



# **South Australian Metropolitan Fire Service**

**Largs North Station Groundwater Investigation (October 2019)**

9 January 2020

# Executive summary

The South Australian Metropolitan Fire Service (MFS) engaged GHD Pty Ltd (GHD) to undertake an environmental investigation in the vicinity of the Largs North Fire Station (the site) following the detection of elevated concentrations of per and poly fluoroalkyl substance (PFAS) in groundwater beneath as well as up and down hydraulic gradient of the site.

Historically the MFS used firefighting foam containing PFAS at the site during testing of delivery systems on firefighting appliances. PFAS foam has not been used at Largs North fire station since 2016.

As part of the PFAS monitoring program MFS has supported its staff to have voluntary blood tests for PFAS in 2018. Several firefighters stationed at Largs North made the MFS aware of higher than average levels of PFAS in confidential blood samples, which caused concern.

In December 2018 the MFS commissioned GHD to perform environmental investigations at Largs North fire station to identify the source(s) of PFAS contamination, so the exposure pathway/s could be removed to reduce risks to human receptors on site. GHD was also commissioned to undertake offsite investigations surrounding the Largs North fire station in accordance with the Voluntary Site Contamination Assessment Proposal (VSCAP) dated 10 May 2019.

The results of the previous investigations prompted the SA MFS, in consultation with the South Australian Environment Protection Authority (SA EPA) and other stakeholders, to engage GHD to undertake further environmental investigations to assess PFAS impacted groundwater associated with the Largs North Fire Station.

In September 2019 the MFS engaged SA EPA accredited Site Contamination Auditor Steve Kirsanovs under the Site Contamination Audit System.

This investigation was carried out by GHD during October 2019. The works were undertaken in accordance with the Sampling Analysis and Quality Plan (SAQP) prepared by GHD for the Largs North Fire Station, dated 30<sup>th</sup> October 2019.

Based on this investigation, the following conclusions were made:

- GHD conducted a groundwater investigation at the Largs North Fire Station between 10<sup>th</sup> October and 23<sup>rd</sup> October 2019. This included the installation of 7 groundwater monitoring wells (MW12 to MW18) and a GME of 18 groundwater wells (11 existing and 7 newly installed).
- The objective of the investigation was to assess the extent of PFAS impacted groundwater down hydraulic gradient, cross hydraulic gradient and up hydraulic gradient of the site to assist in assessing the possibility of any off-site source(s) of PFAS which may be migrating onto the site.
- The standing water levels (SWL) recorded during the October 2019 investigation ranged from 2.07 m bgl (MW16) and 2.74 m bgl (MW03). Groundwater elevations across the site ranged between 0.678 mAHD (MW02) and 0.82 mAHD (MW03 and MW05).
- The groundwater flow direction was inferred to flow towards the north east towards the residential area located immediately north and north east of the Largs North Fire Station.
- An assessment of groundwater salinity indicated that fresh groundwater beneath the site may be suitable for potable use irrigation purposes (SA EPA, 2015).

- All groundwater monitoring wells sampled as part of this investigation reported concentrations of PFAS in groundwater above adopted assessment guidelines with the exception of MW05, MW06, MW07, MW10, MW11, MW15, MW16, MW17 and MW18.
- Groundwater monitoring wells MW03, MW08 and MW09 reported PFAS concentrations slightly lower than previous monitoring rounds. MW05, MW06, MW07, MW10 and MW11 reported a reduction in concentration of PFHxS/PFOS to below the NEMP 2018 Drinking Water Guideline compared to the April 2019 monitoring round where they reported concentrations of PFHxS/PFOS exceeding the NEMP 2018 Drinking Water Guideline.
- The highest PFAS concentrations were reported in groundwater monitoring wells on or immediately adjacent the site (MW04 and MW02). The concentrations of PFAS detected in these wells are likely to be predominantly associated with historical site activities.
- Groundwater monitoring wells located off-site, down hydraulic gradient of the site reported PFHxS/PFOS concentrations exceeding the adopted drinking water criterion at MW08, MW09, MW12, MW13 and MW14.
- PFHxS/PFOS concentrations in off-site, down hydraulic gradient wells, MW10, MW11, MW15, MW16 and MW17, were reported at levels below the drinking water guideline or below the laboratory limit of reporting (LOR).
- The low PFAS concentrations at MW11, located between the site and down gradient wells MW12 to MW14 may be the result of a number of mechanisms or causes including:
  - complex aquifer flow paths
  - surface water inputs during winter and/or
  - separate offsite source
- Groundwater monitoring wells located off-site, up hydraulic gradient of the site reported PFHxS/PFOS concentrations exceeding the adopted drinking water criterion (MW01) and although not above the adopted guidelines, above the laboratory LOR at MW05, MW06, MW07 and MW18.
- PFAS concentrations up hydraulic gradient of the site are not considered to be associated with the site based on the groundwater gradient and inferred groundwater flow direction. The presence of elevated PFAS concentrations in groundwater up hydraulic gradient of the site indicates there are other off-site sources contributing to PFAS in groundwater.
- Groundwater monitoring wells located off-site, cross hydraulic gradient of the site (MW16 and MW17) reported PFOS & PFHxS concentrations below the laboratory LOR, providing delineation of PFAS in groundwater to the north west of the site.
- The results suggest that the historical use of AFFF at the site is contributing PFAS to groundwater, however groundwater data also suggests the possibility of broader regional PFAS sources affecting groundwater within the assessment area.
- The CSM indicates that the use of groundwater for domestic irrigation and / or drinking purposes is possible. A complete exposure pathway based on groundwater use has not been confirmed. The CSM also identified that edible plants interacting with groundwater (i.e. fruit trees) may take up PFAS from groundwater. A potentially complete exposure pathway may exist if this scenario is occurring and the produce from these edible plants is being consumed.

# Table of contents

|     |                                                                                                                   |    |
|-----|-------------------------------------------------------------------------------------------------------------------|----|
| 1.  | Introduction .....                                                                                                | 1  |
| 1.1 | Background .....                                                                                                  | 1  |
| 1.2 | Objectives .....                                                                                                  | 1  |
| 2.  | Site Details .....                                                                                                | 2  |
| 2.1 | Surrounding Land Use .....                                                                                        | 2  |
| 2.2 | Geology .....                                                                                                     | 2  |
| 2.3 | Hydrogeology .....                                                                                                | 3  |
| 2.4 | Registered Bore Survey .....                                                                                      | 3  |
| 3.  | Previous Investigations .....                                                                                     | 4  |
| 3.1 | Largs North Station and Gallantry PFAS Testing - Detailed Site Investigation .....                                | 4  |
| 3.2 | Largs North Station and Gallantry PFAS Testing Site - Groundwater Use Survey<br>& Groundwater Investigation ..... | 4  |
| 3.3 | Limitations .....                                                                                                 | 6  |
| 4.  | Scope of Work .....                                                                                               | 7  |
| 4.1 | Investigation Rationale .....                                                                                     | 7  |
| 4.2 | Scope of Work .....                                                                                               | 8  |
| 4.3 | Community Engagement .....                                                                                        | 8  |
| 5.  | Assessment Criteria .....                                                                                         | 9  |
| 6.  | Methodology .....                                                                                                 | 12 |
| 6.1 | Work Health and Safety .....                                                                                      | 12 |
| 6.2 | Groundwater Well Installation Methodology .....                                                                   | 12 |
| 6.3 | Groundwater Well Sampling Methodology .....                                                                       | 13 |
| 6.4 | Laboratory Analysis Program .....                                                                                 | 14 |
| 7.  | Results .....                                                                                                     | 16 |
| 7.1 | Site Specific Geology .....                                                                                       | 16 |
| 7.2 | Site Specific Hydrogeology .....                                                                                  | 16 |
| 7.3 | Groundwater .....                                                                                                 | 18 |
| 8.  | Quality Assurance and Quality Control .....                                                                       | 20 |
| 9.  | Discussion .....                                                                                                  | 21 |
| 9.1 | Distribution of PFAS in Groundwater .....                                                                         | 21 |
| 9.2 | Conceptual Site Model (CSM) .....                                                                                 | 22 |
| 10. | Conclusions .....                                                                                                 | 25 |
| 11. | References .....                                                                                                  | 27 |
|     | Analytical Results Tables .....                                                                                   | 28 |
|     | Figures .....                                                                                                     | 29 |

## Table index (in text)

|           |                                                            |    |
|-----------|------------------------------------------------------------|----|
| Table 2-1 | Summary of general site identification information.....    | 2  |
| Table 2-2 | Summary of surrounding land use / zoning .....             | 2  |
| Table 4-1 | Groundwater Monitoring Well Locations and Rationale .....  | 7  |
| Table 5-1 | Four step process for determining harm to groundwater..... | 10 |
| Table 5-2 | Adopted PFAS Interim Screening Criteria (Groundwater)..... | 11 |
| Table 6-1 | Groundwater Well Installation Methodology .....            | 12 |
| Table 6-2 | Groundwater Monitoring and Sampling Methodology .....      | 13 |
| Table 6-3 | Laboratory Analytical Schedule .....                       | 15 |
| Table 7-1 | Groundwater Gauging Data.....                              | 16 |
| Table 7-2 | Summary of Site Specific Hydrogeology .....                | 17 |
| Table 7-3 | Summary of Groundwater Analytical Results .....            | 19 |
| Table 9-1 | Conceptual Site Model (CSM) .....                          | 23 |

## Table index (attached)

|         |                                        |
|---------|----------------------------------------|
| Table 1 | QA/QC Results                          |
| Table 2 | Rinsate Results                        |
| Table 3 | Historical Groundwater Gauging Results |
| Table 4 | Groundwater Results                    |
| Table 5 | Historical Groundwater Results         |

## Figures index (attached)

|          |                                                            |
|----------|------------------------------------------------------------|
| Figure 1 | Site Location Plan                                         |
| Figure 2 | Site Layout and Groundwater Monitoring Well Locations Plan |
| Figure 3 | Groundwater Contours & Flow Direction Plan                 |
| Figure 4 | Groundwater Concentrations Exceedances Plan                |
| Figure 5 | Conceptual Site Model                                      |

## Appendices

|            |                                          |
|------------|------------------------------------------|
| Appendix A | Registered Bore Search                   |
| Appendix B | Groundwater Well Installation Permits    |
| Appendix C | Borehole Logs                            |
| Appendix D | Waste Disposal Certificates              |
| Appendix E | Well Survey Data                         |
| Appendix F | Groundwater Purging and Sampling Records |

Appendix G – Calibration Certificates

Appendix H – COC and Laboratory Reports

Appendix I – Quality Assurance and Quality Control

# 1. Introduction

The South Australian Metropolitan Fire Service (MFS) engaged GHD Pty Ltd (GHD) to undertake an environmental investigation in the vicinity of the Largs North Fire Station (the site) following the detection of elevated concentrations of per and poly fluoroalkyl substance (PFAS) in groundwater beneath as well as up and down hydraulic gradient of the site.

## 1.1 Background

Historically the MFS used firefighting foam containing PFAS at the site during testing of delivery systems on firefighting appliances. Foam containing PFAS has not been used at Largs North fire station since 2016.

As part of the PFAS monitoring program MFS has supported its staff to have voluntary blood tests for PFAS in 2018. Several firefighters stationed at Largs North made the MFS aware of higher than average levels of PFAS in confidential blood samples, which caused concern.

In December 2018 the MFS commissioned GHD to perform environmental investigations at Largs North fire station to identify the source(s) of PFAS contamination, so the exposure pathway/s could be removed to reduce risks to human receptors on site. GHD was also commissioned to undertake offsite investigations surrounding the Largs North fire station in accordance with the VSCAP dated 10 May 2019.

In addition to the onsite and offsite investigations, the MFS with the assistance of GHD undertook community engagement including Water Use and Home Grown Produce Survey of the surrounding properties and assisted the MFS to conduct a community drop-in session to provide the community with an update on the investigations being undertaken at the site. The summary of previous investigations is provided in Section 3.

The results of the previous investigations prompted MFS, in consultation with the SA EPA and other stakeholders, to engage GHD to undertake further environmental investigations to assess PFAS impacted groundwater associated with the Largs North Fire Station.

In September 2019 the MFS engaged South Australian Environment Protection Authority (SA EPA) accredited Site Contamination Auditor Steve Kirsanovs under the Site Contamination Audit System.

This report documents the scope of work, methodology and findings of the on-site and off-site environmental investigation carried out by GHD during October 2019. The works were undertaken in accordance with the Sampling Analysis and Quality Plan (SAQP) prepared by GHD for the Largs North Fire Station, dated 30<sup>th</sup> October 2019.

This report is subject to, and must be read in conjunction with, the limitations set out in Section 3.3.

## 1.2 Objectives

The objectives of this environmental investigation were to:

- Assess groundwater conditions and attempt to delineate the extent of PFAS impacted groundwater down hydraulic gradient of the site.
- Assess groundwater conditions up hydraulic gradient of the site and ascertain if any off-site source(s) of PFAS are present in groundwater which may be migrating onto the site.
- Assess groundwater conditions cross hydraulic gradient of the site and ascertain if any off-site source(s) of PFAS are present in groundwater which may be migrating onto the site.

## 2. Site Details

**Table 2-1 Summary of general site identification information**

|                       |                                            |
|-----------------------|--------------------------------------------|
| Site Name:            | Largs North Fire Station                   |
| Site Address:         | 2-4 Willochra Street, Largs North, SA 5016 |
| Certificate of Title: | CT5441/197                                 |
| DP and Lot:           | D7914 Lot A11                              |
| Current Zoning        | Light Industry                             |
| Property Owner:       | South Australian Metropolitan Fire Service |
| Current Site Use:     | Fire Station                               |
| Area:                 | 3,280 m <sup>2</sup>                       |
| Site Elevation:       | 3.0 m AHD                                  |

A site location plan is provided as Figure 1.

### 2.1 Surrounding Land Use

A summary of the surrounding land uses / zoning information for the site is summarised in Table 2-2 below. Refer to Section 6.6 of the previous GHD (2019c) PSI report for more detailed information.

**Table 2-2 – Summary of surrounding land use / zoning**

| Direction      | Land Use / Zoning                                                                                                                                                                                                                                                                                               |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| North          | Residential properties to the north of Willochra St                                                                                                                                                                                                                                                             |
| East and South | Combination of Light Industry and Industry. Immediately adjacent to the site is the Port Adelaide Enfield Council works depot with both sites bounded by Victoria Rd to the west, Willochra St to the north and Mildred Tce to the east and south. Beyond Mildred Tce is the BP Largs North petroleum terminal. |
| South          | The area immediately south of the site, bounded by Mildred Tce and Victoria Rd is classified as Light Industry. The area beyond this to the south is classified as Industry.                                                                                                                                    |
| West           | Largs North Reserve and the local football club is beyond Victoria Road with residential properties approximately 200 m west, North West and south west of the MFS site over Carnarvon Tce and Dover Tce.                                                                                                       |

### 2.2 Geology

#### 2.2.1 Regional Geology

A desktop search using the South Australian Resources Information Gateway (SARIG) map layers catalogue (1:100,000 Surface Geology Map: Adelaide updated 2013) indicated that the site is underlain by the Saint Kilda Formation, comprised of unconsolidated white bioclastic quartz – carbonate sand of modern beaches and transgressive dune fields of the Semaphore Sand Member.

### **2.2.2 Local Geology**

Soils encountered during the installation of groundwater monitoring wells for this investigation were comprised of pale brown sand fill, silty sand fill or natural sand containing gravel and trace organic matter and in one instance shells and sandstone, underlain by a pale brown sand or clayey sand fill containing trace gravel and calcrete (refer to Section 7.1). Fill material at all locations was underlain by natural pale brown, dark yellow and grey sands to the base of investigations, which was consistent with the regional geology.

## **2.3 Hydrogeology**

### **2.3.1 Regional Hydrogeology**

The DWLBC 2006/10 report by the Department of Water, Land and Biodiversity Conservation (Gerges 2006) provides an overview of the hydrogeology of the Adelaide metropolitan area, indicating that the region (Zone 3: Subzone 3B, Penrice (ICI – SAMCOR (industrial))) contains five to six Quaternary aquifers and three to four, almost flat lying, Tertiary aquifers. The first and second Tertiary aquifers are the thickest and the most productive, with relatively low salinity. The greatest proportion of abstracted groundwater for industrial and recreational use comes from the first Tertiary aquifer. The DWLBC 2006/10 report indicates that the First Quaternary Aquifer (Q1) is located at depths between 3 m and 10 m below ground level (m bgl) with an average thickness of approximately 2 m. In the proximity of major structures and surface drainage, aquifer materials tend to be coarser and thicker and therefore more transmissive. The groundwater flows uniformly towards the northwest across the area of the Q1 Aquifer. The outflow from the Q1 Aquifer to Gulf St Vincent is small, as the gradient at the coast is flat and the transmissivity is relatively low.

In the Le Fevre Peninsula area where the Q1 Aquifer was overlain by dune sands, good quality water occurs due to local direct recharge from precipitation. This water is used extensively for garden watering (approximately 600 wells are recorded). An underlying layer, with poor water quality (salinities up to 21 000 mg/L) is also present (Gerges 2006).

### **2.3.2 Local Hydrogeology**

This environmental investigation targeted the First Quaternary Aquifer (Q1), which was located at depths between 2.07 m bgl and 2.74 m bgl (refer Section 7.2 with October 2019 groundwater gauging results). Groundwater elevations across the site ranged between 0.678 m relative to the Australian Height Datum (mAHD) and 0.82 mAHD. The groundwater gradient was calculated to range between 0.00035 m/m over the broader assessment area and 0.00096 m/m in the vicinity of the site. Groundwater flow direction was inferred to flow towards the north east in direction of the Port Adelaide River. This is in line with the north easterly groundwater flow direction reported for the ATOM / BP Largs North Terminal located to the south east of the site (URS 2010). GHD understands that the inferred groundwater flow direction may be variable as a result of tidal influences from the Gulf St Vincent and Port Adelaide River, the closest water body located approximately 700 m to the east of the site.

The salinity at the site was calculated based on electrical conductivity measurements and ranged between 300 mg/L and 2,535 mg/L, indicating fresh to brackish groundwater beneath the site.

## **2.4 Registered Bore Survey**

Water Connect was used to conduct a search of registered bores located within a 2 km radius of the site. The results of the search indicated the following:

- A total of 1,237 registered bores were recorded within the survey area

- Of these:
  - 506 were identified as domestic bores
  - 294 were identified as investigation bores
  - 38 were identified as irrigation bores
  - 37 were identified as monitoring bores
  - 16 were identified as environmental bores
  - 5 were identified as observation bores
  - 3 were identified as industrial bores
  - 1 bore was identified for exploration
  - 1 bore was identified for irrigation/stock watering
  - 1 bore was identified for recreational
  - 1 bore was identified for town water supply
  - 1 bore was identified for stock watering
  - No purpose information was available for 333 registered bores.

Total dissolved solids (TDS) data was available for 658 bores, of these 391 reported TDS values below 1,200 mg/L.

A plan showing the registered bores within a 2 km radius and 500 m radius of the site is presented in Appendix A.

## 3. Previous Investigations

MFS has engaged GHD to undertake two (2) previous environmental investigations at the site and surrounding area. Below is a summary of both investigations.

### 3.1 Largs North Station and Gallantry PFAS Testing - Detailed Site Investigation

GHD conducted an environmental investigation at the site in December 2018 – February 2019 which included a groundwater investigation. The investigation reported the following conclusions:

- The groundwater flow direction was inferred to flow towards the north east towards a residential area located immediately north and north east of the Largs North Fire Station.
- PFAS impacted groundwater was identified in all groundwater monitoring wells MW01 – MW04 at concentrations exceeding the NEMP drinking water criteria. Of these MW02 to MW04 also exceeded the NEMP recreational criteria.
- The distribution of PFAS in groundwater compared with the groundwater flow direction and comparison between concentrations detected in onsite soils and groundwater concentrations indicated that there may be other offsite sources contributing to PFAS in groundwater. However, site data does indicate that historical activities at the Largs North fire station has contributed to PFAS in groundwater.

### 3.2 Largs North Station and Gallantry PFAS Testing Site - Groundwater Use Survey & Groundwater Investigation

GHD conducted an environmental investigation at the site and surrounding area in March – April 2019 which included a groundwater use survey and a groundwater investigation. The investigation reported the following conclusions:

- The results suggest that the historical use of AFFF at the site is contributing PFAS to groundwater, however groundwater data also suggests a broader regional PFAS in groundwater issue is present beneath the assessment area.
- The first regional aquifer is located at depths ranging between 2.289 m bgl (MW10) and 2.944 m bgl (MW03). Groundwater elevations across the site ranged between 0.513 mAHD (MW10) and 0.631 mAHD (MW05).
- An assessment of groundwater salinity indicated that fresh to brackish groundwater beneath the site may be suitable for potable use irrigation purposes (SA EPA, 2015).
- The groundwater flow direction was inferred to flow towards the north east towards the residential area located immediately north and north east of the Largs North Fire Station.
- Elevated concentrations of PFAS in groundwater were identified in all groundwater monitoring wells sampled as part of this environmental investigation.
- The highest PFAS concentrations were reported in groundwater monitoring wells on or adjacent the site which exceeded the adopted recreational criterion for PFOS&PFHxS. The concentrations of PFAS detected in these wells are likely to be predominantly associated with site activities.
- Groundwater monitoring wells located off – site, up hydraulic gradient of the site, reported PFAS concentrations exceeding the adopted drinking water criterion for PFOS&PFHxS. These concentrations are not considered to be associated with the site activities, based on groundwater gradients and inferred groundwater flow.
- Groundwater monitoring wells located off-site, down hydraulic gradient of the site reported PFAS concentrations exceeding the adopted recreational criterion at MW08 and drinking water criterion at MW09, MW10 and MW11 for PFOS&PFHxS.
- The extent of the PFAS in groundwater off-site has not been delineated up hydraulic gradient or down hydraulic gradient in any direction.
- The CSM indicates that the use of groundwater for domestic irrigation and / or drinking purposes is possible. A complete exposure pathway based on groundwater use has not been confirmed. The CSM also identified that edible plants interacting with groundwater (i.e. fruit trees) may take up PFAS from groundwater. A potentially complete exposure pathway may exist if this scenario is occurring and the produce from these edible plants are being consumed.

### 3.3 Limitations

*This report: has been prepared by GHD for South Australian Metropolitan Fire Service and may only be used and relied on by South Australian Metropolitan Fire Service for the purpose agreed between GHD and the South Australian Metropolitan Fire Service.*

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

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

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

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

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

*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.*

## 4. Scope of Work

### Groundwater

#### 4.1 Investigation Rationale

The groundwater beneath the Largs North MFS flows north east toward residential properties located to the north east and north of the site. PFAS impacts have been detected both up hydraulic gradient and down hydraulic gradient of the site.

Therefore the groundwater well installation locations for the October 2019 investigations were selected to aid in the assessment of the extent of PFAS impacts up and down hydraulic gradient of the site, and determine if there may be an up hydraulic gradient offsite source of PFAS contributing to concentrations detected beneath the site.

Seven groundwater wells were installed as part of this environmental investigation. Table 4-1 summarises the locations and rationale of the groundwater monitoring wells.

**Table 4-1 Groundwater Monitoring Well Locations and Rationale**

| Well ID                                                                                                                                              | Location                                                                                      | Justification                                                                             |
|------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|
| <b>North and north east off-site (down hydraulic gradient to the north, north east, and east of impacted wells, MW11, MW10, MW09, MW08 and MW02)</b> |                                                                                               |                                                                                           |
| MW12                                                                                                                                                 | North of Unit 1, 306 Victoria Rd, (on Rankin Drive), Largs North                              | Assess PFAS impacts down hydraulic gradient                                               |
| MW13                                                                                                                                                 | North of 2 Rankin Drive, Largs North                                                          | Assess PFAS impacts down hydraulic gradient                                               |
| MW14                                                                                                                                                 | North of 5 Collins Street (on Rankin Drive), Largs North                                      | Assess PFAS impacts down hydraulic gradient                                               |
| MW15                                                                                                                                                 | East of 1 Waller Ct (on Collins Street), Largs North                                          | Assess PFAS impacts down/cross hydraulic gradient                                         |
| <b>West off-site (cross hydraulic gradient to the west of impacted wells MW11 and MW08)</b>                                                          |                                                                                               |                                                                                           |
| MW16                                                                                                                                                 | On the western side of Victoria Road                                                          | Assess PFAS impacts cross hydraulic gradient, west of impacted well MW11                  |
| MW17                                                                                                                                                 | On the western side of Victoria Rd, Largs North, (North of North Haven Football Club carpark) | Assess PFAS impacts cross hydraulic gradient, West of impacted well MW08                  |
| <b>South west off-site (up hydraulic gradient of the site to the south of impacted wells MW04 and MW03)</b>                                          |                                                                                               |                                                                                           |
| MW18                                                                                                                                                 | 300-280 Victoria Rd, Largs North, adjacent south western boundary of site                     | Assess PFAS impacts up hydraulic gradient and determine potential off-site source of PFAS |

## **4.2 Scope of Work**

The scope of further groundwater assessment is summarised below:

- Installation of seven (7) groundwater monitoring wells up, down and across hydraulic gradient of the site, as detailed in Table 4-1 above and shown in Figure 2.
- A groundwater monitoring event (GME) of 18 monitoring wells (MW01 to MW18, newly installed and existing). The GME included gauging of all wells in a single event and sampling using no flow sampling techniques (HDPE Hydrasleeve™ samplers).
- All groundwater samples were submitted to the laboratory for analysis of PFAS short suite (long suite data is available on request if required).

## **4.3 Community Engagement**

In parallel with the groundwater investigation, GHD in conjunction with the MFS, will continue to implement the community engagement plan for ongoing consultation and updates to off-site property owners in the surrounding area in relation to the assessment and management of PFAS contamination associated with historical site operations, including:

- Operate and resource the site-specific 1800 hot-line number.
- Prepare and provide information letters on groundwater well drilling and sampling activities to nearby households.
- Participate in community engagement meeting/s, as required.

## 5. Assessment Criteria

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

- HEPA, 2018. *PFAS National Environmental Management Plan*, January 2018
- SA EPA, 2018, *Guidelines for the Assessment and Remediation (GAR) of Site Contamination*, July 2018
- SA EPA, 2015, Environment Protection (Water) Policy (EPP)

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 5-1.

**Table 5-1 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 | <p>TDS has been recorded onsite to range between 299.65 mg/L and 2,535 mg/L indicating fresh to brackish groundwater beneath the site that may be suitable for potable use and suitable for the irrigation purposes (SA EPA, 2018).</p> <p>The groundwater data in the WaterConnect data base (Step 3) indicates that out of 658 bores with available TDS data, 391 bores reported TDS values below 1,200 mg/L.</p> |
| Step 2: Assess and identify surface water bodies within a 2 km buffer of the site                                                                | <p>The stormwater network on the Le Fevre Peninsula consists of numerous individual catchments that ultimately discharge into the Port Adelaide River and the Gulf of St Vincent, the closest water body located approximately 700 m to the east and Gulf St Vincent located approximately 1.5 km to the east.</p> <p>These water bodies are considered to represent a marine ecosystem.</p>                        |
| Step 3: Review registered groundwater users in the WaterConnect database                                                                         | The registered bore search identified 1237 registered bores within a 2 km radius of the site. The registered bores consisted of 506 domestic bores, 294 investigation bores, 38 irrigation bores, 16 environmental bores, one irrigation/stock watering bore, one exploration bore, one recreational and 333 unknown status or purpose bores. Remaining bores were either abandoned, backfilled, or dry.            |
| Step 4: Application of the EPA recognised criteria for the most sensitive environmental value                                                    | The most sensitive environmental values to be applied to the site are Health Recreational Water, Health Drinking Water and Interim (Marine) Water (95%)                                                                                                                                                                                                                                                             |

Based on the assessment outlined in Table 5-1, the groundwater criteria were selected to protect the relevant environmental values identified for groundwater underlying the area of investigation.

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

- Assess the potential risk to recreational users of Port River and Gulf St Vincent and swimming pool users, should groundwater be extracted to fill swimming pools within the residential area adjacent and north east of the site
- Assess the potential risk to people using groundwater for domestic and drinking purposes, i.e. potable use
- Assess the potential risk to users of groundwater for irrigation of council reserves, fruit trees and vegetable gardens
- Assess the potential risk to aquatic marine ecosystems. Given the Port Adelaide River receives various inputs from stormwater, therefore it is considered to be a slightly to moderately modified ecosystems. Therefore, the 95% Species Protection value has been selected to assess the effects of PFAS chemicals on aquatic organisms.

The values for the adopted screening/investigation levels from this source, which are considered to protect potentially complete source receptor linkages, are summarised in Table 5-2.

**Table 5-2 Adopted PFAS Interim Screening Criteria (Groundwater)**

| Exposure Scenario                                                                                             | PFOS/PFHxS | PFOA      | Source      |
|---------------------------------------------------------------------------------------------------------------|------------|-----------|-------------|
| PFAS NEMP 2018<br>Health Recreational Water                                                                   | 0.7 µg/L   | 5.6 µg/L  | HEPA, 2018  |
| PFAS NEMP 2018<br>Health Drinking Water                                                                       | 0.07 µg/L  | 0.56 µg/L | HEPA, 2018. |
| PFAS NEMP 2018<br>Interim Marine 95% Species<br>Protection – Slightly to<br>Moderately modified<br>ecosystems | 0.13 µg/L  | 220 µg/L  | HEPA, 2018  |

## 6. Methodology

All field works were conducted by appropriately qualified and trained GHD environmental scientists, who have three to twelve years of experience in site contamination work, in accordance with GHD's Standard Field Operating Procedures (SFOP).

### 6.1 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 WHS forms were completed before commencement of work each day. Groundwater Well Installation Permits were obtained from the Department of Water (DEW) prior to the commencement of any intrusive investigations. Groundwater well permits are presented in Appendix B.

### 6.2 Groundwater Well Installation Methodology

Groundwater wells were installed on the 10<sup>th</sup> and 11<sup>th</sup> October 2019. The groundwater well installation methodology is provided in Table-6-1.

**Table-6-1 Groundwater Well Installation Methodology**

| Activity                     | Details                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Underground service locating | All groundwater well locations were checked for the presence of buried services by a professional services locator (Pipeline Technology Services) before the commencement of the field investigations. In addition, underground service plans for the area were obtained prior to the commencement of the investigations and used to assist with locating underground services.                                                                                                 |
| Soil logging                 | Soils were logged based on field interpretation, consistent with the AS 1726-1993, and recorded on borehole logs. Borehole logs are provided in Appendix C.                                                                                                                                                                                                                                                                                                                     |
| Well Installation            | Groundwater monitoring wells were installed using Hand auger technique to 1.0 m bgl (to clear services), pushtube to interception of groundwater (between 2.5-3.0 m bgl) and hollow flight augers to a depth of 4.5 m (approximately 2.0 m beyond the interception of groundwater) to provide lateral delineation of impacts within the Q1 aquifer. Clean augers were used to drill each well.                                                                                  |
| Well Construction            | <p>Groundwater monitoring wells were constructed with 50 mm diameter, Class 18, polyvinyl chloride (PVC). A 50 mm diameter, class 18 PVC end cap was threaded to the bottom of each well casing.</p> <p>Each monitoring well was installed with a 3.0 m screened section of class 18, PVC well casing, with the screen installed from the base of the well (4.5 m bgl) to 1.5 m bgl. The screened section was covered in a silt sock to prevent sediment entering the well.</p> |

| Activity         | Details                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                  | Graded and washed filter sand was placed around the well screen from the bottom of the borehole to approximately 0.5 m above the top of the well screen (1 m bgl). A bentonite seal was installed on top of the sand/gravel pack with the remaining annular space filled with a cement/bentonite grout from the top of the bentonite seal to ground surface. A locking expansion cap was installed in each groundwater monitoring well with all wells completed at the surface with a flush mounted trafficable gatic cover. Details of the monitoring well construction are provided in the borehole logs located in Appendix E. |
| Well Development | <p>Post installation the wells developed using a dedicated disposable bailer for each well to remove fines from the borehole and promote the flow of groundwater from the surrounding formation into the well for subsequent sampling.</p> <p>Each well was considered to be suitably developed either when three well volumes had been removed where recharge permits or until purge water runs clear or the well is purged dry.</p>                                                                                                                                                                                             |
| Waste Disposal   | Excess soil cuttings from well installation and groundwater from development and sampling activities will be stored appropriately for off-site disposal at a licensed facility. Waste disposal certificates are presented in Appendix D.                                                                                                                                                                                                                                                                                                                                                                                          |
| Well survey      | The top of each well casing was surveyed to Australian Height Datum (AHD) and map grid Australia (MGA) zone 54 geocentric datum 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 E.                                                                                                                                                                                                                                                                          |
| Decontamination  | All non-disposable equipment was washed with Liquinox and rinsed with clean water before and after use.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

### 6.3 Groundwater Well Sampling Methodology

Groundwater sampling was undertaken on 23<sup>rd</sup> October 2019, satisfying the required 7 days between groundwater well installation and groundwater sampling, required to allow connectivity and equalisation between the newly installed groundwater wells and the targeted aquifer. The groundwater sampling methodology is summarised in Table 6-2.

**Table 6-2 Groundwater Monitoring and Sampling Methodology**

| Activity     | Details                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|--------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Well Gauging | <p>Prior to sampling each well, a standing water level (SWL) and bore depth were gauged and recorded using a calibrated Oil / Water Interface Probe. The measurements were taken from the top of the bore casing (TOC).</p> <p>SWL and bore depths were recorded on Groundwater Purging and Sampling Records.</p> <p>Well gauging data is presented in Section 7.2 below and provided in Groundwater Purging and Sampling Records, provided in Appendix F.</p> |

| Activity                            | Details                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                     | Equipment Calibration Certificates are presented in Appendix G.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Sampling                            | <p>Sampling was conducted using a no-purge method via high density HydraSleeve™ samplers dedicated for each well. The sampler was slowly lowered into the screened section of the well to minimise disturbance and then drawn up to open the valve. When the sampler was full it was slowly raised to ensure the valve was closed. Samples were obtained directly from the sampler sleeve into laboratory supplied bottles. The bottles were appropriately labelled with a unique GHD job number, sample identification and sampling date. All samples were collected in laboratory supplied containers with appropriate preservatives where required.</p> <p>Water quality parameters (pH, dissolved oxygen, electrical conductivity, reduction/oxidation (redox) potential and temperature) were recorded via downhole readings prior to sampling using a Multi Parameter Water Meter. The groundwater was visually assessed for turbidity and evidence of contamination, such as odour or visible sheen, foaming or discolouration. These parameters were recorded on the Groundwater Purging and Sampling Records, provided in Appendix F.</p> |
| Sampling preservation and transport | <p>Post collection, samples were immediately stored on ice in an insulated cooler and kept chilled prior to and during delivery to the laboratory.</p> <p>All samples were transported to the laboratory by GHD Field Staff under Chain of Custody (COC) documentation.</p> <p>COC documentation is presented in Appendix H.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Decontamination                     | <p>Decontamination of all non-disposable equipment (Oil / Water Interface Probe (IP) and Multi Parameter Water Meter) was undertaken through a three stage approach. The first stage involved cleaning the equipment using a mixture of pH neutral phosphate and PFAS free detergent (Liquinox) in water, followed by a deionised water wash and a final rinse stage.</p> <p>Disposable nitrile gloves were worn during sampling and changed between samples to minimise the potential for cross-contamination.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| QA/QC                               | <p>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.</p> <p>Rinsate samples were collected from reusable equipment (IP) at a rate of one (1) per day sampling was conducted to assess the potential for cross contamination to occur from reusable sampling equipment.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

## 6.4 Laboratory Analysis Program

### 6.4.1 Analytical Laboratories

GHD consigned all primary groundwater, rinsate and intra-laboratory field duplicate (blind) samples to Envirolab Group for analysis. The analysis of the inter-laboratory duplicate (split) sample, for QC purposes, was undertaken by MGT Eurofins.

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

QA/QC RPD values and rinsate results are presented in Table 1 and Table 2 at the end of this report.

#### 6.4.2 Sample Analysis

Groundwater samples collected as part of this environmental investigation were analysed for PFAS (Short Suite).

Table-6-3 summarises the sampling and analysis undertaken for groundwater samples.

**Table-6-3 Laboratory Analytical Schedule**

| Sample type | No. primary samples |          | No. QA duplicate samples |          | No. Rinsate samples |          | Analytical suite   |
|-------------|---------------------|----------|--------------------------|----------|---------------------|----------|--------------------|
|             | Collected           | Analysed | Collected                | Analysed | Collected           | Analysed |                    |
| Groundwater | 18                  | 18       | 2                        | 2        | 1                   | 1        | PFAS (Short Suite) |

## 7. 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 9.

### 7.1 Site Specific Geology

Soils encountered during the installation of groundwater monitoring wells MW12 – MW18 were described and recorded by a GHD Environmental Scientist on Soil Description Field Sheets. Soil borehole logs are presented in Appendix C.

Soils encountered at depths of 0 to 0.24 metres below ground level (m bgl) during the installation of groundwater monitoring well, MW12, comprised of pale brown silty sand fill containing trace organic matter. This was underlain by a pale brown clayey sand fill containing trace gravel with low plasticity from 0.24 – 0.31 m bgl.

Soils encountered at depths of 0 to 0.6 m bgl during the installation of groundwater monitoring well, MW11, comprised of pale brown sand fill containing gravel and trace organic matter. This was underlain by a pale brown sand fill containing trace gravel and calcrete 0.6 – 1.38 m bgl.

Soils encountered at depths of 0 to 0.34 m bgl during the installation of groundwater monitoring wells, MW14 and MW15, comprised of pale brown sand fill containing gravel and trace organic matter.

Soils encountered at depths of 0 to 0.15 m bgl during the installation of groundwater monitoring well, MW16, comprised of pale brown natural sand containing trace organic matter with an organic odour.

Soils encountered at depths of 0 to 0.47 m bgl during the installation of groundwater monitoring well, MW17, comprised of pale brown silty sand fill containing gravel, shells and sandstone with an organic odour.

Soils encountered at depths of 0 to 0.26 m bgl during the installation of groundwater monitoring well, MW18, comprised of pale brown clayey sand fill containing gravel with an organic odour. This was underlain by a pale brown sand fill from 0.26 – 0.35 m bgl.

Fill material at all locations was underlain by natural pale brown, dark yellow and grey sands to the base of investigations, which was consistent with the regional geology.

### 7.2 Site Specific Hydrogeology

Groundwater gauging data collected on 23 October 2019 as part of this GME is presented in Table 7-1. Historical Groundwater Gauging Results are presented in Table 3 at the end of this report.

**Table 7-1 Groundwater Gauging Data**

| Well ID | Top of casing (mAHD) | SWL (m bgl) | RSWL (mAHD) |
|---------|----------------------|-------------|-------------|
| MW01    | 3.082                | 2.30        | 0.782       |
| MW02    | 3.028                | 2.35        | 0.678       |
| MW03    | 3.560                | 2.74        | 0.820       |
| MW04    | 3.293                | 2.53        | 0.763       |
| MW05    | 3.020                | 2.20        | 0.820       |

| Well ID | Top of casing (mAHD) | SWL (m bgl) | RSWL (mAHD) |
|---------|----------------------|-------------|-------------|
| MW06    | 3.117                | 2.31        | 0.807       |
| MW07    | 3.157                | 2.34        | 0.817       |
| MW08    | 3.045                | 2.33        | 0.715       |
| MW09    | 3.055                | 2.36        | 0.695       |
| MW10    | 2.802                | 2.09        | 0.712       |
| MW11    | 3.192                | 2.46        | 0.732       |
| MW12    | 3.044                | 2.26        | 0.784       |
| MW13    | 3.095                | 2.35        | 0.745       |
| MW14    | 2.854                | 2.12        | 0.734       |
| MW15    | 2.945                | 2.22        | 0.725       |
| MW16    | 2.859                | 2.07        | 0.789       |
| MW17    | 3.068                | 2.29        | 0.778       |
| MW18    | 3.079                | 2.27        | 0.809       |

Using the gauging data presented in Table 7-1, Table 7-2 provides a summary of the site specific hydrogeology.

**Table 7-2 Summary of Site Specific Hydrogeology**

| Feature                                         | Details                                                                                                                                                                                                                       |
|-------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Groundwater Occurrence and Depth to Groundwater | <p>The first regional aquifer is located at depths ranging between 2.07 m bgl (MW16) and 2.74 m bgl (MW03).</p> <p>Groundwater elevations across the site ranged between 0.678 mAHD (MW02) and 0.82 mAHD (MW03 and MW05).</p> |
| Groundwater Flow Direction                      | <p>Groundwater flow direction was inferred to flow towards the north east (Port Adelaide River).</p> <p>Groundwater elevation contours and inferred flow direction are shown in Figure 3 at the end of this report.</p>       |
| Groundwater Gradient                            | <p>The groundwater gradient was calculated to range between 0.00035 m/m over the broader assessment area (MW18 to MW15) and 0.00096 m/m in the vicinity of the site (MW04 to MW08).</p>                                       |
| Effective Porosity                              | <p>The effective porosity of the water bearing fine sand lithology was assumed to be 0.33.</p>                                                                                                                                |
| Hydraulic Conductivity                          | <p>The hydraulic conductivity of the sand (fine) aquifer was assumed to range between 0.017 m/day and 16.33 m/day, with an Arithmetic Mean of 2.49 m/day.</p>                                                                 |
| Seepage Velocity                                | <p>The seepage velocity of groundwater beneath the site was calculated to range between <math>6.6 \times 10^{-3}</math> m/year and 17 m/year, with an Arithmetic Mean of 1.8 m/year.</p>                                      |

| Feature              | Details                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Groundwater Salinity | <p>Total dissolved solids (TDS) within groundwater beneath the site, as an indicator of salinity, was calculated by applying a conversion factor of 0.65 to the electrical conductivity values at each well.</p> <p>The calculated TDS values ranged between 299.65 mg/L (MW18) and 2,535 mg/L (MW16), indicating fresh to brackish groundwater beneath the site.</p> <p>The calculated TDS values of the groundwater beneath the site indicate that groundwater beneath the site may be suitable for potable use and suitable for irrigation purposes (SA EPA, 2018).</p> |

## 7.3 Groundwater

### 7.3.1 Field Observations and Parameters

Groundwater field physiochemical parameters (pH, electrical conductivity (EC), dissolved oxygen (DO), field 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 F. The groundwater field physicochemical results are summarised as follows:

- The groundwater pH results ranged between pH 6.7 (MW13) to pH 8.1 (MW03) indicating neutral to moderately alkaline groundwater conditions.
- Field EC ranged from 461  $\mu\text{S}/\text{cm}$  (MW18) to 3,900  $\mu\text{S}/\text{cm}$  (MW16). The calculated TDS values indicated a minimum salinity of 299.65 mg/L and a maximum of 2,535 mg/L at the respective wells.
- Dissolved oxygen ranged between 0.98 mg/L (MW13) and 11.7 mg/L (MW15).
- Standard hydrogen electrode (SHE) redox was calculated by applying a conversion factor of 199 mV to the field redox readings and ranged between 125.2 mV (MW10) and 348 mV (MW01).
- Temperature ranged between 20.2 (MW12) and 22.7 (MW13) which were considered within normal ranges for spring.

### 7.3.2 Analytical Results

The tabulated analytical groundwater results are presented in Table 4 at the end of this report and laboratory reports are provided in Appendix H. Eighteen (18) primary groundwater samples were submitted for laboratory analysis with the results summarised below in Table 7-3.

A figure showing groundwater Sum of PFHxS & PFOS, PFOA and PFOS concentrations / exceedances is included as Figure 4 at the end of this report.

**Table 7-3 Summary of Groundwater Analytical Results**

| No. Primary Samples | Analyte    | Min Conc.  | Max Con. | Samples exceeding criteria                                           |                           |                              |
|---------------------|------------|------------|----------|----------------------------------------------------------------------|---------------------------|------------------------------|
|                     |            |            |          | Health Drinking Water                                                | Health Recreational Water | Interim Marine 95%           |
| 18                  | PFOS/PFHxS | <0.01 µg/L | 129 µg/L | MW01<br>MW02<br>MW03<br>MW04<br>MW08<br>MW09<br>MW12<br>MW13<br>MW14 | MW02<br>MW03<br>MW04      | NA                           |
|                     | PFOA       | <0.01 µg/L | 1.9 µg/L | MW04                                                                 | No exceedances            | No exceedances               |
|                     | PFOS       | <0.01 µg/L | 100 µg/L | NA                                                                   | NA                        | MW02<br>MW03<br>MW04<br>MW12 |

Note: NA indicates no guideline value for this analyte

Groundwater Exceedances are shown in Figure 4. Historical Groundwater Results are presented in Table 5 at the end of this report.

## **8. Quality Assurance and Quality Control**

Data Quality Indicators (DQIs), Field QA/QC, Laboratory QA/QC and Field QC Results are presented in Tables at the end of this report.

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

## 9. Discussion

### 9.1 Distribution of PFAS in Groundwater

The results of the groundwater investigation reported the presence of PFAS in groundwater immediately beneath the site, up hydraulic gradient of the site and down hydraulic gradient of the site.

The results indicate that all groundwater monitoring wells sampled as part of this investigation reported concentrations of PFAS in groundwater above adopted assessment guidelines with the exception of MW05, MW06, MW07, MW10, MW11, MW15, MW16, MW17 and MW18.

Groundwater monitoring wells MW03, MW08 and MW09 reported PFAS concentrations slightly lower than previous monitoring rounds. MW05, MW06, MW07, MW10 and MW11 reported a reduction in concentration of PFHxS/PFOS to below the NEMP 2018 Drinking Water Guideline compared to the April 2019 monitoring round where they reported concentrations of PFHxS/PFOS exceeding the NEMP 2018 Drinking Water Guideline. It is possible that the reduction in PFAS concentrations at these monitoring well locations was a result of seasonal increases in groundwater elevations as a result of surface water inputs during winter.

As with previous groundwater monitoring rounds, PFAS concentrations beneath the site at MW04 and directly down hydraulic gradient and adjacent the site at MW02 were one to two orders of magnitude higher than PFAS concentrations in the remaining on site and off site wells. Monitoring well MW04 continued to report the highest PFAS concentration across the assessment area. This monitoring well is located down hydraulic gradient of an onsite stormwater soak trench. It is considered likely that the concentrations detected at MW04 are a result of historical use of foam containing PFAS and impacted water flowing from on site hardstand into the soak trench and underlying soil and groundwater. The significant concentrations of PFAS in groundwater beneath the site indicate the site has contributed to PFAS concentrations in groundwater.

