIFF	Contact	: Customer Services ES
Address	: 2/11 VICTORIA SQUARE ADELAIDE SA, AUSTRALIA 5000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 08 8111 6600	Telephone	: +61-2-8784 8555
Project	: ----	Date Samples Received	: 18-Mar-2019 15:30
Order number	: 3319051	Date Analysis Commenced	: 20-Mar-2019
C-O-C number	: ----	Issue Date	: 21-Mar-2019 16:18
Sampler	: ----		
Site	:		
Quote number	: EN/005/18		
No. of samples received	: 1		
No. of samples analysed	: 1		

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

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. 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*
Franco Lentini		Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by 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 Contact 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.

Analytical Results

Sub-Matrix: **WATER**
(Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	**QA02**	----	----	----	----
			Client sampling date / time	14-Mar-2019 00:00	----	----	----	----
				ES1908229-001	--------	--------	--------	--------
				Result	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	**0.05**	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	----	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	**0.03**	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	**0.04**	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	**0.05**	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	**0.02**	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	**0.04**	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	----	----	----	----

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			Client sample ID	**QA02**	**----**	**----**	**----**	**----**
			Client sampling date / time	14-Mar-2019 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	**ES1908229-001**	**--------**	**--------**	**--------**	**--------**
				Result	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	**0.80**	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	----	----	----	----
EP231P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	**1.03**	----	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	**0.08**	----	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L	**1.03**	----	----	----	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	**93.2**	----	----	----	----
13C8-PFOA	----	0.02	%	**102**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **WATER**

Compound	CAS Number	Recovery Limits (%)	
		Low	High
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

ALS Environmental

QUALITY CONTROL REPORT

Work Order : **ES1908229**

Client : **GHD PTY LTD**
Contact : DILARA VALIFF
Address : 2/11 VICTORIA SQUARE
ADELAIDE SA, AUSTRALIA 5000
Telephone : +61 08 8111 6600
Project : ----
Order number : 3319051
C-O-C number : ----
Sampler : ----
Site :
Quote number : EN/005/18
No. of samples received : 1
No. of samples analysed : 1

Page : 1 of 7

Laboratory : Environmental Division Sydney
Contact : Customer Services ES
Address : 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone : +61-2-8784 8555
Date Samples Received : 18-Mar-2019
Date Analysis Commenced : 20-Mar-2019
Issue Date : 21-Mar-2019

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. 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*
Franco Lentini		Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by 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 hig

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
\# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 2244917)									
EM1903824-005	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EM1903711-001	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 2244917)									
EM1903824-005	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
EM1903711-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 2244917) - continued									
EM1903711-001	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 2244917)									
EM1903824-005	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EM1903711-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 2244917)									
EM1903824-005	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 2244917) - continued									
EM1903824-005	Anonymous	EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EM1903711-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 2244917)									
EM1903824-005	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.00	No Limit
EM1903711-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2244917)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.5 µg/L	105	70	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.5 µg/L	112	70	130
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.5 µg/L	99.6	70	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.5 µg/L	114	70	130
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.5 µg/L	102	70	130
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.5 µg/L	112	70	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2244917)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	2.5 µg/L	122	70	130
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.5 µg/L	117	70	130
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.5 µg/L	117	70	130
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.5 µg/L	115	70	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.5 µg/L	119	70	130
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.5 µg/L	110	70	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.5 µg/L	103	70	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.5 µg/L	97.6	70	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.5 µg/L	76.6	70	130
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.5 µg/L	114	70	130
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	1.25 µg/L	119	70	150
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2244917)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.5 µg/L	104	70	130
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	1.25 µg/L	122	70	150
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	1.25 µg/L	108	70	150
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	1.25 µg/L	120	70	150
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	1.25 µg/L	119	70	150
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.5 µg/L	122	70	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.5 µg/L	123	70	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2244917)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.5 µg/L	116	70	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.5 µg/L	117	70	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.5 µg/L	114	70	130

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2244917) - continued								
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.5 µg/L	105	70	130

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2244917)							
EM1903824-005	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.5 µg/L	97.0	50	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.5 µg/L	108	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.5 µg/L	101	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.5 µg/L	116	50	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.5 µg/L	106	50	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.5 µg/L	122	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2244917)							
EM1903824-005	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	2.5 µg/L	119	50	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.5 µg/L	107	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.5 µg/L	115	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.5 µg/L	110	50	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.5 µg/L	115	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.5 µg/L	111	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.5 µg/L	102	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.5 µg/L	94.2	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.5 µg/L	83.8	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.5 µg/L	100	50	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	1.25 µg/L	124	50	150
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2244917)							
EM1903824-005	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.5 µg/L	95.6	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	1.25 µg/L	122	50	150
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	1.25 µg/L	94.8	50	150
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	1.25 µg/L	116	50	150
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	1.25 µg/L	114	50	150
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.5 µg/L	114	50	130

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%) Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2244917) - continued							
EM1903824-005	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.5 µg/L	115	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2244917)							
EM1903824-005	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.5 µg/L	108	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.5 µg/L	116	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.5 µg/L	106	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.5 µg/L	111	50	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES1908229**	Page	: 1 of 4
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: DILARA VALIFF	Telephone	: +61-2-8784 8555
Project	: ----	Date Samples Received	: 18-Mar-2019
Site	:	Issue Date	: 21-Mar-2019
Sampler	: ----	No. of samples received	: 1
Order number	: 3319051	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.**
- **NO Matrix Spike outliers occur.**
- **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.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method	*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							
Clear Plastic Bottle - Natural (EP231X) QA02	**14-Mar-2019**	**20-Mar-2019**	10-Sep-2019	✓	**20-Mar-2019**	10-Sep-2019	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
Clear Plastic Bottle - Natural (EP231X) QA02	**14-Mar-2019**	**20-Mar-2019**	10-Sep-2019	✓	**20-Mar-2019**	10-Sep-2019	✓
EP231C: Perfluoroalkyl Sulfonamides							
Clear Plastic Bottle - Natural (EP231X) QA02	**14-Mar-2019**	**20-Mar-2019**	10-Sep-2019	✓	**20-Mar-2019**	10-Sep-2019	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
Clear Plastic Bottle - Natural (EP231X) QA02	**14-Mar-2019**	**20-Mar-2019**	10-Sep-2019	✓	**20-Mar-2019**	10-Sep-2019	✓
EP231P: PFAS Sums							
Clear Plastic Bottle - Natural (EP231X) QA02	**14-Mar-2019**	**20-Mar-2019**	10-Sep-2019	✓	**20-Mar-2019**	10-Sep-2019	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	*Method*	*Matrix*	*Method Descriptions*
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In house: Direct injection analysis of fresh waters after dilution (1:1) with methanol. Analysis by LC-Electrospray-MS-MS, Negative Mode using MRM. Where commercially available, isotopically labelled analogues of the target analytes are used as internal standards for quantification. Where a labelled analogue is not commercially available, the internal standard with similar chemistry and the closest retention time to the target is used for quantification. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. This method complies with the quality control definitions as stated in QSM 5.1. Data is reviewed in line with the DQOs as stated in QSM5.1

Preparation Methods	*Method*	*Matrix*	*Method Descriptions*
Preparation for PFAS in water.	EP231-PR	WATER	Method presumes direct injection without workup. Preparation includes addition of internal standard and surrogate, and filtration prior to anaylsis.

CERTIFICATE OF ANALYSIS

Work Order : **ES1914608**
Client : **GHD PTY LTD**
Contact : DILARA VALIFF
Address : 2/11 VICTORIA SQUARE
ADELAIDE SA, AUSTRALIA 5000
Telephone : +61 08 8111 6600
Project : 3315565
Order number :
C-O-C number : ----
Sampler : ----
Site :
Quote number : EN/005/18
No. of samples received : 16
No. of samples analysed : 16

Page : 1 of 7
Laboratory : Environmental Division Sydney
Contact : Andrew Epps
Address : 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone : +61 7 3552 8639
Date Samples Received : 15-May-2019 10:00
Date Analysis Commenced : 19-May-2019
Issue Date : 22-May-2019 12:24

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. 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*
Franco Lentini		Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by 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 Contact 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.

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			Client sample ID	**RB**	**P34**	**P35**	**P36**	**P37**
			Client sampling date / time	13-May-2019 00:00	13-May-2019 00:00	13-May-2019 00:00	13-May-2019 00:00	13-May-2019 00:00
Compound	*CAS Number*	*LOR*	*Unit*	**ES1914608-001**	**ES1914608-002**	**ES1914608-003**	**ES1914608-004**	**ES1914608-005**
				Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	**0.03**	<0.02	**0.03**	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	**0.14**	**0.03**	**0.10**	**0.04**
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	**0.04**	**0.04**	**0.07**	**0.04**
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	<0.02	**0.02**	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	**0.02**	<0.02	**0.03**	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	<0.01	**0.02**	<0.01
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums								
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	**0.18**	**0.07**	**0.17**	**0.08**
Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	**0.23**	**0.07**	**0.27**	**0.08**
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	**104**	**101**	**101**	**103**	**105**
13C8-PFOA	----	0.02	%	**106**	**98.9**	**101**	**105**	**100**

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			*Client sample ID*	**P40**	**P41**	**P42**	**P43**	**P44**
			Client sampling date / time	13-May-2019 00:00	13-May-2019 00:00	13-May-2019 00:00	13-May-2019 00:00	13-May-2019 00:00
Compound	*CAS Number*	*LOR*	*Unit*	**ES1914608-006**	**ES1914608-007**	**ES1914608-008**	**ES1914608-009**	**ES1914608-010**
				Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	**0.02**	**0.02**	<0.02	**0.14**
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	**0.03**	**0.12**	**0.09**	**0.03**	**1.74**
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	**0.03**	**0.05**	**0.07**	**0.04**	**0.13**
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	**0.03**	<0.02	<0.02	<0.02	**0.05**
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	**0.05**	<0.02	<0.02	<0.02	**0.37**
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	**0.05**
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	**0.05**	<0.01	**0.02**	<0.01	**0.08**
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums								
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	**0.06**	**0.17**	**0.16**	**0.07**	**1.87**
Sum of PFAS (WA DER List)	----	0.01	µg/L	**0.19**	**0.19**	**0.20**	**0.07**	**2.56**
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	**101**	**101**	**102**	**100**	**100**
13C8-PFOA	----	0.02	%	**99.3**	**96.9**	**98.5**	**95.0**	**95.7**

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			*Client sample ID*	**GWP1-PFC**	**GWP2-PFC**	**GWP3-PFC**	**FD01**	**FD02**
			Client sampling date / time	13-May-2019 00:00	13-May-2019 00:00	13-May-2019 00:00	13-May-2019 00:00	13-May-2019 00:00
Compound	*CAS Number*	*LOR*	*Unit*	**ES1914608-011**	**ES1914608-012**	**ES1914608-013**	**ES1914608-014**	**ES1914608-015**
				Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	**0.15**	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	**0.04**	<0.02	**0.07**	**1.79**	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	**0.02**	**0.03**	**0.05**	**0.14**	**0.03**
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	<0.02	**0.05**	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	<0.02	**0.37**	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	<0.02	**0.04**	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	<0.01	**0.07**	<0.01
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums								
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	**0.06**	**0.03**	**0.12**	**1.93**	**0.03**
Sum of PFAS (WA DER List)	----	0.01	µg/L	**0.06**	**0.03**	**0.12**	**2.61**	**0.03**
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	**103**	**105**	**104**	**104**	**103**
13C8-PFOA	----	0.02	%	**104**	**96.0**	**95.7**	**96.5**	**99.8**

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)	*Client sample ID*			**FD03**	**----**	**----**	**----**	**----**
	Client sampling date / time			13-May-2019 00:00	----	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**ES1914608-016**	**--------**	**--------**	**--------**	**--------**
				Result	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	**0.08**	----	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	**0.05**	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	----	----	----	----
EP231P: PFAS Sums								
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	**0.13**	----	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L	**0.13**	----	----	----	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	**102**	----	----	----	----
13C8-PFOA	----	0.02	%	**93.7**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Appendix H – QA/QC

H. Data quality objectives and quality assurance / quality control

H.1 Data quality objectives

The data quality objectives (DQOs) and investigation strategy have been developed using the methodology discussed in NEPM Schedule B (2) *Guideline on Data Collection, Sample Design and Reporting.* The guideline nominates the implementation of the DQO process in Section 5 of AS4482.1-2005. The purpose of the DQO process is to ensure that the data collection activities are focused on collecting the information needed to make decisions, and answering the relevant questions leading up to such decisions.

The Data Quality Objectives (DQOs) establish a framework for contamination investigations which incorporates a seven stepped continuum that defines the problem at the site. A series of stages then optimises the design of the investigation. The seven steps are outlined below:

- Step 1: State the Problem
- Step 2: Identify the Principal Study Question
- Step 3: Inputs to the Decision
- Step 4: Boundaries of the Study
- Step 5: Decision Rules
- Step 6: Tolerable Limits on Decision Errors
- Step 7: Optimisation of the Data Collection Process

An overview of the DQOs for the investigation is presented below.

H.1.1 Step 1: state the problem

Parafield Airport Limited (AAL) engaged GHD Pty Ltd (GHD) to undertake this environmental investigation of off – site areas to the west and south – west of the Parafield Airport to assess the nature and extent of contamination associated with historical AFFF use.

Parafield Airport Limited (AAL) engaged GHD Pty Ltd (GHD) to undertake this environmental investigation in the vicinity of Parafield Airport following the identification of elevated PFAS levels in groundwater at groundwater monitoring wells GW3-PFC and P33 which are located airside on the western boundary of the airport and landside in the south western extent of the airport, respectively. Groundwater samples collected at GW3_PFC and P33 reported PFAS concentrations that exceeded the adopted criteria PFAS NEMP 2018 Health Drinking Water. As a result, AAL, in consultation with the SA EPA and other stakeholders, commissioned GHD to undertake an environmental investigation of off - site areas to the west and southwest of the Parafield Airport to assess the nature and extent of PFAS contamination associated with historical AFFF use. This included a bore use survey of residential and recreational properties within the assessment area. The locality of the assessment areas are presented in Figure 1 attached to this report.

H.1.2 Step 2: Identify the principal study question

The Environmental Investigation was based on the objectives listed in Section 1.2.

H.1.3 Step 3: Inputs to the decision

The following inputs are required for the decision:

- Information provided by the client from previous investigations
- Quantitative and qualitative data gained through intrusive sampling, analytical works and observations during intrusive investigations.

H.1.4 Step 4: Boundaries of the study

Spatial boundaries for the site are identified in Figure 1 at the end of this report with the vertical extent of the investigations limited to 7 mbgl.

H.1.5 Step 5: Decision rules

Groundwater analytical data will be assessed against the criteria adopted from relevant guidance as discussed in Section 2.

