Ayers Rock Airport
200 Coote Road Yulara NT

Airservices Australia

Environmental Audit Report 0503-NT-2201

JBS&G 57345 | 154,726

27 February 2025



We acknowledge the Traditional Custodians of Country throughout Australia and their connections to land, sea and community.

We pay respect to Elders past and present and in the spirit of reconciliation, we commit to working together for our shared future.



Caring for Country The Journey of JBS&G
Artist: Patrick Caruso, Eastern Arrernte

NSW Site Auditor Scheme

Site Audit Statement

A site audit statement summarises the findings of a site audit. For full details of the site auditor's findings, evaluations and conclusions, refer to the associated site audit report.

This form was approved under the *Contaminated Land Management Act 1997* on 12 October 2017.

For information about completing this form, go to Part IV.

Part I: Site audit identification

Site audit statement no. **0503-NT-2201**

This site audit is a:

☑ statutory audit

~~☐ non-statutory audit~~

~~within the meaning of the *Contaminated Land Management Act 1997.*~~

Site auditor details

(As accredited under the *Contaminated Land Management Act 1997*)

Name	**Andrew Lau**
Company	**JBS&G Australia Pty Ltd**
Address	**Level 8, 179 Elizabeth Street, Sydney, NSW**
	Postcode **2000**
Phone	**02 8245 0300**
Email	**alau@jbsg.com.au**

Site details

Address	**Yulara Airport (also Ayers Rock Airport or Connellan Airport)**
	200 Coote Road, Yulara, NT Postcode

Property description

(Attach a separate list if several properties are included in the site audit.)

Volume 563, Folio 147, Township of Yulara, part of Lot 101 S 81/079

Local government area **Unincorporated (Yulara)**

Area of site (include units, e.g. hectares) **Airport estate: approx 500 ha**

Current zoning **Not zoned**

Regulation and notification

To the best of my knowledge:

☑ **the site is** the subject of a ~~declaration, order, agreement, proposal or~~ Notice under the *Waste Management and Pollution Control Act 1998,* ~~as follows:~~ ~~(provide the no. if applicable)~~

- ☐ ~~Declaration no.~~
- ☐ ~~Order no.~~
- ☐ ~~Proposal no.~~
- ☐ ~~Notice no.~~

☐ ~~**the site is not** the subject of a declaration, order, proposal or notice under the *Contaminated Land Management Act 1997* or the *Environmentally Hazardous Chemicals Act 1985*.~~

~~To the best of my knowledge:~~

☐ ~~the site **has** been notified to the EPA under section 60 of the *Contaminated Land Management Act 1997*~~

☐ ~~the site **has not** been notified to the EPA under section 60 of the *Contaminated Land Management Act 1997*.~~

Site audit commissioned by

Name	**Hollie Ainslie**	
Company	**Airservices Australia**	
Address	**Allan Woods Building**	
	25 Constitution Ave, Canberra, ACT	Postcode **2601**
Phone	**(02) 6268 5460**	
Email	**holly.ainslie@airservicesaustralia.com**	

~~Contact details for contact person~~ ~~(if different from above)~~

~~Name~~

~~Phone~~

~~Email~~

Nature of statutory requirements (not applicable for non-statutory audits)

☐ ~~Requirements under the *Contaminated Land Management Act* 1997 (e.g. management order; please specify, including date of issue)~~

☐ ~~Requirements imposed by an environmental planning instrument (please specify, including date of issue)~~

☐ ~~Development consent requirements under the *Environmental Planning and Assessment Act 1979* (please specify consent authority and date of issue)~~

☑ Requirements under other legislation (please specify, including date of issue)

Notice to Carry Out Environmental Audit Program, issued pursuant to Section 48(1) of the *Waste Management and Pollution Control Act, 1998*, issued 14 December 2021.

Purpose of site audit

☐ **A1** To determine land use suitability

Intended uses of the land:

OR

☐ **A2** To determine land use suitability subject to compliance with either an active or passive environmental management plan

Intended uses of the land:

OR

(Tick all that apply)

☐ **B1** To determine the nature and extent of contamination

☐ **B2** To determine the appropriateness of:

- ☐ an investigation plan
- ☐ a remediation plan
- ☐ a management plan

☐ **B3** To determine the appropriateness of a **site testing plan** to determine if groundwater is safe and suitable for its intended use as required by the *Temporary Water Restrictions Order for the Botany Sands Groundwater Resource 2017*

☑ **B4** To determine the compliance with an approved:

- ☐ **voluntary management proposal** or
- ☐ **management order** under the *Contaminated Land Management Act 1997*
- ☑ **Notice to Carry Out Environmental Audit Program**

☐ **B5** To determine if the land can be made suitable for a particular use (or uses) if the site is remediated or managed in accordance with a specified plan.

Intended uses of the land:

Information sources for site audit

Consultancies which conducted the site investigations and/or remediation:

Tetra Tech Coffey

Titles of reports reviewed:

Ayers Rock Airport – Targeted Site Investigation Site Brief Report. Draft C, Tetra Tech Coffey, 28 July 2021. (TTC 2021)

PFAS Characterisation Program Ayers Rock Airport (AYQ) – Sampling and Analysis Quality Plan. Draft H, Tetra Tech Coffey, 23 March 2022 (TTC 2022a)

PFAS Characterisation Program Ayers Rock Airport (AYQ) – Environmental Site Investigation. Draft C, Tetra Tech Coffey, 5 September 2022 (TTC 2022b)

PFAS Characterisation Program Ayers Rock Airport (AYQ) – Sampling and Analysis Quality Plan. Draft D, Tetra Tech Coffey, 16 December 2022 (TTC 2022c)

PFAS Characterisation Program Ayers Rock Airport (AYQ) – Sampling and Analysis Quality Plan. Rev 0.IFU, Tetra Tech Coffey, 3 August 2023 (TTC 2023a)

PFAS Characterisation Program Ayers Rock Airport – Targeted Site Investigation Site Brief Report. Rev 0.IFU, Tetra Tech Coffey, 3 August 2023 (TTC 2023b)

PFAS Characterisation Program Ayers Rock Airport (AYQ) – Targeted Site Investigation. Rev 0, Tetra Tech Coffey, 26 September 2023 (TTC 2023c)

Other information reviewed, including previous site audit reports and statements relating to the site:

Report on Soil Sampling and Analysis at Yulara Airport Fire Station and ARFF Drill Ground October 2016, Low Ecological Services P/L, 16/5/17. (LES 2017)

Ayers Rock (Yulara) Airport Preliminary Site Investigation October 2017. Revision 0, GHD Pty Ltd, 16/10/17 (GHD 2017a)

Ayers Rock (Yulara) Airport Preliminary Sampling Report October 2017. Revision 0, GHD Pty Ltd, 19/10/17 (GHD 2017b)

Yulara Airport Groundwater Sampling Results for Bore RN012065 August 2019. Revision A, GHD Pty Ltd, 20/8/2019 (GHD 2019)

Site audit report details

Title: Ayers Rock Airport, 200 Coote Road Yulara NT, Environmental Audit Report 0503-NT-2201

Report no. JBS&G 57345 | 154,726 Date 27 February 2025

Part II: Auditor's findings

Please complete either Section A1, Section A2 or Section B, not more than one section. (Strike out the irrelevant sections.)

- Use **Section A1** where site investigation and/or remediation has been completed and a conclusion can be drawn on the suitability of land uses **without the implementation** of an environmental management plan.
- Use **Section A2** where site investigation and/or remediation has been completed and a conclusion can be drawn on the suitability of land uses **with the implementation** of an active or passive environmental management plan.
- Use **Section B** where the audit is to determine:
  - (B1) the nature and extent of contamination, and/or
  - (B2) the appropriateness of an investigation, remediation or management plan[1], and/or
  - (B3) the appropriateness of a site testing plan in accordance with the *Temporary Water Restrictions Order for the Botany Sands Groundwater Source 2017*, and/or
  - (B4) whether the terms of the approved voluntary management proposal or management order have been complied with, and/or
  - (B5) whether the site can be made suitable for a specified land use (or uses) if the site is remediated or managed in accordance with the implementation of a specified plan.

[1] For simplicity, this statement uses the term 'plan' to refer to both plans and reports.

Section A1

I certify that, in my opinion:

The **site is suitable** for the following uses:

(Tick all appropriate uses and strike out those not applicable.)

☐ Residential, including substantial vegetable garden and poultry

☐ Residential, including substantial vegetable garden, excluding poultry

☐ Residential with accessible soil, including garden (minimal home-grown produce contributing less than 10% fruit and vegetable intake), excluding poultry

☐ Day care centre, preschool, primary school

☐ Residential with minimal opportunity for soil access, including units

☐ Secondary school

☐ Park, recreational open space, playing field

☐ Commercial/industrial

☐ Other (please specify):

_____

OR

☐ I certify that, in my opinion, the **site is not suitable** for any use due to the risk of harm from contamination.

Overall comments:

_____

_____

_____

_____

_____

_____

Section A2

I certify that, in my opinion:

Subject to compliance with the **attached** environmental management plan[2] (EMP), the site is suitable for the following uses:

(Tick all appropriate uses and strike out those not applicable.)

☐ Residential, including substantial vegetable garden and poultry

☐ Residential, including substantial vegetable garden, excluding poultry

☐ Residential with accessible soil, including garden (minimal home-grown produce contributing less than 10% fruit and vegetable intake), excluding poultry

☐ Day care centre, preschool, primary school

☐ Residential with minimal opportunity for soil access, including units

☐ Secondary school

☐ Park, recreational open space, playing field

☐ Commercial/industrial

☐ Other (please specify):

_____

EMP details

Title _____

Author _____

Date _____ No. of pages _____

EMP summary

This EMP (attached) is required to be implemented to address residual contamination on the site.

The EMP: (Tick appropriate box and strike out the other option.)

☐ requires operation and/or maintenance of **active** control systems[3]

☐ requires maintenance of **passive** control systems only[3].

[2] Refer to Part IV for an explanation of an environmental management plan.
[3] Refer to Part IV for definitions of active and passive control systems.

~~Purpose of the EMP:~~

~~Description of the nature of the residual contamination:~~

~~Summary of the actions required by the EMP:~~

~~How the EMP can reasonably be made to be legally enforceable:~~

~~How there will be appropriate public notification:~~

~~Overall comments:~~

Section B

Purpose of the plan[4] which is the subject of this audit:

To meet the requirements of the Section 48 Notice, and subsequent amendments.

I certify that, in my opinion:

~~(B1)~~

~~❑ The nature and extent of the contamination **has** been appropriately determined~~

~~❑ The nature and extent of the contamination **has not** been appropriately determined~~

~~AND/OR (B2)~~

~~❑ The investigation, remediation or management plan **is** appropriate for the purpose stated above~~

~~❑ The investigation, remediation or management plan **is not** appropriate for the purpose stated above~~

~~AND/OR (B3)~~

~~❑ The site testing plan:~~

~~❑ **is** appropriate to determine~~

~~❑ **is not** appropriate to determine~~

~~if groundwater is safe and suitable for its intended use as required by the *Temporary Water Restrictions Order for the Botany Sands Groundwater Resource 2017*~~

AND/OR (B4)

❑ The terms of the Notice ~~approved voluntary management proposal* or management order** (strike out as appropriate):~~

☑ **have** been complied with

~~❑ **have not** been complied with.~~

~~AND/OR (B5)~~

~~❑ The site **can be made suitable** for the following uses:~~

~~(Tick all appropriate uses and strike out those not applicable.)~~

~~❑ Residential, including substantial vegetable garden and poultry~~

~~❑ Residential, including substantial vegetable garden, excluding poultry~~

~~❑ Residential with accessible soil, including garden (minimal home-grown produce contributing less than 10% fruit and vegetable intake), excluding poultry~~

~~❑ Day care centre, preschool, primary school~~

[4] For simplicity, this statement uses the term 'plan' to refer to both plans and reports.

~~☐ Residential with minimal opportunity for soil access, including units~~

~~☐ Secondary school~~

~~☐ Park, recreational open space, playing field~~

~~☐ Commercial/industrial~~

~~☐ Other (please specify):~~

~~IF the site is remediated/managed* in accordance with the following plan (**attached**):~~

~~*Strike out as appropriate~~

~~Plan title~~

~~Plan author~~

~~Plan date No. of pages~~

~~SUBJECT to compliance with the following condition(s):~~

Overall comments:

The investigations undertaken to address the requirements of the notice were reviewed by the auditor and found to have been undertaken in general accordance with relevant guidelines, including those referred to in the Notice. The data obtained from the investigations were found to have been of a suitable quality to address the objectives of the study.

The auditor is satisfied that the investigation report (TTC 2023c) has determined the nature and extent of contamination within the premises to a sufficient degree that an assessment of risks has been able to be undertaken. This has resulted in two potentially unacceptable risks being identified as requiring management/further investigation, namely: (i) intrusive maintenance worker exposure; and (ii) potentially indirect exposure to ecological receptors from PFAS impacted soils in certain parts of the site.

Where gaps remain in the complete understanding of the nature and extent of contamination, these have been appropriately acknowledged by the consultant and suitable recommendations included to address each. In each instance, the auditor is satisfied that the current appraisal of risk at the site is unlikely to change as a result of addressing the remaining data gaps, having regard to the management recommendations proposed.

The remaining data gaps relevant to the requirements of the Notice and the auditor's opinions on each are as follows:

- The source and extent of PFAS impacts in groundwater upgradient of the Airservices lease areas and the sewage treatment plant hasn't been fully determined. The auditor agrees with the consultant's recommendation that further investigations are required to clarify this item.
- The source and extent of the PFAS groundwater impact in the northwestern portion of the site (GW11) remains unknown and – where access permits - further investigations are recommended to close this data gap. The mechanism by which this impact originated remains unknown/uncertain and has not been able to be

established as part of the investigations undertaken. The auditor is of the opinion that the consultant's recommendation to undertake further sampling and analysis of GW11 (only) (TTC 2023c) is inadequate. A more comprehensive investigation scope, including both soil and groundwater will be required to identify the source, nature and extent of this identified impact. Notwithstanding this data gap, the auditor considers that the likely risks posed by this identified – but as yet undefined – impact are low. The reason why the auditor has reached this view is primarily due to the lack of identified groundwater users downgradient of the airport, however, agrees with the need to address this as part of the recommended future management measures.

The auditor agrees with the consultant's recommendation that a PFAS Management Plan should be prepared for implementation at the site. As a minimum, the auditor considers that the PFAS Management Plan should include:

- Prohibiting the consumption of groundwater at the site by humans unless it has first been appropriately tested to confirm its suitability for such a use;
- Remediation/management of PFAS impacted accessible soils and/or sediment in and around the fire training ground, not only to address direct exposure risks to identified receptors but to also consider addressing secondary source materials relating to identified groundwater impacts; and
- Management of PFAS impacted water associated with the Fire Training Ground Trade Waste Treatment facility and, if still relevant once addressed, the sewage treatment plant.

Part III: Auditor's declaration

I am accredited as a site auditor by the NSW Environment Protection Authority (EPA) under the *Contaminated Land Management Act 1997.*

Accreditation no. 0503

I certify that:

- I have completed the site audit free of any conflicts of interest as defined in the *Contaminated Land Management Act 1997,* and
- with due regard to relevant laws and guidelines, I have examined and am familiar with the reports and information referred to in Part I of this site audit, and
- on the basis of inquiries I have made of those individuals immediately responsible for making those reports and obtaining the information referred to in this statement, those reports and that information are, to the best of my knowledge, true, accurate and complete, and
- this statement is, to the best of my knowledge, true, accurate and complete.

I am aware that there are penalties under the *Contaminated Land Management Act 1997* for wilfully making false or misleading statements.



Signed

Date 27/02/2005

Part IV: Explanatory notes

To be complete, a site audit statement form must be issued with all four parts.

How to complete this form

Part I

Part I identifies the auditor, the site, the purpose of the audit and the information used by the auditor in making the site audit findings.

Part II

Part II contains the auditor's opinion of the suitability of the site for specified uses or of the appropriateness of an investigation, or remediation plan or management plan which may enable a particular use. It sets out succinct and definitive information to assist decision-making about the use or uses of the site or a plan or proposal to manage or remediate the site.

The auditor is to complete either Section A1 or Section A2 or Section B of Part II, **not** more than one section.

Section A1

In Section A1 the auditor may conclude that the land is *suitable* for a specified use or uses OR *not suitable* for any beneficial use due to the risk of harm from contamination.

By certifying that the site is *suitable*, an auditor declares that, at the time of completion of the site audit, no further investigation or remediation or management of the site was needed to render the site fit for the specified use(s). **Conditions must not be** imposed on a Section A1 site audit statement. Auditors may include **comments** which are key observations in light of the audit which are not directly related to the suitability of the site for the use(s). These observations may cover aspects relating to the broader environmental context to aid decision-making in relation to the site.

Section A2

In Section A2 the auditor may conclude that the land is *suitable* for a specified use(s) subject to a condition for implementation of an environmental management plan (EMP).

Environmental management plan

Within the context of contaminated sites management, an EMP (sometimes also called a 'site management plan') means a plan which addresses the integration of environmental mitigation and monitoring measures for soil, groundwater and/or hazardous ground gases throughout an existing or proposed land use. An EMP succinctly describes the nature and location of contamination remaining on site and states what the objectives of the plan are, how contaminants will be managed, who will be responsible for the plan's implementation and over what time frame actions specified in the plan will take place.

By certifying that the site is suitable subject to implementation of an EMP, an auditor declares that, at the time of completion of the site audit, there was sufficient information satisfying guidelines made or approved under the *Contaminated Land Management Act 1997*

(CLM Act) to determine that implementation of the EMP was feasible and would enable the specified use(s) of the site and no further investigation or remediation of the site was needed to render the site fit for the specified use(s).

Implementation of an EMP is required to ensure the site remains suitable for the specified use(s). The plan should be legally enforceable: for example, a requirement of a notice under the CLM Act or a development consent condition issued by a planning authority. There should also be appropriate public notification of the plan, e.g. on a certificate issued under s.149 of *the Environmental Planning and Assessment Act 1979*.

Active or passive control systems

Auditors must specify whether the EMP requires operation and/or maintenance of active control systems or requires maintenance of passive control systems only. Active management systems usually incorporate mechanical components and/or require monitoring and, because of this, regular maintenance and inspection are necessary. Most active management systems are applied at sites where if the systems are not implemented an unacceptable risk may occur. Passive management systems usually require minimal management and maintenance and do not usually incorporate mechanical components.

Auditor's comments

Auditors may also include **comments** which are key observations in light of the audit which are not directly related to the suitability of the site for the use(s). These observations may cover aspects relating to the broader environmental context to aid decision-making in relation to the site.

Section B

In Section B the auditor draws conclusions on the nature and extent of contamination, and/or suitability of plans relating to the investigation, remediation or management of the land, and/or the appropriateness of a site testing plan in accordance with the *Temporary Water Restrictions Order for the Botany Sands Groundwater Source 2017*, and/or whether the terms of an approved voluntary management proposal or management order made under the CLM Act have been complied with, and/or whether the site can be made suitable for a specified land use or uses if the site is remediated or managed in accordance with the implementation of a specified plan.

By certifying that a site *can be made suitable* for a use or uses if remediated or managed in accordance with a specified plan, the auditor declares that, at the time the audit was completed, there was sufficient information satisfying guidelines made or approved under the CLM Act to determine that implementation of the plan was feasible and would enable the specified use(s) of the site in the future.

For a site that *can be made suitable*, any **conditions** specified by the auditor in Section B should be limited to minor modifications or additions to the specified plan. However, if the auditor considers that further audits of the site (e.g. to validate remediation) are required, the auditor must note this as a condition in the site audit statement. The condition must not specify an individual auditor, only that further audits are required.

Auditors may also include **comments** which are observations in light of the audit which provide a more complete understanding of the environmental context to aid decision-making in relation to the site.

Part III

In **Part III** the auditor certifies their standing as an accredited auditor under the CLM Act and makes other relevant declarations.

Where to send completed forms

In addition to furnishing a copy of the audit statement to the person(s) who commissioned the site audit, statutory site audit statements must be sent to

- the **NSW Environment Protection Authority**: nswauditors@epa.nsw.gov.au or as specified by the EPA

AND

- the **local council** for the land which is the subject of the audit.

Table of Contents

Abbreviations ..... **iv**

1. Introduction **1**

1.1 Introduction 1

1.2 Background 1

1.3 Objectives of the Environmental Audit Program 2

1.4 Type of Audit 2

1.5 Documents Reviewed 2

1.6 Guidance Documents 3

1.7 Site Inspection 3

1.8 Chronology of Site Assessment and Audit Works 3

2. Site Description **5**

2.1 Site Identification 5

2.2 Site Condition 5

2.3 Topography 5

2.4 Soils and Geology 6

2.5 Acid Sulphate Soils 6

2.6 Hydrology 6

2.7 Hydrogeology 6

2.8 Climate 7

2.9 Surrounding Environment 7

2.10 Audit Opinion 8

3. Site History **9**

3.1 Site History Information Sources 9

3.2 Site History Summary 9

3.2.1 Land Titles and Lease Areas 9

3.2.2 Chronology of Airport and Aviation Rescue Fire Fighting Service Function Service 9

3.3 Aerial Photographs 9

3.4 Previous Investigations 11

3.5 Audit Opinion 11

4. Conceptual Site Model **12**

4.1 Sources of Contamination 12

4.2 Potentially Affected Media 13

4.3 Potential Human and Ecological Receptors 13

4.4 Potential Transport Mechanisms 13

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4.5 Potential Exposure Pathways 13
4.6 Audit Opinion 14
5. Sampling and Analysis Quality Plan 15
5.1 Detailed Site Investigation 15
5.2 Supplementary Site Investigation 15
5.3 Audit Opinion 15
6. Sampling Analytical and Quality Program 17
6.1 Data Useability Assessment 17
6.2 Audit Opinion 23
7. Assessment Criteria 24
8. Targeted Site Investigation 26
8.1 Field Observations 26
8.2 Soil Investigation Results 27
8.3 Groundwater Investigation Results 40
8.4 Sediment Analytical Results 47
8.5 Infrastructure Investigations 49
8.6 Consultant's Interpretations and Conclusions 56
8.6.1 Main Fire Station 56
8.6.2 Fire Training Ground 57
8.6.3 Stormwater Drainage and Holding Pond 58
8.6.4 Interim Fire Station 59
8.6.5 Sewage Treatment Plant and Seepage Field 59
8.6.6 Delineation Wells and Off-airport Upgradient Well 60
8.6.7 Conclusions 60
8.7 Revised Conceptual Site Model 60
8.8 Audit Opinion 60
9. Auditor Commentary/Opinions Against Requirements of Notice 63
10. Audit Summary Opinions 65
11. Limitations 66

List of Tables

Table 1.1: Summary of Audit Inspections 3
Table 1.2: Summary of Site Assessment and Audit Works 4
Table 2.1: Summary Site Details 5
Table 3.1: Historical Aerial Imagery Review 9
Table 6.1: Data Usability Assessment (TTC 2023c) 17
Table 8.1: Summary of Minimum and Maximum Soil PFAS Analytical Results 27
Table 8.2: Minimum and Maximum Concentrations of PFAS Compounds 28
Table 8.3: Summary of Soil PFAS Leachability Analytical Results 40

Table 8.4: Summary of Groundwater PFAS Analytical Results 41
Table 8.5: Minimum and Maximum Concentrations of PFAS Compounds in Groundwater and Criteria Exceedances 42
Table 8.6: Summary of Minimum and Maximum Sediment PFAS Analytical Results 47
Table 8.7: Minimum and Maximum Concentrations of PFAS Compounds and LOR Exceedances 47
Table 8.8: Summary of Sediment PFAS Leachability Analytical Results 49
Table 8.9: Summary of Trade Waste Sediment and Concrete PFAS Analytical Results 50
Table 8.10: Minimum and Maximum Concentrations of PFAS Compounds and LOR Exceedances – Fire Training Ground 51
Table 8.11: Minimum and Maximum Concentrations of PFAS Compounds and LOR Exceedances – Main Fire Station 54
Table 8.12: Summary of Infrastructure PFAS Leachability Analytical Results 55
Table 8.13: Summary of Infrastructure Water PFAS Analytical Results 56
Table 8.14: Summary of Consultants General Findings Relevant to Notice Requirements (TTC 2023c) and Audit Opinions 61
Table 9.1: Audit Opinions Against Requirements of Notice 63

Appendices

Appendix A **Audit Correspondence**

Appendix B **Site Plans**

Appendix C **Targeted Site Investigation (TTC 2023c)**

Abbreviations

Term	Definition
AFFF	Aqueous Film Forming Foam
ARFF	Aviation Rescue Fire Fighting
ASS	Acid Sulfate Soils
bgl	Below ground level
BOM	Bureau of Meteorology
BTEX	Benzene, Toluene, Ethylbenzene and Xylenes
CHCs	Chlorinated hydrocarbons
CLM	Contaminated Land Management
CoPCs	Contaminants of Potential Concern
CSM	Conceptual Site Model
DO	Dissolved oxygen
DP	Deposited Plan
DQO	Data Quality Objectives
DSI	Detailed Site Investigation
EAR	Environmental Audit Report
EC	Electrical conductivity
Eh	Redox potential
EIL	Ecological Investigation Level
EPA	Environment Protection Authority
ESL	Ecological Screening Level
FS	Fire Station
FTG	Fire-fighting training Ground
HIL	Health Based Investigation Level
HSL	Health Screening Level
IFS	Interim Fire Station
ILSC	Indigenous Land and Sea Corporation
LMU	Large mock up
LOR	Limit of Reporting
MAH	Monocyclic Aromatic Hydrocarbon
MFS	Main Fire Station
NEPC	National Environment Protection Council
NEPM	National Environment Protection Measure
NSW	New South Wales
NT	Northern Territory
NTPFES	Northern Territory Police Fire and Emergency Services
OCP	Organochlorine Pesticide
OPP	Organophosphorus Pesticide
PAH	Polycyclic Aromatic Hydrocarbons

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Term	Definition
PARCC	Precision, accuracy, representativeness, comparability and completeness
PCB	Polychlorinated Biphenyls
PFAS	Per- and poly-fluoroalkyl substances
PFHxS	Per-fluorohexane sulfonate
PFOA	Per-fluorooctanoic acid
PFOS	Per-fluorooctane sulfonate
PSI	Preliminary Site Investigation
RAP	Remedial Action Plan
QA/QC	Quality Assurance/Quality Control
RPD	Relative Percentage Difference
SAQP	Sampling and Analysis Quality Plan
SAS	Site Audit Statement
STP	Sewage Treatment Plant
SVOC	Semi-volatile organic compound
TSI	Targeted Site Investigation
TRH	Total Recoverable Hydrocarbons
UST	Underground Storage Tank
VIC	Victoria
VITA	Voyages Indigenous Tourism Australia Pty Ltd
VOC	Volatile organic compound
WMPC	Waste Management and Pollution Control

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1. Introduction

1.1 Introduction

Andrew Lau ('the auditor') of JBS&G Australia Pty Ltd (JBS&G) has been engaged by Airservices Australia (Airservices, the client) to carry out an environmental audit program in relation to the Ayers Rock Airport located at 200 Coote Road Yulara Northern Territory (NT) ('the site'). The Ayers Rock Airport is also known as Yulara Airport and Connellan Airport, and these names have been used interchangeably in various reports and public domains to refer to the site. The site is legally identified as part Lot 101 in Deposited Plan (DP) S 81/079 occupying an area of approximately 500 hectares (**Appendix B**).

Ayers Rock Airport is owned by the NT Government and commenced operation in 1984. The airport is currently operated under a lease agreement by Voyages Indigenous Tourism Australia Pty Ltd (VITA), a subsidiary of the corporate Commonwealth entity Indigenous Land and Sea Corporation (ILSC). Airservices sub-leases portions of the airport and has provided Aviation Rescue Fire Fighting (ARFF) services at the site since 2004. Prior to 2004, emergency response services were provided by the Northern Territory Police Fire and Emergency Services (NTPFES) and the Yulara Volunteer Firefighters based in the town of Yulara.

1.2 Background

As part of their commitment to the responsible management of per- and poly-fluoroalkyl substances (PFAS) which were previously used in fire-fighting foams, Airservices has transitioned away from PFAS containing foams since the early 2000s. Since 2010, Airservices has used PFAS-free foam at all civilian airports where ARFF services are provided by them. Airservices is implementing a National PFAS Management Program which includes conducting site investigations and monitoring, to manage the impacts of historical PFAS use by Airservices.

Annual soil sampling completed at Yulara Airport indicated PFAS contamination within the vicinity of the fire station (FS) and fire-fighting training ground (FTG) (LES 2017). Preliminary site investigation was subsequently undertaken within areas of potential contamination from Airservices ARFF activities in 2017 (GHD 2017a and 2017b). The Preliminary Site Investigation (GHD 2017b) identified potential sources of PFAS, relating to the historic use of aqueous film forming foam (AFFF) containing PFAS, at the site including the FS, FTG and former interim fire station (FIFS). Secondary sources of PFAS were identified as stockpiled soil near the FTG; open drain near the FS and AFFF refill station drainage area; FTG treated effluent discharged from the STP; and the wastewater underground storage tank (UST) and vehicle wash down area associated with the FTG. Sampling of groundwater from bore RN012065 located within the site detected low concentrations of PFAS (GHD 2019).

On 14 December 2021, the NT Environment Protection Authority (EPA) issued a Section 48 Notice[1] (**Appendix A**) to VITA (as principal lessee) in accordance with the *Waste Management and Pollution Control Act 1998* (the Act) for an environmental audit program to be carried out on the site by an environmental auditor accredited under the New South Wales (NSW) or Victoria (VIC) auditor accreditation schemes.

Andrew Lau is a site auditor accredited by both the NSW EPA under the *Contaminated Land Management Act 1997* (CLM Act 1997) (Accreditation Number 0503). The audit was completed with the assistance of Christine Louie and (former employee) Sara Arthur, JBS&G senior consultants trained and experienced in contaminated land assessment and auditing.

No previous Environmental Audit Report (EAR) or Site Audit Statement (SAS) are known to exist for the site.

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1 *Notice to Carry Out Environmental Audit Program* Issued to Voyages Indigenous Tourism Pty Ltd ACN 146 482 591, dated 14 December 2021. Northern Territory Environmental Protection Authority (NT EPA 2021).

1.3 Objectives of the Environmental Audit Program

The objectives of the works were to meet the requirements of and undertake an environmental audit program in accordance with the Section 48 Notice (NT EPA 2021) to '*assess and understand the full nature and extent of contamination at and from the Airservices Australia occupied areas and the measures that may be required to address areas of contamination'* (**Appendix A**).

The objectives of the environmental audit were to:

- Independently review a Targeted Site Investigation Site Brief Report (TTC 2023b);
- Independently review a Sampling and Analysis Quality Plan (TTC 2022a and issued as final version TTC 2023a) and subsequent plan for supplementary investigations (TTC 2022c);
- Independently review a Targeted Site Investigation report (TTC 2023c); and
- Prepare an EAR in response to requirement 10 of the Section 48 Notice (and subsequent amendments) for an EAR which must include:

  '*(a) a summary of the methods used for sampling, classification and analysis;*

  (b) all soil and groundwater sample results and documentation;

  (c) identification of all environmental risks relating to any identified contamination; and

  (d) recommendations to prevent, rectify, clean up, rehabilitate or minimise potential environmental harm arising from any identified contamination.'

The environmental audit program has been undertaken with consideration to the provisions of the *Waste Management and Pollution Control Act 1998* (WMPC Act 1998) and subsequent amendments.

1.4 Type of Audit

The environmental audit is being undertaken in response to a Notice to Carry Out Environmental Audit Program issued pursuant to Section 48(1) of the Act.

Based on the above, the environmental audit has therefore been conducted as a statutory audit. Notification was provided by the auditor to NT EPA on 16 February 2022 in accordance with relevant requirements. The audit number is 0503-NT-2201.

1.5 Documents Reviewed

The following documentation was reviewed as part of the site audit:

- *Ayers Rock Airport – Targeted Site Investigation Site Brief Report*. Draft C, Tetra Tech Coffey, 28 July 2021. (TTC 2021)
- *PFAS Characterisation Program Ayers Rock Airport (AYQ) – Sampling and Analysis Quality Plan*. Draft H, Tetra Tech Coffey, 23 March 2022 (TTC 2022a)
- *PFAS Characterisation Program Ayers Rock Airport (AYQ) – Environmental Site Investigation*. Draft C, Tetra Tech Coffey, 5 September 2022 (TTC 2022b)
- *PFAS Characterisation Program Ayers Rock Airport (AYQ) – Sampling and Analysis Quality Plan*. Draft D, Tetra Tech Coffey, 16 December 2022 (TTC 2022c)
- *PFAS Characterisation Program Ayers Rock Airport (AYQ) – Sampling and Analysis Quality Plan*. Rev 0.IFU, Tetra Tech Coffey, 3 August 2023 (TTC 2023a)
- *PFAS Characterisation Program Ayers Rock Airport – Targeted Site Investigation Site Brief Report*. Rev 0.IFU, Tetra Tech Coffey, 3 August 2023 (TTC 2023b)

- *PFAS Characterisation Program Ayers Rock Airport (AYQ) – Targeted Site Investigation*. Rev 0, Tetra Tech Coffey, 26 September 2023 (TTC 2023c)

The following additional documents were also considered during the environmental audit program:

- *Report on Soil Sampling and Analysis at Yulara Airport Fire Station and ARFF Drill Ground October 2016*, Low Ecological Services P/L, 16/5/17. (LES 2017)
- *Ayers Rock (Yulara) Airport Preliminary Site Investigation October 2017*. Revision 0, GHD Pty Ltd, 16/10/17 (GHD 2017a)
- *Ayers Rock (Yulara) Airport Preliminary Sampling Report October 2017*. Revision 0, GHD Pty Ltd, 19/10/17 (GHD 2017b)
- *Yulara Airport Groundwater Sampling Results for Bore RN012065 August 2019*. Revision A, GHD Pty Ltd, 20/8/2019 (GHD 2019)

Additional correspondence relating to the environmental audit is provided in **Appendix A**.

1.6 Guidance Documents

In undertaking this Environmental Audit Program, the environmental auditor has given consideration to the following:

- *Waste Management and Pollution Control Act 1998*
- *Water Act 1992*
- Guidelines made or approved by the NSW EPA (s105 *Contaminated Land Management Act 1997*)
- *Guideline for Reporting on Environmental Monitoring.* Version 1.0, Northern Territory Environment Protection Authority, May 2016 (NT EPA 2016)
- *Northern Territory Contaminated Land Guideline.* Version 1.0, Northern Territory Environmental Protection Authority, June 2017 (NT EPA 2017)
- *PFAS National Environmental Management Plan.* Version 2.0. Heads of EPAs Australia and New Zealand, January 2020 (HEPA 2020)

1.7 Site Inspection

The site was inspected on the date shown in **Table 1.1** below.

Table 1.1: Summary of Audit Inspections

Date	Attendance	Purpose
23 June 2022	Sara Arthur (JBS&G, site auditor assistant)	Site inspection conducted to observe layout and condition. Intrusive investigations were observed being undertaken at the time of the site inspection.

1.8 Chronology of Site Assessment and Audit Works

The process of the assessment and audit works undertaken at the site has been listed chronologically in **Table 1.2**.