Groundwater monitoring wells located off-site, down hydraulic gradient of the site reported PFHxS/PFOS concentrations exceeding the adopted drinking water criterion at MW08, MW09 and MW12 to MW14. The concentrations of PFAS detected at MW11 were lower than the concentrations detected at MW12 to MW14. This may be the result of a number of mechanisms or causes including:

- complex aquifer flow paths
- surface water inputs during winter and/or
- separate offsite source

With regards to a separate offsite source, the PSI (GHD, 2019c) did not identify any historical land uses north of the site that would have contributed to PFAS in groundwater. It is expected that further temporal data would provide further clarity on the inconsistent PFAS concentration gradient across the assessment area.

Groundwater monitoring wells located off-site, up hydraulic gradient of the site reported PFHxS/PFOS concentrations exceeding the adopted drinking water criterion (MW01) and above the laboratory LOR at MW05, MW06, MW07 and MW18. The extent of the PFAS concentrations in groundwater, up hydraulic gradient of the site was not delineated as part of this investigation. However, PFAS concentrations in this portion of the site are not considered to be associated with the site based on the groundwater gradient and inferred groundwater flow direction. The presence of elevated PFAS concentrations in groundwater up hydraulic gradient of the site indicates there are likely other off-site sources contributing to PFAS in groundwater.

Groundwater monitoring wells located off-site, cross hydraulic gradient of the site (MW16 and MW17) reported PFOS & PFHxS concentrations below the laboratory LOR providing delineation of PFAS in groundwater to the north west of the site.

## **9.2 Conceptual Site Model (CSM)**

A site-specific Conceptual Site Model (CSM) has been developed to identify various receptors (human health and environment) and potential exposure routes / pathways in order to determine the presence / absence of complete exposure pathways from PFAS impacted groundwater to said receptors. An exposure pathway is the link between a contaminant source and a receptor.

The conceptual site model uses information obtained throughout this investigation along with information obtained from the environmental investigations undertaken by GHD in December 2018 – February 2019 and March – November 2019.

For an identifiable risk to exist, an exposure pathway must be present which requires each of the following to be identified:

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

A tabular Conceptual Site Model (CSM) is presented in Table 9-1 below and a graphic CSM is presented as Figure 5.

**Table 9-1 Conceptual Site Model (CSM)**

| Potential source          | Receptor                                                                                                                         | Pathway                                                                    | Pathway present?                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|---------------------------|----------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PFAS impacted groundwater | People using groundwater for: domestic and drinking purposes.                                                                    | Consumption of contaminated groundwater.                                   | Possible<br>TDS values in groundwater beneath the assessment area were below 1,200 mg/L indicating that groundwater may be suitable for potable use (NHMRC, 2011 updated 2018).<br>The groundwater use survey results did not identify groundwater being used for potable use. However, as the TDS is variable and in some instances below 1,200 mg/L, potable use cannot be ruled out.                                                                           |
|                           | 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<br>The average calculated TDS value of groundwater beneath the assessment area is 1,164.56 µg/L which is considered suitable for domestic and primary irrigation purposes (SA EPA, 2015).<br>The groundwater use survey results obtained though the survey conducted during the investigation undertaken in March – April 2019 did not identify groundwater being used for irrigation purposes in the assessment area, however this cannot be ruled out. |
|                           | People growing fruit and / or vegetables in open soil which may interact with groundwater.                                       | Consumption of PFAS impacted fruit and / or vegetables.                    | Possible<br>The survey conducted during the investigation undertaken in March – April 2019 identified the presence of fruit trees planted in open soil at numerous residential properties in the survey area. It was also confirmed that the produce is consumed.                                                                                                                                                                                                 |
|                           | People using groundwater for recreational purposes such as filling of swimming pools.                                            | Incidental ingestion of contaminated groundwater.                          | Unlikely<br>Groundwater used for recreational purposes such as filling of swimming pools is considered unlikely (SA EPA, 2015).<br>Although PFAS in groundwater migrating down hydraulic gradient of the site has not been delineated, it is considered unlikely this water body is used for recreational purposes where users would incidentally consume river water (i.e. swimming).                                                                            |
|                           | Down gradient off-site maintenance workers that contact PFAS contaminated groundwater.                                           | Direct dermal contact or incidental ingestion of contaminated groundwater. | Unlikely<br>Whilst it's possible that off-site maintenance workers could incidentally ingest contaminated groundwater, it's unlikely that they'll ingest quantities detrimental to their health.                                                                                                                                                                                                                                                                  |
|                           | Ecosystem of Gulf of St Vincent and Port River                                                                                   | Migration through porous media and discharge to water                      | Possible<br>While Gulf of St Vincent is located approximately 1.3 km west and the Port Adelaide River is located approximately 800 m to the east of the site (both located cross-gradient), this                                                                                                                                                                                                                                                                  |

| Potential source                                                                           | Receptor                                                                                                                                                                                 | Pathway                                                                                                        | Pathway present?                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|--------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                            |                                                                                                                                                                                          | bodies / marine environments.                                                                                  | pathway may potentially be complete, as the extent of groundwater PFAS impact has not been delineated in any direction.                                                                                                                                                                                                                                                                                                                                                       |
| Petroleum Terminal to the south east with potential continuing use of PFAS containing foam | <p>Groundwater in the vicinity of the site and surrounds.</p> <p>People using groundwater for domestic and drinking purposes.</p> <p>Ecosystem of Gulf of St Vincent and Port River.</p> | <p>Migration through porous media into groundwater.</p> <p>Discharge to water bodies / marine environments</p> | <p>Possible</p> <p>The Largs North BP petroleum terminal adjacent to the east and cross-hydraulic gradient, is confirmed to have PFAS impacted groundwater in a number of wells within the terminal.</p> <p>There is potential for PFAS in fire suppression systems at the petroleum facility to have been in use since the 1950s and potential use is currently possible until grace periods for phase out of PFAS use in South Australia are closed on 30 January 2020.</p> |

# 10. Conclusions

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

- GHD conducted a groundwater investigation at the Largs North Fire Station between 10<sup>th</sup> October and 23<sup>rd</sup> October 2019. This included the installation of 7 groundwater monitoring wells (MW12 to MW18) and a GME of 18 groundwater wells (11 existing and 7 newly installed).
- The objective of the investigation was to assess the extent of PFAS impacted groundwater down hydraulic gradient, cross hydraulic gradient and up hydraulic gradient of the site to assist in assessing the possibility of any off-site source(s) of PFAS which may be migrating onto the site.
- The standing water levels (SWL) recorded during the October 2019 investigation ranged from 2.07 m bgl (MW16) and 2.74 m bgl (MW03). Groundwater elevations across the site ranged between 0.678 mAHD (MW02) and 0.82 mAHD (MW03 and MW05).
- The groundwater flow direction was inferred to flow towards the north east towards the residential area located immediately north and north east of the Largs North Fire Station.
- An assessment of groundwater salinity indicated that fresh groundwater beneath the site may be suitable for potable use and irrigation purposes (SA EPA, 2015).
- All groundwater monitoring wells sampled as part of this investigation reported concentrations of PFAS in groundwater above adopted assessment guidelines with the exception of MW05, MW06, MW07, MW10, MW11, MW15, MW16, MW17 and MW18.
- Groundwater monitoring wells MW03, MW08 and MW09 reported PFAS concentrations slightly lower than previous monitoring rounds. MW05, MW06, MW07, MW10 and MW11 reported a reduction in concentration of PFHxS/PFOS to below the NEMP 2018 Drinking Water Guideline compared to the April 2019 monitoring round where they reported concentrations of PFHxS/PFOS exceeding the NEMP 2018 Drinking Water Guideline.
- The highest PFAS concentrations were reported in groundwater monitoring wells on or immediately adjacent the site (MW04 and MW02). The concentrations of PFAS detected in these wells are likely to be predominantly associated with historical site activities.
- Groundwater monitoring wells located off-site, down hydraulic gradient of the site reported PFHxS/PFOS concentrations exceeding the adopted drinking water criterion at MW08, MW09, MW12, MW13 and MW14.
- PFHxS/PFOS concentrations in off-site, down hydraulic gradient wells, MW10, MW11, MW15, MW16 and MW17, were reported at levels below the drinking water guideline or below the laboratory limit of reporting (LOR).
- The low PFAS concentrations at MW11, located between the site and down gradient wells MW12 to MW14 may be the result of a number of mechanisms or causes including:
  - complex aquifer flow paths
  - surface water inputs during winter and/or
  - separate offsite source
- Groundwater monitoring wells located off-site, up hydraulic gradient of the site reported PFHxS/PFOS concentrations exceeding the adopted drinking water criterion (MW01) and although not above the adopted guidelines, above the laboratory LOR at MW05, MW06, MW07 and MW18.

- PFAS concentrations up hydraulic gradient of the site are not considered to be associated with the site, based on the groundwater gradient and inferred groundwater flow direction. The presence of elevated PFAS concentrations in groundwater up hydraulic gradient of the site indicates there are other off-site sources contributing to PFAS in groundwater.
- Groundwater monitoring wells located off-site, cross hydraulic gradient of the site (MW16 and MW17) reported PFOS & PFHxS concentrations below the laboratory LOR, providing delineation of PFAS in groundwater to the north west of the site.
- The results suggest that the historical use of AFFF at the site is contributing PFAS to groundwater, however groundwater data also suggests the possibility of broader regional PFAS sources affecting groundwater within the assessment area.
- The CSM indicates that the use of groundwater for domestic irrigation and / or drinking purposes is possible. A complete exposure pathway based on groundwater use has not been confirmed. The CSM also identified that edible plants interacting with groundwater (i.e. fruit trees) may take up PFAS from groundwater. A potentially complete exposure pathway may exist if this scenario is occurring and the produce from these edible plants is being consumed.

# 11. References

Adelaide 1:250,000 SA Geological Atlas Series Sheet (SI 54-9) (1969), Geological Survey of South Australia

AS/NZS ISO 31000:2009 Risk management - Principles and guidelines

Australian Commonwealth Work Health and Safety Act 2011

Australian/New Zealand Standard (AS/NZ) 5667.1,1998. *Water Quality – Sampling. Standards Australia*

Australian Standard AS 4482.1:2005 Guide to the Investigation and Sampling of Sites with Potentially Contaminated Soil

Australian Standard AS 4482.1,2005. *Guide to the investigation and sampling of sites with potentially contaminated soil - Part 1: Non-volatile and semi-volatile compounds*

Commonwealth Work Health and Safety Regulations 2011

Government of South Australia 1993, Environment Protection Act 1993, Version 22.2.2018

Gerges, N. 2006, Overview of the hydrogeology of the Adelaide metropolitan area, South Australia, Department of Water, Land and Biodiversity Conservation, DWLBC Report 2006/10, June 2010.

GHD 2019a, Largs North Station and Gallantry PFAS testing Detailed Site Investigation Report

GHD 2019b, Largs North Station and Gallantry PFAS Testing Site Groundwater Use Survey & Groundwater Investigation

GHD 2019c, Largs North Fire Station Draft Preliminary Site Investigation

Hydrasleeve 2016, Standard Operating Procedure: Sampling Groundwater with a Hydrasleeve

NEPC 2013, National Environment Protection Council National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended 2013, National Environment Protection Council

NHMRC 2011, Australian Drinking Water Guidelines, Version 3.5 Updated August 2018, National Health and Medical Research Council and Natural Resource Management Ministerial Council

PFAS National Environment Management Plan, January 2018. Heads of EPAs Australia

SA EPA 2015, Environment Protection (Water Quality) Policy 2015, Version 30.1.2018,

SA EPA, 2016, Site Contamination: Guideline for communication and engagement

SA EPA 2018, Guidelines for the Assessment and Remediation (GAR) of Site Contamination, July 2018

SA EPA 2018, Site Contamination Policy: Certification of practitioners

URS 2010, BP Largs North Terminal, Detailed Risk Assessment, 42657409/R001/2 Final, URS Australia Pty Ltd, 22 June 2010

# Analytical Results Tables

**Table 1 – QA/QC Results**

**Table 2 – Rinsate Results**

**Table 3 – Historical Groundwater Gauging Results**

**Table 4 – Groundwater Results**

**Table 5 – Historical Groundwater Results**



| PFAS |                                          |                                         |                                  |                                          |                                              |                     |                          |                                      |                                                   |
|------|------------------------------------------|-----------------------------------------|----------------------------------|------------------------------------------|----------------------------------------------|---------------------|--------------------------|--------------------------------------|---------------------------------------------------|
|      | Perfluorohexane<br>sulfonic acid (PFHxS) | Perfluorooctane<br>sulfonic acid (PFOS) | Perfluorooctanoic acid<br>(PFOA) | 6:2 Fluorotelomer<br>Sulfonate (6:2 FTS) | 8:2 Fluorotelomer<br>sulfonic acid (8:2 FTS) | PFAS (Sum of Total) | Sum of PFHxS and<br>PFOS | Sum of US EPA PFAS<br>(PFOS + PFOA)* | Sum of enHealth PFAS<br>(PFHxS + PFOS +<br>PFOA)* |
|      | µg/L                                     | µg/L                                    | µg/L                             | µg/L                                     | µg/L                                         | µg/L                | µg/L                     | µg/L                                 | µg/L                                              |
| EQL  | 0.01                                     | 0.01                                    | 0.01                             | 0.01                                     | 0.01                                         | 0.01                | 0.01                     | 0.01                                 | 0.01                                              |

| Field ID | Lab Report Number |    |     |     |     |      |     |     |       |       |
|----------|-------------------|----|-----|-----|-----|------|-----|-----|-------|-------|
| MW04     | 229256            | 29 | 100 | 1.9 | 4.0 | 0.44 | 140 | 129 | 101.9 |       |
| FD01     | 229256            | 29 | 110 | 2.0 | 3.8 | 0.34 | 140 | 139 | 102   |       |
| RPD      |                   | 0  | 10  | 5   | 5   | 26   | 0   | 7   | 0     |       |
| MW04     | 229256            | 29 | 100 | 1.9 | 4.0 | 0.44 | 140 | 129 | 101.9 |       |
| FS01     | 684989            | 23 | 120 | 1.7 | 3.1 |      |     | 143 | 121.7 | 144.7 |
| RPD      |                   | 23 | 18  | 11  | 25  |      |     | 10  | 10    |       |



|     |  | PFAS                                  |                                      |                               |                                       |                                           |                     |                       |                                   |
|-----|--|---------------------------------------|--------------------------------------|-------------------------------|---------------------------------------|-------------------------------------------|---------------------|-----------------------|-----------------------------------|
|     |  | Perfluorohexane sulfonic acid (PFHxS) | Perfluorooctane sulfonic acid (PFOS) | Perfluorooctanoic acid (PFOA) | 6:2 Fluorotelomer Sulfonate (6:2 FTS) | 8:2 Fluorotelomer sulfonic acid (8:2 FTS) | PFAS (Sum of Total) | Sum of PFHxS and PFOS | Sum of US EPA PFAS (PFOS + PFOA)* |
|     |  | µg/L                                  | µg/L                                 | µg/L                          | µg/L                                  | µg/L                                      | µg/L                | µg/L                  | µg/L                              |
| EQL |  | 0.01                                  | 0.01                                 | 0.01                          | 0.01                                  | 0.01                                      | 0.01                | 0.01                  | 0.01                              |

| Field ID | Sample Type | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
|----------|-------------|-------|-------|-------|-------|-------|-------|-------|-------|
| RB01     | Rinsate     |       |       |       |       |       |       |       |       |

| <div>  <b>Groundwater Samples</b> </div> |                               |             |                                   |                      |            |     |            |            |           |            |                |             |                                                                                                                                                             |
|---------------------------------------------------------------------------------------------------------------------------|-------------------------------|-------------|-----------------------------------|----------------------|------------|-----|------------|------------|-----------|------------|----------------|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Client: South Australian Metropolitan Fire Service (MFS)                                                                  |                               |             |                                   |                      |            |     |            |            |           |            |                |             |                                                                                                                                                             |
| Project: Groundwater Investigation (October 2019)                                                                         |                               |             |                                   |                      |            |     |            |            |           |            |                |             |                                                                                                                                                             |
| Job No.: 3319080                                                                                                          |                               |             |                                   |                      |            |     |            |            |           |            |                |             |                                                                                                                                                             |
| Location: Largs North Station                                                                                             |                               |             |                                   |                      |            |     |            |            |           |            |                |             |                                                                                                                                                             |
| WL Meter Type: Int.Fce                                                                                                    |                               |             |                                   |                      |            |     |            |            |           |            |                |             |                                                                                                                                                             |
| Location ID                                                                                                               | TOC Elevation surveyed (mAHD) | Sample Date | Standing Water Level (SWL) (mbgl) | Depth of Well (mbgl) | RWL (mAHD) | pH  | EC (us/cm) | TDS (mg/L) | DO (mg/L) | Redox (mV) | SHE Redox (mV) | Temperature | Sample Description                                                                                                                                          |
| MW01                                                                                                                      | 3.082                         | 13/02/2019  | 2.422                             | 4.421                | 0.660      | 6.6 | 1877       | 1220       | 0.06      | -127.9     | 71.1           | 22.6        | Light grey / pale brown. Sulphur dioxide odour. No sheen. Low turbidity. Low sediment load - fine sand in bottom of Hydrasleeve and trace organic matter.   |
|                                                                                                                           |                               | 11/04/2019  | 2.491                             | 4.541                | 0.591      | 6.6 | 2134       | 1387       | 0.00      | 31.6       | 230.6          | 23.4        | Pale brown. No odour. No sheen. High turbidity. High sediment load - fine sands in the bottom of the Hydrasleeve and trace organic matter.                  |
|                                                                                                                           |                               | 23/10/2019  | 2.300                             | 4.440                | 0.782      | 7.3 | 1610       | 1047       | 3.53      | 149.0      | 348.0          | 21.6        | Clear. Low turbidity. No odour. No sheen.                                                                                                                   |
| MW02                                                                                                                      | 3.028                         | 13/02/2019  | 2.454                             | 4.451                | 0.574      | 7.6 | 1098       | 714        | 0.18      | -14.9      | 184.1          | 22.8        | Pale grey / brown. Low organic odour. No sheen. Medium - high turbidity. Low sediment load - fine sand in bottom of Hydrasleeve.                            |
|                                                                                                                           |                               | 11/04/2019  | 2.513                             | 4.407                | 0.515      | 7.0 | 1101       | 716        | 2.53      | 52.8       | 251.8          | 23.2        | Pale brown. Organic odour. No sheen. High turbidity. High sediment load - fine sands in the bottom of the Hydrasleeve and trace organic matter.             |
|                                                                                                                           |                               | 23/10/2019  | 2.350                             | 4.420                | 0.678      | 7.5 | 1800       | 1170       | 2.50      | 143.3      | 342.3          | 23.1        | Clear. Low turbidity. No odour. No sheen.                                                                                                                   |
| MW03                                                                                                                      | 3.560                         | 13/02/2019  | 2.881                             | 4.452                | 0.679      | 7.2 | 1864       | 1212       | 0.06      | 49.1       | 248.1          | 21.1        | Pale brown. No odour. No sheen. Low medium turbidity. No sediment load and trace organic matter.                                                            |
|                                                                                                                           |                               | 11/04/2019  | 2.944                             | 4.527                | 0.616      | 6.8 | 2040       | 1326       | 0.00      | 83.5       | 282.5          | 22.5        | Clear / pale brown. No odour. No sheen. Low turbidity. Low sediment load.                                                                                   |
|                                                                                                                           |                               | 23/10/2019  | 2.740                             | 4.440                | 0.820      | 8.1 | 970        | 631        | 2.59      | 127.0      | 326.0          | 22.3        | Clear. Low turbidity. No odour. No sheen.                                                                                                                   |
| MW04                                                                                                                      | 3.293                         | 13/02/2019  | 2.655                             | 4.464                | 0.638      | 7.2 | 1454       | 945        | 0.08      | 67.0       | 266.0          | 20.2        | Pale brown. No odour. No sheen. High turbidity. No sediment load and trace organic matter.                                                                  |
|                                                                                                                           |                               | 11/04/2019  | 2.703                             | 4.454                | 0.590      | 6.8 | 1681       | 1093       | 0.00      | 86.3       | 285.3          | 21.5        | Pale brown. No odour. No sheen. Low - medium turbidity. Low sediment load.                                                                                  |
|                                                                                                                           |                               | 23/10/2019  | 2.530                             | 4.470                | 0.763      | 7.5 | 1550       | 1008       | 9.00      | 114.8      | 313.8          | 22.6        | Clear. Low turbidity. No odour. No sheen.                                                                                                                   |
| MW05                                                                                                                      | 3.020                         | 11/04/2019  | 2.389                             | 4.551                | 0.631      | 7.0 | 835        | 543        | 0.00      | 51.5       | 250.5          | 24.0        | Pale brown. Very slight hydrocarbon odour. No sheen. High turbidity. High sediment load - fine sands in bottom of the hydrasleeve and trace organic matter. |
|                                                                                                                           |                               | 23/10/2019  | 2.200                             | 4.580                | 0.820      | 7.6 | 700        | 455        | 6.67      | 63.2       | 262.2          | 21.2        | Clear. Low turbidity. No odour. No sheen.                                                                                                                   |
| MW06                                                                                                                      | 3.117                         | 11/04/2019  | 2.500                             | 4.383                | 0.617      | 6.9 | 2992       | 1945       | 0.00      | 51.4       | 250.4          | 22.2        | Pale brown. No odour. No sheen. Medium turbidity. High sediment load - fine sands in the bottom of the Hydrasleeve and trace organic matter.                |
|                                                                                                                           |                               | 23/10/2019  | 2.310                             | 4.380                | 0.807      | 7.2 | 1830       | 1190       | 2.21      | 59.1       | 258.1          | 21.4        | Pale brown / clear. Low turbidity. No odour. No sheen.                                                                                                      |
| MW07                                                                                                                      | 3.157                         | 11/04/2019  | 2.541                             | 4.361                | 0.616      | 7.0 | 1460       | 949        | 0.16      | 98.1       | 297.1          | 23.0        | Pale brown. No odour. No sheen. High turbidity. High sediment load - fine sands in the bottom of the Hydrasleeve and trace organic matter.                  |
|                                                                                                                           |                               | 23/10/2019  | 2.340                             | 4.350                | 0.817      | 7.0 | 1250       | 813        | 2.33      | 103.2      | 302.2          | 21.9        | Clear. Low turbidity. No odour. No sheen.                                                                                                                   |
| MW08                                                                                                                      | 3.045                         | 11/04/2019  | 2.507                             | 4.421                | 0.538      | 7.0 | 2512       | 1633       | 0.00      | 97.1       | 296.1          | 23.2        | Pale brown. No odour. No sheen. High turbidity. High sediment load - fine sands in the bottom of the Hydrasleeve.                                           |
|                                                                                                                           |                               | 23/10/2019  | 2.330                             | 4.430                | 0.715      | 7.2 | 1570       | 1021       | 2.03      | 90.2       | 289.2          | 21.0        | Clear. Low turbidity. No odour. No sheen.                                                                                                                   |
| MW09                                                                                                                      | 3.055                         | 11/04/2019  | 2.534                             | 4.383                | 0.521      | 7.1 | 1222       | 794        | 0.00      | 1.2        | 200.2          | 23.9        | Pale brown. No odour. No sheen. Medium - high turbidity. Low sediment load and trace organic matter.                                                        |
|                                                                                                                           |                               | 23/10/2019  | 2.360                             | 4.380                | 0.695      | 7.3 | 1080       | 702        | 1.92      | 31.4       | 230.4          | 22.4        | Clear. Low turbidity. No odour. No sheen.                                                                                                                   |
| MW10                                                                                                                      | 2.802                         | 11/04/2019  | 2.289                             | 4.431                | 0.513      | 6.8 | 2669       | 1735       | 0.00      | 44.8       | 243.8          | 24.1        | Pale brown. Sulphur odour. No sheen. Medium - high turbidity. Low sediment load.                                                                            |
|                                                                                                                           |                               | 23/10/2019  | 2.090                             | 4.450                | 0.712      | 6.8 | 1920       | 1248       | NR        | -73.8      | 125.2          | 22.2        | Clear. Trace organic matter (grasses). No sheen. Slight hydrogen sulfide odour.                                                                             |
| MW11                                                                                                                      | 3.192                         | 11/04/2019  | 2.646                             | 4.427                | 0.546      | 7.2 | 2555       | 1661       | 0.00      | -91.4      | 107.6          | 23.6        | Clear / pale brown. No odour. No sheen. Low turbidity. Low sediment load.                                                                                   |
|                                                                                                                           |                               | 23/10/2019  | 2.460                             | 4.440                | 0.732      | 7.4 | 1640       | 1066       | 4.66      | 8.3        | 207.3          | 21.8        | Clear. Low turbidity. No odour. No sheen.                                                                                                                   |
| MW12                                                                                                                      | 3.044                         | 23/10/2019  | 2.260                             | 4.390                | 0.784      | 7.0 | 1660       | 1079       | 5.23      | 10.2       | 209.2          | 20.2        | Clear. Low turbidity. No odour. No sheen.                                                                                                                   |
| MW13                                                                                                                      | 3.095                         | 23/10/2019  | 2.350                             | 4.380                | 0.745      | 6.7 | 2770       | 1801       | 0.98      | -55.0      | 144.0          | 22.7        | Pale brown / clear. Low turbidity. No sheen. Slight hydrogen sulfide odour.                                                                                 |
| MW14                                                                                                                      | 2.854                         | 23/10/2019  | 2.120                             | 4.390                | 0.734      | 7.1 | 2750       | 1788       | NR        | -60.1      | 138.9          | 21.2        | Clear. Low turbidity. No sheen. Hydrogen sulfide odour.                                                                                                     |
| MW15                                                                                                                      | 2.945                         | 23/10/2019  | 2.220                             | 4.390                | 0.725      | 6.9 | 2765       | 1797       | 11.70     | -53.2      | 145.8          | 21.5        | Clear. Low turbidity. No odour. No sheen.                                                                                                                   |
| MW16                                                                                                                      | 2.859                         | 23/10/2019  | 2.070                             | 4.290                | 0.789      | 7.6 | 3900       | 2535       | 6.36      | 96.9       | 295.9          | 22.1        | Pale brown / clear. Low turbidity. No odour. No sheen.                                                                                                      |
| MW17                                                                                                                      | 3.068                         | 23/10/2019  | 2.290                             | 4.400                | 0.778      | 7.5 | 2030       | 1320       | 3.72      | 85.4       | 284.4          | 21.9        | Pale brown / clear. Low turbidity. No odour. No sheen.                                                                                                      |
| MW18                                                                                                                      | 3.079                         | 23/10/2019  | 2.270                             | 4.390                | 0.809      | 7.9 | 461        | 300        | NR        | 90.0       | 289.0          | 22.0        | Clear. Low turbidity. No odour. No sheen.                                                                                                                   |

NR denotes no record due to erroneous readings



|                                          | PFAS                                     |                                         |                                  |                                          |                                              |                     |                          |                                      |
|------------------------------------------|------------------------------------------|-----------------------------------------|----------------------------------|------------------------------------------|----------------------------------------------|---------------------|--------------------------|--------------------------------------|
|                                          | Perfluorohexane<br>sulfonic acid (PFHxS) | Perfluorooctane<br>sulfonic acid (PFOS) | Perfluorooctanoic acid<br>(PFOA) | 6:2 Fluorotelomer<br>Sulfonate (6:2 FTS) | 8:2 Fluorotelomer<br>sulfonic acid (8:2 FTS) | PFAS (Sum of Total) | Sum of PFHxS and<br>PFOS | Sum of US EPA PFAS<br>(PFOS + PFOA)* |
|                                          | µg/L                                     | µg/L                                    | µg/L                             | µg/L                                     | µg/L                                         | µg/L                | µg/L                     | µg/L                                 |
| EQL                                      | 0.01                                     | 0.01                                    | 0.01                             | 0.01                                     | 0.01                                         | 0.01                | 0.01                     | 0.01                                 |
| PFAS NEMP 2018 Health Drinking Water     |                                          |                                         | 0.56                             |                                          |                                              |                     | 0.07                     |                                      |
| PFAS NEMP 2018 Health Recreational Water |                                          |                                         | 5.6                              |                                          |                                              |                     | 0.7                      |                                      |
| PFAS NEMP 2018 Interim Marine 95%        |                                          | 0.13                                    | 220                              |                                          |                                              |                     |                          |                                      |

| Field ID |       |       |       |       |       |       |       |       |
|----------|-------|-------|-------|-------|-------|-------|-------|-------|
| MW01     | 0.25  | 0.04  | 0.01  | <0.01 | <0.01 | 0.30  | 0.29  | 0.05  |
| MW02     | 3.3   | 9.1   | 0.07  | <0.01 | <0.01 | 12    | 12    | 9.1   |
| MW03     | 0.08  | 0.69  | <0.01 | <0.01 | <0.01 | 0.77  | 0.77  | 0.69  |
| MW04     | 29    | 100   | 1.9   | 4.0   | 0.44  | 140   | 129   | 101.9 |
| MW05     | <0.01 | 0.02  | <0.01 | <0.01 | <0.01 | 0.02  | 0.02  | 0.02  |
| MW06     | 0.01  | 0.03  | <0.01 | <0.01 | <0.01 | 0.04  | 0.04  | 0.03  |
| MW07     | 0.01  | <0.01 | <0.01 | <0.01 | <0.01 | 0.01  | 0.01  | <0.01 |
| MW08     | 0.33  | 0.07  | 0.02  | <0.01 | <0.01 | 0.42  | 0.40  | 0.09  |
| MW09     | 0.14  | 0.05  | <0.01 | <0.01 | <0.01 | 0.19  | 0.19  | 0.05  |
| MW10     | 0.06  | <0.01 | <0.01 | <0.01 | <0.01 | 0.06  | 0.06  | <0.01 |
| MW11     | 0.06  | <0.01 | <0.01 | <0.01 | <0.01 | 0.06  | 0.06  | <0.01 |
| MW12     | 0.18  | 0.29  | 0.02  | 0.03  | <0.01 | 0.51  | 0.47  | 0.30  |
| MW13     | 0.10  | <0.01 | <0.01 | <0.01 | <0.01 | 0.10  | 0.10  | <0.01 |
| MW14     | 0.11  | <0.01 | <0.01 | <0.01 | <0.01 | 0.11  | 0.11  | <0.01 |
| MW15     | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| MW16     | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| MW17     | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| MW18     | 0.01  | 0.04  | <0.01 | <0.01 | <0.01 | 0.06  | 0.06  | 0.04  |



Analytical Results Tables  
Table 5: Historical Groundwater Results

Largs North Station  
Groundwater Investigation (October 2019)  
3319080

|                                          | PFAS                                  |                                      |                               |                                       |                                           |                     |                       |                                   |
|------------------------------------------|---------------------------------------|--------------------------------------|-------------------------------|---------------------------------------|-------------------------------------------|---------------------|-----------------------|-----------------------------------|
|                                          | Perfluorohexane sulfonic acid (PFHxS) | Perfluorooctane sulfonic acid (PFOS) | Perfluorooctanoic acid (PFOA) | 6:2 Fluorotelomer Sulfonate (6:2 FTS) | 8:2 Fluorotelomer sulfonic acid (8:2 FTS) | PFAS (Sum of Total) | Sum of PFHxS and PFOS | Sum of US EPA PFAS (PFOS + PFOA)* |
|                                          | µg/L                                  | µg/L                                 | µg/L                          | µg/L                                  | µg/L                                      | µg/L                | µg/L                  | µg/L                              |
| EQL                                      | 0.01                                  | 0.01                                 | 0.01                          | 0.01                                  | 0.01                                      | 0.01                | 0.01                  | 0.01                              |
| PFAS NEMP 2018 Health Drinking Water     |                                       |                                      | 0.56                          |                                       |                                           |                     | 0.07                  |                                   |
| PFAS NEMP 2018 Health Recreational Water |                                       |                                      | 5.6                           |                                       |                                           |                     | 0.7                   |                                   |
| PFAS NEMP 2018 Interim Marine 95%        |                                       | 0.13                                 | 220                           |                                       |                                           |                     |                       |                                   |

| Field ID | Date       |       |       |       |       |       |       |       |       |
|----------|------------|-------|-------|-------|-------|-------|-------|-------|-------|
| MW01     | 13/02/2019 | 0.20  | 0.07  | 0.01  | 0.01  | <0.01 | 0.30  | 0.27  | 0.08  |
|          | 11/04/2019 | 0.30  | 0.07  | 0.02  | <0.01 | <0.01 | 0.39  | 0.37  | 0.09  |
|          | 23/10/2019 | 0.25  | 0.04  | 0.01  | <0.01 | <0.01 | 0.30  | 0.29  | 0.05  |
| MW02     | 13/02/2019 | 4.3   | 8.5   | 0.09  | <0.01 | <0.01 | 13    | 13    | 8.6   |
|          | 11/04/2019 | 3.4   | 9.0   | 0.07  | <0.01 | <0.01 | 12    | 12    | 9.1   |
|          | 23/10/2019 | 3.3   | 9.1   | 0.07  | <0.01 | <0.01 | 12    | 12    | 9.1   |
| MW03     | 13/02/2019 | 3.8   | 4.8   | 0.09  | <0.01 | <0.01 | 8.7   | 8.6   | 4.9   |
|          | 11/04/2019 | 5.1   | 3.1   | 0.13  | <0.01 | <0.01 | 8.3   | 8.2   | 3.2   |
|          | 23/10/2019 | 0.08  | 0.69  | <0.01 | <0.01 | <0.01 | 0.77  | 0.77  | 0.69  |
| MW04     | 13/02/2019 | 38    | 25    | 1.8   | 4.6   | 0.13  | 70    | 63    | 27    |
|          | 11/04/2019 | 86    | 130   | 4.2   | 4.9   | 0.36  | 230   | 220   | 130   |
|          | 23/10/2019 | 29    | 100   | 1.9   | 4.0   | 0.44  | 140   | 129   | 101.9 |
| MW05     | 11/04/2019 | 0.02  | 0.07  | <0.01 | <0.01 | <0.01 | 0.09  | 0.09  | 0.07  |
|          | 23/10/2019 | <0.01 | 0.02  | <0.01 | <0.01 | <0.01 | 0.02  | 0.02  | 0.02  |
| MW06     | 11/04/2019 | 0.04  | 0.11  | <0.01 | <0.01 | <0.01 | 0.16  | 0.16  | 0.11  |
|          | 23/10/2019 | 0.01  | 0.03  | <0.01 | <0.01 | <0.01 | 0.04  | 0.04  | 0.03  |
| MW07     | 11/04/2019 | 0.1   | 0.39  | <0.01 | <0.01 | <0.01 | 0.48  | 0.48  | 0.39  |
|          | 23/10/2019 | 0.01  | <0.01 | <0.01 | <0.01 | <0.01 | 0.01  | 0.01  | <0.01 |
| MW08     | 11/04/2019 | 0.77  | 0.15  | 0.03  | <0.01 | <0.01 | 0.95  | 0.92  | 0.18  |
|          | 23/10/2019 | 0.33  | 0.07  | 0.02  | <0.01 | <0.01 | 0.42  | 0.40  | 0.09  |
| MW09     | 11/04/2019 | 0.47  | 0.02  | 0.02  | <0.01 | <0.01 | 0.51  | 0.49  | 0.03  |
|          | 23/10/2019 | 0.14  | 0.05  | <0.01 | <0.01 | <0.01 | 0.19  | 0.19  | 0.05  |
| MW10     | 11/04/2019 | 0.13  | 0.04  | <0.01 | <0.01 | <0.01 | 0.17  | 0.17  | 0.04  |
|          | 23/10/2019 | 0.06  | <0.01 | <0.01 | <0.01 | <0.01 | 0.06  | 0.06  | <0.01 |
| MW11     | 11/04/2019 | 0.50  | 0.02  | 0.03  | <0.01 | <0.01 | 0.54  | 0.52  | 0.05  |
|          | 23/10/2019 | 0.06  | <0.01 | <0.01 | <0.01 | <0.01 | 0.06  | 0.06  | <0.01 |
| MW12     | 23/10/2019 | 0.18  | 0.29  | 0.02  | 0.03  | <0.01 | 0.51  | 0.47  | 0.30  |
| MW13     | 23/10/2019 | 0.10  | <0.01 | <0.01 | <0.01 | <0.01 | 0.10  | 0.10  | <0.01 |
| MW14     | 23/10/2019 | 0.11  | <0.01 | <0.01 | <0.01 | <0.01 | 0.11  | 0.11  | <0.01 |
| MW15     | 23/10/2019 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| MW16     | 23/10/2019 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| MW17     | 23/10/2019 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| MW18     | 23/10/2019 | 0.01  | 0.04  | <0.01 | <0.01 | <0.01 | 0.06  | 0.06  | 0.04  |
| PAE Well | 11/04/2019 | <0.01 | 0.02  | 0.01  | <0.01 | <0.01 | 0.03  | 0.02  | 0.03  |

# Figures

**Figure 1 – Site Location Plan**

**Figure 2 – Groundwater Monitoring Well Locations**

**Figure 3 – Groundwater Contours**

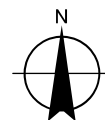
**Figure 4 – Groundwater Exceedances**

**Figure 5 – Conceptual Site Model**



Paper Size ISO A4  
0 60 120 180  
Meters

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



South Australian Metropolitan Fire Service  
Largs North Station Groundwater Investigation

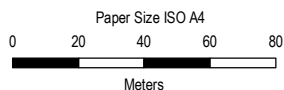
Project No. 33-19080  
Revision No. A  
Date 12/ 11/ 2019

Site Location Plan

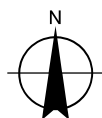
FIGURE 1

N:\AU\Adelaide\Projects\33\19080\GIS\Maps\Deliverables\33-19080\_2002\_SiteLocation\_RevA.mxd  
Print date: 28 Feb 2019 - 12:17

Data source: SA Government: Cadastre (2010), Roads (2010), Railways (2013). Image © Google Earth, Image Date: 10/15/2017; Date Extracted: 26/02/2019 Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, © OpenStreetMap contributors, and the GIS User Community. Created by: ddbanatin



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

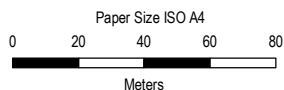


South Australian Metropolitan Fire Service  
Largs North Station Groundwater Investigation

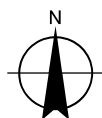
### Site Layout and Groundwater Monitoring Well Locations Plan

Project No. 33-19080  
Revision No. A  
Date 13/ 11/ 2019

**FIGURE 2**



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



South Australian Metropolitan Fire Service Largs  
North Station Groundwater Investigations

Groundwater Contours & Flow  
Direction Plan

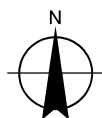
Project No. 33-19080  
Revision No. A  
Date 13/ 11/ 2019

**FIGURE 3**



Paper Size ISO A4  
 0 20 40 60 80  
 Meters

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

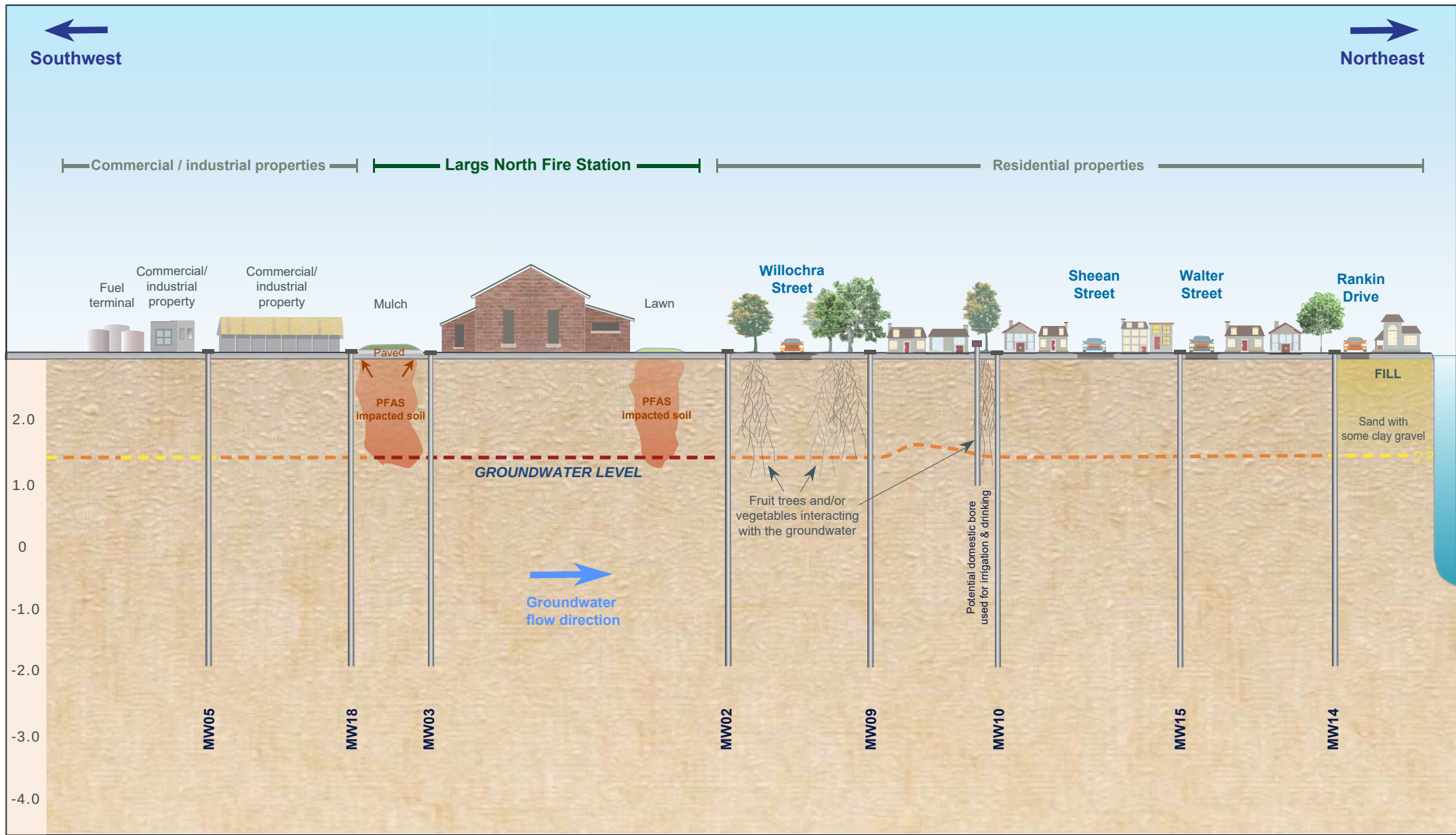


South Australian Metropolitan Fire Service Largs  
 North Station Groundwater Investigations

## Groundwater Concentrations Exceedances Plan

Project No. 33-19080  
 Revision No. A  
 Date 13/ 11/ 2019

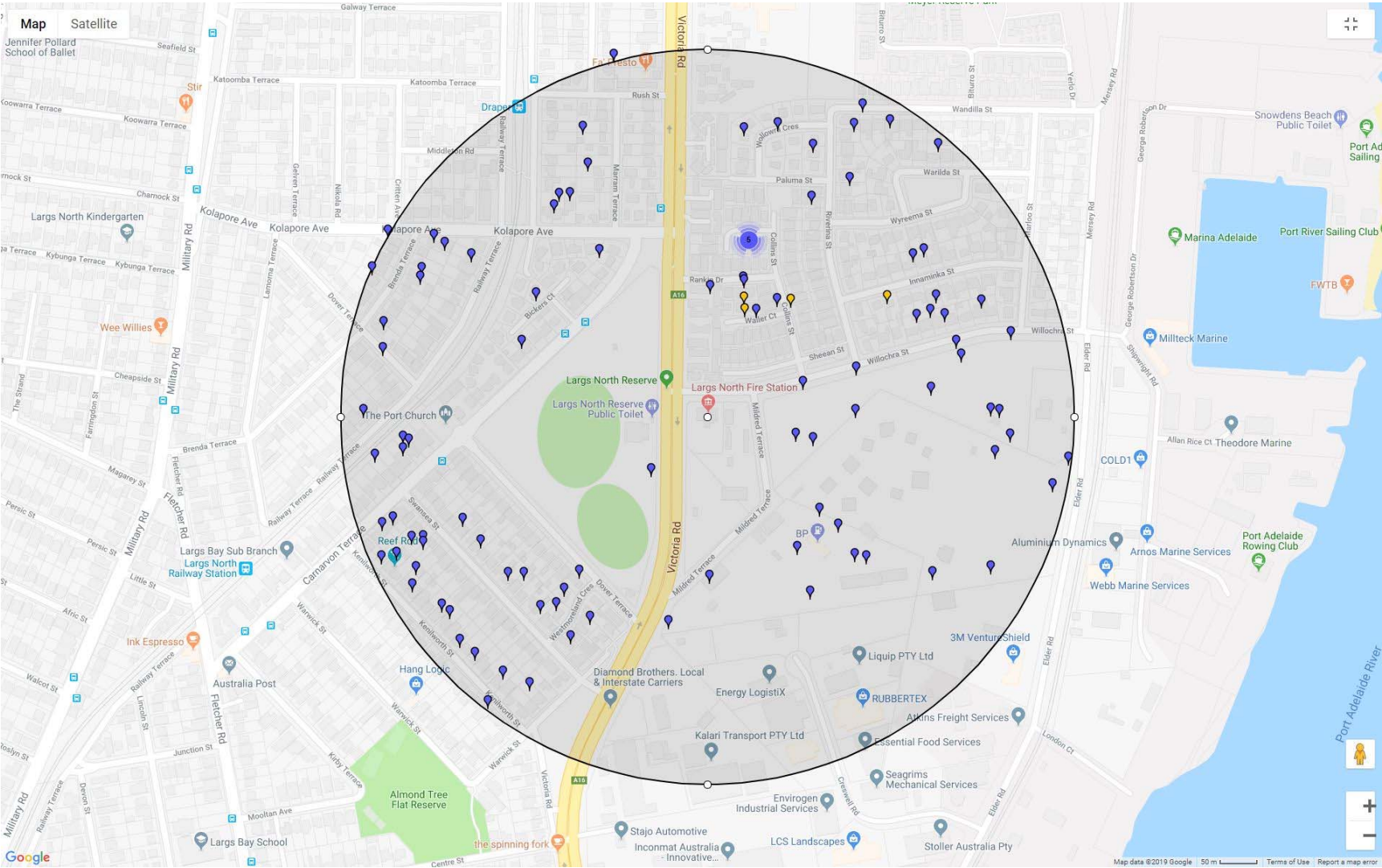
**FIGURE 4**



## **Appendices**

## **Appendix A** – Registered Bore Search

Figure 1: Registered bore search 0.5 km



Notes: The blue icons represent 'Water Wells'. The yellow icons represent 'Engineering Wells' which have been backfilled and decommissioned.