H.1.6 Step 6: Tolerable limits on decision errors

Data generated as part of the Environmental Investigation must be appropriate to allow decisions to be made with confidence. Specific limits have been adopted in accordance with the appropriate guidance from the AS4482.1 which includes appropriate indicators of data quality [data quality indicators (DQIs) used to assess QA/QC and GHD's Standard Field Operating Procedures].

To assess the usability of the data prior to making decisions, the data will be assessed against pre-determined DQIs. The DQIs including precision, accuracy, representativeness, comparability and completeness, will be reviewed at the completion of the Environmental Investigation to assess for the presence of decision errors.

The pre-determined DQIs established for the investigation are discussed below and shown in Table H-1.

- Precision - measures the reproducibility of measurements under a given set of conditions. The precision of the laboratory data and sampling techniques is assessed by calculating the Relative Percentage Difference (RPD) of duplicate samples
- Accuracy - measures the bias in a measurement system. The accuracy of the laboratory data that are generated during this investigation is a measure of the closeness of the analytical results obtained by a method to the ‘true’ (or standard) value. Accuracy is assessed by reference to the analytical results of laboratory control samples, laboratory spikes and analyses against reference standards
- Representativeness - expresses the degree to which sample data accurately and precisely represent a characteristic of a population or an environmental condition. Representativeness is achieved by collecting samples on a representative basis across the site, and by using an adequate number of sample locations to characterise the site to the required accuracy
- Comparability - expresses the confidence with which one data set can be compared with another. This is achieved through maintaining a level of consistency in techniques used to collect samples; ensuring analysing laboratories use consistent analysis techniques and reporting methods

- Completeness - is defined as the percentage of measurements made which are judged to be valid measurements.

Table H-1 Summary of quality assurance / quality control criteria

Data quality indicator	Frequency	Data quality acceptance criteria
Precision		
Duplicates (Intra-Laboratory)	1 / 20 samples	30% - 50% of mean concentration of analyte, however, this variation can be expected to be higher for organic analyses than for inorganics, and for low concentrations of analytes.
Duplicates (Inter-Laboratory)	1 / 20 samples	
Accuracy		
Laboratory (Method) Blank	One sample per batch of 20 samples or fewer	Less than detection limit or limit of reporting (LOR) of the method used.
Laboratory Control Spike		Dynamic Limits varying on previous laboratory data.
Laboratory Spike (Surrogate and Matrix)		Percent recovery is used to assess spiked samples and surrogate standards. Percent recovery is dependent on the type of analyte tested, the concentrations of analytes, and the sample matrix. For matrix spikes Eurofins adopts a matrix spike recovery range of 70-130%. For surrogate spikes Eurofins adopts static limits that vary dependant on matrix and surrogate compounds.
Laboratory Duplicates	One sample per batch of 10 samples or fewer	Laboratory duplicate samples should have RPD's within the NEPM acceptance criteria of ±30%. The laboratory RPDs have been assessed using the following ranges: Results <10 times LOR: no limits. Results between 10 and 20 times LOR 0% - 50%. Results >20 times LOR: 0-20%.
Representativeness		
Sampling appropriate for media and analytes	All samples	-
Samples extracted and analysed within holding times	All samples	Organics (14 days) Inorganics (6 months)
LORs appropriate and consistent	All samples	All samples
Comparability		
Consistent field conditions, sampling staff and laboratory analysis	All samples	All samples
Standard operating procedures for sample collection & handling	All samples	All samples

Data quality indicator	Frequency	Data quality acceptance criteria
Standard analytical methods used for all analyses	All samples	All samples
Completeness		
Sample description and COCs completed and appropriate	All Samples	All Samples
Appropriate documentation	All Samples	All Samples
Satisfactory frequency and result for QA/QC samples	All QA/QC samples	-
Data from critical samples is considered valid	-	Critical samples valid
Notes: COC: Chain of Custody LOR: Limit of Reporting QA/QC: Quality assurance / quality control		

H.1.7 Step 7: Optimisation of the data collection process

To optimise the design of the Environmental Investigation, a sampling and analytical program was undertaken. Results (including QA/QC results) were reviewed as they were received from the laboratory and any inconsistencies or unexpected data were further investigated with the laboratory. Corrective actions were implemented as required.

H.2 Field QA/QC

A series of QA/QC procedures were implemented for the field investigation works, which included:

- Collection of QC Samples
- Use of standard sampling procedures
- Use of standard field sampling forms, including Chain of Custodies (COCs)
- Documenting the calibration and use of field equipment.

All field works were conducted by a GHD environmental scientist in accordance with GHD's *Standard Field Operating Procedures* (SFOP).

H.2.1 QA/QC sampling

Field QA/QC samples were collected and analysed. Field QC sampling was conducted in reference to AS 4482.1: 2005 and NEPM 2013 Schedule B (3) requirements and included the analyses of the following types of samples in Table H-2.

Table H-2 Field QA/QC sample details

Field QA/QC sample type	Details
Intra-Laboratory Duplicate (Blind)	Comprise a single sample that is divided into two separate sampling containers. Both samples are sent anonymously to the primary project laboratory. Blind duplicates provide an indication of the analytical precision of the laboratory, but are inherently influenced by other factors such as sampling techniques and sample media heterogeneity.

Rinsate	A sample of analyte free water poured over or through decontaminated field sampling equipment prior to the collection of environmental samples to assess the adequacy of the decontamination process.

GHD adopts the AS4482.1 acceptance criteria of 30% and 50% RPD for field duplicates of inorganics and organics, respectively. Blind duplicate and split samples should have RPDs less than the criteria in each instance. However it is noted that the criteria will not always be achieved, particularly in heterogeneous materials, or at low analyte concentrations.

In the instance where samples and their corresponding duplicates have concentrations of target analytes less than the laboratory LOR, no quantitative comparison can be carried out and therefore the RPD is undefined. This is also the case for situations where the sample result is less than ten times the laboratory LOR.

Duplicate, split and rinsate sample results and Relative Percentage Difference (RPD) calculations are presented in Appendix E.

H.2.2 Sample handling and preservation

Groundwater samples were collected using disposable equipment (high density hydrasleeves) and transferred to the laboratory-supplied applicable sample bottles. The samples were immediately placed in an insulated cooler containing ice for storage and were delivered by GHD Field Staff to the laboratory upon the completion of field work on a daily basis.

All samples were received intact as per the Laboratory Reports (included in **Appendix F**).

H.2.3 Chain of custody

Unique Chain of Custody documentation and distinct batch numbers accompany all sample batches. This documentation is included in **Appendix F**.

H.3 Laboratory QA/QC

The laboratories subcontracted by GHD to analyse samples (NMI and ALS) are certified by the NATA for the required analysis. NATA certification provides for laboratory QA procedures to be in place and to be carried out on an on-going basis.

As part of the NATA requirements, the laboratories carried out and reported analysis of laboratory quality control samples, such as:

- Duplicate samples (the same sample analysed more than once)
- Blanks (containing none of the analytes to be analysed)
- Spiked samples (containing known additions of the analytes to appropriate matrices)
- Standard samples (samples containing known concentrations of the analytes - also known as reference standards).

H.3.1 Laboratory QA/QC procedures

As part of NATA requirements, the laboratories incorporated a range of QA methods to ensure accuracy of data. This includes the analyses of internal laboratory QC samples, details of which have been provided in Table H-3.

Table H-3 Laboratory QC sample details

Laboratory QA/QC sample	Details

Laboratory (Method) Blank	Usually an organic or aqueous solution that is as free as possible of analytes of interest to which is added all the reagents, in the same volume, as used in the preparation and subsequent analysis of the samples. The reagent blank is carried through the complete sample preparation procedure and contains the same reagent concentrations in the final solution as in the sample solution used for analysis. The reagent blank is used to correct for possible contamination resulting from the preparation or processing of the sample.
Laboratory Control Sample	A reference standard of known concentration is analysed along with a batch of samples. The Laboratory Control Sample provides an indication of the analytical accuracy and the precision of the test method and is used for inorganic analyses.
Laboratory Spike	An authentic field sample is ‘spiked’ by adding an aliquot of known concentration of the target analyte(s) prior to sample extraction and analysis. A spike documents the effect of the sample matrix on the extraction and analytical techniques. Spiked samples will be analysed for each batch where samples are analysed for organic chemicals of concern.
Surrogate Samples	These are organic compounds which are similar to the analyte of interest in terms of chemical composition, extractability, and chromatographic conditions (retention time), but which are not normally found in environmental samples. These surrogate compounds are ‘spiked’ into blanks, standards and samples submitted for organic analyses by gas-chromatographic techniques prior to sample extraction. Surrogate Standard / Spikes provide a means of checking that no gross errors have occurred during any stage of the test method leading to significant analyte loss.
Laboratory Duplicates	The analytical laboratory collects duplicate sub samples from one sample submitted for analytical testing at a rate equivalent to one in twenty samples per analytical batch, or one sample per batch if less than twenty samples are analysed in a batch. A laboratory duplicate provides data on the analytical precision and reproducibility of the test result. The precision of analysis performed by the laboratory is determined by the calculation of the relative percent difference (RPD). The RPD is calculated based on a comparison of an intra-laboratory split of the sample material with results representing the percent difference between the two sample concentrations for a specific contaminant. The RPD is calculated using the following formula: $RPD(\%) = \frac{\lvert C_o - C_d \rvert}{C_o + C_d} \times 200$ Where Co = Analyte concentration of the original sample Cd = Analyte concentration of the duplicate sample

The laboratory is required to provide this information to GHD. The individual analytical laboratories conduct an assessment of the laboratory QC program internally; however the results are also reviewed and assessed by GHD.

H.4 Field QC Results

The field QC results analysis below considers groundwater samples collected as part of the environmental investigation.

H.4.1 Groundwater

A total of 12 primary groundwater samples and two (2) primary soil samples were collected, submitted and analysed as part of the environmental investigation.

Five (2) field duplicate (intra-laboratory / inter - laboratory) water samples were collected and analysed as part of the investigation. The target frequency for analysis of field QC samples is 1 in 10 (10%). In this instance, this frequency was exceeded for water.

No field duplicates were collected for soil. The soil sampling was to provide an indication as to whether a localised source of PFAS was present in soil in the vicinity of P44. The soil data was not intended to be used to assess the potential risk to sensitive receptors and as such the absence of replicate sample pairs is not considered to materially affect the reliability of the data set.

The field QC sample collected are provided in the Table H-4.

Table H-4 Analysed field QC samples for groundwater

Site (Groundwater well)	Project phase	QA sample	QA/QC sample	Primary sample
P9	1	QA01	Intra-laboratory	P9
P34	1	QA02	Intra-laboratory	P34
P35	1	QA01	Intra-laboratory	P35
P42	2	QA01	Intra-laboratory	P42
P42	2	QA02	Intra-laboratory	P42
P44	2 (May Resampling)	FD01	Intra-laboratory	P44
GWP2-PFC	2 (May Resampling)	FD02	Intra-laboratory	GWP2-PFC
GWP3-PFC	2 (May Resampling)	FD03	Intra-laboratory	GWP3-PFC

No RPD exceedances were recorded.

H.4.3 Rinsate

Three (3) rinsate samples were analysed as part of the environmental investigation, one for each day of sampling. All three (3) rinsate samples reported concentrations below the laboratory LOR for PFOS / PFHxS (0.01 µg/L) and / or PFOA (0.01 µg/L), therefore indicating, that there was no evidence of cross contamination during sample collection.

H.5 Laboratory program

The laboratories utilised for this assessment (NMI and ALS Group) undertook their own internal quality assurance and quality control procedures for sample analysis. GHD has reviewed the internal laboratory control data provided within the laboratory reports, which are provided in **Appendix F**.

All of the internal laboratory QA QC analysis, including laboratory duplicates (DUP), method blanks (MB), laboratory control spikes (LCS), matrix spikes (MS) and surrogates spikes were within the data quality criteria, with the exceptions summarised in the following Table H-10.

Table H-10 Laboratory QA outliers summary

Types	Laboratory Reports	Analytes	Reasons
Method Blank	NA	NA	NA

Types	Laboratory Reports	Analytes	Reasons
Laboratory Duplicate	NA	NA	NA
Laboratory Control Spike	NA	NA	NA
Matrix Spike	NA	NA	NA
Surrogate Recovery	NA	NA	NA
Holding Times	NA	NA	NA
Notes: NA No outliers occurred.			

No Outliers occurred.

H.6 Overall Assessment of Data Quality

The GHD QAQC parameters were within the specified requirements, therefore the data is considered to be valid and of sufficient quality for the purposes of this Environmental Investigation.

Appendix I – Community Engagement

16 November 2018

Our ref: 3319051

Dear resident

Groundwater survey

Investigations are currently being undertaken at Parafield Airport in relation to the historical use of PFAS containing fire-fighting foam on the airport by a number of former Commonwealth agencies until 1986, after which time these services were provided externally by the local municipal fire service.

PFAS stands for 'per- and poly-fluoro alkyl substance'. PFASs are ingredients in some common domestic products such as paints, dishwasher rinse aids, and textile treatments (water proofing, stain prevention) along with certain types of fire fighting foam called AFFF (aqueous film forming foams) that were used previously by various Federal Government entities in firefighting activities at Parafield Airport until 1986. Parafield Airport Limited (PAL) is coordinating management of PFAS on the airport under its lease with the Federal Government.

Whilst recent investigations showed PFAS levels within close proximity to the airport boundary were generally low across the airport, PFAS levels were above the relevant guideline value at two locations within the airport boundary. The purpose of this survey is to determine the use of groundwater extraction bores adjacent to the airport should further environmental investigations need to be undertaken in the area.

Members of our project team will be door-knocking landowners between 16/11/2018 and 30/11/2018 from 9am to 8pm. If you are unavailable during these times, but would like to complete the voluntary survey, simply visit https://www.surveymonkey.com/r/SM9H3L3 to complete the survey online by 19 December 2018. The survey should take no longer than 10 minutes to complete.

Subject to the council approval the GHD field scientist will return to install four (4) groundwater monitoring wells on public land to assess the nature and extent of any potential impacts on the groundwater. The groundwater monitoring wells will be drilled to a depth of 6 m. During the installation of the groundwater wells, the only machinery used will be rotary drill rig. The wells will be installed at ground level with a 180 mm diameter metal cover flush to ground.

At this stage, the timing of the installation will be two (2) days, followed by a groundwater sampling event a week after installation. Work to install these groundwater monitors will commence on Monday 26 November 2018. The project team will make every effort to minimise impacts on neighbouring landholders and we thank you for your patience and understanding during these works.

If contamination is found in the groundwater, PAL will fulfil its environmental obligations to the South Australian Government and local community. This will include further investigation to determine the extent of impact and potential risk to human health and ecological receptors. All environmental investigations, remediation and monitoring will be undertaken in accordance with the Environment Protection Act 1993, National Environment Protection (Assessment Site Contamination) Measure 1999 , the PFAS National Environmental Management Plan and relevant state guidelines.