Table 1.2: Summary of Site Assessment and Audit Works

Date	Purpose
2009 - 2021	Contamination assessment of site including PFAS completed by various consultants.
28 July 2021	Preparation of a Site Brief Report (SBR) (TTC 2021) to determine data gaps in characterisation of PFAS contamination from Airservices activities. Desktop assessment of available records and site walkover and interviews were completed to provide input to the SBR.
23 August 2021	Commencement of site audit as part of Airservices' National PFAS Management Program
14 December 2021	Notice to Carry Out Environmental Audit Program issued by NT EPA to VITA.
16 February 2022	Site Audit Notification SAN 0503-NT-2201 submitted to NT EPA.
23 March 2022	Preparation of a Sampling and Analysis Quality Plan (SAQP) (TTC 2022) for conduct of an environmental site investigation to assess contamination impacts, specifically PFAS, from Airservices ARFFS activities at the site.
8 April 2022	Preparation of Interim Audit Advice L002 IAL 0503-NT-2201 to address requirements 6, 7,8 and 9 of the Section 48 Notice in relation to a SAQP for a detailed site investigation (DSI). The auditor considered that the SAQP (TTC 2022a) prepared satisfactorily met the Section 48 Notice requirements.
June 2022	Phase 1 soil, groundwater, sediment and surface water sampling conducted by TTC. Soil investigations included sampling from seven soil bores at the current fire station (CFS); 12 soil bores at the FTG; eight soil bores at the IFS; and seven soil bores at the sewage treatment plant (STP) and seepage spray field. Sampling was also undertaken for sediment from seven locations from the drainage channel network; groundwater from nine monitoring wells (six new and three existing); surface water from five locations within infrastructure drainage and pits; sediment from four locations within infrastructure drainage and pits; and concrete from two locations within the FTG pad.
5 September 2022	Environmental Site Investigation (TTC 2022b) (factual) report prepared documenting desktop reviews and site investigations conducted in June 2022.
8 September 2022	Preparation of Interim Audit Advice L003 IAL 0503-NT-2201 providing auditor opinion on the draft factual Environmental Site Investigation report (TTC 2022b). The auditor considered that data gaps remained and a SAQP was required to be prepared in order to address the requirements of the Section 48 Notice to define the nature and extent of contamination.
16 December 2022	Preparation of a SAQP (TTC 2022c) for supplementary site investigations to address soil data gaps south of the FTG and around the STP, and quantify PFAS concentrations in groundwater where impacts were previously identified in the vicinity of Airservices occupied areas.
January/February 2023	Phase 2 soil, sediment and groundwater sampling conducted by TTC. Soil investigations included sampling from nine soil bores at the FTG and three soil bores at the STP. Sediment was sampled from one location in the stormwater drainage channel network. Five monitoring wells were installed at locations to delineate impacts identified in the Phase 1 investigation and groundwater sampling was conducted on the new wells and three existing wells. One influent and one effluent sample from the STP were collected for laboratory analysis.
August 2023	Final versions of SAQP (TTC 2023a) and Site Brief Report (TTC 2023b) issued.
October 2023	Preparation of a Draft Environmental Audit Report (0503-NT-2201) and site audit statement (JBS&G 2023) confirming that an environmental audit program was completed in response to the requirements of the Section 48 Notice and subsequent amendments.
February 2025	Receipt of comments from NT EPA and finalisation of Environmental Audit Report (0503-NT-2201) and site audit statement (JBS&G 2025)

2. Site Description

2.1 Site Identification

The site details have been summarised in **Table 2.1** and described in further detail in the following sections. A plan identifying the subject site has been presented in **Appendix B**.

Table 2.1: Summary Site Details

Street Address	200 Coote Road Yulara NT	
Property Description	Part Lot 101 S 81/079	
Local Government Area	Unincorporated (Yulara)	
Zoning	Not zoned	
Property Size	Approximately 500 hectares	
Investigation Areas	Main fire station	1.1 hectares
	Former interim fire station	0.2 hectares
	Fire training ground	0.6 hectares
	STP seepage field	1.1 hectares
Airservices Lease Areas Current Use	Main fire station - operating fire station with associated storage, offices and workshop. Fire training ground – fire-fighting training	

2.2 Site Condition

The consultant (TTC 2023c) reported that the site is located 5 kilometres north of the township of Yulara and 17 kilometres north of Uluru. Features of the airport include the following:

- single runway positioned on a northwest-southeast alignment;
- main terminal building on the southern side of the runway;
- aviation refuelling facilities – aviation fuel stored in above ground and underground storage tanks;
- non-aviation fuel storage;
- car parking areas;
- helipad, aircraft hangars and light aircraft parking apron;
- facility warehouse;
- ARFFS fire station;
- firefighting training ground – comprises of a large mock-up aircraft positioned on a bunded concrete pad. Several storage sheds are located to the east; and
- sewage treatment plant and seepage field – liquid waste from all areas of the airport is treated and discharged to the ground via drip irrigation.

A former interim fire station was reported as being located on the southern side of the light aircraft parking areas between May 2004 and October 2006.

2.3 Topography

The consultant (TTC 2023c) reported that the airport is situated at an elevation of approximately 495 metres Australian Height Datum (m AHD).

The topography of the site is generally flat with raised sand dunes situated around the airport.

2.4 Soils and Geology

Based on soil bores and groundwater wells installed by the consultant (TTC 2023c), the site geology was reported to comprise red/brown, fine to medium grained sand to a depth of approximately 3 to 4 metres below ground level (bgl) underlain (from between 3 m bgl to 7 m bgl) by a consolidated conglomerate layer of competent dolomitic sandstone. Generally, less than 0.3 m of fill or disturbed natural soil was encountered in the soil bores (TTC 2022b), with no fill observed around the current FS (CFS). Natural sand dune ridges of approximately 4 metres high were reported (TTC 2022b) around the site with the closest dunes located directly south of the seepage field and approximately 100 metres west of the FTG.

Based on the Australian Geological Survey Organisation and the Central Land Council on-line databases, the consultant (TTC 2023c) reported that the site is underlain by Quaternary Aged, aeolian sand plains and sand dune deposits. To the west of the site, the geology is reported as Quaternary Aged, red sand, mud and gravel, sheet wash deposits.

2.5 Acid Sulphate Soils

The consultant (TTC 2023b) reported that based on the Australian Soil Resource Information System web-site, the site is classed as having extremely low probability/very low confidence of acid sulfate soil (ASS) occurrence.

2.6 Hydrology

Surface water is reported (TTC 2023c) to flow across the airport along natural and constructed flow paths influenced by an aeolian dune system predominantly aligned in a northeast – southwest orientation. Drainage swales and culverts run parallel to the main taxiway and aircraft apron flowing to a stormwater holding pond located southwest of the MFS. The drainage swale located along the northern side of the STP seepage field is anticipated to direct runoff from the STP and the road to an open area to the northwest. Surface runoff is directed away from the eastern and western ends of the runway. Drainage exists at the site to capture and control sheet flow from rainfall events.

Wastewater generated at the MFS and FTG undergoes preliminary treatment prior to discharge to the STP. It is understood that stormwater runoff from the FTG pad can be directed to a leach drain/trench located to the south of the stormwater holding pond however the location of the discharge point outside of the lease area has not been confirmed.

Treated effluent from the STP is reported to be directed to a storage tank for discharge across the STP seepage field. Excess treated effluent is discharged to an unconfirmed location potentially located to the south and southeast of the STP.

Mutujulu waterhole located at the base of Uluru is the closest and reliable source of surface water located 18 kilometres southeast of the site. There is no surface water drainage or groundwater flow pathway from the site to the waterhole.

A brine infiltration basin located between Yulara township and the airport receives an estimated 110 megalitres per year of reverse osmosis reject brine (TTC 2022b).

2.7 Hydrogeology

Groundwater within the Amadeus Basin is reported (TTC 2023c) to provide the only reliable major water supply in the region for irrigation, industrial process water and municipal drinking water. The two main aquifer systems include the Dune Plains Aquifer, comprising of Cenozoic sediments, which supplies Yulara Resort and Yulara township, and the Bedrock Aquifer which provides the water supply for the Mutitjulu community. The Dune Plains Aquifer extends underneath the airport site.

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The municipal potable water supply to Yulara township is reported to be provided from three bore fields located more than 4 kilometres south of the airport. Groundwater level in the closest registered wells is at approximately 23 m bgl.

The airport site is not located within a Water Control District hence there is no requirement for registration of groundwater bores. No bores are registered within the Airservices lease boundaries. Seven groundwater bores registered for investigation or monitoring purposes are located within 2 kilometres of the site. Groundwater has been intercepted between 12.3 and 14.6 m bgl in the wells. No other wells are registered within 30 kilometres of the inferred downgradient direction.

Groundwater in the Amadeus Basin is understood to flow regionally to the northeast towards Lake Amadeus. Within the Dune Plains Aquifer, groundwater is inferred to flow in an arc following the paleo valley from the south of Kata Tjuta to the north of the airport. Recharge is reported to differ from year to year and may result in localised groundwater gradients in response to artificial drawdown and/or recharge.

Based on standing water levels measured during the Phase 1 and Phase 2 investigation works, groundwater flow direction is inferred to flow to the north/northwest consistent with recharge near Kata Tjuta, and flow towards Lake Amadeus.

The consultant (TTC 2023c) reported that abstraction of groundwater downgradient of the airport for use by remote Indigenous communities is not well understood although it was noted that no permanent communities are known to be listed on the Commonwealth Indigenous Australians database. Occurrence of groundwater to the northwest of the site is extremely rare with a general absence of natural springs and soaks.

2.8 Climate

Based on Bureau of Meteorology (BoM) data, Yulara township is reported (TTC 2023c) to experience a hot arid climate with hot summers and cold winters. Rainfall is low and unpredictable with the majority of rainfall occurring between November to March. With highly variable rainfall, very low rainfall may occur in some years and floods in other years. High evaporation rates are experienced in the area with water collected in temporary wetlands or creek lines drying up soon after rain has stopped.

Data recorded at the BoM weather station located at Yulara Airport (station 015635) has reported the climate between 1983 and 2023 as follows:

- Average monthly rainfall ranges from 4.9 millimetres in August to 36.4 millimetres in February;
- Mean annual rainfall is 270 millimetres;
- Mean maximum monthly temperature ranges from 20.4°C in June to 38.4°C in January; and
- Mean minimum monthly temperature ranges from 4.4°C in July to 22.9°C in January.

2.9 Surrounding Environment

Land surrounding the airport site is reported (TTC 2023c) to be largely vacant with native vegetation, sand dunes and some vehicle tracks.

Surrounding land uses are as follows:

- Municipal potable-water bore-fields operated by Power Water Corporation supplying Yulara township located approximately 4.5 kilometres and 9.5 kilometres to the southwest;
- Yulara Wastewater Treatment Plant and Yulara Landfill located greater than 5 kilometres to the south;
- Yulara township located approximately 4.1 kilometres to the southeast; and
- Uluru-Kata Tjuta National Park located approximately 9 kilometres to south.

2.10 Audit Opinion

The information provided by the consultant (TTC 2023b and 2023c) and in supporting background reports (GHD 2017a) in regard to the site condition and surrounding environment has been checked against and generally meet the requirements of relevant guidelines. The information provided was also consistent with the observations made during audit site inspection, and review of Nearmap aerial imagery. Site identification and site area (including lease areas) details have been confirmed by the auditor with relevant site plans provided in **Appendix B**.

Overall, the information provided by the consultant (TTC 2023b and 2023c), supplemented by observations made during the site audit inspections and of Nearmap imagery in relation to the site condition and the surrounding environment, is considered adequate for the purposes of the site audit.

3. Site History

3.1 Site History Information Sources

The history of the site was summarised by the consultant in the Site Brief Report (TTC 2023b) based on information sourced from site records, previous site investigation reports and aerial imagery.

A summary of historical information relevant to the site has been provided in the following sections.

3.2 Site History Summary

3.2.1 Land Titles and Lease Areas

The consultant (TTC 2023b) reported that Certificates of Title obtained for the airport state that the site is owned by the Northern Territory of Australia and leased to Voyages Indigenous Tourism Australia Pty Ltd (formerly Ayers Rock Resort Company Limited and Voyages Hotels & Resorts Pty Ltd).

Airservices has leased portions of the airport site for the provision of ARFF services since September 2004. Airservices does not possess a current lease agreement for the IFS which has now been decommissioned and demolished.

3.2.2 Chronology of Airport and Aviation Rescue Fire Fighting Service Function Service

The chronology of airport and ARFF service function provision at the site was reported (TTC 2023b) as follows:

- 1984 - runway relocated from adjacent to Uluru (now Mutitjulu) to the current site. Northern Territory Police Fire and Emergency Services and the town volunteer firefighters responsible for ARFF function at the Airport
- 1998 - (until 2007) Agreement for Lease between General Property Trust (GPT) and Voyages' predecessors to commence in 2007
- 2004 - Airservices responsible for ARFF services which were initially based at the interim fire station
- 2004 - FTG commenced operation
- 2006 - Current ARFFS fire station commenced operation
- 2007 - Lease executed between NT Government & GPT
- ~2010 - Use of AFFF containing PFAS (Ansulite) ceased at the Airport for ARFF services and replaced by Solberg RF6
- 2011 - Lease transferred to Voyages (lessee)
- 2011 - (until present) Airport operated by Voyages.

3.3 Aerial Photographs

A summary of review of historical aerial imagery for the site including the Airservices lease areas was provided by the consultant (TTC 2023b) and is outlined in **Table 3.1**.

Table 3.1: Historical Aerial Imagery Review

Year	Interim Fire Station	Main Fire Station	Fire Training Ground	Airport
1983	Cleared and appeared to be covered with red dirt and sparse	Cleared and appeared to be covered with red dirt and sparse	Cleared and appeared to be covered with red dirt and sparse	Runway and taxiways visible

Year	Interim Fire Station	Main Fire Station	Fire Training Ground	Airport
1991	No significant change	No significant change	No significant change	Airport parking hardstand has been constructed Increased development within the terminal area. Construction/disturbance appears to be present in the location of the aviation refuelling facilities.
1998	No significant change	No significant change	No significant change	Aviation refuelling facilities are present (Shell and AIR BP) and located in their current positions. Runway appears to have been extended.
2004	Interim fire station is present and comprises five building structures	Soil disturbance within area which is part of the ARFFS fire station construction	LMU is visible Area to the west is cleared A number of small structures (assumed to be locations of wastewater UST and vehicle washdown) are evident	STP is evident to the south interim ARFFS fire station
2005	A building has been constructed on the western side of the interim ARFFS fire station	ARFFS fire station construction has completed	No significant change	No significant change
2006	Station building has been removed and the area is covered by unsealed sands and gravels	No significant change	No significant change	No significant change
2008	Building to the east has been removed	No significant change	No significant change	No significant change
2015	No significant change	Current ARFFS Fire Station is visible.	Two sediment basins which are positioned south of the FTG	Additional taxiways constructed
2020	No significant change	No significant change	No significant change	No significant change

3.4 Previous Investigations

Previous site investigations undertaken at the site between 2009 and 2019 on behalf of Airservices were summarised in the Site Brief Report (TTC 2023b).

The previous reports were taken into consideration as part of the endorsement of the SAQP.

3.5 Audit Opinion

The site history information provided by the consultant (TTC 2023b) has been checked against, and generally meets, the requirements of NEPC 2013.

Overall the information provided is considered sufficient and comprehensive for the purposes of identifying contamination issues at the site as part of the site investigation process.

4. Conceptual Site Model

The *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013)* (NEPC 2013) identifies a conceptual site model (CSM) as a representation of site related information regarding contamination sources, receptors, and exposure pathways between those sources and receptors. The development of a CSM is an essential part of all site assessments and remediation activities.

NEPC 2013 identified the essential elements of a CSM as including:

- Known and potential sources of contamination and contaminants of concern including the mechanism(s) of contamination;
- Potentially affected media (soil, sediment, groundwater, surface water, indoor and ambient air);
- Human and ecological receptors;
- Potential and complete exposure pathways; and
- Any potential preferential pathways for vapour migration (if potential for vapours identified).

4.1 Sources of Contamination

Based on a review of site history and previous site investigations, the consultant (TTC 2023a) identified the following areas of potential contamination for ARFFS lease areas:

- Former interim fire station (and surrounding unsealed areas);
- Current/main fire station – ARRFS fire station footprint, drainage low point, washdown area/pad, underground interceptor and associated underground pipework, former AFFF storage areas, diesel storage area and refuelling point and mechanical workshop; and
- Fire training ground – large mock-up (LMU) and concrete pad, wastewater UST, kerosene storage area and interceptor location.

The potentially contaminating activities were identified to be hazardous chemical storage; fuel storage and dispensing; accidental spillage and discharge; servicing of equipment; use of propellants; and fire-fighting training.

The above potentially contaminating activities were also identified to have the potential to contribute to contamination of areas within the airport that are outside of the ARFFS lease areas. The following areas were identified as potential sources of contamination at the site:

- Airport hangar;
- Aviation (Viva Energy and BP) and non-aviation (car hire) fuel facilities;
- Spoil stockpiling area leased by VITA and adjacent to the FTG – used for temporary stockpiling of excess soil and millings from airport projects; and
- STP and spray fields (previous and current) leased by VITA.

Based on the identified sources of contamination, the consultant (TTC 2023a) identified the following contaminants of potential concern (CoPCs):

- per- and polyfluoroalkyl substances
- heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, molybdenum, nickel, selenium, silver, tin and zinc)
- total recoverable hydrocarbons (TRH)

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- benzene, toluene, ethylbenzene, xylenes (BTEX)
- polycyclic aromatic hydrocarbons (PAHs)
- chlorinated hydrocarbons (CHCs)
- solvents
- organochlorine and organophosphorus pesticides (OCPs/OPPs)
- surfactants

4.2 Potentially Affected Media

Potentially contaminated media include soil, sediment, groundwater and surface water.

4.3 Potential Human and Ecological Receptors

Potential human and ecological receptors identified by the consultant (TTC 2023c) included the following:

- Workers and/or visitors (whose activities and exposure durations are similar to a commercial/industrial scenario);
- Construction or maintenance workers;
- Future users of groundwater for a non-potable purpose (should a bore be installed within the Airservices lease area);
- Users of groundwater (including Yulara town water supply and Ayers Rock Resort accommodation facilities) abstracted from the bore-fields located southwest of the site; and
- Ecological receptors including terrestrial and aquatic flora and fauna.

4.4 Potential Transport Mechanisms

The consultant (TTC 2023c) identified the potential transport mechanisms for distribution of contamination as follows:

- Soil erosion;
- Leaching of soil contamination;
- Atmospheric dispersion of dust;
- Lateral migration of groundwater;
- Surface water run-off;
- Sediment transport;
- Infiltration of treated wastewater;
- Bioaccumulation and biomagnification.

4.5 Potential Exposure Pathways

The consultant (TTC 2023c) identified the following potential exposure pathways to contamination:

- Dermal contact;
- Ingestion;
- Inhalation of soil and sediment-derived dusts;

- Inhalation of vapours; and
- Uptake of contaminated media.

4.6 Audit Opinion

The consultant (TTC 2023a, 2023b and 2023c) identified potential contamination issues within the airport site and specifically the Airservices lease areas, based on site history review and previous site investigation programs. The list of potential contaminants and associated potentially contaminated media are considered to have been suitably comprehensive addressing ARFFS/Airservices activities and other airport activities both aviation and non-aviation related. Taking into consideration the site history review and investigations previously undertaken at the site, the auditor considers that the list of CoPCs was adequate in assessing the nature and extent of contamination from Airservices activities on-site and other activities undertaken within the airport site.

The consultant (TTC 2023a and 2023c) also considered both human and ecological receptors, potential contaminant transport mechanisms and potential exposure pathways. The auditor considers that potential source-pathway-receptor linkages have generally been adequately addressed.

The auditor notes that the CSM prepared by the consultant (TTC 2023a and 2023c) was sufficiently detailed and generally meets the requirements of NEPC 2013.

Overall, the auditor considers that the identified potential contamination issues and potentially contaminated media were appropriate for the purposes of meeting the requirements of the Section 48 Notice.

5. Sampling and Analysis Quality Plan

5.1 Detailed Site Investigation

To address data gaps in relation to ARFFS activities identified in the Site Brief Report, a SAQP was prepared by the consultant (TTC 2022b and TTC 2023a) for an environmental site investigation.

The data gaps were summarised as follows:

- insufficient information on CoPC impacts to soil at the CFS, IFS, FTG and STP to confidently characterise extent and risk or assess compliance with Airservices' regulatory requirements;
- insufficient information on CoPC impacts to the drainage channels which flow to a dam located to the southwest of the fire station, to assess compliance with Airservices' regulatory requirements;
- current analytical data does not cover secondary potential CoPCs;
- source and distribution of contamination in groundwater is not known; and
- hydrogeological regime and future change may impact the risk posed by contamination from the airport on users of groundwater.

Data quality objectives (DQOs) based on the US EPA seven step process (NEPC 2013) were developed to address the identified data gaps.

The proposed sampling and analysis strategy for soil, sediment, surface water, groundwater and concrete, including sampling locations and rationale, was detailed in the SAQP (TTC 2023a).

5.2 Supplementary Site Investigation

Following completion of the detailed site investigation, supplementary works were identified as being required to address the following residual data gaps:

- soil data was not sufficient to delineate PFAS soil impact (to screening criteria levels) laterally to the south and vertically to the west of the FTG pad;
- infiltration from stormwater and sewerage features was not quantified at the stormwater dam and near the FTG wastewater holding tanks;
- soil data was not sufficient to characterise the source of observed groundwater impact around the STP; and
- the extent of contamination in groundwater upgradient and downgradient of Airservices occupied areas was not confirmed.

A supplementary investigation SAQP (TTC 2022c) was prepared with DQOs based on the US EPA seven step process (NEPC 2013) developed to address the identified data gaps.

The proposed sampling and analysis strategy for additional soil and groundwater investigations, including sampling locations and rationale, was detailed in the SAQP.

5.3 Audit Opinion

The SAQPs (TTC 2022b, 2022c and TTC 2023c) provided the rationale for investigation of soil, sediment, groundwater, surface water and concrete locations at the site based on the site history, specifically ARFFS activities conducted by Airservices, and the findings of previous investigations. The sampling locations for the initial targeted site investigation and subsequent supplementary investigation were considered to be appropriate to provide adequate coverage of areas considered likely to have been impacted by Airservices activities and to address the identified data gaps.

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The consultant implemented a systematic planning process in the development of the SAQPs and adequately complied with the requirements outlined in NSW EPA 2017 and 2020a, and NEPC 2013.

6. Sampling Analytical and Quality Program

6.1 Data Useability Assessment

An assessment of quality assurance and quality control (QA/QC) has been undertaken by the consultant (TTC 2023c) by developing data quality indicators (DQIs), broadly based on the seven-step process referred to in EPA 2017.

The auditor has undertaken a review of the field and laboratory QA/QC undertaken by the consultant, which has been summarised in **Table 6.1** against the PARCC parameters (precision, accuracy, representativeness, comparability and completeness).

Table 6.1: Data Usability Assessment (TTC 2023c)

Parameter	DQIs	Requirement	Auditor Assessment
Field and Lab QA/QC			
Precision	Intra-laboratory duplicates (blind)	Collected at a rate of 1 per 20 samples. Analysed for primary contaminants of concern. RPDs typically 30% (inorganics) -50% (organics)	17 intra-laboratory duplicates were collected for 103 total primary samples, and analysed for the contaminants of concern during the Phase 1 (2022) investigations. For the 44 soil and sediment and 14 water samples collected and analysed during the Phase 2 (2023) investigations, 5 and 2 intra-laboratory samples respectively were analysed. For sample pairs where RPDs were not below the acceptable range, the consultant reviewed and reported that the RPD exceedances were due to heterogeneity of soil, concentrations close to the laboratory limit of reporting (LOR) and are not considered to affect the integrity of the laboratory results. The auditor concurs with the consultant's findings and considers the non-conformances not to affect the outcome of the audit.
	Inter-laboratory duplicates (spilt)	Collected at a rate of 1 per 20 samples. Analysed for primary contaminants of concern. RPDs typically 30% (inorganics) -50% (organics)	19 inter-laboratory duplicates were collected for 103 total primary samples, and analysed for the contaminants of concern during the Phase 1 (2022) investigations. For the 44 soil and sediment and 14 water samples collected and analysed during the Phase 2 (2023) investigations, 5 and 2 intra-laboratory samples respectively were analysed. For sample pairs where RPDs were not below the acceptable range, the consultant reviewed and reported that the RPD exceedances were due to heterogeneity of soil, concentrations close to the laboratory limit of reporting (LOR) and are not considered to affect the integrity of the laboratory results. The auditor concurs with the consultant's findings and considers the non-conformances not to affect the outcome of the audit.

Parameter	DQIs	Requirement	Auditor Assessment
Precision	Laboratory duplicates	One per batch. RPDs less than 50%.	Laboratory duplicates were generally undertaken by the laboratories at a rate of one per batch but less than the target of 1 in 10 for PFAS analysis. The reported RPDs were within laboratory acceptance limits.
Accuracy	Field rinsate blanks	Collected at a rate of 1 per piece of decontaminated sampling equipment. Analysed for primary contaminants of concern. Laboratory results below the laboratory limit of reporting (LOR).	11 and 8 field rinsate samples were collected during the 2022 and 2023 sampling programs. The field rinsate samples were analysed for the contaminants of concern and all results were reported below the laboratory LORs with the exception of one sample collected during the 2022 investigations. The detected PFAS concentrations in the rinsate sample collected off a glove and were considered to have low impact on contamination to be transferred as new gloves were used between sample locations. The consultant considers the rinsate results not to affect the reliability of the dataset. The auditor concurs with the consultant's findings.
	Trip blanks	Collected at a rate of 1 per day of sampling where primary contaminants of concern include volatiles. Analysed for volatiles of concern. Laboratory results below laboratory LOR.	5 and 2 laboratory prepared water trip blanks were submitted by the consultant for each batch of samples submitted to the laboratory for the 2022 and 2023 investigations respectively. All results reported below laboratory LORs indicating that cross contamination had not occurred during the transport of samples to the laboratory.
Accuracy	Trip spike	Collected at a rate of 1 per batch where primary contaminants of concern include volatiles. Laboratory results / recovery within 30 % of the spiked concentration.	7 and 1 soil trip spikes were used during the 2022 and 2023 field programs respectively. Recovery results were within acceptable rates indicating that the loss of volatile compounds during storage and transport was not unacceptable.
	Laboratory surrogate spikes	Surrogate spikes to be performed as required by NATA accreditation, generally per sample analysed. Recoveries to be within 70-130 % (inorganics), ±50 %	Surrogate recoveries were generally reported within the NATA accredited laboratory control limits with a number of QC outliers reported for a range of surrogate compounds. The non-conformances were considered to be minor by the consultant and not to have affected the validity of the laboratory results. The auditor concurs with the consultant findings.

Parameter	DQIs	Requirement	Auditor Assessment
		(organics) or 10-140 % (SVOCs).	
	Laboratory method blanks	Laboratory method blanks to be performed as required by NATA accreditation, generally 1 blank per batch. Results to be below laboratory LOR.	All laboratory method blanks were reported less than the LOR.
	Laboratory control samples (LCS)	LCS to be performed as required by NATA accreditation, generally one per 20 samples per batch.	All LCS recoveries were reported within the laboratory control limits.
	Laboratory matrix spikes (MS)	MS to be performed as required as NATA accreditation, generally one per 20 samples per batch. Recoveries to be within 70-130 % or 30-130 % (phenols only).	Matrix spike recoveries were reported within the laboratory control limits.
Sampling and Analytical Schedule and Sampling Methodology			
Representativeness	Sampling locations	Samples to be collected on a representative basis consistent with the CSM.	Soil bores and groundwater wells were installed across the source zone areas to broadly characterise the site and address data gaps at the site. Sediment, surface water and concrete samples were collected in accordance with the SAQP.
	Soil sampling depths and intervals	Soil sampling depths should be consistent with the anticipated distribution of contamination as detailed in the consultant's CSM.	Soil bores were excavated/installed to a maximum depth of 1.0 m bgl. Samples were collected from near surface (0-0.2 m bgl) and then at 0.5 m intervals. The soil sampling depths and intervals at each of the sampling locations were appropriate given the identified potential contamination sources and site geology. The auditor considers the sampling depths are appropriate to assess the vertical extent of contamination at the site.
	Sampling methodology	Samples to be collected using a methodology which is appropriate for the primary contaminants of concern.	Soil samples were collected either directly from the auger or excavator bucket. Soil and sediment samples were collected using fresh nitrile gloves and placed into laboratory supplied 250 mL Teflon-lined jars and clip-lock bags, each with a unique sample ID.

Parameter	DQIs	Requirement	Auditor Assessment
	Sampling methodology	Samples to be collected using a methodology which is appropriate for the primary contaminants of concern.	Collected samples were immediately stored on ice bricks in an esky and sent to NATA-accredited analytical laboratories under chain of custody conditions for analysis. The auditor considers that the sampling methods adopted by the consultant are considered appropriate.
	Groundwater sampling locations	Groundwater sampling locations to assess areas of concern, allow for lateral delineation of contamination and assess the groundwater flow direction.	Groundwater monitoring wells were installed to address data gaps and delineate previously detected impact. The auditor considers that the number and location of new monitoring wells installed were appropriate to address data gaps and provide assessment of groundwater quality within the site.
	Groundwater well construction	Wells to be constructed in accordance with the current version of the Minimum Constructions Requirements for Water Bores in Australia, and screened to target the likely contaminated portion of the water column.	The monitoring wells were constructed using 50 mm diameter Class 18 uPVC casing and machine slotted screen intervals. Wells were backfilled with gravel followed by an annular seal of hydrated bentonite. The wells were finished with airtight well caps and monument standpipe or flush-fitted gatic cover. The auditor considers that the monitoring wells were suitably installed in accordance with relevant guidelines and were suitable to assess groundwater conditions at the site.
Representativeness	Groundwater sampling methodology	Groundwater samples to be collected approximately 7 days after well installation and development. Groundwater samples to be collected using low flow methods (where it can be demonstrated that this is appropriate), or by purging at least 3 well volumes, until field parameters have adequately stabilised.	Following installation, the monitoring wells were developed. Field parameters, including pH, temperature, conductivity, redox potential and dissolved oxygen were measured prior to sampling using a water quality meter. A summary of the field parameters was provided in the consultant's report (TTC 2023c). Groundwater samples were collected using Hydrasleeves left to deploy for one week. The auditor considers that the groundwater sampling methods adopted by the consultant were generally considered appropriate and not likely to affect the representativeness of the data.
	Sampling containers	Soil and sediment to be collected into laboratory supplied, clean unpreserved Teflon lined jars.	Samples were immediately placed in laboratory supplied samples jars which were sealed tight and placed on ice for transport to the analytical laboratories.

Parameter	DQIs	Requirement	Auditor Assessment
		Groundwater and surface water samples to be collected into laboratory supplied, clean and appropriately preserved sampling containers.	
	Sampling equipment decontamination	Sampling equipment to be decontaminated between sampling locations or between sampling depths; and monitoring well locations where significant contamination is encountered.	The consultant (TTC 2023c) reported that sampling was conducted by hand using fresh nitrile gloves for each sample. Groundwater samples were reported (TTC 2022c) to have been collected using Hydrasleeves and placed into laboratory prepared sample containers. All sampling equipment was reported to be decontaminated between sampling locations where designated disposable materials were not used. The auditor considers the sampling methods employed by the consultant during the investigation works are generally acceptable and are unlikely to have resulted in cross-contamination between sample locations.
Representativeness	Sample storage and transport	Samples to be placed in an insulated container and chilled. Samples to be transported to laboratory under chain of custody conditions.	All samples were transported in ice-cooled/insulated chests, under chain of custody conditions, to laboratories that were NATA accredited for the analyses performed. The consultant provided detailed laboratory reports and chain of custody documentation for the soil and groundwater sampling works. Review of sample receipt advice issued by the laboratories indicated that all samples were intact, correctly preserved, and chilled (as appropriate) at the time of receipt.
	Laboratory sample receipt advice	No damaged containers. No samples submitted in containers which have not been chilled. No samples to be submitted without sufficient times to comply with recommended holding times.	Laboratory sample receipt advice provided by the nominated laboratories confirmed that all samples were received in suitable condition, with sufficient times to comply with recommended holding times.

Parameter	DQIs	Requirement	Auditor Assessment
	Holding times	Samples to be extracted and analysed within recommended holding times.	Samples were extracted and analysed outside of holding times for analyses including TPH, MAH, pesticides, MBAS, BOD, volatile halogenated compounds and moisture content. The consultant (TTC 2023c) considered that the breaches were generally minor as the affected analytes did not include the main potential contaminant of concern (PFAS). As there were no visual or olfactory indications of hydrocarbon contamination in the affected samples, it was considered unlikely that the holding time breaches resulted in the loss of volatile contaminants. The auditor considers the holding time breaches not to alter the conclusions of the investigation.
	Analytical Method	Samples to be analysed using NATA accredited methodology.	Laboratories used included: ALS Sydney (primary) and Eurofins Environment Testing Australia Pty Ltd (secondary). All laboratories utilised were NATA accredited. The primary laboratory and the secondary laboratory employed for the chemical analyses used analytical methods which were considered appropriate for the identified COPCs at the site and for which the laboratories were NATA accredited.
Completeness	Sampling, analysis and quality plan completeness	100 % of sampling, analysis and quality plan to be implemented.	The sampling program was undertaken generally in accordance with the SAQP (TTC 2022b and 2023c). The auditor considers the scope of the investigations undertaken to have been appropriate to meet the overall objectives of the audit.
	Field documentation	All relevant field documentation to be collated including sampling logs and calibration records.	The consultant provided borehole logs, and calibration records for the water quality meter and PID.
	Laboratory documentation	All relevant laboratory documentation to be collated, including chain of custody records, sample receipt advice and analytical reports.	The consultant provided all relevant COC documentation; laboratory sample receipt advice; and full laboratory certificates in the reports.

Parameter	DQIs	Requirement	Auditor Assessment
	Critical sample validity	All critical sample data to be valid.	The auditor considers that the data is considered reliable for the purposes of the investigations.
	Sampling, analysis and quality approach	Adequately comparable sampling, analysis and quality approach to be used throughout the project.	The auditor considers that the data is comparable, as consistent sampling methods were employed throughout the investigation works. All laboratory analyses were undertaken by NATA accredited laboratories. Furthermore, consistent field staff were employed during the field program.
	Sampler	Samplers used throughout the project to have sufficient experience.	Consistent experienced field staff were employed by consultant during the field program.

6.2 Audit Opinion

The quality assurance/quality control measures employed by the consultant (TTC 2023c) were checked and found to indicate that the consultant implemented a systematic planning process, and adequately complied with the requirements outlined in NEPC 2013.

The laboratory QA/QC results have been reviewed and the results indicate that the analytical laboratories were achieving adequate levels of precision and accuracy. As such, the sampling, analytical and quality protocols undertaken by the consultant were considered to be adequately reliable for the purpose of assessing the contamination status of the site; and the data is therefore considered reliable and useable for the purpose of this audit.

7. Assessment Criteria

7.1 Soil Criteria

Based on the use of Ayers Rock Airport as a civilian airport and the airside uses of the Airservices lease areas, the assessment criteria adopted for soil at the site was based on a commercial/industrial land use.

The site was assessed by the consultant (TTC 2023c) against guidelines presented in NEPC 2013 and HEPA 2020, comprising the following:

- Health Investigation Level (HIL) D – commercial/industrial;
- Health Screening Levels (HSLs) for vapour intrusion – commercial/industrial, sand soils, depth 0 to < 1 m;
- Management Limits for TPH fractions F1-F4 - commercial/industrial, coarse soil;
- Health based guidance values for perfluorooctane sulfonate (PFOS)/perfluorohexane sulfonate (PFHxS) and perfluorooctanoic acid (PFOA) (HEPA 2020) HIL D – industrial/commercial;
- Ecological Investigation Levels (EILs) - commercial and industrial;
- Ecological Screening Levels (ESLs) - commercial and industrial, coarse soil.
- Ecological guideline values for PFOS and PFOA (HEPA 2020)
    - ecological direct exposure
    - ecological indirect exposure.

7.2 Sediment Criteria

'Sediment' assessed at the site refers to saturated and/or semi-saturated media deposited in infrastructure associated with trade waste systems rather than particulate deposits in freshwater ecosystems which typically contain a much higher organic carbon content. In arid and semi-arid climates, particle deposition in drainage channels and culverts or swales are representative of colluvial deposits of generally eroded mantle material. The consultant (TTC 2023c) considered the application of soil screening criteria is appropriate for the colluvial 'sediment' deposits.

7.3 Groundwater and Surface Water Criteria

Assessment of groundwater contamination (TTC 2023c) was undertaken against guidelines presented in NEPC 2013 and HEPA 2020, and comprised:

- *Australian Drinking Water Guidelines 6 Version 3.7* (NHMRC 2011)
- *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZG 2018) – 95% protection levels for slightly to moderately disturbed fresh water systems
- Health based guidance values for PFOS/PFHxS and PFOA for recreational water quality and drinking water (HEPA 2020)
- Ecological guideline values for PFOS and PFOA – 95% protection of species for freshwater (HEPA 2020).

In the absence of established criteria for TRH and TPH in the NEPM (NEPC 2013), a 10-fold factor was applied conservatively to the World Health Organisation (2008) petroleum products in drinking water guidelines and adopted as a non-potable use guideline value.