Groundwater Data Report 0.5km

| DHNO  | Unit_No   | Unit_Num | drillhole_class | Aquifer | Orig_drilled_depth | Orig_drilled_date | max_drill_depth | late_permit_no | cased_to | purpose | latest_status | swl  | rswl | water_level | TDS       | EC      | pH   | yield | mga_eastlin | mga_north | mga_zone | long_degre | long_minut | long_secor  | lat_degrees | lat_minutes | lat_seconds | decimal_long | decimal_lat | neg_decimal | hundred     | plan      | parcel | Title      | map_250k   | map_100k | map_50k | map_10k | map_2_5k | map_1k |   |
|-------|-----------|----------|-----------------|---------|--------------------|-------------------|-----------------|----------------|----------|---------|---------------|------|------|-------------|-----------|---------|------|-------|-------------|-----------|----------|------------|------------|-------------|-------------|-------------|-------------|--------------|-------------|-------------|-------------|-----------|--------|------------|------------|----------|---------|---------|----------|--------|---|
| 27673 | 6528-545  | 6.53E+08 | WW              | Qhcks   | 5                  | 1/06/1979         | 5               | 5826           |          | DOM     | OPR           |      | 3    | 1.86        | 1/06/1979 | 1468    | 2650 | 7.4   | 1           | 271081.8  | 6144076  | 54         | 138        | 29          | 49.577      | 34          | 49          | 11.534       | 138.4971048 | 34.8198706  | -34.8198706 | PORT ADEL | D426   | A92        | CT 5603 68 | S15409   | 6528    | 2       | 35       | e      | 4 |
| 27762 | 6628-1980 | 6.63E+08 | WW              | Qhcks   | 6                  | 30/06/1981        | 6               | 9709           |          |         |               | 3    | 1.38 | 30/06/1981  |           |         |      | 0.5   | 271348.7    | 6144493   | 54       | 138        | 30         | 0.485       | 34          | 48          | 58.225      | 138.5001347  | 34.8161735  | -34.8161735 | PORT ADEL   | D9013     | A10    | CT 5548 92 | S15409     | 6628     | 3       | 31      | h        | 1      |   |
| 27781 | 6528-653  | 6.53E+08 | WW              | Qhcks   | 6                  | 26/02/1982        | 6               | 10251          |          |         |               |      |      |             |           |         |      | 0.5   | 271094.8    | 6144230   | 54       | 138        | 29         | 50.24       | 34          | 49          | 6.548       | 138.4972888  | 34.8184856  | -34.8184856 | PORT ADEL   | D426      | A180   | CT 5721 48 | S15409     | 6528     | 2       | 35      | e        | 3      |   |
| 27842 | 6528-714  | 6.53E+08 | WW              | Qhcks   | 6                  | 1/12/1982         |                 | 11334          |          |         |               |      |      |             |           |         |      | 0.5   | 271038.7    | 6144462   | 54       | 138        | 29         | 48.263      | 34          | 48          | 58.977      | 138.4967398  | 34.8163826  | -34.8163826 | PORT ADEL   | D3096     | A46    | CT 5173 72 | S15409     | 6528     | 2       | 35      | e        | 3      |   |
| 27880 | 6528-752  | 6.53E+08 | WW              | Qhcks   | 4.5                | 18/04/1983        | 4.5             | 12198          | 3.3      |         |               | 3    | 1.84 | 18/04/1983  | 827       | 1500    | 7.6  | 0.6   | 271170.7    | 6144124   | 54       | 138        | 29         | 53.123      | 34          | 49          | 10.047      | 138.4980898  | 34.8194576  | -34.8194576 | PORT ADEL   | D426      | A138   | CT 5163 17 | S15409     | 6528     | 2       | 35      | e        | 4      |   |
| 27886 | 6528-758  | 6.53E+08 | WW              | Qpah    |                    |                   |                 | 92034          |          |         |               |      |      |             | 772       | 1400    | 7    |       | 271048.7    | 6144208   | 54       | 138        | 29         | 48.407      | 34          | 49          | 7.225       | 138.4967798  | 34.8186736  | -34.8186736 | PORT ADEL   | D426      | A183   | CT 5265 10 | S15409     | 6528     | 2       | 35      | e        | 3      |   |
| 27890 | 6528-762  | 6.53E+08 | WW              | Qhcks   | 4.5                | 18/04/1983        | 4.5             | 12056          | 3        |         |               | 2.1  | 2.07 | 18/04/1983  | 1295      | 2340    | 7.2  | 0.38  | 271329.8    | 614610    | 54       | 138        | 29         | 59.855      | 34          | 48          | 54.412      | 138.4999597  | 34.8151145  | -34.8151145 | PORT ADEL   | D2985     | A15    | CT 5708 76 | S15409     | 6528     | 2       | 35      | e        | 3      |   |
| 27909 | 6528-781  | 6.53E+08 | WW              | Qhcks   | 3.6                | 19/09/1983        | 3.6             | 12753          | 2.4      | DOM     | OPR           | 2.1  | 2.77 | 19/09/1983  | 347       | 630     | 7.7  | 0.6   | 271108.8    | 6144057   | 54       | 138        | 29         | 50.621      | 34          | 49          | 12.171      | 138.4973948  | 34.8200476  | -34.8200476 | PORT ADEL   | D426      | A94    | CT 5638 44 | S15409     | 6528     | 2       | 35      | e        | 4      |   |
| 27955 | 6528-827  | 6.53E+08 | WW              | Qhcks   | 6                  | 1/09/1983         | 6               | 13307          |          | DOM     | OPR           |      |      |             | 1457      | 2630    | 7.3  |       | 271284.7    | 6144552   | 54       | 138        | 29         | 58.026      | 34          | 48          | 56.259      | 138.4994517  | 34.8156275  | -34.8156275 | PORT ADEL   | D2985     | A18    | CT 5141 63 | S15409     | 6528     | 2       | 35      | e        | 4      |   |
| 27964 | 6528-836  | 6.53E+08 | WW              | Qhcks   | 6                  | 1/12/1982         | 6               | 13709          |          | DOM     | OPR           |      |      |             |           |         |      |       | 271173.8    | 6144483   | 54       | 138        | 29         | 53.595      | 34          | 48          | 58.408      | 138.4982207  | 34.8162246  | -34.8162246 | PORT ADEL   | D3096     | A61    | CT 5524 88 | S15409     | 6528     | 2       | 35      | e        | 3      |   |
| 27974 | 6528-846  | 6.53E+08 | WW              | Qhcks   | 6                  | 1/03/1984         | 6               | 14235          |          | DOM     | OPR           |      |      |             |           |         |      |       | 271171.7    | 6143960   | 54       | 138        | 29         | 53.001      | 34          | 49          | 15.368      | 138.4980558  | 34.8209356  | -34.8209356 | PORT ADEL   | D426      | A101   | CT 5709 37 | S15409     | 6528     | 2       | 35      | e        | 4      |   |
| 27987 | 6528-859  | 6.53E+08 | WW              | Qhcks   | 4                  | 6/06/1984         | 4               | 14825          |          |         |               |      |      |             | 613       | 1112    | 7.6  |       | 271177.7    | 6144099   | 54       | 138        | 29         | 51.014      | 34          | 49          | 10.814      | 138.4975038  | 34.8196706  | -34.8196706 | PORT ADEL   | D85531    | A1     | CT 6079 79 | S15409     | 6528     | 2       | 35      | e        | 4      |   |
| 28008 | 6528-880  | 6.53E+08 | WW              | Qhcks   | 6                  | 1/08/1984         | 6               | 12685          |          | DOM     | OPR           |      |      |             | 819       | 1486    | 7.6  |       | 271279.7    | 6144008   | 54       | 138        | 29         | 57.296      | 34          | 49          | 13.899      | 138.4992488  | 34.8205276  | -34.8205276 | PORT ADEL   | D110234   | A15    | CT 6159 73 | S15409     | 6528     | 2       | 35      | e        | 4      |   |
| 28032 | 6528-904  | 6.53E+08 | WW              | Qhcks   | 3.9                | 24/10/1984        | 3.9             | 15275          | 3        | IRR     | OPR           | 2.4  | 2.46 | 24/10/1984  | 630       | 1144    | 7.5  | 0.7   | 271075.7    | 6144124   | 54       | 138        | 29         | 49.387      | 34          | 49          | 9.972       | 138.4970518  | 34.8194366  | -34.8194366 | PORT ADEL   | F5160     | A54    | CT 5862 38 | S15409     | 6528     | 2       | 35      | e        | 4      |   |
| 28033 | 6528-905  | 6.53E+08 | WW              | Qhcks   | 3.9                | 24/10/1984        | 3.9             | 15276          | 3        | IRR     | OPR           | 2.4  | 2.48 | 24/10/1984  | 495       | 900     | 7.5  | 0.7   | 271061.7    | 6144115   | 54       | 138        | 29         | 48.829      | 34          | 49          | 10.253      | 138.4968968  | 34.8195146  | -34.8195146 | PORT ADEL   | F5160     | A53    | CT 5692 20 | S15409     | 6528     | 2       | 35      | e        | 4      |   |
| 28056 | 6528-928  | 6.53E+08 | WW              | Qhcks   | 6                  | 7/01/1985         | 6               | 15792          |          | DOM     | OPR           | 3    | 1.24 | 7/01/1985   | 1636      | 2950    | 7.1  | 0.5   | 271306.7    | 6144569   | 54       | 138        | 29         | 58.908      | 34          | 48          | 55.726      | 138.4996967  | 34.8154795  | -34.8154795 | PORT ADEL   | D2985     | A19    | CT 5793 64 | S15409     | 6528     | 2       | 35      | e        | 3      |   |
| 28096 | 6528-968  | 6.53E+08 | WW              | Qhcks   | 4.2                | 7/03/1985         | 4.2             | 16106          | 3        | DOM     | OPR           | 2.7  | 1.37 | 7/03/1985   | 1239      | 2240    | 7.2  | 0.6   | 271321.8    | 6144660   | 54       | 138        | 29         | 59.589      | 34          | 48          | 52.785      | 138.4998857  | 34.8146625  | -34.8146625 | PORT ADEL   | D2985     | A12    | CT 5105 9  | S15409     | 6528     | 2       | 35      | e        | 3      |   |
| 28110 | 6528-982  | 6.53E+08 | WW              | Qhcks   | 6                  | 28/03/1985        | 6               | 16388          |          | DOM     | OPR           | 4    | 0    | 28/03/1985  | 725       | 1315    | 7.5  | 0.5   | 271234.8    | 6144052   | 54       | 138        | 29         | 55.571      | 34          | 49          | 12.434      | 138.4987698  | 34.8201206  | -34.8201206 | PORT ADEL   | D426      | A144   | CT 5704 80 | S15409     | 6528     | 2       | 35      | e        | 4      |   |
| 28130 | 6528-1002 | 6.53E+08 | WW              | Qhcks   | 6                  | 7/06/1985         | 6               | 16926          |          | DOM     | OPR           | 3    | 1.88 | 7/06/1985   | 921       | 1670    | 7.3  | 0.5   | 271104.7    | 6144033   | 54       | 138        | 29         | 50.438      | 34          | 49          | 12.945      | 138.4973438  | 34.8202626  | -34.8202626 | PORT ADEL   | D426      | A95    | CT 5228 16 | S15409     | 6528     | 2       | 35      | e        | 4      |   |
| 28165 | 6528-1037 | 6.53E+08 | WW              | Qhcks   | 3                  | 1/10/1985         | 3               | 16231          |          | DOM     | OPR           | 1.8  | 1.2  | 1/10/1985   | 1765      | 3180    | 7.4  | 25    | 271245.8    | 6144367   | 54       | 138        | 29         | 56.313      | 34          | 49          | 2.228       | 138.4989758  | 34.8172856  | -34.8172856 | PORT ADEL   | D9013     | A2     | CT 5548 89 | S15409     | 6528     | 2       | 35      | e        | 3      |   |
| 28172 | 6528-1044 | 6.53E+08 | WW              | Qhcks   | 6                  | 20/11/1985        | 6               | 17620          | 6        | DOM     | OPR           | 4    | 0.86 | 20/12/1985  | 1284      | 2320    | 7.3  | 0.5   | 271061.8    | 6144070   | 54       | 138        | 29         | 48.785      | 34          | 49          | 11.711      | 138.4968848  | 34.8199196  | -34.8199196 | PORT ADEL   | D426      | A91    | CT 5465 67 | S15409     | 6528     | 2       | 35      | e        | 4      |   |
| 28495 | 6528-1367 | 6.53E+08 | WW              | Qhcks   | 6                  | 9/01/1990         | 6               | 23694          | 3.5      | IRR     | OPR           | 2    | 2.76 | 23/01/1990  | 1010      | 1829    | 8.2  |       | 271347.8    | 6143995   | 54       | 138        | 29         | 59.96       | 34          | 49          | 14.374      | 138.4999888  | 34.8206596  | -34.8206596 | PORT ADEL   | D9013     | A22    | CT 5390 48 | S15409     | 6528     | 2       | 35      | e        | 4      |   |
| 28510 | 6528-1382 | 6.53E+08 | WW              | Qhcks   | 7.62               | 12/10/1990        | 7.62            | 24431          | 7.62     | DOM     | OPR           | 3.05 | 1.43 | 12/10/1990  | 332       | 604     | 7.6  |       | 271104.7    | 6144451   | 54       | 138        | 29         | 50.848      | 34          | 48          | 59.388      | 138.4974578  | 34.8164966  | -34.8164966 | PORT ADEL   | D3096     | A54    | CT 5836 62 | S15409     | 6528     | 2       | 35      | e        | 3      |   |
| 28555 | 6528-1427 | 6.53E+08 | WW              | Qhcks   | 7.3                | 12/09/1991        | 7.3             | 26071          |          | DOM     | OPR           | 3    | 1.85 | 12/09/1991  | 1072      | 1940    | 7.3  | 0.87  | 271196.7    | 6144095   | 54       | 138        | 29         | 54.117      | 34          | 49          | 11.009      | 138.4983658  | 34.8197246  | -34.8197246 | PORT ADEL   | D426      | A140   | CT 5137 77 | S15409     | 6528     | 2       | 35      | e        | 4      |   |
| 28558 | 6528-1430 | 6.53E+08 | WW              | Qhcks   | 5                  | 20/10/1991        | 5               | 26263          |          | DOM     | OPR           | 3.5  | 0.95 | 20/10/1991  | 1272      | 2300    | 7.2  |       | 271263.7    | 6144432   | 54       | 138        | 29         | 57.083      | 34          | 49          | 0.133       | 138.4991897  | 34.8167036  | -34.8167036 | PORT ADEL   | D35002    | A5     | CT 5087 65 | S15409     | 6528     | 2       | 35      | e        | 3      |   |
| 28630 | 6528-1502 | 6.53E+08 | WW              | Qhcks   | 5                  | 24/01/1992        | 5               | 26805          |          | DOM     | OPR           | 3.5  | 1.29 | 4/03/1992   | 914       | 1656    | 8.4  |       | 271267.8    | 6143903   | 54       | 138        | 29         | 56.723      | 34          | 49          | 17.294      | 138.4990898  | 34.8214706  | -34.8214706 | PORT ADEL   | D426      | A110   | CT 5797 14 | S15409     | 6528     | 2       | 35      | e        | 4      |   |
| 51405 | 6628-4436 | 6.63E+08 | ENG             | Qpah    | 28.65              | 15/02/1965        | 28.65           |                |          |         | UKN           |      |      |             | 2715      | 4861    |      |       | 271742.8    | 6144440   | 54       | 138        | 30         | 15.929      | 34          | 49          | 0.262       | 138.5044247  | 34.8167395  | -34.8167395 | PORT ADEL   | D7964     | A97    | CT 5545 84 | S15409     | 6628     | 3       | 31      | h        | 1      |   |
| 51406 | 6628-4437 | 6.63E+08 | ENG             | Qpah    | 18.29              | 19/02/1965        | 18.29           |                |          |         | UKN           |      |      |             | 2830      | 5063    |      |       | 271611.8    | 6144432   | 54       | 138        | 30         | 10.77       | 34          | 49          | 0.413       | 138.5029917  | 34.8167815  | -34.8167815 | PORT ADEL   | ADELAIDE  |        |            | S15409     | 6628     | 3       | 31      | h        | 1      |   |
| 51407 | 6628-4438 | 6.63E+08 | ENG             | Qpah    | 15.65              | 8/10/1970         | 15.65           |                |          |         | UKN           |      |      |             | 28991     | 45028   |      |       | 271548.8    | 6144418   | 54       | 138        | 30         | 8.279       | 34          | 49          | 0.817       | 138.5022997  | 34.8168935  | -34.8168935 | PORT ADEL   | ADELAIDE  |        |            | S15409     | 6628     | 3       | 31      | h        | 1      |   |
| 51408 | 6628-4439 | 6.63E+08 | ENG             | Qpah    | 15.7               | 9/10/1970         | 15.7            |                |          |         | UKN           |      |      |             | 271547.8  | 6144433 | 54   | 138   | 30          | 8.254     | 34       | 49         | 0.331      | 138.5022927 | 34.8167585  | -34.8167585 | PORT ADEL   | D71819       | A73         | CT 5973 34  | S15409      | 6628      | 3      | 31         | h          | 1        |         |         |          |        |   |
| 59228 | 6628-1225 | 6.63E+08 | WW              | Qpah    | 4.2                | 16/04/1983        | 4.2             | 12638          | 3        |         |               | 2.7  | -0.7 | 16/03/1983  | 838       | 1520    | 7.4  | 0.6   | 271687.7    | 6144599   | 54       | 138        | 30         | 13.24       | 34          | 48          | 55.06       | 138.5038667  | 34.8152945  | -34.8152945 | PORT ADEL   | D7964     | A26    | CT 5554 87 | S15409     | 6628     | 3       | 31      | h        | 1      |   |
| 59780 | 6628-1281 | 6.63E+08 | WW              | Qhcks   | 3.3                | 8/03/1984         | 3.3             | 13792          | 2.1      | DOM     | OPR           | 1.8  | 0.2  | 8/03/1984   | 1709      | 3080    | 7.5  | 0.6   | 271587.8    | 6144671   | 54       | 138        | 30         | 10.061      | 34          | 48          | 52.645      | 138.5027947  | 34.8146235  | -34.8146235 | PORT ADEL   | ADELAIDE  |        |            | S15409     | 6628     | 3       | 31      | h        | 1      |   |
| 60057 | 6628-1308 | 6.63E+08 | WW              | Qhcks   | 6                  | 2/12/1984         | 6               | 15644          |          | DOM     | OPR           |      |      |             | 1036      | 1876    | 7.6  |       | 271783.7    | 6144416   | 54       | 138        | 30         | 17.516      |             |             |             |              |             |             |             |           |        |            |            |          |         |         |          |        |   |

[illegible]

2

Groundwater Data Report 2km

| DHNO         | Unit No  | Unit Name | Drillhole | Acquifer | Orig drilled depth | Orig drilled depth | max drill depth | late permit no | closed to | exp  | latest status | hwi | flow | water level | TDS        | EC   | pH   | yield | map_easting | map_northing | map_zone   | long degrees | long minutes | long seconds | lat degrees | lat minutes | lat seconds | decimal long | decimal lat   | map_decimal   | hundred       | plan    | parcel  | Title   | map_250m | map_500m | map_1000m | map_2_5a | map_1b |   |
|--------------|----------|-----------|-----------|----------|--------------------|--------------------|-----------------|----------------|-----------|------|---------------|-----|------|-------------|------------|------|------|-------|-------------|--------------|------------|--------------|--------------|--------------|-------------|-------------|-------------|--------------|---------------|---------------|---------------|---------|---------|---------|----------|----------|-----------|----------|--------|---|
| 27150528-3   | 6.53E+08 | WW        | Tormw(T1) |          | 92.96              | 1/12/1991          | 92.96           |                |           |      |               |     | 3.05 | 1.95        | 1/12/1991  | 1385 | 2502 |       | 270312.72   | 6143455.25   | 54         | 138          | 29           | 11.209       | 34          | 49          | 30.895      | 138.486647   | 34.8252487    | PORT ADELAIDE |               | 56409   | 65208   | 2       | 35       | m        | 2         |          |        |   |
| 27440528-32  | 6.53E+08 | WW        | Tormw(T1) |          | 115.82             | 27/11/1988         | 143.26          |                |           |      |               |     | 2.13 | 2.21        | 31/08/1991 | 1042 | 2961 | 10.1  | 270827.73   | 6145048.33   | 54         | 138          | 29           | 41.329       | 34          | 48          | 13.822      | 138.494136   | 34.803895     | PORT ADELAIDE | D59587        | A100    | CT 1875 | 755409  | 6528     | 2        | 35        | d        | 3      |   |
| 27440528-33  | 6.53E+08 | WW        | Tormw(T1) |          | 101.8              | 31/08/1991         | 101.8           | 91580          |           | 1.90 | 1.51          | BNF |      |             |            |      |      |       | 271075.7    | 6145031.0    | 54         | 138          | 29           | 50.542       | 34          | 48          | 13.797      | 138.493178   | 34.808825     | PORT ADELAIDE | D16460        | A35     | CT 6148 | 755409  | 6528     | 2        | 35        | d        | 3      |   |
| 27440528-34  | 6.53E+08 | WW        | Tormw(T1) |          | 102.11             | 27/11/1991         | 102.11          |                |           |      |               |     | 6.1  | 1.1         | 22/11/1991 | 1227 | 3113 | 5.0   | 270758.76   | 6145038.28   | 54         | 138          | 29           | 51.728       | 34          | 48          | 13.811      | 138.493167   | 34.813686     | PORT ADELAIDE | D4317         | A100    | CT 6150 | 755409  | 6528     | 2        | 35        | d        | 3      |   |
| 27440528-35  | 6.53E+08 | WW        | Tormw(T1) |          | 127.5              | 20/04/1972         | 127.5           | 229825         |           |      |               |     |      |             | 4/07/2003  | 2030 | 3650 | 7.4   | 5           | 270726.7     | 6145038.28 | 54           | 138          | 29           | 36.509      | 34          | 48          | 40.045       | 138.490487    | 34.8111236    | PORT ADELAIDE | D88971  | A200    | CT 6095 | 855409   | 6528     | 2         | 35       | d      | 4 |
| 27440528-36  | 6.53E+08 | WW        | Ohcks     |          | 6.1                |                    |                 |                |           | 6.1  | DOM           | BNF | 3.66 | 4.41        | 13/11/1967 | 645  | 1173 | 7     | 270632.78   | 6144202.28   | 54         | 138          | 29           | 32.081       | 34          | 49          | 5.085       | 138.4922449  | 34.8129196    | PORT ADELAIDE | F4711         | A170    | CT 5450 | 755409  | 6528     | 2        | 35        | d        | 3      |   |
| 27440528-37  | 6.53E+08 | WW        | Ohcks     |          | 3.66               |                    |                 |                |           | 3.66 | RRSTX         | OPR | 2.44 | 1.56        | 18/08/1969 | 830  | 1505 | 6.5   | 0.25        | 270899.77    | 6143882.33 | 54           | 138          | 29           | 42.23       | 34          | 49          | 17.676       | 138.490638    | 34.8215766    | PORT ADELAIDE | D82480  | A182    | CT 6035 | 855409   | 6528     | 2         | 35       | d      | 4 |
| 27440528-38  | 6.53E+08 | WW        | Ohcks     |          | 8.23               |                    |                 |                |           |      |               |     |      |             |            |      |      |       | 270422.7    | 6145035.36   | 54         | 138          | 29           | 23.353       | 34          | 49          | 21.353      | 138.490602   | 34.8215337    | PORT ADELAIDE | D1996         | A73     | CT 5407 | 855409  | 6528     | 2        | 35        | d        | 3      |   |
| 27440528-39  | 6.53E+08 | WW        | Ohcks     |          | 8.23               |                    |                 |                |           |      |               |     |      |             |            |      |      |       | 270400.73   | 6143438.25   | 54         | 138          | 29           | 22.078       | 34          | 49          | 34.593      | 138.489466   | 34.8262757    | PORT ADELAIDE | F4238         | A17     | CT 6094 | 855409  | 6528     | 2        | 35        | m        | 2      |   |
| 27440528-40  | 6.53E+08 | WW        | Ohcks     |          | 3.35               |                    |                 |                |           |      |               |     | 2.44 | 2.56        | 31/10/1994 | 956  | 1703 |       | 270797.74   | 6143255.29   | 54         | 138          | 29           | 37.601       | 34          | 49          | 37.93       | 138.493778   | 34.8272027    | PORT ADELAIDE | D2077         | A40     | CT 5271 | 255409  | 6528     | 2        | 35        | m        | 3      |   |
| 27440528-41  | 6.53E+08 | WW        | Ohcks     |          | 2.74               |                    |                 |                |           |      |               |     | 2.13 | 1.87        | 26/07/1994 | 805  | 1451 | 0.19  | 270613.77   | 6143261.22   | 54         | 138          | 29           | 30.645       | 34          | 49          | 25.942      | 138.491439   | 34.8282727    | PORT ADELAIDE | D2790         | A87     | CT 5171 | 355409  | 6528     | 2        | 35        | d        | 4      |   |
| 27440528-42  | 6.53E+08 | WW        | Ohcks     |          | 102.11             |                    |                 |                |           |      |               |     | 0.7  | 0.7         | 21/2/1990  | 1016 | 1840 | 6.8   | 0.2         | 270578.87    | 6143981.7  | 54           | 138          | 29           | 38.381      | 34          | 49          | 31.831       | 138.493177    | 34.8215688    | PORT ADELAIDE | F4317   | A100    | CT 5150 | 755409   | 6528     | 2         | 35       | d      | 3 |
| 27450528-326 | 6.53E+08 | WW        | Ohcks     |          | 6.4                |                    |                 |                |           |      |               |     | 1.85 | 3.15        | 9/11/1945  | 1113 | 2014 |       | 270202.72   | 6143141.26   | 54         | 138          | 29           | 14.086       | 34          | 49          | 41.145      | 138.487261   | 34.8280958    | PORT ADELAIDE | D341          | A59     | CT 5907 | 755409  | 6528     | 2        | 35        | m        | 2      |   |
| 27450528-328 | 6.53E+08 | WW        | Ohcks     |          | 4.57               |                    |                 |                |           |      |               |     | 4.27 | 0.73        | 21/09/1934 | 1798 | 8472 |       | 270312.73   | 6142705.29   | 54         | 138          | 29           | 17.778       | 34          | 49          | 55.39       | 138.4885471  | 34.8205268    | PORT ADELAIDE | H10080        | S1098   | CT 1932 | 855409  | 6528     | 2        | 35        | m        | 5      |   |
| 27605528-59  | 6.53E+08 | WW        | Ogah      |          |                    |                    |                 |                |           |      |               |     |      |             |            |      |      |       | 271016.7    | 6143485.31   | 54         | 138          | 29           | 46.498       | 34          | 49          | 30.647      | 138.4962129  | 34.8251796    | PORT ADELAIDE | D13186        | A88     | CT 5711 | 155409  | 6528     | 2        | 35        | d        | 3      |   |
| 27605528-60  | 6.53E+08 | WW        | Ogah      |          |                    |                    |                 |                |           |      |               |     |      |             |            |      |      |       | 271365.74   | 6143925.36   | 54         | 138          | 29           | 58.617       | 34          | 49          | 10.255      | 138.496502   | 34.8212485    | PORT ADELAIDE | D5464         | A1      | CT 5641 | 855409  | 6528     | 2        | 35        | d        | 3      |   |
| 27605528-61  | 6.53E+08 | WW        | Ohcks     |          | 5                  | 1/06/1979          | 5               | 5826           |           |      | DOM           | OPR | 3    | 1.86        | 1/06/1991  | 1468 | 2650 | 7.4   | 1           | 271038.76    | 6140706.24 | 54           | 138          | 29           | 49.577      | 34          | 49          | 11.534       | 138.491048    | 34.8198706    | PORT ADELAIDE | D426    | A92     | CT 5190 | 655409   | 6528     | 2         | 35       | d      | 3 |
| 27605528-559 | 6.53E+08 | WW        | Ohcks     |          |                    |                    |                 |                |           |      |               |     | 3    | 3           | 1/01/1981  | 882  | 1600 | 7.5   | 0.5         | 270957.75    | 6145457.28 | 54           | 138          | 29           | 44.09       | 34          | 48          | 26.602       | 138.4955806   | 34.8073895    | PORT ADELAIDE | D66756  | A1      | CT 1940 | 155409   | 6528     | 2         | 35       | d      | 4 |
| 27605528-560 | 6.53E+08 | WW        | Ohcks     |          |                    |                    |                 |                |           |      |               |     | 3    | 5.88        | 1/01/1981  | 922  | 1690 | 7.4   | 0.5         | 270815.71    | 6145462.51 | 54           | 138          | 29           | 40.76       | 34          | 48          | 26.865       | 138.4954676   | 34.8073236    | PORT ADELAIDE | D11294  | A50     | CT 6176 | 255409   | 6528     | 2         | 35       | d      | 3 |
| 27605528-561 | 6.53E+08 | WW        | Ohcks     |          |                    |                    |                 |                |           |      |               |     | 3    | 5.25        | 1/01/1981  | 1160 | 2100 | 7.4   | 0.5         | 270871.75    | 6145655.35 | 54           | 138          | 29           | 42.898      | 34          | 48          | 23.071       | 138.4952486   | 34.8064085    | PORT ADELAIDE | D116397 | A1      | CT 6194 | 755409   | 6528     | 2         | 35       | d      | 3 |
| 27605528-562 | 6.53E+08 | WW        | Ohcks     |          |                    |                    |                 |                |           |      |               |     | 3    | 6.17        | 1/01/1981  | 805  | 1460 | 7.1   | 0.5         | 270660.77    | 6145628.26 | 54           | 138          | 29           | 34.547      | 34          | 48          | 20.857       | 138.4923996   | 34.8057936    | PORT ADELAIDE | D7575   | A15     | CT 5592 | 755409   | 6528     | 2         | 35       | d      | 3 |
| 27605528-563 | 6.53E+08 | WW        | Ohcks     |          |                    |                    |                 |                |           |      |               |     | 3    | 1.9         | 1/01/1981  | 916  | 1660 | 7.2   | 0.5         | 271091.76    | 6143965.27 | 54           | 138          | 29           | 49.862      | 34          | 49          | 15.141       | 138.4971838   | 34.8208726    | PORT ADELAIDE | D426    | A79     | CT 5708 | 355409   | 6528     | 2         | 35       | d      | 3 |
| 27605528-564 | 6.53E+08 | WW        | Ohcks     |          |                    |                    |                 |                |           |      |               |     | 3    | 1.66        | 1/01/1981  | 960  | 1720 | 7.5   | 0.5         | 270575.72    | 6142859.33 | 54           | 138          | 29           | 35.952      | 34          | 49          | 50.746       | 138.491812    | 34.8307627    | PORT ADELAIDE |         |         | CT 5649 | 855409   | 6528     | 2         | 35       | d      | 3 |
| 27605528-565 | 6.53E+08 | WW        | Ohcks     |          |                    |                    |                 |                |           |      |               |     | 3    | 1.66        | 1/01/1981  | 938  | 1700 | 7.5   | 0.5         | 270400.76    | 6143373.33 | 54           | 138          | 29           | 22.11       | 34          | 49          | 33.585       | 138.489872    | 34.8289957    | PORT ADELAIDE | F4238   | A18     | CT 5089 | 855409   | 6528     | 2         | 35       | m      | 2 |
| 27605528-566 | 6.53E+08 | WW        | Ohcks     |          |                    |                    |                 |                |           |      |               |     | 3    | 4.37        | 1/01/1981  | 1172 | 2120 | 7.5   | 0.5         | 270428.73    | 6144615.26 | 54           | 138          | 29           | 40.158      | 34          | 49          | 53.847       | 138.4944487   | 34.8149576    | PORT ADELAIDE | D3735   | A1      | CT 5719 | 355409   | 6528     | 2         | 35       | m      | 2 |
| 27705528-674 | 6.53E+08 | WW        | Ohcks     |          |                    |                    |                 |                |           |      |               |     | 4    | 0           | 1/01/1981  | 761  | 1380 | 7.6   | 0.5         | 270589.73    | 6143195.25 | 54           | 138          | 29           | 28.36       | 34          | 49          | 39.708       | 138.491489    | 34.8276667    | PORT ADELAIDE | F4279   | A2      | CT 5356 | 455409   | 6528     | 2         | 35       | m      | 2 |
| 27705528-575 | 6.53E+08 | WW        | Ohcks     |          |                    |                    |                 |                |           |      |               |     | 4    | 0           | 1/01/1981  | 716  | 1380 | 7.7   | 0.5         | 270583.73    | 6143241.28 | 54           | 138          | 29           | 29.17       | 34          | 49          | 38.211       | 138.491436    | 34.8272807    | PORT ADELAIDE | F4279   | A6      | CT 5851 | 355409   | 6528     | 2         | 35       | d      | 3 |
| 27705528-578 | 6.53E+08 | WW        | Ohcks     |          | 3.1                | 29/04/1981         | 683             |                |           |      |               |     | 2    | 29.04       | 1/01/1981  | 683  | 1340 | 7.4   | 0.5         | 270581.73    | 6143241.28 | 54           | 138          | 29           | 29.17       | 34          | 49          | 49.306       | 138.491472    | 34.8283627    | PORT ADELAIDE | F4279   | A46     | CT 5852 | 355409   | 6528     | 2         | 35       | d      | 3 |
| 27705528-579 | 6.53E+08 | WW        | Ohcks     |          | 4                  | 24/04/1981         | 4               |                |           |      |               |     | 2.6  | 1.93        | 24/04/1981 | 1049 | 1590 | 7.3   | 0.46        | 270712.75    | 6143060.29 | 54           | 138          | 29           | 34.656      | 34          | 49          | 44.527       | 138.492396    | 34.8289437    | PORT ADELAIDE | F2521   | A37     | CT 1387 | 855409   | 6528     | 2         | 35       | d      | 3 |
| 27705528-580 | 6.53E+08 | WW        | Ohcks     |          | 6                  | 19/06/1979         | 6               |                |           |      |               |     | 4    | 1           | 1/06/1979  | 728  | 1320 | 7.5   | 1           | 270675.73    | 6145676.28 | 54           | 138          | 29           | 35.267      | 34          | 48          | 16.122       | 138.4931296   | 34.8045896    | PORT ADELAIDE | D7557   | A37     | CT 5957 | 755409   | 6528     | 2         | 35       | d      | 3 |
| 27710528-583 | 6.53E+08 | WW        | Ohcks     |          |                    |                    |                 |                |           |      |               |     | 3    | 3.32        | 1/01/1981  | 805  | 1460 | 7.5   | 0.5         | 270881.77    | 6144609.23 | 54           | 138          | 29           | 46.498      | 34          | 49          | 51.569       | 138.4951136   | 34.8181236    | PORT ADELAIDE | D5683   | A1      | CT 6235 | 855409   | 6528     | 2         | 35       | d      | 3 |
| 27710528-584 | 6.53E+08 | WW        | Ohcks     |          |                    |                    |                 |                |           |      |               |     | 3    | 2.25        | 1/01/1981  | 805  | 1460 | 7.5   | 0.5         | 270881.77    | 6144107.3  | 54           | 138          | 29           | 39.263      | 34          | 49          | 10.314       | 138.4943208   | 34.8195316    | PORT ADELAIDE | F4784   | A30     | CT 5177 | 855409   | 6528     | 2         | 35       | d      | 3 |
| 27710528-585 | 6.53E+08 | WW        | Ogah      |          |                    |                    |                 |                |           |      |               |     |      |             |            |      |      |       | 910         | 1650         | 7.6        |              |              |              |             | 45.55       | 138.4944408 | 34.8154166   | PORT ADELAIDE | F4802         | A50           | CT 5159 | 655409  | 6528    | 2        | 35       | d         | 3        |        |   |
| 27710528-590 | 6.53E+08 | WW        | Ogah      |          |                    |                    |                 |                |           |      |               |     |      |             |            |      |      |       | 938         | 1700         | 7.1        |              |              |              |             | 49.246      | 138         | 44.609       | 138.490138    | 34.8207246    | PORT ADELAIDE | D426    | A81     | CT 5715 | 555409   | 6528     | 2         | 35       | d      | 3 |
| 27710528-591 | 6.53E+08 | WW        | Ogah      |          |                    |                    |                 |                |           |      |               |     |      |             |            |      |      |       | 1099        | 1990         | 7.5        |              |              |              |             | 52.825      | 138.497737  | 34.8187788   | PORT ADELAIDE | D5317         | A1            | CT 5649 | 855409  | 6528    | 2        | 35       | d         | 3        |        |   |
| 27720528-594 | 6.53E+08 | WW        | Ohcks     |          | 5.49               | 1/01/1981          | 5.49            | 8983           | 5.49      |      |               |     | 3.35 | 1.58        | 1/01/1981  |      |      | 0.69  | 271019.78   | 6140504.31   | 54         | 138          | 29           |              |             |             |             |              |               |               |               |         |         |         |          |          |           |          |        |   |

Groundwater Data Report 2km

|               |          |    |       |     |            |     |       |     |     |     |     |      |            |      |      |     |     |           |            |    |     |    |        |    |    |        |             |             |             |                |      |            |       |      |   |    |   |   |
|---------------|----------|----|-------|-----|------------|-----|-------|-----|-----|-----|-----|------|------------|------|------|-----|-----|-----------|------------|----|-----|----|--------|----|----|--------|-------------|-------------|-------------|----------------|------|------------|-------|------|---|----|---|---|
| 279316528-804 | 6.53E+08 | WW | Obsks | 4.1 | 20/03/1984 | 5.1 | 14202 | 3.9 | RRR | OPR | 3.6 | 1.4  | 20/03/1984 | 619  | 1124 | 7.6 | 0.6 | 270569.77 | 6143572.34 | 54 | 138 | 29 | 28.846 | 34 | 49 | 27.64  | 138.491374  | 34.824957   | 34.824295   | PORT ADE02790  | A66  | CT 5817.65 | 95409 | 6528 | 2 | 35 | e | 5 |
| 279316528-805 | 6.53E+08 | WW | Obsks | 4.2 | 25/03/1984 | 4.2 | 14402 | 3.9 | RRR | OPR | 2.7 | 1.97 | 25/03/1984 | 840  | 1524 | 7.6 | 0.6 | 270317.78 | 614763.34  | 54 | 138 | 29 | 28.846 | 34 | 48 | 21.64  | 138.496817  | 34.8136706  | 34.8136706  | PORT ADE02533  | A396 | CT 5311.15 | 95409 | 6528 | 2 | 35 | e | 3 |
| 279316528-808 | 6.53E+08 | WW | Obsks | 5.4 | 23/04/1984 | 5.4 | 14433 | 4.1 | DOM | OPR | 1.9 | 0.98 | 23/04/1984 | 542  | 985  | 7.7 | 0.6 | 270319.71 | 6143325.3  | 54 | 138 | 29 | 19.655 | 34 | 49 | 35.65  | 138.488793  | 34.826487   | 34.826487   | PORT ADE0343   | A203 | CT 5261.65 | 95409 | 6528 | 2 | 35 | m | 2 |
| 279316528-809 | 6.53E+08 | WW | Obsks | 5   | 18/04/1984 | 5   | 14548 | 3.9 | RRR | OPR | 3.6 | 4.76 | 18/04/1984 | 1083 | 1920 | 7.5 | 0.6 | 270731.47 | 6144405.28 | 54 | 138 | 29 | 19.655 | 34 | 49 | 0.587  | 138.491348  | 34.81842637 | 34.81842637 | PORT ADE47731  | A157 | CT 5261.65 | 95409 | 6528 | 2 | 35 | m | 3 |
| 279316528-810 | 6.53E+08 | WW | Obsks | 5.4 | 18/04/1984 | 5.4 | 14578 | 4.2 | RRR | OPR | 3.8 | 1.15 | 18/04/1984 | 927  | 1640 | 7.6 | 0.6 | 270427.38 | 6145927.38 | 54 | 138 | 29 | 19.655 | 34 | 49 | 0.587  | 138.491348  | 34.81842637 | 34.81842637 | PORT ADE08178  | A102 | CT 5261.65 | 95409 | 6528 | 2 | 35 | m | 3 |
| 279316528-811 | 6.53E+08 | WW | Obsks | 4.5 | 24/04/1984 | 4.5 | 14550 | 3.9 | RRR | OPR | 3   | 1.66 | 24/04/1984 | 1687 | 3040 | 7.4 | 0.6 | 271272.78 | 6143706.27 | 54 | 138 | 29 | 56.727 | 34 | 49 | 23.68  | 138.499008  | 34.8232466  | 34.8232466  | PORT ADE51189  | A66  | CT 5540.95 | 95409 | 6528 | 2 | 35 | e | 4 |
| 279416528-813 | 6.53E+08 | WW | Obsks | 3.9 | 26/04/1984 | 3.9 | 13955 | 2.7 | DOM | OPR | 2.4 | 1.5  | 26/04/1984 | 1351 | 2440 | 7.4 | 0.6 | 271027.34 | 6147525.24 | 54 | 138 | 29 | 59.012 | 34 | 48 | 49.693 | 138.4992757 | 34.8138035  | 34.8138035  | PORT ADE05270  | A19  | CT 5751.75 | 95409 | 6528 | 2 | 35 | e | 3 |
| 279516528-822 | 6.53E+08 | WW | Obsks | 6   | 1/02/1983  | 6   | 11914 | 6   | DOM | OPR | 2   | 1.08 | 1/02/1983  | 1217 | 2160 | 7.5 | 0.6 | 270859.76 | 6145780.31 | 54 | 138 | 29 | 42.521 | 34 | 49 | 16.67  | 138.4951448 | 34.804485   | 34.804485   | PORT ADE05743  | A31  | CT 5854.05 | 95409 | 6528 | 2 | 35 | d | 3 |
| 279516528-825 | 6.53E+08 | WW | Obsks | 3   | 1/08/1983  | 3   | 12121 | 6   | DOM | OPR | 2   | 1.08 | 1/08/1983  | 1217 | 2160 | 7.5 | 0.6 | 270859.76 | 6145780.31 | 54 | 138 | 29 | 42.521 | 34 | 49 | 16.67  | 138.4951448 | 34.804485   | 34.804485   | PORT ADE05743  | A31  | CT 5854.05 | 95409 | 6528 | 2 | 35 | d | 3 |
| 279516528-826 | 6.53E+08 | WW | Obsks | 6   | 1/10/1983  | 6   | 13305 | 6   | DOM | OPR | 2   | 1.08 | 1/10/1983  | 1217 | 2160 | 7.5 | 0.6 | 270859.76 | 6145780.31 | 54 | 138 | 29 | 42.521 | 34 | 49 | 16.67  | 138.4951448 | 34.804485   | 34.804485   | PORT ADE05743  | A31  | CT 5854.05 | 95409 | 6528 | 2 | 35 | d | 3 |
| 279516528-827 | 6.53E+08 | WW | Obsks | 6   | 1/09/1983  | 6   | 13307 | 6   | DOM | OPR | 2   | 1.08 | 1/09/1983  | 1217 | 2160 | 7.5 | 0.6 | 270859.76 | 6145780.31 | 54 | 138 | 29 | 42.521 | 34 | 49 | 16.67  | 138.4951448 | 34.804485   | 34.804485   | PORT ADE05743  | A31  | CT 5854.05 | 95409 | 6528 | 2 | 35 | d | 3 |
| 279516528-828 | 6.53E+08 | WW | Obsks | 6   | 1/10/1983  | 6   | 13307 | 6   | DOM | OPR | 2   | 1.08 | 1/10/1983  | 1217 | 2160 | 7.5 | 0.6 | 270859.76 | 6145780.31 | 54 | 138 | 29 | 42.521 | 34 | 49 | 16.67  | 138.4951448 | 34.804485   | 34.804485   | PORT ADE05743  | A31  | CT 5854.05 | 95409 | 6528 | 2 | 35 | d | 3 |
| 279516528-829 | 6.53E+08 | WW | Obsks | 6   | 1/10/1983  | 6   | 13307 | 6   | DOM | OPR | 2   | 1.08 | 1/10/1983  | 1217 | 2160 | 7.5 | 0.6 | 270859.76 | 6145780.31 | 54 | 138 | 29 | 42.521 | 34 | 49 | 16.67  | 138.4951448 | 34.804485   | 34.804485   | PORT ADE05743  | A31  | CT 5854.05 | 95409 | 6528 | 2 | 35 | d | 3 |
| 279516528-830 | 6.53E+08 | WW | Obsks | 6   | 1/10/1983  | 6   | 13307 | 6   | DOM | OPR | 2   | 1.08 | 1/10/1983  | 1217 | 2160 | 7.5 | 0.6 | 270859.76 | 6145780.31 | 54 | 138 | 29 | 42.521 | 34 | 49 | 16.67  | 138.4951448 | 34.804485   | 34.804485   | PORT ADE05743  | A31  | CT 5854.05 | 95409 | 6528 | 2 | 35 | d | 3 |
| 279616528-833 | 6.53E+08 | WW | Obsks | 6   | 11/05/1983 | 6   | 13539 | 6   | DOM | OPR | 2   | 1.08 | 11/05/1983 | 1217 | 2160 | 7.5 | 0.6 | 270859.76 | 6145780.31 | 54 | 138 | 29 | 42.521 | 34 | 49 | 16.67  | 138.4951448 | 34.804485   | 34.804485   | PORT ADE05743  | A31  | CT 5854.05 | 95409 | 6528 | 2 | 35 | d | 3 |
| 279616528-834 | 6.53E+08 | WW | Obsks | 6   | 1/11/1983  | 6   | 13564 | 6   | DOM | OPR | 2   | 1.08 | 1/11/1983  | 1217 | 2160 | 7.5 | 0.6 | 270859.76 | 6145780.31 | 54 | 138 | 29 | 42.521 | 34 | 49 | 16.67  | 138.4951448 | 34.804485   | 34.804485   | PORT ADE05743  | A31  | CT 5854.05 | 95409 | 6528 | 2 | 35 | d | 3 |
| 279616528-836 | 6.53E+08 | WW | Obsks | 6   | 1/11/1983  | 6   | 13564 | 6   | DOM | OPR | 2   | 1.08 | 1/11/1983  | 1217 | 2160 | 7.5 | 0.6 | 270859.76 | 6145780.31 | 54 | 138 | 29 | 42.521 | 34 | 49 | 16.67  | 138.4951448 | 34.804485   | 34.804485   | PORT ADE05743  | A31  | CT 5854.05 | 95409 | 6528 | 2 | 35 | d | 3 |
| 279616528-838 | 6.53E+08 | WW | Obsks | 6   | 1/01/1984  | 6   | 13845 | 6   | DOM | OPR | 2   | 1.08 | 1/01/1984  | 1217 | 2160 | 7.5 | 0.6 | 270859.76 | 6145780.31 | 54 | 138 | 29 | 42.521 | 34 | 49 | 16.67  | 138.4951448 | 34.804485   | 34.804485   | PORT ADE05743  | A31  | CT 5854.05 | 95409 | 6528 | 2 | 35 | d | 3 |
| 279616528-842 | 6.53E+08 | WW | Obsks | 6   | 1/01/1984  | 6   | 13887 | 6   | DOM | OPR | 2   | 1.08 | 1/01/1984  | 1217 | 2160 | 7.5 | 0.6 | 270859.76 | 6145780.31 | 54 | 138 | 29 | 42.521 | 34 | 49 | 16.67  | 138.4951448 | 34.804485   | 34.804485   | PORT ADE05743  | A31  | CT 5854.05 | 95409 | 6528 | 2 | 35 | d | 3 |
| 279716528-845 | 6.53E+08 | WW | Obsks | 6   | 1/01/1984  | 6   | 14144 | 6   | DOM | OPR | 2   | 1.08 | 1/01/1984  | 1217 | 2160 | 7.5 | 0.6 | 270859.76 | 6145780.31 | 54 | 138 | 29 | 42.521 | 34 | 49 | 16.67  | 138.4951448 | 34.804485   | 34.804485   | PORT ADE05743  | A31  | CT 5854.05 | 95409 | 6528 | 2 | 35 | d | 3 |
| 279716528-846 | 6.53E+08 | WW | Obsks | 6   | 1/01/1984  | 6   | 14235 | 6   | DOM | OPR | 2   | 1.08 | 1/01/1984  | 1217 | 2160 | 7.5 | 0.6 | 270859.76 | 6145780.31 | 54 | 138 | 29 | 42.521 | 34 | 49 | 16.67  | 138.4951448 | 34.804485   | 34.804485   | PORT ADE05743  | A31  | CT 5854.05 | 95409 | 6528 | 2 | 35 | d | 3 |
| 279816528-859 | 6.53E+08 | WW | Obsks | 4   | 6/06/1984  | 4   | 14825 | 6   | DOM | OPR | 2   | 1.08 | 6/06/1984  | 1217 | 2160 | 7.5 | 0.6 | 27117.7   | 6144099.34 | 54 | 138 | 29 | 51.014 | 34 | 49 | 10.814 | 138.497538  | 34.8196706  | 34.8196706  | PORT ADE08531  | A1   | CT 6079.75 | 95409 | 6528 | 2 | 35 | e | 4 |
| 279916528-864 | 6.53E+08 | WW | Obsks | 6   | 7/01/1984  | 6   | 13164 | 5   | RRR | OPR | 4   | 0.94 | 7/01/1984  | 1317 | 2380 | 7.3 | 0.5 | 270336.78 | 6142989.33 | 54 | 138 | 29 | 19.109 | 34 | 49 | 46.181 | 138.488696  | 34.8294947  | 34.8294947  | PORT ADE0341   | A114 | CT 5174.15 | 95409 | 6528 | 2 | 35 | e | 4 |
| 279916528-866 | 6.53E+08 | WW | Obsks | 6   | 1/07/1984  | 6   | 12251 | 6   | DOM | OPR | 2   | 1.08 | 1/07/1984  | 1217 | 2160 | 7.5 | 0.6 | 271042.71 | 6145993.63 | 54 | 138 | 29 | 57.765 | 34 | 48 | 12.181 | 138.499382  | 34.8038376  | 34.8038376  | PORT ADE404    | A27  | CT 5540.95 | 95409 | 6528 | 2 | 35 | e | 3 |
| 279916528-867 | 6.53E+08 | WW | Obsks | 4.2 | 15/08/1983 | 4.2 | 12152 | 3.9 | RRR | OPR | 2   | 1.08 | 15/08/1983 | 1217 | 2160 | 7.5 | 0.6 | 271042.71 | 6145993.63 | 54 | 138 | 29 | 46.958 | 34 | 49 | 10.076 | 138.4962748 | 34.8193656  | 34.8193656  | PORT ADE078629 | A701 | CT 6028.65 | 95409 | 6528 | 2 | 35 | e | 3 |
| 279916528-871 | 6.53E+08 | WW | Obsks | 6   | 1/07/1984  | 6   | 14901 | 6   | DOM | OPR | 2   | 1.08 | 1/07/1984  | 1217 | 2160 | 7.5 | 0.6 | 270844.74 | 6142548.27 | 54 | 138 | 29 | 59.911 | 34 | 49 | 0.901  | 138.4941421 | 34.8335837  | 34.8335837  | PORT ADE4425   | A4   | CT 5665.85 | 95409 | 6528 | 2 | 35 | e | 4 |
| 280016528-872 | 6.53E+08 | WW | Obsks | 12  | 1/07/1984  | 12  | 14001 | 6   | DOM | OPR | 10  | 1.58 | 1/07/1984  | 1995 | 3442 | 7.5 | 0.6 | 270532.77 | 6145475.34 | 54 | 138 | 29 | 48.474 | 34 | 49 | 55.032 | 138.4912428 | 34.8152866  | 34.8152866  | PORT ADE02331  | A115 | CT 6190.95 | 95409 | 6528 | 2 | 35 | e | 2 |
| 280016528-876 | 6.53E+08 | WW | Obsks | 6   | 1/09/1984  | 6   | 15157 | 6   | DOM | OPR | 2   | 1.08 | 1/09/1984  | 1217 | 2160 | 7.5 | 0.6 | 270859.76 | 6145780.31 | 54 | 138 | 29 | 42.521 | 34 | 49 | 48.739 | 138.4953837 | 34.8152866  | 34.8152866  | PORT ADE02331  | A424 | CT 5305.65 | 95409 | 6528 | 2 | 35 | e | 2 |
| 280016528-878 | 6.53E+08 | WW | Obsks | 6   | 1/06/1984  | 6   | 14829 | 6   | DOM | OPR | 2   | 1.08 | 1/06/1984  | 1217 | 2160 | 7.5 | 0.6 | 270859.76 | 6145780.31 | 54 | 138 | 29 | 42.521 | 34 | 49 | 27.824 | 138.4970889 | 34.8234956  | 34.8234956  | PORT ADE03186  | A77  | CT 5731.85 | 95409 | 6528 | 2 | 35 | e | 3 |
| 280016528-880 | 6.53E+08 | WW | Obsks | 6   | 1/08/1984  | 6   | 12685 | 6   | DOM | OPR | 2   | 1.08 | 1/08/1984  | 1217 | 2160 | 7.5 | 0.6 | 271279.71 | 6144008.25 | 54 | 138 | 29 | 57.296 | 34 | 49 | 13.899 | 138.4992488 | 34.8205276  | 34.8205276  | PORT ADE110234 | A15  | CT 5179.75 | 95409 | 6528 | 2 | 35 | e | 4 |
| 280016528-881 | 6.53E+08 | WW | Obsks | 5   | 1/07/1984  | 5   | 15044 | 6   | DOM | OPR | 2   | 1.08 | 1/07/1984  | 1217 | 2160 | 7.5 | 0.6 | 270844.74 | 6142592.24 | 54 | 138 | 29 | 59.911 | 34 | 49 | 59.472 | 138.4941101 | 34.8311867  | 34.8311867  | PORT ADE4425   | A20  | CT 5565.45 | 95409 | 6528 | 2 | 35 | e | 4 |
| 280116528-892 | 6.53E+08 | WW | Obsks | 24  | 24/10/1984 | 24  | 15279 | 3   | RRR | OPR | 7   | 1.61 | 24/10/1984 | 1527 | 2800 | 7.5 | 0.6 | 270859.76 | 6145780.31 | 54 | 138 | 29 | 42.521 | 34 | 49 | 28.514 | 138.4964837 | 34.8210206  | 34.8210206  | PORT ADE02986  | A318 | CT 5261.65 | 95409 | 6528 | 2 | 35 | m | 4 |
| 280116528-900 | 6.53E+08 | WW | Obsks | 5.4 | 19/10/1984 | 5.4 | 15207 | 4.2 | RRR | OPR | 3.9 | 4.33 | 19/10/1984 | 1272 | 2300 | 7.5 | 0.7 | 270212.7  | 6144485.26 | 54 | 138 | 29 | 35.465 | 34 | 49 | 57.969 | 1           |             |             |                |      |            |       |      |   |    |   |   |