PAL works cooperatively with a range of government agencies in relation to its monitoring programs. Details of the groundwater survey may be shared with the technical advisors, Commonwealth and State regulatory authorities to determine whether further environmental investigations are required.

In the event that it is decided that further environmental investigations are required, the information obtained from the survey would be used to inform that investigation. For privacy reasons, your name or address will not be published.

Should you desire further information about the groundwater survey or PFAS, you can contact the project team on 1800 531 899. Alternatively, survey respondents can visit the airport website: https://www.parafieldairport.com.au/environment *SA Health provide general health advice in respect to PFAS on their website (http://www.sahealth.sa.gov.au) and SA Health's Scientific Services can be contacted on (08) 226 7100. The South Australian Environment Protection Authority can be contacted on (08) 8204 2004.*

Once the results and findings of the groundwater survey and other on-going investigations are available, PAL will host open days in order to share the results with the local community. At this stage, it is anticipated that results will be available by late January 2019. More information on the open days will be provided to community members closer to time they are due to occur.

Sincerely
GHD Pty Ltd

Scott Cawrse
Stakeholder Engagement Manager

The purpose of this survey is to obtain information from you about your groundwater use. Information collected will help us determine the extent of bore use in the area and how bores are being used. This will assist us in determining what additional sampling needs to be conducted within the investigation area to better understand the hydrogeological characteristics adjacent to the southwestern boundary of Parafield Airport.

Investigations are currently being undertaken in relation to the historical use of PFAS containing fire-fighting foam on the airport by a number of former Commonwealth agencies until 1986, after which time this service was provided externally by the local municipal fire service. Parafield Airport Limited (PAL) is coordinating management of PFAS on the airport under its lease with the Federal Government.

Regular soil and groundwater sampling continues to be undertaken at the airport.

The requested information will help inform PAL's investigation of groundwater use adjacent to the western boundary of the airport. This information is being collected by GHD on behalf of PAL.

The collection of this information is voluntary.

The information you provide may be shared with technical advisors, the Commonwealth Government, and relevant SA government agencies, organisations, and entities directly involved in groundwater regulation. Such organisations may include, but are not limited to: the Department of Infrastructure, Regional Development and Cities, SA Environment Protection Authority, SA Department of Health, SA Department for Environment and Water, SA Water.

PAL's Privacy Policy is available at https://www.parafieldairport.com.au/footer/privacy/

PAL's Privacy Policy contains information on how an individual may apply for access to their personal information and how an individual may apply to have their personal information amended. If you have any privacy or security concerns, please contact PAL via email: pal@aal.com.au

* 1. Contact details *(*mandatory field)*

Name*

Address*

City/Town*

State*

Postal Code*

Email Address

Phone Number

Feedback from the survey cannot be considered unless a name and address has been provided

SECTION 1: PROPERTY WATER SUPPLY SOURCE

2. What type of property are you responding about?

○ Private residential

○ Industrial / commercial

○ Community / recreational

Other (please specify)

☐

3. How is water supplied to the dwelling/ building(s) on your property? (tick all that apply)

☐ SA Water (mains connection)

☐ Tank / rainwater

☐ Bore water

4. How is water supplied to your property for outdoor / non-household use? (tick all that apply)

☐ SA Water (mains connection)

☐ Tank / rainwater

☐ Bore water

SECTION 2: BORE WATER USE

5. Do you have a groundwater extraction bore(s) at your property?

○ Yes (*Go to Question 6)*

○ No *(If you do not have a bore, please stop here and submit your survey)*

6. Is your bore a registered bore?

○ Yes *(Go to Question 7*)

○ No *(Got to Question 8*)

7. If you answered 'yes' to Question 6, what is the permit/ registration number(s) of your well?

Well No ☐

Well No ☐

Well No ☐

Well No ☐

Well No ☐

8. How many active bores do you have on your property (in working condition)?

○ None

○ 1

○ 2

○ 3 or more

9. What activities do you currently use bore water for on your property? (tick all that apply)

☐ Drinking	☐ Irrigation
☐ Other house (cooking, showering, washing, etc.)	☐ Swimming
☐ Vegetables / Fruit trees	☐ Pets / stock

Other (please specify)

☐

10. Is your bore plumbed into the house and used for household or domestic purposes (other than flushing toilets)

○ Yes - the bore is plumbed directly to the house and supplies household water

○ Yes - the bore is connected to rainwater tanks which supply household water

○ No - the bore is not connected to the house

11. Do you have rainwater tanks to supply water at your property?

○ Yes *(Go to Question 12)*

○ No *(Please stop here and submit your survey)*

12. Have your household rainwater tanks contained bore water, either currently or historically?

○ Yes - my household rainwater tanks are currently mixed with bore water

○ Yes - in the past

○ No - bore water has not been used in rainwater tanks

Appendix J – Environmental Projects Report

environmental projects ep

24 April 2019

Robert Kaftan
Adelaide Airport Limited
1 James Schofield Drive
Adelaide Airport SA

Dear Robert

Parafield Airport Groundwater Monitoring Event

1. Introduction

Environmental Projects (EP) was commissioned by Adelaide Airport Limited (AAL) to undertake a groundwater monitoring event of three wells at Parafield Airport. A site location plan is provided as Figure 1, **Attachment 1**.

1.1 Objectives

The groundwater monitoring event was to assess PFAS concentrations in groundwater.

2. Scope of Work

The scope of work for the groundwater monitoring event included:

- preparation of safety plans and application for required AAL permits
- gauging depth to groundwater, from top of casing (TOC), at the three selected monitoring wells
- collect samples from the three selected wells using hydrasleeve and transferring the samples into appropriately preserve bottles provided by the primary laboratory Australian Laboratory Services (ALS) and the secondary laboratory National Measurement Institute (NMI)
- dispatching all samples to the testing laboratories under chain of custody procedure
- chemical testing of three groundwater samples and two duplicate samples by NATA accredited contract laboratory ALS and NMI for:
    - extended PFAS suite (low-level detection)

- tabulating chemical testing data and comparing the respective analyte concentrations against appropriate published criteria PFAS National Environmental Management Plan (NEMP)

- provide a factual report summarising the works completed, the methodology and the analytical results.

3. Groundwater Assessment Methodology

3.1 Regulatory Guidance

The groundwater monitoring event was undertaken in accordance with the following guidance documents:

- Environment Protection Authority Guideline – Regulatory monitoring and testing; Groundwater Sampling (SA EPA 2007)

- National Environment Protection (Assessment of Site Contamination) Measure (ASC NEPM), National Environment Protection Council 1999, as amended 2013

- PFAS National Environmental Management Plan (NEMP) 2018

3.2 Groundwater Well Gauging and Sampling Methodology

The groundwater monitoring event methodology is summarised in Table 3-1.

Groundwater well locations are provided as Figure 2, **Attachment 1**.

Table 3-1: Groundwater Monitoring Methodology

Activity	Details
Contamination	Per the NEMP, additional precautions were given to the PFAS sampling and analysis plan to limit PFAS sample contamination. Attention was given to possible products that can cause PFAS contamination, including but not limited to clothing fabric treatments, sunscreens, cosmetics, food wrappers and sticky notes. The field representative took precautions not to wear or use such products and not to touch sample or sample containers with clothing, bare skin or other. Reusable freezer bricks were not used. Dedicated disposable hydrasleeves for PFAS sampling were provided by Air-Met Scientific and samples bottles for PFAS low level detection were supplied by National Measurement Institute (NMI). A PFAS free decontamination solution was used for any reusable equipment. The sampler washed his hands and wore a new clean pair of disposable nitrile gloves before sample collection.
Groundwater level gauging	On 10 April 2019 EP gauged the standing water level (SWL) at three monitoring wells located at Parafield Airport (GWP2-PFC, GWP3-PFC, P44) using an electronic interface probe (IP). The depth to groundwater and to bottom of well was measured relative to the top of well casing and recorded as metres below top of well casing (mBTOC).
Groundwater sampling	On 10 April 2019 EP deployed three hydrasleeves, one in each groundwater well. The minimal water displaced during deployment was given time to equilibrate. The hydrasleeves were retrieved and samples collected on 10 April 2019. Following groundwater sample collection into laboratory supplied bottles, water quality parameters including pH, electrical conductivity (EC), reduction/oxidation potential (redox), total dissolved solids (TDS) and temperature were recorded using a calibrated water quality meter. All groundwater samples were placed into appropriately preserved bottles supplied by the analytical laboratories.

Activity	**Details**
Equipment decontamination	In order to minimise the potential for cross-contamination, the IP was cleaned with a PFAS-free decontamination solution (Liquinox or similar) and rinsed with potable water between every monitoring well. All other equipment used was dedicated to wells and disposed of following groundwater sampling.
Quality control samples and duplicate samples	Two blind-coded field duplicate samples DUP-1 and DUP-2 were recovered during the groundwater monitoring event for the purpose of assessing the precision and repeatability of the analytical data. One equipment rinsate blank sample was recovered during groundwater sampling. The blank samples were collected by pouring potable water over and through the decontaminated equipment into an appropriate laboratory supplied sample container. EPs QA/QC methodology was generally consistent with the recommendations in the ASC NEPM.
Sample preservation	Groundwater samples were stored under chilled conditions in a portable cooler immediately after sampling. Samples were kept chilled prior to and during delivery to the contract laboratory. Sample transport was performed in accordance with EPs chain of custody procedures.
Laboratory analysis	The recovered groundwater samples were dispatched to the primary laboratory, ALS for chemical testing. Two inter-laboratory duplicate samples (DUP-1 and DUP-2) from groundwater wells (GWP2-PFC and GWP3-PFC) were forwarded to the secondary laboratory, NMI. Both laboratories were NATA accredited for the chemical testing performed. Analysis: extended PFAS suite (low-level detection).

4. Groundwater Results

4.1 Assessment Criteria

Groundwater chemical data summary tables are presented in **Attachment 3** and include comparison of results against the following adopted screening criteria:

- PFAS NEMP 2018
  - Table 1 - Health Drinking Water
  - Table 1 - Health Recreational Water
  - Table 5 - Freshwater (80%, 90%, 95% and 99% species protection level)

4.2 Field Measurements and Observations

Standing water levels (SWLs) and water quality parameters for each groundwater well are summarised in Table 4-1.

Table 4-1: Groundwater Monitoring Methodology

Well ID	**SWL mBTOC**	**pH**	**EC µS/cm**	**Redox mV**	**Dissolved Oxygen ppm**	**Temperature ⁰C**
GWP2-PFC	3.718	7.08	1,786	86.8	2.26	20.4

Well ID	SWL mBTOC	pH	EC µS/cm	Redox mV	Dissolved Oxygen ppm	Temperature ^{0}C
GWP3-PFC	3.984	7.10	3,058	114.5	4.92	22.5
P44	6.098	6.93	4,185	113.8	3.92	20.0

4.3 Groundwater Analytical Results

Chemical data summary tables are presented in **Attachment 2** and include comparison of results against the adopted screening criteria identified in Section 4.1 above.

Concentrations exceeding a relevant guideline screening criterion have been highlighted in the data tables. Where concentrations exceed more than one of the criteria, the concentration has been highlighted with the value with the highest screening level.

Laboratory certificates and chain of custody documentation is presented in **Attachment 3**.

Several perfluorinated compounds were detected at all groundwater wells, however all were at concentrations below adopted screening criteria except:

- Perfluorooctanesulfonic acid PFOS, with concentrations exceeding the PFAS NEMP 99% Freshwater ecosystem criteria in all three groundwater wells; and
- Sum of PFHxS and PFOS, with concentrations exceeding the PFAS NEMP Health Drinking Water criteria in groundwater well GWP3-PFC.

5. QA/QC Validation

An evaluation of all QA/QC information for the groundwater assessment work and a statement of the data representativeness is provided below.

As part of the evaluation of laboratory chemical data, duplicate pair results were compared by determining the relative percentage difference (RPD) between the results. The RPD was calculated using the formula:

$$\text{RPD } (\%) = \quad 100(x1 - x2) / X$$

where x1, x2 = duplicate results and X = mean of duplicate results.

Based on guidance provided in ASC NEPM 1999 a groundwater RPD within the range of -20% to 20% is considered to show acceptable agreement and, conversely, data is considered to have poor agreement where an RPD is outside this range.

The results of internal laboratory quality control procedures are provided within the laboratory certificates (Appendix R). The acceptance criterion for internal laboratory replicates is set at an RPD of -50% to 50%. Laboratory recoveries should be in the range 70% to 130%.

Table 5-1 indicates conformance to specific QA/QC requirements for groundwater data. Duplicate sample, trip blank and equipment blank results are presented in **Attachment 2**.

Table 5-1: Groundwater Data Validation

QA/QC Requirement	Completed	Comments
Chain of custody documentation completed	Yes	All samples were transported under strict chain of custody procedures. COC documents are included in Attachment 3.
Appropriate sampling method	Yes	Groundwater wells were sampled using hydrasleeves. This method is the preferred groundwater sampling technique for PFAS compounds.
Samples delivered to laboratory within sample holding times and with correct preservative	Yes	Samples were delivered to the laboratories within the sample holding times and in laboratory-supplied containers prepared with the appropriate preservative (where required).
All analyses NATA accredited	Yes	ALS and NMI were NATA accredited for all the analyses performed.
Required number of sample duplicates and blanks collected	Yes	Two inter-laboratory duplicates were submitted for analysis, meeting the recommendation of 1:10 for three primary samples analysed. Rinsate samples were not submitted for analysis as the samples were collected in dedicated hydrasleeves and decanted directly into laboratory supplied bottles. Overall, the duplicate and blank testing frequency was considered acceptable for assessing the quality of the laboratory data.
A majority of intra-laboratory field duplicate and inter-laboratory field duplicate samples reported RPDs within +/-20%	Yes	The majority of RPDs were within +/- 20% with the exception of perfluoroheptanoic acid, perfluorooctanesulfonic acid PFOS, Sum of PFHxS and PFOS, perfluorodecanoic acid, perfluoropentanesulfonic acid, PFHxS, perfluorooctanoate (PFOA) and 6:2 fluorotelomer sulfonate (6:2 FtS) in duplicate pair GWP2-PFC / DUP-1 and perfluoroheptane sulfonic acid (PFHpS), perfluorobutane sulfonic acid (PFBS), perfluoroheptanoic acid, perfluorohexanoic acid, perfluoropentanoic acid and Perfluorooctanoate (PFOA) in duplicate pair GWP3-PFC / DUP-2. The elevated RPDs were likely to be due to low sample concentrations. A number of RPDs were unable to be calculated due to one or both samples having concentrations below laboratory LORs. Overall the analyte pair RPD results indicated good data correlation between the primary and duplicate results.
Field blank results below laboratory LOR	N/A	Samples not submitted for analysis as the samples were collected in dedicated hydrasleeves and decanted directly into laboratory supplied bottles.
Acceptable laboratory QC results	Yes	Laboratory reports from ALS indicated matrix spike outliers exist for PFHxS and PFOS where MS recovery not determined, background level greater than or equal to 4x spike level Laboratory reports from NMI did not indicate any internal QC exceedances. Overall, the internal laboratory QC results were within acceptable specifications.