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7.4 Surface Water Criteria

The adopted groundwater criteria was also applied to the assessment of surface water.

7.5 Concrete

The criteria for assessment of risk to human health from PFAS concentrations in concrete derived dusts has been adopted from *Airservices PFAS Characterisation Assessment Criteria Derivation of PFAS Criteria for sediment, concrete, asphalt and pore water* (GHD 2021).

7.6 Audit Opinion

The soil and sediment criteria adopted by the consultant (TTC 2023c) for the assessment of human health and ecological risks have been checked against and were consistent with, criteria approved by the EPA for the continued use of the site for aviation and associated activities under a commercial/industrial land use.

The consultant also took into consideration aesthetic issues (i.e., odours and discolouration) as part of the assessment works, in accordance with NEPC 2013.

The adoption of the soil assessment criteria for 'sediment' collected from trade waste infrastructure is considered to be conservatively appropriate.

The groundwater investigation criteria adopted by the consultant (TTC 2023c) have been checked against, and were sourced from relevant approved guidelines. The drinking water guidelines were adopted as a conservative tier 1 human health screening criteria for potential future abstraction of groundwater for potable water purposes and is considered appropriate. As the nearest natural surface water body and potential ecological receptor is Mutitjulu waterhole, the adopted fresh water quality guidelines are considered to be appropriate.

The adoption of soil investigation criteria by the consultant (TTC 2023c) for the assessment of human health and ecological risks from PFAS compounds are considered conservative and appropriate.

Overall, the auditor considers that the soil, sediment, groundwater, surface water and concrete criteria adopted by the consultant (TTC 2023c) were appropriate for assessing the identified contaminants of concern at the site, and nature and extent of contamination that may be present at the site.

8. Targeted Site Investigation

The completion of a detailed site investigation (DSI) to '*determine the types, amount, distribution and mobility of contaminants and waste, including but not limited to PFAS present in the environment from activities undertaken by or in any way associated with Airservices Australia's activities*' forms one of the requirements of the Section 48 Notice.

A targeted site investigation (TSI) was conducted by the consultant (TTC 2023c) in two phases:

- Phase 1 - desktop review of available information for Ayers Rock Airport in relation to the use of AFFF and other potentially contaminating products used by Airservices, ARFFS services and site hydrogeology (summarised in **Section 2.7**); and investigation of soil, sediment, surface water, groundwater and concrete within the Ayers Rock Airport site;
- Phase 2 – investigation of soil at the FTG, STP and stormwater drain; groundwater within the site at locations upgradient and downgradient of Airservices occupied areas; and wastewater entering and leaving the STP.

8.1 Field Observations

A summary of field observations encountered during the intrusive site investigations conducted by the consultant (TTC 2023c) is provided below:

- The subsurface profiles encountered within the targeted investigation areas were as follows:
  - interim fire station – grey gravel with some red/brown coarse sand to a depth of 0.02 m bgl underlain by red/brown, fine to medium grained silty sand to a depth of 3.5 m bgl. Pale brown weathered conglomerate was encountered below the sand to a depth of 5.0 m bgl which was underlain by weathered sandstone.
  - current fire station – red/brown, fine to medium grained silty sand to the extent of investigation at 1 m bgl;
  - fire training ground – fine grained crushed rock/gravel to a depth of 0.25 m bgl underlain by red/brown, fine to medium grained silty sand to a depth of 2.8 m bgl. White cemented conglomerate/gravel was encountered below the sand to a depth of 4.0 m bgl which was underlain by pale brown highly weathered sandstone.
  - downgradient of Airservices lease areas – red/brown, fine to medium grained silty sand to a depth of 3.2 m bgl underlain by conglomerate with some gravel to a depth of 5.0 m bgl and pale brown extremely weathered sandstone.
- Fill was observed in most locations within the FTG. No fill was observed around the STP.
- No odours or staining was observed during soil bore or groundwater monitoring well installation.
- Potential asbestos containing material (ACM) was not observed during the site investigations.
- Groundwater elevation was recorded between 482.340 m AHD (GW05) and 482.730 m AHD (GW02) during the Phase 1 investigations (June 2022) and between 481.280 m AHD (GW04) and 482.928 (GW01) during the Phase 2 investigations (February 2023) within the airport site. Groundwater was recorded at 483.166 m AHD an off-site groundwater observation well.
- Localised groundwater flow indicated migration north/northwest.
- Groundwater appearance ranged from clear with no observable turbidity to slightly cloudy with low turbidity. No noticeable odours were observed during sampling of the on-site wells with a slight

rotten egg odour was noted in the off-site well. LNAPL or hydrocarbon sheen were not observed in any of the wells sampled.

- Groundwater quality parameters were recorded during the groundwater monitoring event completed in June 2022 as follows:
  - pH ranged from 7.20 to 8.38;
  - electrical conductivity ranged from 826 µS/cm to 4,436 µS/cm;
  - dissolved oxygen ranged from 2.5 mg/L to 6.62 mg/L;
  - oxidation reduction potential ranged from 72.5 mV to 8.38 mV.
- Groundwater quality parameters were recorded during the groundwater monitoring event completed in February 2023 as follows:
  - pH ranged from 7.08 to 8.38 in on-site wells and 7.17 to 8.45 in off-site wells;
  - electrical conductivity ranged from 831 µS/cm to 4,614 µS/cm in on-site wells and 2,939 µS/cm to 4,809 µS/cm in off-site wells;
  - dissolved oxygen ranged from 0.63 mg/L to 4.87 mg/L in on-site wells and 3.19 mg/L to 7.18 mg/L in off-site wells;
  - oxidation reduction potential ranged from 51.1 mV to 129.1 mV in on-site wells and -10.0 mV to 282.7 mV in off-site wells.
- No evidence of perched aquifers was observed during the site investigations.

8.2 Soil Investigation Results

Soil investigations involved the collection of 111 primary samples from 56 locations. Analysis was undertaken for the full PFAS suite (28 compounds).

The consultant (TTC 2023c) provided summary tables in addition to laboratory reports and chain of custody documentation for the soil investigations undertaken. Figures showing sampling locations and concentrations for total PFAS concentrations were also included.

Analytical results for the investigation areas were compared with the adopted site criteria and are summarised in **Table 8.1**.

Table 8.1: Summary of Minimum and Maximum Soil PFAS Analytical Results

Source Zone Area	No. of Locations and Samples Analysed	PFHxS (mg/kg)	PFOS (mg/kg)	PFOA (mg/kg)	PFHxS + PFOS (mg/kg)	Sum of PFAS (mg/kg)	Criteria Exceeded
Main Fire Station	6 14	<0.0002 0.0009	<0.0002 0.0013	<0.0004 0.0344	<0.0002 0.0013	<0.0002 0.309	None
Interim Fire Station	8 12	<0.0002 0.0219	<0.0002 0.0084	<0.0002 0.108	<0.0002 0.026	<0.0002 0.145	None
STP and Seepage Field	10 23	<0.0002 0.0008	<0.0002 0.0078	<0.0002 0.0072	<0.0002 0.0078	<0.0002 0.0418	Ecological indirect exposure – 15 samples
Fire Training Ground	21 56	<0.0002 0.0642	<0.0002 0.370	<0.0002 0.283	<0.0002 0.383	<0.0002 0.401	None
Monitoring Wells	11 7	<0.0002	<0.0002 0.0002	<0.0002	<0.0002 0.0002	<0.0002 0.0002	

Analytical results for PFAS compounds where no adopted screening criteria are summarised in **Table 8.2**.

Table 8.2: Minimum and Maximum Concentrations of PFAS Compounds

PFAS Compound	Main Fire Station		IFS including STP and Seepage Field		Fire Training Ground		Monitoring Wells		LOR Exceedances
	min (mg/kg)	max (mg/kg)	min (mg/kg)	max (mg/mg)	min (mg/kg)	max (mg/kg)	min (mg/kg)	max (mg/kg)	
Perfluorobutane sulfonic acid (PFBS)	<0.0002	<0.0002	<0.0002	0.0003	<0.0002	0.0072	<0.0002	<0.0002	IFS SB07_0.0 and SB34_0.3 FTG YAP2_0.0_240622, YAP4_0.0_230622, YAP4_0.45_230622, SB10_0.45_240622, SB10_0.85-1.0, SB12_0.0_240622, SB13_0.0_230622, SB13_0.45_230622, SB22_0.0_230622, SB22_0.45-0.5, SB23_0.45-0.5, SB25_0.0_240622, SB25_0.45-0.5, SB26_0.0_230622, SB26_0.45-0.5, SB35_0-0.2, SB37_0.9-1.0, SB39_0.4-0.5, SB39_0.9-1.0, SB40_0.4-0.5, SB40_0.9-1.0, SB41_0.9-1.0, SB42_0.4-0.5, SB42_0.9-1.0, SB43_1.9-2.0 and SB43_2.9-3.0
Perfluoropentane sulfonic acid (PFPeS)	<0.0002	<0.0002	<0.0002	0.0011	<0.0002	0.0150	<0.0002	<0.0002	IFS SB47_0.4-0.5, SB07_0.0 and SB34_0.3 FTG YAP2_0.0_240622, YAP2_0.6_240622, YAP4_0.45_230622, SB10_0.45_240622, SB10_0.85-1.0, SB12_0.0_240622, SB12_0.3_240622, SB12_0.9, SB13_0.0_230622, SB13_0.45_230622, SB22_0.0_230622, SB22_0.45-0.5, SB25_0.0_240622, SB25_0.45-0.5, SB26_0.0_230622, SB26_0.45-0.5, SB27_0.0_240622, SB35_0-0.2,

PFAS Compound	Main Fire Station		IFS including STP and Seepage Field		Fire Training Ground		Monitoring Wells		LOR Exceedances
	min (mg/kg)	max (mg/kg)	min (mg/kg)	max (mg/mg)	min (mg/kg)	max (mg/kg)	min (mg/kg)	max (mg/kg)	
									SB37_0.4-0.5, SB37_0.9-1.0, SB39_0.4-0.5, SB40_0.4-0.5, SB40_0.9-1.0, SB42_0.4-0.5, SB42_0.9-1.0, SB43_1.9-2.0 and SB43_2.9-3.0
Perfluoroheptane sulfonic acid (PFHpS)	<0.0002	<0.0002	<0.0002	0.0004	<0.0002	0.0158	<0.0002	<0.0002	IFS SB07_0.0 FTG YAP2_0.0_240622, YAP4_0.45_230622, SB10_0.45_240622, SB12_0.0_240622, SB12_0.3_240622, SB24_0.0_240622, SB25_0.0_240622, SB25_0.45-0.5, SB26_0.0_230622, SB26_0.45-0.5, SB27_0.0_240622 SB37_0-0.2, SB37_0.4-0.5, SB37_0.9-1.0, SB40_0-0.2 and SB41_0-0.2
Perfluorodecane sulfonic acid (PFDS)	<0.0002	<0.0002	<0.0002	0.0003	<0.0002	0.0002	<0.0002	<0.0002	IFS SB34_0.3 STP SB02_0.0 and SB29_0.0 FTG YAP4_0.45_230622 and SB41_0-0.2
Perfluorobutanoic acid (PFBA)	<0.0001	0.005	<0.0001	0.001	<0.0001	0.0440	<0.0001	<0.0001	MFS SB19_0.3, SB19_0.6 and SB20_0.3 Seepage Field SB05_0.3 FTG YAP2_0.0_240622, YAP3_0.6_230622, YAP4_0.0_230622, YAP4_0.45_230622,

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PFAS Compound	Main Fire Station		IFS including STP and Seepage Field		Fire Training Ground		Monitoring Wells		LOR Exceedances
	min (mg/kg)	max (mg/kg)	min (mg/kg)	max (mg/mg)	min (mg/kg)	max (mg/kg)	min (mg/kg)	max (mg/kg)	
									SB10_0.45_240622, SB12_0.0_240622, SB12_0.3_240622, SB12_0.9, SB13_0.0_230622, SB13_0.45_230622, SB26_0.45-0.5, SB37_0.4-0.5, SB37_0.9-1.0, SB40_0.9-1.0, SB42_0.4-0.5, SB43_0.4-0.5, SB43_0.9-1.0, SB43_1.9-2.0 and SB43_2.9-3.0
Perfluoropentanoic acid (PFPeA)	<0.0002	0.0094	<0.0002	0.0018	<0.0002	0.0475	<0.0002	<0.0002	MFS SB17_0.6-0.75, SB19_0.3, SB19_0.6, SB20_0.0, SB20_0.3, SB20_0.85-1.0 and YAP1_0.6-0.75 STP SB02_0.0, SB02_0.3-0.5, SB05_0.3 and SB47_0.4-0.5 IFS SB06_0.0-0.2, SB07_0.0, SB07_0.3-0.5, SB32_0.3, SB33_0.3-0.5, and SB34_0.3 FTG YAP2_0.0_240622, YAP2_0.6_240622, YAP3_0.0_230622, YAP3_0.6_230622, YAP4_0.0_230622, YAP4_0.45_230622, SB10_0.0_240622, SB10_0.45_240622, SB10_0.85-1.0, SB12_0.0_240622, SB12_0.3_240622, SB12_0.9, SB13_0.0_230622, SB13_0.45_230622, SB22_0.0_230622, SB22_0.45-0.5, SB23_0.0_230622, SB23_0.45-0.5, SB24_0.45-0.5, SB25_0.0_240622, SB25_0.45-0.5, SB26_0.0_230622, SB26_0.45-0.5, SB35_0.4-0.5, SB36_0.9-

PFAS Compound	Main Fire Station		IFS including STP and Seepage Field		Fire Training Ground		Monitoring Wells		LOR Exceedances
	min (mg/kg)	max (mg/kg)	min (mg/kg)	max (mg/mg)	min (mg/kg)	max (mg/kg)	min (mg/kg)	max (mg/kg)	
									1.0, SB37_0-0.2, SB37_0.4-0.5, SB37_0.9-1.0, SB38_0.4-0.5, SB38_0.9-1.0, SB39_0.4-0.5, SB39_0.9-1.0, SB40_0.4-0.5, SB40_0.9-1.0, SB41_0.4-0.5, SB41_0.9-1.0, SB42_0.4-0.5, SB42_0.9-1.0 SB43_0.4-0.5, SB43_0.9-1.0, SB43_1.9-2.0 and SB43_2.9-3.0
Perfluorohexanoic acid (PFHxA)	<0.0002	0.0049	<0.0002	0.0054	<0.0002	0.0829	<0.0002	<0.0002	MFS SB17_0.6-0.75, SB19_0.3, SB19_0.6, SB20_0.3, SB20_0.85-1.0, YAP1_0.0-0.2 and YAP1_0.6-0.75 STP SB02_0.0, SB02_0.3-0.5, SB05_0.3, SB47_0.4-0.5 and SB47_0.9-1.0 IFS SB07_0.0, SB07_0.3-0.5, SB32_0.3, SB33_0.0, SB330.3-0.5 and SB34_0.3 FTG YAP2_0.0_240622, YAP2_0.6_240622, YAP3_0.0_230622, YAP3_0.6_230622, YAP4_0.0_230622, YAP4_0.45_230622, SB10_0.0_240622, SB10_0.45_240622, SB10_0.85-1.0, SB12_0.0_240622, SB12_0.3_240622, SB12_0.9, SB13_0.0_230622, SB13_0.45_230622, SB13_0.85-1.0, SB22_0.0_230622, SB22_0.45-0.5, SB23_0.0_230622, SB23_0.45-0.5, SB24_0.45-0.5, SB25_0.0_240622, SB25_0.45-0.5, SB26_0.0_230622 , SB26_0.45-0.5,

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PFAS Compound	Main Fire Station		IFS including STP and Seepage Field		Fire Training Ground		Monitoring Wells		LOR Exceedances
	min (mg/kg)	max (mg/kg)	min (mg/kg)	max (mg/mg)	min (mg/kg)	max (mg/kg)	min (mg/kg)	max (mg/kg)	
									SB27_0.0_240622, SB35_0-0.2, SB35_0.4-0.5, SB27_0.0_240622, SB36_0.4-0.5, SB36_0.9-1.0, SB37_0-0.2, SB37_0.4-0.5, SB37_0.9-1.0, SB38_0.4-0.5, SB38_0.9-1.0, SB39_0.4-0.5, SB39_0.9-1.0, SB40_0.4-0.5, SB40_0.9-1.0, SB41_0-0.2, SB41_0.4-0.5, SB41_0.9-1.0, SB42_0.4-0.5, SB42_0.9-1.0, SB42_1.9-2.0, SB42_2.4-2.5, SB43_0.4-0.5, SB43_0.9-1.0, SB43_1.9-2.0 and SB43_2.9-3.0
Perfluoroheptanoic acid (PFHpA)	<0.0002	0.0094	<0.0002	0.0140	<0.0002	0.08	<0.0002		MFS SB17_0.6-0.75, SB19_0.0, SB19_0.3, SB19_0.6, SB20_0.3, SB20_0.85-1.0, YAP1_0.0-0.2 and YAP1_0.6-0.75 FTG YAP2_0.0_240622, YAP2_0.6_240622, YAP3_0.0_230622, YAP3_0.6_230622, YAP4_0.0_230622, YAP4_0.45_230622, SB10_0.0_240622, SB10_0.45_240622, SB12_0.0_240622, SB12_0.3_240622, SB12_0.9, SB13_0.0_230622, SB13_0.45_230622, SB22_0.0_230622, SB22_0.45-0.5, SB23_0.0_230622, SB23_0.45-0.5, SB24_0.0_240622, SB24_0.45-0.5, SB25_0.0_240622, SB25_0.45-0.5, SB26_0.0_230622 , SB26_0.45-0.5, SB27_0.0_240622, SB35_0.4-0.5,

PFAS Compound	Main Fire Station		IFS including STP and Seepage Field		Fire Training Ground		Monitoring Wells		LOR Exceedances
	min (mg/kg)	max (mg/kg)	min (mg/kg)	max (mg/mg)	min (mg/kg)	max (mg/kg)	min (mg/kg)	max (mg/kg)	
									SB35_0.9-1.0, SB36_0.4-0.5, SB36_0.9-1.0, SB37_0-0.2, SB37_0.4-0.5, SB37_0.9-1.0, SB38_0-0.2, SB38_0.4-0.5, SB38_0.9-1.0, SB39_0.4-0.5, SB39_0.9-1.0, SB40_0-0.2, SB40_0.4-0.5, SB40_0.9-1.0, SB41_0-0.2, SB41_0.4-0.5, SB41_0.9-1.0, SB42_0.4-0.5, SB42_0.9-1.0, SB42_1.9-2.0, SB42_2.4-2.5, SB43_0.4-0.5, SB43_0.9-1.0, SB43_1.9-2.0 and SB43_2.9-3.0
Perfluorodecanoic acid (PFDA)	<0.0002	0.0081	<0.0002	0.0152	<0.0002	0.0206	<0.0002		MFS SB19_0.0, SB20_0.0, SB20_0.3, SB20_0.85-1.0, SB21_0.0 and YAP1_0.0-0.2 STP SB02_0.0, SB02_0.3-0.5, SB03_0.0, SB04_0.0 and SB05_0.0 IFS SB06_0.0-0.2, SB06_0.3-0.5, SB07_0.0, SB08_0.0, SB30_0.3 and SB33_0.0 FTG YAP2_0.0_240622, YAP3_0.0_230622, YAP3_0.6_230622, YAP4_0.45_230622, SB10_0.0_240622, SB12_0.0_240622, SB13_0.0_230622, SB13_0.45_230622, SB22_0.0_230622, SB24_0.0_240622, SB25_0.0_240622, SB25_0.45-0.5, SB35_0-0.2, SB36_0-0.2, SB37_0-0.2,

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PFAS Compound	Main Fire Station		IFS including STP and Seepage Field		Fire Training Ground		Monitoring Wells		LOR Exceedances
	min (mg/kg)	max (mg/kg)	min (mg/kg)	max (mg/mg)	min (mg/kg)	max (mg/kg)	min (mg/kg)	max (mg/kg)	
									SB38_0-0.2, SB40_0-0.2, SB41_0-0.2, SB42_0.9-1.0, SB43_0.4-0.5, SB43_0.9-1.0, SB43_1.9-2.0 and SB43_2.9-3.0
Perfluorododecanoic acid (PFDoDA)	<0.0002	0.0098	<0.0002	0.0347	<0.0002	0.0054	<0.0002		MFS SB19_0.0, SB20_0.0, SB20_0.3 and YAP1_0.0-0.2 STP SB02_0.0, SB05_0.0 and SB29_0.0 IFS SB06_0.0-0.2, SB06_0.3-0.5, SB07_0.0, SB08_0.0 and SB33_0.0 FTG YAP2_0.0_240622, YAP3_0.0_230622, YAP3_0.6_230622, YAP4_0.45_230622, SB10_0.0_240622, SB12_0.0_240622, SB13_0.0_230622, SB22_0.0_230622, SB24_0.0_240622, SB25_0.0_240622, SB25_0.45-0.5, SB36_0-0.2, SB40_0-0.2, SB41_0-0.2, SB43_0.4-0.5, SB43_0.9-1.0, SB43_1.9-2.0 and SB43_2.9-3.0
Perfluorononanoic acid (PFNA)	<0.0002	0.0171	<0.0002	0.0126	<0.0002	0.0368	<0.0002		MFS SB18_0.0, SB19_0.0, SB20_0.0, SB20_0.3, SB20_0.85-1.0, SB21_0.0 and YAP1_0.0-0.2 STP SB02_0.0, SB02_0.3-0.5, SB03_0.0, SB04_0.0, SB05_0.0, SB05_0.3, SB28_0.0, SB29_0.0 and SB29_0.3 IFS

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PFAS Compound	Main Fire Station		IFS including STP and Seepage Field		Fire Training Ground		Monitoring Wells		LOR Exceedances
	min (mg/kg)	max (mg/kg)	min (mg/kg)	max (mg/mg)	min (mg/kg)	max (mg/kg)	min (mg/kg)	max (mg/kg)	
									SB06_0.0-0.2, SB06_0.3-0.5, SB07_0.0, SB08_0.0, SB30_0.3, SB31_0.0, SB33_0.0 and SB33_0.3-0.5 FTG YAP2_0.0_240622, YAP3_0.0_230622, YAP3_0.6_230622, YAP4_0.0_230622, YAP4_0.45_230622, SB10_0.0_240622, SB12_0.0_240622, SB12_0.3_240622, SB13_0.0_230622, SB13_0.45_230622, SB22_0.0_230622, SB24_0.0_240622, SB24_0.45-0.5, SB25_0.0_240622, SB25_0.45-0.5, SB27_0.0_240622, SB35_0-0.2, SB35_0.4-0.5, SB36_0-0.2, SB37_0-0.2, SB37_0.4-0.5, SB37_0.9-1.0, SB38_0-0.2, SB40_0-0.2, SB41_0-0.2, SB41_0.4-0.5, SB42_0.9-1.0, SB43_0.4-0.5, SB43_0.9-1.0, SB43_1.9-2.0 and SB43_2.9-3.0
Perfluorotetradecanoic acid (PFTeDA)	<0.0005	0.0017	<0.0005	0.0030	<0.0005	0.0021	<0.0005		MFS SB19_0.0 and YAP1_0.0-0.2 IFS SB06_0.0 FTG YAP3_0.0_230622, SB10_0.0_240622, SB13_0.0_230622, SB40_0-0.2, SB41_0-0.2 and SB43_0.9-1.0
Perfluorotridecanoic acid (PFTrDA)	<0.0002	0.0016	<0.0002	0.0045	<0.0002	0.0011	<0.0002		MFS SB19_0.0, SB20_0.0 and YAP1_0.0-0.2 IFS

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PFAS Compound	Main Fire Station		IFS including STP and Seepage Field		Fire Training Ground		Monitoring Wells		LOR Exceedances
	min (mg/kg)	max (mg/kg)	min (mg/kg)	max (mg/mg)	min (mg/kg)	max (mg/kg)	min (mg/kg)	max (mg/kg)	
									SB06_0.0 and SB33_0.0 FTG YAP2_0.0_240622, YAP3_0.0_230622, YAP4_0.45_230622, SB10_0.0_240622, SB12_0.0_240622, SB13_0.0_230622, SB22_0.0_230622, SB24_0.0_240622, SB40_0-0.2, SB41_0-0.2 and SB43_0.9-1.0
Perfluoroundecanoic acid (PFUnDA)	<0.0002	0.0018	<0.0002	0.0360	<0.0002	0.0055	<0.0002		MFS SB19_0.0, SB20_0.0, SB20_0.3 and YAP1_0.0-0.2 STP SB02_0.0, SB03_0.0, SB05_0.0, SB28_0.0 and SB29_0.0 IFS SB06_0.0-0.2, SB06_0.3-0.5, SB07_0.0, SB08_0.0 and SB33_0.0 FTG YAP2_0.0_240622, YAP3_0.0_230622, YAP3_0.6_230622, YAP4_0.0_230622, YAP4_0.45_230622, SB10_0.0_240622, SB12_0.0_240622, SB13_0.0_230622, SB22_0.0_230622, SB24_0.0_240622, SB25_0.0_240622, SB36_0-0.2, SB40_0-0.2, SB41_0-0.2, SB43_0.4-0.5, SB43_0.9-1.0, SB43_1.9-2.0 and SB43_2.9-3.0

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PFAS Compound	Main Fire Station		IFS including STP and Seepage Field		Fire Training Ground		Monitoring Wells		LOR Exceedances
	min (mg/kg)	max (mg/kg)	min (mg/kg)	max (mg/mg)	min (mg/kg)	max (mg/kg)	min (mg/kg)	max (mg/kg)	
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005		-
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	<0.0005	0.0099	<0.0005	0.0020	<0.0005	0.0166	<0.0005		MFS SB19_0.0, SB19_0.3 and YAP1_0.0-0.2 IFS SB33_0.0 FTG YAP2_0.0_240622, YAP3_0.0_230622, YAP4_0.0_230622, YAP4_0.45_230622, SB10_0.0_240622, SB12_0.0_240622, SB12_0.3_240622, SB13_0.0_230622, SB13_0.45_230622, SB22_0.0_230622, SB27_0.0_240622, SB37_0-0.2, SB40_0-0.2
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	<0.0005	0.0898	<0.0005	0.0358	<0.0005	0.0413	<0.0005		MFS SB19_0.0, SB19_0.3, SB20_0.0 and YAP1_0.0-0.2 STP SB02_0.0, SB02_0.3-0.5, SB03_0.0, SB04_0.0, SB05_0.0, SB29_0.0 and SB29_0.3 IFS SB06_0.0-0.2, SB06_0.3-0.5, SB07_0.0, SB08_0.0 and SB33_0.0 FTG YAP2_0.0_240622, YAP3_0.0_230622, YAP3_0.6_230622, YAP4_0.0_230622, YAP4_0.45_230622, SB10_0.0_240622, SB12_0.0_240622, SB12_0.3_240622,

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PFAS Compound	Main Fire Station		IFS including STP and Seepage Field		Fire Training Ground		Monitoring Wells		LOR Exceedances
	min (mg/kg)	max (mg/kg)	min (mg/kg)	max (mg/mg)	min (mg/kg)	max (mg/kg)	min (mg/kg)	max (mg/kg)	
									SB13_0.0_230622, SB13_0.45_230622, SB22_0.0_230622, SB24_0.0_240622, SB25_0.0_240622, SB27_0.0_240622, SB27_1.9_240622, SB36_0-0.2, SB37_0-0.2, SB38_0-0.2, SB40_0-0.2, SB41_0-0.2, SB42_0.9-1.0, SB43_0.4-0.5, SB43_0.9-1.0, SB43_1.9-2.0 and SB43_2.9-3.0
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	<0.0005	0.0007	<0.0005	0.0059	<0.0005	0.0014	<0.0005		MFS SB19_0.0 and YAP1_0.0-0.2 STP SB02_0.0 IFS SB06_0.0 FTG SB41_0-0.2 and SB43_0.9-1.0
Perfluorooctane sulfonamide (FOSA)	<0.0002	<0.0002	<0.0002	0.0003	<0.0002	0.0003	<0.0002		IFS SB34_0.3 FTG SB13_0.45_230622
N-methyl perfluorooctane sulfonamide (MeFOSA)	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005		-
N-methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002		-

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PFAS Compound	Main Fire Station		IFS including STP and Seepage Field		Fire Training Ground		Monitoring Wells		LOR Exceedances
	min (mg/kg)	max (mg/kg)	min (mg/kg)	max (mg/mg)	min (mg/kg)	max (mg/kg)	min (mg/kg)	max (mg/kg)	
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005		-
N-ethyl perfluorooctane sulfonamide (EtFOSA)	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005		-
N-ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002		-
N-ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005		-

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PFAS leachability analysis was undertaken for 11 soil samples from nine investigation locations using the Australian Standard Leaching Procedure (ASLP) method. Analytical results for the investigation areas were compared with the adopted screening criteria and are summarised in **Table 8.3**.

Table 8.3: Summary of Soil PFAS Leachability Analytical Results

Source Zone Area	No. of Locations and Samples Analysed	PFHxS (µg/L)	PFOS (µg/L)	PFOA (µg/L)	PFHxS + PFOS (µg/L)	Sum of PFAS (µg/L)	Criteria Exceeded
Main Fire Station	1 1	0.01	0.01	1.92	0.02	4.91	Drinking Water – 1 sample
Interim Fire Station	1 1	<0.01	0.5	<0.02	0.5	4.14	95% protection level for fresh water – 1 sample Drinking Water – 1 sample
STP and Seepage Field	1 1	<0.01	0.16	0.03	0.16	0.94	95% protection level for fresh water – 1 sample Drinking Water – 1 sample
Fire Training Ground	1 1	1.68	9.73	0.45	11.4	12.4	95% protection level for fresh water – 1 sample Recreational water – 1 sample Drinking Water – 1 sample

Selected soil samples were also analysed for TRH/BTEXN, PAHs, heavy metals and VOC screen with all analytical results reported at concentrations below the adopted human health and ecological investigation levels.

8.3 Groundwater Investigation Results

Analytical results for groundwater samples analysed for PFAS for the source zones areas were compared with the adopted site criteria and are summarised in **Table 8.4**.

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Table 8.4: Summary of Groundwater PFAS Analytical Results

Well ID	Location	PFHxS (µg/L)		PFOS (µg/L)		PFOA (µg/L)		PFHxS + PFOS (µg/L)		Sum of PFAS (µg/L)		Criteria Exceeded
		June 2022	February 2023	June 2022	February 2023	June 2022	February 2023	June 2022	February 2023	June 2022	February 2023	
Main Fire Station												
GW04	Down gradient	<0.01	<0.0005	<0.01	<0.0002	<0.01	<0.0005	<0.01	<0.0002	<0.01	0.0042	-
GW06	Upgradient	0.21	0.04	0.01	<0.01	<0.01	<0.01	0.22	0.04	0.45	0.06	Drinking water guidelines – June 2022
RN12065	Downgradient	0.03	0.0225	0.04	0.0389	<0.01	0.0013	0.07	0.0614	0.013	0.221	-
Interim Fire Station and STP												
GW01	Upgradient of STP	1.65	1.92	0.06	0.07	0.72	0.82	1.71	1.99	12.0	12.9	Drinking water guidelines - June 2022 and February 2023
GW08	Within footprint of IFS	-	0.498	-	0.412	-	0.145	-	0.910	-	4.22	Drinking water guidelines – February 2023 Freshwater 95% protection guidelines
Fire Training Ground												
GW02	Upgradient	<0.01	0.0006	<0.01	<0.0002	<0.01	<0.0005	<0.01	0.0006	<0.01	0.0012	-
GW03	Downgradient	0.11	0.13	0.01	0.02	0.33	0.46	0.12	0.15	2.62	3.25	Drinking water guidelines – June 2022 and February 2023
GW05	Downgradient of FTG and stormwater holding pond	0.03	0.04	0.09	0.10	0.20	0.23	0.12	0.14	0.71	0.74	Drinking water guidelines – June 2022 and February 2023

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Well ID	Location	PFHxS (µg/L)		PFOS (µg/L)		PFOA (µg/L)		PFHxS + PFOS (µg/L)		Sum of PFAS (µg/L)		Criteria Exceeded
		June 2022	February 2023	June 2022	February 2023	June 2022	February 2023	June 2022	February 2023	June 2022	February 2023	
Delineation Monitoring Wells												
GW07	Upgradient of all source zone areas	-	0.0096	-	0.0029	-	0.0007	-	0.0125	-	0.0373	-
GW09	Cross-gradient to north	-	0.0428	-	0.0041	-	0.0113	-	0.0469	-	0.215	-
GW10	Cross-gradient to south	-	0.0017	-	0.0091	-	0.0028	-	0.0108	-	0.0183	-
GW11	Downgradient of all source zone areas	-	0.481	-	0.776	-	0.0414	-	1.26	-	1.65	Drinking water guidelines – February 2023 Freshwater 95% protection guidelines – February 2023
Upgradient Wells												
RN12081		-	<0.01	-	<0.01	-	<0.01	-	<0.01	-	<0.01	-
RN12082		-	<0.01	-	<0.01	-	<0.01	-	<0.01	-	<0.01	-

Analytical results for PFAS compounds where no adopted screening criteria are summarised in **Table 8.5**.