Groundwater Data Report 2kM

|                 |          |     |        |      |            |      |       |      |       |            |            |            |      |      |           |           |           |           |        |             |            |          |        |             |             |             |            |          |       |         |         |         |       |      |    |    |   |   |
|-----------------|----------|-----|--------|------|------------|------|-------|------|-------|------------|------------|------------|------|------|-----------|-----------|-----------|-----------|--------|-------------|------------|----------|--------|-------------|-------------|-------------|------------|----------|-------|---------|---------|---------|-------|------|----|----|---|---|
| 28212-6528-1084 | 6.53E+08 | WW  | Chicks | 7    | 1/03/1983  | 7    | 18184 | 0    | 6.139 | 0.44       | 270899.71  | 614650.33  | 54   | 138  | 29        | 42.982    | 34        | 48        | 52.767 | 138.4952728 | 34.8146507 | PORT ADE | 05493  | A6          | CT          | 5649.55     | 95409      | 6528     | 2     | 35      | e       | 3       |       |      |    |    |   |   |
| 28217-6528-1088 | 6.53E+08 | WW  | Chicks | 6    | 1/03/1986  | 6    | 18143 | 6    | 3.2   | 16/04/1986 | 451        | 820        | 8.7  | 0.5  | 270899.74 | 614646.33 | 54        | 138       | 29     | 42.982      | 34         | 48       | 52.767 | 138.4952728 | 34.8146507  | PORT ADE    | 05493      | A6       | CT    | 5649.55 | 95409   | 6528    | 2     | 35   | e  | 3  |   |   |
| 28218-6528-1090 | 6.53E+08 | WW  | Chicks | 6    | 4/04/1986  | 6    | 18268 | 6    | 3     | 1.76       | 16/04/1986 | 972        | 1760 | 7.3  | 0.5       | 271028.7  | 614676.33 | 54        | 138    | 29          | 47.093     | 34       | 49     | 24.494      | 138.4944159 | 34.8234706  | PORT ADE   | 03186    | A53   | CT      | 5172.95 | 95409   | 6528  | 2    | 35 | e  | 4 |   |
| 28220-6528-1092 | 6.53E+08 | WW  | Chicks | 6    | 1/03/1986  | 6    | 18226 | 6    | 3     | 2.07       | 16/04/1986 | 946        | 1716 | 7.3  | 0.5       | 270827.9  | 614607.33 | 54        | 138    | 29          | 49.037     | 34       | 49     | 11.813      | 138.4944159 | 34.8234706  | PORT ADE   | 04784    | A21   | CT      | 5359.95 | 95409   | 6528  | 2    | 35 | e  | 4 |   |
| 28222-6528-1094 | 6.53E+08 | WW  | Chicks | 6    | 1/03/1986  | 6    | 18226 | 6    | 3     | 1.85       | 16/04/1986 | 916        | 1660 | 7.1  | 0.5       | 270827.9  | 614607.33 | 54        | 138    | 29          | 49.037     | 34       | 49     | 24.494      | 138.4944159 | 34.8234706  | PORT ADE   | 04784    | A21   | CT      | 5359.95 | 95409   | 6528  | 2    | 35 | e  | 4 |   |
| 28230-6528-1102 | 6.53E+08 | WW  | Chicks | 6    | 1/10/1986  | 6    | 18192 | 6    | 4     | 1.18       | 8/10/1986  | 1049       | 1900 | 7.1  | 0.5       | 270944.72 | 614636.33 | 54        | 138    | 29          | 44.444     | 34       | 49     | 2.988       | 138.4956728 | 34.8174966  | PORT ADE   | 02290    | A272  | CT      | 5691.65 | 95409   | 6528  | 2    | 35 | e  | 3 |   |
| 28231-6528-1103 | 6.53E+08 | WW  | Gpah   | 6    | 1/09/1986  | 6    | 18425 | 6    | 4     | 0.1        | 8/10/1986  | 1631       | 2940 | 7.3  | 0.5       | 271240.8  | 614253.33 | 54        | 138    | 29          | 54.319     | 34       | 50     | 1.639       | 138.498422  | 34.8337887  | PORT ADE   | 20039    | A48   | CT      | 5125.95 | 95409   | 6528  | 2    | 35 | m  | 4 |   |
| 2824-6528-1115  | 6.53E+08 | WW  | Chicks | 6    | 5/10/1986  | 6    | 18004 | 5    | 0     | 8.91       | 10/11/1986 | 1261       | 2280 | 7.3  | 0.5       | 270669.76 | 614456.33 | 54        | 138    | 29          | 33.748     | 34       | 48     | 58.875      | 138.4927078 | 34.8163536  | PORT ADE   | 02331    | A313  | CT      | 5693.85 | 95409   | 6528  | 2    | 35 | e  | 3 |   |
| 28242-6528-1117 | 6.53E+08 | WW  | Chicks | 6    | 5/10/1986  | 6    | 18004 | 5    | 0     | 1.31       | 5/01/1987  | 1072       | 2040 | 7.3  | 0.5       | 270669.76 | 614456.33 | 54        | 138    | 29          | 33.748     | 34       | 48     | 58.875      | 138.4927078 | 34.8163536  | PORT ADE   | 02331    | A313  | CT      | 5693.85 | 95409   | 6528  | 2    | 35 | e  | 3 |   |
| 28243-6528-1118 | 6.53E+08 | WW  | Chicks | 4.8  | 10/02/1987 | 4.8  | 19352 | 4.48 | 3.3   | 2.96       | 18/02/1987 | 801        | 1464 | 7.5  | 0.6       | 270960.69 | 614210.33 | 54        | 138    | 29          | 40.303     | 34       | 49     | 7.045       | 138.4952508 | 34.8186236  | PORT ADE   | 07922    | A1    | CT      | 5243.75 | 95409   | 6528  | 2    | 35 | e  | 3 |   |
| 28248-6528-1130 | 6.53E+08 | WW  | Chicks | 4.2  | 11/02/1988 | 4.2  | 20743 | 4.2  | 0     | 4.87       | 10/5/1988  | 547        | 995  | 7.8  | 0.6       | 271115.74 | 614877.25 | 54        | 138    | 29          | 50.719     | 34       | 49     | 48.174      | 138.4974218 | 34.8216706  | PORT ADE   | 04236    | A59   | CT      | 5787.95 | 95409   | 6528  | 2    | 35 | e  | 4 |   |
| 28249-6528-1131 | 6.53E+08 | WW  | Chicks | 4.8  | 8/01/1988  | 4.8  | 21085 | 2.1  | DOM   | 2.1        | 242        | 5/05/1988  | 1586 | 2880 | 7.6       | 0.8       | 27084     | 614877.25 | 54     | 138         | 29         | 43.069   | 34     | 49          | 45.799      | 138.4952728 | 34.8146507 | PORT ADE | 04325 | A155    | CT      | 5292.95 | 95409 | 6528 | 2  | 35 | e | 4 |
| 2840-6528-1301  | 6.53E+08 | WW  | Chicks | 9.2  | 7/03/1987  | 9.2  | 23121 | 6    | INV   | 2          | 8/01/1987  | 942        | 1705 | 7.7  | 2         | 270669.76 | 614456.33 | 54        | 138    | 29          | 33.748     | 34       | 48     | 51.021      | 138.4927078 | 34.814726   | PORT ADE   | 02331    | A188  | CT      | 5371.75 | 95409   | 6528  | 2    | 35 | e  | 3 |   |
| 28405-6528-1308 | 6.53E+08 | ENG | Chicks | 10.5 | 13/03/1984 | 10.5 |       |      |       |            |            |            |      |      | 270439.73 | 613545.25 | 54        | 138       | 29     | 25.836      | 34         | 48       | 28.255 | 138.489946  | 34.8245097  | PORT ADE    | 18805      | A51      | CT    | 5113.95 | 95409   | 6528    | 2     | 35   | e  | 3  |   |   |
| 2847-6528-1329  | 6.53E+08 | WW  | Chicks | 10.5 | 14/03/1984 | 10.5 |       |      |       |            |            |            |      |      | 270942.77 | 614529.33 | 54        | 138       | 29     | 43.832      | 34         | 48       | 14.564 | 138.4906046 | 34.8040455  | PORT ADE    | 05987      | A100     | CT    | 5875.75 | 95409   | 6528    | 2     | 35   | e  | 3  |   |   |
| 2849-6528-1331  | 6.53E+08 | WW  | Chicks | 7    | 1/07/1988  | 7    | 21895 | 3    | DOM   | 4          | 0.89       | 1/07/1988  |      |      | 270835.7  | 614374.54 | 54        | 138       | 29     | 39.584      | 34         | 49       | 21.776 | 138.4941289 | 34.8227156  | PORT ADE    | 04913      | A22      | CT    | 5420.15 | 95409   | 6528    | 2     | 35   | e  | 4  |   |   |
| 28495-6528-1363 | 6.53E+08 | WW  | Chicks | 7.5  | 14/05/1987 | 7.5  | 23880 | 3    | DOM   | 2.4        | 1.98       | 6/11/1987  | 2551 | 4572 | 7.4       | 0.8       | 270964.72 | 614583.28 | 54     | 138         | 29         | 43.376   | 34     | 49          | 6.705       | 138.495381  | 34.8239197 | PORT ADE | 05118 | A227    | CT      | 5430.95 | 95409 | 6528 | 2  | 35 | m | 4 |
| 28498-6528-1362 | 6.53E+08 | WW  | Chicks | 7.5  | 17/11/1989 | 7.5  | 23500 | 3    | DOM   | 3.5        | 1.47       | 17/11/1989 |      |      | 270656.72 | 614583.28 | 54        | 138       | 29     | 32.377      | 34         | 49       | 27.176 | 138.4932369 | 34.8242157  | PORT ADE    | 045014     | A2       | CT    | 5343.75 | 95409   | 6528    | 2     | 35   | e  | 4  |   |   |
| 28499-6528-1366 | 6.53E+08 | WW  | Chicks | 12   | 3/11/1989  | 12   | 23224 | 12   | DOM   | 9          | 2.01       | 25/01/1990 | 745  | 1351 | 0.18      | 270563.76 | 614550.25 | 54        | 138    | 29          | 60.308     | 34       | 48     | 24.864      | 138.4918357 | 34.8090566  | PORT ADE   | 051084   | A401  | CT      | 6017.25 | 95409   | 6528  | 2    | 35 | e  | 4 |   |
| 28499-6528-1367 | 6.53E+08 | WW  | Chicks | 6    | 9/01/1990  | 6    | 24994 | 5.8  | RR    | 2          | 2.76       | 23/01/1990 | 1010 | 1829 | 8.2       |           | 271147.77 | 614399.5  | 54     | 138         | 29         | 59.96    | 34     | 48          | 14.374      | 138.4999888 | 34.8206596 | PORT ADE | 04913 | A22     | CT      | 5390.45 | 95409 | 6528 | 2  | 35 | e | 4 |
| 28499-6528-1370 | 6.53E+08 | WW  | Chicks | 9.2  | 7/03/1987  | 9.2  | 23121 | 6    | INV   | 2          | 8/01/1987  | 942        | 1705 | 7.7  | 2         | 270669.76 | 614456.33 | 54        | 138    | 29          | 33.748     | 34       | 48     | 51.021      | 138.4927078 | 34.814726   | PORT ADE   | 02331    | A188  | CT      | 5371.75 | 95409   | 6528  | 2    | 35 | e  | 3 |   |
| 28499-6528-1375 | 6.53E+08 | WW  | Gpah   | 5.5  | 27/04/1990 | 5.5  | 24066 | 3.1  | DOM   | 2.6        | 1.51       | 27/04/1990 |      |      | 271263.76 | 614236.28 | 54        | 138       | 29     | 55.057      | 34         | 50       | 7.14   | 138.498627  | 34.8353167  | PORT ADE    | 03889      | A65      | CT    | 5833.25 | 95409   | 6528    | 2     | 35   | m  | 4  |   |   |
| 28501-6528-1382 | 6.53E+08 | WW  | Chicks | 7.62 | 12/10/1990 | 7.62 | 24431 | 7.62 | DOM   | 3.05       | 1.43       | 12/10/1990 | 332  | 604  | 7.6       |           | 271104.7  | 614451.32 | 54     | 138         | 29         | 48.848   | 34     | 48          | 59.388      | 138.4974578 | 34.8146596 | PORT ADE | 03096 | A54     | CT      | 5836.65 | 95409 | 6528 | 2  | 35 | e | 3 |
| 28501-6528-1383 | 6.53E+08 | WW  | Chicks | 6    | 24/11/1990 | 6    | 24994 | 5.8  | RR    | 2          | 2.79       | 21/11/1990 |      |      | 271147.77 | 614399.5  | 54        | 138       | 29     | 59.96       | 34         | 48       | 14.374 | 138.4999888 | 34.8206596  | PORT ADE    | 04913      | A22      | CT    | 5390.45 | 95409   | 6528    | 2     | 35   | e  | 4  |   |   |
| 28502-6528-1386 | 6.53E+08 | WW  | Chicks | 6    | 5/11/1990  | 6    | 24994 | 5.8  | RR    | 2          | 2.79       | 21/11/1990 |      |      | 271147.77 | 614399.5  | 54        | 138       | 29     | 59.96       | 34         | 48       | 14.374 | 138.4999888 | 34.8206596  | PORT ADE    | 04913      | A22      | CT    | 5390.45 | 95409   | 6528    | 2     | 35   | e  | 4  |   |   |
| 2851-6528-1386  | 6.53E+08 | WW  | Chicks | 11   | 10/12/1990 | 11   | 24923 | 11   | DOM   | 7          | 2.38       | 11/12/1990 | 906  | 1642 | 7.8       |           | 270657.78 | 614630.33 | 54     | 138         | 29         | 51.025   | 34     | 48          | 53.228      | 138.4927338 | 34.8147856 | PORT ADE | 02331 | A178    | CT      | 5391.45 | 95409 | 6528 | 2  | 35 | e | 3 |
| 28514-6528-1388 | 6.53E+08 | WW  | Chicks | 5.56 | 28/12/1990 | 5.56 | 24880 | 2.5  | DOM   | 2.34       | 2.45       | 28/12/1990 |      |      | 271370.75 | 614380.25 | 54        | 138       | 29     | 52.81       | 34         | 49       | 20.426 | 138.4980028 | 34.8223406  | PORT ADE    | 039699     | A2       | CT    | 5113.95 | 95409   | 6528    | 2     | 35   | e  | 4  |   |   |
| 2852-6528-1398  | 6.53E+08 | WW  | Chicks | 9    | 10/03/1991 | 9    | 25384 | 3    | DOM   | 6          | 1.7        | 15/05/1991 | 1144 | 2071 | 7.4       |           | 270720.76 | 614287.33 | 54     | 138         | 29         | 35.88    | 34     | 49          | 4.295       | 138.4932188 | 34.8178676 | PORT ADE | 04731 | A177    | CT      | 5378.75 | 95409 | 6528 | 2  | 35 | e | 4 |
| 2853-6528-1400  | 6.53E+08 | WW  | Chicks | 6.4  | 28/08/1991 | 6.4  | 25686 | 3    | DOM   | 2.1        | 2.68       | 1/08/1991  | 1100 | 1929 | 7.1       | 1.06      | 270827.9  | 614607.33 | 54     | 138         | 29         | 42.864   | 34     | 49          | 72.25       | 138.4952389 | 34.8206596 | PORT ADE | 03186 | A14     | CT      | 5677.95 | 95409 | 6528 | 2  | 35 | e | 4 |
| 2853-6528-1402  | 6.53E+08 | WW  | Chicks | 6.7  | 29/08/1991 | 6.7  | 25964 | 3    | DOM   | 2.4        | 1.41       | 3/09/1991  | 1373 | 2481 | 7.4       | 0.45      | 271263.7  | 614831.25 | 54     | 138         | 29         | 47.935   | 34     | 48          | 47.13       | 138.4992987 | 34.8130915 | PORT ADE | 02532 | A601    | CT      | 5928.35 | 95409 | 6528 | 2  | 35 | e | 3 |
| 28531-6528-1403 | 6.53E+08 | WW  | Chicks | 7.9  | 28/08/1991 | 7.9  | 25615 | 3    | DOM   | 3.6        | 2.64       | 3/09/1991  | 1357 | 2451 | 7.3       | 0.97      | 270896.76 | 614739.25 | 54     | 138         | 29         | 45.93    | 34     | 48          | 48.88       | 138.4952467 | 34.813556  | PORT ADE | 06333 | A387    | CT      | 5625.95 | 95409 | 6528 | 2  | 35 | e | 3 |
| 28532-6528-1404 | 6.53E+08 | WW  | Chicks | 7.9  | 28/08/1991 | 7.9  | 25615 | 3    | DOM   | 3.6        | 2.64       | 3/09/1991  | 1357 | 2451 | 7.3       | 0.97      | 270896.76 | 614739.25 | 54     | 138         | 29         | 45.93    | 34     | 48          | 48.88       | 138.4952467 | 34.813556  | PORT ADE | 06333 | A387    | CT      | 5625.95 | 95409 | 6528 | 2  | 35 | e | 3 |
| 28532-6528-1423 | 6.53E+08 | WW  | Chicks | 7.9  | 28/08/1991 | 7.9  | 25615 | 3    | DOM   | 3.6        | 2.64       | 3/09/1991  | 1357 | 2451 | 7.3       | 0.97      | 270896.76 | 614739.25 | 54     | 138         | 29         | 45.93    | 34     | 48          | 48.88       | 138.4952467 | 34.813556  | PORT ADE | 06333 | A387    | CT      | 5625.95 | 95409 | 6528 | 2  | 35 | e | 3 |
| 28532-6528-1424 | 6.53E+08 | WW  | Chicks | 7.9  | 28/08/1991 | 7.9  | 25615 | 3    | DOM   | 3.6        | 2.64       | 3/09/1991  | 1357 | 2451 | 7.3       | 0.97      | 270896.76 | 614739.25 | 54     | 138         | 29         | 45.93    | 34     | 48          | 48.88       | 138.4952467 | 34.813556  | PORT ADE | 06333 | A387    | CT      | 5625.95 | 95409 | 6528 | 2  | 35 | e | 3 |
| 28532-6528-1425 | 6.53E+08 | WW  | Chicks | 7.9  | 28/08/1991 | 7.9  | 25615 | 3    | DOM   | 3.6        | 2.64       | 3/09/1991  | 1357 | 2451 | 7.3       | 0.97      | 270896.76 | 614739.25 | 54     | 138         | 29         | 45.93    | 34     | 48          | 48.88       |             |            |          |       |         |         |         |       |      |    |    |   |   |



## Groundwater Data Report 2km

[illegible]



Groundwater Data Report 2km

|                  |          |    |      |      |            |      |       |         |     |     |      |            |        |           |             |    |     |    |         |    |      |        |             |            |            |                |      |            |       |      |   |    |   |   |
|------------------|----------|----|------|------|------------|------|-------|---------|-----|-----|------|------------|--------|-----------|-------------|----|-----|----|---------|----|------|--------|-------------|------------|------------|----------------|------|------------|-------|------|---|----|---|---|
| 169303-6628-1988 | 6.63E+08 | WW | Qgph | 4    | 22/02/1998 | 4    | 56303 | INV     | BKF | 1.5 | 2.53 | 22/02/1998 | 0.2    | 272061.86 | 6145438.31  | 54 | 138 | 30 | 29.2955 | 34 | 48   | 28.15  | 138.508185  | 34.8078194 | 34.8078194 | PORT ADE075980 | A52  | C 6017.85  | 95409 | 6628 | 3 | 31 | a | 6 |
| 169304-6628-1988 | 6.63E+08 | WW | Qgph | 4    | 22/02/1998 | 4    | 44221 | 4 INV   |     | 1.5 | 2.54 | 22/02/1998 | 0.2    | 271981.86 | 6145393.25  | 54 | 138 | 30 | 26.264  | 34 | 48   | 29.547 | 138.507295  | 34.8080274 | 34.8080274 | PORT ADE071226 | A56  | C 5832.15  | 95409 | 6628 | 3 | 31 | a | 5 |
| 169305-6628-1988 | 6.63E+08 | WW | Qgph | 4    | 22/02/1998 | 4    | 44222 | 4 INV   |     | 1.5 | 2.5  | 22/02/1998 | 0.2    | 272081.92 | 61454008.28 | 54 | 138 | 30 | 30.213  | 34 | 48   | 30.14  | 138.5083925 | 34.8080944 | 34.8080944 | PORT ADE075980 | A52  | C 6017.95  | 95409 | 6628 | 3 | 31 | a | 5 |
| 169306-6628-1988 | 6.63E+08 | WW | Qgph | 4    | 22/02/1998 | 4    | 44223 | 4 INV   |     | 1.5 | 2.51 | 22/02/1998 | 0.2    | 272048.87 | 6145378.23  | 54 | 138 | 30 | 28.805  | 34 | 48   | 30.083 | 138.5080315 | 34.8080564 | 34.8080564 | PORT ADE071673 | A14  | C 5994.95  | 95409 | 6628 | 3 | 31 | a | 5 |
| 169307-6628-1988 | 6.63E+08 | WW | Qgph | 4    | 22/02/1998 | 4    | 44224 | 4 INV   |     | 1.5 | 2.52 | 22/02/1998 | 0.2    | 272021.51 | 6145381.28  | 54 | 138 | 30 | 27.844  | 34 | 48   | 29.212 | 138.5077145 | 34.8080714 | 34.8080714 | PORT ADE071226 | A56  | C 5832.15  | 95409 | 6628 | 3 | 31 | a | 5 |
| 169308-6628-1988 | 6.63E+08 | WW | Qgph | 5    | 22/02/1998 | 5    | 56303 | INV     | BKF | 2   | 2.08 | 22/02/1998 | 0.2    | 271956.88 | 6145454.26  | 54 | 138 | 30 | 25.738  | 34 | 48   | 27.426 | 138.5071495 | 34.8078614 | 34.8078614 | PORT ADE071226 | A56  | C 5832.15  | 95409 | 6628 | 3 | 31 | a | 6 |
| 173601-6628-1926 | 6.63E+08 | WW | Qgph | 5    | 27/11/1998 | 5    | 46991 | 4.5 DOM |     | 2   | 2.02 | 27/11/1998 | 0.5737 | 27161.89  | 6145278.33  | 54 | 138 | 30 | 17.502  | 34 | 48   | 33.036 | 138.5048616 | 34.8091935 | 34.8091935 | PORT ADE059093 | A6   | C 5870.125 | 95409 | 6628 | 3 | 31 | a | 6 |
| 17411-6528-2018  | 6.53E+08 | WW | Qgph | 6    | 19/01/1997 | 6    | 39761 | DOM     |     | 2.3 | 2.58 | 19/01/1997 | 1021   | 1850      | 6145241.24  | 54 | 138 | 29 | 53.779  | 34 | 48   | 19.587 | 138.4862718 | 34.8210936 | 34.8210936 | PORT ADE0426   | A103 | C 5694.75  | 95409 | 6528 | 2 | 35 | e | 4 |
| 17412-6528-2110  | 6.53E+08 | WW | Qgph | 6    | 20/02/1997 | 6    | 39761 | DOM     |     | 1.5 | 1.50 | 20/02/1997 | 1802   | 1310      | 6145241.24  | 54 | 138 | 29 | 53.779  | 34 | 48   | 19.587 | 138.4862718 | 34.8210936 | 34.8210936 | PORT ADE0426   | A103 | C 5694.75  | 95409 | 6528 | 2 | 35 | e | 4 |
| 17413-6528-2111  | 6.53E+08 | WW | Qgph | 6    | 20/02/1997 | 6    | 39761 | DOM     |     | 1.5 | 1.42 | 20/02/1997 | 1860   | 1310      | 6145241.24  | 54 | 138 | 29 | 53.779  | 34 | 48   | 19.587 | 138.4862718 | 34.8210936 | 34.8210936 | PORT ADE0426   | A103 | C 5694.75  | 95409 | 6528 | 2 | 35 | e | 4 |
| 17414-6528-2111  | 6.53E+08 | WW | Qgph | 10.1 | 20/03/1997 | 10.1 | 40508 | DOM     |     | 6.1 | 1.48 | 20/03/1997 | 1032   | 1870      | 6145409.35  | 54 | 138 | 30 | 25.397  | 34 | 48   | 10.501 | 138.4806657 | 34.8195837 | 34.8195837 | PORT ADE02108  | A39  | C 5357.75  | 95409 | 6528 | 2 | 35 | e | 5 |
| 17417-6528-2112  | 6.53E+08 | WW | Qgph | 7.5  | 11/04/1997 | 7.5  | 40911 | DOM     |     | 3.5 | 1.39 | 11/04/1997 | 1328   | 2400      | 6146048.28  | 54 | 138 | 29 | 42.474  | 34 | 48   | 5.685  | 138.4951136 | 34.8202625 | 34.8202625 | PORT ADE02252  | A268 | C 5635.95  | 95409 | 6528 | 2 | 35 | d | 3 |
| 17418-6528-2113  | 6.53E+08 | WW | Qgph | 5    | 15/04/1997 | 5    | 40928 | DOM     |     | 2   | 1.45 | 15/04/1997 | 1535   | 2770      | 6146048.28  | 54 | 138 | 29 | 46.007  | 34 | 48   | 7.139  | 138.494131  | 34.8103097 | 34.8103097 | PORT ADE010960 | A10  | C 5618.45  | 95409 | 6528 | 2 | 35 | d | 3 |
| 17419-6528-2114  | 6.53E+08 | WW | Qgph | 6    | 19/08/1997 | 6    | 4291  | DOM     |     | 2   | 1.08 | 19/08/1997 | 1485   | 2400      | 6146048.28  | 54 | 138 | 29 | 44.418  | 34 | 48   | 5.685  | 138.4951136 | 34.8202625 | 34.8202625 | PORT ADE02252  | A268 | C 5635.95  | 95409 | 6528 | 2 | 35 | d | 3 |
| 17412-6528-2116  | 6.53E+08 | WW | Qgph | 8.1  | 24/09/1997 | 8.1  | 42549 | DOM     |     | 3.7 | 1.88 | 24/09/1997 | 683    | 1240      | 6145663.24  | 54 | 138 | 29 | 51.729  | 34 | 48   | 20.075 | 138.4970726 | 34.8055765 | 34.8055765 | PORT ADE043387 | A16  | C 5310.35  | 95409 | 6528 | 2 | 35 | d | 3 |
| 17412-6528-2118  | 6.53E+08 | WW | Qgph | 5.6  | 29/10/1997 | 5.6  | 42897 | DOM     |     | 1.6 | 2.58 | 29/10/1997 | 805    | 1460      | 6145663.24  | 54 | 138 | 29 | 58.006  | 34 | 48   | 58.784 | 138.494946  | 34.8238816 | 34.8238816 | PORT ADE025989 | A16  | C 5275.25  | 95409 | 6528 | 2 | 35 | d | 3 |
| 17410-6528-2187  | 6.63E+08 | WW | Qgph | 6.8  | 28/11/1997 | 6.8  | 43187 | DOM     |     | 2.8 | 0.86 | 28/11/1997 | 1850   | 1310      | 6144888.3   | 54 | 138 | 30 | 0.978   | 34 | 48   | 46.064 | 138.5002717 | 34.8127955 | 34.8127955 | PORT ADE04953  | A55  | C 5794.75  | 95409 | 6628 | 3 | 31 | h | 1 |
| 17416-6528-2191  | 6.53E+08 | WW | Qgph | 7.3  | 18/12/1997 | 7.3  | 43187 | DOM     |     | 3.1 | 1.42 | 18/12/1997 | 1860   | 1310      | 6145241.24  | 54 | 138 | 29 | 53.779  | 34 | 48   | 19.587 | 138.4862718 | 34.8210936 | 34.8210936 | PORT ADE0426   | A103 | C 5694.75  | 95409 | 6528 | 2 | 35 | e | 4 |
| 17413-6528-2194  | 6.53E+08 | WW | Qgph | 8.4  | 27/01/1998 | 8.4  | 43471 | DOM     |     | 4.3 | 0.7  | 27/01/1998 | 821    | 1490      | 6145454.26  | 54 | 138 | 29 | 16.522  | 34 | 48   | 40.913 | 138.488034  | 34.8253257 | 34.8253257 | PORT ADE01195  | A239 | C 5410.65  | 95409 | 6528 | 2 | 35 | m | 2 |
| 174138-6528-2126 | 6.53E+08 | WW | Qgph | 8.7  | 14/03/1998 | 8.7  | 43653 | DOM     |     | 4.6 | 0.63 | 14/03/1998 | 1454   | 1550      | 6145454.26  | 54 | 138 | 29 | 37.942  | 34 | 48   | 12.528 | 138.4938729 | 34.8201466 | 34.8201466 | PORT ADE0468   | A114 | C 5612.85  | 95409 | 6528 | 2 | 35 | e | 4 |
| 174138-6528-2127 | 6.53E+08 | WW | Qgph | 6.5  | 3/02/1998  | 6.5  | 43789 | DOM     |     | 2.5 | 2.02 | 3/02/1998  | 1446   | 2610      | 6145454.26  | 54 | 138 | 29 | 81.828  | 34 | 48   | 34.488 | 138.4977299 | 34.8261556 | 34.8261556 | PORT ADE02078  | A24  | C 5409.25  | 95409 | 6528 | 2 | 35 | e | 4 |
| 17414-6528-2128  | 6.53E+08 | WW | Qgph | 8.1  | 3/04/1998  | 8.1  | 43781 | DOM     |     | 4   | 4.37 | 3/04/1998  | 385    | 700       | 6145454.26  | 54 | 138 | 29 | 32.881  | 34 | 48   | 4.309  | 138.4924668 | 34.8178636 | 34.8178636 | PORT ADE01092  | A36  | C 5698.85  | 95409 | 6528 | 2 | 35 | e | 3 |
| 17414-6528-2130  | 6.53E+08 | WW | Qgph | 8.1  | 17/04/1998 | 8.1  | 44843 | DOM     |     | 4   | 3.1  | 17/04/1998 | 1138   | 2060      | 6145454.26  | 54 | 138 | 29 | 40.322  | 34 | 48   | 5.436  | 138.4845338 | 34.8181766 | 34.8181766 | PORT ADE02290  | A236 | C 5718.15  | 95409 | 6528 | 2 | 35 | e | 3 |
| 17414-6528-2131  | 6.53E+08 | WW | Qgph | 6.8  | 14/04/1998 | 6.8  | 44844 | DOM     |     | 2.8 | 1.95 | 14/04/1998 | 1210   | 2190      | 6145454.26  | 54 | 138 | 29 | 50.175  | 34 | 48   | 4.242  | 138.4927209 | 34.8234616 | 34.8234616 | PORT ADE03186  | A57  | C 5419.75  | 95409 | 6528 | 2 | 35 | e | 3 |
| 17414-6528-2132  | 6.53E+08 | WW | Qgph | 6.8  | 14/04/1998 | 6.8  | 44844 | DOM     |     | 2.8 | 1.94 | 14/04/1998 | 1210   | 2190      | 6145454.26  | 54 | 138 | 29 | 50.175  | 34 | 48   | 4.242  | 138.4927209 | 34.8234616 | 34.8234616 | PORT ADE03186  | A57  | C 5419.75  | 95409 | 6528 | 2 | 35 | e | 3 |
| 17414-6528-2133  | 6.53E+08 | WW | Qgph | 6.8  | 11/11/1998 | 6.8  | 46999 | DOM     |     | 2.8 | 1.93 | 11/11/1998 | 1295   | 2340      | 6145454.26  | 54 | 138 | 29 | 42.386  | 34 | 48   | 27.727 | 138.4953849 | 34.8243686 | 34.8243686 | PORT ADE03186  | A10  | C 5565.85  | 95409 | 6528 | 2 | 35 | e | 3 |
| 17414-6528-2134  | 6.53E+08 | WW | Qgph | 8.1  | 21/11/1998 | 8.1  | 47211 | DOM     |     | 3.7 | 2.08 | 21/11/1998 | 722    | 1310      | 6145663.24  | 54 | 138 | 29 | 53.362  | 34 | 48   | 22.03  | 138.4978506 | 34.8061195 | 34.8061195 | PORT ADE019152 | A701 | C 5312.65  | 95409 | 6528 | 2 | 35 | d | 3 |
| 17414-6528-2136  | 6.53E+08 | WW | Qgph | 5.9  | 23/12/1998 | 5.9  | 47241 | DOM     |     | 2.2 | 2.32 | 23/12/1998 | 755    | 1370      | 6145663.24  | 54 | 138 | 29 | 52.083  | 34 | 48   | 32.936 | 138.4978909 | 34.8258156 | 34.8258156 | PORT ADE012000 | A1   | C 5285.85  | 95409 | 6528 | 2 | 35 | m | 3 |
| 17414-6528-2137  | 6.53E+08 | WW | Qgph | 6.2  | 10/12/1998 | 6.2  | 47244 | DOM     |     | 2.2 | 2.02 | 10/12/1998 | 1440   | 2600      | 6145663.24  | 54 | 138 | 29 | 49.714  | 34 | 48   | 39.213 | 138.4974249 | 34.8282926 | 34.8282926 | PORT ADE02078  | A40  | C 5128.85  | 95409 | 6528 | 2 | 35 | m | 3 |
| 17415-6528-2138  | 6.53E+08 | WW | Qgph | 6.8  | 20/12/1998 | 6.8  | 47245 | DOM     |     | 2.8 | 2.02 | 20/12/1998 | 1373   | 2480      | 6145663.24  | 54 | 138 | 29 | 36.47   | 34 | 48   | 39.213 | 138.4974249 | 34.8282926 | 34.8282926 | PORT ADE02078  | A40  | C 5128.85  | 95409 | 6528 | 2 | 35 | m | 3 |
| 17415-6528-2139  | 6.63E+08 | WW | Qgph | 6.1  | 10/01/1997 | 6.1  | 38516 | DOM     |     | 2.7 | 1.47 | 10/01/1997 | 3035   | 5420      | 6145663.24  | 54 | 138 | 30 | 24.608  | 34 | 48   | 58.284 | 138.5068356 | 34.8162025 | 34.8162025 | PORT ADE07964  | A116 | C 5265.35  | 95409 | 6628 | 3 | 31 | h | 1 |
| 17448-6528-2145  | 6.53E+08 | WW | Qgph | 8.4  | 22/10/1997 | 8.4  | 43280 | DOM     |     | 4.3 | 0.7  | 22/10/1997 | 1278   | 2310      | 6145663.24  | 54 | 138 | 29 | 17.502  | 34 | 48   | 50.246 | 138.4883081 | 34.8306238 | 34.8306238 | PORT ADE04203  | A18  | C 5165.85  | 95409 | 6528 | 2 | 35 | m | 2 |
| 17448-6528-2147  | 6.53E+08 | WW | Qgph | 5.5  | 2/02/1998  | 5.5  | 43280 | DOM     |     | 2.3 | 2.73 | 2/02/1998  | 1898   | 3130      | 6145663.24  | 54 | 138 | 29 | 53.016  | 34 | 48   | 21.2   | 138.4918768 | 34.8321176 | 34.8321176 | PORT ADE03186  | A10  | C 5285.85  | 95409 | 6528 | 2 | 35 | m | 2 |
| 17518-6528-2149  | 6.53E+08 | WW | Qgph | 6    | 28/12/1996 | 6    | 39705 | DOM     |     | 2.8 | 2.33 | 28/12/1996 | 1788   | 3220      | 6145663.24  | 54 | 138 | 29 | 41.23   | 34 | 48   | 4.467  | 138.4947863 | 34.8353297 | 34.8353297 | PORT ADE01116  | A209 | C 5703.75  | 95409 | 6528 | 2 | 35 | m | 2 |
| 17585-6528-2163  | 6.53E+08 | WW | Qgph | 9.8  | 7/01/1997  | 9.8  | 39189 | DOM     |     | 6.1 | 1.1  | 7/01/1997  | 611    | 1110      | 6145663.24  | 54 | 138 | 29 | 10.079  | 34 | 48   | 42.455 | 138.4863131 | 34.8264598 | 34.8264598 | PORT ADE06378  | A56  | C 5409.25  | 95409 | 6528 | 2 | 35 | m | 2 |
| 17586-6528-2171  | 6.53E+08 | WW | Qgph | 8.8  | 22/01/1997 | 8.8  | 39822 | DOM     |     | 5   | 1.95 | 22/01/1997 | 1110   | 2010      | 6145663.24  | 54 | 138 | 29 | 50.021  | 34 | 48</ |        |             |            |            |                |      |            |       |      |   |    |   |   |