Based on the outcomes above, EP considered the data quality was acceptable for the purposes of the assessment.

6. Discussion and Conclusions

The objective of the sampling program was to determine the magnitude of PFAS concentrations in groundwater at wells GWP2-PFC, GWP3-PFC and P44 at Parafield airport.

Chemical analysis of groundwater samples collected from each groundwater well shows that there are levels of PFAS present in groundwater. Sum of PFOS and PFHxS concentrations were above the PFAS NEMP 2018 Health-based guidance values in groundwater well GWP3-PFC.

Aquatic ecosystems, freshwater guidance values were also exceeded for PFOS concentrations for 99% species protection levels in all three groundwater wells.

Our conclusions are subject to the limitations expressed below.

Regards,

Joe Pedicini

Principal Consultant

Attachments

1. Figures
2. Chemical Summary Tables
3. Laboratory Analytical Certificates

LIMITATIONS

Scope of Services

This environmental site assessment report (the report") has been prepared in accordance with the scope of services set out in the contract, or as otherwise agreed, between the client and Environmental Projects ("scope of services"). In some circumstances the scope of services may have been limited by a range of factors such as time, budget, access and/or site disturbance constraints.

Reliance on Data

In preparing the report, Environmental Projects has relied upon data, surveys, analyses, designs and plans as well as any other information provided by the client and other individuals and organisations, most of which are referred to in the report ("the data"). Except as otherwise stated in the report, Environmental Projects has not verified the accuracy or completeness of the data. To the extent that the statements, opinions, facts, information, conclusions and/or recommendations in the report ("conclusions") are based in whole or part on the data, those conclusions are contingent upon the accuracy and completeness of the data. Environmental Projects will not be liable in relation to incorrect conclusions should any data, information or condition be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed to Environmental Projects.

Environmental Conclusions

In accordance with the scope of services, Environmental Projects has relied upon the data and conducted environmental field monitoring and/or testing in the preparation of the report. The nature and extent of monitoring and/or testing conducted is described in the report.

On all sites, varying degrees of non-uniformity of the vertical and horizontal soil or groundwater conditions are encountered. Hence no monitoring, common testing or sampling techniques can eliminate the possibility that monitoring or testing results/samples are not totally representative of soil and/or groundwater conditions encountered. The conclusions are based upon the data and the environmental field monitoring and/or testing and are therefore merely indicative of the environmental condition of the site at the time of preparing the report, including the presence or otherwise of contaminants or emissions.

Also, it should be recognised that site conditions, including the extent and concentrations of contaminants, can change with time.

Within the limitations imposed by the scope of services, the monitoring testing, sampling and preparation of this report have been undertaken and performed in a professional manner, in accordance with generally accepted practices and using a degree of skill and care ordinarily exercised by reputable environmental consultants under similar circumstances. No other warranty, expressed or implied, is made.

Report for Benefit of Client

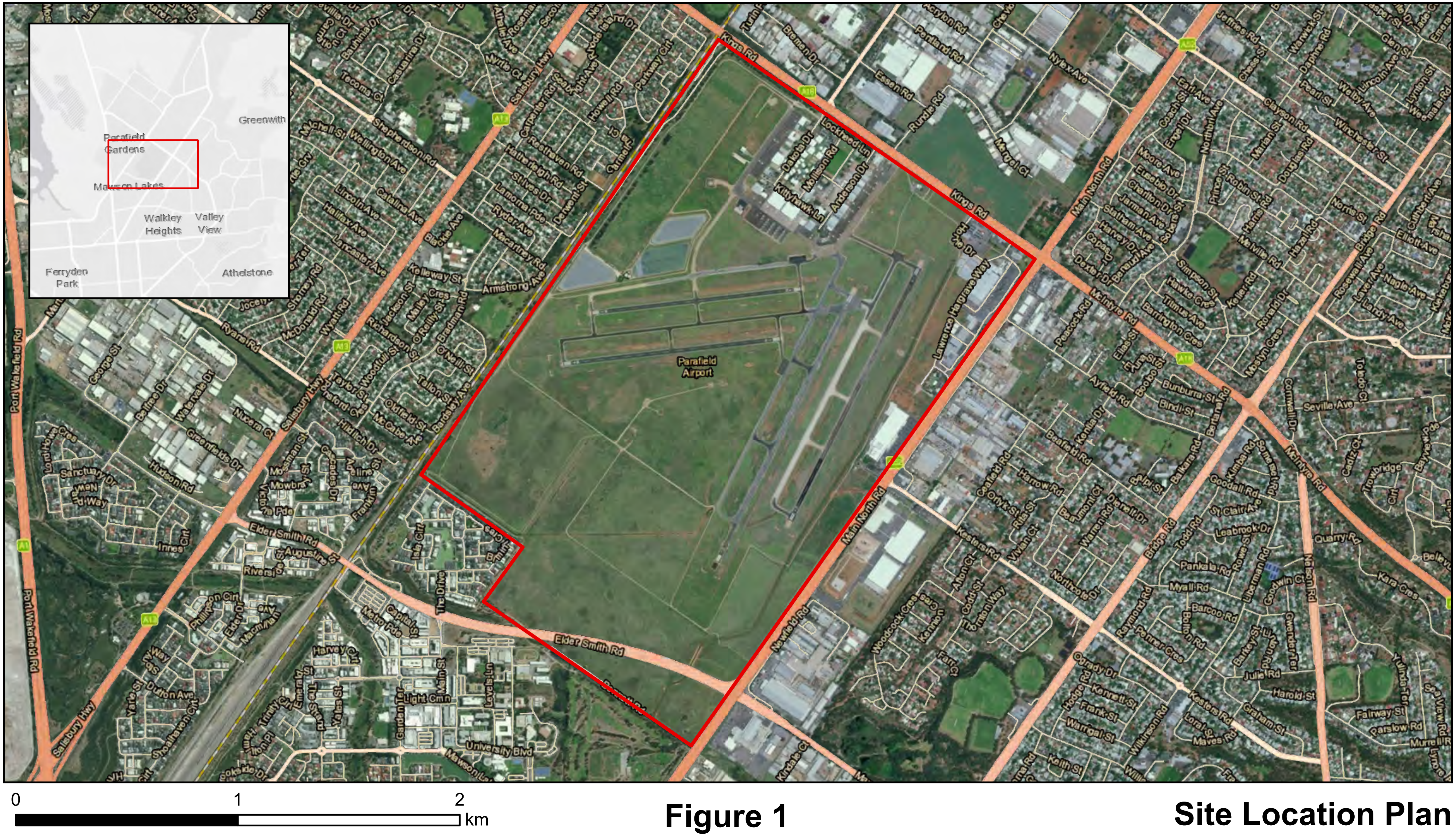
The report has been prepared for the benefit of the client and no other party. Environmental Projects assumes no responsibility and will not be liable to any other person or organisation for or in relation to any matter dealt with or conclusions expressed in the report, or for any loss or damage suffered by any other person or organisation arising from matters dealt with or conclusions expressed in the report (including without limitations matters arising from any negligent act or omission of Environmental Projects or for any loss or damage suffered by any other party relying upon the matters dealt with or conclusions expressed in the report). Other parties should not rely upon the report or the accuracy or completeness of any conclusions and should make their own enquiries and obtain independent advice in relation to such matters

Other Limitations

Environmental Projects will not be liable to update or revise the report to take into account any events or emergent circumstances or facts occurring or becoming apparent after the date of the report.

Attachment 1

Figures



🟥 Approximate site boundary

Figure 1

Job name: Parafield Airport GME

Prepared for: Adelaide Airport Limited (AAL)

Job number: 19040.01

Site Location Plan

Tiger Moth Lane,
Parafield SA 5106

environmental projects

Level 3, 117 King William Street,
Adelaide 5000
www.environmentalprojects.com.au

Drawn: AN
Date: 12/04/2019
Rev: A

🟥 Approximate site boundary

● Approximate groundwater well location

Figure 2

Sample Location Plan

Tiger Moth Lane,
Parafield SA 5106

Job name: Parafield Airport GME

Prepared for: Adelaide Airport Limited (AAL)

Job number: 19040.01

Drawn: AN
Date: 12/04/2019
Rev: A

environmental projects

Level 3, 117 King William Street,
Adelaide 5000
www.environmentalprojects.com.au

Attachment 2

Chemical Summary Tables

Chemical Table

		Perfluorinated Compounds																
		Perfluoroheptane sulfonic acid (PFHpS)	EtPerfluorooctanesulf- amid oacetic acid	4:2 FTS	8:2 FTS	Perfluorobutane sulfonic acid (PFBS)	Perfluorobutanoic acid	Perfluoroheptanoic acid	Perfluorohexanoic acid	Perfluorooctanesulfonic acid PFOS	Perfluoropentanoic acid	Sum of PFAS (WA DER List)	Sum of PFHxS and PFOS	MePerfluorooctanesulf- amid oacetic acid	N-Et perfluorooctanesulfonamid oethanol	N-Ethyl perfluorooctanesulfon amide	N-Me perfluorooctanesulfonamid oethanol	N-Methyl perfluorooctane sulfonamide
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL		0.0005	0.0005	0.001	0.001	0.0005	0.002	0.0005	0.0005	0.0003	0.0005	0.0003	0.0003	0.0005	0.001	0.001	0.001	0.001
PFAS NEMP 2018 Table 1 Health Drinking Water													0.07					
PFAS NEMP 2018 Table 1 Health Recreational Water													0.7					
PFAS NEMP 2018 Table 5 Freshwater 80%										31								
PFAS NEMP 2018 Table 5 Freshwater 90%										2								
PFAS NEMP 2018 Table 5 Freshwater 95%										0.13								
PFAS NEMP 2018 Table 5 Freshwater 99%										0.00023								
Field ID	**Date**																	
GWP2-PFC	10/04/2019	0.0008	<0.0005	<0.001	<0.001	0.002	<0.002	0.0008	0.0009	0.0267	0.0026	0.0470	0.0361	<0.0005	<0.001	<0.001	<0.001	<0.001
GWP3-PFC	10/04/2019	0.0031	<0.0005	<0.001	<0.001	0.0106	<0.002	0.0014	0.0054	0.0514	0.0010	0.148	0.121	<0.0005	<0.001	<0.001	<0.001	<0.001
P44	10/04/2019	0.0014	<0.0005	<0.001	<0.001	0.006	<0.002	<0.0005	0.0050	0.0162	<0.0005	0.0713	0.0570	<0.0005	<0.001	<0.001	<0.001	<0.001

Environmental Standards

HEPA, Jan 2018, PFAS NEMP 2018 Table 1 Health Drinking Water

HEPA, Jan 2018, PFAS NEMP 2018 Table 1 Health Recreational Water

HEPA, Jan 2018, PFAS NEMP 2018 Table 5 Freshwater 80%

HEPA, Jan 2018, PFAS NEMP 2018 Table 5 Freshwater 90%

HEPA, Jan 2018, PFAS NEMP 2018 Table 5 Freshwater 95%

HEPA, Jan 2018, PFAS NEMP 2018 Table 5 Freshwater 99%

Chemical Table

	Perfluorinated Compounds													
	Perfluorodecanesulfonic acid	Perfluorodecanoic acid	Perfluorododecanoic acid	Perfluorononanoic acid	Perfluorooctane sulfonamide	Perfluoropentanesulfonic acid	Perfluorotetradecanoic acid	Perfluorotridecanoic acid	Perfluoroundecanoic acid	PFHxS (355-46-4)	Sum of PFAS	10:2 FTS	Perfluorooctanoate (PFOA)	6:2 Fluorotelomer Sulfonate (6:2 FtS)
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	ug/L	ug/L	µg/L	µg/L	µg/L
EQL	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0003	0.001	0.0005	0.001
PFAS NEMP 2018 Table 1 Health Drinking Water													0.56	
PFAS NEMP 2018 Table 1 Health Recreational Water													5.6	
PFAS NEMP 2018 Table 5 Freshwater 80%													1824	
PFAS NEMP 2018 Table 5 Freshwater 90%													632	
PFAS NEMP 2018 Table 5 Freshwater 95%													220	
PFAS NEMP 2018 Table 5 Freshwater 99%													19	

Field ID	**Date**														
GWP2-PFC	10/04/2019	<0.0005	0.0020	<0.0005	0.0013	0.0005	0.0015	<0.0005	<0.0005	<0.0005	0.0094	0.0531	<0.001	0.0036	0.001
GWP3-PFC	10/04/2019	<0.0005	<0.0005	<0.0005	0.0006	<0.0005	0.0092	<0.0005	<0.0005	<0.0005	0.0698	0.16	<0.001	0.004	0.004
P44	10/04/2019	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0068	<0.0005	<0.0005	<0.0005	0.0408	0.0795	<0.001	0.0033	<0.001

Environmental Standards

HEPA, Jan 2018, PFAS NEMP 2018 Table 1 Health Drinking Water

HEPA, Jan 2018, PFAS NEMP 2018 Table 1 Health Recreational Water

HEPA, Jan 2018, PFAS NEMP 2018 Table 5 Freshwater 80%

HEPA, Jan 2018, PFAS NEMP 2018 Table 5 Freshwater 90%

HEPA, Jan 2018, PFAS NEMP 2018 Table 5 Freshwater 95%

HEPA, Jan 2018, PFAS NEMP 2018 Table 5 Freshwater 99%

Duplicate Table

		Perfluorinated Compounds																
		Perfluoroheptane sulfonic acid (PFHpS)	EtPerfluorooctanesulf- amid oacetic acid	4:2 FTS	8:2 FTS	Perfluorobutane sulfonic acid (PFBS)	Perfluorobutanoic acid	Perfluoroheptanoic acid	Perfluorohexanoic acid	Perfluorooctanesulfonic acid PFOS	Perfluoropentanoic acid	Sum of PFAS (WA DER List)	Sum of PFHxS and PFOS	MePerfluorooctanesulf- amid oacetic acid	N-Et perfluorooctanesulfonamid oethanol	N-Ethyl perfluorooctanesulfon amide	N-Me perfluorooctanesulfonamid oethanol	N-Methyl perfluorooctane sulfonamide
		µg/L	µg/L	µg/L	µg/L	ug/m3	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL		0.0005	0.0005	0.001	0.001	0.5	0.002	0.0005	0.0005	0.0003	0.0005	0.0003	0.0003	0.0005	0.001	0.001	0.001	0.001
PFAS NEMP 2018 Table 1 Health Drinking Water													0.07					
PFAS NEMP 2018 Table 1 Health Recreational Water													0.7					
PFAS NEMP 2018 Table 5 Freshwater 80%										31								
PFAS NEMP 2018 Table 5 Freshwater 90%										2								
PFAS NEMP 2018 Table 5 Freshwater 95%										0.13								
PFAS NEMP 2018 Table 5 Freshwater 99%										0.00023								
Field ID	**Date**																	
GWP2-PFC	10/04/2019	0.0008	<0.0005	<0.001	<0.001	2.0	<0.002	0.0008	0.0009	0.0267	0.0026	0.0470	0.0361	<0.0005	<0.001	<0.001	<0.001	<0.001
DUP-1	10/04/2019	<0.001				2.2	0.0072	0.0011	<0.001	0.021	<0.002		0.0279	<0.005	<0.005	<0.002	<0.002	<0.002
RPD						10		**32**		**24**			**26**					
GWP3-PFC	10/04/2019	0.0031	<0.0005	<0.001	<0.001	10.6	<0.002	0.0014	0.0054	0.0514	0.0010	0.148	0.121	<0.0005	<0.001	<0.001	<0.001	<0.001
DUP-2	10/04/2019	0.0012				8.5	0.0051	0.0018	0.0043	0.043	0.0023		0.112	<0.005	<0.005	<0.002	<0.002	<0.002
RPD		**88**				**22**		**25**	**23**	18	**79**		8					