Table 8.5: Minimum and Maximum Concentrations of PFAS Compounds in Groundwater and Criteria Exceedances

PFAS Compound	Main Fire Station		IFS and STP		Fire Training Ground		Delineation Wells		Upgradient Off-airport Wells	
	min (µg/L)	max (µg/L)	min (µg/L)	max (µg/L)	min (µg/L)	max (µg/L)	min (µg/L)	max (µg/L)	min (µg/L)	max (µg/L)
	<0.02	<0.05	0.233	0.92	<0.0005	0.04	<0.0005	0.0499	<0.02	<0.02

PFAS Compound	Main Fire Station		IFS and STP		Fire Training Ground		Delineation Wells		Upgradient Off-airport Wells	
	min (µg/L)	max (µg/L)	min (µg/L)	max (µg/L)	min (µg/L)	max (µg/L)	min (µg/L)	max (µg/L)	min (µg/L)	max (µg/L)
Perfluorobutane sulfonic acid (PFBS)	GW04 - February 2023 RN12065 – February 2023 GW06 – June 2022 and February 2023		GW01 – June 2022 and February 2023 GW08 – February 2023		GW03 – June 2022 and February 2023		GW07 – February 2023 GW09 – February 2023 GW11- February 2023			
Perfluoropentane sulfonic acid (PFPeS)	<0.0005	<0.06	0.137	0.69	<0.0005	0.03	<0.0005	0.0562	<0.02	<0.02
	RN12065 – February 2023 GW06 – June 2022		GW01 – June 2022 and February 2023 GW08 – February 2023		GW03 – June 2022 and February 2023		GW07 – February 2023 GW09 – February 2023 GW11- February 2023			
Perfluoroheptane sulfonic acid (PFHpS)	<0.0005	<0.02	0.0157	0.2	<0.0005	<0.02	<0.0005	0.018	<0.02	<0.02
			GW01 – February 2023 GW08 – February 2023				GW11 – February 2023			
Perfluorodecane sulfonic acid (PFDS)	<0.0005	<0.02	<0.0016	<0.02	<0.0005	<0.02	<0.0005	<0.0005	<0.02	<0.02
Perfluorobutanoic acid (PFBA)	<0.002	<0.01	0.858	2.2	<0.002	0.4	0.0026	0.0543	<0.1	<0.1
			GW01 – June 2022 and February 2023 GW08 – February 2023		GW03 – June 2022 and February 2023		GW07 – February 2023 GW09 – February 2023 GW10 – February 2023 GW11- February 2023			
Perfluoropentanoic acid (PFPeA)	<0.02	0.04	0.882	2.86	<0.0005	0.62	<0.0005	0.0533	<0.02	<0.02
	GW04 - February 2023 RN12065 – February 2023		GW01 – June 2022 and February 2023 GW08 – February 2023		GW03 – June 2022 and February 2023		GW07 – February 2023			

PFAS Compound	Main Fire Station		IFS and STP		Fire Training Ground		Delineation Wells		Upgradient Off-airport Wells	
	min (µg/L)	max (µg/L)	min (µg/L)	max (µg/L)	min (µg/L)	max (µg/L)	min (µg/L)	max (µg/L)	min (µg/L)	max (µg/L)
	GW06 – June 2022 and February 2023				GW05 – June 2022 and February 2023		GW09 – February 2023 GW11- February 2023			
Perfluorohexanoic acid (PFHxA)	0.06	0.09	0.592	2.32	<0.02	0.74	0.0007	0.12	<0.02	<0.02
	RN12065 – June 2022 and February 2023 GW06 – June 2022 and February 2023		GW01 – June 2022 and February 2023 GW08 – February 2023		GW03 – June 2022 and February 2023 GW05 – June 2022 and February 2023		GW07 – February 2023 GW09 – February 2023 GW10 – February 2023 GW11- February 2023			
Perfluoroheptanoic acid (PFHpA)	<0.0005	0.0023	0.443	1.27	<0.0005	0.78	<0.0005	0.0199	<0.02	<0.02
	RN12065 – February 2023		GW01 – June 2022 and February 2023 GW08 – February 2023		GW03 – June 2022 and February 2023 GW05 – June 2022 and February 2023		GW09 – February 2023 GW11- February 2023			
Perfluorodecanoic acid (PFDA)	<0.0005	0.0006	<0.0016	<0.02	<0.0005	0.02	<0.0005	0.0008	<0.02	<0.02
	RN12065 – February 2023				GW05 – June 2022		GW10 – February 2023			
Perfluorododecanoic acid (PFDoDA)	<0.0005	<0.01	<0.0016	<0.02	<0.0005	<0.02	<0.0005	<0.0005	<0.02	<0.02
Perfluorononanoic acid (PFNA)	<0.0005	0.0009	<0.0016	<0.02	<0.0005	0.09	<0.0005	0.0006	<0.02	<0.02
	RN12065 – February 2023				GW03 – February 2023 GW05 – June 2022 and February 2023		GW10 – February 2023			
Perfluorotetradecanoic acid (PFTeDA)	<0.0005	<0.05	<0.0040	<0.05	<0.0005	<0.05	<0.0005	<0.0005	<0.05	<0.05

PFAS Compound	Main Fire Station		IFS and STP		Fire Training Ground		Delineation Wells		Upgradient Off-airport Wells	
	min (µg/L)	max (µg/L)	min (µg/L)	max (µg/L)	min (µg/L)	max (µg/L)	min (µg/L)	max (µg/L)	min (µg/L)	max (µg/L)
Perfluorotridecanoic acid (PFTrDA)	<0.0005	<0.05	<0.0016	<0.02	<0.0005	<0.02	<0.0005	<0.0005	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	<0.0005	<0.02	<0.0016	<0.02	<0.0005	<0.02	<0.0005	<0.0005	<0.02	<0.02
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	<0.001	<0.05	<0.002	<0.05	<0.001	<0.05	<0.001	<0.001	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	<0.001	0.006	<0.002	<0.05	<0.001	<0.05	<0.001	<0.001	<0.05	<0.05
	RN12065 – February 2023									
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	<0.001	<0.05	<0.002	<0.05	<0.001	<0.05	<0.001	<0.001	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	<0.001	<0.05	<0.002	<0.05	<0.001	<0.05	<0.001	<0.001	<0.05	<0.05
Perfluorooctane sulfonamide (FOSA)	<0.0005	0.0006	<0.0016	<0.05	<0.0005	<0.020	<0.0005	<0.0005	<0.02	<0.02
	RN12065 – February 2023									
N-methyl perfluorooctane sulfonamide (MeFOSA)	<0.001	0.0006	<0.004	<0.05	<0.001	<0.05	<0.001	<0.001	<0.05	<0.05
N-methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	<0.0005	<0.02	<0.0016	<0.02	<0.0005	<0.02	<0.0005	<0.0005	<0.02	<0.02
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	<0.001	<0.05	<0.004	<0.05	<0.001	<0.05	<0.001	<0.001	<0.05	<0.05
N-ethyl perfluorooctane sulfonamide (EtFOSA)	<0.001	<0.05	<0.004	<0.05	<0.001	<0.05	<0.001	<0.001	<0.05	<0.05

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PFAS Compound	Main Fire Station		IFS and STP		Fire Training Ground		Delineation Wells		Upgradient Off-airport Wells	
	min (µg/L)	max (µg/L)	min (µg/L)	max (µg/L)	min (µg/L)	max (µg/L)	min (µg/L)	max (µg/L)	min (µg/L)	max (µg/L)
N-ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	<0.0005	<0.02	<0.0016	<0.02	<0.0005	<0.02	<0.0005	<0.0005	<0.02	<0.02
N-ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	<0.001	<0.05	<0.004	<0.05	<0.001	<0.05	<0.001	<0.001	<0.05	<0.05

Groundwater samples from the FTG monitoring wells were analysed for also TRH and BTEXN. Concentrations were not detected above the LOR with the exception of samples sampled from GW02 and GW05 which detected concentrations of TRH C_{10}-C_{14}, and TRHC_{29}-C_{36} and toluene respectively were detected below the adopted site criteria.

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8.4 Sediment Analytical Results

Sediment samples were collected from the two following source zone areas:

- drainage channel near the IFS and seepage spray field; and
- stormwater holding pond near the MFS.

Analytical results for were compared with the adopted site criteria and are summarised in **Table 8.6**

Table 8.6: Summary of Minimum and Maximum Sediment PFAS Analytical Results

Source Zone Area	No. of Locations and Samples Analysed	PFHxS (mg/kg)	PFOS (mg/kg)	PFOA (mg/kg)	PFHxS + PFOS (mg/kg)	Sum of PFAS (mg/kg)	Criteria Exceeded
Drainage Channel near IFS and Seepage Spray Field	2 2	<0.0002	<0.0002 0.0465	<0.0002	0.0022 0.0465	0.0030 0.0493	Ecological indirect exposure – 1 sample
Drainage Channel and Dam near MFS	5 6	<0.0002	<0.0002 0.0479	<0.0002 0.0006	0.0002 0.0479	0.0088 0.360	Ecological indirect exposure -3 samples

Analytical results for PFAS compounds where no adopted screening criteria are summarised in **Table 8.7**.

Table 8.7: Minimum and Maximum Concentrations of PFAS Compounds and LOR Exceedances

PFAS Compound	Drainage Channel near IFS and Seepage Spray Field		Drainage Channel and Holding Pond near MFS	
	min (mg/kg)	max (mg/kg)	min (mg/kg)	max (mg/mg)
Perfluorobutane sulfonic acid (PFBS)	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptane sulfonic acid (PFHpS)	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecane sulfonic acid (PFDS)	<0.0002	<0.0002	<0.0002 SS01_220622 SS02_220622 SS04	0.0011
Perfluorobutanoic acid (PFBA)	<0.001	<0.001	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexanoic acid (PFHxA)	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptanoic acid (PFHpA)	<0.0002	<0.0002	<0.0002 SS01_220622 SS02_220622 SS03_220622	0.0003
Perfluorodecanoic acid (PFDA)	0.0004 SED10_200622 and SED11_200622	0.0016	<0.0002 SS01_220622 SS02_220622	0.0468

PFAS Compound	Drainage Channel near IFS and Seepage Spray Field		Drainage Channel and Holding Pond near MFS	
	min (mg/kg)	max (mg/kg)	min (mg/kg)	max (mg/mg)
			SS03_220622 SS04_220622 SB44_0.4-0.5 SB44_0.9-1.0	
Perfluorododecanoic acid (PFDoDA)	<0.0002 SED11_200622	0.0003	<0.0002 SS01_220622 SS02_220622 SS03_220622 SS04	0.131
Perfluorononanoic acid (PFNA)	0.0004 SED10_200622 and SED11_200622	0.0006	<0.0002 SS01_220622 SS02_220622 SS03_220622 SS04_220622 SB44_0.4-0.5 SB44_0.9-1.0	0.0026
Perfluorotetradecanoic acid (PFTeDA)	<0.0005	<0.0005	<0.0005 SS01_220622 SS02_220622	0.0123
Perfluorotridecanoic acid (PFTrDA)	<0.0002	<0.0002	<0.0002 SS01_220622 SS02_220622 SS04	0.0187
Perfluoroundecanoic acid (PFUnDA)	<0.0002 SED11_200622	0.0003	<0.0002 SS01_220622 SS02_220622 SS03_220622 SS04 SB44_0.4-0.5	0.0523
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	<0.0005	<0.0005	<0.0005	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	<0.0005	<0.0005	<0.0005	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	<0.0005	<0.0005	0.0032 SS01_220622 SS02_220622 SS03_220622 SS04 SB44_0.4-0.5 SB44_0.9-1.0	0.100

PFAS Compound	Drainage Channel near IFS and Seepage Spray Field		Drainage Channel and Holding Pond near MFS	
	min (mg/kg)	max (mg/kg)	min (mg/kg)	max (mg/mg)
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	<0.0005	<0.0005	<0.0005 SS01_220622 SS02_220622	0.0144
Perfluorooctane sulfonamide (FOSA)	<0.0002	<0.0002	<0.0002	<0.0002
N-methyl perfluorooctane sulfonamide (MeFOSA)	<0.0005	<0.0005	<0.0005	<0.0005
N-methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	<0.0002	<0.0002	<0.0002	<0.0002
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	<0.0005	<0.0005	<0.0005	<0.0005
N-ethyl perfluorooctane sulfonamide (EtFOSA)	<0.0005	<0.0005	<0.0005	<0.0005
N-ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	<0.0002	<0.0002	<0.0002	<0.0002
N-ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	<0.0005	<0.0005	<0.0005	<0.0005

PFAS leachability analysis was undertaken on three sediment samples using the ASLP method. Analytical results for the investigation areas were compared with the adopted screening criteria and are summarised in **Table 8.8**.

Table 8.8: Summary of Sediment PFAS Leachability Analytical Results

Source Zone Area	No. of Locations and Samples Analysed	PFHxS (µg/L)	PFOS (µg/L)	PFOA (µg/L)	PFHxS + PFOS (µg/L)	Sum of PFAS (µg/L)	Criteria Exceeded
Drainage Channel near IFS and Seepage Spray Field	1 1	<0.01	2.48	<0.01	2.48	2.57	95% protection level for freshwater – 1 sample Recreational Water – 1 sample Drinking Water – 1 sample
Drainage Channel and Dam near CFS	2 3	<0.01	0.08 1.72	<0.01 0.04	0.08 1.72	0.31 7.19	95% protection level for fresh water – 2 samples Drinking Water – 3 samples

Sediment samples collected in the drainage channel and holding pond near the MFS were also analysed for TRH/BTEXN, PAHs and heavy metals with all analytical results reported at concentrations below the adopted human health and ecological investigation levels.

8.5 Infrastructure Investigations

The following media types were collected from locations within or near to source zone areas where AFFF was known or reported to have been stored or used, and within drainage systems where vehicle washdown or PFAS liquid wastes were disposed of.

PFAS analysis (28 analytes) was undertaken on trade waste drainage pit sediments and concrete (CC01 sliced into three discs, CC02 single core) from the MFS and FTG.

Analytical results were compared with the adopted site criteria and are summarised in **Table 8.9**

Table 8.9: Summary of Trade Waste Sediment and Concrete PFAS Analytical Results

Source Zone Area	PFHxS (mg/kg)	PFOS (mg/kg)	PFOA (mg/kg)	PFHxS + PFOS (mg/kg)	Sum of PFAS (mg/kg)	Criteria Exceeded
Main Fire Station						
SS08 Sediment Pit Sample	<0.0002	0.0073	0.0087	0.0073	0.604	-
SS09 Sediment Surface Sample	0.0004	0.0045	0.0019	0.0049	0.142	-
SS12 Sediment in grated pit on AST slab	<0.0002	0.0011	<0.0002	0.0011	0.03	-
Fire Training Ground						
SS05 Pad Sump	0.0011	0.0329	0.0170	0.0340	1.15	Ecological direct exposure – 1 sample
Pit 1 Trade Waste Pit Sediment	<0.0002	0.0087	0.0005	0.0087	0.523	-
CC01 Concrete	0.0010 – 0.0237	0.0028 – 0.0526	0.0045 – 0.0327	0.0038 – 0.0763	0.0705 - - 0.528	-
CC02 Concrete	0.0009	0.0886	0.0198	0.0895	0.509	-

Analytical results for PFAS compounds where no adopted screening criteria are summarised in **Tables 8.10 and 8.11.**

Table 8.10: Minimum and Maximum Concentrations of PFAS Compounds and LOR Exceedances – Fire Training Ground

PFAS Compound	SS05 Pad Sump and Pit 1		CC01 Concrete		CC02 Concrete	
	min (mg/kg)	max (mg/kg)	min (mg/kg)	max (mg/mg)	min (mg/kg)	max (mg/mg)
Perfluorobutane sulfonic acid (PFBS)	<0.0002 SS05_220622	0.0006	0.0004 CC01_Bottom_260622 CC01_Soil_260622 CC01_Top_260622	0.0033	0.0002 CC02	0.0002
Perfluoropentane sulfonic acid (PFPeS)	<0.0002 SS05_220622	0.0005	<0.0002 CC01_Soil_260622 CC01_Top_260622	0.0026	<0.0002	<0.0002
Perfluoroheptane sulfonic acid (PFHpS)	<0.0002	<0.0005	<0.0002 CC01_Soil_260622 CC01_Top_260622	0.0026	0.0006 CC02	0.0006
Perfluorodecane sulfonic acid (PFDS)	<0.0005 Pit1_sed	0.0003	<0.0002	<0.0002	0.0008 CC02	0.0008
Perfluorobutanoic acid (PFBA)	<0.001 SS05_220622	0.004	0.005 CC01_Bottom_260622 CC01_Soil_260622 CC01_Top_260622	0.072	0.015 CC02	0.015
Perfluoropentanoic acid (PFPeA)	0.0004 SS05_220622 and Pit1_sed	0.002	0.0062 CC01_Bottom_260622 CC01_Soil_260622 CC01_Top_260622	0.0508	0.0061 CC02	0.0061
Perfluorohexanoic acid (PFHxA)	0.0006 SS05_220622 and Pit1_sed	0.0045	0.0067 CC01_Bottom_260622 CC01_Soil_260622 CC01_Top_260622	0.0744	0.0112 CC02	0.0112
Perfluoroheptanoic acid (PFHpA)	<0.0008	0.0056	0.0030	0.0325	0.0073	0.0073

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PFAS Compound	SS05 Pad Sump and Pit 1		CC01 Concrete		CC02 Concrete	
	min (mg/kg)	max (mg/kg)	min (mg/kg)	max (mg/mg)	min (mg/kg)	max (mg/mg)
	SS05_220622 and Pit1_sed		CC01_Bottom_260622 CC01_Soil_260622 CC01_Top_260622		CC02	
Perfluorodecanoic acid (PFDA)	0.0448	0.0904	0.0011	0.0057	0.0230	0.0230
	SS05_220622 and Pit1_sed		CC01_Bottom_260622 CC01_Soil_260622 CC01_Top_260622		CC02	
Perfluorododecanoic acid (PFDoDA)	0.123	0.186	0.0002	0.0012	0.0139	0.0139
	SS05_220622 and Pit1_sed		CC01_Bottom_260622 CC01_Soil_260622 CC01_Top_260622		CC02	
Perfluorononanoic acid (PFNA)	0.0179	0.0428	0.0024	0.0168	0.0152	0.0152
	SS05_220622 and Pit1_sed		CC01_Bottom_260622 CC01_Soil_260622 CC01_Top_260622		CC02	
Perfluorotetradecanoic acid (PFTeDA)	0.0479	0.112	<0.0005	<0.0005	0.0036	0.0036
	SS05_220622 and Pit1_sed				CC02	
Perfluorotridecanoic acid (PFTrDA)	0.0479	0.114	<0.0002	0.0003	0.0038	0.0038
	SS05_220622 and Pit1_sed		CC01_Top_260622		CC02	
Perfluoroundecanoic acid (PFUnDA)	0.0702	0.102	0.0006	0.0012	0.0115	0.0115
	SS05_220622 and Pit1_sed		CC01_Bottom_260622 CC01_Soil_260622 CC01_Top_260622		CC02	
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	<0.0005	<0.0005	<0.0005	0.0353	0.0061	0.0061
	SS05_220622		CC01_Bottom_260622		CC02	

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PFAS Compound	SS05 Pad Sump and Pit 1		CC01 Concrete		CC02 Concrete	
	min (mg/kg)	max (mg/kg)	min (mg/kg)	max (mg/mg)	min (mg/kg)	max (mg/mg)
			CC01_Top_260622			
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	0.145	0.398	0.0048	0.120	0.273	0.273
	SS05_220622 and Pit1_sed		CC01_Bottom_260622 CC01_Soil_260622 CC01_Top_260622		CC02	
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	0.0346	0.0167	<0.0005	0.0016	0.0083	0.0083
	SS05_220622 and Pit1_sed		CC01_Bottom_260622 CC01_Top_260622		CC02	
Perfluorooctane sulfonamide (FOSA)	<0.0002	<0.0005	<0.0002	0.0004	<0.0002	<0.0002
			CC01_Top_260622			
N-methyl perfluorooctane sulfonamide (MeFOSA)	<0.0005	<0.0012	<0.0005	<0.0005	<0.0005	<0.0005
N-methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	<0.0005	<0.0012	<0.0005	<0.0005	<0.0005	<0.0005
N-ethyl perfluorooctane sulfonamide (EtFOSA)	<0.0005	<0.0012	<0.0005	<0.0005	<0.0005	<0.0005
N-ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002
N-ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	<0.0012	0.0046	<0.0005	<0.0005	<0.0005	<0.0005
	Pit1_sed					

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Table 8.11: Minimum and Maximum Concentrations of PFAS Compounds and LOR Exceedances – Main Fire Station

PFAS Compound	min (mg/kg)	max (mg/kg)	LOR Exceedances
Perfluorobutane sulfonic acid (PFBS)	<0.0002	<0.0002	-
Perfluoropentane sulfonic acid (PFPeS)	<0.0002	<0.0002	-
Perfluoroheptane sulfonic acid (PFHpS)	<0.0002	<0.0002	-
Perfluorodecane sulfonic acid (PFDS)	<0.0002	<0.0002	-
Perfluorobutanoic acid (PFBA)	<0.001	0.01	SS08_250622
Perfluoropentanoic acid (PFPeA)	<0.0002	0.0144	SS08_250622 and SS09_250622
Perfluorohexanoic acid (PFHxA)	<0.0002	<0.0144	SS08_250622 and SS09_250622
Perfluoroheptanoic acid (PFHpA)	<0.0002	0.0011	SS08_250622 and SS09_250622
Perfluorodecanoic acid (PFDA)	0.001	0.0683	SS08_250622 SS09_250622 SS12_250622
Perfluorododecanoic acid (PFDoDA)	0.011	0.0507	SS08_250622 SS09_250622 SS12_250622
Perfluorononanoic acid (PFNA)	0.0003	0.0458	SS08_250622 SS09_250622 SS12_250622
Perfluorotetradecanoic acid (PFTeDA)	0.0058	0.0357	SS08_250622 SS09_250622 SS12_250622
Perfluorotridecanoic acid (PFTrDA)	0.0037	0.0219	SS08_250622 SS09_250622 SS12_250622
Perfluoroundecanoic acid (PFUnDA)	0.0021	0.0395	SS08_250622 SS09_250622 SS12_250622
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	<0.0005	<0.0005	-
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	<0.0005	0.0014	SS09_250622
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	0.0043	0.327	SS08_250622 SS09_250622 SS12_250622
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	0.0007	0.0043	SS08_250622 SS09_250622 SS12_250622
Perfluorooctane sulfonamide (FOSA)	<0.0002	<0.0002	-
N-methyl perfluorooctane sulfonamide (MeFOSA)	<0.0005	<0.0005	-
N-methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	<0.0002	<0.0002	-

PFAS Compound	min (mg/kg)	max (mg/kg)	LOR Exceedances
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	<0.0005	<0.0005	-
N-ethyl perfluorooctane sulfonamide (EtFOSA)	<0.0005	<0.0005	-
N-ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	<0.0002	<0.0002	-
N-ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	<0.0005	<0.0005	-

PFAS leachability analysis was undertaken on trade waste drainage sediment and concrete samples using the ASLP method. Analytical results were compared with the adopted screening criteria and are summarised in **Table 8.12**.

Table 8.12: Summary of Infrastructure PFAS Leachability Analytical Results

Source Zone Area	No. of Locations	PFHxS (µg/L)	PFOS (µg/L)	PFOA (µg/L)	PFHxS + PFOS (µg/L)	Sum of PFAS (µg/L)	Criteria Exceeded
SS05 Pit Sediment	1	0.03	0.17	0.66	0.2	5.15	C/A6 EGV for leaching to surface water and ecological food chain exposures
CC01 Concrete	2	0.05 – 0.8	0.08 – 1.36	0.24 – 1.11	0.13 - - 2.16	2.36 – 21.6	C/A2 EGV for leaching to groundwater and potable off-site groundwater – 1 sample C/A6 EGV for leaching to surface water and ecological food chain exposures – 2 samples

Sediment samples collected from the MFS and FTG were also analysed for TRH/BTEXN, PAHs, phenols, heavy metals and VOC screen with all analytical results reported at concentrations below the adopted human health and ecological investigation levels with the exception of the following:

- TRH C_{10}-C_{16} (F2) reported at 2,350 mg/kg in sample SS05_0.0-0.2 and 28,000 mg/kg in sample Pit1_sed exceeding the adopted ecological criteria (170 mg/kg) and management limit (1,000 mg/kg); and
- TRH C_{16}-C_{34} (F3) reported at 4,160 mg/kg in sample SS05_0.0-0.2 and 3,570 mg/kg in sample Pit1_sed exceeding the ecological criteria (1,700 mg/kg) and management limit (3,500 mg/kg).

Trade waste drainage water and washdown area run off at the MFS and FTG, and STP influent and effluent were sampled and analysed for PFAS (28 analytes). The analytical results were compared with the adopted site criteria and are summarised in **Table 8.13**.

Table 8.13: Summary of Infrastructure Water PFAS Analytical Results

Source Zone Area	PFHxS (µg/L)	PFOS (µg/L)	PFOA (µg/L)	PFHxS + PFOS (µg/L)	Sum of PFAS (µg/L)	Criteria Exceeded
Main Fire Station						
SS07 Garage Drain	0.05	0.33	1.36	0.38	6.62	95% freshwater Drinking water guideline
WD03 Washdown South Driveway	<0.01	0.03	<0.01	0.03	0.03	-
WD04 Washdown North Driveway	<0.01	<0.01	0.02	<0.01	<0.01	-
WD05 Washdown Gutter Next to AST Pad	<0.01	0.03	0.16	0.03	0.03	-
Fire Training Ground						
SS06 Sealed Pit on Pad	16.8	17.6	196	34.4	1.440	95% freshwater Recreational water Drinking water guideline
Pit 1 Trade Waste Pit	0.16	0.74	4.33	0.9	31.0	95% freshwater Drinking water guideline
Pit 2 Anaerobic Digester	0.19	2.45	3.56	2.64	25.4	95% freshwater Recreational water Drinking water guideline
Pit 3 Anaerobic Polisher	0.19	1.37	4.02	1.56	25.4	95% freshwater Drinking water guideline
WD01 & WD02 Washdown Concrete	0.07 – 0.11	0.36 – 0.96	0.88 – 2.16	0.44 – 1.07	12.5 – 24.6	95% freshwater Drinking water guideline
Sewage Treatment Plant						
IN01 (influent)	<0.0016	<0.0016	0.0365	<0.0016	0.194	-
EF01 (effluent)	0.0295	0.154	0.698	0.184	3.60	95% freshwater Drinking water guideline

Water samples collected from selected pits at the MFS and FTG were also analysed for TRH/BTEXN, PAHs, heavy metals and VOCs with all analytical results reported at concentrations below the adopted site criteria with the exception of concentrations of cadmium, chromium, copper, lead, nickel and zinc detected above the 95% and 99% freshwater protection guidelines in the sample collected from SS07.

8.6 Consultant's Interpretations and Conclusions

The consultant (TTC 2023c) presented the findings of the site investigations at the potential sources of PFAS contamination at the site.

8.6.1 Main Fire Station

Soil, groundwater and trade waste sediment/water was collected to assess PFAS impacts in or nearby to MFS infrastructure.

Soil was sampled across areas of natural ground surrounding the MFS building and hardstand. Detected concentrations of PFAS marginally above the laboratory LOR at all sample locations at varying depths in the upper soil profile demonstrates that PFAS concentrations decrease with depth in the upper 1 metre of the soil

profile. Concentrations of PFAS detected were below the adopted ecological and human health criteria. Limited parent polyfluoralkyl precursor compounds were detected in soils and future risk from PFAS in soils at the MFS is predicted to remain low. Leachate analysis of surface soil indicates the possibility for elevated PFOA in groundwater although groundwater analysis downgradient of the MFS does not support this.

Sediments accumulated in drainage and adjacent to the MFS trade waste treatment system and former Ansulite storage tank. Minor concentrations of PFAS were detected in sediments. Considerable precursor compounds were detected in sediment adjacent to the former Ansulite storage tank likely indicating minor product releases or spills. However, the concentrations detected are unlikely to present appreciable risk to ecological or human health receptors.

Water was collected from drainage sumps within the MFS garage trade waste system. PFOS concentrations were detected exceeding the freshwater 95% protection guidelines and drinking water guidelines, and PFOA was detected above the drinking water guidelines. The PFAS signatures indicate that an additional source of impact with drainage plans indicating potential inputs from sewage wastewaters and/or greywaters containing high levels of surfactants.

Groundwater analysis detected concentrations of PFAS as PFHxS exceeding the drinking water guideline upgradient of the MFS. Concentrations of PFAS in the immediate downgradient well were detected at concentrations consistent with 2019 levels and below adopted ecological and human health criteria. Only minor concentrations of PFAS were detected further downgradient. Based on PFAS concentrations in soil, sediment and the trade waste system, no appreciable source of PFAS is indicated and no further consideration of PFAS within the MFS lease area is considered necessary.

Analysis for supplementary CoPCs detected concentrations in soil and sediment below the adopted human health criteria. Concentrations detected exceeding the ecological criteria in an infrastructure water sample are not considered to pose risks due to the commercial/industrial setting, depth to groundwater (9 – 12 m bgl) and limited availability of surface runoff. Supplementary CoPCs were not detected in concentrations above the ecological and human health criteria in groundwater.

8.6.2 Fire Training Ground

The FTG is the only known location of AFFF application by Airservices within the site and training activities occur on a frequent basis. F2 Class Foam Ansulite AFFF was used at the FTG prior to transition to F3 Class Foam Solberg RF6 in late 2010. A trade waste system captures liquids from the FTG concrete pad for preliminary treatment prior to direction to the wastewater rising main directed to the STP. When training is not occurring, stormwater runoff is reported to be manually diverted to the Stormwater Holding Pond although the outlet in the pond could not be physically verified as part of the site investigations.

Concentrations of PFAS detected in soil sampled from the FTG were characterised by either PFOS or PFOA as the dominant compound. As the use of Ansulite (primarily comprising fluorotelomers and carboxylic acids) by Airservices occurred post 2004, the detection of long chain PFSAs in soil suggests one or more unknown sources of PFAS. Concentrations of PFAS were detected below the human health criteria and ecological direct exposure criteria. Concentrations of PFAS in soil exceeding the ecological indirect exposure guideline have not been fully delineated. Leachable concentrations of PFOS exceeded ecological and human health criteria, and leachable concentrations of PFHxS exceeded the drink water guideline and freshwater 95% protection level guideline in one soil sample. However, the total and leachable concentrations of PFAS detected in soil are considered not likely to contribute to significant groundwater impact which is supported by groundwater monitoring in the downgradient well.

Accumulated sediments in the base of the main drainage sump within the FTG training pad reported concentrations of PFAS below the human health criteria, and ecological direct exposure and adopted adjusted ecological indirect exposure criteria. Stormwater input to the sump may be maintaining aerobic conditions and degradation of precursor compounds. Parent polyfluoralkyl precursors were detected in sediment

collected from the trade waste collection pit which operates in anoxic conditions limiting degradation of precursor compounds.

Water samples collected from the FTG training pad drainage line, trade waste collection pit and anaerobic digestion tank and aerobic finishing tank of the F3 foam treatment system were characterised by PFCAs and fluorotelomer compounds, and appreciable concentrations of PFHxS and PFOS indicating that PFAS discharging as wastewater and washdown water runoff from the FTG training pad remains elevated. Concentrations of PFHxS, PFOS and PFOA were detected in trade waste drainage waters exceeding the drinking water guideline and recreational water guideline with PFOS also exceeding the freshwater 95% protection guideline. A total PFAS concentration of 1,440 µg/L may indicate historic activities at the FTG and desorption of PFAS from materials within the trade waste treatment system (sediment) as a source of impact. Concentrations of PFHxS, PFOS and PFOA detected in samples collected from the trade waste collection pit and foam treatment system tanks exceeded the drinking water guideline and PFOS also exceeded the freshwater 95% protection guideline. However, concentrations of total PFAS are orders of magnitude lower in the wastewater system indicating a reduced PFAS load discharged to the trade waste system and foam treatment system. Post-TOPA analytical results for washdown samples indicate potential for degradation of parent fluoroalkyl precursors from biotic and abiotic processes.

Concentrations of PFHxS detected in groundwater sampled from the downgradient monitoring well exceeded the drinking water guideline. With consideration of the concentrations of PFAS in the sediments and trade waste drainage waters, groundwater downgradient of the FTG is considered to be moderately impacted suggesting a relatively low contribution from direct release from leaking infrastructure. Leaching of PFAS from soils and concrete within the FTG training pad and surrounding unsealed ground is considered to contribute to groundwater impact.

Leaching of PFAS from concrete and trade waste drainage system pit sediment from the FTG was assessed against EGVs for concrete derived dust. Leachable concentrations of PFAS in two concrete samples and one sediment pit sample exceeded the C/A2 EGV for leaching to groundwater and potable use of off-site groundwater.

Analysis for supplementary CoPCs detected concentrations in soil below the adopted human health criteria. Concentrations of petroleum hydrocarbons were reported in infrastructure drain and pit samples above the adopted criteria for assessment of risk to inground services. Concentrations detected exceeding the ecological criteria in two infrastructure sediment samples are not considered to pose risks due to the commercial/industrial setting and low likelihood and ecological value of on-airport terrestrial fauna and flora. ability of surface runoff. Supplementary CoPCs were not detected in concentrations above the ecological and human health criteria in groundwater.

8.6.3 Stormwater Drainage and Holding Pond

Sediment within the constructed stormwater drainage swale running parallel to the runway past the MFS to the stormwater holding pond was sampled.

Concentrations of PFOS in sediment collected upstream of the MFS exceeded the ecological indirect guideline for soil indicating input of PFAS to the stormwater drainage system from a source other than Airservices operations. PFOS concentrations in the stormwater holding pond were consistent with drainage alignment concentrations with the exception on one sample which detected higher concentrations although increased concentrations within a drainage flow end point where sediments accumulate is not unexpected. Leachable concentrations of PFOS in sediment at one location exceeded the freshwater 95% protection guideline and drinking water guideline suggesting leaching to groundwater may result from attenuation of PFAS from migration through unsaturated zone soils. Post-TOPA analysis indicated limited parent polyfluoroalkyl precursors are present in the drainage swale system although biotic and abiotic transformation may be occurring. Due to the highly sporadic and ephemeral nature of the stormwater drainage system, there are considered to be no plausible pathways for PFAS migration leading to a relevant exposure route.

The risk profile for PFAS in groundwater downgradient of the stormwater holding pond is considered to negligible due to the presence of low to very low permeability conglomerate hosting the upper aquifer and lack of abstraction for beneficial use.

8.6.4 Interim Fire Station

The IFS is reported to have been used by Airservices between 2004 and 2006 prior to the construction of the MFS for storage of Ansulite AFFF and washdown of ARFF vehicles.

Concentrations of PFAS in soil were detected within the IFS area with compound signatures generally consistent with that observed in the MFS and below the adopted ecological and human health criteria. Concentrations decreasing considerable with depth within the upper 1 metre of the soil profile are consistent with low level impact from the storage and use of F2 Class Foams. Concentrations of PFOS in leachable elutriant were detected above the drinking water guideline and freshwater 95% protection guideline. The leachable concentrations in soils at the IFS are notably different compared with the MFS and there is uncertainty in the use of the IFS area prior to Airservices occupation. TOPA analysis confirm that historical Ansulite storage and ARFF vehicle washdown have contributed to the presence of PFAS within soils at the IFS.

Concentrations of PFHxS were detected above the drinking water guideline and concentrations of PFOS above both the drinking water guideline and freshwater 95% protection guideline in groundwater sampled within the IFS area. The relatively consistent magnitude of detectable concentrations of PFAA compounds is representative of inputs from F1 Class Foams or liquid streams, and F2 Class Foams.

8.6.5 Sewage Treatment Plant and Seepage Field

Concentrations of PFAS detected in soil sampled to the northwest of the treated wastewater seepage field and directly adjacent to the STP were below the adopted human health and ecological screening criteria. Although the concentrations of PFOS in the leachable elutriant exceeded the drinking water guideline and the freshwater 95% protection guideline, there are considered to be no plausible risks to human health or ecological receptors as there is no groundwater abstraction for potable purposes within the site or downgradient off-site and groundwater is not discharged or expressed in any surface water features. TOPA analysis of soil has detected parent polyfluoroalkyl precursors that have the potential to degrade to a range of PFAAs characterised by short and long chain PFCAs consistent with F2 Class Foam PFAS sources.

Leachability analysis of sediment sampled from the western end of the drainage swale detected PFOS at a concentration above the freshwater 95% protection, drinking water and recreational use guidelines. However, due to the highly sporadic and ephemeral nature of the drainage swale there is not considered to be any plausible migration pathways for exposure for ecological and human health receptors.

Variable analytical results were detected in the sampling of the inferred upgradient and downgradient monitoring wells. Concentrations of PFHxS and PFOA were detected above the drinking water guideline and marginally below the recreational water guidelines in groundwater sampled from the upgradient well with concentrations of PFHxA being the greatest contributor to total PFAS concentrations. It is unclear if historical operational activities have impacted the groundwater upgradient of the STP. Concentrations of PFAS were not reported above the laboratory LOR in the downgradient monitoring well including following adoption of low level reporting limits. TOPA analysis did not indicate appreciable parent polyfluoroalkyl precursors present in groundwater sampled. Based on the groundwater results and with consideration of additional upgradient groundwater sampling, there is considered to be no plausible risk posed by groundwater impacts to human health or ecological receptors.

Airservices has and does not possess a lease agreement for the STP area. However, wastewater from the MFS and FTG is discharged to the STP under certain conditions. Influent to the STP was sampled under conditions consistent with no activities occurring at the FTG or vehicle washdown at the MFS prior or during collection. Concentrations of PFOS and PFOA were detected in the effluent sample exceeding the freshwater 95% protection guideline likely indicating that accumulated sediment and biosolids with the STP treatment train tanks and irrigation storage tank are contributing to contamination.

Concentrations of supplementary CoPCs were not detected above the adopted human health and ecological criteria in soil and sediment sampled from the drainage channel, STP and seepage spray field, groundwater and infrastructure water.

8.6.6 Delineation Wells and Off-airport Upgradient Well

Additional groundwater monitoring was undertaken during the Phase 2 investigations following PFAS impacts in groundwater not being delineated in the Phase 1 investigations.

Concentrations of PFAS were not detected above the adopted site criteria in the existing upgradient off-airport and upgradient and cross gradient delineation groundwater monitoring wells.

Concentrations of PFHxS and PFOS and the sum of both were detected exceeding the freshwater 95% protection guideline and the drinking water guideline in the monitoring well located to the northwest of the airport (GW11). The concentrations detected are higher than those detected in the IFS. The source of elevated PFAS at this location outside of airport operational areas is unknown.

Delineation of PFAS impact has been achieved within close proximity, upgradient, downgradient and cross gradient of all source zone areas however broad scale delineation has not been achieved downgradient of GW11.

Based on the limited PFAS migration rate across the airport due to the arid climate and episodic rainfall and the identified lithology of the unsaturated zone soils, detected groundwater impacts at GW11 are considered to be discrete and are not attributed to any known on-airport land uses or Airservices ARFF activities undertaken since 2004. Further investigation of the source of the impact including the disturbed area to the southwest of the monitoring well is recommended.

8.6.7 Conclusions

The consultant's conclusions are included in **Table 8.14** and discussed in **Section 8.8** (Audit Opinion) below.

8.7 Revised Conceptual Site Model

The CSM was revised based on the TSI findings and a potentially complete pathway and exposure route is considered present in relation to intrusive maintenance workers with the wastewater drainage system at the FTG.