Groundwater Data Report 2km

|        |           |            |    |        |      |            |      |       |         |      |       |            |       |      |      |           |            |    |     |    |        |    |    |        |            |           |           |          |        |      |         |    |       |      |   |    |   |   |
|--------|-----------|------------|----|--------|------|------------|------|-------|---------|------|-------|------------|-------|------|------|-----------|------------|----|-----|----|--------|----|----|--------|------------|-----------|-----------|----------|--------|------|---------|----|-------|------|---|----|---|---|
| 178276 | 6528-2238 | 6.53E+08   | WW | Chicks | 5.9  | 15/10/1997 | 9.1  | 42633 | DOM     | 5.2  | 1.24  | 16/10/1997 | 905   | 1640 | 0.55 | 270682.13 | 614412.05  | 54 | 138 | 29 | 33.896 | 34 | 49 | 10.049 | 138.492748 | 34.819458 | 34.819458 | PORT ADE | 021018 | A90  | CT 5108 | 65 | 50409 | 6528 | 2 | 35 | e | 4 |
| 178277 | 6628-2031 | 6.63E+08   | WW | Gphah  | 5.9  | 12/10/1999 | 5.9  | 50561 | DOM     | 2.4  | 1.78  | 12/10/1999 | 3932  | 6980 | 0.6  | 271867.18 | 614665.97  | 54 | 138 | 29 | 21.031 | 34 | 48 | 53.431 | 138.505842 | 34.814842 | 34.814842 | PORT ADE | 07964  | A47  | CT 5281 | 45 | 50409 | 6528 | 2 | 35 | h | 1 |
| 178279 | 6528-2380 | 6.53E+08   | WW | Chicks | 6.4  | 8/10/1999  | 6.4  | 50580 | DOM     | 2.5  | 2.31  | 8/10/1999  | 1373  | 2480 | 0.89 | 270876.15 | 614245.04  | 54 | 138 | 29 | 40.852 | 34 | 49 | 39.685 | 138.494841 | 34.825691 | 34.825691 | PORT ADE | 02328  | A11  | CT 5777 | 25 | 50409 | 6528 | 2 | 35 | m | 3 |
| 178280 | 6528-2381 | 6.53E+08   | WW | Chicks | 12.2 | 22/09/1999 | 12.2 | 50477 | DOM     | 8.5  | 1.88  | 22/09/1999 | 1088  | 1970 | 0.62 | 270551.2  | 614422.01  | 54 | 138 | 29 | 29.058 | 34 | 48 | 95.048 | 138.491409 | 34.816582 | 34.816582 | PORT ADE | 01092  | A64  | CT 5430 | 85 | 50409 | 6528 | 2 | 35 | e | 2 |
| 178282 | 6528-2382 | 6.53E+08   | WW | Chicks | 5.8  | 14/10/1999 | 5.8  | 40512 | DOM     | 1.6  | 2.81  | 14/10/1999 | 1513  | 2730 | 0.71 | 271668.13 | 614591.05  | 54 | 138 | 29 | 48.233 | 34 | 48 | 13.803 | 138.499427 | 34.834834 | 34.834834 | PORT ADE | 02544  | A17  | CT 5115 | 25 | 50409 | 6528 | 2 | 35 | e | 2 |
| 178285 | 6528-2389 | 6.53E+08   | WW | Gphah  | 4.9  | 29/01/1999 | 4.9  | 47765 | DOM     | 1.2  | 3.14  | 29/01/1999 | 1038  | 1880 | 0.64 | 271030.16 | 612430.01  | 54 | 138 | 29 | 45.931 | 34 | 50 | 4.884  | 138.496092 | 34.834909 | 34.834909 | PORT ADE | 01318  | A71  | CT 5509 | 85 | 50409 | 6528 | 2 | 35 | m | 4 |
| 178289 | 6528-2390 | 6.53E+08   | WW | Gphah  | 5.3  | 3/02/1999  | 5.3  | 47791 | DOM     | 1.5  | 2.63  | 3/02/1999  | 1468  | 2650 | 0.58 | 271202.11 | 614254.96  | 54 | 138 | 29 | 52.811 | 34 | 50 | 1.988  | 138.498003 | 34.833666 | 34.833666 | PORT ADE | 02009  | A36  | CT 5402 | 15 | 50409 | 6528 | 2 | 35 | m | 4 |
| 178294 | 6528-2623 | 6.63E+08   | WW | Chicks | 5    | 13/10/1999 | 5    | 50584 | DOM     | 1.7  | 2.38  | 13/10/1999 | 3862  | 6860 | 0.6  | 271027.17 | 614259.93  | 54 | 138 | 30 | 0.619  | 34 | 48 | 23.242 | 138.500172 | 34.808956 | 34.808956 | PORT ADE | 02789  | A88  | CT 5446 | 75 | 50409 | 6628 | 3 | 31 | a | 6 |
| 178295 | 6528-2393 | 6.53E+08   | WW | Chicks | 6.3  | 10/11/1999 | 6.3  | 50612 | DOM     | 3    | 1.84  | 10/11/1999 | 1513  | 2730 | 0.62 | 271668.13 | 614591.05  | 54 | 138 | 29 | 48.233 | 34 | 48 | 13.803 | 138.499427 | 34.834834 | 34.834834 | PORT ADE | 02544  | A17  | CT 5115 | 25 | 50409 | 6528 | 2 | 35 | e | 2 |
| 178296 | 6528-2394 | 6.53E+08   | WW | Chicks | 8.3  | 22/10/1998 | 8.3  | 46831 | DOM     | 4    | 2.29  | 22/10/1998 | 1630  | 2950 | 0.8  | 271050.15 | 614556.02  | 54 | 138 | 29 | 49.787 | 34 | 48 | 32.245 | 138.497761 | 34.806532 | 34.806532 | PORT ADE | 02732  | A56  | CT 5178 | 75 | 50409 | 6528 | 2 | 35 | d | 5 |
| 178297 | 6528-2033 | 6.63E+08   | WW | Chicks | 6.2  | 27/10/1998 | 6.2  | 46890 | DOM     | 2.2  | 2.5   | 27/10/1998 | 1384  | 2500 | 0.7  | 271348.15 | 615865.03  | 54 | 138 | 30 | 1.807  | 34 | 48 | 13.734 | 138.500502 | 34.803815 | 34.803815 | PORT ADE | 03411  | A7   | CT 5163 | 25 | 50409 | 6628 | 3 | 31 | a | 1 |
| 178298 | 6528-2387 | 6.53E+08   | WW | Chicks | 7.9  | 9/02/1999  | 7.9  | 47778 | DOM     | 3.6  | 1.97  | 9/02/1999  | 1289  | 2330 | 0.81 | 271027.17 | 614259.93  | 54 | 138 | 29 | 50.179 | 34 | 48 | 19.631 | 138.497761 | 34.806532 | 34.806532 | PORT ADE | 02732  | A56  | CT 5178 | 75 | 50409 | 6528 | 2 | 35 | d | 5 |
| 178299 | 6528-2398 | 6.53E+08   | WW | Chicks | 4.9  | 29/01/1999 | 4.9  | 47791 | DOM     | 1.5  | 2.63  | 29/01/1999 | 1468  | 2650 | 0.58 | 271202.11 | 614254.96  | 54 | 138 | 29 | 52.811 | 34 | 50 | 1.988  | 138.498003 | 34.833666 | 34.833666 | PORT ADE | 02009  | A36  | CT 5402 | 15 | 50409 | 6528 | 2 | 35 | m | 4 |
| 178300 | 6528-2399 | 6.53E+08   | WW | Chicks | 5.9  | 27/10/1999 | 5.9  | 50820 | DOM     | 2.4  | 2.25  | 27/10/1999 | 1440  | 2600 | 0.68 | 271079.14 | 614357.97  | 54 | 138 | 29 | 47.88  | 34 | 49 | 27.854 | 138.496039 | 34.824404 | 34.824404 | PORT ADE | 01186  | A76  | CT 5416 | 65 | 50409 | 6528 | 2 | 35 | e | 4 |
| 178301 | 6528-2400 | 6.53E+08   | WW | Chicks | 9.8  | 4/02/1998  | 9.8  | 43960 | DOM     | 5.9  | 0.89  | 4/02/1998  | 821   | 1490 | 0.46 | 270041.35 | 612960.96  | 54 | 138 | 29 | 2.878  | 34 | 49 | 46.855 | 138.483535 | 34.829682 | 34.829682 | PORT ADE | 01545  | A19  | CT 5192 | 35 | 50409 | 6528 | 2 | 35 | m | 4 |
| 178302 | 6528-2403 | 6.53E+08   | WW | Chicks | 8.9  | 20/02/1998 | 8.9  | 44188 | DOM     | 6.1  | 1.09  | 20/02/1998 | 827   | 1530 | 0.54 | 270127.15 | 614285.96  | 54 | 138 | 29 | 30.826 | 34 | 49 | 50.498 | 138.486341 | 34.830694 | 34.830694 | PORT ADE | 01545  | A19  | CT 5192 | 35 | 50409 | 6528 | 2 | 35 | m | 4 |
| 178303 | 6528-2404 | 6.53E+08   | WW | Chicks | 10.8 | 16/03/1999 | 10.8 | 44188 | DOM     | 6.2  | 1.49  | 16/03/1999 | 805   | 1460 | 0.55 | 271030.16 | 614259.93  | 54 | 138 | 29 | 45.931 | 34 | 48 | 13.803 | 138.499427 | 34.834834 | 34.834834 | PORT ADE | 02544  | A17  | CT 5115 | 25 | 50409 | 6528 | 2 | 35 | e | 2 |
| 178305 | 6528-2406 | 6.53E+08   | WW | Chicks | 5.9  | 3/11/1999  | 5.9  | 50908 | DOM     | 2.4  | 1.99  | 3/11/1999  | 490   | 890  | 0.61 | 271071.12 | 614489.95  | 54 | 138 | 29 | 49.96  | 34 | 48 | 50.498 | 138.497711 | 34.812519 | 34.812519 | PORT ADE | 02533  | A452 | CT 5602 | 95 | 50409 | 6528 | 2 | 35 | e | 3 |
| 178306 | 6528-2408 | 6.53E+08   | WW | Chicks | 11.5 | 4/11/1999  | 11.5 | 50909 | DOM     | 7.4  | 2.18  | 4/11/1999  | 611   | 1110 | 0.72 | 270612.13 | 614452.1   | 54 | 138 | 29 | 31.546 | 34 | 48 | 56.729 | 138.492096 | 34.815758 | 34.815758 | PORT ADE | 02331  | A142 | CT 5791 | 25 | 50409 | 6528 | 2 | 35 | e | 3 |
| 178307 | 6528-2406 | 6.53E+08   | WW | Chicks | 9    | 17/02/1998 | 9    | 44188 | DOM     | 5.1  | 3.27  | 17/02/1998 | 821   | 1490 | 0.68 | 270127.15 | 614285.96  | 54 | 138 | 29 | 35.768 | 34 | 48 | 52.828 | 138.493249 | 34.817459 | 34.817459 | PORT ADE | 01092  | A32  | CT 5160 | 45 | 50409 | 6528 | 2 | 35 | e | 3 |
| 178308 | 6528-2407 | 6.53E+08   | WW | Chicks | 8.9  | 25/02/1998 | 8.9  | 44231 | DOM     | 5.1  | 1.32  | 25/02/1998 | 876   | 1590 | 0.71 | 270111.12 | 614422.01  | 54 | 138 | 29 | 35.138 | 34 | 48 | 6.701  | 138.493994 | 34.818528 | 34.818528 | PORT ADE | 04711  | A181 | CT 5139 | 75 | 50409 | 6528 | 2 | 35 | e | 3 |
| 178309 | 6528-2408 | 6.53E+08   | WW | Chicks | 8.6  | 18/12/1998 | 8.6  | 47457 | DOM     | 4.6  | 4.2   | 18/12/1998 | 783   | 1440 | 0.65 | 270678.12 | 614440.96  | 54 | 138 | 29 | 34.062 | 34 | 48 | 59.798 | 138.492795 | 34.816494 | 34.816494 | PORT ADE | 038452 | A1   | CT 5170 | 45 | 50409 | 6528 | 2 | 35 | e | 3 |
| 178311 | 6528-2409 | 6.53E+08   | WW | Chicks | 8.7  | 12/02/1999 | 8.7  | 47979 | DOM     | 4.8  | 3.57  | 12/02/1999 | 794   | 1440 | 0.76 | 270928.19 | 614428.97  | 54 | 138 | 29 | 35.272 | 34 | 48 | 59.792 | 138.493311 | 34.816609 | 34.816609 | PORT ADE | 02331  | A134 | CT 5716 | 12 | 50409 | 6528 | 2 | 35 | e | 3 |
| 178312 | 6528-2410 | 6.5999E+08 | WW | Chicks | 7.3  | 5/09/1998  | 7.3  | 45992 | DOM     | 3.6  | 1.48  | 1/09/1998  | 1564  | 2600 | 0.49 | 270946.10 | 614962.96  | 54 | 138 | 29 | 44.527 | 34 | 48 | 2.125  | 138.495070 | 34.817257 | 34.817257 | PORT ADE | 02283  | A209 | CT 5691 | 65 | 50409 | 6528 | 2 | 35 | e | 3 |
| 178408 | 6628-2030 | 6.63E+08   | WW | Gphah  | 5    | 5/11/1998  | 5    | 46954 | DOM     | 2.1  | 2.08  | 5/11/1998  | 210   | 1650 | 0.57 | 271843.11 | 614667.02  | 54 | 138 | 30 | 10.202 | 34 | 48 | 52.828 | 138.505384 | 34.816474 | 34.816474 | PORT ADE | 07964  | A39  | CT 5445 | 25 | 50409 | 6628 | 3 | 31 | h | 1 |
| 178409 | 6628-2034 | 6.63E+08   | WW | Gphah  | 5.7  | 24/03/1998 | 5.7  | 44657 | DOM     | 2.6  | 1.64  | 24/03/1998 | 1222  | 2210 | 0.55 | 271668.17 | 614547.99  | 54 | 138 | 30 | 13.982 | 34 | 48 | 27.518 | 138.503884 | 34.807444 | 34.807444 | PORT ADE | 031452 | A1   | CT 5327 | 95 | 50409 | 6628 | 3 | 31 | a | 6 |
| 178505 | 6528-2419 | 6.53E+08   | WW | Chicks | 6    | 9/11/1998  | 6    | 47105 | 6 MON   | 3    | 1.58  | 12/01/1997 | 1092  | 1870 | 0.7  | 270606.18 | 6146015.01 | 54 | 138 | 29 | 32.708 | 34 | 48 | 8.629  | 138.492439 | 34.802297 | 34.802297 | PORT ADE | 059587 | A100 | CT 5875 | 75 | 50409 | 6528 | 2 | 35 | d | 3 |
| 178506 | 6528-2422 | 6.53E+08   | WW | Chicks | 7.3  | 12/01/1997 | 7.3  | 47879 | 5 DOM   | 3.3  | 1.58  | 12/01/1997 | 1092  | 1870 | 0.8  | 271145.12 | 614600.96  | 54 | 138 | 29 | 32.004 | 34 | 48 | 13.812 | 138.497779 | 34.820509 | 34.820509 | PORT ADE | 0426   | A98  | CT 5875 | 75 | 50409 | 6528 | 2 | 35 | d | 3 |
| 180518 | 6528-2431 | 6.53E+08   | WW | Chicks | 5.5  | 1/05/2001  | 5.5  | 47879 | 5 DOM   | 3.3  | 1.58  | 1/05/2001  | 1092  | 1870 | 0.8  | 271145.12 | 614600.96  | 54 | 138 | 29 | 32.004 | 34 | 48 | 13.812 | 138.497779 | 34.820509 | 34.820509 | PORT ADE | 0426   | A98  | CT 5875 | 75 | 50409 | 6528 | 2 | 35 | d | 3 |
| 182995 | 6528-2450 | 6.53E+08   | WW | Chicks | 31.5 | 7/02/1994  | 31.5 | 30765 | 11 INV  | 9.2  | -1.45 | 7/02/1994  | 1200  | 1820 | 7.54 | 270498.14 | 614741.96  | 54 | 138 | 29 | 27.125 | 34 | 48 | 50.443 | 138.490093 | 34.814012 | 34.814012 | PORT ADE | 01092  | A32  | CT 5445 | 25 | 50409 | 6628 | 3 | 31 | h | 1 |
| 183002 | 6528-2450 | 6.63E+08   | WW | Chicks | 10   | 25/01/1994 | 10   | 30766 | 6.5 INV | 9.5  | 1.5   | 28/25/1994 | 2810  | 4850 | 7.5  | 270498.14 | 614741.96  | 54 | 138 | 29 | 11.865 | 34 | 48 | 55.872 | 138.502396 | 34.815522 | 34.815522 | PORT ADE | 06969  | A9   | CT 5954 | 65 | 50409 | 6628 | 3 | 31 | e | 2 |
| 183003 | 6528-2451 | 6.63E+08   | WW | Chicks | 11.5 | 24/01/1994 | 11.5 | 30766 | 6.5 INV | 9.5  | 1.5   | 28/25/1994 | 2810  | 4850 | 7.5  | 270498.14 | 614741.96  | 54 | 138 | 29 | 11.865 | 34 | 48 | 55.872 | 138.502396 | 34.815522 | 34.815522 | PORT ADE | 06969  | A9   | CT 5954 | 65 | 50409 | 6628 | 3 | 31 | e | 2 |
| 184742 | 6628-2408 | 6.63E+08   | WW | Chicks | 3    | 3/03/2001  | 3    | 54876 | 1 MON   | 2.85 | 0.85  | 3/10/1994  | 19350 | 3750 | 7.25 | 270498.14 | 614741.96  | 54 | 138 | 29 | 11.865 | 34 | 48 | 55.872 | 138.502396 | 34.815522 | 34.815522 | PORT ADE | 06969  | A9   | CT 5954 | 65 | 50409 | 6    |   |    |   |   |

Groundwater Data Report 2km

|        |           |          |    |       |     |            |     |        |          |     |      |       |            |         |            |         |     |     |     |     |    |    |     |       |         |            |            |            |               |          |        |      |       |       |       |       |      |    |    |   |   |
|--------|-----------|----------|----|-------|-----|------------|-----|--------|----------|-----|------|-------|------------|---------|------------|---------|-----|-----|-----|-----|----|----|-----|-------|---------|------------|------------|------------|---------------|----------|--------|------|-------|-------|-------|-------|------|----|----|---|---|
| 234236 | 6628-2308 | 6.63E+08 | WW | Qgah  | 5.5 | 25/09/2007 | 5.5 | 135956 | 2.5      |     | 4.8  | -1.65 | 25/09/2007 | 227452  | 6142757.92 | 54      | 138 | 30  | 42  | 39  | 34 | 49 | 55  | 401   | 138     | 511775     | 34.8202559 | 34.8202559 | PORT ADE      | 073873   | A4     | CT   | 6156  | 15    | 54509 | 6628  | 3    | 31 | 1  | 5 |   |
| 234363 | 6628-2311 | 6.63E+08 | WW | Qgah  | 5   | 3/07/2006  | 5   | 119867 | 2 INV    |     | 2.3  | 1.65  | 3/07/2006  | 271768  | 6143040    | 54      | 138 | 30  | 15  | 557 | 34 | 49 | 45  | 697   | 138     | 5042125    | 34.8293602 | 34.8293602 | PORT ADELAIDE |          |        |      | 55409 | 6628  | 3     | 31    | 1    | 5  |    |   |   |
| 234364 | 6628-2311 | 6.63E+08 | WW | Qgah  | 5   | 26/06/2006 | 5   | 119866 | 1 INV    |     | 2.8  | 1.09  | 26/06/2006 | 271829  | 6143023    | 54      | 138 | 30  | 17  | 549 | 34 | 49 | 46  | 298   | 138     | 5049833    | 34.8295271 | 34.8295271 | PORT ADE      | 087823   | A205   | CT   | 6146  | 55    | 54509 | 6628  | 3    | 31 | 1  | 1 |   |
| 234365 | 6628-2311 | 6.63E+08 | WW | Qgah  | 5   | 29/06/2006 | 5   | 119865 | 1 INV    |     | 2.6  | 1.31  | 29/06/2006 | 271792  | 6143023    | 54      | 138 | 30  | 18  | 548 | 34 | 49 | 46  | 268   | 138     | 5054791    | 34.8295188 | 34.8295188 | PORT ADE      | 087823   | A205   | CT   | 6146  | 55    | 54509 | 6628  | 3    | 31 | 1  | 1 |   |
| 234366 | 6628-2311 | 6.63E+08 | WW | Qgah  | 5   | 28/06/2006 | 5   | 119864 | 2 INV    |     | 2.3  | 1.65  | 28/06/2006 | 271782  | 6143016    | 54      | 138 | 30  | 17  | 548 | 34 | 49 | 46  | 268   | 138     | 5054791    | 34.8295188 | 34.8295188 | PORT ADE      | 087823   | A205   | CT   | 6146  | 55    | 54509 | 6628  | 3    | 31 | 1  | 1 |   |
| 234367 | 6628-2311 | 6.63E+08 | WW | Qgah  | 5   | 28/06/2006 | 5   | 119863 | 2 INV    |     | 2    | 1.95  | 28/06/2006 | 271774  | 6143056    | 54      | 138 | 30  | 15  | 509 | 34 | 49 | 45  | 183   | 138     | 5043934    | 34.8292174 | 34.8292174 | PORT ADELAIDE |          |        |      | 55409 | 6628  | 3     | 31    | 1    | 1  |    |   |   |
| 234368 | 6628-2311 | 6.63E+08 | WW | Qgah  | 5   | 29/06/2006 | 5   | 119862 | 2 INV    |     | 3.3  | 0.6   | 29/06/2006 | 271819  | 6143043    | 54      | 138 | 30  | 17  | 566 | 34 | 49 | 45  | 641   | 138     | 5048795    | 34.8293447 | 34.8293447 | PORT ADE      | 087823   | A205   | CT   | 6146  | 55    | 54509 | 6628  | 3    | 31 | 1  | 1 |   |
| 234369 | 6628-2311 | 6.63E+08 | WW | Qgah  | 6   | 27/06/2006 | 6   | 119861 | 1.75 INV |     | 3.2  | 0.7   | 27/06/2006 | 271815  | 6143031    | 54      | 138 | 30  | 18  | 548 | 34 | 49 | 47  | 138   | 5048244 | 34.8297222 | 34.8297222 | PORT ADE   | 087823        | A205     | CT     | 6146 | 55    | 54509 | 6628  | 3     | 31   | 1  | 1  |   |   |
| 234370 | 6628-2311 | 6.63E+08 | WW | Qgah  | 5   | 29/06/2006 | 5   | 119860 | 2 INV    |     | 2.7  | 0.76  | 29/06/2006 | 271795  | 6143026    | 54      | 138 | 30  | 16  | 569 | 34 | 49 | 47  | 373   | 138     | 5046022    | 34.8295257 | 34.8295257 | PORT ADE      | 087823   | A205   | CT   | 6146  | 55    | 54509 | 6628  | 3    | 31 | 1  | 1 |   |
| 234371 | 6628-2311 | 6.63E+08 | WW | Qgah  | 5.1 | 27/06/2006 | 5.1 | 119859 | 2 INV    |     | 3.5  | 0.38  | 27/06/2006 | 271833  | 6143001    | 54      | 138 | 30  | 17  | 076 | 34 | 49 | 47  | 014   | 138     | 5055311    | 34.8297262 | 34.8297262 | PORT ADE      | 087823   | A205   | CT   | 6146  | 55    | 54509 | 6628  | 3    | 31 | 1  | 1 |   |
| 234372 | 6628-2311 | 6.63E+08 | WW | Qgah  | 5   | 27/06/2006 | 5   | 119858 | 2 INV    |     | 3.5  | 0.37  | 27/06/2006 | 271843  | 6143010    | 54      | 138 | 30  | 18  | 076 | 34 | 49 | 46  | 731   | 138     | 5051328    | 34.8296474 | 34.8296474 | PORT ADE      | 087823   | A205   | CT   | 6146  | 55    | 54509 | 6628  | 3    | 31 | 1  | 1 |   |
| 234373 | 6628-2311 | 6.63E+08 | WW | Qgah  | 5.2 | 3/07/2006  | 5.2 | 119857 | 2 INV    | ROP | 2.4  | 1.19  | 3/07/2006  | 271795  | 6143027    | 54      | 138 | 30  | 20  | 98  | 34 | 49 | 47  | 718   | 138     | 5052878    | 34.8296996 | 34.8296996 | PORT ADE      | 087823   | A205   | CT   | 6146  | 55    | 54509 | 6628  | 3    | 31 | 1  | 1 |   |
| 235791 | 6628-2616 | 6.53E+08 | WW | Qhcks | 4   | 21/11/2007 | 5.6 | 137104 | 4        |     |      |       | 747        | 1355    | 270746     | 6143265 | 54  | 138 | 30  | 39  | 41 | 34 | 49  | 45    | 145     | 138        | 5011851    | 34.8207086 | 34.8207086    | PORT ADE | 087823 | A16  | CT    | 6141  | 35    | 54509 | 6628 | 3  | 31 | 6 | 1 |
| 235792 | 6628-2616 | 6.53E+08 | WW | Qhcks | 4   | 6/11/2007  | 4   | 138238 | 1 INV    |     | 2.57 | 1.59  | 6/11/2007  | 270718  | 6143678    | 54      | 138 | 30  | 34  | 894 | 34 | 49 | 45  | 243   | 138     | 5043061    | 34.823373  | 34.823373  | PORT ADE      | 087823   | A16    | CT   | 6141  | 35    | 54509 | 6628  | 3    | 31 | 6  | 1 |   |
| 236084 | 6628-2327 | 6.63E+08 | WW | Qgah  | 4   | 6/11/2007  | 4   | 138237 | 1.5 INV  |     | 3.2  | 1.04  | 6/11/2007  | 271934  | 6142544    | 54      | 138 | 30  | 22  | 518 | 34 | 49 | 45  | 633   | 138     | 5062551    | 34.818425  | 34.818425  | PORT ADE      | 087823   | A16    | CT   | 6141  | 35    | 54509 | 6628  | 3    | 31 | 6  | 1 |   |
| 236085 | 6628-2327 | 6.63E+08 | WW | Qgah  | 4   | 6/11/2007  | 4   | 138236 | 1 INV    |     | 2.7  | 1.1   | 6/11/2007  | 271887  | 6142544    | 54      | 138 | 30  | 21  | 589 | 34 | 49 | 45  | 529   | 138     | 5050972    | 34.8181136 | 34.8181136 | PORT ADE      | 087823   | A16    | CT   | 6141  | 35    | 54509 | 6628  | 3    | 31 | 6  | 1 |   |
| 236086 | 6628-2327 | 6.63E+08 | WW | Qgah  | 4   | 6/11/2007  | 4   | 138235 | 4 INV    |     | 2.63 | 1.66  | 6/11/2007  | 271846  | 6143635    | 54      | 138 | 30  | 19  | 921 | 34 | 49 | 45  | 232   | 138     | 5055311    | 34.8174534 | 34.8174534 | PORT ADE      | 087823   | A16    | CT   | 6141  | 35    | 54509 | 6628  | 3    | 31 | 6  | 1 |   |
| 236087 | 6628-2327 | 6.63E+08 | WW | Qgah  | 4   | 7/11/2007  | 4   | 138234 | 1 INV    |     | 2.71 | 1.81  | 7/11/2007  | 271642  | 6144245    | 54      | 138 | 30  | 11  | 949 | 34 | 49 | 45  | 649   | 138     | 5033191    | 34.8184693 | 34.8184693 | PORT ADE      | 087823   | A16    | CT   | 6141  | 35    | 54509 | 6628  | 3    | 31 | 6  | 1 |   |
| 236088 | 6628-2327 | 6.63E+08 | WW | Qgah  | 4   | 7/11/2007  | 4   | 138233 | 1 INV    |     | 2.75 | 1.88  | 7/11/2007  | 271599  | 6144054    | 54      | 138 | 30  | 6   | 395 | 34 | 49 | 45  | 1257  | 138     | 5017764    | 34.8201581 | 34.8201581 | PORT ADE      | 087823   | A16    | CT   | 6141  | 35    | 54509 | 6628  | 3    | 31 | 6  | 1 |   |
| 236089 | 6628-2327 | 6.63E+08 | WW | Qgah  | 4   | 7/11/2007  | 4   | 138232 | 1 INV    |     | 2.63 | 2.04  | 7/11/2007  | 271455  | 6143995    | 54      | 138 | 30  | 4   | 194 | 34 | 49 | 45  | 14551 | 138     | 5011851    | 34.8207086 | 34.8207086 | PORT ADE      | 087823   | A16    | CT   | 6141  | 35    | 54509 | 6628  | 3    | 31 | 6  | 1 |   |
| 236090 | 6628-2327 | 6.63E+08 | WW | Qgah  | 4   | 7/11/2007  | 4   | 138231 | 1 INV    |     | 2.63 | 1.86  | 7/11/2007  | 271647  | 6144037    | 54      | 138 | 30  | 11  | 78  | 34 | 49 | 45  | 13259 | 138     | 5033271    | 34.8203497 | 34.8203497 | PORT ADE      | 087823   | A16    | CT   | 6141  | 35    | 54509 | 6628  | 3    | 31 | 6  | 1 |   |
| 236091 | 6628-2327 | 6.63E+08 | WW | Qgah  | 4   | 8/11/2007  | 4   | 138230 | 1 INV    |     | 2.63 | 1.81  | 8/11/2007  | 271813  | 6144068    | 54      | 138 | 30  | 18  | 37  | 34 | 49 | 45  | 12382 | 138     | 5051027    | 34.820106  | 34.820106  | PORT ADE      | 087823   | A16    | CT   | 6141  | 35    | 54509 | 6628  | 3    | 31 | 6  | 1 |   |
| 236092 | 6628-2327 | 6.63E+08 | WW | Qgah  | 4   | 8/11/2007  | 4   | 138229 | 1 INV    |     | 1.55 | 2.67  | 8/11/2007  | 270893  | 6144078    | 54      | 138 | 30  | 21  | 501 | 34 | 49 | 45  | 12127 | 138     | 5059725    | 34.820353  | 34.820353  | PORT ADE      | 087823   | A16    | CT   | 6141  | 35    | 54509 | 6628  | 3    | 31 | 6  | 1 |   |
| 236093 | 6628-2327 | 6.63E+08 | WW | Qgah  | 7.5 | 15/11/2007 | 7.5 | 138763 | 3 INV    |     | 4.25 | 1.37  | 15/11/2007 | 272332  | 6142755    | 54      | 138 | 30  | 41  | 712 | 34 | 49 | 45  | 5484  | 138     | 5115203    | 34.832801  | 34.832801  | PORT ADE      | 073873   | A4     | CT   | 6156  | 15    | 54509 | 6628  | 3    | 31 | 5  | 1 |   |
| 236094 | 6628-2328 | 6.63E+08 | WW | Qgah  | 4   | 15/11/2007 | 4   | 138762 | 1 INV    |     | 2.49 | 0.73  | 15/11/2007 | 272389  | 6142736    | 54      | 138 | 30  | 39  | 712 | 34 | 49 | 45  | 5603  | 138     | 5115203    | 34.8322305 | 34.8322305 | PORT ADE      | 073873   | A4     | CT   | 6156  | 15    | 54509 | 6628  | 3    | 31 | 5  | 1 |   |
| 236095 | 6628-2328 | 6.63E+08 | WW | Qgah  | 7   | 15/11/2007 | 7   | 138764 | 2.5 INV  |     | 4.03 | -0.85 | 15/11/2007 | 272409  | 6142727    | 54      | 138 | 30  | 40  | 523 | 34 | 49 | 45  | 55392 | 138     | 5115205    | 34.832034  | 34.832034  | PORT ADE      | 073873   | A4     | CT   | 6156  | 15    | 54509 | 6628  | 3    | 31 | 5  | 1 |   |
| 236760 | 6628-2337 | 6.63E+08 | WW | Qgah  | 4   | 26/11/2006 | 4   | 124797 | 0        |     |      |       | 271445     | 6143452 | 54         | 138     | 30  | 4   | 265 | 34  | 49 | 45 | 362 | 138   | 5060971 | 34.8287952 | 34.8287952 | PORT ADE   | 087823        | A290     | CT     | 6065 | 4     | 54509 | 6628  | 3     | 31   | 1  | 1  |   |   |
| 236761 | 6628-2337 | 6.63E+08 | WW | Qgah  | 1   | 26/11/2006 | 1   | 124798 | 0.5 INV  |     | 1    | 3.35  | 26/11/2006 | 271441  | 6143456    | 54      | 138 | 30  | 5   | 015 | 34 | 49 | 45  | 3159  | 138     | 5050588    | 34.8289971 | 34.8289971 | PORT ADE      | 087823   | A290   | CT   | 6065  | 4     | 54509 | 6628  | 3    | 31 | 1  | 1 |   |
| 236762 | 6628-2337 | 6.63E+08 | WW | Qgah  | 3.5 | 26/11/2006 | 3.5 | 124799 | 0.5 INV  |     | 1.1  | 3.23  | 26/11/2006 | 271419  | 6143802    | 54      | 138 | 30  | 2   | 167 | 34 | 49 | 45  | 44    | 138     | 5060020    | 34.828215  | 34.828215  | PORT ADE      | 087823   | A290   | CT   | 6065  | 4     | 54509 | 6628  | 3    | 31 | 1  | 1 |   |
| 236763 | 6628-2337 | 6.63E+08 | WW | Qgah  | 6   | 26/11/2006 | 5   | 124804 | 0.5 INV  |     | 1.5  | 2.52  | 26/11/2006 | 271712  | 6143140    | 54      | 138 | 30  | 13  | 465 | 34 | 49 | 45  | 395   | 138     | 5037401    | 34.8284432 | 34.8284432 | PORT ADE      | 087823   | A431   | CT   | 6065  | 6     | 54509 | 6628  | 3    | 31 | 1  | 1 |   |
| 236764 | 6628-2337 | 6.63E+08 | WW | Qgah  | 4   | 26/11/2006 | 4   | 124803 | 0.5 INV  |     | 1.6  | 2.41  | 26/11/2006 | 271714  | 6143140    | 54      | 138 | 30  | 13  | 465 | 34 | 49 | 45  | 42    | 138     | 5038102    | 34.8284432 | 34.8284432 | PORT ADE      | 087823   | A431   | CT   | 6065  | 6     | 54509 | 6628  | 3    | 31 | 1  | 1 |   |
| 236765 | 6628-2337 | 6.63E+08 | WW | Qgah  | 3.8 | 26/11/2006 | 3.8 | 124803 | 0.5 INV  |     | 1.4  | 2.63  | 26/11/2006 | 271714  | 6143127    | 54      | 138 | 30  | 13  | 524 | 34 | 49 | 45  | 42    | 138     | 5037466    | 34.8285589 | 34.8285589 | PORT ADE      | 087823   | A431   | CT   | 6065  | 6     | 54509 | 6628  | 3    | 31 | 1  | 1 |   |
| 236766 | 6628-2337 | 6.63E+08 | WW | Qgah  | 4   | 26/11/2006 | 4   | 124800 | 3.5 INV  |     | 0.9  | 3.12  | 26/11/2006 | 271708  | 6143113    | 72      | 132 | 30  | 13  | 112 | 34 | 49 | 45  | 42    | 674     | 138        | 5036978    | 34.8285027 | 34.8285027    | PORT ADE | 087823 | A431 | CT    | 6065  | 6     | 54509 | 6628 | 3  | 31 | 1 | 1 |
| 236767 | 6628-2337 | 6.63E+08 | WW | Qgah  | 4   | 26/11/2006 | 4   | 124801 | 0.5 INV  |     | 1.4  | 2.63  | 26/11/2006 | 271696  | 6143131    | 72      | 132 | 30  | 13  | 112 | 34 | 49 | 45  | 42    | 665     | 138</      |            |            |               |          |        |      |       |       |       |       |      |    |    |   |   |

## Groundwater Data Report 2km

|        |           |          |    |       |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |        |      |    |   |            |   |      |
|--------|-----------|----------|----|-------|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|------|
| 251828 | 6628-2518 | 6.63E+06 | WW | Qpath | 4 | 21/05/2008 | 4 | 147348 | 0.75 | NW | 1 | 21/05/2008 | 4 | 147369 | 0.75 | NW | 1 | 21/05/2008 | 4 | 147390 | 0.75 | NW | 1 | 21/05/2008 | 4 | 147411 | 0.75 | NW | 1 | 21/05/2008 | 4 | 147432 | 0.75 | NW | 1 | 21/05/2008 | 4 | 147453 | 0.75 | NW | 1 | 21/05/2008 | 4 | 147474 | 0.75 | NW | 1 | 21/05/2008 | 4 | 147495 | 0.75 | NW | 1 | 21/05/2008 | 4 | 147516 | 0.75 | NW | 1 | 21/05/2008 | 4 | 147537 | 0.75 | NW | 1 | 21/05/2008 | 4 | 147558 | 0.75 | NW | 1 | 21/05/2008 | 4 | 147579 | 0.75 | NW | 1 | 21/05/2008 | 4 | 147600 | 0.75 | NW | 1 | 21/05/2008 | 4 | 147621 | 0.75 | NW | 1 | 21/05/2008 | 4 | 147642 | 0.75 | NW | 1 | 21/05/2008 | 4 | 147663 | 0.75 | NW | 1 | 21/05/2008 | 4 | 147684 | 0.75 | NW | 1 | 21/05/2008 | 4 | 147705 | 0.75 | NW | 1 | 21/05/2008 | 4 | 147726 | 0.75 | NW | 1 | 21/05/2008 | 4 | 147747 | 0.75 | NW | 1 | 21/05/2008 | 4 | 147768 | 0.75 | NW | 1 | 21/05/2008 | 4 | 147789 | 0.75 | NW | 1 | 21/05/2008 | 4 | 147810 | 0.75 | NW | 1 | 21/05/2008 | 4 | 147831 | 0.75 | NW | 1 | 21/05/2008 | 4 | 147852 | 0.75 | NW | 1 | 21/05/2008 | 4 | 147873 | 0.75 | NW | 1 | 21/05/2008 | 4 | 147894 | 0.75 | NW | 1 | 21/05/2008 | 4 | 147915 | 0.75 | NW | 1 | 21/05/2008 | 4 | 147936 | 0.75 | NW | 1 | 21/05/2008 | 4 | 147957 | 0.75 | NW | 1 | 21/05/2008 | 4 | 147978 | 0.75 | NW | 1 | 21/05/2008 | 4 | 148000 | 0.75 | NW | 1 | 21/05/2008 | 4 | 148021 | 0.75 | NW | 1 | 21/05/2008 | 4 | 148042 | 0.75 | NW | 1 | 21/05/2008 | 4 | 148063 | 0.75 | NW | 1 | 21/05/2008 | 4 | 148084 | 0.75 | NW | 1 | 21/05/2008 | 4 | 148105 | 0.75 | NW | 1 | 21/05/2008 | 4 | 148126 | 0.75 | NW | 1 | 21/05/2008 | 4 | 148147 | 0.75 | NW | 1 | 21/05/2008 | 4 | 148168 | 0.75 | NW | 1 | 21/05/2008 | 4 | 148189 | 0.75 | NW | 1 | 21/05/2008 | 4 | 148210 | 0.75 | NW | 1 | 21/05/2008 | 4 | 148231 | 0.75 | NW | 1 | 21/05/2008 | 4 | 148252 | 0.75 | NW | 1 | 21/05/2008 | 4 | 148273 | 0.75 | NW | 1 | 21/05/2008 | 4 | 148294 | 0.75 | NW | 1 | 21/05/2008 | 4 | 148315 | 0.75 | NW | 1 | 21/05/2008 | 4 | 148336 | 0.75 | NW | 1 | 21/05/2008 | 4 | 148357 | 0.75 | NW | 1 | 21/05/2008 | 4 | 148378 | 0.75 | NW | 1 | 21/05/2008 | 4 | 148399 | 0.75 | NW | 1 | 21/05/2008 | 4 | 148420 | 0.75 | NW | 1 | 21/05/2008 | 4 | 148441 | 0.75 | NW | 1 | 21/05/2008 | 4 | 148462 | 0.75 | NW | 1 | 21/05/2008 | 4 | 148483 | 0.75 | NW | 1 | 21/05/2008 | 4 | 148504 | 0.75 | NW | 1 | 21/05/2008 | 4 | 148525 | 0.75 | NW | 1 | 21/05/2008 | 4 | 148546 | 0.75 | NW | 1 | 21/05/2008 | 4 | 148567 | 0.75 | NW | 1 | 21/05/2008 | 4 | 148588 | 0.75 | NW | 1 | 21/05/2008 | 4 | 148609 | 0.75 | NW | 1 | 21/05/2008 | 4 | 148630 | 0.75 | NW | 1 | 21/05/2008 | 4 | 148651 | 0.75 | NW | 1 | 21/05/2008 | 4 | 148672 | 0.75 | NW | 1 | 21/05/2008 | 4 | 148693 | 0.75 | NW | 1 | 21/05/2008 | 4 | 148714 | 0.75 | NW | 1 | 21/05/2008 | 4 | 148735 | 0.75 | NW | 1 | 21/05/2008 | 4 | 148756 | 0.75 | NW | 1 | 21/05/2008 | 4 | 148777 | 0.75 | NW | 1 | 21/05/2008 | 4 | 148798 | 0.75 | NW | 1 | 21/05/2008 | 4 | 148819 | 0.75 | NW | 1 | 21/05/2008 | 4 | 148840 | 0.75 | NW | 1 | 21/05/2008 | 4 | 148861 | 0.75 | NW | 1 | 21/05/2008 | 4 | 148882 | 0.75 | NW | 1 | 21/05/2008 | 4 | 148903 | 0.75 | NW | 1 | 21/05/2008 | 4 | 148924 | 0.75 | NW | 1 | 21/05/2008 | 4 | 148945 | 0.75 | NW | 1 | 21/05/2008 | 4 | 148966 | 0.75 | NW | 1 | 21/05/2008 | 4 | 148987 | 0.75 | NW | 1 | 21/05/2008 | 4 | 149008 | 0.75 | NW | 1 | 21/05/2008 | 4 | 149029 | 0.75 | NW | 1 | 21/05/2008 | 4 | 149050 | 0.75 | NW | 1 | 21/05/2008 | 4 | 149071 | 0.75 | NW | 1 | 21/05/2008 | 4 | 149092 | 0.75 | NW | 1 | 21/05/2008 | 4 | 149113 | 0.75 | NW | 1 | 21/05/2008 | 4 | 149134 | 0.75 | NW | 1 | 21/05/2008 | 4 | 149155 | 0.75 | NW | 1 | 21/05/2008 | 4 | 149176 | 0.75 | NW | 1 | 21/05/2008 | 4 | 149197 | 0.75 | NW | 1 | 21/05/2008 | 4 | 149218 | 0.75 | NW | 1 | 21/05/2008 | 4 | 149239 | 0.75 | NW | 1 | 21/05/2008 | 4 | 149260 | 0.75 | NW | 1 | 21/05/2008 | 4 | 149281 | 0.75 | NW | 1 | 21/05/2008 | 4 | 149302 | 0.75 | NW | 1 | 21/05/2008 | 4 | 149323 | 0.75 | NW | 1 | 21/05/2008 | 4 | 149344 | 0.75 | NW | 1 | 21/05/2008 | 4 | 149365 | 0.75 | NW | 1 | 21/05/2008 | 4 | 149386 | 0.75 | NW | 1 | 21/05/2008 | 4 | 149407 | 0.75 | NW | 1 | 21/05/2008 | 4 | 149428 | 0.75 | NW | 1 | 21/05/2008 | 4 | 149449 | 0.75 | NW | 1 | 21/05/2008 | 4 | 149470 | 0.75 | NW | 1 | 21/05/2008 | 4 | 149491 | 0.75 | NW | 1 | 21/05/2008 | 4 | 149512 | 0.75 | NW | 1 | 21/05/2008 | 4 | 149533 | 0.75 | NW | 1 | 21/05/2008 | 4 | 149554 | 0.75 | NW | 1 | 21/05/2008 | 4 | 149575 | 0.75 | NW | 1 | 21/05/2008 | 4 | 149596 | 0.75 | NW | 1 | 21/05/2008 | 4 | 149617 | 0.75 | NW | 1 | 21/05/2008 | 4 | 149638 | 0.75 | NW | 1 | 21/05/2008 | 4 | 149659 | 0.75 | NW | 1 | 21/05/2008 | 4 | 149680 | 0.75 | NW | 1 | 21/05/2008 | 4 | 149701 | 0.75 | NW | 1 | 21/05/2008 | 4 | 149722 | 0.75 | NW | 1 | 21/05/2008 | 4 | 149743 | 0.75 | NW | 1 | 21/05/2008 | 4 | 149764 | 0.75 | NW | 1 | 21/05/2008 | 4 | 149785 | 0.75 | NW | 1 | 21/05/2008 | 4 | 149806 | 0.75 | NW | 1 | 21/05/2008 | 4 | 149827 | 0.75 | NW | 1 | 21/05/2008 | 4 | 149848 | 0.75 | NW | 1 | 21/05/2008 | 4 | 149869 | 0.75 | NW | 1 | 21/05/2008 | 4 | 149890 | 0.75 | NW | 1 | 21/05/2008 | 4 | 149911 | 0.75 | NW | 1 | 21/05/2008 | 4 | 149932 | 0.75 | NW | 1 | 21/05/2008 | 4 | 149953 | 0.75 | NW | 1 | 21/05/2008 | 4 | 149974 | 0.75 | NW | 1 | 21/05/2008 | 4 | 150000 | 0.75 | NW | 1 | 21/05/2008 | 4 | 150021 | 0.75 | NW | 1 | 21/05/2008 | 4 | 150042 | 0.75 | NW | 1 | 21/05/2008 | 4 | 150063 | 0.75 | NW | 1 | 21/05/2008 | 4 | 150084 | 0.75 | NW | 1 | 21/05/2008 | 4 | 150105 | 0.75 | NW | 1 | 21/05/2008 | 4 | 150126 | 0.75 | NW | 1 | 21/05/2008 | 4 | 150147 | 0.75 | NW | 1 | 21/05/2008 | 4 | 150168 | 0.75 | NW | 1 | 21/05/2008 | 4 | 150189 | 0.75 | NW | 1 | 21/05/2008 | 4 | 150210 | 0.75 | NW | 1 | 21/05/2008 | 4 | 150231 | 0.75 | NW | 1 | 21/05/2008 | 4 | 150252 | 0.75 | NW | 1 | 21/05/2008 | 4 | 150273 | 0.75 | NW | 1 | 21/05/2008 | 4 | 150294 | 0.75 | NW | 1 | 21/05/2008 | 4 | 150315 | 0.75 | NW | 1 | 21/05/2008 | 4 | 150336 | 0.75 | NW | 1 | 21/05/2008 | 4 | 150357 | 0.75 | NW | 1 | 21/05/2008 | 4 | 150378 | 0.75 | NW | 1 | 21/05/2008 | 4 | 150399 | 0.75 | NW | 1 | 21/05/2008 | 4 | 150420 | 0.75 | NW | 1 | 21/05/2008 | 4 | 150441 | 0.75 | NW | 1 | 21/05/2008 | 4 | 150462 | 0.75 | NW | 1 | 21/05/2008 | 4 | 150483 | 0.75 | NW | 1 | 21/05/2008 | 4 | 150504 | 0.75 | NW | 1 | 21/05/2008 | 4 | 150525 | 0.75 | NW | 1 | 21/05/2008 | 4 | 150546 | 0.75 | NW | 1 | 21/05/2008 | 4 | 150567 | 0.75 | NW | 1 | 21/05/2008 | 4 | 150588 | 0.75 | NW | 1 | 21/05/2008 | 4 | 150609 | 0.75 | NW | 1 | 21/05/2008 | 4 | 150630 | 0.75 | NW | 1 | 21/05/2008 | 4 | 150651 | 0.75 | NW | 1 | 21/05/2008 | 4 | 150672 | 0.75 | NW | 1 | 21/05/2008 | 4 | 150693 | 0.75 | NW | 1 | 21/05/2008 | 4 | 150714 | 0.75 | NW | 1 | 21/05/2008 | 4 | 150735 | 0.75 | NW | 1 | 21/05/2008 | 4 | 150756 | 0.75 | NW | 1 | 21/05/2008 | 4 | 150777 | 0.75 | NW | 1 | 21/05/2008 | 4 | 150798 | 0.75 | NW | 1 | 21/05/2008 | 4 | 150819 | 0.75 | NW | 1 | 21/05/2008 | 4 | 150840 | 0.75 | NW | 1 | 21/05/2008 | 4 | 150861 | 0.75 | NW | 1 | 21/05/2008 | 4 | 150882 | 0.75 | NW | 1 | 21/05/2008 | 4 | 150903 | 0.75 | NW | 1 | 21/05/2008 | 4 | 150924 | 0.75 | NW | 1 | 21/05/2008 | 4 | 150945 | 0.75 | NW | 1 | 21/05/2008 | 4 | 150966 | 0.75 | NW | 1 | 21/05/2008 | 4 | 150987 | 0.75 | NW | 1 | 21/05/2008 | 4 | 151008 | 0.75 | NW | 1 | 21/05/2008 | 4 | 151029 | 0.75 | NW | 1 | 21/05/2008 | 4 | 151050 | 0.75 | NW | 1 | 21/05/2008 | 4 | 151071 | 0.75 | NW | 1 | 21/05/2008 | 4 | 151092 | 0.75 | NW | 1 | 21/05/2008 | 4 | 151113 | 0.75 | NW | 1 | 21/05/2008 | 4 | 151134 | 0.75 | NW | 1 | 21/05/2008 | 4 | 151155 | 0.75 | NW | 1 | 21/05/2008 | 4 | 151176 | 0.75 | NW | 1 | 21/05/2008 | 4 | 151197 | 0.75 | NW | 1 | 21/05/2008 | 4 | 151218 | 0.75 | NW | 1 | 21/05/2008 | 4 | 151239 | 0.75 | NW | 1 | 21/05/2008 | 4 | 151260 | 0.75 | NW | 1 | 21/05/2008 | 4 | 151281 | 0.75 | NW | 1 | 21/05/2008 | 4 | 151302 | 0.75 | NW | 1 | 21/05/2008 | 4 | 151323 | 0.75 | NW | 1 | 21/05/2008 | 4 | 151344 | 0.75 | NW | 1 | 21/05/2008 | 4 | 151365 | 0.75 | NW | 1 | 21/05/2008 | 4 | 151386 | 0.75 | NW | 1 | 21/05/2008 | 4 | 151407 | 0.75 | NW | 1 | 21/05/2008 | 4 | 151428 | 0.75 | NW | 1 | 21/05/2008 | 4 | 151449 | 0.75 | NW | 1 | 21/05/2008 | 4 | 151470 | 0.75 | NW | 1 | 21/05/2008 | 4 | 151491 | 0.75 | NW | 1 | 21/05/2008 | 4 | 151512 | 0.75 | NW | 1 | 21/05/2008 | 4 | 151533 | 0.75 | NW | 1 | 21/05/2008 | 4 | 151554 | 0.75 | NW | 1 | 21/05/2008 | 4 | 151575 | 0.75 | NW | 1 | 21/05/2008 | 4 | 151596 | 0.75 | NW | 1 | 21/05/2008 | 4 | 151617 | 0.75 | NW | 1 | 21/05/2008 | 4 | 151638 | 0.75 | NW | 1 | 21/05/2008 | 4 | 151659 | 0.75 | NW | 1 | 21/05/2008 | 4 | 151680 | 0.75 | NW | 1 | 21/05/2008 | 4 | 151701 | 0.75 | NW | 1 | 21/05/2008 | 4 | 151722 | 0.75 | NW | 1 | 21/05/2008 | 4 | 151743 | 0.75 | NW | 1 | 21/05/2008 | 4 | 151764 | 0.75 | NW | 1 | 21/05/2008 | 4 | 151785 | 0.75 | NW | 1 | 21/05/2008 | 4 | 151806 | 0.75 | NW | 1 | 21/05/2008 | 4 | 151827 | 0.75 | NW | 1 | 21/05/2008 | 4 | 151848 | 0.75 | NW | 1 | 21/05/2008 | 4 | 151869 | 0.75 | NW | 1 | 21/05/2008 | 4 | 151890 | 0.75 | NW | 1 | 21/05/2008 | 4 | 151911 | 0.75 | NW | 1 | 21/05/2008 | 4 | 151932 | 0.75 | NW | 1 | 21/05/2008 | 4 | 151953 | 0.75 | NW | 1 | 21/05/2008 | 4 | 151974 | 0.75 | NW | 1 | 21/05/2008 | 4 | 151995 | 0.75 | NW | 1 | 21/05/2008 | 4 | 152016 | 0.75 | NW | 1 | 21/05/2008 | 4 | 152037 | 0.75 | NW | 1 | 21/05/2008 | 4 | 152058 | 0.75 | NW | 1 | 21/05/2008 | 4 | 152079 | 0.75 | NW | 1 | 21/05/2008 | 4 | 152100 | 0.75 | NW | 1 | 21/05/2008 | 4 | 152121 | 0.75 | NW | 1 | 21/05/2008 | 4 | 152142 | 0.75 | NW | 1 | 21/05/2008 | 4 | 152163 | 0.75 | NW | 1 | 21/05/2008 | 4 | 152184 | 0.75 | NW | 1 | 21/05/2008 | 4 | 152205 | 0.75 | NW | 1 | 21/05/2008 | 4 | 1522 |
|--------|-----------|----------|----|-------|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|--------|------|----|---|------------|---|------|



## **Appendix B** – Groundwater Well Installation Permits

**DEPARTMENT FOR ENVIRONMENT AND WATER**

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

**PERMIT to undertake a WATER AFFECTING ACTIVITY**  
pursuant to section 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,

|                     |            |
|---------------------|------------|
| <b>Permit No:</b>   | 351375     |
| <b>Expiry Date:</b> | 03/10/2020 |

**Permission is hereby granted to:** GHD PTY LTD  
ACN 008 488 373  
LEVEL 4, 211 VICTORIA SQUARE  
ADELAIDE SA 5000

**To undertake the following water affecting activity:**

**Activity:** Well Construction

**Well Use:** Investigation

**CONDITIONS:**

1. The activity authorised by this permit must only be undertaken on the land described below:  
CT 5135/492  
Strata Unit 1 in Strata Plan 12521  
Hundred of Port Adelaide
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. 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.
4. 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.
5. This work may be subject to inspection by the Department's Drilling Inspectors.
6. 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.
7. 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.
8. Water samples are required from all wells drilled in respect of this permit.