Environmental Standards

HEPA, Jan 2018, PFAS NEMP 2018 Table 1 Health Drinking Water

HEPA, Jan 2018, PFAS NEMP 2018 Table 1 Health Recreational Water

HEPA, Jan 2018, PFAS NEMP 2018 Table 5 Freshwater 80%

HEPA, Jan 2018, PFAS NEMP 2018 Table 5 Freshwater 90%

HEPA, Jan 2018, PFAS NEMP 2018 Table 5 Freshwater 95%

HEPA, Jan 2018, PFAS NEMP 2018 Table 5 Freshwater 99%

Duplicate Table

		Perfluorinated Compounds													
		Perfluorodecanesulfonic acid (PFDS)	Perfluorodecanoic acid	Perfluorododecanoic acid	Perfluorononanoic acid	Perfluorooctane sulfonamide	Perfluoropentanesulfonic acid	Perfluorotetradecanoic acid PFTeDA	Perfluorotridecanoic acid PFTrDA	Perfluoroundecanoic acid PFUdA	PFHxS (355-46-4)	Sum of PFAS	10:2 FTS	Perfluorooctanoate (PFOA)	6:2 Fluorotelomer Sulfonate (6:2 FtS)
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	ug/L	ug/L	µg/L	mg/L	mg/L
EQL		0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0003	0.001	0.0000005	0.000001
PFAS NEMP 2018 Table 1 Health Drinking Water														0.00056	
PFAS NEMP 2018 Table 1 Health Recreational Water														0.0056	
PFAS NEMP 2018 Table 5 Freshwater 80%														1.82	
PFAS NEMP 2018 Table 5 Freshwater 90%														0.632	
PFAS NEMP 2018 Table 5 Freshwater 95%														0.22	
PFAS NEMP 2018 Table 5 Freshwater 99%														0.019	
Field ID	**Date**														
GWP2-PFC	10/04/2019	<0.0005	0.0020	<0.0005	0.0013	0.0005	0.0015	<0.0005	<0.0005	<0.0005	0.0094	0.0531	<0.001	0.0000036	0.000001
DUP-1	10/04/2019	<0.001	0.0015	0.0015	<0.001	<0.001	0.001	<0.002	<0.002	<0.002	0.0069		<0.001	0.0000029	0.0000022
RPD			**29**				**40**				**31**			**22**	**75**
GWP3-PFC	10/04/2019	<0.0005	<0.0005	<0.0005	0.0006	<0.0005	0.0092	<0.0005	<0.0005	<0.0005	0.0698	0.16	<0.001	0.0000040	0.000004
DUP-2	10/04/2019	<0.001	<0.001	<0.001	<0.001	<0.001	0.008	<0.002	<0.002	<0.002	0.069		<0.001	0.0000032	0.0000048
RPD							14				1			**22**	18

Environmental Standards

HEPA, Jan 2018, PFAS NEMP 2018 Table 1 Health Drinking Water
HEPA, Jan 2018, PFAS NEMP 2018 Table 1 Health Recreational Water
HEPA, Jan 2018, PFAS NEMP 2018 Table 5 Freshwater 80%
HEPA, Jan 2018, PFAS NEMP 2018 Table 5 Freshwater 90%
HEPA, Jan 2018, PFAS NEMP 2018 Table 5 Freshwater 95%
HEPA, Jan 2018, PFAS NEMP 2018 Table 5 Freshwater 99%

Duplicate Table

		Perfluorinated Compounds				
		PFDoA (307-55-1)	PFHxDA (67905-19-5)	PFODA (16517-11-6)	FOUEA (70887-84-2)	PFNS (68259-12-1)
		ug/L	ug/L	ug/L	ug/L	ug/L
EQL		<0.001	<0.002	<0.005	<0.001	<0.001
PFAS NEMP 2018 Table 1 Health Drinking Water						
PFAS NEMP 2018 Table 1 Health Recreational Water						
PFAS NEMP 2018 Table 5 Freshwater 80%						
PFAS NEMP 2018 Table 5 Freshwater 90%						
PFAS NEMP 2018 Table 5 Freshwater 95%						
PFAS NEMP 2018 Table 5 Freshwater 99%						
Field ID	**Date**					
GWP2-PFC	10/04/2019					
DUP-1	10/04/2019	<0.001	<0.002	<0.005	<0.001	<0.001
RPD						
GWP3-PFC	10/04/2019					
DUP-2	10/04/2019	<0.001	<0.002	<0.005	<0.001	<0.001
RPD						

Environmental Standards

HEPA, Jan 2018, PFAS NEMP 2018 Table 1 Health Drinking Water

HEPA, Jan 2018, PFAS NEMP 2018 Table 1 Health Recreational Water

HEPA, Jan 2018, PFAS NEMP 2018 Table 5 Freshwater 80%

HEPA, Jan 2018, PFAS NEMP 2018 Table 5 Freshwater 90%

HEPA, Jan 2018, PFAS NEMP 2018 Table 5 Freshwater 95%

HEPA, Jan 2018, PFAS NEMP 2018 Table 5 Freshwater 99%

Attachment 3

Laboratory Analytical Certificates

TAT

CHAIN OF CUSTODY DOCUMENTATION - Environmental Projects

Received mcAvs Smithfield
11/4/19 1:25pm

Project Title : Parafield Airport Groundwater Monitoring Event
Job Number : 19040.01
Project Manager: Brad Fitzgerald
Phone: 0422 482 364
Email: brad.fitzgerald@environmentalprojects.com.au
Results to: Lab.Results@environmentalprojects.com.au
brad.fitzgerald@environmentalprojects.com.au
Invoice to: Lab.Results@environmentalprojects.com.au
brad.fitzgerald@environmentalprojects.com.au

Primary Laboratory: ALS
Laboratory Quote Ref:

Secondary Laboratory:
Laboratory Quote Ref:

COC REFERENCE
19040.01

Turnaround Required
3 day

SAMPLE DETAILS					CHEMICAL TESTING REQUIRED										
Contract Laboratory Sample ID	**Sample ID**	**Sample Depth**	**Date Sampled**	**Sample Matrix / Type**	**Extended PFAS suit (ultra-trace detection)**										**Additional Comments / Notes**
1	-EB	-	10/04/2019	Water											
2	TB	-	10/04/2019	Water											
3	GWP2-PFC	-	10/04/2019	Water	1										
4	GWP3-PFC	-	10/04/2019	Water	1										
5	P44	-	10/04/2019	Water	1										
6	Water	-	10/04/2019	Water											

Environmental Division
Sydney
Work Order Reference
ES1911356

Telephone : + 61-2-8784 8555

EP AUTHORISATION	**LABORATORY RECEIPT**	3
Requested by: Jake B	Received by:	**Additional Comments**
Date\time requested: 11-Apr-19	Date\time received:	
Signature: Brad Fitzgerald	Signature:	

Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1911356**	Page	: 1 of 5
Client	: **ENVIRONMENTAL PROJECTS**	Laboratory	: Environmental Division Sydney
Contact	: BRAD FITZGERALD	Contact	: Customer Services ES
Address	: LEVEL 3 117 KING WILLIAM ST ADELAIDE SA 5001	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 08 8410 1846	Telephone	: +61-2-8784 8555
Project	: 19040.01 Parafield Airport Groundwater Monitoring Event	Date Samples Received	: 11-Apr-2019 11:45
Order number	:	Date Analysis Commenced	: 12-Apr-2019
C-O-C number	: ----	Issue Date	: 15-Apr-2019 12:35
Sampler	: ----		
Site	: ----		
Quote number	: EN/333		
No. of samples received	: 6		
No. of samples analysed	: 3		

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

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. 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*
Franco Lentini		Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by 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 Contact 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.

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			*Client sample ID*	**GWP2-PFC**	**GWP3-PFC**	**P44**	**----**	**----**
			Client sampling date / time	10-Apr-2019 00:00	10-Apr-2019 00:00	10-Apr-2019 00:00	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**ES1911356-003**	**ES1911356-004**	**ES1911356-005**	**--------**	**--------**
				Result	Result	Result	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	**0.0020**	**0.0106**	**0.0060**	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	**0.0015**	**0.0092**	**0.0068**	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	**0.0094**	**0.0698**	**0.0408**	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	**0.0008**	**0.0031**	**0.0014**	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0003	µg/L	**0.0267**	**0.0514**	**0.0162**	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.002	µg/L	<0.002	<0.002	<0.002	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	**0.0026**	**0.0010**	<0.0005	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	**0.0009**	**0.0054**	**0.0050**	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	**0.0008**	**0.0014**	<0.0005	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	**0.0036**	**0.0040**	**0.0033**	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	**0.0013**	**0.0006**	<0.0005	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	**0.0020**	<0.0005	<0.0005	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<0.0005	<0.0005	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	<0.0005	<0.0005	<0.0005	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<0.0005	<0.0005	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	<0.0005	<0.0005	<0.0005	----	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	**0.0005**	<0.0005	<0.0005	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	<0.001	<0.001	<0.001	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<0.001	<0.001	----	----

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			*Client sample ID*	**GWP2-PFC**	**GWP3-PFC**	**P44**	**----**	**----**
			Client sampling date / time	10-Apr-2019 00:00	10-Apr-2019 00:00	10-Apr-2019 00:00	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**ES1911356-003**	**ES1911356-004**	**ES1911356-005**	**--------**	**--------**
				Result	Result	Result	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	<0.001	<0.001	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	<0.001	<0.001	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	<0.0005	<0.0005	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	<0.0005	<0.0005	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<0.001	<0.001	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	**0.001**	**0.004**	<0.001	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	µg/L	<0.001	<0.001	<0.001	----	----
EP231P: PFAS Sums								
Sum of PFAS	----	0.0003	µg/L	**0.0531**	**0.160**	**0.0795**	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0003	µg/L	**0.0361**	**0.121**	**0.0570**	----	----
Sum of PFAS (WA DER List)	----	0.0003	µg/L	**0.0470**	**0.148**	**0.0713**	----	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0005	%	**98.2**	**96.7**	**100**	----	----
13C8-PFOA	----	0.0005	%	**95.0**	**76.0**	**82.0**	----	----

Surrogate Control Limits

Sub-Matrix: **WATER**

		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

ALS Environmental

QUALITY CONTROL REPORT

Work Order : **ES1911356**

Client : **ENVIRONMENTAL PROJECTS**
Contact : BRAD FITZGERALD
Address : LEVEL 3 117 KING WILLIAM ST
ADELAIDE SA 5001
Telephone : +61 08 8410 1846
Project : 19040.01 Parafield Airport Groundwater Monitoring Event
Order number :
C-O-C number : ----
Sampler : ----
Site : ----
Quote number : EN/333
No. of samples received : 6
No. of samples analysed : 3

Page : 1 of 6

Laboratory : Environmental Division Sydney
Contact : Customer Services ES
Address : 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone : +61-2-8784 8555
Date Samples Received : 11-Apr-2019
Date Analysis Commenced : 12-Apr-2019
Issue Date : 15-Apr-2019

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. 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*
Franco Lentini		Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by 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 hig

Key :
Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
\# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	***Client sample ID***	***Method: Compound***	***CAS Number***	***LOR***	***Unit***	***Original Result***	***Duplicate Result***	***RPD (%)***	***Recovery Limits (%)***
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 2292706)									
ES1911356-003	GWP2-PFC	EP231X-ST: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0003	µg/L	0.0267	0.0274	2.51	0% - 20%
		EP231X-ST: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	0.0020	0.0026	26.1	No Limit
		EP231X-ST: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	0.0015	0.0015	0.00	No Limit
		EP231X-ST: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	0.0094	0.0100	6.21	0% - 50%
		EP231X-ST: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	0.0008	0.0008	0.00	No Limit
		EP231X-ST: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 2292706)									
ES1911356-003	GWP2-PFC	EP231X-ST: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	0.0026	0.0024	8.00	No Limit
		EP231X-ST: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	0.0009	0.0009	0.00	No Limit
		EP231X-ST: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	0.0008	0.0006	28.6	No Limit
		EP231X-ST: Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	0.0036	0.0036	0.00	No Limit
		EP231X-ST: Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	0.0013	0.0012	0.00	No Limit
		EP231X-ST: Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	0.0020	0.0022	10.5	No Limit
		EP231X-ST: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<0.0005	0.00	No Limit
		EP231X-ST: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	<0.0005	<0.0005	0.00	No Limit
		EP231X-ST: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<0.0005	0.00	No Limit
		EP231X-ST: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	<0.0005	<0.0005	0.00	No Limit
		EP231X-ST: Perfluorobutanoic acid (PFBA)	375-22-4	0.002	µg/L	<0.002	<0.002	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 2292706)									
ES1911356-003	GWP2-PFC	EP231X-ST: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	0.0005	0.0006	0.00	No Limit
		EP231X-ST: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	<0.0005	0.00	No Limit
		EP231X-ST: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	<0.0005	0.00	No Limit
		EP231X-ST: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	<0.001	<0.001	0.00	No Limit
		EP231X-ST: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<0.001	0.00	No Limit
		EP231X-ST: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	<0.001	0.00	No Limit
		EP231X-ST: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	<0.001	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 2292706)									
ES1911356-003	GWP2-PFC	EP231X-ST: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<0.001	0.00	No Limit
		EP231X-ST: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	0.001	0.001	0.00	No Limit
		EP231X-ST: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	0.00	No Limit
		EP231X-ST: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	µg/L	<0.001	<0.001	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 2292706)									
ES1911356-003	GWP2-PFC	EP231X-ST: Sum of PFAS	----	0.0003	µg/L	0.0531	0.0548	3.15	0% - 20%