Indirect ecological receptors have been identified as a potential risk within and south of the FTG.

8.8 Audit Opinion

The consultant (TTC 2023c) provided tables which adequately summarised the laboratory results, in addition to the provision of complete laboratory reports and chain of custody documentation.

The site plans provided by the consultant (TTC 2023c) adequately identified the sampling locations relevant to the main site features such as property boundaries and have been produced to scale.

The laboratory procedures were generally appropriate for the identified potential contaminants of concern and adopted criteria against which results were compared.

Overall, the consultant (TTC 2023c) is considered to have obtained and reported data in a manner which broadly enables conclusions to be drawn regarding the nature and extent of contamination. Where data gaps remain, these have been appropriately identified to be addressed in further investigations.

The audit opinions on the general findings reached by the consultant relevant to the requirements of the notice are provided in **Table 8.14**.

Table 8.14: Summary of Consultants General Findings Relevant to Notice Requirements (TTC 2023c) and Audit Opinions

Consultant General Findings	Audit Opinion
Concentrations of PFAS (and other limited CoPCs) are present in soils and groundwater within (or associated with) the Airservices lease areas that have been partially contributed to as a result of activities undertaken by Airservices.	The auditor agrees that PFAS (and other limited COPCs) have been identified in soils and groundwater within (or associated with) the Airservices lease areas. The auditor agrees that these reported impacts appear to be (at least) partially attributable to Airservices activities.
There is evidence that PFAS detected within the airport site has been contributed to by other land users and their activities.	The auditor has not attempted to assess whether the impacts have been contributed to by other land users and their activities, since the Notice does not require this. Rather the Notice relates to, "PFAS present in the environment from activities undertaken by or in any way associated with AA [Airservices] activities within the premises."
The source of PFAS impacts detected in groundwater monitoring well GW11 located more than 1 kilometre down hydraulic gradient from the Airservices lease areas is uncertain. It is unlikely that Airservices lease areas or their known activities on the airport site have resulted in the identified impact. Further appraisal of the impacts may be required.	The auditor agrees that the source of groundwater impact at GW11 is uncertain. The auditor agrees that it does not appear that the Airservice lease areas appear to be the source of this impact. The auditor considers that there remains an unknown source of PFAS impact in the vicinity of GW11 which has yet to be characterised. Notwithstanding this data gap (discussed further below), the auditor considers that the likely risks posed by this identified – but as yet undefined – impact are low. The reason why the auditor has reached this view is primarily due to the lack of identified groundwater users downgradient of the airport, however, agrees with the need to address this as part of the recommended future management measures.
The detected concentrations of PFAS exceeding drinking water guidelines and freshwater 95% protection guidelines are considered to pose very low risk to on-airport or off-airport groundwater receptors with the exception of the following: - Risk of exposure to PFAS for intrusive maintenance workers if working in the trade waste drainage system at the FTG without appropriate health, safety and environment measure or personal protective equipment; and - Indirect exposure to ecological receptors from PFAS soil impacts within the FTG, MFS drainage pond sediments and an isolated sediment location at the western end of the STP seepage field perimeter swale.	The auditor agrees that the identified risks are generally low and acceptable, with the exception of intrusive maintenance worker exposure and potentially indirect exposure to ecological receptors from shallow PFAS impacted soils in certain parts of the site. The auditor agrees with the recommended management and further assessment requirements made by the consultant in relation to these two identified items.
A review of the data gap assessment established for the TSI has established that two data gaps remain open. The following new or residual data gaps have been developed: - The source and extent of PFAS in groundwater upgradient of Airservices lease areas and the STP require further consideration. Further testing of inflows and outflows, ongoing groundwater monitoring at GW01, GW07 and GW08 and increased certainty of STP operations and historical discharges is required;	The auditor considers that the first two of the consultant's three identified remaining data gaps are relevant to the requirements of the Notice. The auditor agrees with the recommendation to address the first data gap.

Consultant General Findings	Audit Opinion
- The source and extent of per- and poly-fluoroalkyl substances in groundwater at GW11 has not been established. Additional sampling and analysis of this monitoring well should be undertaken; - Concentrations of PFSA compounds identified across the investigation areas are not characteristic of those observed solely from the use of F2 Class Foams (Ansulite). The source of short and long chain PFSAs such as PFHxS and PFOS entering the constructed stormwater drainage network and holding pond, and non-Airservices related inputs to the FTG should be further investigated.	The auditor is of the opinion that the consultant's recommendation to undertake further sampling and analysis of GW11 (only) is inadequate. A more comprehensive investigation scope, including both soil and groundwater will be required to identify the source, nature and extent of this identified impact. In relation to the third identified data gap, the auditor is of the opinion that this recommendation falls outside the requirements of the Notice, so has not included this in the audit recommendations.
A PFAS Management Plan should be should be prepared and implemented to mitigate risks to receptors from PFAS impacts at and in the vicinity of the site. The PFAS Management Plan should include hotspot removal of identified PFAS impacted sediment and/or soil, and treatment of captured water from the FTG trade waste treatment and/or sewage treatment plant.	The auditor agrees with this recommendation.
Consumption of groundwater sourced from groundwater bores at the site should be prohibited.	The auditor agrees with this recommendation, and notes that groundwater is not used for consumption at the airport.

9. Auditor Commentary/Opinions Against Requirements of Notice

The auditor opinions against the requirements of the Section 48 Notice, and subsequent amendments, under the environmental audit program are presented in **Table 9.1** (in order of appearance in the notice).

Table 9.1: Audit Opinions Against Requirements of Notice

Notice Requirement	Audit Commentary/Opinion
The environmental audit program (the program) must be performed by a person who is registered under section 68 of the Waste Management and Pollution Control Act 1998 (the Act), in this case an environmental auditor accredited under the New South Wales or Victorian auditor accreditation schemes	The environmental audit program has been undertaken by Andrew Lau, accredited by the NSW EPA as a Site Auditor (refer **Section 1.2**).
The program must relate to all activities undertaken by or in any way associated with AA activities at the premises, including ARFF and related training, since AA began its occupation of Airservices Australia occupied areas within the premises.	The auditor is satisfied that the investigations have encompassed Airservices lease areas and other areas potentially associated with Airservices activities since occupation of the premises in 2004.
As part of the program VITA must complete a Detailed Site Investigation (DSI) to determine the types, amount, distribution and mobility of contaminants and waste, including but not limited to PFAS present in the environment from activities undertaken by or in any way associated with AA activities within the premises	The investigation (TTC 2023c) was conducted to address the DSI requirements of the Section 48 Notice (refer **Section 8**). The auditor considers that the investigations undertaken by the consultant have broadly addressed this requirement of the notice which relates to PFAS present in the environment from activities undertaken by or in any way associated with Airservices activities at the site. Where data gaps remain in relation to the distribution and mobility of PFAS contaminants, these have been appropriately identified by the consultant as requiring further assessment. Whilst the investigation report prepared by the consultant was titled a Targeted Site Investigation, the auditor is satisfied – based on the contents and nature of the works undertaken – that this has the same practical meaning as a Detailed Site Investigation required by the notice.
Where applicable, the DSI must be undertaken in accordance with the requirements of the National Environmental Protection (Assessment of Site Contamination) Measure 1999 (ASC NEPM) as amended, the Northern Territory Contaminated Land Guideline 2017 (NTCLG) and the PFAS National Environmental Management Plan Version 2.0, January 2020 (PFAS NEMP) as amended	The auditor is satisfied that the relevant requirements of these guidelines were followed as part of the site investigations.
The DSI must determine the nature and extent of contamination at and beyond the Airservices Australia occupied areas within the premises, to a sufficient degree that an appropriate level of risk assessment may be undertaken and, if necessary, provide the basis for the development	The auditor is satisfied that the investigation report (TTC 2023c) has determined the nature and extent of contamination within the premises to a sufficient degree that an assessment of risks has been able to be undertaken. This has resulted in only two potentially unacceptable risks being identified as requiring management/further investigation, namely: (i) intrusive maintenance worker exposure; and (ii) potentially

of an appropriate remediation or management strategy.	indirect exposure to ecological receptors from shallow PFAS impacted soils in certain parts of the site. The recommended management measures aimed at addressing each of these two items are considered by the auditor to be appropriate. Where gaps remain in the complete understanding of the nature and extent of contamination, these have been appropriately acknowledged by the consultant. In each instance, the auditor is satisfied that the current appraisal of risk at the site is unlikely to change as a result of addressing the remaining data gaps, having regard to the management recommendations proposed (discussed further below).
As part of the DSI, VITA must develop a Sampling and Analysis Quality Plan (SAQP).	A SAQP was prepared by the consultant (refer **Section 5**).
The SAQP must be provided to the NT EPA for review no later than 3 months from the date of issue of this notice.	The initial and supplementary SAQPs were provided to the NT EPA on 3 November 2021 and 16 December 2022 respectively.
The SAQP must include, but be not limited to: (a) assessment methods to be used to characterise soil, surface water and groundwater; (b) data quality objectives; (c) sampling locations within the premises; (d) extent and number of samples to be taken within the premises and any potential areas of concern; and where initial sampling and analysis indicates that the area of impact has the potential to extend beyond the boundary of the premises, the steps which will be taken to provide further sampling and analysis.	The auditor is satisfied that the SAQP prepared by the consultant satisfied the requirements of the notice. The auditor's appraisal of the adequacy of the SAQP was documented in Interim Audit Advice L002 IAL 0503-NT-2201, dated 8 April 2022 (**Appendix A**)
The SAQP must be reviewed and endorsed in writing by the qualified person registered under Section 68 of the Act	The SAQP was reviewed and endorsed by the auditor in Interim Audit Advice L002 IAL 0503-NT-2201, dated 8 April 2022 (**Appendix A**)
By 24 August 2023, Voyages Indigenous Tourism Australia Pty Ltd (VITA) must submit the results of the program in the form of an Environmental Audit Report prepared by the person referred to in requirement 1 which must include, but be not limited to: (a) a summary of the methods used for sampling, classification and analysis; (b) all soil and groundwater sample results and documentation; (c) identification of all environmental risks relating to any identified contamination; and (d) recommendations to prevent, rectify, clean up, rehabilitate or minimise potential environmental harm arising from any identified contamination.	This audit report has been prepared to address these requirements of the Notice, and is to be submitted to NT EPA.

10. Audit Summary Opinions

On the basis of the findings of the environmental audit program, and subject to the limitations in **Section 11**, the auditor's summary opinions are presented as follows:

- The investigations undertaken to address the requirements of the notice were reviewed by the auditor and found to have been undertaken in general accordance with relevant guidelines, including those referred to in the Notice. The data obtained from the investigations were found to have been of a suitable quality to address the objectives of the study.
- The auditor is satisfied that the investigation report (TTC 2023c) has determined the nature and extent of contamination within the premises to a sufficient degree that an assessment of risks has been able to be undertaken. This has resulted in two potentially unacceptable risks being identified as requiring management/further investigation, namely: (i) intrusive maintenance worker exposure; and (ii) potentially indirect exposure to ecological receptors from PFAS impacted soils in certain parts of the site.
- Where gaps remain in the complete understanding of the nature and extent of contamination, these have been appropriately acknowledged by the consultant and suitable recommendations included to address each. In each instance, the auditor is satisfied that the current appraisal of risk at the site is unlikely to change as a result of addressing the remaining data gaps, having regard to the management recommendations proposed.
- The remaining data gaps relevant to the requirements of the Notice and the auditor's opinions on each are as follows:
    - The source and extent of PFAS impacts in groundwater upgradient of the Airservices lease areas and the sewage treatment plant hasn't been fully determined. The auditor agrees with the consultant's recommendation that further investigations are required to clarify this item.
    - The source and extent of the PFAS groundwater impact in the northwestern portion of the site (GW11) remains unknown and – where access permits - further investigations are recommended to close this data gap. The mechanism by which this impact originated remains unknown/uncertain and has not been able to be established as part of the investigations undertaken. The auditor is of the opinion that the consultant's recommendation to undertake further sampling and analysis of GW11 (only) (TTC 2023c) is inadequate. A more comprehensive investigation scope, including both soil and groundwater will be required to identify the source, nature and extent of this identified impact. Notwithstanding this data gap, the auditor considers that the likely risks posed by this identified – but as yet undefined – impact are low. The reason why the auditor has reached this view is primarily due to the lack of identified groundwater users downgradient of the airport, however, agrees with the need to address this as part of the recommended future management measures.
- The auditor agrees with the consultant's recommendation that a PFAS Management Plan should be prepared for implementation at the site. As a minimum, the auditor considers that the PFAS Management Plan should include:
    - Prohibiting the consumption of groundwater at the site by humans unless it has first been appropriately tested to confirm its suitability for such a use;
    - Remediation/management of PFAS impacted accessible soils and/or sediment in and around the fire training ground, not only to address direct exposure risks to identified receptors but to also consider addressing secondary source materials relating to identified groundwater impacts; and
    - Management of PFAS impacted water associated with the Fire Training Ground Trade Waste Treatment facility and, if still relevant once addressed, the sewage treatment plant.

11. Limitations

This audit was conducted with a reasonable level of scrutiny, care and diligence on behalf of the client for the purposes outlined in the NT *Waste Management and Pollution Control Act 1998*. The data used to support the conclusions reached in this audit were obtained by other consultants and the limitations which apply to the consultant's report(s) apply equally to this audit report.

Every reasonable effort has been made to identify and obtain all relevant data, reports and other information that provide evidence about the condition of the site, and those that were held by the client and the client's consultants, or that were readily available. No liability can be accepted for unreported omissions, alterations or errors in the data collected and presented by other consultants. Accordingly, the data and information presented by others are taken and interpreted in good faith.

Sampling and chemical analysis of environmental media is based on appropriate guidance documents made and approved by the relevant regulatory authorities. Conclusions arising from the review and assessment of environmental data are based on the sampling and analysis considered appropriate based on the regulatory requirements.

Limited sampling and laboratory analyses were undertaken as part of the investigations reviewed, as described herein. Ground conditions between sampling locations and media may vary, and this should be considered when extrapolating between sampling points. Chemical analytes are based on the information detailed in the site history. Further chemicals or categories of chemicals may exist at the site, which were not identified in the site history and which may not be expected at the site.

Changes to the subsurface conditions may occur subsequent to the investigations described herein, through natural processes or through the intentional or accidental addition of contaminants. The conclusions and recommendations reached in this audit are based on the information obtained at the time of the investigations.

This report does not provide a complete assessment of the environmental status of the site, and it is limited to the scope defined herein. Should information become available regarding conditions at the site including previously unknown sources of contamination, JBS&G and the Environmental Auditor reserve the right to review the report in the context of the additional information, subject to meeting relevant guideline requirements imposed by the NT EPA.

Appendix A Audit Correspondence

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Audit Comments - Yulara Airport - SBR, EM SAQP and SAQP

Sara Arthur <sarthur@jbsg.com.au>

Thu 27/01/2022 8:27 AM

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Hi Damien,

On behalf of Andrew Lau, thank you for the following reports:

- Draft *Ayers Rock Airport – Targeted SIte Investigation Site Brief Report,* Tetra Tech Coffey, July 2021 (Rev C), ("the SBR");
- Draft*, PFAS Characterisation Program, Ayers Rock Airport (AYQ), Sampling Analysis and Quality Plan,* Tetra Tech Coffey, 1 November 2021 (Rev C) ("the SAQP"); and
- Draft, *Environmental Monitoring Services, Ayers Rock Airport (AYQ), Sampling Analysis and Quality Plan,* 12 November 2021 (Rev b) ("the EM SAQP").

The auditor has completed his review and offers the following comments:

<u>SBR</u>

- The SBR states that the land to the north is vacant land. As this is the presumed groundwater flow direction it would be useful for the SBR to identify any affected parties, such as landowners or occupiers, please?
- The NT Police, Fire and Emergency Services (NTPFES) and the Yulara Volunteer firefighters provided emergency response

prior to Airservices operating at the site. Is there any information on these groups conducting any training or responding to any incidents where foam was released?

- The SBR states that Mutujulu waterhole at the base of Uluru is the closest natural source of surface water and is believed to be frequently recharged (but doesn't state from where), whereas the SAQP states that the waterhole recharges the Southern Aquifer with surface water. Can the documents be consistent regarding surface water features? Is it anticipated that this waterhole is downgradient of the airport?
- Are there any waterholes or soaks that are downgradient of the airport? The auditor notes the presence of the ephemeral salt Lake Amadeus (50km) to the north, and some smaller unnamed ephemeral salt lakes between the airport and Lake Amadeus. Are these potentially downgradient/receiving waters of the airport?
- The SBR states that flora and fauna within the region are not considered dependent on groundwater, but there is no reference or discussion supporting this statement. Can the SBR please elaborate?
- The SBR cites GHD 2017 PSI when it states that the two underlying aquifers in the National Park, i.e. the Dunes Plains Aquifer and the Southern Aquifer, are not connected. Is there any other evidence or references to support this statement? The statement in GHD 2017 PSI is not referenced. Is a consideration of the Southern Aquifer relevant to the investigation?

<u>SAQP</u>

- The SAQP does not discuss consultation with indigenous groups, although the auditor realises that stakeholder engagement is yet to occur. This should be addressed.
- The SAQP includes monitoring of eight existing groundwater wells that are off airport and are identified as being up gradient. These locations appear to be over 1 km away from the nearest location of Airservices activities and if the groundwater flow direction is established and these are found to be up gradient of the airport, it is not clear how they will

assist meeting the SAQP objective: to "…determine if ARFFS lease areas have impacted groundwater quality down hydraulic gradient". This should be addressed.

- The installation of downgradient monitoring wells should be undertaken, as there appear to be none known to exist off airport. This will be especially important should the single existing groundwater well that is on airport (RN012065) is found to contain PFAS above the limits of reporting.
- The SAQP should include the collection of opportunistic surface water samples, including background locations.
- The SAQP provides assessment criteria for groundwater as recreational use and drinking water use. However, the investigations do not seem to have considered potential receptors to the north.

<u>The Environmental Monitoring SAQP</u>

- An environmental audit notice has been issued by the NT EPA and identifies several areas that outside the Airservices leased areas, namely an area around and including the sewage treatment plant and discharge area and an "open drainage channel" that is to the north of the fire training ground; the "open drainage channel" includes a small dam at its western end. The auditor understands from discussions with Airservices that the areas identified within the environmental audit notice issued by the NT EPA will need to be included in the SAQP. The auditor notes that the STP and discharge area have been included in the EM SAQP, but only two locations from the "open drainage channel" – that is – sediment from the dam. A sample(s) from adjacent to where the underground pipe enters the drainage channel will be beneficial.
- An objective of the EM SAQP is to "Understand surface water flow paths and the potential contaminant migration pathways within drainage channels associated with the CFS, FFS, FTG and STP areas" and to "Determine whether drainage channels contain concentrations of CoPCs in surface water surface water and/or sediment which exceed Tier 1 screening criteria, particularly from the STP, and determine if these pose a

potential risk to receptors." Figure 3 shows sampling locations for the investigation and includes four soil bores across the STP seepage field. Aerial views suggest there could be a surface water drain to the north of this area so the SAQP should include potentially sampling from this area, should surface water flows be directed to that drain.

If you have any queries, please contact myself on 0425 287 451 or Andrew on 0412 512 614.

Kind Regards,

Sara

Dr Sara Arthur | Principal | JBS&G
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FW: Airservices Australia Yulara SAQP for comment and information

Sara Arthur <sarthur@jbsg.com.au>

Wed 9/03/2022 1:01 AM

To:Sharon O'Brien <SObrien@jbsg.com.au>

1 attachments (8 MB)

754-PEREN233360_R16_DraftG_AYQ SAQP.pdf;

From: ChristineJ Plewinski <Christinej.Plewinski@nt.gov.au>
Sent: Tuesday, 8 March 2022 4:24 PM
To: Richards, Sarah <Sarah.Richards@coffey.com>; Elena Madden <elena@truenorthcomm.com.au>; Christopher Arends <Christopher.Arends@AirservicesAustralia.com>
Cc: Peter Vasel <Peter.Vasel@nt.gov.au>; Gemma Sheridan <Gemma.Sheridan@nt.gov.au>; Christopher Coombes <Christopher.Coombes@nt.gov.au>; Holly.ainslie@AirservicesAustralia.com.au; Sara Arthur <sarthur@jbsg.com.au>; Andrew Lau <ALau@jbsg.com.au>; Kristin Howden <Kristin.Howden@voyages.com.au>
Subject: RE: Airservices Australia Yulara SAQP for comment and information

[EXTERNAL EMAIL] Stop and think before opening attachments, clicking or responding.

Good afternoon Sarah, Elena and Chris,

Thank you for your email and the opportunity to comment on the Yulara Airport SAQP.

Please find below our comments and questions on the SAQP.

TTC Response to NT EPA Comments - Comments Dated 8 March 2020.

PFAS Characterisation Program - Ayres Rock Airport (AYQ) - Sampling and Analysis Quality Plan - 2 March 2022.

Number	EPA Comment	Meeting Response to Comment - Clarification	Proposed update to SAQP
1	It is noted that Ansulite has been used at the airport between 2004 and 2010. In 2010, Airservices changed over to Solberg RF6: *1. Have works been undertaken to assess infrastructure such as storage tanks, pits, associated pipework, fleet vehicles and other firefighting related equipment for residual PFAS contamination?* *2. Has consideration been made to assess precursors and daughter end products of the PFAS compounds?*	1. Infrastructure has historically been assessed by Beca as part of wastewater testing, and by Low as part of a washdown process at foam changeover to Solberg. PFAS has been confirmed in wastewater pits and is assumed to be present in connecting pipework. Airservices has tested fire trucks for PFAS at multiple other sites, but not at Yulara. Trucks at the other ASA Sites tested have been clean. The former bulk AFFF (Ansulite) tank is still onsite, but it is not in-use. The 'system' is isolated and not proposed to be tested as it doesn't represent a pathway to environmental impact. Additional sediment sampling will be included in the area where sediments are observed in drains or kerbside. 2. Consideration has been made to test for PFAS precursers by TOPA sampling to assess for analytes which may change to PFAS. Samples would be nominated for testing based on proximity to Ansulite use, and samples that are initially reported to contain elevated fluorotelemers or sulfonamides.	Update the SAQP to include TOPA analysis. Present analytical program in Appendix B for clarity.
2	Throughout the SAQP, there are statements relating to Airservices stipulating the locations of the sampling locations, such as "Soil samples will be collected at the sampling locations provided by Airservices". Please explain the reasoning behind Airservices determining the sampling locations instead of relying on the expertise of the Environmental Site Auditor – Andrew Lau and your environmental consultant – Tetra Tech Coffey. This gives the impression that certain areas not being fully assessed to determine the nature and extent of PFAS contamination. It is our expectation that the environmental consultants and Environmental Site Auditor are free to determine the appropriateness of sampling locations to ensure the investigation is carried out in accordance with the ASC NEPM and Northern Territory Contaminated Land Guideline.	The comment referred to within Table N of the SAQP relates to the locations identified by ASA as most likely containing PFAS based on Airservices knowledge of practices at the site and locations that are part of an ongoing annual monitoring program. Could not identify any other reference in the SAQP indicated Airservices stipulating soil locations. The consultant (in consultation with the auditor) have selected additional locations to address data gaps.	SAQP to be updated to make it clearer on sample selection methodology and on the reference to ASA's involvement in preparing the scope and sample locations.
3	In Section 2.1 – the estimates on the size of the Current ARFFS fire station, the Former Interim ARFFS fire station and the FTG are listed. In accordance with Table A of the NSW EPA Sampling Design Guidelines 1995, which provides guidance on the minimum sampling points required for site characterisation based on detecting circular hot spots and in accordance with ASC NEPM and the Northern Territory Contaminated Land Guideline, June 2017. It appears that the proposed number of sampling locations do not align with these guidelines. It is also noted that the Site Auditor is undertaking the audit under the NSW EPA auditor scheme. *1. Can you please provide detail to justify the appropriateness of the sampling design (sample locations, density and frequency of sample collection) as the proposed sampling density isn't in accordance with the relevant guidelines listed above.* *2. It is also noted that sewage irrigation area is approximately 1.2ha in size with only 5 sampling locations spaced across the entire area.*	1. The sampling design guidelines are currently being updated, which Andrew Lau is involved in the development, and describes a range of sampling design approaches based on the site situation and CSM. The scope setout in this SAQP (specifically for the CFS and FTG) is a targeted scope as the source and likely pathways are currently known. The Sampling design guidelines with a grid sampling approach is generally for sites where the source and pathways are not known, hence the sampling being biased to the known source and pathway areas of impact and not in areas where there is less likely to be impact. The Site Auditor considers this approach to be appropriate for the site in order to meet the objectives of the investigation. Noting that in a lot of cases, return sampling will occur where impacts have not been delineated. *Also refer to comment 11 below for additional targeted sampling.* The initial sampling strategy has been modified for the IFS. Previous annual sampling has indicated detectable, but low, levels of PFAS. Due to the age and short period of use, specific areas of highest likelihood of impact can not be identified. This assessment will add additional locations to meet the NSW Sampling Design guidelines systematic density and close out the area (i.e. it will subsequently be removed from the annual monitoring program). 2. The Sampling strategy for the sewage irrigation areas has been prepared based on the known/inferred topography of the irrigation area as being concave towards the centre. and likely accumulation of PFAS being along the centre alignment of the area. The Site Auditor considers this appropriate sampling selection both in location and quantity as there doesnt generally record variable results when sampling these areas. Two additional locations have been included to be targetted in areas of observed vegetation, which indicate areas of frequent irrigation and higher likelihood of infiltration/accumulation. Offsite sampling results provided by the NT EPA did not indicate migration of PFAS south of the airport boundary at the seepage field.	The Environmental Auditor for the site considered the original scope of the SAQP suitable for its intended purpose, as it stood. No update to the CFS and FTG areas proposed as a result of this comment. Additional locations included at STP seepage field and IFS.
4	Since November 2021 there has been approximately 268mm of rainfall at the Yulara Airport and across the southern portions of the NT. It is also noted that the recorded annual rainfall at Yulara airport is up to 575 mm since 2011. Has consideration been made to potential for offsite migration of contaminants via overland flow? Also has consideration been made for opportunistic sampling of shallow groundwater that may be encountered during well installation?	The Stage 1 report for PWC (Cloud GMS 2019) discusses recharge and rainfall thresholds. Additional description has been included in the SAQP. Migration of PFAS in over land flow beyond the investigation area is unlikely due to the very high storm events that would be required to generate run off and then saturate the vadose zone to overcome seepage. Such high rainfall events would also create significant dilution. The sampling plan has been prepared to assess known areas of potential surface water and sediment migration within the investigation area. Opportunistic sampling of surface water and perched water will be included, if encountered during the drilling program.	No changes to be included to the SAQP based on surface run-off of stormwater. Opportunistic sampling, inlcuded in a SAQP will be included if perched water presents.
5	Is the Yulara Airport within the upper catchment of Lake Amadeus?	Most rainfall that falls in the area of the Yulara airport is lost to evaporation and transpiration. However, the rare overland flow (in flood conditions) and minor contributions to groundwater recharge, contributes to the Dune Plains Aquifer and ultimately feeds into Lake Amadeus. TTC proposes 5 - 6 groundwater monitoring wells to consolidate the understanding of the hydrogeological setting of the airport and characterise contaminants migrating in groundwater towards Lake Amedeus.	Hydrogeology description expanded.
6	Has consideration been made to undertake analysis of soil property parameters that may affect PFAS movement?	The soil properties that are considered to influence PFAS migration are organic carbon and to a lesser extent pH and soluble Calcium content. Based on the geology and hydrogeology, the conditions at the investigation area are not expected to have significant levels of any of these parameters. The soil characteristics that will influence transport most significantly at this site is soil moisture (i.e. free water and % saturation) and aquifer permeability. We will include a few soil characteristics tests (pH, particle size, cations, TOC) to confirm conditions. Moisture content is measured in every soil sample tested for any analyte. Aquifer permeability will be based on existing PWC and DENR studies.	Update to include representative samples to be tested for soil properties (TOC, particle size distribution, cations, pH)
7	Does the investigation intend to determine how contaminants are moving within the surrounding environment and will a site mass balance flux model be generated once this information is determined?	The objective of the investigation is to investigate the extend of PFAS associated with Airservices use of their lease areas and beyond, and the level of risk associated with the identified contamination. If if is identified in this investigation that there is no risk to any receptors then the objective has been met, including complying with the S48 notice. However, if a level of risk is considered unacceptable to either human health or the environment, by exceeding regulator guidelines, then further works would be warranted including , if necessay, a mass flux model.	No change to the SAQP is considered warranted.
8	Are the secondary source areas identified in the GHD reports being investigated?	yes. The potential and minor secondary sources identified by GHD were: - stockpiled soils near the FTG (which have been removed) - the open drain near the FS and low point from AFFF refill station (which are represented by locations SS03, SS04 and YAP1.) - discharge of treated effluent from the FTG at the STP area (Which are represented by annual wastewater results and SB1-5, SB2B and SB29) - Wastewater UST and vehicle wash-down area associated with the FTG (which are represented by annual wastewater testing and locations YAP2 and YAP3)	Two shallow SBs added to seepage field.
9	Has there been consideration to investigate potential exposure pathways outside of the Airservices Occupied Areas? There appears to be no sample locations along the site boundaries of Yulara Airport and outside of the Yulara airport boundaries. We expect additional soil sampling locations be included to confirm any apparent assumptions around the spatial extent of PFAS impact.	The objective of the investigation is to investigate the extent of PFAS associated with Airservices use of their lease areas and beyond, and the level of risk associated with the identified contamination. If it is identified that there is no risk from the sources and activities based on the existing SAQP, then no further sampling is warranted. Upgradient monitoring wells are proposed to be installed close to the airport boundary which would likely identify the presence of upgradient impacts if present. **Note:** NT EPA commented that two samples were collected to the south of the airport. The results that were subsequently provided were well below any applicable criteria and do not indicate that meaningful migration off-airport has occurred. As we are aiming to characterise the extent above relevant criteria and validate migration pathways, the results provided by EPA no not indicate that off-airport sampling to the south is warranted.	No update to the SAQP proposed
10	**FTG** 1. Concrete sampling at the FTG appears to be insufficient and we would expect additional concrete samples across the FTG pad and the collection of soil beneath the FTG pad. 2. The wastewater drainage pit in the FTG, labelled "Drain" on Figure 4C – if there is accumulated sediment in the pit, we expect this sediment to be collected and assessed.	The Site Auditor comments during the Round Table endorsed the current sampling of the FTG pad as one sample being sufficient to characterise the pad. Additonal concrete core sampling is unlikely to be beneficial to the investigation, and potentailly present a conduit into the underlying soil should concrete coring penetrate the pad. Some wash down samples will be collected from the FTG pad and CFS concrete to supplement the core data. TTC aggrees, the accumulated sediment in the pit should be sampled. Locations for investigation and sampling (if sediment or water is present) are main sump and stormwater diversion pit at the FTG (SS05 and SS06) and the floor drains in the CFS, under the hose drying rack north of the CFS and any sediments in kerbs (SS07, SS08 and SS09).	Update the SAQP to include sampling of the sediment within infrastructure pits/drains.
11	**Current ARFF Fire Station** The following areas should be investigated and assessed to determine potential contamination: o Former Ansulite AFFF AST: o Hazardous Chemical Storage o Firewater Tank o Oil & Hazardous Chemical Storage Location o Waste Oil AST o Workshop o Concrete pads the AST's are situated on o Concrete driveway o Drains within the workshop area o Wastewater collection tank	o Former Ansulite AFFF AST - System is closed and disused. Adjacent impacts are assessed by locations SB19 and the new sediment locations SS08 and SS09, and concrete run-off test. o Hazardous Chemical Storage - Release is unlikely. Potential impact from the location is assessed by YAP1, SB19 and new SS08 and SS09. o Firewater Tank - These are water tanks. o Oil & Hazardous Chemical Storage Location - The storage includes a small self bunded cabinet. Release in unlikely. There is no soil or drains nearby. Broader impact, if present would be captured by SB17 or SS09. o Waste Oil AST - Small AST. Release is unlikely and there is no soil or drains nearby. o Workshop - Potential impact (if any) assessed via sampling of CFS infloor drains, and down gradient GW. o Concrete pads the AST's are situated on - Concrete run-off test and kerbside sediment test proposed. o Concrete driveway - Concrete run-off test proposed. o Drains within the workshop area - Sediment sample proposed o Wastewater collection tank - tested annually.	Additional locations (between version G and H): - SS07 that assesses in floor drainage in the CFS - SS08 and SS09 that assess sediment if present near the ASTs and hose drying rack - Concrete run-off tests proposed on AST pad (near AFFF tank) and on the CFS driveway (north and south).
12	**Seepage Field** 'We are concerned that the sample locations are within a straight line. See dot point 3 above.	Refer to the response in Point 3 above. Per Auditor comments, the proposed sampling of the Seepage Field is considered appropriate considering the topography of the Seepage Field. Additional shallow locations are proposed in heavily vegetated areas, which are indicators of frequent irrigation and accumulation.	Additional shallow locations are proposed in heavily vegetated areas, which are indicators of areas of frequent irrigation and accumulation.

- It is noted that Ansulite has been used at the airport between 2004 and 2010. In 2010, Airservices changed over to Solberg RF6.
    - Have works been undertaken to assess infrastructure such as storage tanks, pits, associated pipework, fleet vehicles and other firefighting related equipment for residual PFAS contamination?
    - Has consideration been made to assess precursors and daughter end products of the PFAS compounds?

- Throughout the SAQP, there are statements relating to Airservices stipulating the locations of the sampling locations, such as *"Soil samples will be collected at the sampling locations provided by Airservices"*. Please explain the reasoning behind Airservices determining the sampling locations instead of relying on the expertise of the Environmental Site Auditor – Andrew Lau and your environmental consultant – Tetra Tech Coffey. This gives the impression that certain areas not being fully assessed to determine the nature and extent of PFAS contamination. It is our expectation that the environmental consultants and Environmental Site Auditor are free to determine the appropriateness of sampling locations to ensure the investigation is carried out in accordance with the ASC NEPM and Northern Territory Contaminated Land Guideline.

- In Section 2.1 – the estimates on the size of the Current ARFFS fire station, the Former Interim ARFFS fire station and the FTG are listed. In accordance with Table A of the *NSW EPA Sampling Design Guidelines 1995*, which provides guidance on the minimum sampling points required for site characterisation based on detecting circular hot spots and in accordance with ASC NEPM and the *Northern Territory Contaminated Land Guideline, June 2017*. It appears that the proposed number of sampling locations do not align with these guidelines. It is also noted that the Site Auditor is undertaking the audit under the NSW EPA auditor scheme.

Can you please provide detail to justify the appropriateness of the sampling design (sample locations, density and frequency of sample collection) as the proposed sampling density isn't in accordance with the relevant guidelines listed above.

- It is also noted that sewage irrigation area is approximately 1.2ha in size with only 5 sampling locations spaced across the entire area.

- Since November 2021 there has been approximately 268mm of rainfall at the Yulara Airport and across the southern portions of the NT. It is also noted that the recorded annual rainfall at Yulara airport is up to 575 mm since 2011. Has consideration been made to potential for offsite migration of contaminants via overland flow? Also has consideration been made for opportunistic sampling of shallow groundwater that may be encountered during well installation?

- Is the Yulara Airport within the upper catchment of Lake Amadeus?

- Has consideration been made to undertake analysis of soil property parameters that may affect PFAS movement?

- Does the investigation intend to determine how contaminants are moving within the surrounding environment and will a site mass balance flux model be generated once this information is determined?

- Are the secondary source areas identified in the GHD reports being investigated?

- Has there been consideration to investigate potential exposure pathways outside of the Airservices Occupied Areas? There appears to be no sample locations along the site boundaries of Yulara Airport and outside of the Yulara airport boundaries. We expect additional soil sampling locations be included to

confirm any apparent assumptions around the spatial extent of PFAS impact.

FTG

- Concrete sampling at the FTG appears to be insufficient and we would expect additional concrete samples across the FTG pad and the collection of soil beneath the FTG pad.
- The wastewater drainage pit in the FTG, labelled “Drain” on Figure 4C – if there is accumulated sediment in the pit, we expect this sediment to be collected and assessed.