## DEPARTMENT FOR ENVIRONMENT AND WATER

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

### **PERMIT to undertake a WATER AFFECTING ACTIVITY**

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

### **WELL PERMIT**

9. Strata samples are not required.
10. 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.
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 as per the 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 not to penetrate beyond a depth of 15 metres unless approved by the Regional Hydrogeologist.
16. This permit authorises the construction of a well on the portion of road adjacent to the land parcel described above.
17. Due to known nearby soil/groundwater contamination in the sediments and aquifers above, caution should be taken in the drilling and/or cementing of this well(s).

#### **NOTES:**

1. 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.
2. This permit is not transferable.
3. This well construction permit is not an authorisation for a person to enter private property and prior authority must be obtained from the land owner in all circumstances.
4. The issue of this permit does not negate the requirement to comply with the provisions of other Acts that may impact on the activity undertaken pursuant to this permit.
5. This permit is not an approval to clear native vegetation.
6. It is recommended that all drilling equipment be decontaminated prior to construction of a new well or rehabilitation of an existing well to prevent the introduction or transfer of iron bacteria. Similar precautions should also be taken with pump installation equipment.
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.

**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**

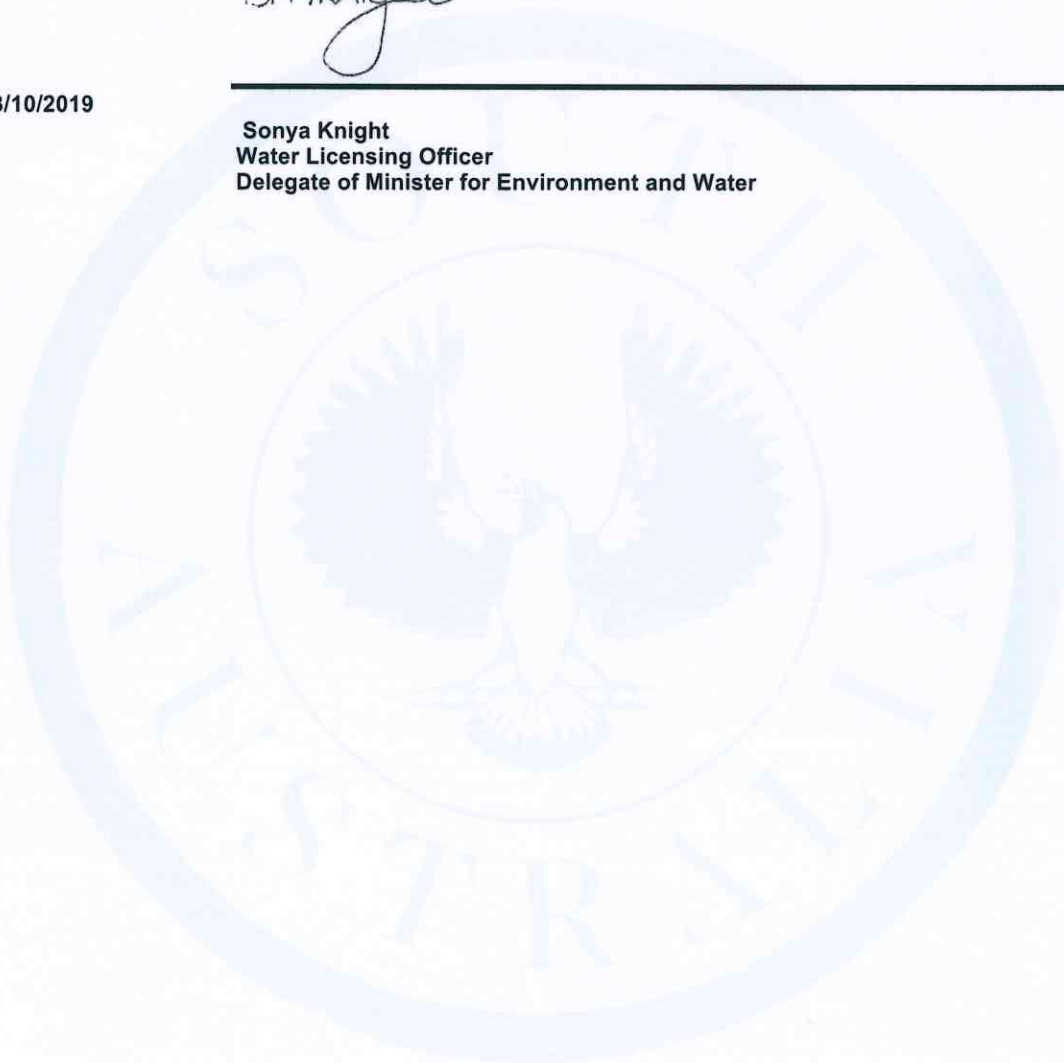
**TAKE NOTE** that the permit holder, or a person acting on behalf of the permit holder, who contravenes or fails to comply with a condition of this permit is guilty of an offence, and such acts or omissions may result in the variation, suspension or revocation of the permit.



Date: 03/10/2019

---

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



**DEPARTMENT FOR ENVIRONMENT AND WATER**

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

**PERMIT to undertake a WATER AFFECTING ACTIVITY**  
pursuant to section 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,

|                     |            |
|---------------------|------------|
| <b>Permit No:</b>   | 351376     |
| <b>Expiry Date:</b> | 03/10/2020 |

**Permission is hereby granted to:** GHD PTY LTD  
ACN 008 488 373  
LEVEL 4, 211 VICTORIA SQUARE  
ADELAIDE SA 5000

**To undertake the following water affecting activity:**

**Activity:** Well Construction

**Well Use:** Investigation

**CONDITIONS:**

1. The activity authorised by this permit must only be undertaken on the land described below:  
CT 6051/824  
Allotment 80 in Deposited Plan 82872  
Hundred of Port Adelaide
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. 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.
4. 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.
5. This work may be subject to inspection by the Department's Drilling Inspectors.
6. 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.
7. 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.
8. Water samples are required from all wells drilled in respect of this permit.

## DEPARTMENT FOR ENVIRONMENT AND WATER

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

### **PERMIT to undertake a WATER AFFECTING ACTIVITY**

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

### **WELL PERMIT**

9. Strata samples are not required.
10. 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.
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 as per the 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 not to penetrate beyond a depth of 15 metres unless approved by the Regional Hydrogeologist.
16. This permit authorises the construction of a well on the portion of road adjacent to the land parcel described above.
17. Due to known soil/groundwater contamination in the sediments and aquifers above, caution should be taken in the drilling and/or cementing of this well.

#### **NOTES:**

1. Under section 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.
2. This permit is not transferable.
3. This well construction permit is not an authorisation for a person to enter private property and prior authority must be obtained from the land owner in all circumstances.
4. The issue of this permit does not negate the requirement to comply with the provisions of other Acts that may impact on the activity undertaken pursuant to this permit.
5. This permit is not an approval to clear native vegetation.
6. It is recommended that all drilling equipment be decontaminated prior to construction of a new well or rehabilitation of an existing well to prevent the introduction or transfer of iron bacteria. Similar precautions should also be taken with pump installation equipment.
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.

**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**

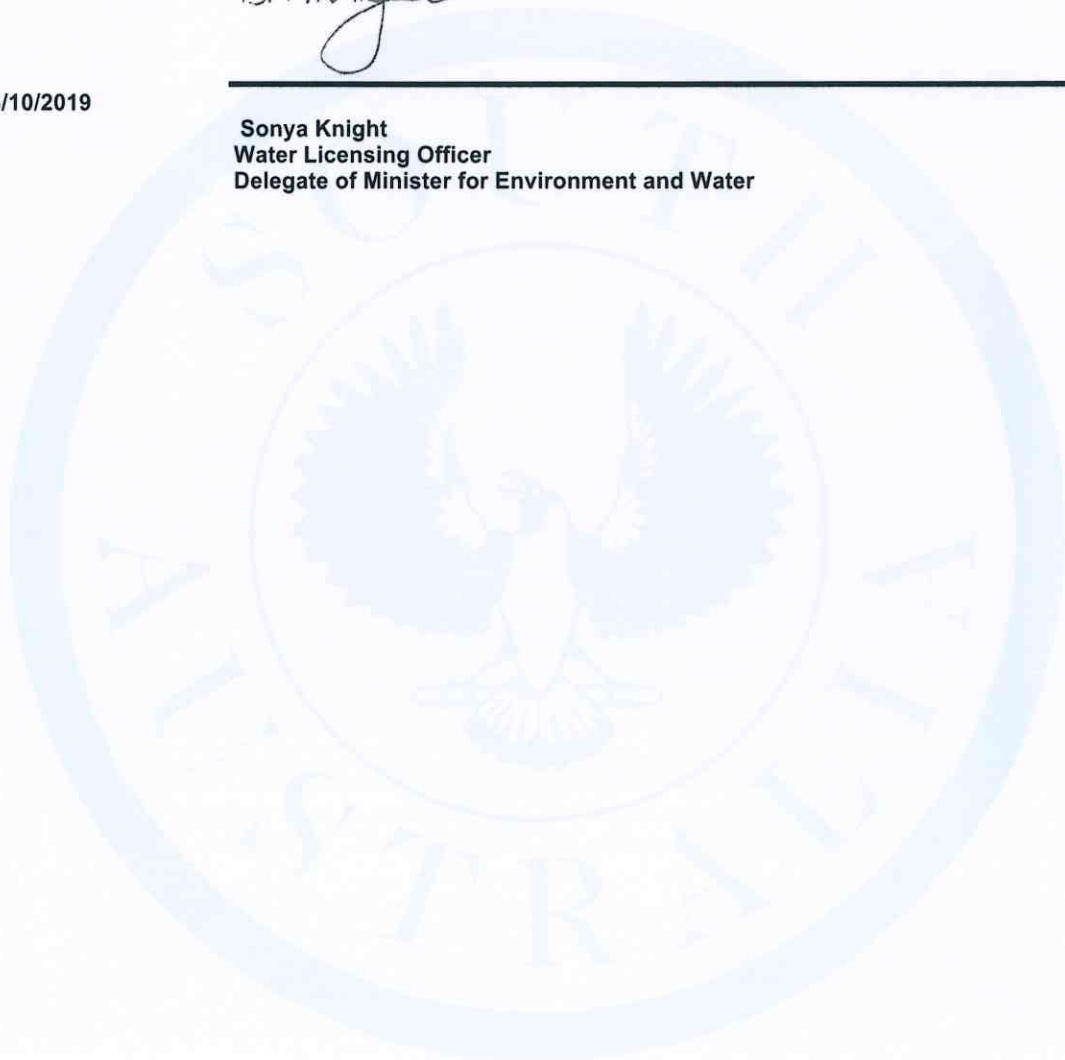
**TAKE NOTE** that the permit holder, or a person acting on behalf of the permit holder, who contravenes or fails to comply with a condition of this permit is guilty of an offence, and such acts or omissions may result in the variation, suspension or revocation of the permit.



Date: 03/10/2019

---

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



**DEPARTMENT FOR ENVIRONMENT AND WATER**

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

**PERMIT to undertake a WATER AFFECTING ACTIVITY**  
pursuant to section 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,

|                     |            |
|---------------------|------------|
| <b>Permit No:</b>   | 351377     |
| <b>Expiry Date:</b> | 03/10/2020 |

**Permission is hereby granted to:** GHD PTY LTD  
ACN 008 488 373  
LEVEL 4, 211 VICTORIA SQUARE  
ADELAIDE SA 5000

**To undertake the following water affecting activity:**

**Activity:** Well Construction

**Well Use:** Investigation

**CONDITIONS:**

1. The activity authorised by this permit must only be undertaken on the land described below:  
CT 5954/627  
Piece 77 in Deposited Plan 69689  
Hundred of Port Adelaide
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. 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.
4. 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.
5. This work may be subject to inspection by the Department's Drilling Inspectors.
6. 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.
7. 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.
8. Water samples are required from all wells drilled in respect of this permit.

## DEPARTMENT FOR ENVIRONMENT AND WATER

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

### **PERMIT to undertake a WATER AFFECTING ACTIVITY** pursuant to section 135 of the *Natural Resources Management Act 2004* **WELL PERMIT**

9. Strata samples are not required.
10. 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.
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 as per the 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 not to penetrate beyond a depth of 15 metres unless approved by the Regional Hydrogeologist.
16. This permit authorises the construction of a well on the portion of road adjacent to the land parcel described above.
17. Due to known soil/groundwater contamination in the sediments and aquifers above, caution should be taken in the drilling and/or cementing of this well.

#### **NOTES:**

1. Under section 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.
2. This permit is not transferable.
3. This well construction permit is not an authorisation for a person to enter private property and prior authority must be obtained from the land owner in all circumstances.
4. The issue of this permit does not negate the requirement to comply with the provisions of other Acts that may impact on the activity undertaken pursuant to this permit.
5. This permit is not an approval to clear native vegetation.
6. It is recommended that all drilling equipment be decontaminated prior to construction of a new well or rehabilitation of an existing well to prevent the introduction or transfer of iron bacteria. Similar precautions should also be taken with pump installation equipment.
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.

**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**

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



Date: 03/10/2019

---

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

**DEPARTMENT FOR ENVIRONMENT AND WATER**

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

**PERMIT to undertake a WATER AFFECTING ACTIVITY**  
pursuant to section 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,

|                     |            |
|---------------------|------------|
| <b>Permit No:</b>   | 351378     |
| <b>Expiry Date:</b> | 03/10/2020 |

**Permission is hereby granted to:** GHD PTY LTD  
ACN 008 488 373  
LEVEL 4, 211 VICTORIA SQUARE  
ADELAIDE SA 5000

**To undertake the following water affecting activity:**

**Activity:** Well Construction

**Well Use:** Investigation

**CONDITIONS:**

1. The activity authorised by this permit must only be undertaken on the land described below:  
CT 5954/615  
Allotment 63 in Deposited Plan 69689  
Hundred of Port Adelaide
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. 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.
4. 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.
5. This work may be subject to inspection by the Department's Drilling Inspectors.
6. 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.
7. 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.
8. Water samples are required from all wells drilled in respect of this permit.

## DEPARTMENT FOR ENVIRONMENT AND WATER

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

### **PERMIT to undertake a WATER AFFECTING ACTIVITY**

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

### **WELL PERMIT**

9. Strata samples are not required.
10. 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.
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 as per the 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 not to penetrate beyond a depth of 15 metres unless approved by the Regional Hydrogeologist.
16. This permit authorises the construction of a well on the portion of road adjacent to the land parcel described above.
17. Due to known soil/groundwater contamination in the sediments and aquifers above, caution should be taken in the drilling and/or cementing of this well.

#### **NOTES:**

1. Under section 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.
2. This permit is not transferable.
3. This well construction permit is not an authorisation for a person to enter private property and prior authority must be obtained from the land owner in all circumstances.
4. The issue of this permit does not negate the requirement to comply with the provisions of other Acts that may impact on the activity undertaken pursuant to this permit.
5. This permit is not an approval to clear native vegetation.
6. It is recommended that all drilling equipment be decontaminated prior to construction of a new well or rehabilitation of an existing well to prevent the introduction or transfer of iron bacteria. Similar precautions should also be taken with pump installation equipment.
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.

**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**

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



Date: 03/10/2019

---

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

**DEPARTMENT FOR ENVIRONMENT AND WATER**

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

**PERMIT to undertake a WATER AFFECTING ACTIVITY**  
pursuant to section 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,

|                     |            |
|---------------------|------------|
| <b>Permit No:</b>   | 351379     |
| <b>Expiry Date:</b> | 03/10/2020 |

**Permission is hereby granted to:** GHD PTY LTD  
ACN 008 488 373  
LEVEL 4, 211 VICTORIA SQUARE  
ADELAIDE SA 5000

**To undertake the following water affecting activity:**

**Activity:** Well Construction

**Well Use:** Investigation

**CONDITIONS:**

1. The activity authorised by this permit must only be undertaken on the land described below:  
CT 5808/458  
Allotment 1001 in Filed Plan 30530  
Hundred of Port Adelaide
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. 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.
4. 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.
5. This work may be subject to inspection by the Department's Drilling Inspectors.
6. 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.
7. 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.
8. Water samples are required from all wells drilled in respect of this permit.

## DEPARTMENT FOR ENVIRONMENT AND WATER

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

### **PERMIT to undertake a WATER AFFECTING ACTIVITY** pursuant to section 135 of the *Natural Resources Management Act 2004* **WELL PERMIT**

9. Strata samples are not required.
10. 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.
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 as per the 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 not to penetrate beyond a depth of 15 metres unless approved by the Regional Hydrogeologist.
16. This permit authorises the construction of a well on the portion of road adjacent to the land parcel described above.
17. Due to known nearby soil/groundwater contamination in the sediments and aquifers above, caution should be taken in the drilling and/or cementing of this well(s).

#### **NOTES:**

1. 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.
2. This permit is not transferable.
3. This well construction permit is not an authorisation for a person to enter private property and prior authority must be obtained from the land owner in all circumstances.
4. The issue of this permit does not negate the requirement to comply with the provisions of other Acts that may impact on the activity undertaken pursuant to this permit.
5. This permit is not an approval to clear native vegetation.
6. It is recommended that all drilling equipment be decontaminated prior to construction of a new well or rehabilitation of an existing well to prevent the introduction or transfer of iron bacteria. Similar precautions should also be taken with pump installation equipment.
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.

**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**

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



Date: 03/10/2019

---

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

**DEPARTMENT FOR ENVIRONMENT AND WATER**

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

**PERMIT to undertake a WATER AFFECTING ACTIVITY**  
pursuant to section 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,

|                     |            |
|---------------------|------------|
| <b>Permit No:</b>   | 351380     |
| <b>Expiry Date:</b> | 03/10/2020 |

**Permission is hereby granted to:** GHD PTY LTD  
ACN 008 488 373  
LEVEL 4, 211 VICTORIA SQUARE  
ADELAIDE SA 5000

**To undertake the following water affecting activity:**

**Activity:** Well Construction

**Well Use:** Investigation

**CONDITIONS:**

1. The activity authorised by this permit must only be undertaken on the land described below:  
CT 5808/458  
Allotment 1001 in Filed Plan 30530  
Hundred of Port Adelaide
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. 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.
4. 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.
5. This work may be subject to inspection by the Department's Drilling Inspectors.
6. 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.
7. 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.
8. Water samples are required from all wells drilled in respect of this permit.

## DEPARTMENT FOR ENVIRONMENT AND WATER

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

### **PERMIT to undertake a WATER AFFECTING ACTIVITY**

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

### **WELL PERMIT**

9. Strata samples are not required.
10. 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.
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 as per the 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 not to penetrate beyond a depth of 15 metres unless approved by the Regional Hydrogeologist.
16. This permit authorises the construction of a well on the portion of road adjacent to the land parcel described above.
17. Due to known nearby soil/groundwater contamination in the sediments and aquifers above, caution should be taken in the drilling and/or cementing of this well(s).

#### **NOTES:**

1. 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.
2. This permit is not transferable.
3. This well construction permit is not an authorisation for a person to enter private property and prior authority must be obtained from the land owner in all circumstances.
4. The issue of this permit does not negate the requirement to comply with the provisions of other Acts that may impact on the activity undertaken pursuant to this permit.
5. This permit is not an approval to clear native vegetation.
6. It is recommended that all drilling equipment be decontaminated prior to construction of a new well or rehabilitation of an existing well to prevent the introduction or transfer of iron bacteria. Similar precautions should also be taken with pump installation equipment.
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.

**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**

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



Date: 03/10/2019

---

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

**DEPARTMENT FOR ENVIRONMENT AND WATER**

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

**PERMIT to undertake a WATER AFFECTING ACTIVITY**  
pursuant to section 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,

|                     |            |
|---------------------|------------|
| <b>Permit No:</b>   | 351381     |
| <b>Expiry Date:</b> | 03/10/2020 |

**Permission is hereby granted to:** GHD PTY LTD  
ACN 008 488 373  
LEVEL 4, 211 VICTORIA SQUARE  
ADELAIDE SA 5000

**To undertake the following water affecting activity:**

**Activity:** Well Construction

**Well Use:** Investigation

**CONDITIONS:**

1. The activity authorised by this permit must only be undertaken on the land described below:  
CT 5808/458  
Allotment 9 in Filed Plan 4994  
Hundred of Port Adelaide
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. 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.
4. 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.
5. This work may be subject to inspection by the Department's Drilling Inspectors.
6. 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.
7. 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.
8. Water samples are required from all wells drilled in respect of this permit.

## DEPARTMENT FOR ENVIRONMENT AND WATER

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

### **PERMIT to undertake a WATER AFFECTING ACTIVITY**

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

### **WELL PERMIT**

9. Strata samples are not required.
10. 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.
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 as per the 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 not to penetrate beyond a depth of 15 metres unless approved by the Regional Hydrogeologist.
16. This permit authorises the construction of a well on the portion of road adjacent to the land parcel described above.
17. Due to known nearby soil/groundwater contamination in the sediments and aquifers above, caution should be taken in the drilling and/or cementing of this well(s).

#### **NOTES:**

1. 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.
2. This permit is not transferable.
3. This well construction permit is not an authorisation for a person to enter private property and prior authority must be obtained from the land owner in all circumstances.
4. The issue of this permit does not negate the requirement to comply with the provisions of other Acts that may impact on the activity undertaken pursuant to this permit.
5. This permit is not an approval to clear native vegetation.
6. It is recommended that all drilling equipment be decontaminated prior to construction of a new well or rehabilitation of an existing well to prevent the introduction or transfer of iron bacteria. Similar precautions should also be taken with pump installation equipment.
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.

**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**

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



Date: 03/10/2019

---

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

## **Appendix C** – Borehole Logs

## BOREHOLE LOG SHEET

Client : South Australian Metropolitan Fire Service

Project : MFS Monitoring Wells

Location : Largs North, SA

HOLE No. MW12

SHEET 1 OF 1

Position : Refer to test location plan MGA94 54

Surface RL: -3.40m AHD

Angle from Horiz. : 90°

Processed : JC

Rig Type : EziProbe

Mounting: Landcruiser

Contractor : WB Drilling

Driller : I &amp; D Watt

Checked : DV

Date Started : 11/10/2019

Date Completed : 11/10/2019

Logged by : JC

Date: 04/11/2019

Note: \* indicates signatures on original issue of log or last revision of log

## BOREHOLE

| DRILLING  |                     |                        |       | MATERIAL            |             |            |                                                                                                                                                                                                                                                                                                                            | Comments/<br>Observations | BOREHOLE Log                | Components                                     |
|-----------|---------------------|------------------------|-------|---------------------|-------------|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|-----------------------------|------------------------------------------------|
| SCALE (m) | Drilling Method     | Hole Support<br>Casing | Water | Depth / (RL) metres | Graphic Log | USC Symbol | Description<br>[COBBLES/BOULDERS/FILL/TOPSOIL]<br>then<br>SOIL NAME: plasticity / primary particle characteristics, colour, secondary and minor components, zoning (origin) and<br>ROCK NAME: grain size, colour, fabric / texture, inclusions or minor components, durability, strength, weathering / alteration, defects | Moisture Condition        | Consistency / Density Index |                                                |
| 1         | Hand Auger          |                        |       | 0.11                |             | (SM)       | FILL: Silty SAND, pale brown, fine to medium grained, moderately well sorted.                                                                                                                                                                                                                                              | D                         | -                           | No odour                                       |
|           |                     |                        |       | 0.24                |             | (ML)       |                                                                                                                                                                                                                                                                                                                            | D                         | -                           | No odour.                                      |
|           |                     |                        |       | 0.31                |             | (SC)       | FILL: Sandy SILT, brown to dark brown, non-plastic, fine grained, moderately well sorted sand, trace organics.                                                                                                                                                                                                             | D                         | -                           | No odour.                                      |
|           |                     |                        |       |                     |             | SP         | FILL: Clayey SAND, pale brown, fine to coarse grained, well sorted, low plasticity fines, some gravel.<br>SAND, pale brown, fine grained, well sorted.                                                                                                                                                                     | D                         | -                           |                                                |
|           |                     |                        |       | 1.15                |             | SP         | SAND, dark yellowish orange, fine grained, well sorted.                                                                                                                                                                                                                                                                    | D                         | -                           | No odour.                                      |
| 2         | Push Tube           | Nil                    |       | 2.03                |             | SP         | SAND, dark yellowish orange, fine grained, well sorted.                                                                                                                                                                                                                                                                    | W                         | -                           | No odour.<br>Groundwater Encountered at 2.03m. |
| 3         |                     |                        |       | 2.75                |             | SP         | SAND, grey, fine grained, well sorted.                                                                                                                                                                                                                                                                                     | W                         | -                           | No odour.                                      |
| 4         | Hollow Flight Auger |                        |       | 4.50                |             |            | End of borehole at 4.50 metres.<br>Target Depth                                                                                                                                                                                                                                                                            |                           |                             |                                                |
| 5         |                     |                        |       |                     |             |            |                                                                                                                                                                                                                                                                                                                            |                           |                             |                                                |

See standard sheets for details of abbreviations &amp; basis of descriptions



GHD

Level 4, 211 Victoria Square, Adelaide SA 5000 Australia  
T: +61 8 8111 6600 F: +61 8 8111 6699 E: adlmail@ghd.com

CONSULTING GEOTECHNICAL ENGINEERS AND GEOLOGISTS

Job No.

3319080

GEO BOREHOLE ASI726 2017 3319080.MW12-MW18.GPJ GHD GEO TEMPLATE 2.00.GDT 18/11/19

## BOREHOLE LOG SHEET

Client : South Australian Metropolitan Fire Service

Project : MFS Monitoring Wells

Location : Largs North, SA

HOLE No. MW13

SHEET 1 OF 1

Position : Refer to test location plan MGA94 54

Surface RL: -9.20m AHD

Angle from Horiz. : 90°

Processed : JC

Rig Type : EziProbe

Mounting: Landcruiser

Contractor : WB Drilling

Driller : I &amp; D Watt

Checked : DV

Date Started : 11/10/2019

Date Completed : 11/10/2019

Logged by : JC

Date: 04/11/2019

| DRILLING  |                     |                       |       |                 | MATERIAL            |             |                                                                                         |                                                                                                                                                                                                                                                                                                                            |                                                   |                             |                           | BOREHOLE     |            |                                              |                             |
|-----------|---------------------|-----------------------|-------|-----------------|---------------------|-------------|-----------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|-----------------------------|---------------------------|--------------|------------|----------------------------------------------|-----------------------------|
| SCALE (m) | Drilling Method     | Hole Support \ Casing | Water | Samples & Tests | Depth / (RL) metres | Graphic Log | USC Symbol                                                                              | Description<br>[COBBLES/BOULDERS/FILL/TOPSOIL]<br>then<br>SOIL NAME: plasticity / primary particle characteristics, colour, secondary and minor components, zoning (origin) and<br>ROCK NAME: grain size, colour, fabric / texture, inclusions or minor components, durability, strength, weathering / alteration, defects | Moisture Condition                                | Consistency / Density Index | Comments/<br>Observations | BOREHOLE Log | Components |                                              |                             |
| 1         | Hand Auger          | Nil                   |       |                 | 0.60                |             | (SP)                                                                                    | FILL: SAND, pale brown, fine to medium grained, poorly sorted, some gravel, trace organics.                                                                                                                                                                                                                                | D                                                 | -                           | No odour.                 |              | Gatic      |                                              |                             |
|           |                     |                       |       |                 |                     | (SP)        | FILL: SAND, pale brown, fine to medium grained, poorly sorted, some calcareous content. | D                                                                                                                                                                                                                                                                                                                          | -                                                 | No odour.                   | Bentonite                 |              |            |                                              |                             |
| 2         | Push Tube           |                       |       |                 |                     | 1.38        |                                                                                         | SP                                                                                                                                                                                                                                                                                                                         | SAND, pale brown, fine grained, well sorted.      | D                           | -                         |              | No odour.  | No odour.<br>Groundwater encountered at 2.1m | Filter Pack (Sand 2 - 3 mm) |
|           |                     |                       |       |                 |                     | 1.85        |                                                                                         | SP                                                                                                                                                                                                                                                                                                                         | SAND, yellowish brown, fine grained, well sorted. | D                           | -                         |              | No odour.  |                                              |                             |
|           |                     |                       |       |                 |                     | 2.10        |                                                                                         | SP                                                                                                                                                                                                                                                                                                                         | SAND, yellowish brown, fine grained, well sorted. | W                           | -                         |              | No odour.  |                                              |                             |
| 3         | Hollow Flight Auger |                       |       |                 |                     | 2.70        |                                                                                         | SP                                                                                                                                                                                                                                                                                                                         | SAND, grey, fine grained, well sorted.            | W                           | -                         |              | No odour.  | Screen                                       |                             |
| 4.50      |                     |                       |       |                 |                     |             |                                                                                         |                                                                                                                                                                                                                                                                                                                            |                                                   |                             |                           |              |            |                                              |                             |
| 5         |                     |                       |       |                 |                     |             |                                                                                         | End of borehole at 4.50 metres.<br>Target Depth                                                                                                                                                                                                                                                                            |                                                   |                             |                           |              |            |                                              |                             |

Note: \* indicates signatures on original issue of log or last revision of log  
BOREHOLE

See standard sheets for details of abbreviations &amp; basis of descriptions



GHD

Level 4, 211 Victoria Square, Adelaide SA 5000 Australia  
T: +61 8 8111 6600 F: +61 8 8111 6699 E: adlmail@ghd.com

CONSULTING GEOTECHNICAL ENGINEERS AND GEOLOGISTS

Job No.

3319080

## BOREHOLE LOG SHEET

Client : South Australian Metropolitan Fire Service

Project : MFS Monitoring Wells

Location : Largs North, SA

HOLE No. MW14

SHEET 1 OF 1

Position : Refer to test location plan MGA94 54

Surface RL: 8.70m AHD

Angle from Horiz. : 90°

Processed : JC

Rig Type : EziProbe

Mounting: Landcruiser

Contractor : WB Drilling

Driller : I &amp; D Watt

Checked : DV

Date Started : 11/10/2019

Date Completed : 11/10/2019

Logged by : JC

Date: 04/11/2019

Note: \* indicates signatures on original issue of log or last revision of log  
**BOREHOLE**

| DRILLING  |                     |                       |       |                 | MATERIAL            |             |                                                                  |                                                                                                                                                                                                                                                                                                                            |                    |                                                           |                           | Note: * indicates signatures on original issue of log or last revision of log<br>BOREHOLE |            |
|-----------|---------------------|-----------------------|-------|-----------------|---------------------|-------------|------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-----------------------------------------------------------|---------------------------|-------------------------------------------------------------------------------------------|------------|
| SCALE (m) | Drilling Method     | Hole Support \ Casing | Water | Samples & Tests | Depth / (RL) metres | Graphic Log | USC Symbol                                                       | Description<br>[COBBLES/BOULDERS/FILL/TOPSOIL]<br>then<br>SOIL NAME: plasticity / primary particle characteristics, colour, secondary and minor components, zoning (origin) and<br>ROCK NAME: grain size, colour, fabric / texture, inclusions or minor components, durability, strength, weathering / alteration, defects | Moisture Condition | Consistency / Density Index                               | Comments/<br>Observations | BOREHOLE Log                                                                              | Components |
| 1         | Hand Auger          | Nil                   |       |                 | 0.31                |             | (SP)                                                             | FILL: SAND, pale brown, fine grained, moderately well sorted, trace gravel and organics.                                                                                                                                                                                                                                   | D                  | -                                                         | No odour                  |                                                                                           | Gatic      |
|           | 0.95                |                       |       |                 |                     | SP          | SAND, pale brown, fine grained, well sorted.                     | D                                                                                                                                                                                                                                                                                                                          | -                  | No odour                                                  |                           | Grout                                                                                     |            |
| 2         | Push Tube           |                       |       |                 | 2.10                |             | SP                                                               | SAND, yellowish brown, fine grained, well sorted.                                                                                                                                                                                                                                                                          | D                  | -                                                         | No odour                  |                                                                                           | Bentonite  |
|           | 2.35                |                       |       |                 |                     | SP          | SAND, yellowish brown mottled orange, fine grained, well sorted. | W                                                                                                                                                                                                                                                                                                                          | -                  | No odour.<br>Groundwater encountered at 2.1m.<br>No odour |                           |                                                                                           |            |
|           | 2.80                |                       |       |                 |                     | SP          | SAND, grey, fine grained, well sorted.                           | W                                                                                                                                                                                                                                                                                                                          | -                  | Sulphur odour.<br>No visual evidence of contamination.    |                           |                                                                                           |            |
|           | 3.15                |                       |       |                 |                     | SP          | SAND, grey, fine grained, well sorted.                           | W                                                                                                                                                                                                                                                                                                                          | -                  |                                                           |                           |                                                                                           |            |
| 3         | Hollow Flight Auger |                       |       |                 | 4.50                |             |                                                                  |                                                                                                                                                                                                                                                                                                                            |                    | End of borehole at 4.50 metres.<br>Target Depth           |                           |                                                                                           |            |
| 4         |                     |                       |       |                 |                     |             |                                                                  |                                                                                                                                                                                                                                                                                                                            |                    |                                                           |                           |                                                                                           |            |
| 5         |                     |                       |       |                 |                     |             |                                                                  |                                                                                                                                                                                                                                                                                                                            |                    |                                                           |                           |                                                                                           |            |

See standard sheets for details of abbreviations &amp; basis of descriptions



GHD

Level 4, 211 Victoria Square, Adelaide SA 5000 Australia  
T: +61 8 8111 6600 F: +61 8 8111 6699 E: adlmail@ghd.com

CONSULTING GEOTECHNICAL ENGINEERS AND GEOLOGISTS

Job No.

3319080

## BOREHOLE LOG SHEET

Client : South Australian Metropolitan Fire Service

Project : MFS Monitoring Wells

Location : Largs North, SA

HOLE No. MW15

SHEET 1 OF 1

Position : Refer to test location plan MGA94 54

Surface RL: -18.70m AHD

Angle from Horiz. : 90°

Processed : JC

Rig Type : EziProbe

Mounting: Landcruiser

Contractor : WB Drilling

Driller : I &amp; D Watt

Checked : DV

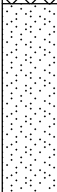
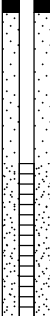
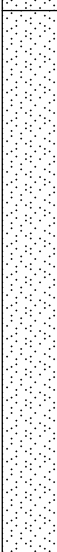
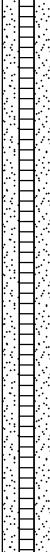
Date Started : 11/10/2019

Date Completed : 11/10/2019

Logged by : JC

Date: 04/11/2019

Note: \* indicates signatures on original issue of log or last revision of log  
BOREHOLE

| DRILLING  |                     |                       |       |                 | MATERIAL            |                                                                                     |            |                                                                                                                                                                                                                                                                                                                            |                    |                             |                                                            | Note: * indicates signatures on original issue of log or last revision of log         |                                           |
|-----------|---------------------|-----------------------|-------|-----------------|---------------------|-------------------------------------------------------------------------------------|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-----------------------------|------------------------------------------------------------|---------------------------------------------------------------------------------------|-------------------------------------------|
|           |                     |                       |       |                 | BOREHOLE            |                                                                                     |            |                                                                                                                                                                                                                                                                                                                            |                    |                             |                                                            |                                                                                       |                                           |
| SCALE (m) | Drilling Method     | Hole Support \ Casing | Water | Samples & Tests | Depth / (RL) metres | Graphic Log                                                                         | USC Symbol | Description<br>[COBBLES/BOULDERS/FILL/TOPSOIL]<br>then<br>SOIL NAME: plasticity / primary particle characteristics, colour, secondary and minor components, zoning (origin) and<br>ROCK NAME: grain size, colour, fabric / texture, inclusions or minor components, durability, strength, weathering / alteration, defects | Moisture Condition | Consistency / Density Index | Comments/<br>Observations                                  | BOREHOLE Log                                                                          | Components                                |
| 1         | Hand Auger          | Nil                   | ▽     |                 | 0.34                |    | (SP)       | FILL: SAND, pale brown, fine to medium grained, poorly sorted, trace gravel and organics.                                                                                                                                                                                                                                  | D                  | -                           | No odour.                                                  |    | Gatic                                     |
|           |                     |                       |       |                 | 0.98                |    | SP         | SAND, pale brown, fine to medium grained, well sorted.                                                                                                                                                                                                                                                                     | D                  | -                           | No odour.                                                  |    | Grout                                     |
|           |                     |                       |       |                 |                     |                                                                                     |            |                                                                                                                                                                                                                                                                                                                            |                    |                             |                                                            |                                                                                       |                                           |
|           |                     |                       |       |                 |                     |                                                                                     |            |                                                                                                                                                                                                                                                                                                                            |                    |                             |                                                            |                                                                                       |                                           |
|           |                     |                       |       |                 |                     |                                                                                     |            |                                                                                                                                                                                                                                                                                                                            |                    |                             |                                                            |                                                                                       |                                           |
| 2         | Push Tube           | Nil                   | ▽     |                 | 2.00                |   | SP         | SAND, yellowish brown, fine to medium grained, well sorted.                                                                                                                                                                                                                                                                | D                  | -                           | No odour.                                                  |   | Bentonite                                 |
|           |                     |                       |       |                 | 2.20                |                                                                                     | SP         | SAND, yellowish brown mottled orange, fine to medium grained, well sorted.                                                                                                                                                                                                                                                 | W                  | -                           | No odour.<br>Groundwater encountered at 2.0m.<br>No odour. |                                                                                       |                                           |
|           |                     |                       |       |                 |                     |                                                                                     |            |                                                                                                                                                                                                                                                                                                                            |                    |                             |                                                            |                                                                                       |                                           |
| 3         | Hollow Flight Auger | Nil                   | ▽     |                 | 2.70                |  | SP         | SAND, grey, fine grained, well sorted.                                                                                                                                                                                                                                                                                     | W                  | -                           | No odour.                                                  |  | Filter Pack (Sand 2 - 3 mm)<br><br>Screen |
|           |                     |                       |       |                 |                     |                                                                                     |            |                                                                                                                                                                                                                                                                                                                            |                    |                             |                                                            |                                                                                       |                                           |
| 4         |                     |                       |       |                 | 4.50                |  |            | End of borehole at 4.50 metres.<br>Target Depth                                                                                                                                                                                                                                                                            |                    |                             |                                                            |  |                                           |
| 5         |                     |                       |       |                 |                     |                                                                                     |            |                                                                                                                                                                                                                                                                                                                            |                    |                             |                                                            |                                                                                       |                                           |

See standard sheets for details of abbreviations &amp; basis of descriptions



GHD

Level 4, 211 Victoria Square, Adelaide SA 5000 Australia  
T: +61 8 8111 6600 F: +61 8 8111 6699 E: adlmail@ghd.com

CONSULTING GEOTECHNICAL ENGINEERS AND GEOLOGISTS

Job No.

3319080

## BOREHOLE LOG SHEET

Client : South Australian Metropolitan Fire Service

Project : MFS Monitoring Wells

Location : Largs North, SA

HOLE No. MW16

SHEET 1 OF 1

Position : Refer to test location plan MGA94 54

Surface RL: 6.60m AHD

Angle from Horiz. : 90°

Processed : JC

Rig Type : EziProbe

Mounting: Landcruiser

Contractor : WB Drilling

Driller : I &amp; D Watt

Checked : DV

Date Started : 10/10/2019

Date Completed : 10/10/2019

Logged by : JC

Date: 04/11/2019

| DRILLING  |                     |                       |       |                 | MATERIAL            |                                                                  |                                              |                                                                                                                                                                                                                                                                                                                            |                                            |                             |                                                 | BOREHOLE     |            |  |  |        |  |
|-----------|---------------------|-----------------------|-------|-----------------|---------------------|------------------------------------------------------------------|----------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|-----------------------------|-------------------------------------------------|--------------|------------|--|--|--------|--|
| SCALE (m) | Drilling Method     | Hole Support \ Casing | Water | Samples & Tests | Depth / (RL) metres | Graphic Log                                                      | USC Symbol                                   | Description<br>[COBBLES/BOULDERS/FILL/TOPSOIL]<br>then<br>SOIL NAME: plasticity / primary particle characteristics, colour, secondary and minor components, zoning (origin) and<br>ROCK NAME: grain size, colour, fabric / texture, inclusions or minor components, durability, strength, weathering / alteration, defects | Moisture Condition                         | Consistency / Density Index | Comments/<br>Observations                       | BOREHOLE Log | Components |  |  |        |  |
| 1         | Hand Auger          | Nil                   |       |                 | 0.15                |                                                                  | SP                                           | SAND, pale brown, fine grained, moderately well sorted, trace organics.                                                                                                                                                                                                                                                    | D                                          | -                           | No odour                                        |              | Gatic      |  |  |        |  |
|           |                     |                       |       |                 |                     | SP                                                               | SAND, pale brown, fine grained, well sorted. | D                                                                                                                                                                                                                                                                                                                          | -                                          | No odour.                   | Grout                                           |              |            |  |  |        |  |
| 0.67      |                     |                       |       |                 | SP                  | SAND, yellowish brown, fine grained, well sorted.                | D                                            | -                                                                                                                                                                                                                                                                                                                          | No odour.                                  | Bentonite                   |                                                 |              |            |  |  |        |  |
| 2.10      |                     |                       |       |                 | SP                  | SAND, yellowish brown, fine grained, well sorted.                | W                                            | -                                                                                                                                                                                                                                                                                                                          | No odour. Groundwater encountered at 2.1m. | Filter Pack (Sand 2 - 3 mm) |                                                 |              |            |  |  |        |  |
| 2.35      |                     |                       |       |                 | SP                  | SAND, yellowish brown mottled orange, fine grained, well sorted. | W                                            | -                                                                                                                                                                                                                                                                                                                          | No odour.                                  |                             |                                                 |              |            |  |  |        |  |
| 2.65      |                     |                       |       |                 | SP                  | SAND, grey, fine grained, well sorted.                           | W                                            | -                                                                                                                                                                                                                                                                                                                          | No odour                                   |                             |                                                 |              |            |  |  |        |  |
| 3         | Hollow Flight Auger |                       |       |                 |                     |                                                                  |                                              |                                                                                                                                                                                                                                                                                                                            |                                            |                             |                                                 |              |            |  |  | Screen |  |
|           |                     |                       |       |                 |                     |                                                                  |                                              |                                                                                                                                                                                                                                                                                                                            |                                            |                             |                                                 |              |            |  |  |        |  |
| 4         |                     |                       |       |                 |                     |                                                                  |                                              | 4.50                                                                                                                                                                                                                                                                                                                       |                                            |                             | End of borehole at 4.50 metres.<br>Target Depth |              |            |  |  |        |  |
| 5         |                     |                       |       |                 |                     |                                                                  |                                              |                                                                                                                                                                                                                                                                                                                            |                                            |                             |                                                 |              |            |  |  |        |  |

Note: \* indicates signatures on original issue of log or last revision of log  
BOREHOLE

See standard sheets for details of abbreviations &amp; basis of descriptions



GHD

Level 4, 211 Victoria Square, Adelaide SA 5000 Australia  
T: +61 8 8111 6600 F: +61 8 8111 6699 E: adlmail@ghd.com

CONSULTING GEOTECHNICAL ENGINEERS AND GEOLOGISTS

Job No.