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	*Laboratory Control Spike (LCS) Report*			
					Spike Concentration	*Spike Recovery (%)*	*Recovery Limits (%)*	
Method: Compound	*CAS Number*	*LOR*	*Unit*	*Result*		*LCS*	*Low*	*High*
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2292706)								
EP231X-ST: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	0.01 µg/L	116	50	130
EP231X-ST: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	0.01 µg/L	111	50	130
EP231X-ST: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	0.01 µg/L	96.0	50	130
EP231X-ST: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	0.01 µg/L	103	50	130
EP231X-ST: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0003	µg/L	<0.0003	0.01 µg/L	89.2	50	130
EP231X-ST: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	0.01 µg/L	52.0	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2292706)								
EP231X-ST: Perfluorobutanoic acid (PFBA)	375-22-4	0.002	µg/L	<0.002	0.05 µg/L	65.0	30	130
EP231X-ST: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	0.01 µg/L	126	50	130
EP231X-ST: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	0.01 µg/L	117	50	130
EP231X-ST: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	0.01 µg/L	120	50	130
EP231X-ST: Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	0.01 µg/L	97.8	50	130
EP231X-ST: Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	0.01 µg/L	99.2	50	130
EP231X-ST: Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	0.01 µg/L	94.6	50	130
EP231X-ST: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	0.01 µg/L	65.6	40	130
EP231X-ST: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	<0.0005	0.01 µg/L	52.2	40	130
EP231X-ST: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	0.01 µg/L	44.6	40	130
EP231X-ST: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	<0.0005	0.025 µg/L	59.0	40	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2292706)								
EP231X-ST: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	0.01 µg/L	96.4	40	130
EP231X-ST: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	<0.001	0.025 µg/L	53.1	40	130
EP231X-ST: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	0.025 µg/L	52.6	40	130
EP231X-ST: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	0.025 µg/L	63.6	40	130
EP231X-ST: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	0.025 µg/L	55.6	40	130
EP231X-ST: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	0.01 µg/L	53.8	40	130
EP231X-ST: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	0.01 µg/L	51.2	40	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2292706)								
EP231X-ST: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	0.01 µg/L	112	50	130
EP231X-ST: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	0.01 µg/L	128	50	130

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2292706) - continued								
EP231X-ST: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	0.01 µg/L	116	50	130
EP231X-ST: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	µg/L	<0.001	0.01 µg/L	58.4	50	130
EP231P: PFAS Sums (QCLot: 2292706)								
EP231X-ST: Sum of PFAS	----	0.0003	µg/L	<0.0003	----	----	----	----

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2292706)							
ES1911356-004	GWP3-PFC	EP231X-ST: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.01 µg/L	76.0	50	130
		EP231X-ST: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.01 µg/L	90.0	50	130
		EP231X-ST: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01 µg/L	# Not Determined	50	130
		EP231X-ST: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.01 µg/L	86.2	50	130
		EP231X-ST: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01 µg/L	# Not Determined	50	130
		EP231X-ST: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.01 µg/L	75.0	30	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2292706)							
ES1911356-004	GWP3-PFC	EP231X-ST: Perfluorobutanoic acid (PFBA)	375-22-4	0.05 µg/L	30.4	30	130
		EP231X-ST: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.01 µg/L	104	50	130
		EP231X-ST: Perfluorohexanoic acid (PFHxA)	307-24-4	0.01 µg/L	88.0	50	130
		EP231X-ST: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.01 µg/L	94.0	50	130
		EP231X-ST: Perfluorooctanoic acid (PFOA)	335-67-1	0.01 µg/L	90.2	50	130
		EP231X-ST: Perfluorononanoic acid (PFNA)	375-95-1	0.01 µg/L	130	50	130
		EP231X-ST: Perfluorodecanoic acid (PFDA)	335-76-2	0.01 µg/L	125	50	130
		EP231X-ST: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.01 µg/L	91.2	30	130
		EP231X-ST: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.01 µg/L	39.4	30	130
		EP231X-ST: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.01 µg/L	40.4	30	130
		EP231X-ST: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.025 µg/L	118	30	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2292706)							
ES1911356-004	GWP3-PFC	EP231X-ST: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.01 µg/L	98.6	30	130
		EP231X-ST: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.025 µg/L	43.4	30	130

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%) Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2292706) - continued							
ES1911356-004	GWP3-PFC	EP231X-ST: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.025 µg/L	88.3	30	130
		EP231X-ST: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.025 µg/L	69.4	30	130
		EP231X-ST: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.025 µg/L	61.7	30	130
		EP231X-ST: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.01 µg/L	96.8	30	130
		EP231X-ST: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.01 µg/L	78.2	30	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2292706)							
ES1911356-004	GWP3-PFC	EP231X-ST: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.01 µg/L	100	50	130
		EP231X-ST: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.01 µg/L	122	50	130
		EP231X-ST: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.01 µg/L	90.0	50	130
		EP231X-ST: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.01 µg/L	54.0	50	130

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	**Analyte**	CAS Number	Data	Limits	**Comment**
Matrix Spike (MS) Recoveries							
EP231A: Perfluoroalkyl Sulfonic Acids	ES1911356--004	GWP3-PFC	**Perfluorohexane sulfonic acid (PFHxS)**	355-46-4	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231A: Perfluoroalkyl Sulfonic Acids	ES1911356--004	GWP3-PFC	**Perfluorooctane sulfonic acid (PFOS)**	1763-23-1	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method	***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 (no PTFE) (EP231X-ST) GWP2-PFC, GWP3-PFC, P44	**10-Apr-2019**	**12-Apr-2019**	07-Oct-2019	✓	**12-Apr-2019**	07-Oct-2019	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X-ST) GWP2-PFC, GWP3-PFC, P44	**10-Apr-2019**	**12-Apr-2019**	07-Oct-2019	✓	**12-Apr-2019**	07-Oct-2019	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X-ST) GWP2-PFC, GWP3-PFC, P44	**10-Apr-2019**	**12-Apr-2019**	07-Oct-2019	✓	**12-Apr-2019**	07-Oct-2019	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X-ST) GWP2-PFC, GWP3-PFC, P44	**10-Apr-2019**	**12-Apr-2019**	07-Oct-2019	✓	**12-Apr-2019**	07-Oct-2019	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X-ST) GWP2-PFC, GWP3-PFC, P44	**10-Apr-2019**	**12-Apr-2019**	07-Oct-2019	✓	**12-Apr-2019**	07-Oct-2019	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-ST	1	3	**33.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-ST	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-ST	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-ST	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES1911356**	Page	: 1 of 4
Client	: **ENVIRONMENTAL PROJECTS**	Laboratory	: Environmental Division Sydney
Contact	: BRAD FITZGERALD	Telephone	: +61-2-8784 8555
Project	: 19040.01 Parafield Airport Groundwater Monitoring Event	Date Samples Received	: 11-Apr-2019
Site	: ----	Issue Date	: 15-Apr-2019
Sampler	: ----	No. of samples received	: 6
Order number	:	No. of samples analysed	: 3

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

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*
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-ST	WATER	In-house: Analysis of fresh and saline waters by solid phase extraction and LC-Electrospray-MS-MS, Negative Mode using MRM. This method is targeted to pristine environmental and drinking waters reporting at sub-parts per trillion. Where commercially available, isotopically labelled analogues of the target analytes are used as internal standards for quantification. Where a labelled analogue is not commercially available, the internal standard with similar chemistry and the closest retention time to the target is used for quantification. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. This method complies with the quality control definitions as stated in QSM 5.1. Data is reviewed in line with the DQOs as stated in QSM5.1

Preparation Methods	*Method*	*Matrix*	*Method Descriptions*
SPE preparation for LL and saline PFCs	EP231-SPE	WATER	In house

Environmental

QUALITY CONTROL REPORT

Work Order : **ES1911356**

Client : **ENVIRONMENTAL PROJECTS**
Contact : BRAD FITZGERALD
Address : LEVEL 3 117 KING WILLIAM ST
ADELAIDE SA 5001
Telephone : +61 08 8410 1846
Project : 19040.01 Parafield Airport Groundwater Monitoring Event
Order number :
C-O-C number : ----
Sampler : ----
Site : ----
Quote number : EN/333
No. of samples received : 6
No. of samples analysed : 3

Page : 1 of 6

Laboratory : Environmental Division Sydney
Contact : Customer Services ES
Address : 277-289 Woodpark Road Smithfield NSW Australia 2164

Telephone : +61-2-8784 8555
Date Samples Received : 11-Apr-2019
Date Analysis Commenced : 12-Apr-2019
Issue Date : 15-Apr-2019

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. 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*
Franco Lentini		Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by 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

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 2292706)									
ES1911356-003	GWP2-PFC	EP231X-ST: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0003	µg/L	0.0267	0.0274	2.51	0% - 20%
		EP231X-ST: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	0.0020	0.0026	26.1	No Limit
		EP231X-ST: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	0.0015	0.0015	0.00	No Limit
		EP231X-ST: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	0.0094	0.0100	6.21	0% - 50%
		EP231X-ST: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	0.0008	0.0008	0.00	No Limit
		EP231X-ST: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 2292706)									
ES1911356-003	GWP2-PFC	EP231X-ST: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	0.0026	0.0024	8.00	No Limit
		EP231X-ST: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	0.0009	0.0009	0.00	No Limit
		EP231X-ST: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	0.0008	0.0006	28.6	No Limit
		EP231X-ST: Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	0.0036	0.0036	0.00	No Limit
		EP231X-ST: Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	0.0013	0.0012	0.00	No Limit
		EP231X-ST: Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	0.0020	0.0022	10.5	No Limit
		EP231X-ST: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<0.0005	0.00	No Limit
		EP231X-ST: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	<0.0005	<0.0005	0.00	No Limit
		EP231X-ST: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<0.0005	0.00	No Limit
		EP231X-ST: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	<0.0005	<0.0005	0.00	No Limit
		EP231X-ST: Perfluorobutanoic acid (PFBA)	375-22-4	0.002	µg/L	<0.002	<0.002	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 2292706)									
ES1911356-003	GWP2-PFC	EP231X-ST: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	0.0005	0.0006	0.00	No Limit
		EP231X-ST: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	<0.0005	0.00	No Limit
		EP231X-ST: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	<0.0005	0.00	No Limit
		EP231X-ST: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	<0.001	<0.001	0.00	No Limit
		EP231X-ST: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<0.001	0.00	No Limit
		EP231X-ST: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	<0.001	0.00	No Limit
		EP231X-ST: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	<0.001	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 2292706)									
ES1911356-003	GWP2-PFC	EP231X-ST: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<0.001	0.00	No Limit
		EP231X-ST: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	0.001	0.001	0.00	No Limit
		EP231X-ST: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	0.00	No Limit
		EP231X-ST: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	µg/L	<0.001	<0.001	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 2292706)									
ES1911356-003	GWP2-PFC	EP231X-ST: Sum of PFAS	----	0.0003	µg/L	0.0531	0.0548	3.15	0% - 20%

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	*Laboratory Control Spike (LCS) Report*			
					Spike	*Spike Recovery (%)*	*Recovery Limits (%)*	
Method: Compound	*CAS Number*	*LOR*	*Unit*	*Result*	*Concentration*	*LCS*	*Low*	*High*
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2292706)								
EP231X-ST: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	0.01 µg/L	116	50	130
EP231X-ST: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	0.01 µg/L	111	50	130
EP231X-ST: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	0.01 µg/L	96.0	50	130
EP231X-ST: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	0.01 µg/L	103	50	130
EP231X-ST: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0003	µg/L	<0.0003	0.01 µg/L	89.2	50	130
EP231X-ST: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	0.01 µg/L	52.0	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2292706)								
EP231X-ST: Perfluorobutanoic acid (PFBA)	375-22-4	0.002	µg/L	<0.002	0.05 µg/L	65.0	30	130
EP231X-ST: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	0.01 µg/L	126	50	130
EP231X-ST: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	0.01 µg/L	117	50	130
EP231X-ST: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	0.01 µg/L	120	50	130
EP231X-ST: Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	0.01 µg/L	97.8	50	130
EP231X-ST: Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	0.01 µg/L	99.2	50	130
EP231X-ST: Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	0.01 µg/L	94.6	50	130
EP231X-ST: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	0.01 µg/L	65.6	40	130
EP231X-ST: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	<0.0005	0.01 µg/L	52.2	40	130
EP231X-ST: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	0.01 µg/L	44.6	40	130
EP231X-ST: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	<0.0005	0.025 µg/L	59.0	40	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2292706)								
EP231X-ST: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	0.01 µg/L	96.4	40	130
EP231X-ST: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	<0.001	0.025 µg/L	53.1	40	130
EP231X-ST: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	0.025 µg/L	52.6	40	130
EP231X-ST: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	0.025 µg/L	63.6	40	130
EP231X-ST: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	0.025 µg/L	55.6	40	130
EP231X-ST: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	0.01 µg/L	53.8	40	130
EP231X-ST: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	0.01 µg/L	51.2	40	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2292706)								
EP231X-ST: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	0.01 µg/L	112	50	130
EP231X-ST: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	0.01 µg/L	128	50	130

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2292706) - continued								
EP231X-ST: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	0.01 µg/L	116	50	130
EP231X-ST: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	µg/L	<0.001	0.01 µg/L	58.4	50	130
EP231P: PFAS Sums (QCLot: 2292706)								
EP231X-ST: Sum of PFAS	----	0.0003	µg/L	<0.0003	----	----	----	----

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2292706)							
ES1911356-004	GWP3-PFC	EP231X-ST: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.01 µg/L	76.0	50	130
		EP231X-ST: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.01 µg/L	90.0	50	130
		EP231X-ST: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01 µg/L	# Not Determined	50	130
		EP231X-ST: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.01 µg/L	86.2	50	130
		EP231X-ST: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01 µg/L	# Not Determined	50	130
		EP231X-ST: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.01 µg/L	75.0	30	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2292706)							
ES1911356-004	GWP3-PFC	EP231X-ST: Perfluorobutanoic acid (PFBA)	375-22-4	0.05 µg/L	30.4	30	130
		EP231X-ST: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.01 µg/L	104	50	130
		EP231X-ST: Perfluorohexanoic acid (PFHxA)	307-24-4	0.01 µg/L	88.0	50	130
		EP231X-ST: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.01 µg/L	94.0	50	130
		EP231X-ST: Perfluorooctanoic acid (PFOA)	335-67-1	0.01 µg/L	90.2	50	130
		EP231X-ST: Perfluorononanoic acid (PFNA)	375-95-1	0.01 µg/L	130	50	130
		EP231X-ST: Perfluorodecanoic acid (PFDA)	335-76-2	0.01 µg/L	125	50	130
		EP231X-ST: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.01 µg/L	91.2	30	130
		EP231X-ST: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.01 µg/L	39.4	30	130
		EP231X-ST: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.01 µg/L	40.4	30	130
		EP231X-ST: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.025 µg/L	118	30	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2292706)							
ES1911356-004	GWP3-PFC	EP231X-ST: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.01 µg/L	98.6	30	130
		EP231X-ST: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.025 µg/L	43.4	30	130