Current ARFFF Fire Station

- The following areas should be investigated and assessed to determine potential contamination:
    - Former Ansulite AFFF AST
    - Hazardous Chemical Storage
    - Firewater Tank
    - Oil & Hazardous Chemical Storage Location
    - Waste Oil AST
    - Workshop
    - Concrete pads the AST’s are situated on
    - Concrete driveway
    - Drains within the workshop area
    - Wastewater collection tank

Seepage Field

- We are concerned that the sample locations are within a straight line. See dot point 3 above.

If you have any questions, please do not hesitate to contact me.

Kind regards
Christine

Christine Plewinski

Senior Environmental Officer

Environmental Operations - Environment Division
Department of Environment, Parks and Water Security
Northern Territory Government

Providing services for the
Northern Territory Environment Protection Authority

ntepa Northern Territory Environment Protection Authority

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From: Richards, Sarah <Sarah.Richards@tetratech.com>
Sent: Wednesday, 2 March 2022 6:35 PM
To: kristin.howden@voyages.com.au; David.white@voyages.com.au; Victoria.Wright@infrastructure.gov.au; ChristineJ Plewinski <Christinej.Plewinski@nt.gov.au>; Adam Davis <Adam.Davis@powerwater.com.au>; Amy Dysart <Amy.Dysart@nt.gov.au>; Christopher Coombes <Christopher.Coombes@nt.gov.au>; Gemma Sheridan <Gemma.Sheridan@nt.gov.au>; Tracy Ward <Tracy.Ward@nt.gov.au>
Cc: Julia Dunne <Julia.Dunne@AirservicesAustralia.com>; Craig Barnes <craig.barnes@AirservicesAustralia.com>; Xanthis, Adam <ADAM.XANTHIS@tetratech.com>; Robert.Fitzsimmons@AirserviesAustralia.com; Elena Madden <elena@truenorthcomm.com.au>; Christopher Arends <Christopher.Arends@AirservicesAustralia.com>; Holly.ainslie@AirservicesAustralia.com.au; sarthur@jbsg.com.au; alau@jbsg.com.au
Subject: TRM: Airservices Australia Yulara SAQP for comment and information

Hi all,

To those of you who attended the Airservices Yulara roundtable on Tuesday, thank you so much for your time.
Attached is a copy of the Sampling and Analysis Quality Plan (SAQP), which guides collection of information to address the investigation objectives. This version includes some small updates from the version discussed at the meeting, to address comments from the Environmental Auditor.

We value your comments on the SAQP and note that any comments **need to be received by Tuesday 8 March** in order for them to be considered in the final version.
Please check the distribution list and forward on to any others in your organisation who you consider should comment.

If you have any questions regarding the SAQP or the investigation in general please send to Elena Madden, Chris Arends and me. We can

ensure that they are circulated within the project team.

Regards,

Dr Sarah Richards GAICD *(she/her)* | Senior Principal Geoenvironmental Engineer
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From:	Sara Arthur
To:	Pares, Damien
Cc:	Andrew Lau; Sharon O"Brien; Richards, Sarah; Xanthis, Adam; Christopher Arends; Andrew Hamilton (InTouch); Craig Barnes (InTouch); Ainslie, Holly
Subject:	Audit Comments - Yulara Airport - SAQP (revF)
Date:	Tuesday, 1 March 2022 11:29:54 AM
Attachments:	image001.png image003.jpg

Hi Damien,

Thank you for the draft *Ayers Rock Airport (AYQ) – Sampling and Analysis Quality Plan*, (RevF), Tetra Tech Coffey, 22/02/2022. Andrew has completed his review and offers the following comments.

- Figure 1 is attributed to "Cloud GMS 2019, modified from English 1998", but it is not listed in the reference section. Can the reference be provided more fully please;
- Section 3.3.2 notes that high salinity (such as that within Lake Amadeus) impacts PFAS solubility. Can a reference please be provided to support this statement for concentrations of PFAS that are of interest to this investigation – that is close to criteria as well as those concentrations detected in the groundwater. Otherwise this argument should be removed from the discussion;
- Section 3.3.2 identifies Lake Amadeus as being the down gradient receptor of the groundwater from the airport. A review of google earth shows potential soaks/lakes between the airport and Lake Amadeus. Attempts should be made to engage with the owners of the land to the north of the airport to enable identification of soaks or lakes closer to the airport than Lake Amadeus;
- Table Z shows assessment criteria. PFOS is not shown as a criterion for ecological receptors, but rather PFOS+PFHxS. This should be addressed; and
- A contingency well to the north of the runway is shown on Figure 5, which would be installed if the groundwater flow direction is not found to be N-NNW. Table N refers to contingency locations, but the auditor can only see the one proposed location for a contingency well. If there is more than one contingency locations, then they should be shown on Figure 5, or if there is just one, then Table N should indicate that this is the case.

Kind Regards,

Sara

Dr Sara Arthur | Principal | JBS&G
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JBS&G acknowledges the Traditional Owners and custodians on the land we walk, work and live. We pay respect to their cultures, Elders past and present, and in the spirit of reconciliation, we commit to working together for our shared future.

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Audit Comments - Ayers Rock Airport ESI, Rev B.

Sara Arthur <sarthur@jbsg.com.au>

Fri 23/09/2022 12:45 AM

To:Christopher Arends <Christopher.Arends@AirservicesAustralia.com>;Andrew Hamilton (InTouch) <andrew.hamilton@AirservicesAustralia.com>;Richards, Sarah <Sarah.Richards@tetratech.com>
Cc:Andrew Lau <ALau@jbsg.com.au>;Sharon O'Brien <SObrien@jbsg.com.au>

Hi Chris, Andrew and Sarah,

Andrew has completed his review of the draft *Ayers Rock Airport (AYQ) – Environmental Site Investigation*, Tetra Tech Coffey, 5th September 2022, Rev B, and offers the following comments.

- Figure 2-1 shows the Dunes Plain Aquifer and depth to basement. Please include the airport location on the Figure.
- Section 2.1.3.3 reference is made to "Cloud GMS 2019 Groundwater Modelling prepared for NT Power and Water Corp, Nov 2019. The auditor should be supplied with this report, please.
- Section 2.1.3.4 Groundwater Bore Search – not all off site groundwater wells discussed in this section are shown on Figure 3. Please provide.
- Section 2.1.3.5 discusses Surface Water features. The auditor has included snips of views on the northern and western boundaries of the airport – below. A track is visible that appears to provide access to an area of vegetation that could be indicative of surface water/groundwater at this location. Has any contact been sought with the neighbours downgradient (northwest) to enquire about use of groundwater, potentially via unregistered bores, including the Tali Wiru Dinner venue that can be viewed via Google earth less than 3 km to the northwest of the airport boundary.
- Section 5.2.2 discusses assessment criteria and notes that ecological investigation levels for off-airport surface water is not considered necessary. While the auditor agrees that surface water flows off site are not a credible pathway from the airport, the auditor considers that groundwater to surface water is a credible pathway to offsite ecological receptors, especially in the absence of discussion of the use of groundwater or the presence of surface water or surface expressions of groundwater in the downgradient area – that is to the north and northwest of the airport.
- Soil samples were not collected for analysis across multiple depths during groundwater well drilling. This should be addressed in the next round of monitoring to better understand the depth of PFAS contamination, now that PFAS has been confirmed as being within groundwater across the site.
- Section 6.2 Well development was via three bore volumes or for some wells; the well went dry, twice. The report notes that the equilibration period for some wells, between development and sampling was less than 2 days. Comments: 1) This period should be longer for wells installed in the next campaign and 2) a discussion on the effect of the reduced well development time on the data for those wells should be included in this report.
- Figure 7-1 is it possible to display these data including minima and maxima or an error bar, please?
- Table H-presents soil PFAS leachability results and the auditor suggests that the concentrations within parent soil should be included in this table.
- Section 7.1.5.3 The auditor notes that not all locations were vertically delineated in the investigation around the FTG and expects that this will be addressed within the SAQP for the next investigation. Section 7.1.5.4 the auditor notes the detection of PFAS in the earthen drain to the north west of the seepage field and recommends that delineation in this drain be included in the next investigation due to the PFOS exceedance.
- Section 7.4 it is not clear why absolute concentrations of PFAS concentrations pre and post TOPA are not environmentally relevant, but in Section 7.4.1 the discussion states that "…or may indicate that environmental, or treatment processes have already caused precursors to oxidise." If pre-cursors can be oxidised in the environment or treatment system associated with the FTG, then the auditor considers this to be environmentally relevant.
- Figure 7-6 the legend needs to be edited.
- Appendix H presents the assessment of QA/QC. The impact of holding time exceedances on some analytes, in particular TPH, BOD and VHCs is discussed. This being the case, field observations should be included in the report to support the statement that "these analytes are not considered to be

sensitive COPCs for the site, and were not reported at concentrations where a moderate increase would change the interpretation against criteria."

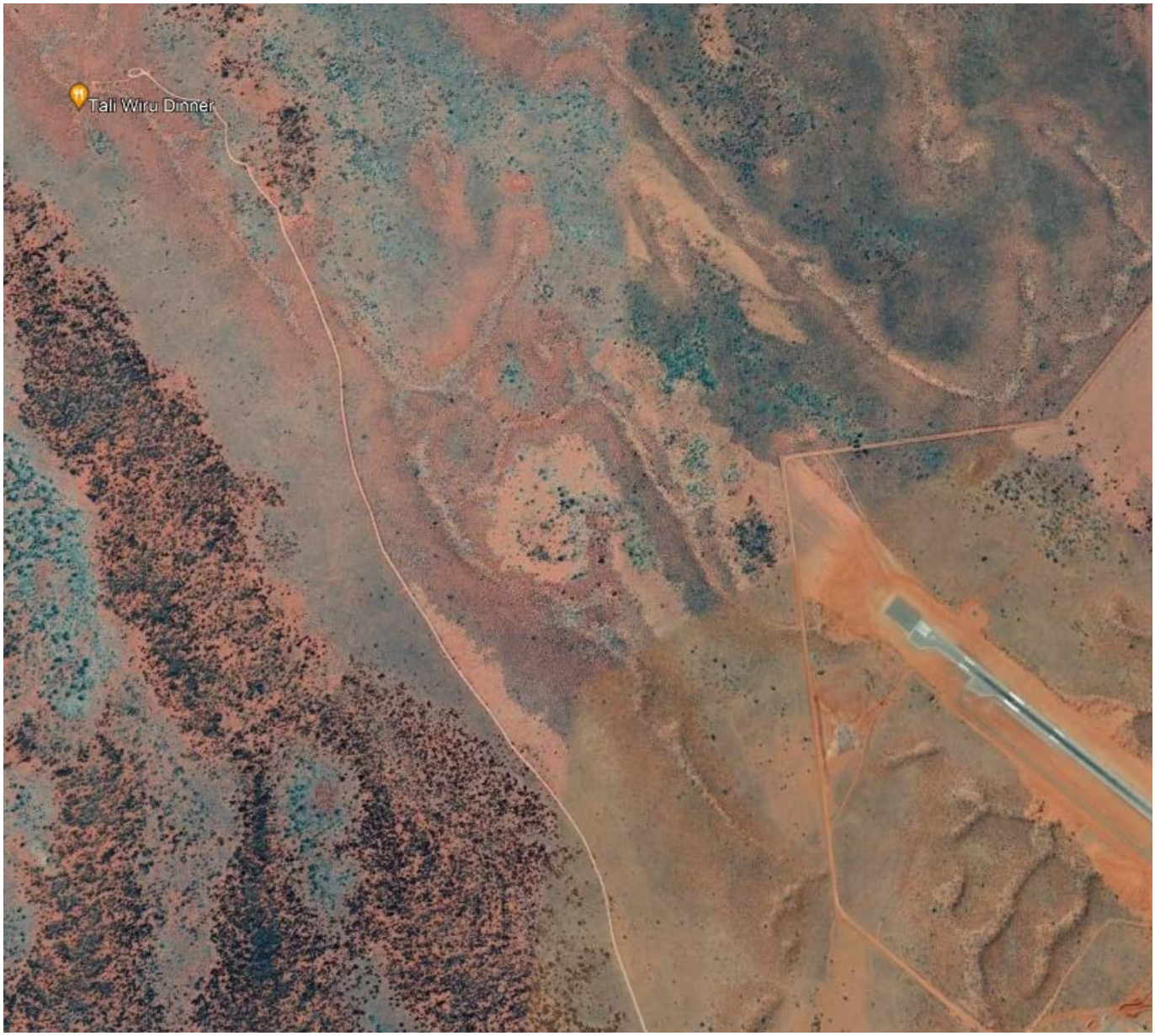
- Table 16 There is a row where no data are presented.
- Next investigation: the auditor anticipates that an updated CSM will be included in the SAQP for the next investigation.

If you have any queries, please contact myself on 0425 287 451 or Andrew on 0412 512 614.

Kind Regards,

Sara





Dr Sara Arthur | **Principal | JBS&G**
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Exceptional Outcomes

From:	Sara Arthur
To:	Christopher Arends; Craig Barnes (InTouch); Cameron Baldock; Price, Robyn
Cc:	Andrew Lau; Sharon O"Brien
Subject:	Audit Comments - Airservices - Yulara TSI
Date:	Thursday, 27 July 2023 8:59:04 AM
Attachments:	image001.jpg image002.png

Hi Chris, Craig, Cameron and Robyn,

Thank you for the report: *PFAS Characterisation Program, Ayers Rock Airport (AYQ) – Targeted Site Investigation, Draft E* Tetra Tech Coffey, 13 July 2023 ("TTC", "the report" or "the TSI"). Andrew has completed his review and offers the following comments.

Comments on Further works:

Based on auditor review of the data, the auditor considers that the following must be addressed in the report, in addition to works described in Section 13 of the TSI:

- further investigations will be required in the vicinity of GW11 at the northwest end of the runway, to satisfy the requirement of the Section 48 notice regarding determining the nature and extent of contamination (the auditor notes this is outlined by TTC in Section 13);
- Potentially further investigations will be required in the vicinity of stormwater outlets (described below in Specific Comments); and
- Remediation and/or management of PFAS contamination in soils will be required at some locations at Yulara airport. These will include but are not limited to the vicinity of the FTG, the FTG trade waste system and some parts of the drainage system.

General comments

- Finalise all Reports and Plans: For preparation of the Audit Report, all reports and plans issued for Yulara airport should be final versions so that the auditor can reference them.
- Assessment criteria: The auditor notes that for PFOS in soil, the Ecological indirect exposure criterion of 0.14 mg/kg has been applied. The auditor does not consider this to be appropriate. None of the investigation areas at the airport could be described as "intensively developed" as defined within the NEMP. This definition states the following:
    - *"The site is intensively developed with greater than 80% of each hectare covered by hard surfaces (to be applied separately to each hectare).* (the airport is chiefly bare earth. Soil results were collected from areas not covered with hard stand).
    - *Secondary consumers are effectively absent from the site. The site is situated in an extensively built-up urban setting.* (no ecological investigation has been provided to the auditor to demonstrate that secondary consumers are absent from the site; casual observations made by contaminated land specialists during daylight hours and while undertaking intrusive activities are generally not adequate ecological investigations).
    - *The site is not in close proximity to waterways, drainage networks or groundwater."* (there are drainage channels at the site, and groundwater is at 9 - 12 m BTOC.).

  Therefore the auditor requires that the soil results be considered against the ecological indirect exposure criterion of 0.01 mg/kg. As a result, TTC will need to re-consider the updated conceptual site model, the data gap assessment and conclusions. For instance, the

auditor does not consider the PFAS to the south of the FTG to be delineated, but there will be more widespread changes to the document required and recommendations regarding remediation/management of contamination should be made.

- Section 48 notice requirements: TTC must comment on the site areas that are identified in Attachment F of Section 48 notice as being addressed in this report. If there is a reliance on earlier reports to close out areas described in the notice, then this should be stated.
- Section 48 notice requirements: TTC must present data to enable the auditor to comment on whether or not the TSI has determined "…the types, amount, distribution and mobility of contaminants and waste, including but not limited to PFAS present in the environment from activities undertaken by or in any way associated with Airservices activities…." at Yulara airport.
- Section 48 notice requirements: TTC must ensure that the TSI presents data so that the report clearly articulates on whether or not it has succeeded in determining "…the nature and extent of contamination…. To a sufficient degree that appropriate level of risk assessment may be undertaken, and if necessary, provide the basis for the development of an appropriate remediation or management strategy".
- References are made to Ross, 2022. This source does not appear to have been subject to peer review and published in the scientific literature. The auditor therefore views information provided in Ross, 2022 as opinion and suggests that TTC re-consider its inclusion and the information provided in that reference, or find a relevant reference that has been published in the peer reviewed scientific literature.
- Potable water at the airport: the report should clearly state from where the airport receives potable water for drinking purposes. The potential for a prohibition on consuming groundwater sourced from the airport estate should be discussed.
- Remediation: There is little discussion regarding remediation or management of contamination. Given the data, the auditor considers that some remedial works or management of contamination at Yulara airport is required. For instance, there is evidence of PFAS within the FTG trade waste collection pits and TTC should include some recommendations in the final report around locations where detections above criteria have been made.
- PFAS Analytical results: there have been detections of PFAS chemicals in all on site groundwater wells, with the exception of GW04. Upgradient and offsite wells RN012081 and RN012163 did not report PFAS. With regards soil, there has been widespread detection of PFAS in soils around the MFS and the FTG, within drainage lines and within the pits where water from the FTG is directed towards the sewage treatment system, as well as within soils of the seepage spray field and the interim fire station. ASLP analysis has found leachable concentrations of PFAS from soils from the FTG, with lesser detections at the Main fire station, interim fire station and STP. From the results, TTC have concluded that there are up to three different source zones for groundwater contamination with PFAS at Yulara airport. Some discussions suggested that the underlying geology would not allow much transmission of PFAS from soils to groundwater, but the auditor considers that the results of the upgradient wells RN012081 and RN012082, together with a plausible activity of fire fighting training at Yulara airport being a source of contamination enables him to conclude that Airservices activities at the airport are likely the source of PFAS in soils and groundwater at the airport.

Specific Comments

Section 3.2 – Drainage. The second paragraph notes the following: "However, in the case of the FTG, a set of diversion valves can be used to direct stormwater runoff from the FTG pad through a diversion pipeline which discharges to a leach drain and/or trench located to the south of the stormwater holding pond." The location for the outlet for this diversion pipeline is not marked on any site figures but it is stated as being the stormwater holding pond in section 11.4. Has the exact location of the outlet been identified and have any samples been collected immediately below the outlet for the diversion pipeline? Similarly, the following paragraph notes that excess treated effluent from the STP can be sent to an approved point of discharge, but the location for this overflow is uncertain. Both locations (and potential sampling requirements) should be discussed further.

- Section 3.2.2: lists assets of the stormwater and trade waste treatment system (SW & TW TS) at the FTG, but the list does not include the foam degradation system, which is mentioned (but no further detail provided) two paragraphs below. Can the text indicate more clearly how the foam degradation system fits with the remainder of the SW & TW TS? For instance, is all wastewater from the FTG diverted through the foam degradation system (unless the stormwater discharge line is open)?
- Section 3.2.2: does AirServices keep a log of opening and closing of the stormwater discharge line that diverts stormwater away from the trade waste treatment system? Any future sampling should include the location to where it discharges.
- Section 3.5.1.1: the auditor notes that TTC have not contacted Tali Wiru restaurant, located to the north west of the airport, to find out where they source their water from. There is an assumption that their water is sourced elsewhere based on assumed groundwater salinity being prohibitive and there being no electricity supply to make water potable. Depending on the outcome of the further investigations around GW11, these assumptions will need to be investigated and follow up with Tali Wiru might be required.
- Table 6.3 reference to AS4482 should be reconsidered as this Australian Standard has been withdrawn.
- Section 11.2.3: the discussion around the source of PFAS at GW01 could be expanded to consider the potential for mounding from the seepage field to result in detections of PFAS at this location, given the low gradient of the groundwater table and the proximity of GW01 to the seepage field.
- Section 11.4.3:discusses the PFAS in the trade waste drainage system and the second paragraph states: "At the time of sampling no activities had occurred in the immediate period (i.e. <48 hours) prior to sample collection and as such the nature and source of the water at this sample location is unclear". Given that the trade waste treatment system appears to drain the FTG exclusively, the auditor concludes that historic activities at the FTG are the source of PFAS within that system, and TTC should consider the potential for materials within the trade waste treatment system to absorb then desorb PFAS chemicals and therefore the use of the FTG is the likely source of PFAS within the trade waste drainage system.
- Section 11.7.1 and Section 12.3: TTC conclude that the impact at GW11 is not related to any Airservices activities or any known on-airport land uses. Nonetheless, fire crews were the main users of PFAS containing chemicals at Yulara airport, and they had access to this portion of the airport estate. It is plausible that AFFF was released in this vicinity and possibly by Airservices personnel.
- Appendix H: holding times were exceeded for some volatile analytes, but the results were still considered acceptable by TTC. Given no trip spikes were assessed, the locations

should be identified as a data gap for analysis of the volatile contaminants for which holding times were exceeded.

- Appendix H: the final report should include a comment regarding the use (or otherwise) of the highest result for duplicate pairs. If this has not occurred, then the results tables should be altered to report highest results for duplicate pairs.

If you have any queries, please contact myself on 0425 287 451 or Andrew on 0412 512 614.

Kind Regards,

Sara
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From: Andrew Lau
To: Christopher Arends; Christine Louie
Subject: RE: Section 48 Notice - Draft TSI Report and Site Auditor Report
Date: Thursday, 21 September 2023 12:36:26 PM
Attachments: image001.png
image003.png
image006.png
image007.png
image009.png

OFFICIAL

CAUTION: This email was sent from an external email address. Do not click any links or open any attachments unless you trust the sender and know the content is safe.

Hi Chris,

I've reviewed all the revisions to the TSI report and am satisfied that my previous audit comments have been broadly addressed. I have no further comments to provide. Please send through final version when it's compiled.

Regards,
Andrew

Andrew Lau | CEO, Accredited Auditor | JBS&G
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From: Christopher Arends <Christopher.Arends@AirservicesAustralia.com>
Sent: Thursday, September 7, 2023 3:24 PM
To: Kristin Howden <Kristin.Howden@voyages.com.au>
Cc: Matthew Cameron-Smith <matthew.cameronsmith@voyages.com.au>; David White <David.White@voyages.com.au>; Michelle Petersen <Michelle.Petersen@AirservicesAustralia.com>; Stephen Tapsall <Stephen.Tapsall@AirservicesAustralia.com>; Andrew Lau <ALau@jbsg.com.au>; Christine Louie <clouie@jbsg.com.au>; Jason Clay <jason.clay@senversa.com.au>; Janiak, Monika <MONIKA.JANIAK@tetratech.com>; Price, Robyn <ROBYN.PRICE@tetratech.com>
Subject: RE: Section 48 Notice - Draft TSI Report and Site Auditor Report

[EXTERNAL EMAIL]** Stop and think before opening attachments, clicking or responding.

OFFICIAL

Hi Kristin,

To ensure Airservices continues to update Voyages and the NT EPA on meeting the requirements of the Section 48 Notice, below is a summary of status of the TSI and subsequent Site Auditor report

JBS&G 57345- 144,571
L002 - (IAL 0503-NT-2201 - Yulara Airport) Rev0

8 April 2022

Robert Fitzsimmons
Program Head, PFAS Strategy and Delivery
Airservices Australia

Via email: Robert.fitzsimmons@airservicesaustralia.com

L002 Interim Audit Advice (0503-NT-2201)

Dear Mr Fitzsimmons,

1. Introduction

Andrew Lau of JBS&G Australia Pty Ltd (JBS&G), was engaged on the 23 August 2021 by Airservices Australia (Airservices) to conduct a site audit at Yulara Airport, Northern Territory. Airservices lease a portion of the airport from Voyages Indigenous Tourism Australia Pty Ltd (VITA), which owns the airport. Airservices have provided aviation rescue and firefighting services (ARFF) at the airport since May 2004. The location of the airport, the Airservices lease areas and the investigation areas are shown in Figures 1 – 5, included in **Attachment 2**.

The Northern Territory Environmental Protection Authority (NT EPA) served a notice on VITA to carry out an environmental audit program at the Yulara airport under section 48(1) of the *Waste Management and Pollution Control Act*, (1998) (WMPC Act). By agreement between Airservices and VITA, the auditor, Mr Andrew Lau will conduct the audit required by the notice, included in **Attachment 4**.

Andrew Lau is a Site Auditor accredited by the NSW Environment Protection Authority (NSW EPA) under the *Contaminated Land Management Act* (1997) NSW, (CLM Act), (Accreditation Number 0503). The *Northern Territory Contaminated Land* Guideline, NT EPA, June 2017 ('the guideline') notes that Part 9 of the WMPC Act defines a qualified person to conduct environmental audits and the guideline states that an auditor accredited through the schemes of New South Wales or Victoria are considered to be registered in the NT in accordance with the WMPC Act.

The Section 48(1) notice requires an evaluation of the following:

> *The types, amount, distribution and mobility of contaminants or wastes present in the environment namely per- and poly-fluoroalkyl substances (PFAS) and other contaminants of concern present in the environment at the premises resulting from or in any way connected with Airservices Australia's activities.*

To enable this evaluation, the Section 48(1) notice required that a sampling analysis and quality plan (SAQP) be prepared and provided to the NT EPA by 14 March 2022, although a fortnight's extension was granted, so that the SAQP was required to be provided to NT EPA by 28 March 2022. The Section 48(1) notice states that the SAQP must include:

a. Assessment methods to be used to characterise soil, surface water and groundwater;
b. Data quality objectives;
c. Sampling locations within the premises;

d. Extent and number of samples to be taken within the premises and any potential areas of concern; and

e. Where initial sampling and analysis indicates that the area of impact has the potential to extend beyond the boundary of the premises, the steps which will be taken to provide further sampling and analysis.

The Section 48(1) notice requires that the SAQP be reviewed and endorsed in writing by a qualified person. This interim audit advice letter has been prepared by Mr Andrew Lau to fulfil this function.

Airservices have engaged Tetra Tech Coffey (TTC) to undertake a targeted investigation at Yulara airport. To this end two documents have been prepared and the auditor has reviewed these in preparing this interim audit advice letter.

- *Ayres Rock Airport – Targeted Site Investigation - Site Brief Report*, *Rev C*, Draft, (Tetra Tech Coffey, 28 July 2021) ('The SBR'); and
- *Ayers Rock Airport – Sampling and Analysis Quality Plan Rev H* (Tetra Tech Coffey, 24 March 2022) and earlier drafts ('The SAQP').

2. Site Description

The SBR and SAQP have provided background information regarding the airport and Airservices' activities at Yulara airport which has been relied upon for **sections 2.1 to 2.8**, below.

The site identification details presented in the SBR and the SAQP are summarised in **Table 1**, below.

Table 1: Yulara Airport Details

Airport Address	200 Coote Road, Yulara
Airport Area	Entire Airport Estate: approx. 500 ha Airservices lease area: Current Aviation Rescue Fire Fighting Service (ARFFS) fire station: 1.1 ha Former Interim ARFFS fire station:0.4 ha Fire Training ground (FTG): 0.96 ha
Property Identifiers	Lot 101 S 81/079
Parish/ Local Government Area	Unincorporated (Yulara)
Airport Ownership as relating to the ARFFS lease area	Voyages Indigenous Tourism Australia Pty Ltd (VITA)
Zoning	Not zoned

2.1 Surrounding uses

The SBR notes that the land surrounding the airport is largely vacant with native vegetation, sand dunes and some constructed vehicle tracks. The Uluru-Kata Tjuta National Park occupies 1326 km^2 approximately 9 km to the south.

2.2 Site History

A runway was established at the current airport in 1984. The Northern Territory Police, Fire and Emergency Services (NTPFES), together with the Yulara Volunteer firefighters provided emergency response services to the airport up until May 2004, when Airservices Aviation Rescue Firefighting

Services (Airservices) established operations at Yulara airport. Initially ARFFS occupied a temporary station for 18 months until the current station was opened in October 2005.

A fire training ground (FTG) exists at the airport and that it consists of a large mock aircraft on a concrete pad and that several foam and fuel stores are located on the eastern side of the FTG. A below ground separator is present to manage wastewater prior to discharge to the on airport STP.

2.3 History of Aviation Fire Fighting Foam (AFFF) Use

The SBR indicates that when Airservices commenced operations at Yulara airport in May 2004, Ansulite fire fighting foam was used. Solberg RF6 was introduced in December 2010. Relying on dates of operations and anecdotal evidence, the SBR concludes that 3M Lightwater was not used by Airservices at Yulara.

The SBR indicated that anecdotal evidence based on interviews suggested that the frequency of fire training was historically every two weeks at the FTG. Historically the quantity of foam utilised for training purposes was 200 L per fire man per year. Staff numbers were not presented.

The SBR indicated that currently fire drills are currently conducted on a weekly basis, where water only is utilised.

The SBR notes that some remnant AFFF containers remain on site in bunded areas awaiting disposal.

2.4 Geology

The SBR cites data from the Australian Geological Survey organisation and the Central Land Council to note that the airport is underlain by Quaternary Aged aeolian sand plains and sand dune deposits.

There have been limited investigations at the airport to provide site specific geological data but the SBR reports that drilling undertaken by GHD in 2017 reported that the shallow geological profile consisted of cemented fine sandy fill material overlying fine to course sub-rounded sands generally dark red in colour with some orange mottling.

2.5 Hydrogeology

The discussion regarding hydrogeology within the SAQP has been developed further than that within the SBR, so the following has been principally derived from the SAQP.

The groundwater underlying the airport is within the Amadeus Basin which is understood to regionally flow to the northeast towards Lake Amadeus, which is a saline and ephemeral lake approximately 20 km to the north of the airport. The SAQP reports that groundwater flow direction beneath the airport is uncertain but is likely to be northerly.

The SAQP reports that there are two main aquifer systems within the area, the Dune Plains aquifer which supplies Yulara resort and township (approx, 5 km to the south of the airport) and the Bedrock Aquifer, which is the water supply for the Mutijulu community (approx. 20 km to the south southeast of the airport). The municipal potable water supply to the Yulara township is provided from three bore fields, the closest of which is 4.5 km south of the airport. The closest wells to the airport are screened between 41 and 56 m below ground level (m BGL) and groundwater is at approximately 23 m BGL. A groundwater bore search revealed there are no known bores to the north, that is, in the presumed downgradient direction.

A groundwater bore search notes the presence of one on airport bore located 100 m to the north of the ARFFS fire station (Bore RN 12065) and is understood to be used for monitoring purposes. No other bores were identified within the boundaries of the airport estate. The on airport bore is reported as being drilled to 37.5 m below ground level (BGL) and the water level was reported as

12.3 m BGL at the time of construction. A GHD report[1] provided to the auditor for background purposes but which is not part of the audit indicates that on 19 June 2019 the standing water level was measure at 9.882 m BGL.

2.6 Topography

The SAQP notes that the airport sits at an elevation of approx. 495 metres Australian Height Datum (m AHD) and that the site is flat with no indicators of fill material noted in earlier investigations.

2.7 Surface Water Features

The SAQP notes the following with regards surface water features on the airport.

A constructed stormwater drainage system diverts surface water away from the runway and passes the ARFF fire station. Figure 2 within the SAQP shows that the surface water drainage directs water to a dam located approx. 150 m to the south west of the fire station.

Wastewater generated at both the ARFF and the FTG is directed through a coalescing plate separator before being pumped into the airport's sewer system. The airport sewerage is treated at the airport sewage treatment plant (STP) which discharges the treated effluent via field irrigation on the airport. Figure 4A in the SBR (**Attachment 2**) shows the location of the field irrigation area.

Off airport, the SAQP discusses temporary and reliable soaks and waterholes throughout the Ulura-Kata Tjuta National Park but notes that there is no pathway in surface water drainage or groundwater flow from the airport to the permanent Mutijulu waterhole which is located adjacent to Uluru and is approx. 30 km to the south east of the airport.

The SAQP notes that a brine infiltration basin is present between the Yulara township and Yulara Airport and receives an estimated 110 ML/year of reverse osmosis reject brine.

The SAQP reports the presence of Lake Amadeus, approx. 30 km to the north of the airport. This is a large salt lake that potentially receives groundwater that flows beneath the airport and several smaller salt ponds between the airport and Lake Amadeus. The SAQP states that based on their size, these ponds are less likely to be in contact with groundwater from the airport areas of concern, than Lake Amadeus.

2.8 Meteorology

The SBR noted that the area is an arid climate with hot summers and cold winters.

- Mean maximum temperatures ranging from 22.9°C to 38.4 °C in June and January, respectively;
- Mean minimum temperatures ranging from 4.5 °C in July to 20.4°C in January; and
- Mean monthly rainfall ranging from 4.8 mm in August to 42.2 mm in December, with an average annual rainfall of 268.1 mm.

2.9 Acid Sulfate Soils

The SAQP has identified that the airport is classed as having an extremely low probability/very low confidence of acid sulfate soil (ASS) occurrence. The SBR noted that ASS is typically associated with low-lying sections of coastal floodplains, rivers and creeks.

[1] *Yulara Airport Groundwater Sampling Results for bore RN012065*, GHD, August 2019.

2.10 Auditor Opinion

The auditor has made further on-line enquiries and for completeness this information is presented below along with audit opinions regarding information presented in the SBR and SAQP, where relevant.

Surrounding Uses

With regards surrounding land uses, the auditor notes the following. Review of Google Earth aerial imagery shows that a caravan park is located approx. 3 km to the south of the airport. Yulara township including various campgrounds and resorts are located approx. 5 km to the south. Auditor on-line investigations have suggested that the land to the north is referred to as the Katiti-Petermann Indigenous Protected Area[2][3] and is freehold land owned by traditional owners.

Hydrogeology

The SAQP notes there is uncertainty regarding groundwater flow direction in the vicinity of the airport and based on the information provided in the SBR & SAQP and on-line resources, the auditor agrees. The auditor notes that standing water levels within the one bore at the airport range for approx. 9.9 to 12.3 m BGL.

With regards groundwater quality, the SBR and SAQP report that groundwater is the only reliable water supply in the region. The auditor notes that the bore log for RN012065 (the on airport bore) reported in the SBR shows that historic total dissolved solid (TDS) values were within the range of 1720 to 2540 mg/L and specific conductance was 2563 to 4010 µS/cm, suggesting that the groundwater underlying the site exceeds the Australian Drinking Water Guideline values for salinity. Comparing the TDS and specific conductance values with regards those suitable for livestock consumption (Australian and New Zealand Government, 2018) suggests that the groundwater quality would be adequate for livestock. The auditor therefore concludes that the groundwater could be suitable for consumption by ecological receptors in an arid zone, such as the area surrounding Yulara airport.

The Katiti-Petermann Indigenous Protection Area Plan of Management[3], Central Land Council, 2015 states the following:

> "Groundwater can sometimes be quite close to the surface (such as at the base of granite ranges and in dry river beds) and reached by digging. More often, bores are required to access this water, especially if the deeper bedrock aquifers need to be tapped. All water supplies for communities and out stations in the IPA depend on groundwater sourced from wells or bores. The quality of this water is highly variable, and in some cases it does not meet international standards for drinking water."
>
> "Visits to water places often included maintenance activities directed at optimising the quantity and quality of water supplies. These included cleaning out debris, mud and sand to avoid siltation and covering water or seepages with branches or rocks to minimise evaporation. These maintenance practices continue to be undertaken by Anangu [Indigenous people of the area] today".

Topography and Surface Water Drainage

The auditor has accessed the Geoscience Australia website[4] and notes that the topography in the vicinity of Yulara airport appears to generally trend to lower elevation towards the north, but the

[2] Katiti-Petermann IPA, Kaltukatjara Rangers and Mutijulu Tjakura Rangers | National Indigenous Australians Agency NT projects - Central Australian region (niaa.gov.au)

[3] Katiti-Petermann-IPA-Plan-of-Management.pdf (clc.org.au)

4 https://elevation.fsdf.org.au/

relief consists of low elevation gains and losses, consistent with a sand dune environment. This suggests that any surface water flow path (should they exist) from the airport could be convoluted, and it is likely that surface water will travel in the swales between dunes and be absorbed into the sand. Examination of aerial views does not suggest obvious surface water flow paths or drainage channels. An area of greener vegetation consistent with a dry river bed is apparent immediately to the north of the airport boundary when viewed from google earth. This area is located less than 2 km from the fire station.

The auditor assumes that once surface water has flowed to the dam to the south west of the fire station it is absorbed into the ground/evaporates.