3319080

## BOREHOLE LOG SHEET

Client : South Australian Metropolitan Fire Service

Project : MFS Monitoring Wells

Location : Largs North, SA

HOLE No. MW17

SHEET 1 OF 1

Position : Refer to test location plan MGA94 54

Surface RL: -2.70m AHD

Angle from Horiz. : 90°

Processed : JC

Rig Type : EziProbe

Mounting: Landcruiser

Contractor : WB Drilling

Driller : I &amp; D Watt

Checked : DV

Date Started : 10/10/2019

Date Completed : 10/10/2019

Logged by : JC

Date: 04/11/2019

Note: \* indicates signatures on original issue of log or last revision of log  
**BOREHOLE**

| DRILLING  |                     |                       |       |                 | MATERIAL            |             |            |                                                                                                                                                                                                                                                                                                                            |                    |                             |                                            | Note: * indicates signatures on original issue of log or last revision of log<br>BOREHOLE |                             |
|-----------|---------------------|-----------------------|-------|-----------------|---------------------|-------------|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-----------------------------|--------------------------------------------|-------------------------------------------------------------------------------------------|-----------------------------|
| SCALE (m) | Drilling Method     | Hole Support \ Casing | Water | Samples & Tests | Depth / (RL) metres | Graphic Log | USC Symbol | Description<br>[COBBLES/BOULDERS/FILL/TOPSOIL]<br>then<br>SOIL NAME: plasticity / primary particle characteristics, colour, secondary and minor components, zoning (origin) and<br>ROCK NAME: grain size, colour, fabric / texture, inclusions or minor components, durability, strength, weathering / alteration, defects | Moisture Condition | Consistency / Density Index | Comments/<br>Observations                  | BOREHOLE Log                                                                              | Components                  |
| 1         | Hand Auger          | Nil                   |       |                 | 0.47                |             | (SM)       | FILL: Silty SAND, pale brown, fine to medium grained, poorly sorted, with gravel, shells and sandstone.                                                                                                                                                                                                                    | D                  | -                           | No odour.                                  |                                                                                           | Gatic                       |
|           |                     |                       |       |                 | 0.81                |             | SP         | SAND, pale yellowish brown, fine grained, well sorted.                                                                                                                                                                                                                                                                     | D                  | -                           | No odour.                                  |                                                                                           | Grout                       |
|           |                     |                       |       |                 |                     |             | SP         | SAND, yellow-white, fine grained, well sorted.                                                                                                                                                                                                                                                                             | D                  | -                           | No odour.                                  |                                                                                           | Bentonite                   |
|           |                     |                       |       |                 | 2.20                |             | SP         | SAND, yellowish brown mottled orange, fine grained, well sorted.                                                                                                                                                                                                                                                           | W                  | -                           | No odour. Groundwater encountered at 2.2m. |                                                                                           |                             |
|           |                     |                       |       |                 | 3.10                |             | SP         | SAND, grey, fine grained, well sorted.                                                                                                                                                                                                                                                                                     | W                  | -                           | No odour.                                  |                                                                                           | Filter Pack (Sand 2 - 3 mm) |
| 4         | Hollow Flight Auger |                       |       |                 | 4.25                |             | SP         | SAND, grey mottled orange, fine grained, well sorted.                                                                                                                                                                                                                                                                      | W                  | -                           | Sulphur odour.                             | Screen                                                                                    |                             |
|           |                     |                       |       |                 | 4.50                |             |            | End of borehole at 4.50 metres.<br>Target Depth                                                                                                                                                                                                                                                                            |                    |                             |                                            |                                                                                           |                             |
| 5         |                     |                       |       |                 |                     |             |            |                                                                                                                                                                                                                                                                                                                            |                    |                             |                                            |                                                                                           |                             |

See standard sheets for details of abbreviations &amp; basis of descriptions



GHD

Level 4, 211 Victoria Square, Adelaide SA 5000 Australia  
T: +61 8 8111 6600 F: +61 8 8111 6699 E: adlmail@ghd.com

CONSULTING GEOTECHNICAL ENGINEERS AND GEOLOGISTS

Job No.

3319080

## BOREHOLE LOG SHEET

Client : South Australian Metropolitan Fire Service

Project : MFS Monitoring Wells

Location : Largs North, SA

HOLE No. MW18

SHEET 1 OF 1

Position : Refer to test location plan MGA94 54 Surface RL: -5.30m AHD Angle from Horiz. : 90° Processed : JC  
 Rig Type : EziProbe Mounting: Landcruiser Contractor : WB Drilling Driller : I & D Watt Checked : DV  
 Date Started : 10/10/2019 Date Completed : 10/10/2019 Logged by : JC Date: 04/11/2019

| DRILLING  |                 |                       |       |                 | MATERIAL            |             |                                                 |                                                                                                                                                                                                                                                                                                                            |                                               |                                                           |                           | BOREHOLE     |            |           |  |
|-----------|-----------------|-----------------------|-------|-----------------|---------------------|-------------|-------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|-----------------------------------------------------------|---------------------------|--------------|------------|-----------|--|
| SCALE (m) | Drilling Method | Hole Support \ Casing | Water | Samples & Tests | Depth / (RL) metres | Graphic Log | USC Symbol                                      | Description<br>[COBBLES/BOULDERS/FILL/TOPSOIL]<br>then<br>SOIL NAME: plasticity / primary particle characteristics, colour, secondary and minor components, zoning (origin) and<br>ROCK NAME: grain size, colour, fabric / texture, inclusions or minor components, durability, strength, weathering / alteration, defects | Moisture Condition                            | Consistency / Density Index                               | Comments/<br>Observations | BOREHOLE Log | Components |           |  |
| 1         | Hand Auger      | Nil                   |       |                 | 0.26                |             | (SC)                                            | FILL: Clayey SAND, pale brown, fine to medium grained, poorly sorted, low plasticity fines, with gravel.<br>FILL: SAND, pale brown, fine to medium grained, moderately sorted.<br>SAND, pale brown, fine grained, well sorted.                                                                                             | D                                             | -                                                         | No odour                  |              | Gatic      |           |  |
|           |                 |                       |       |                 |                     |             | (SP)                                            |                                                                                                                                                                                                                                                                                                                            | D                                             | -                                                         | No odour.                 |              | Grout      |           |  |
|           |                 |                       |       |                 |                     |             | SP                                              |                                                                                                                                                                                                                                                                                                                            | D                                             | -                                                         | No odour.                 |              |            |           |  |
|           |                 |                       |       |                 |                     |             | 0.81                                            |                                                                                                                                                                                                                                                                                                                            | SP                                            | D                                                         | -                         |              | No odour.  | Bentonite |  |
|           | Push Tube       |                       |       |                 | 2.00                | SP          | W                                               | -                                                                                                                                                                                                                                                                                                                          | No odour.<br>Groundwater encountered at 2.0m. |                                                           |                           |              |            |           |  |
|           |                 |                       |       |                 | 2.50                | SP          | W                                               | -                                                                                                                                                                                                                                                                                                                          | No odour.                                     |                                                           |                           |              |            |           |  |
|           |                 |                       |       |                 | 3                   | 3.30        | SP                                              | W                                                                                                                                                                                                                                                                                                                          | -                                             | No odour.                                                 |                           |              |            |           |  |
|           |                 |                       |       |                 |                     | 3.45        | SP                                              | W                                                                                                                                                                                                                                                                                                                          | -                                             | HC/Sulphur odour.<br>No visual evidence of contamination. |                           |              |            |           |  |
|           |                 |                       |       |                 |                     | 4           | 4.50                                            |                                                                                                                                                                                                                                                                                                                            |                                               |                                                           |                           |              |            |           |  |
|           |                 |                       |       |                 |                     |             |                                                 |                                                                                                                                                                                                                                                                                                                            |                                               |                                                           |                           |              |            |           |  |
| 5         |                 |                       |       |                 |                     |             | End of borehole at 4.50 metres.<br>Target Depth |                                                                                                                                                                                                                                                                                                                            |                                               |                                                           |                           |              |            |           |  |

See standard sheets for details of abbreviations & basis of descriptions



GHD

Level 4, 211 Victoria Square, Adelaide SA 5000 Australia  
 T: +61 8 8111 6600 F: +61 8 8111 6699 E: adlmail@ghd.com  
 CONSULTING GEOTECHNICAL ENGINEERS AND GEOLOGISTS

Job No.

3319080

## **Appendix D** – Waste Disposal Certificates

# TRANSPORT CERTIFICATE - No. 5T00341732

Created by : Pasindu Sellapperumage

CA start date: 25-Mar-2019

CA no: 5C00028030

Status: Processed

CA end date: 24-Mar-2020

## PART 1 (this part to be completed by consignor at pickup)

### CONSIGNOR

VARIOUS - PRODUCER  
VARIOUS LOCATIONS SA  
VARIOUS, SA 5000

**Role:** Producer  
**ABN/ACN:**  
**ANZSIC #:** 2919  
**Licence #:** N/A

**Contact:** ENVIRONMENT PROTECTION AU  
**Phone:** (08) 8204 2000  
**Fax:** N/A  
**Emergency:** (08) 8204 2000  
**Email:** N/A

**Pickup details:** As above

### WASTE

[See attachment for details of additional wastes transported under this TC](#)

**Waste code:** J120 - Waste oil/water, hydrocarbons/water mixtures or emulsions  
**Description:** Oil/hydrocarbon mixed with water nos  
**Form:** Liquid  
**Contaminants:** N/A  
**Proposed treatment:** Chemical/Physical treatment

*This section is not administered by EPA - contact SafeWork SA 1300 365 255 [www.safeworksa.sa.gov.au](http://www.safeworksa.sa.gov.au)*

**Dangerous goods class:** **Subsidiary risk class:** **UN no.:**  
**Packaging type:** **Packing group no:** **No. package:**

Waste amount at pick up: 0.00 Litres - (Required)  
Waste amount at arrival: 0.00 L Processing treatment: Chemical/Physical treatment

### PICKUP

**Pick-up date:** 21/11/2019 12:00:00/ **Intended delivery date:** 21/11/2019

## PART 2 - TRANSPORTER (this part to be completed by the transporter at pickup)

CLEANAWAY OPERATIONS PTY LTD - 15319  
GEORGE STREET  
VARIOUS, SA 5000

**Licence #:** 15319  
**Vehicle reg:**  
**Transport type:** Road  
**Transit State:** SA

**Contact:** TERRY SOUKOULIS  
**Phone:** (08) 8344 0900  
**Fax:** N/A  
**Email:** [terry.soukoulis@cleanaway.com.au](mailto:terry.soukoulis@cleanaway.com.au)

## PART 3 - RECEIVING FACILITY (this part to be completed by the receiving facility)

CLEANAWAY OPERATIONS PTY LTD - 15195 (R)  
GEORGE STREET  
WINGFIELD, SA 5013

**Licence #:** 15195  
**Facility ref #:** N/A

**Contact:** DAVID LEANEY  
**Phone:** (08) 8344 0900  
**Fax:**  
**Email:** [david.leaney@cleanaway.com.au](mailto:david.leaney@cleanaway.com.au)

Date waste arrived at the facility: . 21/11/2019

**Acceptance date:** 27/11/2019

**Date processed:** 27/11/2019

**Date rejected waste accepted:**

## NOTE (including any discrepancies)

7x205L

If any of the information in Parts 1 and 2 is not correct and it is not practical at the time to change the information in *WasteTracker* and print a new version of the certificate, the consignor or transporter must write and initial any corrections on the certificate. The receiving facility must ensure these corrections are entered into *WasteTracker* as soon as practicable afterwards.

# TRANSPORT CERTIFICATE - No. 5T00341732

Created by : Pasindu Sellapperumage

CA no: 5C00028030

Status: Processed

CA start date: 25-Mar-2019

CA end date: 24-Mar-2020

## ADDITIONAL WASTES

This consignment authorisation permits the wastes described below to be transported provided the consignor, transporter and receiving facility comply with the conditions of this approval and other EPA regulations .

**Waste code:** N120 - Soils contaminated with a controlled waste  
**Description:** Contaminated soil - unclassified  
**Form:** Solid  
**Proposed treatment:** Chemical/Physical treatment  
**Contaminants:** N/A

Waste amount at pickup: 1,400.00 kg

Waste amount at arrival: 1,400.00 kg

Processing treatment: Chemical/Physical treatment

## **Appendix E** – Well Survey Data



**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**

|                                                                                                    |
|----------------------------------------------------------------------------------------------------|
| <b>Monitoring well coordinates – Largs North MFS</b><br><b>2 Willochra St, Largs North SA 5016</b> |
|----------------------------------------------------------------------------------------------------|

| Well or Bore | Easting    | Northing    | R.L. Top of Casing | Natural Surface |
|--------------|------------|-------------|--------------------|-----------------|
| No.          | MGA94      | MGA94       | A.H.D.             | A.H.D.          |
| MW01         | 271572.661 | 6144213.974 | 3.082              | 3.121           |
| MW02         | 271523.732 | 6144310.050 | 3.028              | 3.090           |
| MW03         | 271508.013 | 6144240.835 | 3.560              | 3.555           |
| MW04         | 271474.464 | 6144275.717 | 3.293              | 3.366           |

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



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

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

**Date: 8/4/2019**

**Monitoring well coordinates – Largs North MFS**  
**2 Willochra St, Largs North SA 5016**

| <b>Well or Bore</b> | <b>Easting</b> | <b>Northing</b> | <b>R.L. Top of Casing</b> | <b>Natural Surface</b> |
|---------------------|----------------|-----------------|---------------------------|------------------------|
| <b>No.</b>          | <b>MGA20</b>   | <b>MGA20</b>    | <b>A.H.D.</b>             | <b>A.H.D.</b>          |
| MW05                | 271517.264     | 6144107.565     | 3.020                     | 3.091                  |
| MW06                | 271480.61      | 6144082.112     | 3.117                     | 3.194                  |
| MW07                | 271471.262     | 6144160.987     | 3.157                     | 3.236                  |
| MW08                | 271484.051     | 6144324.021     | 3.045                     | 3.114                  |
| MW09                | 271548.436     | 6144339.874     | 3.055                     | 3.146                  |
| MW10                | 271612.521     | 6144354.927     | 2.802                     | 2.866                  |
| MW11                | 271537.710     | 6144419.720     | 3.192                     | 3.265                  |

All Survey information was based from the MGA20 Z54 grid system and Australian Height Datum(AHD), Triangulated from Network Survey Marks on the area.



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

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

**Date: 16/10/2019**

**Monitoring well coordinates – Largs North MFS**  
**2 Willochra St, Largs North SA 5016**

| <b>Well or Bore</b> | <b>Easting</b> | <b>Northing</b> | <b>R.L. Top of Casing</b> | <b>Natural Surface</b> |
|---------------------|----------------|-----------------|---------------------------|------------------------|
| <b>No.</b>          | <b>MGA20</b>   | <b>MGA20</b>    | <b>A.H.D.</b>             | <b>A.H.D.</b>          |
| MW12                | 6144464.385    | 271482.969      | 3.044                     | 3.165                  |
| MW13                | 6144465.420    | 271533.901      | 3.095                     | 3.193                  |
| MW14                | 6144468.505    | 271574.956      | 2.854                     | 2.886                  |
| MW15                | 6144411.698    | 271605.893      | 2.945                     | 3.040                  |
| MW16                | 6144420.700    | 271427.454      | 2.859                     | 2.920                  |
| MW17                | 6144344.319    | 271430.132      | 3.068                     | 3.140                  |
| MW18                | 6144222.074    | 271470.715      | 3.079                     | 3.193                  |

All Survey information was based from the MGA20 Z54 grid system and Australian Height Datum(AHD), Triangulated from Network Survey Marks on the area.

## **Appendix F** – Groundwater Purging and Sampling Records

Bore ID: M201

[illegible]

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

1 x PFA5 (Involved)

|                         | Purge Volumes |     |      |
|-------------------------|---------------|-----|------|
| Casing Int. Dia (mm)    | 50            | 100 | 150  |
| Vol (l/m of casing)     | 2.0           | 7.9 | 17.7 |
| *Double for gravel pack |               |     |      |

| <i>Purge Volumes</i> |     |     |      |
|----------------------|-----|-----|------|
| 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

[illegible]

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

$$H \times D_{\frac{1}{2}}^{\frac{1}{2}}(g)$$

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

| Job Information |           | Sampling Information |                           | Bore Information |          |
|-----------------|-----------|----------------------|---------------------------|------------------|----------|
| Client:         | SA MFS    | Sample Method:       | HS                        | SWL:             | 2.74     |
| Project:        | GME - OCT | WG Meter Type:       | 451                       | Date:            | 23-10-19 |
| Proj. No.:      | 3319080   | Flow Cell:           | Y / N                     | Ref. datum:      | —        |
| Sampler:        | 1313      | WLevel Meter Type:   | Dip / Fox / Int.Fce / Gge | Bore Depth:      | 4.44     |
|                 |           | NAPL Check:          | Yes                       | Screen From:     | — to —   |
|                 |           |                      |                           | Stick Up:        | — m      |
|                 |           |                      |                           | Bore Diam.:      | 50 mm    |
|                 |           |                      |                           | Well Cap Secure? | Yes      |

[illegible]

| Field QA Checks:                                         | Well Volume Calculations                                                              |
|----------------------------------------------------------|---------------------------------------------------------------------------------------|
| Air bubbles in vials? Y (N) Any violent reactions? Y (N) | $r = 0.025m$ H =                                                                      |
| Decontamination as per GHD procedure? Y (N)              | $R = 0.05m$ h =                                                                       |
| Was sampling equipment pre-cleaned? Y (N)                | H = height of water col (m)                                                           |
| COC updated? Y (N) Field Filtered? Y (N)                 | h = thickness of sat. filterpack (m)                                                  |
|                                                          | R = Bore Radius                                                                       |
|                                                          | r = PVC radius (m)                                                                    |
|                                                          | PV = $[(H \times \pi \times r^2) + 0.2(h \times \pi \times (R^2 - r^2))] \times 1000$ |
|                                                          | =                                                                                     |
|                                                          | =                                                                                     |
|                                                          | = 1 well volume                                                                       |
|                                                          | = 3 well vole                                                                         |

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

$$(g_{p_1}, \dots, g_{p_n})$$

### Purge Volumes

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

\*Double for gravel pack

Bore ID: MW04

| Job Information |           | Sampling Information |                           | Bore Information |          |
|-----------------|-----------|----------------------|---------------------------|------------------|----------|
| Client:         | S&MFS     | Sample Method:       | H/S                       | SWL:             | 2.53 m   |
| Project:        | GME - OCT | WQ Meter Type:       | YSI                       | Date:            | 23-10-19 |
|                 | 2019      | Flow Cell:           | Y/N                       | Pump Depth:      | — m      |
| Proj. No.:      | 3319080   | WL Level Meter Type: | Dip / Fox / Int.Fce / Gge | Ref. datum:      | —        |
| Sampler:        | T3/B      | NAPL Check:          | Yes                       | Bore Depth:      | 4.47 m   |
|                 |           |                      |                           | Screen From:     | — to — m |
|                 |           |                      |                           | Well Cap Secure? | Yes      |
|                 |           |                      |                           | Logic Check:     | —        |
|                 |           |                      |                           | Time:            | 3:30     |
|                 |           |                      |                           | Stick Up:        | — m      |
|                 |           |                      |                           | Bore Diam.:      | 50 mm    |

## Purging and Sampling Record

| Job Information |           | Sampling Information |                            | Bore Information |          |
|-----------------|-----------|----------------------|----------------------------|------------------|----------|
| Client:         | S&MFS     | Sample Method:       | H/S                        | SWL:             | 2-20     |
| Project:        | GME - OCT | WQ Meter Type:       | YSI                        | Date:            | 23-10-19 |
|                 | 2019      | Flow Cell:           | Y/N                        | Pump Depth:      | — m      |
| Proj. No.:      | 3319080   | WL Level Meter Type: | Dip / Fox / Int.Fce / Gage | Bore Depth:      | 4.58 m   |
| Sampler:        | T3/B3     | NAPL Check:          | Yes                        | Ref. datum:      | —        |
|                 |           |                      |                            | Stick Up:        | — m      |
|                 |           |                      |                            | Bore Diam.:      | 50 mm    |
|                 |           |                      |                            | Well Cap Secure? | Yes      |
|                 |           |                      |                            | Screen From:     | — to — m |
|                 |           |                      |                            | Logic Check:     | —        |
|                 |           |                      |                            | Time:            | 12:58    |

[illegible]

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**

|                                               |       |                             |
|-----------------------------------------------|-------|-----------------------------|
| $r = 0.025\text{m}$                           | $H =$ | $R = \text{Bore Radius}$    |
| $R = 0.05\text{ m}$                           | $h =$ | $r = \text{PVC radius (m)}$ |
| $H = \text{height of water col (m)}$          |       |                             |
| $h = \text{thickness of sat. filterpack (m)}$ |       |                             |

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

= 1 well volume

= 3 well vols

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

Purge Volumes

$\frac{H}{x} = \frac{T}{D}$

|                      |     |     |      |
|----------------------|-----|-----|------|
| 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

| Job Information |            | Sampling Information |                            | Bore Information |          |
|-----------------|------------|----------------------|----------------------------|------------------|----------|
| Client:         | S.A.M.F.S. | Sample Method:       | H/S                        | SWL:             | 2-31     |
| Project:        | GME - OCT  | WQ Meter Type:       | YSI                        | Date:            | 23-10-19 |
|                 | 2019       | Flow Cell:           | V(N)                       | Pump Depth:      | — m      |
| Proj. No.:      | 3319080    | WL Level Meter Type: | Dip / Fox / Int.Fce / Gage | Bore Depth:      | 4.38 m   |
| Sampler:        | T3.13      | NAPL Check:          | Yes                        | Ref. datum:      | — m      |
|                 |            |                      |                            | Stick Up:        | — m      |
|                 |            |                      |                            | Bore Diam.:      | 50 mm    |
|                 |            |                      |                            | Well Cap Secure? | Yes      |

[illegible]

|                                                          |                                                                                        |
|----------------------------------------------------------|----------------------------------------------------------------------------------------|
| Field QA Checks:                                         | Well Volume Calculations                                                               |
| Air bubbles in vials? Y (N) Any violent reactions? Y (N) | $r = 0.025\text{m}$ $H =$                                                              |
| Decontamination as per GHD procedure? Y (N)              | $R = 0.05\text{m}$ $h =$                                                               |
| Was sampling equipment pre-cleaned? Y (N)                | $H = \text{height of water col (m)}$                                                   |
| COC updated? Y (N) Field Filtered? Y (N)                 | $R = \text{Bore Radius}$                                                               |
|                                                          | $h = \text{thickness of sat. filterpack (m)}$                                          |
|                                                          | $r = \text{PVC radius (m)}$                                                            |
|                                                          | $PV = [(H \times \pi \times r^2) + 0.2 (h \times \pi \times (R^2 - r^2))] \times 1000$ |
|                                                          | $PV =$                                                                                 |
|                                                          | $=$                                                                                    |
|                                                          | $= \text{1 well volume}$                                                               |
|                                                          | $= \text{3 well vols}$                                                                 |

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

$$H \times P(A)S(\text{Envirolab})$$

| <i>Purge Volumes</i>    |     |     |      |
|-------------------------|-----|-----|------|
| Casing Int. Dia (mm)    | 50  | 100 | 150  |
| Vol (L/m of casing)     | 2.0 | 7.9 | 17.7 |
| *Double for gravel pack |     |     |      |

Bore ID: ..... MW07

[illegible]

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

## Purging and Sampling Record

| Job Information |           | Sampling Information |                           | Bore Information |          |
|-----------------|-----------|----------------------|---------------------------|------------------|----------|
| Client:         | SA MFS    | Sample Method:       | HS                        | SWL:             | 2.33     |
| Project:        | GME - OCT | WQ Meter Type:       | YSI                       | Date:            | 23-10-19 |
| Proj. No.:      | 3319080   | Flow Cell:           | Y/N                       | Ref. datum:      | —        |
| Sampler:        | 1313      | WLevel Meter Type:   | Dip / Fox / Int.Fce / Gge | Bore Depth:      | 4.43     |
|                 |           | NAPL Check:          | yes                       | Screen From:     | — to —   |
|                 |           |                      |                           | Stick Up:        | — m      |
|                 |           |                      |                           | Bore Diam.:      | 50 mm    |
|                 |           |                      |                           | Well Cap Secure? | yes      |

[illegible]

|                                                                                                                                                                                                  |                                                                                                                                                                                               |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Air bubbles in vials? Y (N) Any violent reactions? Y (N)<br>Decontamination as per GHD procedure? Y (N)<br>Was sampling equipment pre-cleaned? Y (N)<br>COC updated? Y (N) Field Filtered? Y (N) | <b>Field QA Checks:</b>                                                                                                                                                                       |
| r = 0.025m H =<br>R = 0.05 m h =<br>H = height of water col (m)<br>h = thickness of sat. filterpack (m)<br>R = Bore Radius<br>r = PVC radius (m)                                                 | <b>Well Volume Calculations</b><br><br>$PV = [(H \times \pi \times r^2) + 0.2 (h \times \pi \times (R^2 - r^2))] \times 1000$ $PV =$ $=$ $=$ $= 1 \text{ well volume}$ $= 3 \text{ well vol}$ |

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

$$H \times D_{\mathbb{R}^n}(\mathbb{U}(\mathbf{u}_0, \mathbf{v}_0))$$

### 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

[illegible]

|                                                                                        | Purge Volumes           |     |      |
|----------------------------------------------------------------------------------------|-------------------------|-----|------|
|                                                                                        | Casing Int. Dia (mm)    | 50  | 100  |
|                                                                                        | Vol (L/m of casing)     | 2.0 | 7.9  |
|                                                                                        | *Double for gravel pack |     | 17.7 |
| Comment: Duplicate samples collected, bottles used, access, condition of headworks etc |                         |     |      |
| H x PFA5 (EnviroLab)                                                                   |                         |     |      |

## Purging and Sampling Record

| Job Information |           | Sampling Information |                             | Bore Information |          |
|-----------------|-----------|----------------------|-----------------------------|------------------|----------|
| Client:         | SA MFS    | Sample Method:       | HS                          | SWL:             | 2.09 m   |
| Project:        | GME - OCT | WQ Meter Type:       | YSI                         | Date:            | 23-10-19 |
|                 | 2019      | Flow Cell:           | Y (N)                       | Ref. datum:      | —        |
| Proj. No.:      | 3319080   | WL Level Meter Type: | Dip / Fox / (Int.Fce / Gge) | Bore Depth:      | 4.45 m   |
| Sampler:        | BSB       | NAPL Check:          | Yes                         | Screen From:     | — to — m |
|                 |           |                      |                             | Well Cap Secure? | Yes      |
|                 |           |                      |                             | Logic Check:     | —        |
|                 |           |                      |                             | Time:            | 10:40    |
|                 |           |                      |                             | Stick Up:        | — m      |
|                 |           |                      |                             | Bore Diam.:      | 50 mm    |

[illegible]

|                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>Field QA Checks:</b></p> <p>Air bubbles in vials? Y (N) Any violent reactions? Y (N)</p> <p>Decontamination as per GHD procedure? Y (N)</p> <p>Was sampling equipment pre-cleaned? Y (N)</p> <p>COC updated? Y (N) Field Filtered? Y (N)</p> | <p><b>Well Volume Calculations</b></p> <p><math>r = 0.025\text{m}</math> <math>H =</math></p> <p><math>R = 0.05\text{ m}</math> <math>h =</math></p> <p><math>H = \text{height of water col (m)}</math></p> <p><math>h = \text{thickness of sat. filterpack (m)}</math></p> <p><math>R = \text{Bore Radius}</math></p> <p><math>r = \text{PVC radius (m)}</math></p> <p><math>PV = [(H \times \pi \times r^2) + 0.2 (h \times \pi \times (R^2 - r^2))] \times 1000</math></p> <p><math>PV =</math></p> <p><math>=</math></p> <p><math>=</math></p> <p><math>= 1 \text{ well volume}</math></p> <p><math>= 3 \text{ well vole}</math></p> |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

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

$$H \times P + Q_N(\equiv \text{involub})$$

### 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

[illegible]

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

$$\begin{pmatrix} 11 \\ 5 \\ 0 \\ 0 \\ 1 \\ 0 \end{pmatrix}$$

### 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

| Job Information |           | Sampling Information |                           | Bore Information |          |
|-----------------|-----------|----------------------|---------------------------|------------------|----------|
| Client:         | SA MFS    | Sample Method:       | H/S                       | SWL:             | 2.26     |
| Project:        | GME - OCT | WQ Meter Type:       | YSI                       | Date:            | 23-10-19 |
|                 | 2019      | Flow Cell:           | Y/N                       | Ref. datum:      | —        |
| Proj. No.:      | 3319080   | WLevel Meter Type:   | Dip / Fox (Int.Fce / Gge) | Bore Depth:      | 4.39     |
| Sampler:        | 7313      | NAPL Check:          | Yes                       | Screen From:     | — to —   |
|                 |           |                      |                           |                  |          |
|                 |           |                      |                           | Logic Check:     | —        |
|                 |           |                      |                           | Time:            | 8:30     |
|                 |           |                      |                           | Stick Up:        | —        |
|                 |           |                      |                           | Bore Diam.:      | 50 mm    |
|                 |           |                      |                           | Well Cap Secure? | Yes      |

[illegible]

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**

|                                               |       |                             |
|-----------------------------------------------|-------|-----------------------------|
| $r = 0.025\text{m}$                           | $H =$ | $R = \text{Bore Radius}$    |
| $R = 0.05\text{ m}$                           | $h =$ | $r = \text{PVC radius (m)}$ |
| $H = \text{height of water col (m)}$          |       |                             |
| $h = \text{thickness of sat. filterpack (m)}$ |       |                             |

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

= 1 well volume

= 3 well vols

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

PTAS (Environ Biol Fish)

### 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

| Job Information |           | Sampling Information |                            | Bore Information |          |
|-----------------|-----------|----------------------|----------------------------|------------------|----------|
| Client:         | SA MFS    | Sample Method:       | H/S                        | SWL:             | 2.35     |
| Project:        | GME - OCT | WQ Meter Type:       | YSI                        | Date:            | 23-10-19 |
| Proj. No.:      | 3319080   | Flow Cell:           | Y/N                        | Ref. datum:      | —        |
| Sampler:        | 7313      | WLevel Meter Type:   | Dip / Fox / Int.Fce / Gage | Bore Depth:      | 4.38     |
|                 |           | NAPL Check:          | Yes                        | Screen From:     | — to —   |
|                 |           |                      |                            | Stick Up:        | —        |
|                 |           |                      |                            | Bore Diam.:      | 50 mm    |
|                 |           |                      |                            | Well Cap Secure? | Yes      |

[illegible]

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| <p><b>Field QA Checks:</b></p> <p>Air bubbles in vials? Y (N) Any violent reactions? Y (N)</p> <p>Decontamination as per GHD procedure? Y (N)</p> <p>Was sampling equipment pre-cleaned? Y (N)</p> <p>COC updated? Y (N) Field Filtered? Y (N)</p>                                                                                                                                                                                                                                                                                                                              |  |
| <p><b>Well Volume Calculations</b></p> <p><math>r = 0.025\text{m}</math> <math>H =</math></p> <p><math>R = 0.05\text{ m}</math> <math>h =</math></p> <p><math>H =</math> height of water coil (m) <math>R =</math> Bore Radius</p> <p><math>h =</math> thickness of sat. filterpack (m) <math>r =</math> PVC radius (m)</p> <p><math>PV = [(H \times \pi \times r^2) + 0.2 (h \times \pi \times (R^2 - r^2))] \times 1000</math></p> <p><math>PV =</math></p> <p><math>=</math></p> <p><math>=</math></p> <p><math>=</math> 1 well volume</p> <p><math>=</math> 3 well vols</p> |  |

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

$$H \times T \times S \times (U \times V)$$

| 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

| Job Information |           | Sampling Information |                           | Bore Information |          |
|-----------------|-----------|----------------------|---------------------------|------------------|----------|
| Client:         | SA MFS    | Sample Method:       | H/S                       | SWL:             | 2.12     |
| Project:        | GME - OCT | WQ Meter Type:       | YSI                       | Date:            | 23-10-19 |
|                 | 2019      | Flow Cell:           | Y/N                       | Ref. datum:      | —        |
| Proj. No.:      | 3319080   |                      |                           | Bore Depth:      | 4.39     |
| Sampler:        | 1313      | Pump Depth:          | —                         | Screen From:     | — to —   |
|                 |           | WLevel Meter Type:   | Dip / Fox / Int.Fce / Gge |                  |          |
|                 |           | NAPL Check:          | Yes                       | Logic Check:     | —        |
|                 |           |                      |                           | Time:            | 9:20     |
|                 |           |                      |                           | Stick Up:        | —        |
|                 |           |                      |                           | Bore Diam.:      | 50 mm    |
|                 |           |                      |                           | Well Cap Secure? | Yes      |

[illegible]

| Field QA Checks:                                         | Well Volume Calculations                                                              |
|----------------------------------------------------------|---------------------------------------------------------------------------------------|
| Air bubbles in vials? Y (N) Any violent reactions? Y (N) | $r = 0.025m$ H =                                                                      |
| Decontamination as per GHD procedure? Y (N)              | $R = 0.05m$ h =                                                                       |
| Was sampling equipment pre-cleaned? Y (N)                | H = height of water col (m)                                                           |
| COC updated? Y (N) Field Filtered? Y (N)                 | h = thickness of sat. filterpack (m)                                                  |
|                                                          | R = Bore Radius                                                                       |
|                                                          | r = PVC radius (m)                                                                    |
|                                                          | $PV = [(H \times \pi \times r^2) + 0.2(h \times \pi \times (R^2 - r^2))] \times 1000$ |
|                                                          | $PV =$                                                                                |
|                                                          | $=$                                                                                   |
|                                                          | $= 1 \text{ well volume}$                                                             |
|                                                          | $= 3 \text{ well vol}$                                                                |

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

Group (UFD)  $\times$  H

### 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

[illegible]

= 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

## Purging and Sampling Record

| Job Information |           | Sampling Information |                             | Bore Information |          |
|-----------------|-----------|----------------------|-----------------------------|------------------|----------|
| Client:         | S&MFS     | Sample Method:       | H/S                         | SWL:             | 2.07 m   |
| Project:        | GME - OCT | WQ Meter Type:       | YSI                         | Date:            | 23-10-19 |
|                 | 2019      | Flow Cell:           | Y/N                         | Ref. datum:      | — m      |
| Proj. No.:      | 3319080   | WLevel Meter Type:   | Dip / Fox / Int. Fce / 5gse | Bore Depth:      | 4.29 m   |
| Sampler:        | 7313      | NAPL Check:          | Yes                         | Screen From:     | — to — m |
|                 |           |                      |                             | Well Cap Secure? | Yes      |
|                 |           |                      |                             | Logic Check:     | —        |
|                 |           |                      |                             | Time:            | 11.54    |
|                 |           |                      |                             | Stick Up:        | — m      |
|                 |           |                      |                             | Bore Diam.:      | 50 mm    |

[illegible]

Field QA Checks:

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

Decontamination as per OHD procedure? Y / N

Was sampling equipment pre-cleaned? Y / N

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

**Well Volume Calculations**

|                                               |       |                             |
|-----------------------------------------------|-------|-----------------------------|
| $r = 0.025\text{m}$                           | $H =$ | $R = \text{Bore Radius}$    |
| $R = 0.05\text{ m}$                           | $h =$ | $r = \text{PVC radius (m)}$ |
|                                               |       |                             |
| $H = \text{height of water col (m)}$          |       |                             |
| $h = \text{thickness of sat. filterpack (m)}$ |       |                             |

$$\begin{aligned} PV &= [(H \times \pi \times r^2) + 0.2(h \times \pi \times (R^2 - r^2))] \times 1000 \\ &= \\ &= 1 \text{ well } \end{aligned}$$

= 1 well volume

= 3 well vojs

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

### Purge Volumes

$$H \times \frac{1}{\sqrt{2}} \left( \frac{1}{\sqrt{2}} \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix} + \frac{1}{\sqrt{2}} \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix} \right)$$

|                      |     |     |      |
|----------------------|-----|-----|------|
| 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

| Job Information |           | Sampling Information |                            | Bore Information |          |
|-----------------|-----------|----------------------|----------------------------|------------------|----------|
| Client:         | SA MFS    | Sample Method:       | H/S                        | SWL:             | 2.29 m   |
| Project:        | GME - OCT | WQ Meter Type:       | YSI                        | Date:            | 23-10-19 |
|                 | 2019      | Flow Cell:           | Y/N                        | Ref. datum:      | —        |
| Proj. No.:      | 3319080   | WLevel Meter Type:   | Dip / Fox (Int.Fce / Gage) | Bore Depth:      | 4.40 m   |
| Sampler:        | 1313      | NAPL Check:          | Yes                        | Screen From:     | — to — m |
|                 |           |                      |                            | Well Cap Secure? | Yes      |
|                 |           |                      |                            | Stick Up:        | — m      |
|                 |           |                      |                            | Bore Diam.:      | 50 mm    |

[illegible]

| Field QA Checks:                                         | Well Volume Calculations                                                               |
|----------------------------------------------------------|----------------------------------------------------------------------------------------|
| Air bubbles in vials? Y (N) Any violent reactions? Y (N) | $r = 0.025\text{m}$ H =                                                                |
| Decontamination as per GHD procedure? Y (N)              | $R = 0.05\text{m}$ h =                                                                 |
| Was sampling equipment pre-cleaned? Y (N)                | H = height of water col (m)                                                            |
| COC updated? Y (N) Field Filtered? Y (N)                 | h = thickness of sat. filterpack (m)                                                   |
|                                                          | R = Bore Radius                                                                        |
|                                                          | 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                                                                        |
|                                                          | = 2 well volume                                                                        |

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

$\mathbb{H} \times \mathbb{D}^n$   
 $(\mathbb{H} \times \mathbb{D}^n)$

### Purge Volumes

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

\*Double for gravel pack

Bore ID: ..... M118

[illegible]

|                         | Purge Volumes        |     |      |
|-------------------------|----------------------|-----|------|
|                         | Casing Int. Dia (mm) | 50  | 150  |
| Vol (L/m of casing)     | 2.0                  | 7.9 | 17.7 |
| *Double for gravel pack |                      |     |      |

## **Appendix G – Calibration Certificates**

Air-Met Scientific Pty Ltd  
1300 137 067

|            |                       |
|------------|-----------------------|
| Instrument | Interface Meter (30M) |
| Serial No. | 312523                |

| Item                  | Test             | Pass | Comments |
|-----------------------|------------------|------|----------|
| Battery               | Compartment      | ✓    |          |
|                       | Capacity         | ✓    | 8.2 V    |
| Probe                 | Cleaned/Decon.   | ✓    |          |
|                       | Operation        | ✓    |          |
| Connectors            | Condition        | ✓    |          |
| Tape Check Connectors | Cleaned          | ✓    |          |
|                       | Checked for cuts | ✓    |          |
| Instrument Test       | At surface level | ✓    |          |

## Certificate of Calibration

This is to certify that the above instrument ~~has~~ been cleaned and tested.