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%) Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2292706) - continued							
ES1911356-004	GWP3-PFC	EP231X-ST: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.025 µg/L	88.3	30	130
		EP231X-ST: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.025 µg/L	69.4	30	130
		EP231X-ST: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.025 µg/L	61.7	30	130
		EP231X-ST: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.01 µg/L	96.8	30	130
		EP231X-ST: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.01 µg/L	78.2	30	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2292706)							
ES1911356-004	GWP3-PFC	EP231X-ST: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.01 µg/L	100	50	130
		EP231X-ST: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.01 µg/L	122	50	130
		EP231X-ST: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.01 µg/L	90.0	50	130
		EP231X-ST: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.01 µg/L	54.0	50	130

Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order : **ES1911356**

Client : **ENVIRONMENTAL PROJECTS**
Contact : BRAD FITZGERALD
Project : 19040.01 Parafield Airport Groundwater Monitoring Event
Site : ----
Sampler : ----
Order number :

Page : 1 of 4

Laboratory : Environmental Division Sydney
Telephone : +61-2-8784 8555
Date Samples Received : 11-Apr-2019
Issue Date : 15-Apr-2019
No. of samples received : 6
No. of samples analysed : 3

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	**Analyte**	CAS Number	Data	Limits	**Comment**
Matrix Spike (MS) Recoveries							
EP231A: Perfluoroalkyl Sulfonic Acids	ES1911356--004	GWP3-PFC	**Perfluorohexane sulfonic acid (PFHxS)**	355-46-4	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231A: Perfluoroalkyl Sulfonic Acids	ES1911356--004	GWP3-PFC	**Perfluorooctane sulfonic acid (PFOS)**	1763-23-1	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method ***Container*** */ Client Sample ID(s)*	***Sample Date***	*Extraction / Preparation*			*Analysis*		
		Date extracted	*Due for extraction*	*Evaluation*	***Date analysed***	*Due for analysis*	*Evaluation*
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X-ST) GWP2-PFC, GWP3-PFC, P44	**10-Apr-2019**	**12-Apr-2019**	07-Oct-2019	✓	**12-Apr-2019**	07-Oct-2019	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X-ST) GWP2-PFC, GWP3-PFC, P44	**10-Apr-2019**	**12-Apr-2019**	07-Oct-2019	✓	**12-Apr-2019**	07-Oct-2019	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X-ST) GWP2-PFC, GWP3-PFC, P44	**10-Apr-2019**	**12-Apr-2019**	07-Oct-2019	✓	**12-Apr-2019**	07-Oct-2019	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X-ST) GWP2-PFC, GWP3-PFC, P44	**10-Apr-2019**	**12-Apr-2019**	07-Oct-2019	✓	**12-Apr-2019**	07-Oct-2019	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X-ST) GWP2-PFC, GWP3-PFC, P44	**10-Apr-2019**	**12-Apr-2019**	07-Oct-2019	✓	**12-Apr-2019**	07-Oct-2019	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-ST	1	3	**33.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-ST	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-ST	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-ST	1	3	**33.33**	**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*
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-ST	WATER	In-house: Analysis of fresh and saline waters by solid phase extraction and LC-Electrospray-MS-MS, Negative Mode using MRM. This method is targeted to pristine environmental and drinking waters reporting at sub-parts per trillion. Where commercially available, isotopically labelled analogues of the target analytes are used as internal standards for quantification. Where a labelled analogue is not commercially available, the internal standard with similar chemistry and the closest retention time to the target is used for quantification. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. This method complies with the quality control definitions as stated in QSM 5.1. Data is reviewed in line with the DQOs as stated in QSM5.1

Preparation Methods	*Method*	*Matrix*	*Method Descriptions*
SPE preparation for LL and saline PFCs	EP231-SPE	WATER	In house

Australian Government
Department of Industry,
Innovation and Science

National
Measurement
Institute

NATA

REPORT OF ANALYSIS

Report No. RN1229650

Client	: ENVIRONMENTAL PROJECTS UNIT 9 LEVEL 3 ADELAIDE SOUTH SA 5000	**Job No.**	:	ENVI193/190411
		Quote No.	:	QT-02018
		Order No.	:	
		Date Received	:	11-APR-2019
Attention	: BRAD FITZGERALD	**Sampled By**	:	CLIENT
Project Name	: PARAFIELD AIRPORT GW MONITORIN			
Your Client Services Manager	: Tony Lattari	**Phone**	:	02 9449 0196

Lab Reg No.	Sample Ref	Sample Description
N19/009914	DUP-1	WATER 10/04/2019 JOB: 19040.01
N19/009915	DUP-2	WATER 10/04/2019 JOB: 19040.01

Lab Reg No.		**N19/009914**	**N19/009915**			
Date Sampled		**10-APR-2019**	**10-APR-2019**			
Sample Reference	**Units**	**DUP-1**	**DUP-2**			**Method**
PFAS (per-and poly-fluoroalkyl substances)						
PFBA (375-22-4)	ug/L	0.0072	0.0051			NR70
PFPeA (2706-90-3)	ug/L	<0.002	0.0023			NR70
PFHxA (307-24-4)	ug/L	<0.001	0.0043			NR70
PFHpA (375-85-9)	ug/L	0.0011	0.0018			NR70
PFOA (335-67-1)	ug/L	0.0029	0.0032			NR70
PFNA (375-95-1)	ug/L	<0.001	<0.001			NR70
PFDA (335-76-2)	ug/L	0.0015	<0.001			NR70
PFUdA (2058-94-8)	ug/L	<0.001	<0.001			NR70
PFDoA (307-55-1)	ug/L	<0.001	<0.001			NR70
PFTrDA (72629-94-8)	ug/L	<0.002	<0.002			NR70
PFTeDA (376-06-7)	ug/L	<0.002	<0.002			NR70
PFHxDA (67905-19-5)	ug/L	<0.002	<0.002			NR70
PFODA (16517-11-6)	ug/L	<0.005	<0.005			NR70
FOUEA (70887-84-2)	ug/L	<0.001	<0.001			NR70
PFBS (375-73-5)	ug/L	0.0022	0.0085			NR70
PFPeS (2706-91-4)	ug/L	0.0010	0.0080			NR70
PFHxS (355-46-4)	ug/L	0.0069	0.069			NR70
PFHpS (375-92-8)	ug/L	<0.001	0.0012			NR70
PFOS (1763-23-1)	ug/L	0.021	0.043			NR70
PFNS (68259-12-1)	ug/L	<0.001	<0.001			NR70
PFDS (335-77-3)	ug/L	<0.001	<0.001			NR70
PFOSA (754-91-6)	ug/L	<0.001	<0.001			NR70
N-MeFOSA (31506-32-8)	ug/L	<0.002	<0.002			NR70
N-EtFOSA (4151-50-2)	ug/L	<0.002	<0.002			NR70
N-MeFOSAA (2355-31-9)	ug/L	<0.002	<0.002			NR70
N-EtFOSAA(2991-50-6)	ug/L	<0.002	<0.002			NR70
N-MeFOSE (24448-09-7)	ug/L	<0.005	<0.005			NR70
N-EtFOSE (1691-99-2)	ug/L	<0.005	<0.005			NR70

REPORT OF ANALYSIS

Lab Reg No.	Units	N19/009914	N19/009915			Method
Date Sampled		10-APR-2019	10-APR-2019			
Sample Reference		DUP-1	DUP-2			
PFAS (per-and poly-fluoroalkyl substances)						
4:2 FTS (757124-72-4)	ug/L	<0.001	<0.001			NR70
6:2 FTS (27619-97-2)	ug/L	0.0022	0.0048			NR70
8:2 FTS (39108-34-4)	ug/L	<0.001	<0.001			NR70
10:2 FTS (120226-60-0)	ug/L	<0.001	<0.001			NR70
8:2 diPAP (678-41-1)	ug/L	<0.002	<0.002			NR70
PFBA (Surrogate Recovery)	%	109	113			NR70
PFPeA (Surrogate Recovery)	%	174	147			NR70
PFHxA (Surrogate Recovery)	%	93	94			NR70
PFHpA (Surrogate Recovery)	%	98	115			NR70
PFOA (Surrogate Recovery)	%	107	113			NR70
PFNA (Surrogate Recovery)	%	109	105			NR70
PFDA (Surrogate Recovery)	%	103	127			NR70
PFUdA (Surrogate Recovery)	%	89	133			NR70
PFDoA (Surrogate Recovery)	%	99	109			NR70
PFTeDA (Surrogate Recovery)	%	80	88			NR70
PFHxDA (Surrogate Recovery)	%	90	90			NR70
FOUEA (Surrogate Recovery)	%	79	80			NR70
PFBS (Surrogate Recovery)	%	93	77			NR70
PFHxS (Surrogate Recovery)	%	99	95			NR70
PFOS (Surrogate Recovery)	%	103	116			NR70
PFOSA (Surrogate Recovery)	%	90	71			NR70
N-MeFOSA (Surrogate Recovery)	%	50	26			NR70
N-EtFOSA (Surrogate Recovery)	%	41	38			NR70
N-MeFOSAA (Surrogate Recovery)	%	94	100			NR70
N-EtFOSAA (Surrogate Recovery)	%	85	108			NR70
N-MeFOSE (Surrogate Recovery)	%	67	72			NR70
N-EtFOSE (Surrogate Recovery)	%	93	74			NR70
4:2 FTS (Surrogate Recovery)	%	78	53			NR70
6:2 FTS (Surrogate Recovery)	%	90	76			NR70
8:2 FTS (Surrogate Recovery)	%	105	126			NR70
8:2 diPAP (Surrogate Recovery)	%	49	44			NR70
Dates						
Date extracted		17-APR-2019	17-APR-2019			
Date analysed		18-APR-2019	18-APR-2019			

N19/009914
to
N19/009915:

REPORT OF ANALYSIS

PFOS is quantified using a combined branched and linear standard,
linear and branched isomers are totalled for reporting.
All results corrected for labelled surrogate recoveries.
Selected PFAS surrogate recoveries are biased due to matrix effects.

Danny Slee, Section Manager
Organic - NSW
Accreditation No. 198

18-APR-2019

NATA
ACCREDITED FOR
TECHNICAL
COMPETENCE

Accredited for compliance with ISO/IEC 17025 - Testing.
This report shall not be reproduced except in full.
Results relate only to the sample(s) tested.

This Report supersedes reports: *RN1229610*

Measurement Uncertainty is available upon request.
Chemical Accreditation 198: 105 Delhi Road, North Ryde, NSW, 2113

Australian Government

National Measurement Institute

QUALITY ASSURANCE REPORT

Client: ENVIRONMENTAL PROJECTS

NMI QA Report No: ENVI193/190411 **Sample Matrix:** Liquid

Analyte	Method	LOR	Blank	Sample Duplicates			Recoveries	
				Sample	Duplicate	RPD	LCS	Matrix Spike
		ug/L	ug/L	ug/L	ug/L	%	%	%
PFBA (375-22-4)	NR70	0.005	<0.005	NA	NA	NA	122	NA
PFPeA (2706-90-3)	NR70	0.002	<0.002	NA	NA	NA	104	NA
PFHxA (307-24-4)	NR70	0.001	<0.001	NA	NA	NA	97	NA
PFHpA (375-85-9)	NR70	0.001	<0.001	NA	NA	NA	101	NA
PFOA (335-67-1)	NR70	0.001	<0.001	NA	NA	NA	97	NA
PFNA (375-95-1)	NR70	0.001	<0.001	NA	NA	NA	107	NA
PFDA (335-76-2)	NR70	0.001	<0.001	NA	NA	NA	100	NA
PFUdA (2058-94-8)	NR70	0.001	<0.001	NA	NA	NA	104	NA
PFDoA (307-55-1)	NR70	0.001	<0.001	NA	NA	NA	113	NA
PFTrDA (72629-94-8)	NR70	0.002	<0.002	NA	NA	NA	101	NA
PFTeDA (376-06-7)	NR70	0.002	<0.002	NA	NA	NA	120	NA
PFHxDA (67905-19-5)	NR70	0.002	<0.002	NA	NA	NA	124	NA
PFODA (16517-11-6)	NR70	0.005	<0.005	NA	NA	NA	15	NA
FOUEA (70887-84-2)	NR70	0.001	<0.001	NA	NA	NA	108	NA
PFBS (375-73-5)	NR70	0.001	<0.001	NA	NA	NA	105	NA
PFPeS (2706-91-4)	NR70	0.001	<0.001	NA	NA	NA	104	NA
PFHxS (355-46-4)	NR70	0.001	<0.001	NA	NA	NA	102	NA
PFHpS (375-92-8)	NR70	0.001	<0.001	NA	NA	NA	101	NA
PFOS (1763-23-1)	NR70	0.002	<0.002	NA	NA	NA	110	NA
PFNS (68259-12-1)	NR70	0.001	<0.001	NA	NA	NA	100	NA
PFDS (335-77-3)	NR70	0.001	<0.001	NA	NA	NA	98	NA
PFOSA (754-91-6)	NR70	0.001	<0.001	NA	NA	NA	108	NA
N-MeFOSA (31506-32-8)	NR70	0.002	<0.002	NA	NA	NA	126	NA
N-EtFOSA (4151-50-2)	NR70	0.002	<0.002	NA	NA	NA	96	NA
N-MeFOSAA (2355-31-9)	NR70	0.002	<0.002	NA	NA	NA	101	NA
N-EtFOSAA(2991-50-6)	NR70	0.002	<0.002	NA	NA	NA	105	NA
N-MeFOSE (24448-09-7)	NR70	0.005	<0.005	NA	NA	NA	149	NA
N-EtFOSE (1691-99-2)	NR70	0.005	<0.005	NA	NA	NA	132	NA
4:2 FTS (757124-72-4)	NR70	0.001	<0.001	NA	NA	NA	115	NA
6:2 FTS (27619-97-2)	NR70	0.001	<0.001	NA	NA	NA	106	NA
8:2 FTS (39108-34-4)	NR70	0.001	<0.001	NA	NA	NA	101	NA
10:2 FTS (120226-60-0)	NR70	0.001	<0.001	NA	NA	NA	84	NA
8:2 diPAP (678-41-1)	NR70	0.002	<0.002	NA	NA	NA	116	NA

Results expressed in percentage (%) or ug/L wherever appropriate.
Acceptable Spike recovery is 50-150%.
Maximum acceptable RPDs on spikes and duplicates is 40%.
'NA ' = Not Applicable.
RPD= Relative Percentage Difference.