Meteorology

In addition to the observations summarised in the SBR, the auditor notes that rainfall is considered low and unreliable, and averages one rainfall event per year.[5]

Summary

Groundwater flow direction underlying the airport has not been determined but is considered likely towards the north. The area to the immediate north of the airport (off site) cannot be accessed to determine whether it is plausible for a dry river/creek bed to be present that is a potential receiving environment for groundwater from the site. Currently a data gap exists regarding the potential for off site movement of groundwater underlying the airport and reaching the surface or being accessed as a groundwater resource.

The auditor is generally satisfied with the site information presented by Tetra Tech Coffey in the SBR and the SAQP. Some additional information sources and interpretation has been discovered and developed by the auditor and has been summarised, above.

3. Previous Investigations and SBR Data Gap Analysis

The SBR identified a number of previous reports and investigations that have been conducted at Yulara Airport, which included trade waste sampling, the results of sampling of waters arising from steam cleaning of concrete at the FTG, sampling arising during the advancement of 23 soil bores and five stockpile samples. In addition, RN12065 has been sampled once and analysed for PFAS, in 2019.

The SBR identifies the following data gaps:

1. The source of groundwater impact identified at RN012065 is unknown; and
2. The potential risks to off-airport users of groundwater for potable and non-potable purposes is unconfirmed.

3.1 Auditor Opinion

The auditor notes that previous investigations have been conducted and reports have been provided for background purposes. Review of the previous investigations is beyond the scope of the current audit. However, the auditor considers that the information summarised in the SBR provides sufficient information to identify some data gaps. Further data gaps have been identified by Tetra Tech Coffey and are provided in the SAQP; these are assessed in **Section 4**, below.

[5] Australian Regional Weather and Climate Guides (bom.gov.au)

4. Assessment of the SAQP

The auditor has assessed the SAQP against both the requirements of the Section 48(1) Notice and against relevant requirements of various guidelines, as described below in **Section 4.1** and **4.2**, respectively.

4.1 Section 48(1) Notice requirements

The Section 48(1) Notice assessment of the SAQP is summarised in **Table 2**, below.

Table 2: SAQP Assessment

Requirements of Section 48(1) Notice	Addressed in SAQP	Auditor Opinion
Assessment methods to be used to characterise soil, surface water and groundwater.	Section 5 – sampling and analysis strategy and shown in Tables O, P, Q, R, S, T and U and Appendix B.	See **Section 4.2.7**, below.
Data quality objectives	Section 4 – Table N.	See **Section 4.2.1**, below.
Sampling locations within the premises	Described in Table O. Shown in Figures 4A- 4C and Figure 5.	See **Section 4.2.7.1**, below.
Extent and number of samples to be taken within the premises and any potential areas of concern		
Where initial sampling and analysis indicates that the area of impact has the potential to extend beyond the boundary of the premises, the steps which will be taken to provide further sampling and analysis.	Section 9 states (in part) that a report will be prepared that will include "identification of potential risks associated with PFAS to relevant receptors and potential management measures."	The auditor is satisfied that by identifying potential risks to receptors and developing management measures, any further sampling and analysis that is identified when refining the conceptual site model will be undertaken, as necessary. The auditor requests that an initial data evaluation be undertaken and presented to the auditor to assess the need for additional delineation works required to achieve the notice objectives.

4.2 Guideline Requirements

The auditor has assessed the SAQP against relevant requirements of the guidelines listed below, and his assessment follows.

- *Northern Territory Contaminated Land Guideline,* Version 1.0, (NT EPA, June 2017);
- *Consultants Reporting on Contaminated Land, Contaminated Land Guidelines*, (NSW EPA, 2020);
- National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended 2013, National Environment Protection Council (NEPC 2013); and
- *PFAS National Environment Management Plan*, *Version 2.0,* Heads of EPA Australia and New Zealand, 2020.

4.2.1 SAQP Objectives

The SAQP states that its "…objective is to provide the scope and rationale for a site investigation of Airservices operations at AYQ so sufficient and reliable information is collected to describe the nature and extent of contamination, related to ARFFS operations, and describe potential risk, if any, to plausible receptors."

The SAQP states that the objectives of the site investigation are to address the following:

- "Understanding activities undertaken by or in any way associated with Airservices activities at the premises, including ARFF and related training, since Airservices began its occupation of the Airservices occupied areas within the premises;
- "Understanding activities conducted on or impacting Airservices lease areas, by NTPFES and Yulara Volunteer Firefighters prior to Airservices occupation of the lease areas;
- "Determining the types, amount, distribution and mobility of contaminants and waste, including but not limited to PFAS present in the environment from activities undertaken by Airservices activities within the premises;
- "Determining the nature and extent of contamination at and beyond the Airservices occupied areas, to a sufficient degree that an appropriate level of risk assessment may be undertaken and, if necessary, providing the basis for the development of an appropriate remediation or management strategy.

"Based on the existing information and data available, the site investigation described in the SAQP will:

- "Supplement existing soil data to refine the understanding of the nature and extent of contamination and include secondary potential contaminants not previously assessed;
- "Describe the hydrogeological regime relevant to the CoPCs and feasible receptors, and improve understanding of potential exposure pathways in groundwater; and
- "Quantify PFAS concentrations in groundwater up-gradient and down-gradient of Airservices occupied areas to inform risk assessment and potential mitigation strategies."

Auditor Opinion
The objectives as stated within the SAQP are appropriate.

4.2.2 Preliminary Conceptual Site Model

The SAQP developed a preliminary CSM as described below.

Source Zones

The Airservices lease areas that were potential sources of contamination at the airport were the interim fire station (IFS), the current fire station (CFS) and the fire training ground (FTG).

Other potential source areas on airport were also identified as being the airport hangar, fuel facilities, the spoil stockpiling area and the sewage treatment plant and spray field.

Off airport potential sources are identified are the municipal tip 5 km southwest and a brine disposal pit approx. 2 km up gradient of the airport and both were noted as potential sources of contamination to groundwater.

Contaminants of Potential Concern

Contaminants of potential concern (CoPC) were identified for each source area, aside from the off-airport sources. These included PFAS, total recoverable hydrocarbons (TRH) benzene, toluene, ethylbenzene and xylene (BTEX), polycyclic aromatic hydrocarbons (PAHs), metals, chlorinated hydrocarbons (CHCs), solvents, pesticides/herbicides and surfactants, as chemical contaminants and for the STP and spray field, the SAQP identifies nutrients and pathogens as well.

The SAQP notes that no off-airport potential source areas are within 2.5 km of the airport.

The SAQP identified which CoPCs would potentially be present at each source zone area.

Receptors and Pathways

The SAQP identified the following human receptors:

- Lease areas: Airservices, construction/maintenance workers and visitors in a commercial/industrial scenario, as well as potential future users of groundwater for a non-potable purpose, should a bore be installed.
- On Airport and Off Airport: Airservices, construction/maintenance workers and visitors in a commercial/industrial scenario, and users of groundwater such as Yulara town water supply and Yulara resort.

With regards pathways, the SAQP identified dermal contact with, incidental ingestion of, and inhalation of soil and sediment, as well as ingestion of groundwater as potential pathways. With regards ingestion of groundwater, the SAQP identified that ingestion of shallow groundwater through abstraction for potable or non-potable use was a potential pathway, but that there were no abstraction bores on the Airservices lease areas. Further, the SAQP noted that "current groundwater flow directions do not support a pathway between contamination sourced from the airport and the established water supply bores. However, future flow direct changes or installation of alternative bores may generate future connection."

The SAQP identified that terrestrial flora and fauna both on and off airport were potential ecological receptors.

The pathways that were identified were via direct contact and uptake of contamination from soils, surface water and/or sediments and ingestion of contamination which has bio-accumulated within the food chain.

Auditor Opinion

With regards ingestion of groundwater by on or off lease area human receptors, the auditor notes that currently there are no known groundwater abstraction bores in the presumed downgradient flow direction. However, there is no evidence of attempts to contact the owners of the land to the north of the airport. Given that the Katiti-Petermann Indigenous Protection Area Plan of Management[6] indicates that groundwater is at times accessed in dry river beds and so presumably not always via registered bores, a data gap exists with regards the use of groundwater to the north of the airport. Similarly, for ecological receptors, if there is maintenance of a groundwater resource within a dry river bed, then it is possible that groundwater is accessed by ecological receptors in the area to the north of the airport.

Generally, the auditor considers the preliminary CSM presented in the SAQP to be adequate. Given the data gaps regarding the groundwater flow direction and that the potential use of groundwater resources in the land to the north of the airport has not been ruled out, that is, no contact has been made with the owners of the land to the north, the auditor considers that not all receptors and not all potential pathways to receptors have been listed in the SAQP. Notwithstanding this, the proposed scope of works includes intrusive groundwater well installation, sampling and analyses, which will provide relevant information to assess the receptors and pathways as part of the development of the CSM.

4.2.3 Data Gaps

The SAQP presented five data gaps which are to be addressed by the works as listed below:

[6] Katiti-Petermann-IPA-Plan-of-Management.pdf (clc.org.au)

1. There is insufficient information on CoPC impacts to soil at the CFS, IFS, FTG and STP to confidently characterise extent and risk, or assess compliance with Airservices's regulatory requirements;
2. There is insufficient information on CoPC impacts to the drainage channels which flow to a dam located to the southwest of the fire station, to assess compliance with Airservices's regulatory requirements;
3. Current analytical data does not cover secondary potential CoPCs;
4. Source and distribution of contamination in groundwater is not known; and
5. Hydrogeological regime and future change may impact the risk posed by contamination from the airport on users of groundwater.

Auditor Opinion

The auditor is satisfied that the data gaps listed in the SAQP are those that have been identified to date.

4.2.4 Scope of Works

The SAQP indicates the objectives of the SAQP will be addressed through:

- Desktop review of all available information regarding training and all AFFF and other PCoC used by Airservices at the airport;
- Desktop review of available hydrogeological information to assist in a better understanding of the risk to groundwater;
- Installation of six groundwater wells within the airport and testing of three existing wells upgradient and downgradient of the Airservices occupied areas;
- Soil, sediment and surface water (where possible) testing to build on existing data and to describe the lateral and vertical extent of contamination; and
- Development of an updated CSM that provides specific detail about the nature, extent, mobility and pathways to receptors. Where plausible pathways are identified, then a risk assessment will be completed to assess if risk mitigation is required.

The Scope of works also included a statement that the magnitude of the risk to receptors will inform an assessment of potentially effective and proportionate management measures.

Auditor Opinion

The auditor is satisfied that the scope of works undertaken to develop the SAQP is considered adequately complete.

4.2.5 Assessment Criteria

The SAQP adopted criteria from the NEMP[7] for soil, sediment (adopting the soil guideline values for sediment) for industrial/commercial human health exposure scenarios as well as the ecological guideline values. In addition, the SAQP indicates that applicable guidelines for groundwater and surface water assessment criteria have been derived from the NEMP, and will be assessed against the freshwater 95% species protection, and water for both recreational and drinking water.

The SAQP indicates that total and leachable concentrations in soil and sediment will also be used to assess potential for impact to surface water.

[7] *PFAS National Environment Management Plan*, *Version 2.0,* Heads of EPA Australia and New Zealand, 2020.

The SAQP indicates that concrete samples will be compared with values derived by GHD (2021).[8] The SAQP notes that these values recommend a dilution attenuation factor (DAF) of 20 to be applied to leachate or run-off to compare with relevant human health or ecological protection criteria. The SAQP notes that this likely to be conservative. The SAQP indicates that concrete sample results will be compared with the soil criteria for consideration of risks to human health through direct contact.

Auditor Opinion

The auditor is satisfied that the use of the guideline values within the NEMP are appropriate for consideration of risks to on airport receptors for PFAS. It is noted that for sample locations closer to the boundary, more sensitive criteria might need to be applied.

The auditor notes that the SAQP does not list assessment criteria for contaminants of concern other than PFAS. The consultant will be required to assess other contaminants of concern with reference to the *Airports (Environment Protection) Regulations 1997* (Schedule 3) when considering on airport receptors and will reference the NEPM[9] and ANZG (2018)[10] for off site receptors. For consideration of human receptors for drinking water, the auditor will refer to the Australian Drinking Water Guidelines[11] as updated from time to time.

4.2.6 Data Quality Objectives

The SAQP has presented data quality objectives (DQOs) for the airport investigation, against each of the data gaps, using the process outlined in the NEPM.[10]

Auditor Opinion

The auditor is generally satisfied that the DQOs presented in the SAQP have been prepared in accordance with the NEPM and are suitable for addressing the identified data gaps. The auditor notes that the DQO table does not describe procedures to be undertaken if the data does not meet the expected DQOs. Due to the targeted nature of the investigation and the prospect of further investigations being carried out, the auditor does not consider this oversight to affect the investigation program.

4.2.7 Sampling and Analysis Plan and Methodology

4.2.7.1 Sampling Locations, Depth and Analytes

The SAQP presented more than 30 soil, ten sediment (and surface water if present), one concrete, five concrete washdown and 12 groundwater sampling locations for a targeted investigation and included a rationale for each location. The locations are shown on **Figure 4A-4C** and **Figure 5** (**Attachment 2**). Some locations that have been previously sampled will be re-sampled.

The SAQP presented the analytical program for all analytes from each location and sample depths. In general soil sample depths varied based on location; with those near the CFS were 0.5 to 1.0 m BGL, while those near the FTG were 1.0 – 2 m BGL. In addition, the SAQP indicated that the primary contaminants of concern for this investigation are PFAS, although some samples will be assessed for metals and TRH and other organic contaminants.

Auditor Opinion

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8 Airservices PFAS Characterisation Assessment Criteria Derivation of PFAS criteria for sediment, concrete, asphalt and pore water (GHD 2021)

9 *ASC NEPM (1999) National Environment Protection (Assessment of Site Contamination) Measure (1999) as amended 2013*. National Environment Protection Council

10 *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZG, August 2018)

11 *Australian Drinking Water Guidelines,* National Health and Medical Research Council and Agriculture and Resource Management Council of Australia and New Zealand, 2011 (NHMRC/NRMMC 2011) updated in January 2022

The soil, sediment and concrete locations are appropriate and will provide adequate coverage of areas considered likely to have been impacted, noting that this is a targeted investigation. Sample depths are generally considered appropriate. The auditor notes that the SAQP does not indicate that soil sampling will occur during installation of groundwater wells. The auditor considers this to be satisfactory, given that the wells are not located within assumed source zones.

With regards groundwater locations, the auditor notes that the three existing groundwater bore locations that are off airport are anticipated to provide background data. A contingency location is indicated in case groundwater flow direction is more easterly than anticipated. The groundwater locations and analyte list are considered adequate based on the current knowledge of the site, however, in the event additional contamination is identified, there may be a need for further works.

4.2.7.2 Field and Laboratory QA/QC Program

The SAQP included details of field procedures and the laboratory program and listed data quality indicators (DQIs) which will be used to assess the adequacy of the data.

Auditor Opinion

The auditor has reviewed the procedures described and the laboratory program and considers them to be adequate for the objectives of the investigation program.

4.2.7.3 Hydrogeological Assessment

The SAQP indicates that a hydrogeological assessment will be undertaken and the results used to update the CSM. The SAQP listed information sources including information held by NT Power and Water and other NT government agencies.

Auditor Opinion

Additional information regarding groundwater use and maintenance (if any) of groundwater access locations be sought from the owners of the land to the north of the airport, assuming the groundwater flow direction is found to be to the north.

5. Auditor Opinion/Requested Actions

The auditor is satisfied that the SAQP meets the requirements of the Section 48(1) notice and relevant requirements of the guidelines listed in **Section 4.2**, above.

The auditor requests the following actions:

1. The owners of all land the surrounding land be identified and stakeholder engagement commences as soon as feasible.
2. The preliminary CSM has not identified human or ecological receptors in the presumed downgradient direction of the airport, that is to the north of the airport. If the hydrogeological investigations and assessment find that groundwater flow direction is to the north and that concentrations of CoPC are within groundwater at concentrations greater than relevant criteria, then confirmation of the presence/absence of any groundwater access areas will need to be sought from the land owners to the north of the site.
3. Whilst the auditor accepts the rationale presented in the SAQP for the largely targeted sampling strategy, depending on the nature of the impacts identified, additional investigations may be required to achieve the requirements of the Section 48 Notice.

Please note that this interim advice does not constitute a Site Audit Statement or a Site Audit Report but is provided to assist in the assessment and management of contamination issues at the site in

regard to requirements of the site audit. The information provided herein should not be considered pre-emptive of the final audit conclusions, but rather represent the findings of the audit based on a preliminary review of available site information. Furthermore, the interim advice should not be regarded as approval of any proposed investigations or remedial activities, as any such approval is beyond the scope of an independent auditor.

Should you require clarification, please contact the undersigned on 02 8245 0300 or by email alau@jbsg.com.au.

Yours sincerely:



Andrew Lau
NSW EPA Accredited Site Auditor
Accreditation Number 0503
JBS&G Australia Pty Ltd

Attachments
(1) Limitations
(2) Site Plans
(3) Documentation Reviewed
(4) Notice to Carry out Environmental Audit Program, Issued to Voyages Indigenous Tourism Australia Pty Ltd, dated 14 December 2021

Attachment 1 – Limitations

This audit was conducted with a reasonable level of scrutiny, care and diligence on behalf of the client for the purposes outlined in s.48(1) of the *Waste Management and Pollution Control Act 1998*, (NT). The data used to support the conclusions reached in this audit were obtained by other consultants and the limitations which apply to the consultant's report(s) apply equally to this audit report.

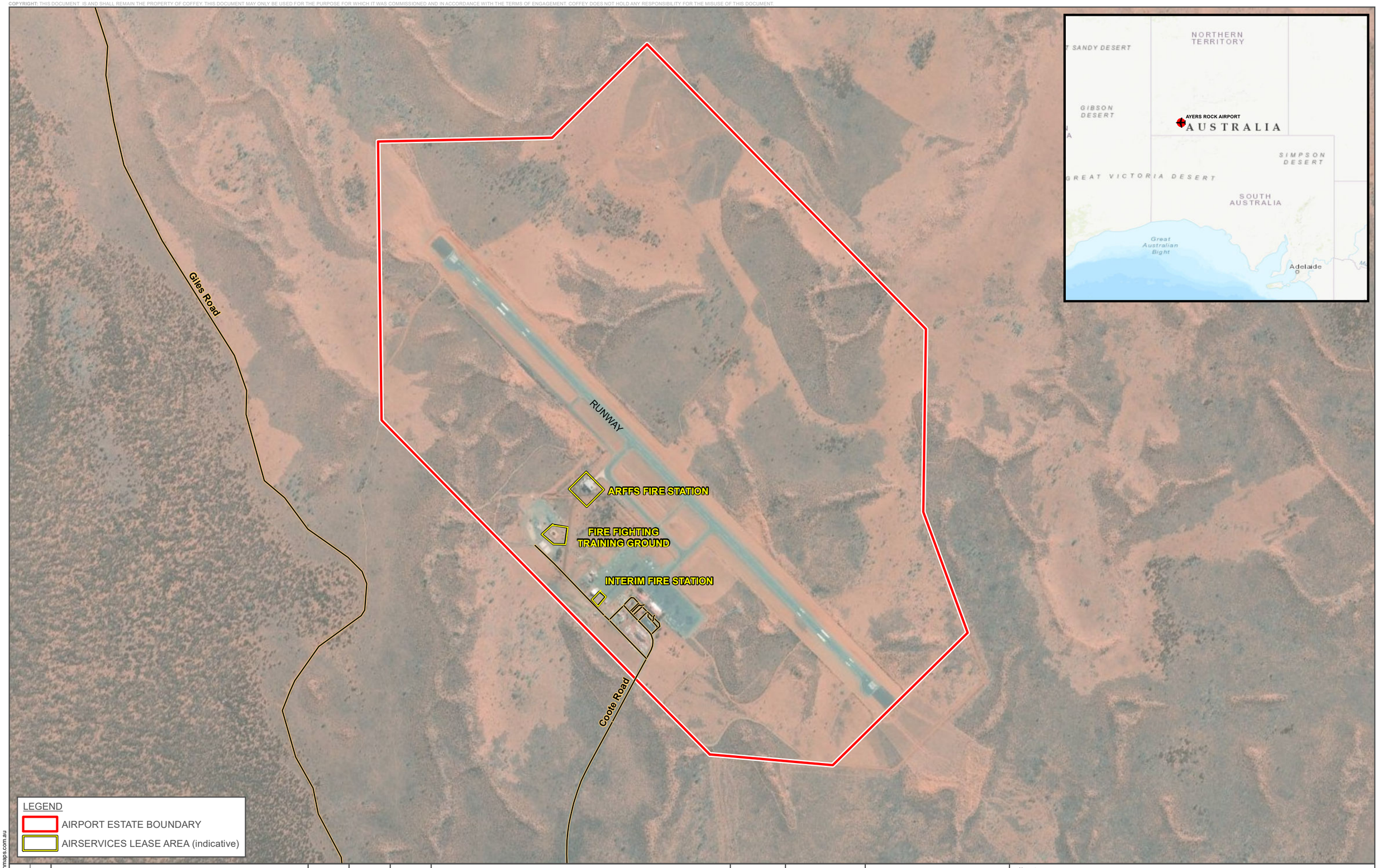
Every reasonable effort has been made to identify and obtain all relevant data, reports and other information that provide evidence about the condition of the site, and those that were held by the client and the client's consultants, or that were readily available. No liability can be accepted for unreported omissions, alterations or errors in the data collected and presented by other consultants. Accordingly, the data and information presented by others are taken and interpreted in good faith.

Sampling and chemical analysis of environmental media is based on appropriate guidance documents made and approved by the relevant regulatory authorities. Conclusions arising from the review and assessment of environmental data are based on the sampling and analysis considered appropriate based on the regulatory requirements. Limited sampling and laboratory analyses were undertaken as part of the investigations reviewed, as described herein. Ground conditions between sampling locations and media may vary, and this should be considered when extrapolating between sampling points. Chemical analytes are based on the information detailed in the site history. Further chemicals or categories of chemicals may exist at the site, which were not identified in the site history and which may not be expected at the site.

Changes to the subsurface conditions may occur subsequent to the investigations described herein, through natural processes or through the intentional or accidental addition of contaminants. The conclusions and recommendations reached in this audit are based on the information obtained at the time of the investigations.

Attachment 2 – Site Plans

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project: AYERS ROCK AIRPORT SAQP

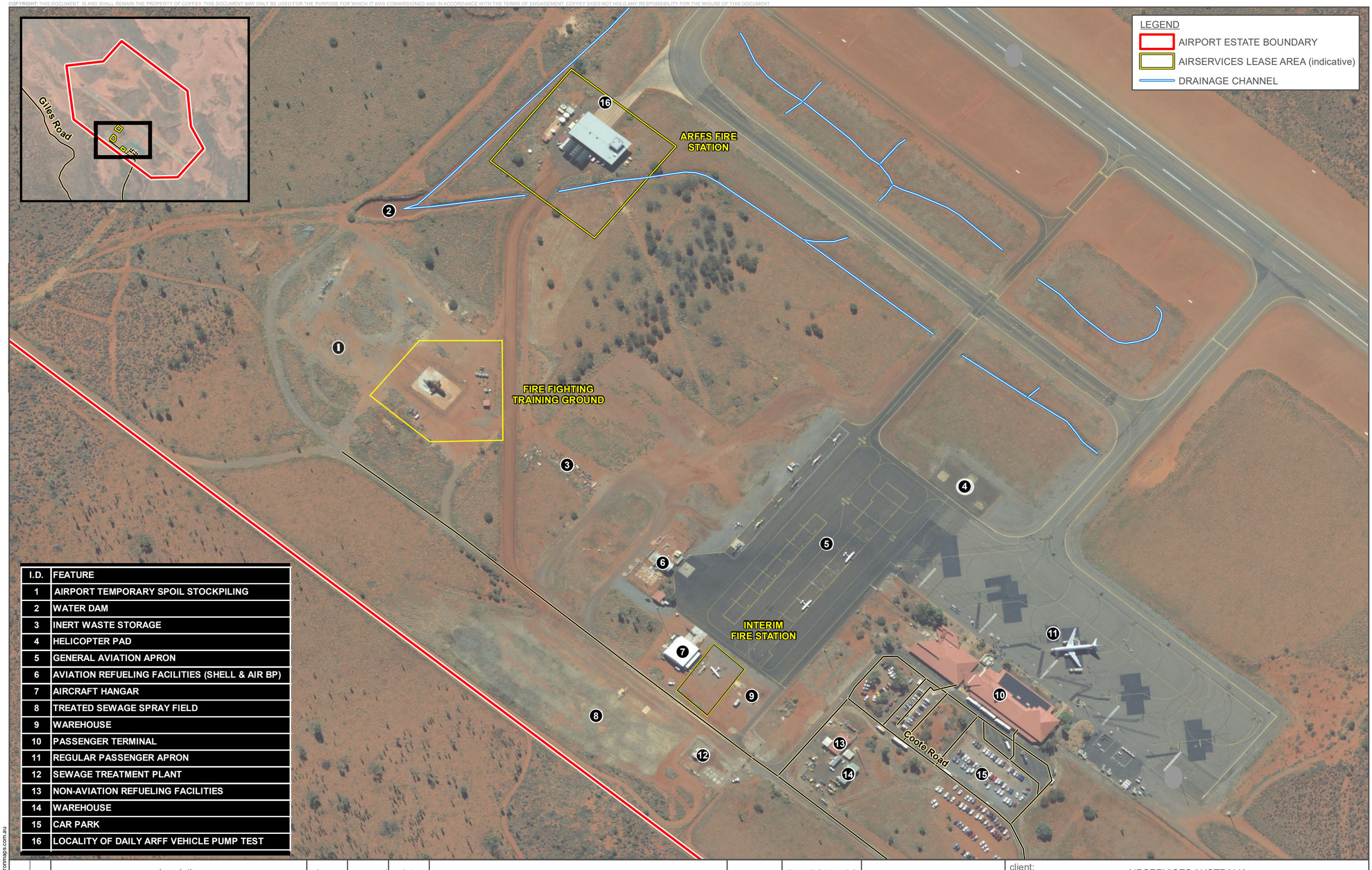
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I.D.	FEATURE
1	AIRPORT TEMPORARY SPOIL STOCKPILING
2	WATER DAM
3	INERT WASTE STORAGE
4	HELICOPTER PAD
5	GENERAL AVIATION APRON
6	AVIATION REFUELING FACILITIES (SHELL & AIR BP)
7	AIRCRAFT HANGAR
8	TREATED SEWAGE SPRAY FIELD
9	WAREHOUSE
10	PASSENGER TERMINAL
11	REGULAR PASSENGER APRON
12	SEWAGE TREATMENT PLANT
13	NON-AVIATION REFUELING FACILITIES
14	WAREHOUSE
15	CAR PARK
16	LOCALITY OF DAILY ARFF VEHICLE PUMP TEST

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project: YULARA AIRPORT SAQP

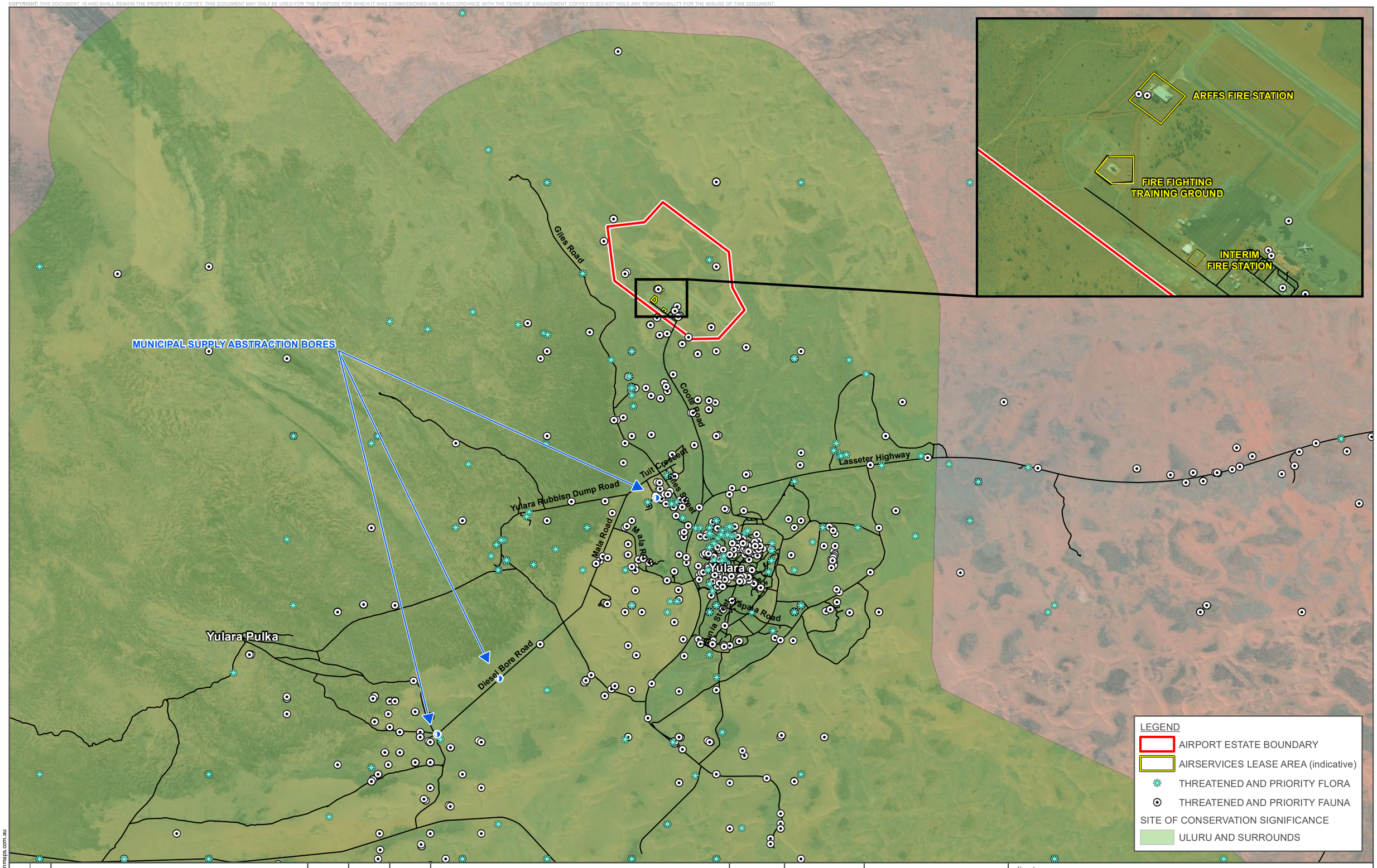
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project: AYERS ROCK AIRPORT SAQP

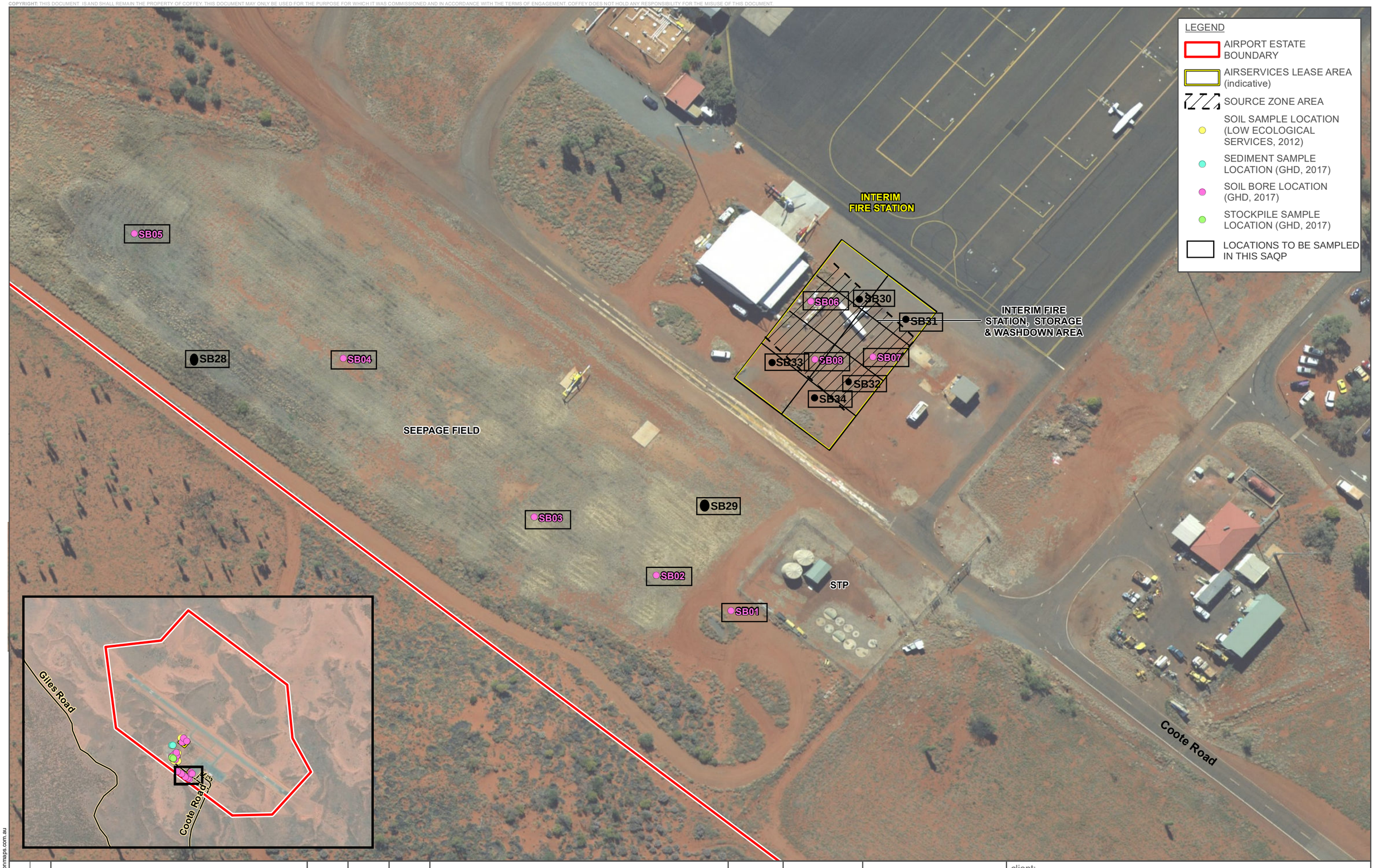
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original size	A3

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project: YULARA AIRPORT SAQP

title: INTERIM FIRE STATION SITE FEATURES AND SOURCES OF PFAS

project no: 754-PEREN233360 | figure no: 4A | rev: A

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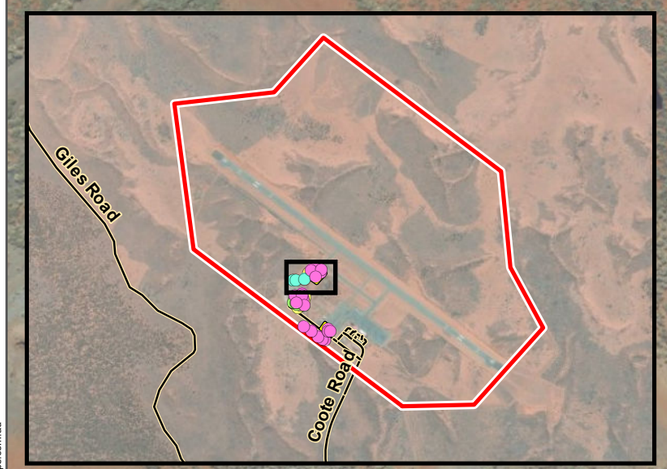
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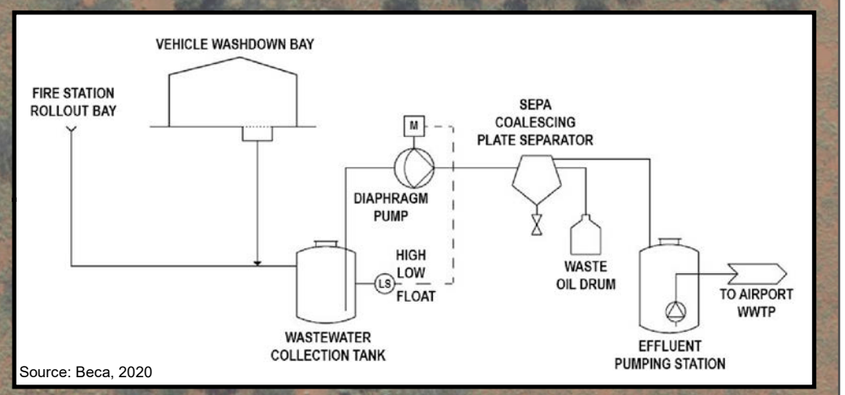
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LEGEND