**Calibrated by:**

the above instrument has

*Jon*

James Draper

**Calibration date:**

22/10/2019

**Next calibration due:**

21/12/2019

## Multi Parameter Water Meter

Instrument YSI Quatro Pro Plus  
 Serial No. 14D101791



Air-Met Scientific Pty Ltd  
 1300 137 067

| Item                     | Test                 | Pass | Comments |
|--------------------------|----------------------|------|----------|
| Battery                  | Charge Condition     | ✓    |          |
|                          | Fuses                | ✓    |          |
|                          | Capacity             | ✓    |          |
| Switch/keypad<br>Display | Operation            | ✓    |          |
|                          | Intensity            | ✓    |          |
|                          | Operation (segments) | ✓    |          |
| Grill Filter             | Condition            | ✓    |          |
|                          | Seal                 | ✓    |          |
| PCB                      | Condition            | ✓    |          |
| Connectors               | Condition            | ✓    |          |
| Sensor                   | 1. pH                | ✓    |          |
|                          | 2. mV                | ✓    |          |
|                          | 3. EC                | ✓    |          |
|                          | 4. D.O               | ✓    |          |
|                          | 5. Temp              | ✓    |          |
| Alarms                   | Beeper               | ✓    |          |
|                          | Settings             | ✓    |          |
| Software                 | Version              | ✓    |          |
| Data logger              | Operation            | ✓    |          |
| Download                 | Operation            | ✓    |          |
| Other tests:             |                      |      |          |

### Certificate of Calibration

This is to certify that the above instrument has been calibrated to the following specifications:

| Sensor     | Serial no | Standard Solutions | Certified | Solution Bottle Number | Instrument Reading |
|------------|-----------|--------------------|-----------|------------------------|--------------------|
| 1. pH 7.00 |           | pH 7.00            |           | 330737                 | pH 7.00            |
| 2. pH 4.00 |           | pH 4.00            |           | 330734                 | pH 4.00            |
| 3. ORP     |           | 231mV              |           | 333082/329762          | 231 mV             |
| 4. EC      |           | 2.76 mS            |           | 329027                 | 2.76 mS            |
| 5. D.O     |           | 0 ppm              |           | 123302                 | 0 ppm              |
| 6. Temp    |           | 17                 |           | MultiTherm             | 17.1               |

Calibrated by:

James Draper

Calibration date:

21/10/2019

## **Appendix H** – COC and Laboratory Reports



# CHAIN OF CUSTODY - Client

ENVIROLAB GROUP - National phone number 1300 42 43 44

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

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

Melbourne Lab - Envirolab Services  
1A Dalmore Drive Scoresby VIC 3179  
Ph 03 9763 2500 / melbourne@envirolab.com.au

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

Adelaide Office - Envirolab Services  
7A The Parade Norwood SA 5067  
Ph 0406 350 706 / adelaide@envirolab.com.au

Client: GHD Pty Ltd

Contact Person: Joel Chance

Project Mgr: Dilara Valiff

Sampler: Bridy baney

Address: Level 4, 211 Victoria Square. Adelaide SA 5000

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

3319080 - Largs North Fire Station October 2019 GME

PO No.: 3319080

Envirolab Quote No. : 19SA002

Date results required: Standard

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

Phone: 0407713133 Mob: 0 439277657

Report format: esdat

Email:

Lab Comments:

joel.chance@ghd.com dilara.valiff@ghd.com

| Sample Information  |                                 |       |              |                | Tests Required       |  |  |  |  |  |  |  |  |  |  |  |  |  |  | Comments                                                |
|---------------------|---------------------------------|-------|--------------|----------------|----------------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|---------------------------------------------------------|
| Envirolab Sample ID | Client Sample ID or information | Depth | Date sampled | Type of sample | PFAS (Short - Suite) |  |  |  |  |  |  |  |  |  |  |  |  |  |  | Provide as much information about the sample as you can |
| 1                   | MW01                            | N/A   | 23/10/2019   | Water          | X                    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                                         |
| 2                   | MW02                            | N/A   | 23/10/2019   | Water          | X                    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                                         |
| 3                   | MW03                            | N/A   | 23/10/2019   | Water          | X                    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                                         |
| 4                   | MW04                            | N/A   | 23/10/2019   | Water          | X                    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                                         |
| 5                   | MW05                            | N/A   | 23/10/2019   | Water          | X                    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                                         |
| 6                   | MW06                            | N/A   | 23/10/2019   | Water          | X                    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                                         |
| 7                   | MW07                            | N/A   | 23/10/2019   | Water          | X                    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                                         |
| 8                   | MW08                            | N/A   | 23/10/2019   | Water          | X                    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                                         |
| 9                   | MW09                            | N/A   | 23/10/2019   | Water          | X                    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                                         |
| 10                  | MW10                            | N/A   | 23/10/2019   | Water          | X                    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                                         |
| 11                  | MW11                            | N/A   | 23/10/2019   | Water          | X                    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                                         |
| 12                  | MW12                            | N/A   | 23/10/2019   | Water          | X                    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                                         |
| 13                  | MW13                            | N/A   | 23/10/2019   | Water          | X                    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                                         |
| 14                  | MW14                            | N/A   | 23/10/2019   | Water          | X                    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                                         |
| 15                  | MW15                            | N/A   | 23/10/2019   | Water          | X                    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                                         |
| 16                  | MW16                            | N/A   | 23/10/2019   | Water          | X                    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                                         |
| 17                  | MW17                            | N/A   | 23/10/2019   | Water          | X                    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                                         |
| 18                  | MW18                            | N/A   | 23/10/2019   | Water          | X                    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                                         |
| 19                  | RB01                            | N/A   | 23/10/2019   | Water          | X                    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                                         |
| 20                  | FD01                            | N/A   | 23/10/2019   | Water          | X                    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                                         |
| 21                  | FS02.01 (kev)                   | N/A   | 23/10/2019   | Water          | X                    |  |  |  |  |  |  |  |  |  |  |  |  |  |  | Forward to Eurofins                                     |

Relinquished by (Company): GHD Pty Ltd

Print Name: Bridy Baney

Date & Time: 24/10/19

Signature:

Received by (Company): EUS

Print Name: Alex Shih

Date & Time: 24/10/19 @ 12pm

Signature:

Lab use only:

Samples Received: Cool or Ambient (circle one)

Temperature Received at: (if applicable)

Transported by: Hand delivered / courier



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

Job No:

229256

Date Received: 24/10/19

Time Received: 12:05

Received by: AS

Temp: Cool/Ambient (kev)

Cooling: Ice/Repack

Security: Intact/Broken/None

## SAMPLE RECEIPT ADVICE

### Client Details

|                  |                            |
|------------------|----------------------------|
| <b>Client</b>    | GHD Pty Ltd                |
| <b>Attention</b> | Joel Chance, Dilara Valiff |

### Sample Login Details

|                                             |            |
|---------------------------------------------|------------|
| <b>Your reference</b>                       | 3319080    |
| <b>Envirolab Reference</b>                  | 229256     |
| <b>Date Sample Received</b>                 | 25/10/2019 |
| <b>Date Instructions Received</b>           | 25/10/2019 |
| <b>Date Results Expected to be Reported</b> | 01/11/2019 |

### Sample Condition

|                                                               |          |
|---------------------------------------------------------------|----------|
| <b>Samples received in appropriate condition for analysis</b> | Yes      |
| <b>No. of Samples Provided</b>                                | 20 Water |
| <b>Turnaround Time Requested</b>                              | Standard |
| <b>Temperature on Receipt (°C)</b>                            | 20.9     |
| <b>Cooling Method</b>                                         | Ice Pack |
| <b>Sampling Date Provided</b>                                 | YES      |

### Comments

Nil

Please direct any queries to:

| <b>Aileen Hie</b>                   | <b>Jacinta Hurst</b>                  |
|-------------------------------------|---------------------------------------|
| <b>Phone:</b> 02 9910 6200          | <b>Phone:</b> 02 9910 6200            |
| <b>Fax:</b> 02 9910 6201            | <b>Fax:</b> 02 9910 6201              |
| <b>Email:</b> ahie@envirolab.com.au | <b>Email:</b> jhurst@envirolab.com.au |

Analysis Underway, details on the following page:



| Sample ID | PFAS in Waters Short |
|-----------|----------------------|
| MW01      | ✓                    |
| MW02      | ✓                    |
| MW03      | ✓                    |
| MW04      | ✓                    |
| MW05      | ✓                    |
| MW06      | ✓                    |
| MW07      | ✓                    |
| MW08      | ✓                    |
| MW09      | ✓                    |
| MW10      | ✓                    |
| MW11      | ✓                    |
| MW12      | ✓                    |
| MW13      | ✓                    |
| MW14      | ✓                    |
| MW15      | ✓                    |
| MW16      | ✓                    |
| MW17      | ✓                    |
| MW18      | ✓                    |
| RB01      | ✓                    |
| FD01      | ✓                    |

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

### Additional Info

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

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

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

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

## **CERTIFICATE OF ANALYSIS 229256**

### **Client Details**

|                  |                                  |
|------------------|----------------------------------|
| <b>Client</b>    | GHD Pty Ltd                      |
| <b>Attention</b> | Joel Chance, Dilara Valiff       |
| <b>Address</b>   | GPO Box 2052, Adelaide, SA, 5001 |

### **Sample Details**

|                                             |                       |
|---------------------------------------------|-----------------------|
| <b>Your Reference</b>                       | <b><u>3319080</u></b> |
| <b>Number of Samples</b>                    | 20 Water              |
| <b>Date samples received</b>                | 25/10/2019            |
| <b>Date completed instructions received</b> | 25/10/2019            |

### **Analysis Details**

Please refer to the following pages for results, methodology summary and quality control data.  
Samples were analysed as received from the client. Results relate specifically to the samples as received.  
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.  
**Please refer to the last page of this report for any comments relating to the results.**

### **Report Details**

|                                                                                                             |            |
|-------------------------------------------------------------------------------------------------------------|------------|
| <b>Date results requested by</b>                                                                            | 01/11/2019 |
| <b>Date of Issue</b>                                                                                        | 31/10/2019 |
| NATA Accreditation Number 2901. This document shall not be reproduced except in full.                       |            |
| Accredited for compliance with ISO/IEC 17025 - Testing. <b>Tests not covered by NATA are denoted with *</b> |            |

#### **Results Approved By**

Fiona Tan, LC Supervisor

#### **Authorised By**



Nancy Zhang, Laboratory Manager

| PFAS in Waters Short                               |       |            |            |            |            |            |
|----------------------------------------------------|-------|------------|------------|------------|------------|------------|
| Our Reference                                      |       | 229256-1   | 229256-2   | 229256-3   | 229256-4   | 229256-5   |
| Your Reference                                     | UNITS | MW01       | MW02       | MW03       | MW04       | MW05       |
| Date Sampled                                       |       | 23/10/2019 | 23/10/2019 | 23/10/2019 | 23/10/2019 | 23/10/2019 |
| Type of sample                                     |       | Water      | Water      | Water      | Water      | Water      |
| Date prepared                                      | -     | 28/10/2019 | 28/10/2019 | 28/10/2019 | 28/10/2019 | 28/10/2019 |
| Date analysed                                      | -     | 28/10/2019 | 28/10/2019 | 28/10/2019 | 28/10/2019 | 28/10/2019 |
| Perfluorohexanesulfonic acid - PFHxS               | µg/L  | 0.25       | 3.3        | 0.08       | 29         | <0.01      |
| Perfluorooctanesulfonic acid PFOS                  | µg/L  | 0.04       | 9.1        | 0.69       | 100        | 0.02       |
| Perfluorooctanoic acid PFOA                        | µg/L  | 0.01       | 0.07       | <0.01      | 1.9        | <0.01      |
| 6:2 FTS                                            | µg/L  | <0.01      | <0.01      | <0.01      | 4.0        | <0.01      |
| 8:2 FTS                                            | µg/L  | <0.01      | <0.01      | <0.01      | 0.44       | <0.01      |
| Surrogate <sup>13</sup> C <sub>8</sub> PFOS        | %     | 102        | 98         | 106        | 119        | 111        |
| Surrogate <sup>13</sup> C <sub>2</sub> PFOA        | %     | 96         | 109        | 106        | 99         | 109        |
| Extracted ISTD <sup>18</sup> O <sub>2</sub> PFHxS  | %     | 105        | 108        | 108        | 82         | 102        |
| Extracted ISTD <sup>13</sup> C <sub>4</sub> PFOS   | %     | 91         | 100        | 93         | 98         | 97         |
| Extracted ISTD <sup>13</sup> C <sub>4</sub> PFOA   | %     | 99         | 99         | 102        | 101        | 96         |
| Extracted ISTD <sup>13</sup> C <sub>2</sub> 6:2FTS | %     | 94         | 95         | 96         | 77         | 100        |
| Extracted ISTD <sup>13</sup> C <sub>2</sub> 8:2FTS | %     | 94         | 96         | 92         | 93         | 95         |
| Total Positive PFHxS & PFOS                        | µg/L  | 0.29       | 12         | 0.77       | 130        | 0.02       |
| Total Positive PFOA & PFOS                         | µg/L  | 0.05       | 9.1        | 0.69       | 110        | 0.02       |
| Total Positive PFAS                                | µg/L  | 0.30       | 12         | 0.77       | 140        | 0.02       |

| PFAS in Waters Short                               |       |            |            |            |            |            |
|----------------------------------------------------|-------|------------|------------|------------|------------|------------|
| Our Reference                                      |       | 229256-6   | 229256-7   | 229256-8   | 229256-9   | 229256-10  |
| Your Reference                                     | UNITS | MW06       | MW07       | MW08       | MW09       | MW10       |
| Date Sampled                                       |       | 23/10/2019 | 23/10/2019 | 23/10/2019 | 23/10/2019 | 23/10/2019 |
| Type of sample                                     |       | Water      | Water      | Water      | Water      | Water      |
| Date prepared                                      | -     | 28/10/2019 | 28/10/2019 | 28/10/2019 | 28/10/2019 | 28/10/2019 |
| Date analysed                                      | -     | 28/10/2019 | 28/10/2019 | 28/10/2019 | 28/10/2019 | 28/10/2019 |
| Perfluorohexanesulfonic acid - PFHxS               | µg/L  | 0.01       | 0.01       | 0.33       | 0.14       | 0.06       |
| Perfluorooctanesulfonic acid PFOS                  | µg/L  | 0.03       | <0.01      | 0.07       | 0.05       | <0.01      |
| Perfluorooctanoic acid PFOA                        | µg/L  | <0.01      | <0.01      | 0.02       | <0.01      | <0.01      |
| 6:2 FTS                                            | µg/L  | <0.01      | <0.01      | <0.01      | <0.01      | <0.01      |
| 8:2 FTS                                            | µg/L  | <0.01      | <0.01      | <0.01      | <0.01      | <0.01      |
| Surrogate <sup>13</sup> C <sub>8</sub> PFOS        | %     | 101        | 100        | 98         | 100        | 104        |
| Surrogate <sup>13</sup> C <sub>2</sub> PFOA        | %     | 111        | 108        | 121        | 116        | 113        |
| Extracted ISTD <sup>18</sup> O <sub>2</sub> PFHxS  | %     | 105        | 100        | 107        | 108        | 101        |
| Extracted ISTD <sup>13</sup> C <sub>4</sub> PFOS   | %     | 93         | 93         | 100        | 95         | 87         |
| Extracted ISTD <sup>13</sup> C <sub>4</sub> PFOA   | %     | 94         | 94         | 99         | 96         | 94         |
| Extracted ISTD <sup>13</sup> C <sub>2</sub> 6:2FTS | %     | 107        | 101        | 102        | 99         | 91         |
| Extracted ISTD <sup>13</sup> C <sub>2</sub> 8:2FTS | %     | 95         | 93         | 93         | 98         | 91         |
| Total Positive PFHxS & PFOS                        | µg/L  | 0.04       | 0.01       | 0.40       | 0.19       | 0.06       |
| Total Positive PFOA & PFOS                         | µg/L  | 0.03       | <0.01      | 0.09       | 0.05       | <0.01      |
| Total Positive PFAS                                | µg/L  | 0.04       | 0.01       | 0.42       | 0.19       | 0.06       |

| PFAS in Waters Short                               |       |            |            |            |            |            |
|----------------------------------------------------|-------|------------|------------|------------|------------|------------|
| Our Reference                                      |       | 229256-11  | 229256-12  | 229256-13  | 229256-14  | 229256-15  |
| Your Reference                                     | UNITS | MW11       | MW12       | MW13       | MW14       | MW15       |
| Date Sampled                                       |       | 23/10/2019 | 23/10/2019 | 23/10/2019 | 23/10/2019 | 23/10/2019 |
| Type of sample                                     |       | Water      | Water      | Water      | Water      | Water      |
| Date prepared                                      | -     | 28/10/2019 | 28/10/2019 | 28/10/2019 | 28/10/2019 | 28/10/2019 |
| Date analysed                                      | -     | 28/10/2019 | 28/10/2019 | 28/10/2019 | 28/10/2019 | 28/10/2019 |
| Perfluorohexanesulfonic acid - PFHxS               | µg/L  | 0.06       | 0.18       | 0.10       | 0.11       | <0.01      |
| Perfluorooctanesulfonic acid PFOS                  | µg/L  | <0.01      | 0.29       | <0.01      | <0.01      | <0.01      |
| Perfluorooctanoic acid PFOA                        | µg/L  | <0.01      | 0.02       | <0.01      | <0.01      | <0.01      |
| 6:2 FTS                                            | µg/L  | <0.01      | 0.03       | <0.01      | <0.01      | <0.01      |
| 8:2 FTS                                            | µg/L  | <0.01      | <0.01      | <0.01      | <0.01      | <0.01      |
| Surrogate <sup>13</sup> C <sub>8</sub> PFOS        | %     | 105        | 107        | 95         | 112        | 100        |
| Surrogate <sup>13</sup> C <sub>2</sub> PFOA        | %     | 120        | 103        | 107        | 105        | 112        |
| Extracted ISTD <sup>18</sup> O <sub>2</sub> PFHxS  | %     | 110        | 107        | 102        | 106        | 105        |
| Extracted ISTD <sup>13</sup> C <sub>4</sub> PFOS   | %     | 93         | 93         | 97         | 93         | 92         |
| Extracted ISTD <sup>13</sup> C <sub>4</sub> PFOA   | %     | 96         | 107        | 102        | 104        | 96         |
| Extracted ISTD <sup>13</sup> C <sub>2</sub> 6:2FTS | %     | 95         | 108        | 105        | 105        | 97         |
| Extracted ISTD <sup>13</sup> C <sub>2</sub> 8:2FTS | %     | 87         | 113        | 98         | 97         | 95         |
| Total Positive PFHxS & PFOS                        | µg/L  | 0.06       | 0.47       | 0.10       | 0.11       | <0.01      |
| Total Positive PFOA & PFOS                         | µg/L  | <0.01      | 0.30       | <0.01      | <0.01      | <0.01      |
| Total Positive PFAS                                | µg/L  | 0.06       | 0.51       | 0.10       | 0.11       | <0.01      |

| PFAS in Waters Short                               |       |            |            |            |            |            |
|----------------------------------------------------|-------|------------|------------|------------|------------|------------|
| Our Reference                                      |       | 229256-16  | 229256-17  | 229256-18  | 229256-19  | 229256-20  |
| Your Reference                                     | UNITS | MW16       | MW17       | MW18       | RB01       | FD01       |
| Date Sampled                                       |       | 23/10/2019 | 23/10/2019 | 23/10/2019 | 23/10/2019 | 23/10/2019 |
| Type of sample                                     |       | Water      | Water      | Water      | Water      | Water      |
| Date prepared                                      | -     | 28/10/2019 | 28/10/2019 | 28/10/2019 | 28/10/2019 | 28/10/2019 |
| Date analysed                                      | -     | 28/10/2019 | 28/10/2019 | 28/10/2019 | 28/10/2019 | 28/10/2019 |
| Perfluorohexanesulfonic acid - PFHxS               | µg/L  | <0.01      | <0.01      | 0.01       | <0.01      | 29         |
| Perfluorooctanesulfonic acid PFOS                  | µg/L  | <0.01      | <0.01      | 0.04       | <0.01      | 110        |
| Perfluorooctanoic acid PFOA                        | µg/L  | <0.01      | <0.01      | <0.01      | <0.01      | 2.0        |
| 6:2 FTS                                            | µg/L  | <0.01      | <0.01      | <0.01      | <0.01      | 3.8        |
| 8:2 FTS                                            | µg/L  | <0.01      | <0.01      | <0.01      | <0.01      | 0.34       |
| Surrogate <sup>13</sup> C <sub>8</sub> PFOS        | %     | 101        | 102        | 103        | 101        | 105        |
| Surrogate <sup>13</sup> C <sub>2</sub> PFOA        | %     | 103        | 104        | 107        | 106        | 115        |
| Extracted ISTD <sup>18</sup> O <sub>2</sub> PFHxS  | %     | 106        | 106        | 101        | 102        | 80         |
| Extracted ISTD <sup>13</sup> C <sub>4</sub> PFOS   | %     | 93         | 95         | 93         | 94         | 99         |
| Extracted ISTD <sup>13</sup> C <sub>4</sub> PFOA   | %     | 99         | 103        | 100        | 107        | 89         |
| Extracted ISTD <sup>13</sup> C <sub>2</sub> 6:2FTS | %     | 104        | 101        | 100        | 95         | 82         |
| Extracted ISTD <sup>13</sup> C <sub>2</sub> 8:2FTS | %     | 85         | 97         | 93         | 91         | 98         |
| Total Positive PFHxS & PFOS                        | µg/L  | <0.01      | <0.01      | 0.06       | <0.01      | 140        |
| Total Positive PFOA & PFOS                         | µg/L  | <0.01      | <0.01      | 0.04       | <0.01      | 110        |
| Total Positive PFAS                                | µg/L  | <0.01      | <0.01      | 0.06       | <0.01      | 140        |

| Method ID | Methodology Summary                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Org-035   | <p>Soil samples are extracted with basified Methanol. Waters and soil extracts are directly injected and/or concentrated/extracted using SPE. Analysis is undertaken with LC-MS/MS.</p> <p>PFAS results include the sum of branched and linear isomers where applicable.</p> <p>Please note that PFAS results are corrected for Extracted Internal Standards (QSM 5.3 Table B-15 terminology), which are mass labelled analytes added prior to sample preparation to assess matrix effects and verify processing of the sample. PFAS analytes without a commercially available mass labelled analogue are corrected vs a closely eluting mass labelled PFAS compound. Surrogates are also reported, in this context they are mass labelled PFAS compounds added prior to extraction but are used as monitoring compounds only (not used for result correction). Envicarb (or similar) is used discretionally to remove interfering matrix components.</p> <p>Please contact the laboratory if estimates of Measurement Uncertainty are required as per WA DER.</p> |

| QUALITY CONTROL: PFAS in Waters Short              |       |      |         |            | Duplicate |            |            | Spike Recovery % |            |            |
|----------------------------------------------------|-------|------|---------|------------|-----------|------------|------------|------------------|------------|------------|
| Test Description                                   | Units | PQL  | Method  | Blank      | #         | Base       | Dup.       | RPD              | LCS-W1     | 229256-2   |
| Date prepared                                      | -     |      |         | 28/10/2019 | 1         | 28/10/2019 | 28/10/2019 |                  | 28/10/2019 | 28/10/2019 |
| Date analysed                                      | -     |      |         | 28/10/2019 | 1         | 28/10/2019 | 28/10/2019 |                  | 28/10/2019 | 28/10/2019 |
| Perfluorohexanesulfonic acid - PFHxS               | µg/L  | 0.01 | Org-035 | <0.01      | 1         | 0.25       | 0.26       | 4                | 99         | ##         |
| Perfluorooctanesulfonic acid PFOS                  | µg/L  | 0.01 | Org-035 | <0.01      | 1         | 0.04       | 0.05       | 22               | 103        | 126        |
| Perfluorooctanoic acid PFOA                        | µg/L  | 0.01 | Org-035 | <0.01      | 1         | 0.01       | 0.02       | 67               | 96         | 98         |
| 6:2 FTS                                            | µg/L  | 0.01 | Org-035 | <0.01      | 1         | <0.01      | <0.01      | 0                | 104        | 108        |
| 8:2 FTS                                            | µg/L  | 0.01 | Org-035 | <0.01      | 1         | <0.01      | <0.01      | 0                | 111        | 107        |
| Surrogate <sup>13</sup> C <sub>8</sub> PFOS        | %     |      | Org-035 | 106        | 1         | 102        | 110        | 8                | 95         | 94         |
| Surrogate <sup>13</sup> C <sub>2</sub> PFOA        | %     |      | Org-035 | 110        | 1         | 96         | 108        | 12               | 107        | 101        |
| Extracted ISTD <sup>18</sup> O <sub>2</sub> PFHxS  | %     |      | Org-035 | 105        | 1         | 105        | 98         | 7                | 101        | 99         |
| Extracted ISTD <sup>13</sup> C <sub>4</sub> PFOS   | %     |      | Org-035 | 94         | 1         | 91         | 89         | 2                | 99         | 90         |
| Extracted ISTD <sup>13</sup> C <sub>4</sub> PFOA   | %     |      | Org-035 | 95         | 1         | 99         | 97         | 2                | 103        | 96         |
| Extracted ISTD <sup>13</sup> C <sub>2</sub> 6:2FTS | %     |      | Org-035 | 94         | 1         | 94         | 96         | 2                | 92         | 90         |
| Extracted ISTD <sup>13</sup> C <sub>2</sub> 8:2FTS | %     |      | Org-035 | 87         | 1         | 94         | 91         | 3                | 87         | 94         |

| QUALITY CONTROL: PFAS in Waters Short             |       |      |         |       | Duplicate |            |            | Spike Recovery % |      |      |
|---------------------------------------------------|-------|------|---------|-------|-----------|------------|------------|------------------|------|------|
| Test Description                                  | Units | PQL  | Method  | Blank | #         | Base       | Dup.       | RPD              | [NT] | [NT] |
| Date prepared                                     | -     |      |         | [NT]  | 11        | 28/10/2019 | 28/10/2019 |                  | [NT] | [NT] |
| Date analysed                                     | -     |      |         | [NT]  | 11        | 28/10/2019 | 28/10/2019 |                  | [NT] | [NT] |
| Perfluorohexanesulfonic acid - PFHxS              | µg/L  | 0.01 | Org-035 | [NT]  | 11        | 0.06       | 0.08       | 29               | [NT] | [NT] |
| Perfluorooctanesulfonic acid PFOS                 | µg/L  | 0.01 | Org-035 | [NT]  | 11        | <0.01      | <0.01      | 0                | [NT] | [NT] |
| Perfluorooctanoic acid PFOA                       | µg/L  | 0.01 | Org-035 | [NT]  | 11        | <0.01      | <0.01      | 0                | [NT] | [NT] |
| 6:2 FTS                                           | µg/L  | 0.01 | Org-035 | [NT]  | 11        | <0.01      | <0.01      | 0                | [NT] | [NT] |
| 8:2 FTS                                           | µg/L  | 0.01 | Org-035 | [NT]  | 11        | <0.01      | <0.01      | 0                | [NT] | [NT] |
| Surrogate <sup>13</sup> C <sub>8</sub> PFOS       | %     |      | Org-035 | [NT]  | 11        | 105        | 97         | 8                | [NT] | [NT] |
| Surrogate <sup>13</sup> C <sub>2</sub> PFOA       | %     |      | Org-035 | [NT]  | 11        | 120        | 106        | 12               | [NT] | [NT] |
| Extracted ISTD <sup>18</sup> O <sub>2</sub> PFHxS | %     |      | Org-035 | [NT]  | 11        | 110        | 100        | 10               | [NT] | [NT] |
| Extracted ISTD <sup>13</sup> C <sub>4</sub> PFOS  | %     |      | Org-035 | [NT]  | 11        | 93         | 89         | 4                | [NT] | [NT] |
| Extracted ISTD <sup>13</sup> C <sub>4</sub> PFOA  | %     |      | Org-035 | [NT]  | 11        | 96         | 95         | 1                | [NT] | [NT] |

| QUALITY CONTROL: PFAS in Waters Short              |       |     |         |       |    | Duplicate |      | Spike Recovery % |      |      |
|----------------------------------------------------|-------|-----|---------|-------|----|-----------|------|------------------|------|------|
| Test Description                                   | Units | PQL | Method  | Blank | #  | Base      | Dup. | RPD              | [NT] | [NT] |
| Extracted ISTD <sup>13</sup> C <sub>2</sub> 6:2FTS | %     |     | Org-035 | [NT]  | 11 | 95        | 94   | 1                | [NT] | [NT] |
| Extracted ISTD <sup>13</sup> C <sub>2</sub> 8:2FTS | %     |     | Org-035 | [NT]  | 11 | 87        | 77   | 12               | [NT] | [NT] |

## Result Definitions

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

## Quality Control Definitions

|                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Blank</b>                                                                                                                                                                                                                                               | This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.           |
| <b>Duplicate</b>                                                                                                                                                                                                                                           | This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.                                                 |
| <b>Matrix Spike</b>                                                                                                                                                                                                                                        | A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist. |
| <b>LCS (Laboratory Control Sample)</b>                                                                                                                                                                                                                     | This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.                                |
| <b>Surrogate Spike</b>                                                                                                                                                                                                                                     | Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.                          |
| Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011. |                                                                                                                                                                                                                                  |

## Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

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

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the same sample will be re-analysed. When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

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

Measurement Uncertainty estimates are available for most tests upon request.

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

## Report Comments

PFAS\_W\_SHORT: ## Percent recovery is not possible to report due to the high concentration of contaminant in the sample. However an acceptable recovery was obtained for the LCS.

## Sample Receipt Advice

Company name: **GHD Pty Ltd SA**  
Contact name: **Dilara Valiff**  
Project name: **LARGE NORTH FIRE STATION OCTOBER 2019 GME**  
Project ID: **3319080**  
COC number: **Not provided**  
Turn around time: **5 Day**  
Date/Time received: **Oct 28, 2019 4:11 PM**  
Eurofins reference: **684989**

### Sample information

- ☒ A detailed list of analytes logged into our LIMS, is included in the attached summary table.
- ☒ All samples have been received as described on the above COC.
- ☒ COC has been completed correctly.
- ☒ Attempt to chill was evident.
- ☒ Appropriately preserved sample containers have been used.
- ☒ All samples were received in good condition.
- ☒ Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
- ☒ Appropriate sample containers have been used.
- ☒ Sample containers for volatile analysis received with zero headspace.
- ☒ Split sample sent to requested external lab.
- ☒ Some samples have been subcontracted.
- N/A Custody Seals intact (if used).

### Contact notes

If you have any questions with respect to these samples please contact:

Michael Cassidy on Phone : +61 3 8564 5000 or by e.mail: MichaelCassidy@eurofins.com

Results will be delivered electronically via e.mail to Dilara Valiff - dilara.valiff@ghd.com.

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

**Project Name:** LARGE NORTH FIRE STATION OCTOBER 2019 GME  
**Project ID:** 3319080

**Order No.:** 3319080  
**Report #:** 684989  
**Phone:** 08 8111 6600  
**Fax:** 08 8111 6699

**Received:** Oct 28, 2019 4:11 PM  
**Due:** Nov 4, 2019  
**Priority:** 5 Day  
**Contact Name:** Dilara Valiff

**Eurofins Analytical Services Manager : Michael Cassidy**

| Sample Detail                                   |           |              |               |        |             | Per- and Polyfluoroalkyl Substances (PFASs) - Short |
|-------------------------------------------------|-----------|--------------|---------------|--------|-------------|-----------------------------------------------------|
| Melbourne Laboratory - NATA Site # 1254 & 14271 |           |              |               |        |             |                                                     |
| Sydney Laboratory - NATA Site # 18217           |           |              |               |        |             |                                                     |
| Brisbane Laboratory - NATA Site # 20794         |           |              |               |        |             | X                                                   |
| Perth Laboratory - NATA Site # 23736            |           |              |               |        |             |                                                     |
| External Laboratory                             |           |              |               |        |             |                                                     |
| No                                              | Sample ID | Sample Date  | Sampling Time | Matrix | LAB ID      |                                                     |
| 1                                               | FS01      | Oct 23, 2019 |               | Water  | S19-Oc43557 | X                                                   |
| Test Counts                                     |           |              |               |        |             | 1                                                   |

GHD Pty Ltd  
GPO Box 2052  
Adelaide  
SA 5001



NATA Accredited  
Accreditation Number 1261  
Site Number 18217

Accredited for compliance with ISO/IEC 17025 – Testing  
The results of the tests, calibrations and/or  
measurements included in this document are traceable  
to Australian/national standards.

**Attention:** Dilara Valiff

**Report** 684989-W  
Project name LARGS NORTH FIRE STATION OCTOBER 2019 GME  
Project ID 3319080  
Received Date Oct 28, 2019

|                                                                    |      |      |                     |
|--------------------------------------------------------------------|------|------|---------------------|
| <b>Client Sample ID</b>                                            |      |      | <b>FS01</b>         |
| <b>Sample Matrix</b>                                               |      |      | <b>Water</b>        |
| <b>Eurofins Sample No.</b>                                         |      |      | <b>S19-Oc43557</b>  |
| <b>Date Sampled</b>                                                |      |      | <b>Oct 23, 2019</b> |
| Test/Reference                                                     | LOR  | Unit |                     |
| <b>Per- and Polyfluoroalkyl Substances (PFASs) - Short</b>         |      |      |                     |
| 1H,1H,2H,2H-perfluorooctanesulfonic acid (6:2 FTSA) <sup>N11</sup> | 0.05 | ug/L | 3.1                 |
| 13C2-6:2 FTSA (surr.)                                              | 1    | %    | 55                  |
| Perfluorohexanesulfonic acid (PFHxS) <sup>N11</sup>                | 0.01 | ug/L | 23                  |
| Perfluorooctanesulfonic acid (PFOS) <sup>N11</sup>                 | 0.01 | ug/L | 120                 |
| 18O2-PFHxS (surr.)                                                 | 1    | %    | 95                  |
| 13C8-PFOS (surr.)                                                  | 1    | %    | 96                  |
| Perfluorooctanoic acid (PFOA) <sup>N11</sup>                       | 0.01 | ug/L | 1.7                 |
| 13C8-PFOA (surr.)                                                  | 1    | %    | 110                 |
| Sum (PFHxS + PFOS)*                                                | 0.01 | ug/L | 143                 |
| Sum of US EPA PFAS (PFOS + PFOA)*                                  | 0.01 | ug/L | 121.7               |
| Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*                        | 0.01 | ug/L | 144.7               |

**Sample History**

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

A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

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

**Description**

Per- and Polyfluoroalkyl Substances (PFASs) - Short

**Testing Site**

Brisbane

**Extracted**

Oct 30, 2019

**Holding Time**

14 Days

- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)

**Company Name:** GHD Pty Ltd SA  
**Address:** GPO Box 2052  
Adelaide  
SA 5001  
  
**Project Name:** LARGS NORTH FIRE STATION OCTOBER 2019 GME  
**Project ID:** 3319080

**Order No.:** 3319080  
**Report #:** 684989  
**Phone:** 08 8111 6600  
**Fax:** 08 8111 6699

**Received:** Oct 28, 2019 4:11 PM  
**Due:** Nov 4, 2019  
**Priority:** 5 Day  
**Contact Name:** Dilara Valiff

**Eurofins Analytical Services Manager : Michael Cassidy**

| Sample Detail                                   |           |              |               |        |             | Per- and Polyfluoroalkyl Substances (PFASs) - Short |
|-------------------------------------------------|-----------|--------------|---------------|--------|-------------|-----------------------------------------------------|
| Melbourne Laboratory - NATA Site # 1254 & 14271 |           |              |               |        |             |                                                     |
| Sydney Laboratory - NATA Site # 18217           |           |              |               |        |             |                                                     |
| Brisbane Laboratory - NATA Site # 20794         |           |              |               |        |             | X                                                   |
| Perth Laboratory - NATA Site # 23736            |           |              |               |        |             |                                                     |
| External Laboratory                             |           |              |               |        |             |                                                     |
| No                                              | Sample ID | Sample Date  | Sampling Time | Matrix | LAB ID      |                                                     |
| 1                                               | FS01      | Oct 23, 2019 |               | Water  | S19-Oc43557 | X                                                   |
| Test Counts                                     |           |              |               |        |             | 1                                                   |

## Internal Quality Control Review and Glossary

### General

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

### Holding Times

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

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

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

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

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

**\*\*NOTE:** pH duplicates are reported as a range NOT as RPD

### Units

**mg/kg:** milligrams per kilogram

**mg/L:** milligrams per litre

**ug/L:** micrograms per litre

**ppm:** Parts per million

**ppb:** Parts per billion

**%:** Percentage

**org/100mL:** Organisms per 100 millilitres

**NTU:** Nephelometric Turbidity Units

**MPN/100mL:** Most Probable Number of organisms per 100 millilitres

### Terms

|                         |                                                                                                                                                                    |
|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Dry</b>              | Where a moisture has been determined on a solid sample the result is expressed on a dry basis.                                                                     |
| <b>LOR</b>              | Limit of Reporting.                                                                                                                                                |
| <b>SPIKE</b>            | Addition of the analyte to the sample and reported as percentage recovery.                                                                                         |
| <b>RPD</b>              | Relative Percent Difference between two Duplicate pieces of analysis.                                                                                              |
| <b>LCS</b>              | Laboratory Control Sample - reported as percent recovery.                                                                                                          |
| <b>CRM</b>              | Certified Reference Material - reported as percent recovery.                                                                                                       |
| <b>Method Blank</b>     | In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.     |
| <b>Surr - Surrogate</b> | The addition of a like compound to the analyte target and reported as percentage recovery.                                                                         |
| <b>Duplicate</b>        | A second piece of analysis from the same sample and reported in the same units as the result to show comparison.                                                   |
| <b>USEPA</b>            | United States Environmental Protection Agency                                                                                                                      |
| <b>APHA</b>             | American Public Health Association                                                                                                                                 |
| <b>TCLP</b>             | Toxicity Characteristic Leaching Procedure                                                                                                                         |
| <b>COC</b>              | Chain of Custody                                                                                                                                                   |
| <b>SRA</b>              | Sample Receipt Advice                                                                                                                                              |
| <b>QSM</b>              | US Department of Defense Quality Systems Manual Version 5.3                                                                                                        |
| <b>CP</b>               | Client Parent - QC was performed on samples pertaining to this report                                                                                              |
| <b>NC</b>               | Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within. |
| <b>TEQ</b>              | Toxic Equivalency Quotient                                                                                                                                         |

### QC - Acceptance Criteria

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

Results <10 times the LOR : No Limit

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

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

Surrogate Recoveries: Recoveries must lie between 20-130% Phenols & 50-150% PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

### QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " - " in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

**Quality Control Results**

| Test                                                       |               |           |      | Units | Result 1 |          |     | Acceptance Limits | Pass Limits | Qualifying Code |
|------------------------------------------------------------|---------------|-----------|------|-------|----------|----------|-----|-------------------|-------------|-----------------|
| <b>Method Blank</b>                                        |               |           |      |       |          |          |     |                   |             |                 |
| <b>Per- and Polyfluoroalkyl Substances (PFASs) - Short</b> |               |           |      |       |          |          |     |                   |             |                 |
| 1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)        |               |           |      | ug/L  | < 0.05   |          |     | 0.05              | Pass        |                 |
| Perfluorohexanesulfonic acid (PFHxS)                       |               |           |      | ug/L  | < 0.01   |          |     | 0.01              | Pass        |                 |
| Perfluorooctanesulfonic acid (PFOS)                        |               |           |      | ug/L  | < 0.01   |          |     | 0.01              | Pass        |                 |
| Perfluorooctanoic acid (PFOA)                              |               |           |      | ug/L  | < 0.01   |          |     | 0.01              | Pass        |                 |
| <b>LCS - % Recovery</b>                                    |               |           |      |       |          |          |     |                   |             |                 |
| <b>Per- and Polyfluoroalkyl Substances (PFASs) - Short</b> |               |           |      |       |          |          |     |                   |             |                 |
| 1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)        |               |           |      | %     | 114      |          |     | 50-150            | Pass        |                 |
| Perfluorohexanesulfonic acid (PFHxS)                       |               |           |      | %     | 100      |          |     | 50-150            | Pass        |                 |
| Perfluorooctanesulfonic acid (PFOS)                        |               |           |      | %     | 93       |          |     | 50-150            | Pass        |                 |
| Perfluorooctanoic acid (PFOA)                              |               |           |      | %     | 95       |          |     | 50-150            | Pass        |                 |
| Test                                                       | Lab Sample ID | QA Source |      | Units | Result 1 |          |     | Acceptance Limits | Pass Limits | Qualifying Code |
| <b>Spike - % Recovery</b>                                  |               |           |      |       |          |          |     |                   |             |                 |
| <b>Per- and Polyfluoroalkyl Substances (PFASs) - Short</b> |               |           |      |       | Result 1 |          |     |                   |             |                 |
| 1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)        | S19-Oc42732   | NCP       | %    |       | 55       |          |     | 50-150            | Pass        |                 |
| Perfluorohexanesulfonic acid (PFHxS)                       | S19-Oc42732   | NCP       | %    |       | 92       |          |     | 50-150            | Pass        |                 |
| Perfluorooctanesulfonic acid (PFOS)                        | S19-Oc42732   | NCP       | %    |       | 83       |          |     | 50-150            | Pass        |                 |
| Perfluorooctanoic acid (PFOA)                              | S19-Oc42732   | NCP       | %    |       | 92       |          |     | 50-150            | Pass        |                 |
| Test                                                       | Lab Sample ID | QA Source |      | Units | Result 1 |          |     | Acceptance Limits | Pass Limits | Qualifying Code |
| <b>Duplicate</b>                                           |               |           |      |       |          |          |     |                   |             |                 |
| <b>Per- and Polyfluoroalkyl Substances (PFASs) - Short</b> |               |           |      |       | Result 1 | Result 2 | RPD |                   |             |                 |
| 1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)        | S19-Oc43557   | CP        | ug/L |       | 3.1      | 3.4      | 10  | 30%               | Pass        |                 |
| Perfluorohexanesulfonic acid (PFHxS)                       | S19-Oc43557   | CP        | ug/L |       | 23       | 23       | 3.0 | 30%               | Pass        |                 |
| Perfluorooctanesulfonic acid (PFOS)                        | S19-Oc43557   | CP        | ug/L |       | 120      | 120      | <1  | 30%               | Pass        |                 |
| Perfluorooctanoic acid (PFOA)                              | S19-Oc43557   | CP        | ug/L |       | 1.7      | 1.8      | 5.0 | 30%               | Pass        |                 |

## Comments

### Sample Integrity

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

### Qualifier Codes/Comments

| Code | Description                                                                                                                                                                                                                                                                                        |
|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| N11  | Isotope dilution is used for calibration of each native compound for which an exact labelled analogue is available (Isotope Dilution Quantitation). The isotopically labelled analogues allow identification and recovery correction of the concentration of the associated native PFAS compounds. |

## Authorised By

|                 |                             |
|-----------------|-----------------------------|
| Michael Cassidy | Analytical Services Manager |
| Bryan Wilson    | Senior Analyst-PFAS (QLD)   |



### Glenn Jackson General Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

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

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

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

# **Appendix I** – Quality Assurance and Quality Control

# Data quality objectives and quality assurance / quality control

## I.1 Data quality objectives

The data quality objectives (DQOs) and investigation strategy were developed using the methodology discussed in NEPM Schedule B (2) *Guideline on Data Collection, Sample Design and Reporting*. The guideline nominated the implementation of the DQO process in Section 5 of AS4482.1-2005. The purpose of the DQO process was to ensure that the data collection activities were focused on collecting the information needed to make decisions, and answering the relevant questions leading up to such decisions.

The Data Quality Objectives (DQOs) established a framework for contamination investigations which incorporated a seven stepped continuum that defines the problem at the site. A series of stages then optimised 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.

### I.1.1 Step 1: state the problem

The South Australian Metropolitan Fire Service (MFS) engaged GHD Pty Ltd (GHD) to undertake an environmental investigation in the vicinity of the Largs North Fire Station (the site) following the detection of elevated concentrations of per and poly fluoroalkyl substance (PFAS) in groundwater beneath as well as up and down hydraulic gradient of the site. The investigation was initiated based on the findings of previous investigations conducted by GHD in December 2018/January 2019 and March/April 2019. Previous reports are summarised in Section 3 of the report with a brief summary provided below.

The results of the previous environmental investigation (GHD, 2019) exhibited the following:

- The highest PFAS concentrations were reported in groundwater monitoring wells on or adjacent the site which exceeded the adopted recreational criterion for PFOS & PFHxS. The concentrations of PFAS detected in these wells are likely to be predominantly associated with site activities.
- Groundwater monitoring wells MW05 – MW07 located up hydraulic gradient (south) of the site reported PFAS concentrations exceeding the adopted drinking water criterion for PFOS & PFHxS. These concentrations are not considered to be associated with the site activities, based on groundwater gradients and inferred groundwater flow direction.

- Groundwater monitoring wells located down hydraulic gradient (north) of the site reported PFAS concentrations exceeding the adopted recreational criterion at MW08 and drinking water criterion at MW09 - MW11 for PFOS & PFHxS.

The results of the investigation prompted MFS, in consultation with the SA EPA and other stakeholders, to engage GHD to undertake an environmental investigation of groundwater down hydraulic gradient of the site in order to delineate the extent of PFAS impacted groundwater, and up and cross hydraulic gradient of the site in order to aid in the assessment of possible source(s) and the extent of PFAS contamination.

### **I.1.2 Step 2: Identify the principal study question**

The Environmental Investigation was based on the objectives listed in Section 1.2.

### **I.1.3 Step 3: Inputs to the decision**

The following inputs were required for the decision:

- Quantitative and qualitative data gained through intrusive sampling, analytical works and observations during intrusive investigations.

### **I.1.4 Step 4: Boundaries of the study**

Spatial boundaries for the assessment area are defined by the extent of the onsite and offsite well network. The vertical extent of the investigations limited to 4.5 mBGL. The temporal boundaries of the study are 18<sup>th</sup> September to 23<sup>rd</sup> October 2019.

### **I.1.5 Step 5: Decision rules**

Groundwater analytical data was assessed against the criteria adopted from relevant guidance as discussed in Section 5.

### **I.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 were adopted in accordance with the appropriate guidance from the AS4482.1 which included 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 was assessed against pre-determined DQIs. The DQIs including precision, accuracy, representativeness, comparability and completeness, were 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 I-1.

- Precision - measured the reproducibility of measurements under a given set of conditions. The precision of the laboratory data and sampling techniques was assessed by calculating the Relative Percentage Difference (RPD) of duplicate samples
- Accuracy - measured the bias in a measurement system. The accuracy of the laboratory data 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 was assessed by

reference to the analytical results of laboratory control samples, laboratory spikes and analyses against reference standards

- Representativeness - expressed the degree to which sample data accurately and precisely represented a characteristic of a population or an environmental condition.  
Representativeness was 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 - expressed the confidence with which one data set could be compared with another. This was achieved through maintaining a level of consistency in techniques used to collect samples; ensuring analysing laboratories used consistent analysis techniques and reporting methods
- Completeness - was defined as the percentage of measurements made which are judged to be valid measurements.

**Table I-1 Summary of quality assurance / quality control criteria**

| Data quality indicator                                         | Frequency                                   | Data quality acceptance criteria                                                                                                                                                                                                                                                                                                                                                           |
|----------------------------------------------------------------|---------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Precision                                                      |                                             |                                                                                                                                                                                                                                                                                                                                                                                            |
| Duplicates (Intra-Laboratory)<br>Duplicates (Inter-Laboratory) | 1 / 20 samples<br>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.                                                                                                                                                                                                         |
| 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.<br>For matrix spikes Eurofins adopts a matrix spike recovery range of 70-130%.<br>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 $\pm 30\%$ .<br>The laboratory RPDs have been assessed using the following ranges:<br>Results <10 times LOR: no limits.<br>Results between 10 and 20 times LOR 0% - 50%.<br>Results >20 times LOR: 0-20%.                                                                                            |
| Representativeness                                             |                                             |                                                                                                                                                                                                                                                                                                                                                                                            |
| Sampling appropriate for media and analytes                    | All samples                                 | -<br>Organics (14 days)                                                                                                                                                                                                                                                                                                                                                                    |

| Data quality indicator                                                                                   | Frequency         | Data quality acceptance criteria |
|----------------------------------------------------------------------------------------------------------|-------------------|----------------------------------|
| Samples extracted and analysed within holding times                                                      | All samples       | 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                      |
| 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:<br>COC: Chain of Custody<br>LOR: Limit of Reporting<br>QA/QC: Quality assurance / quality control |                   |                                  |

### **I.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.

## **I.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).

### **I.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 I-2.

**Table I-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. |
| Inter-Laboratory Duplicate (Split) | Inter-Laboratory Duplicate (Split) samples are two separate samples collected at the same location and analysed by two separate laboratories to determine the analytical proficiency of the primary laboratory.                                                                                                                                       |
| 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 adopted 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.

GHD consigned all primary groundwater, rinsate and intra-laboratory field duplicate (blind) samples to Envirolab Group for analysis. The analysis of the inter-laboratory duplicate (split) samples, for QC purposes, was completed by MGT Eurofins.

In the instance where samples and their corresponding duplicates had concentrations of target analytes less than the laboratory LOR, no quantitative comparison could be carried out and therefore the RPD was undefined. This was also the case for situations where the sample result was less than ten times the laboratory LOR.

Duplicate, split and rinsate sample results and Relative Percentage Difference (RPD) calculations are presented in Table 4 and Table 5 in Analytical Results Tables at the end of the report.

### **I.2.2      Sample handling and preservation**

All sample collection methodology is documented in Section 5.

All 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 primary and intra laboratory duplicate samples were analysed within the specified holding times.

All samples were received intact as per the Sample Receipt Notification (included in **Appendix H**).

### **I.2.3      Chain of custody**

Unique Chain of Custody documentation and distinct batch numbers accompany all sample batches. This documentation is included in **Appendix H**.

## **I.3      Laboratory QA/QC**

The laboratories subcontracted by GHD to analyse samples (Envirolab Group and MGT Eurofins) 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).

### I.3.1 Laboratory QA/QC procedures

As part of NATA requirements, the laboratory incorporated a range of QA methods to ensure accuracy of data. This included the analyses of internal laboratory QC samples, details of which have been provided in Table I-3.

**Table I-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.<br><br>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 |

|                                                                                                                                                                                                                                          |      |                                               |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-----------------------------------------------|
| <p>with results representing the percent difference between the two sample concentrations for a specific contaminant.</p> <p>The RPD is calculated using the following formula:</p> $RPD(\%) = \frac{ C_o - C_d }{C_o + C_d} \times 200$ |      |                                               |
| 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.

## I.4 Field QC Results

The field QC results analysis below considered all sample types collected as part of the environmental investigation.

### I.4.1 Groundwater

A total of eighteen (18) primary groundwater samples were collected, submitted and analysed as part of the environmental investigation.

One (1) field duplicate (intra-laboratory) and one (1) split (inter-laboratory) sample was collected and analysed as part of the investigation. The target frequency for analysis of field QC samples was 2 replicate samples in 20 primary samples (10%). In this instance, this frequency was achieved for analysis and collection.

The field QC sample collected are provided in the Table I-4.

**Table I-4 Analysed field QC samples for groundwater**

| Site (Groundwater well) | QA sample | QA/QC sample     | Primary sample |
|-------------------------|-----------|------------------|----------------|
| MW04                    | FD01      | Intra-laboratory | MW04           |
| MW04                    | FS02      | Inter-laboratory | MW04           |

No RPD exceedances were identified. Primary and duplicate sample results with calculated RPDs are presented in Table 4 at the end of this report.

### I.4.3 Rinsate

One (1) rinsate sample was analysed as part of the environmental investigation. The rinsate sample didn't exceed 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.

Rinsate results are presented in Table 5 at the end of this report.

## I.5 Laboratory program

The NATA certified laboratories utilised for this assessment (Envirolab Group and MGT Eurofins) 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 H**.

## **I.6 Overall Assessment of Data Quality**

As the GHD QA/QC parameters were within the specified requirements, it is considered that the data is valid and of sufficient quality for the purposes of this Environmental Investigation.



GHD

Level 4, 211 Victoria Square  
Adelaide SA 5000

T: 61 8 8111 6600 F: 61 8 8111 6699 E: adlmail@ghd.com

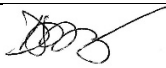
© GHD 2020

This document is and shall remain the property of GHD. The document may only be used for the purpose for which it was commissioned and in accordance with the Terms of Engagement for the commission. Unauthorised use of this document in any form whatsoever is prohibited.

3319080-

35602/<https://projects.ghd.com/oc/SouthAustralia1/largsnorthstationand/Delivery/Documents/3319080-RPT- MFS Largs North GME Oct 2019.docx>

#### Document Status

| Revision | Author     | Reviewer |                                                                                     | Approved for Issue |                                                                                       |            |
|----------|------------|----------|-------------------------------------------------------------------------------------|--------------------|---------------------------------------------------------------------------------------|------------|
|          |            | Name     | Signature                                                                           | Name               | Signature                                                                             | Date       |
| A        | J Chance   | J Howard |                                                                                     | J Howard           |                                                                                       | 27/05/2019 |
| B        | M Hanna    | D Valiff |                                                                                     | J Howard           |                                                                                       | 22/11/2019 |
| Final    | V Bearmann | D Valiff |  | J Howard           |  | 9/01/2020  |

[www.ghd.com](http://www.ghd.com)