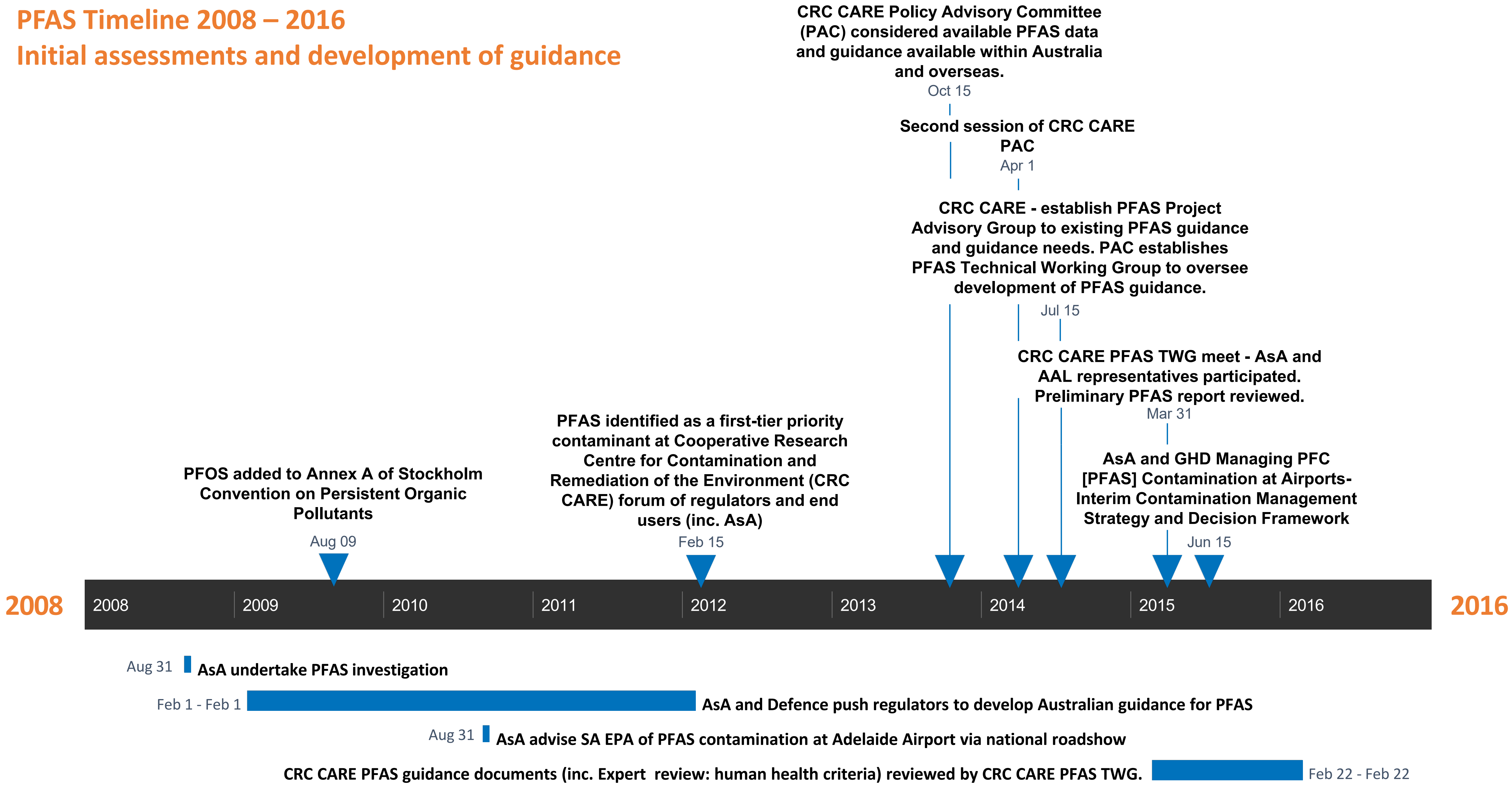
Signed:

Danny Slee
Organics Manager, NMI-North Ryde

Date: **18/04/2019**

Appendix K – PFAS Timeline

PFAS Timeline 2008 – 2016
Initial assessments and development of guidance



CRC CARE Policy Advisory Committee (PAC) considered available PFAS data and guidance available within Australia and overseas.
Oct 15

Second session of CRC CARE PAC
Apr 1

CRC CARE - establish PFAS Project Advisory Group to existing PFAS guidance and guidance needs. PAC establishes PFAS Technical Working Group to oversee development of PFAS guidance.
Jul 15

CRC CARE PFAS TWG meet - AsA and AAL representatives participated. Preliminary PFAS report reviewed.
Mar 31

PFAS identified as a first-tier priority contaminant at Cooperative Research Centre for Contamination and Remediation of the Environment (CRC CARE) forum of regulators and end users (inc. AsA)
Feb 15

AsA and GHD Managing PFC [PFAS] Contamination at Airports- Interim Contamination Management Strategy and Decision Framework
Jun 15

PFOS added to Annex A of Stockholm Convention on Persistent Organic Pollutants
Aug 09

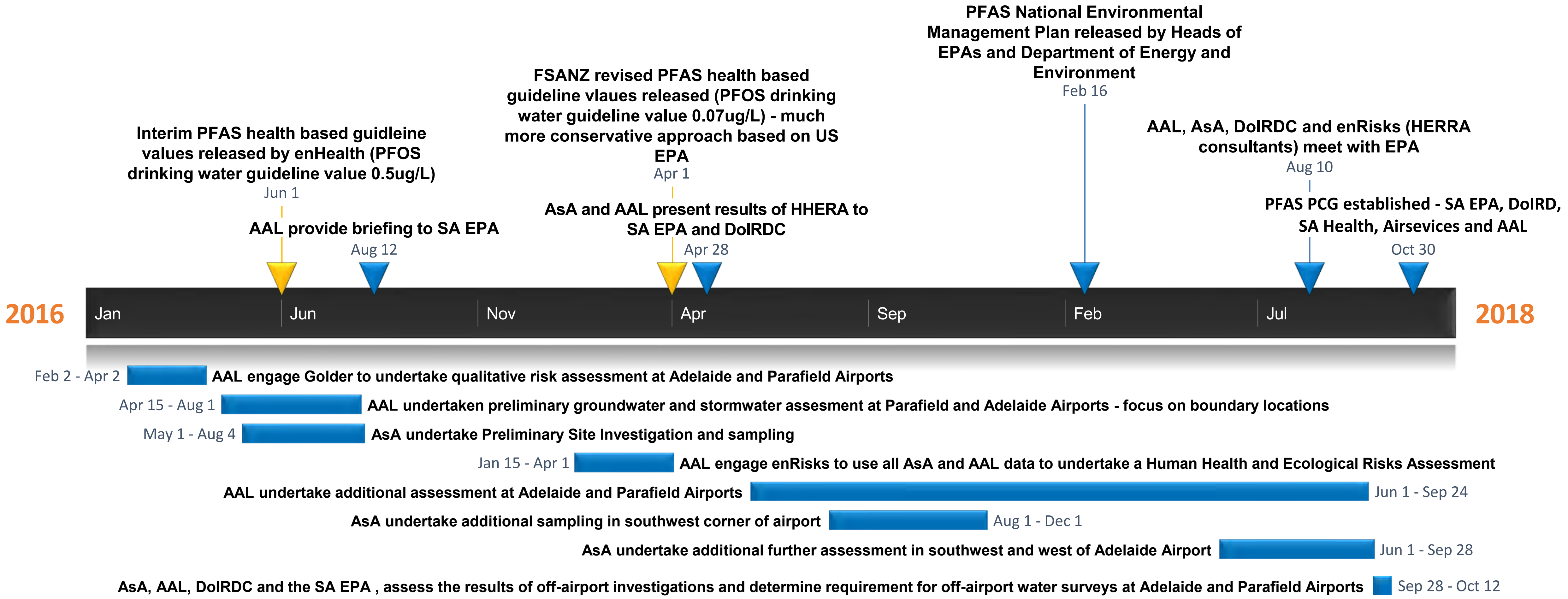
Aug 31 **AsA undertake PFAS investigation**

Feb 1 - Feb 1 **AsA and Defence push regulators to develop Australian guidance for PFAS**

Aug 31 **AsA advise SA EPA of PFAS contamination at Adelaide Airport via national roadshow**

CRC CARE PFAS guidance documents (inc. Expert review: human health criteria) reviewed by CRC CARE PFAS TWG. Feb 22 - Feb 22

PFAS Timeline 2016 – 2018
Investigations and development of guideline values



Interim PFAS health based guidleine values released by enHealth (PFOS drinking water guideline value 0.5ug/L)
Jun 1

AAL provide briefing to SA EPA
Aug 12

FSANZ revised PFAS health based guideline vlaues released (PFOS drinking water guideline value 0.07ug/L) - much more conservative approach based on US EPA
Apr 1

AsA and AAL present results of HHERA to SA EPA and DoIRDC
Apr 28

PFAS National Environmental Management Plan released by Heads of EPAs and Department of Energy and Environment
Feb 16

AAL, AsA, DoIRDC and enRisks (HERRA consultants) meet with EPA
Aug 10

PFAS PCG established - SA EPA, DoIRD, SA Health, Airsevices and AAL
Oct 30

Feb 2 - Apr 2 **AAL engage Golder to undertake qualitative risk assessment at Adelaide and Parafield Airports**

Apr 15 - Aug 1 **AAL undertaken preliminary groundwater and stormwater assesment at Parafield and Adelaide Airports - focus on boundary locations**

May 1 - Aug 4 **AsA undertake Preliminary Site Investigation and sampling**

Jan 15 - Apr 1 **AAL engage enRisks to use all AsA and AAL data to undertake a Human Health and Ecological Risks Assessment**

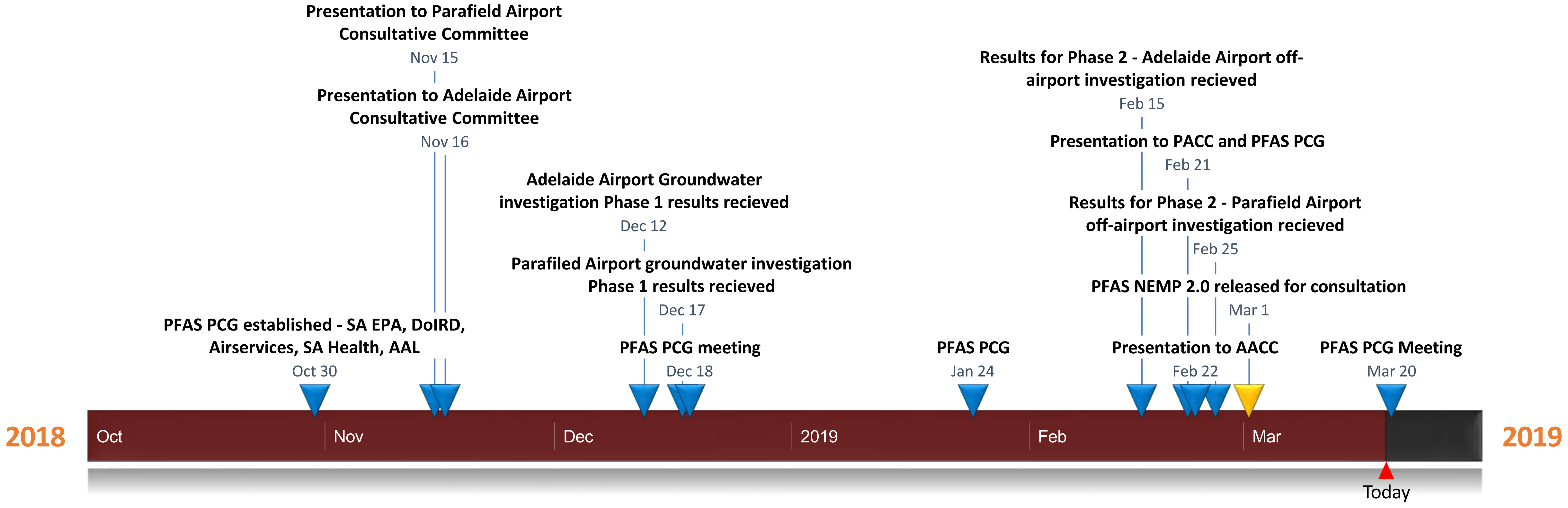
AAL undertake additional assessment at Adelaide and Parafield Airports Jun 1 - Sep 24

AsA undertake additional sampling in southwest corner of airport Aug 1 - Dec 1

AsA undertake additional further assessment in southwest and west of Adelaide Airport Jun 1 - Sep 28

AsA, AAL, DoIRDC and the SA EPA , assess the results of off-airport investigations and determine requirement for off-airport water surveys at Adelaide and Parafield Airports Sep 28 - Oct 12

PFAS Timeline 2018 – 2019
Investigations and development of guideline values



PFAS PCG established - SA EPA, DoIRD, Airservices, SA Health, AAL
Oct 30

Presentation to Parafield Airport Consultative Committee
Nov 15

Presentation to Adelaide Airport Consultative Committee
Nov 16

Adelaide Airport Groundwater investigation Phase 1 results recieved
Dec 12

Parafiled Airport groundwater investigation Phase 1 results recieved
Dec 17

PFAS PCG meeting
Dec 18

PFAS PCG
Jan 24

Results for Phase 2 - Adelaide Airport off-airport investigation recieved
Feb 15

Presentation to PACC and PFAS PCG
Feb 21

Presentation to AACC
Feb 22

Results for Phase 2 - Parafield Airport off-airport investigation recieved
Feb 25

PFAS NEMP 2.0 released for consultation
Mar 1

PFAS PCG Meeting
Mar 20

Nov 5 - Nov 15 **AAL meet with local councils and elected state and federal MPs - Adelaide and Parafield**

Nov 16 - Nov 20 **AsA undertake groundwater survey and off-airport investigation at Adelaide Airport - daily PCG**

Nov 16 - Nov 21 **AAL undertake groundwater survey and off-airport investigation at Parafield Airport - daily PCG**

Jan 24 **Update provided to AACC**

Jan 29 - Jan 31 **Phase 2 - groundwater survey and off-airport investigation at Adelaide and Parafield Airport**

GHD

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

3319051-25139/G:\33\19051\GME & Survey Report combined\Parafield report 3319051 Rev4.docx

Document Status

Revision	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
1	J Chance	J Howard	*	J Howard	*	4/4/2019
2	J Chance	J Howard	*	J Howard	*	18/06/2019
3	D Valiff	J Howard		J Howard		1/07/2019
4	D Valiff	J Howard		J Howard		6/08/2019
5	D Valiff M Hanna (edits)	B Smith		B Smith		20/08/2019
6	M Hanna (report compiled)	J Howard		J Howard		2/09/2019

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