- AIRPORT ESTATE BOUNDARY
- AIRSERVICES LEASE AREA
- SOURCE ZONE AREA
- UNDERGROUND PIPELINE (APPROXIMATE)
- SOIL SAMPLE LOCATION (LOW ECOLOGICAL SERVICES, 2012)
- SEDIMENT SAMPLE LOCATION (GHD, 2017)
- SOIL BORE LOCATION (GHD, 2017)
- STOCKPILE SAMPLE LOCATION (GHD, 2017)
- NEW SAMPLING LOCATION
- LOCATION TO BE SAMPLED IN THIS SAQP

WASTEWATER COLLECTION TANK
SHIPPING CONTAINER FOR STORAGE OF SOLBERG RF6 IN IBCs
SB17
SEWER PUMPING STATION
SEPARATOR ENCLOSURE
OIL & HAZARDOUS CHEMICAL STORAGE LOCATION
FIRE WATER TANK (x2)
WD04
WASTE OIL AST
SB19
SB20
HOSE STORE LOCATION
WORKSHOP
SS08
WD05
DRAIN
DRAIN
DRAIN
FORMER ANSULITE AFFF AST
MAIN GARAGE
WASHDOWN AREA (IN GARAGE)
HAZARDOUS CHEMICAL STORAGE
SS09
SS07
SB18
YAP1
PURPLE K STORAGE LOCATION
WD03
SB16
SB21
GENERATOR
TRANSFORMER
SS04
SS03
ARFFS FIRE STATION
SS01
SS02





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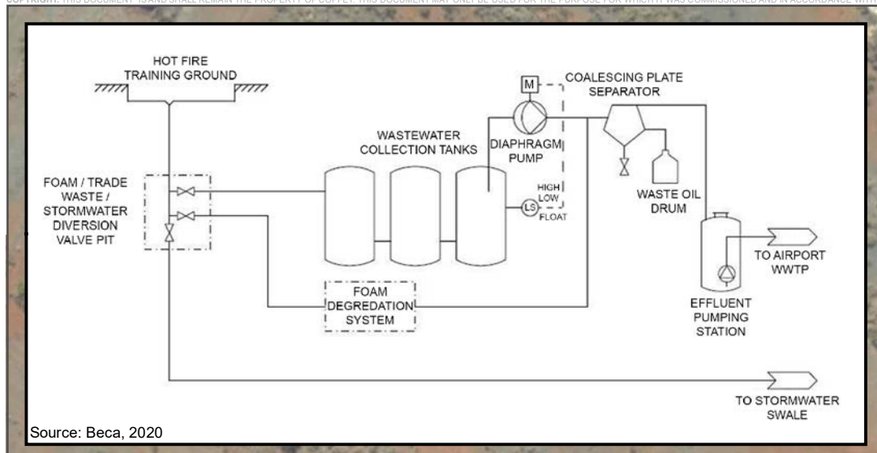
TETRA TECH COFFEY

client: AIRSERVICES AUSTRALIA
project: AYERS ROCK AIRPORT SAQP
title: CURRENT ARFFS FIRE STATION, SITE FEATURES AND SOURCES OF PFAS
project no: 754-PEREN233360 | figure no: 4B | rev: A

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FIREFIGHTING TRAINING GROUND

SB15 SB26 SB23 SB22 SB12 SB13 SB14 SB27 SB11 SB10 SB03 SB25 SB09 SB24

SP03 SP04 SP02 SP05 SP01

YAP2 YAP4 YAP3 YAP5

SS06 SS05 WD02 WD01 CC01

DRAIN

KEROSENE STORAGE (TRAILER)

OLD WASTEWATER TANKS

TRADEWASTE COLLECTION PITS (x3)

x2 ODOUR VENTS, x2 AUTOMATED DOSING SYSTEMS

TO AIRPORT SEWER TREATMENT PLANT

WATER PUMPING STATION

DIAPHRAM PUMP, SAMPLE POINT AND OIL SEPARATOR

TRUCK DRAINING AREA

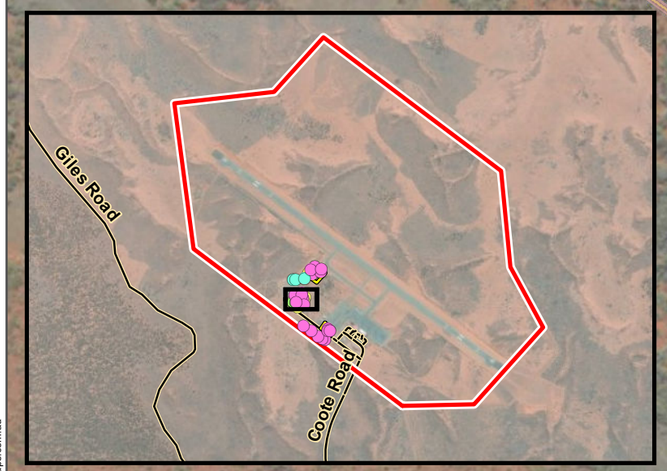
TRAINING PAD & MOCK PLANE

ANAEROBIC DIGESTION TANK 20,000 L

FINISHING/AEROBIC TANK 12,000 L

LEGEND

- AIRPORT ESTATE BOUNDARY
- AIRSERVICES LEASE AREA (indicative)
- SOURCE ZONE
- UNDERGROUND PIPE
- SOIL SAMPLE LOCATION (LOW ECOLOGICAL SERVICES, 2012)
- SEDIMENT SAMPLE LOCATION (GHD, 2017)
- SOIL BORE LOCATION (GHD, 2017)
- STOCKPILE SAMPLE LOCATION (GHD, 2017)
- NEW LOCATION
- LOCATIONS TO BE SAMPLED IN THIS SAQP



revision no.	description	drawn	approved	date
A	ORIGINAL ISSUE			

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Scale 1:650 (A3) METRES

drawn	ENVIRONMAPS
approved	AX
date	15/02/2022
scale	AS SHOWN
original size	A3

TETRA TECH COFFEY

client:	AIRSERVICES AUSTRALIA
project:	YULARA AIRPORT SAQP
title:	FIREFIGHTING TRAINING GROUND SITE FEATURES AND SOURCES OF PFAS
project no:	754-PEREN233360
figure no:	4C
rev:	A

ENVIRONMAPS Environmental Mapping Solutions t: 0406 590 006 www.environmaps.com.au

C:\GIS\Jobs\Coffey\754-PEREN233360 - Site Brief Report, Airservices Australia\Figures - Yalara\SAQP\754-PEREN233360-SAQP-Yalara_F04c Firefighting Training Ground, Site Features and Sources of PFAS_220215.mxd

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GW04
CONTINGENCY
GW05
RN012065
ARFFS FIRE STATION
GW06
GW03
FIRE FIGHTING TRAINING GROUND
GW02
INTERIM FIRE STATION
GW01
Coote Road
POTENTIAL GROUNDWATER FLOW DIRECTION

RN012065
Giles Road
RN012163
RN012081
Coote Road
RN012073
Mala Road
Giles Street
Kulgera Crescent
Lasseter Highway
1 km

LEGEND
- AIRPORT ESTATE BOUNDARY
- AIRSERVICES LEASE AREA (indicative)
- EXISTING GROUNDWATER MONITORING WELL (TETRA TECH COFFEY)
- PROPOSED GROUNDWATER MONITORING WELL (TETRA TECH COFFEY)

revision no.	description	drawn	approved	date
A	ORIGINAL ISSUE			

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drawn	ENVIRONMAPS
approved	AX
date	15/02/2022
scale	AS SHOWN
original size	A3

TETRA TECH COFFEY

client: AIRSERVICES AUSTRALIA
project: AYERS ROCK AIRPORT SAQP
title: GROUNDWATER ASSESSMENT LOCATION
project no: 754-PEREN233360
figure no: 5
rev: A

ENVIRONMAPS| t: 0406 590 006 Environmental Mapping Solutions| www.environmaps.com.au

C:\GIS\Jobs\Coffey\754-PEREN233360 - Site Brief Report, Airservices Australia\Figures - Yalara\SAQP\754-PEREN233360-SAQP-Yalara_F05 Groundwater Assessment Location_220215.mxd

Attachment 3 – Documents Reviewed

- Draft *Ayres Rock Airport – Targeted Site Investigation - Site Brief Report*, Rev C (Tetra Tech Coffey, 28 July 2021) ('The SBR'); and
- *Ayers Rock Airport – Sampling and Analysis Quality Plan Rev H* (Tetra Tech Coffey, 23 March 2022) and earlier drafts ('The SAQP').

Attachment 4 – Notice to Carry out Environmental Audit Program, Issued to Voyages Indigenous Tourism Australia Pty Ltd, dated 14 December 2021

ntepa Northern Territory Environment Protection Authority

NOTICE TO CARRY OUT ENVIRONMENTAL AUDIT PROGRAM

(Issued pursuant to Section 48(1) of the *Waste Management and Pollution Control Act 1998*)

ISSUED TO: Voyages Indigenous Tourism Australia Pty Ltd
ACN 146 482 591

OF: Level 9, 179 Elizabeth Street
Sydney NSW 2000

WHEREAS the Northern Territory Environment Protection Authority (NT EPA) is satisfied for the reasons stated in **Attachment A** to this notice that you are a person required to carry out an Environmental Audit Program of the current fire station, the fire training ground, and the former interim fire station as delineated in yellow in **Attachment E** and the surrounding areas as delineated in yellow in **Attachment F** (secondary sources of PFAS) and broader Yulara Airport area as delineated in blue in **Attachment D** (the premises) to evaluate:

(i) *the types, amount, distribution and mobility of contaminants or wastes present in the environment namely per- and poly-fluoroalkyl substances (PFAS) and other contaminants of concern present in the environment at the premises resulting from or in any way connected with Airservices Australia's activities.*

NOW TAKE NOTICE that you are required to comply with each of the requirements specified in **Attachment B** to this notice on and from the date of issue of this notice.

ISSUE DATE: 14 December 2021

.....
AMY DENNISON
EXECUTIVE DIRECTOR
ENVIRONMENTAL REGULATION
DELEGATE OF THE NT EPA

Important Notice

Failure to comply with this notice is an offence under Section 51 and section 52 of the *Waste Management and Pollution Control Act 1998* and may incur significant penalties and/or other statutory action.

Section 51(2) of the *Waste Management and Pollution Control Act 1998* states that a person is not to be taken to have submitted results to the NT EPA in accordance with an environmental audit program unless he or she submits with the results: (a) a statutory declaration signed by him or her stating that he or she has provided all relevant information to the auditor and has not provided to the auditor information that the person knows or suspects to be false or misleading; and (b) a statutory declaration signed by the auditor stating that the results are accurate to the best of his or her knowledge or belief and that he or she has not included in the results information that he or she knows or suspects to be false or misleading or failed to include in the report information that he or she knows to be relevant.

This notice takes effect on the date on which it is served upon you. Pursuant to Section 108 of the *Waste Management and Pollution Control Act 1998*, **you have the right to apply for a review of the decision to issue you with this Notice to carry out an Environmental Audit Program. If you intend to apply for a review, YOU MUST MAKE AN APPLICATION WITHIN 28 DAYS after the day on which this notice of the decision was given.** For information on how to lodge an application for review, contact the Northern Territory Environment Protection Authority, telephone 8924 4041.

Pursuant to Section 112 of the *Waste Management and Pollution Control Act 1998* the person issued with this notice must fulfil certain obligations before selling, leasing, sub-leasing, giving or exchanging land, premises, a vehicle or business which is the subject of this Notice.

ATTACHMENT A

REASONS FOR ISSUING THIS NOTICE

1. Northern Territory of Australia as the landowner and principal lessor, leases part of Lot 101 Town of Yulara otherwise known as the premises as delineated in blue in **Attachment D**, to Voyages Indigenous Tourism Australia Pty Ltd (VITA) (ACN 146 482 591) as the principal lessee (lease cover page provided in **Attachment C**), which shows the original lessee was Perpetual Trustee Company Limited (ACN 000 001 007), which assigned its rights and interests under the lease to VITA);

2. Within the premises, VITA occupy, control and operate Yulara Airport;

3. Airservices Australia (AA) occupy the current fire station (CFS) and the fire training ground (FTG) within the premises at Yulara Airport, and AA previously occupied the former interim fire station (FIFS) collectively termed the Airservices Australia occupied areas as delineated in yellow in **Attachment E.** AA currently occupies or previously occupied the Airservices Australia occupied areas under sub-leases from VITA;

4. VITA has superintendence of the premises which also includes the Airservices Australia occupied areas;

5. VITA has obligations under the terms of its lease with the Northern Territory of Australia that extends to mitigating environmental harm from contaminants or polluting event(s);

6. AA provide aviation rescue fire-fighting (ARFF) services for Yulara Airport;

7. AA has conducted activities (ARFF services and training) within the Airservices Australia occupied areas that have the potential to cause pollution resulting in environmental harm, due to the use of aqueous film forming foams (AFFF) containing PFAS;

8. AA has been an occupier and controller of one or more of the three parcels of land within the Airservices Australia occupied areas, since May 2004;

9. In December 2016, a report provided by AA and titled, The Report on Soil Sampling and Analysis at Yulara Airport Fire Station and ARFF Drill Ground by Low Ecological Services, analysed annual soil sampling between 2009 and 2016 at Airservices Australia occupied areas, and linked contamination to AA's activities;

10. The Report on Soil Sampling and Analysis at Yulara Airport Fire Station and ARFF Drill Ground identified that the land is contaminated with per- and poly-fluoroalkyl substances (PFAS) at the CFS and the FTG parcels of land within the Airservices Australia occupied areas;

11. In October 2017, AA commissioned a preliminary site investigation (PSI) titled Airservices Australia, Ayers Rock (Yulara) Airport Preliminary Site Investigation October 2017 and a preliminary sampling report (PSR) titled, Airservices Australia Ayers Rock (Yulara) Airport Preliminary Sampling Report October 2017, to assess the areas of potential PFAS contamination as a result of historical ARFF activities by AA at the Airservices Australia occupied areas which included:

    (a) CFS and surrounding areas within the VITA lease;

    (b) FTG and surrounding areas within the VITA lease; and

    (c) FIFS and surrounding area within the VITA lease;

12. The PSI stated that AA training practices have occurred at the Airservices Australia occupied areas and "training practices included the use of unleaded petroleum, kerosene as accelerants and extinguishment of fires using AFFF, dry chemical powder and water";

13. The PSI also stated that:

    (a) AA used Ansulite AFFF within the Airservices Australia occupied areas from 2004 – 2009;

    (b) there was no evidence of appropriate control measures (concrete bunding or wastewater collection systems) at the Airservices Australia occupied areas pre-2005 to prevent pollution occurring from AA activities;

    (c) there was no evidence of an impermeable concrete pad on which to conduct training activities, pre-October 2004;

    (d) AA conducted fire training activities without a pad for up to 5 months, from May 2004 – October 2004; and

    (e) AA failed to prevent the release of contaminants and wastewater from its activities to land at and from Airservices Australia occupied areas and surrounding land;

14. The PSI identified the following AA activities within the Airservices Australia occupied areas as being primary sources of PFAS contamination (see locations in **Attachment E**) that included:

    (a) FTG - discharge of foam during training events from 2004 to 2010;

    (b) CFS - including but not limited to the vehicles and hoses, wash-down areas and drainage channels; and

    (c) FIFS - including but not limited to the AFFF temporary storage area and the vehicle wash-down areas;

15. The PSI identified the following activities and areas as secondary sources of PFAS contamination (see locations in **Attachment F**):

    (a) stockpiled soils near the FTG;

    (b) open drain near the CFS and drainage area from the AFFF refill station;

    (c) discharge of treated effluent from the FTG at the sewage treatment plant (STP) area; and

    (d) wastewater underground storage tank (UST) and vehicle wash down area associated with the FTG;

16. The PSI acknowledged that while the risk of new PFAS contamination has now been reduced by switching from Ansulite to Solberg RF6, polluted secondary sources of PFAS still remain at and from the Airservices Australia occupied areas. These include:

    (a) contaminated infrastructure (concrete pads and drains);

    (b) residual soil and sediment contamination; and

    (c) the soil material stockpiled near the FTG;

17. In July 2019, AA undertook sampling of a decommissioned bore RN012065, located within the premises (see location of bore in **Attachment E**) and the results indicate contamination by PFAS of groundwater;

18. Further contamination is indicated by:

(a) the contamination by PFAS of stockpiled soil within the Airservices Australia occupied areas; and

(b) the contamination by PFAS of surface water drainage lines at the Airservices Australia occupied areas;

19. PFAS contamination is environmentally significant due to its persistence in the environment, its potential for bioaccumulation and high solubility in water, readily leaching from soil to groundwater and can move long distances;

20. The full nature and extent of PFAS contamination and pollution at and beyond the Airservices Australia occupied areas is unknown and has the potential for environmental harm or risk of future harm or adverse impact on the environment;

21. An environmental audit program is required to assess and understand the full nature and extent of contamination at and from the Airservices Australia occupied areas and the measures that may be required to address areas of contamination.

ATTACHMENT B

NOTICE REQUIREMENTS

1. The environmental audit program (the program) must be performed by a person who is registered under section 68 of the *Waste Management and Pollution Control Act 1998* (the Act), in this case an environmental auditor accredited under the New South Wales or Victorian auditor accreditation schemes;

2. The program must relate to all activities undertaken by or in any way associated with AA activities at the premises, including ARFF and related training, since AA began its occupation of Airservices Australia occupied areas within the premises;

3. As part of the program VITA must complete a Detailed Site Investigation (DSI) to determine *the types, amount, distribution and mobility of contaminants and waste,* including but not limited to PFAS present in the environment from activities undertaken by or in any way associated with AA activities within the premises;

4. Where applicable, the DSI must be undertaken in accordance with the requirements of the *National Environmental Protection (Assessment of Site Contamination) Measure 1999* (ASC NEPM) as amended, *the Northern Territory Contaminated Land Guideline 2017* (NTCLG) and the *PFAS National Environmental Management Plan Version 2.0*, January 2020 (PFAS NEMP) as amended;

5. The DSI must determine the nature and extent of contamination at and beyond the Airservices Australia occupied areas within the premises, to a sufficient degree that an appropriate level of risk assessment may be undertaken and, if necessary, provide the basis for the development of an appropriate remediation or management strategy;

6. As part of the DSI, VITA must develop a Sampling and Analysis Quality Plan (SAQP);

7. The SAQP must be provided to the NT EPA for review **no later than 3 months from the date of issue of this notice**;

8. The SAQP must include, but be not limited to:

   (a) assessment methods to be used to characterise soil, surface water and groundwater;

   (b) data quality objectives;

   (c) sampling locations within the premises;

   (d) extent and number of samples to be taken within the premises and any potential areas of concern; and

   (e) where initial sampling and analysis indicates that the area of impact has the potential to extend beyond the boundary of the premises, the steps which will be taken to provide further sampling and analysis;

9. The SAQP must be reviewed and endorsed in writing by the qualified person registered under Section 68 of the Act;

10. By **no later than 9 months from the date of issue of this notice** VITA must submit the results of the program in the form of an Environmental Audit Report prepared by the person referred to in requirement 1 which must include, but be not limited to:

    (a) a summary of the methods used for sampling, classification and analysis;

    (b) all soil and groundwater sample results and documentation;

(c) identification of all environmental risks relating to any identified contamination; and

(d) recommendations to prevent, rectify, clean up, rehabilitate or minimise potential environmental harm arising from any identified contamination.

ATTACHMENT C

"VOYAGES INDIGENOUS TOURISM AUSTRALIA PTY LTD (VITA) LEASE"

Dealing 424353

Real Property Regulations

FORM 18 Section 116

NORTHERN TERRITORY OF AUSTRALIA

L	S	No. 424353

424353

Commissioner of Taxes use only

LODGED AT THE REGISTRAR - GENERAL'S OFFICE

ON 2/4/99 AT

BY Crid lands CORRECTION TO

FEE $35 RECEIPT

DUPLICATE This 1 LEASE TO Crid lands

NT STAMP DUTY 11/03/99
3070 05559301 LSC duty $93,750.00

LEASE

The Owner leases to the tenant the land described and the tenant accepts this lease of the land for the term and at the rent stipulated and subject to the covenants and conditions contained below or on the back of this document.

Register	Volume	Folio	Location	Parcel	Plan	Unit
Grant in Fee simple	~~34~~ 563	~~56~~ 147	Townsite of Yulara	Lot 101 (part only)	S81/079	

OWNER Name only: NORTHERN TERRITORY OF AUSTRALIA

TENANT Name: PERPETUAL TRUSTEE COMPANY LIMITED
(ACN 000 001 007)
Address for the service of notices:
PO Box 46 Yulara, NT 0872

TERM OF LEASE	Commencing:	Expiring:	Right of Renewal:
	1 July 2007	30 June 2032	Clause 2.2

CONSENTS

~~Signed by the Owner~~
~~on (Date) 2/11/98~~
~~In the presence of~~

DION JOHN WHITEHEAD
of 1 Castlereagh Street
Sydney New South Wales
Justice of the Peace

PERPETUAL TRUSTEE COMPANY LIMITED
by its Attorneys pursuant to Registered Power of Attorney 341531
on (~~Date~~) 2/4/98

Brendan Howell

James Thomas McNally

Signed by the Owner on 1 in the presence of the Hon Barry Coulter on behalf of

Registered on 3 February 99 at Darwin

Lawrie
Commissioner for Oaths (NT)
Telephone: (08) 8985 5151

Correct for the purposes of the Real Property Act

A Practitioner of the Supreme Court of the Northern Territory of Australia

REGISTERED ON 16/2/99 AT 14

ATTACHMENT D

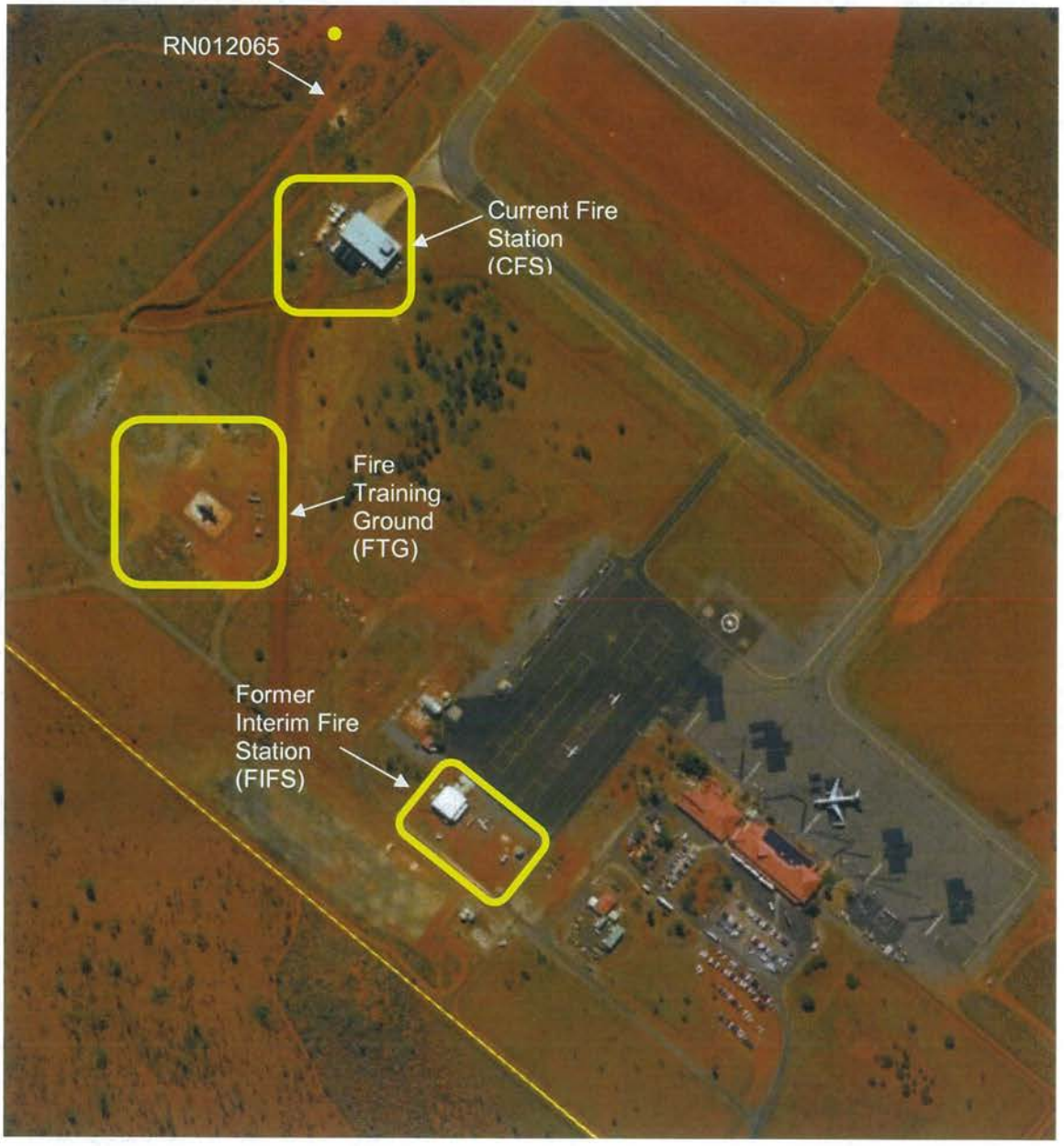
"THE PREMISES"

(VOYAGES INDIGENOUS TOURISM AUSTRALIA PTY LTD (VITA) LEASE AREA).



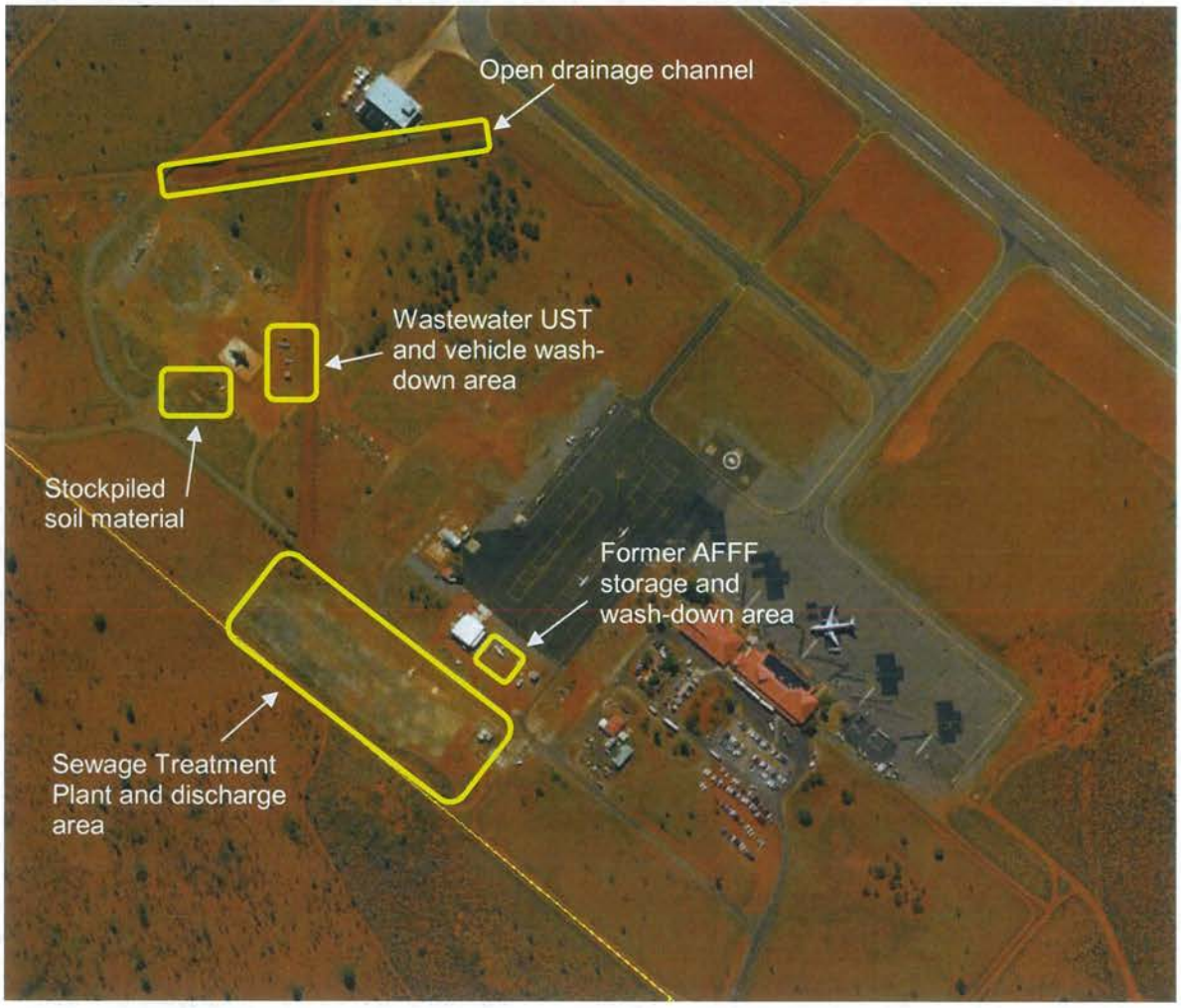
ATTACHMENT E

"THE AIRSERVICES AUSTRALIA OCCUPIED AREAS"



ATTACHMENT F

"SECONDARY SOURCES OF PFAS"



JBS&G 57345- 147,456
L003 - (IAL 0503-NT-2201 - Yulara Airport) Rev0

8 September 2022

Robert Fitzsimmons
Program Head, PFAS Strategy and Delivery
Airservices Australia

Via email: Robert.fitzsimmons@airservicesaustralia.com

L003 Interim Audit Advice (0503-NT-2201)

Dear Robert,

1. Introduction

Andrew Lau, of JBS&G Australia Pty Ltd (JBS&G), was engaged on the 23 August 2021 by Airservices Australia (Airservices) to conduct a site audit at Yulara Airport, Northern Territory. Airservices lease a portion of the airport from Voyages Indigenous Tourism Australia Pty Ltd (VITA), which owns the airport. Airservices have provided aviation rescue and firefighting services (ARFF) at the airport since May 2004.

The Northern Territory Environmental Protection Authority (NT EPA) served a notice on VITA to carry out an environmental audit program at the Yulara airport under section 48(1) of the *Waste Management and Pollution Control Act*, (1998) (WMPC Act). By agreement between Airservices and VITA, the auditor, Mr Andrew Lau will conduct the audit required by the notice.

Andrew Lau is a Site Auditor accredited by the NSW Environment Protection Authority (NSW EPA) under the *Contaminated Land Management Act* (1997) NSW, (CLM Act), (Accreditation Number 0503). The *Northern Territory Contaminated Land* Guideline, NT EPA, June 2017 ('the guideline') notes that Part 9 of the WMPC Act defines a qualified person to conduct environmental audits and the guideline states that an auditor accredited through the schemes of New South Wales or Victoria are considered to be registered in the NT in accordance with the WMPC Act.

The Section 48(1) notice requires a Detailed Site Investigation (DSI) to be completed to determine:

> *The types, amount, distribution and mobility of contaminants or wastes present in the environment namely per- and poly-fluoroalkyl substances (PFAS) and other contaminants of concern present in the environment at the premises resulting from or in any way connected with Airservices Australia's activities.*

A Sampling Analysis and Quality Plan (SAQP) was prepared to address (in part) the requirements of the Section 48(1) notice, and the auditor reviewed that SAQP in the following letter:

- *L002 Interim Audit Advice (0503-NT-2201)*, for Yulara Airport, 8 April 2022, from Andrew Lau of JBS&G to Robert Fitzsimmons of Airservices Australia.

2. Reports Provided

Works were carried out by Tetra Tech Coffey and the auditor has received the following draft factual report describing the results of those investigations:

- *Ayers Rock Airport (AYQ) – Environmental Site Investigation*, Tetra Tech Coffey, 5th September 2002 (TTC 2022)

3. Auditor Opinions

The auditor has conducted a preliminary review of the draft factual report (TTC 2022) and provides the following opinions:

1. The data presented in the draft factual report appears to be of sufficient quality for the purposes of the investigation.
2. It is apparent from the factual report that data gaps exist which prevent the nature and extent of contamination being defined and prevents a considered appraisal of risks.
3. In order to address the requirements of the Section 48(1) notice, further investigations are required to address a number of data gaps and complete the Detailed Site Investigation (DSI) report.
4. A Sampling Analytical Quality Plan (SAQP) should be prepared by the consultant to address the identified data gaps and provided to the auditor for review prior to being implemented.
5. The data gap investigations cannot be practically implemented under the current timeframes outlined in the Section 48(1) notice and consultation with NT EPA is required to provide sufficient time for the data collection, interpretation, reporting and auditing activities required to address the requirements of the notice.

Please note that this interim advice does not constitute a Site Audit Statement or a Site Audit Report but is provided to assist in the assessment and management of contamination issues at the site in regard to requirements of the site audit. The information provided herein should not be considered pre-emptive of the final audit conclusions, but rather represent the findings of the audit based on a preliminary review of available site information. Furthermore, the interim advice should not be regarded as approval of any proposed investigations or remedial activities, as any such approval is beyond the scope of an independent auditor.

Should you require clarification, please contact the undersigned on 02 8245 0300 or by email alau@jbsg.com.au.

Yours sincerely:



Andrew Lau
NSW EPA Accredited Site Auditor
Accreditation Number 0503
JBS&G Australia Pty Ltd

Attachments (1) Limitations

Attachment 1 – Limitations

This audit was conducted with a reasonable level of scrutiny, care and diligence on behalf of the client for the purposes outlined in s.48(1) of the *Waste Management and Pollution Control Act 1998*, (NT). The data used to support the conclusions reached in this audit were obtained by other consultants and the limitations which apply to the consultant's report(s) apply equally to this audit report.

Every reasonable effort has been made to identify and obtain all relevant data, reports and other information that provide evidence about the condition of the site, and those that were held by the client and the client's consultants, or that were readily available. No liability can be accepted for unreported omissions, alterations or errors in the data collected and presented by other consultants. Accordingly, the data and information presented by others are taken and interpreted in good faith.

Sampling and chemical analysis of environmental media is based on appropriate guidance documents made and approved by the relevant regulatory authorities. Conclusions arising from the review and assessment of environmental data are based on the sampling and analysis considered appropriate based on the regulatory requirements. Limited sampling and laboratory analyses were undertaken as part of the investigations reviewed, as described herein. Ground conditions between sampling locations and media may vary, and this should be considered when extrapolating between sampling points. Chemical analytes are based on the information detailed in the site history. Further chemicals or categories of chemicals may exist at the site, which were not identified in the site history and which may not be expected at the site.

Changes to the subsurface conditions may occur subsequent to the investigations described herein, through natural processes or through the intentional or accidental addition of contaminants. The conclusions and recommendations reached in this audit are based on the information obtained at the time of the investigations.

Appendix B Site Plans

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Giles Road

RUNWAY

CURRENT FIRE STATION

OPEN DRAINAGE CHANNEL

FIRE TRAINING GROUND

STOCKPILE SOIL MATERIAL

WASTEWATER UST AND VEHICLE WASH-DOWN AREA

FORMER INTERIM FIRE STATION

FORMER AFFF STORAGE AND WASH-DOWN AREA

SEWAGE TREATMENT PLANT AND DISCHARGE AREA

Coote Road

LEGEND

- AIRPORT ESTATE BOUNDARY
- AIRSERVICE LEASE AREA (INDICATIVE)
- SECONDARY SOURCES OF PFAS AS IDENTIFIED IN ATTACHMENT F OF THE SECTION 48 NOTICE (NT EPA 2021)

revision	no.	description	drawn	approved	date
	A	ORIGINAL ISSUE			

0 200 400 600 800

Scale 1:15,000 (A3) METRES

drawn	ENVIRONMAPS
approved	MJ
date	28/08/2023
scale	AS SHOWN
original size	A3

TETRA TECH COFFEY

client: AIRSERVICES AUSTRALIA

project: AYERS ROCK AIRPORT (AYQ) - TSI REPORT

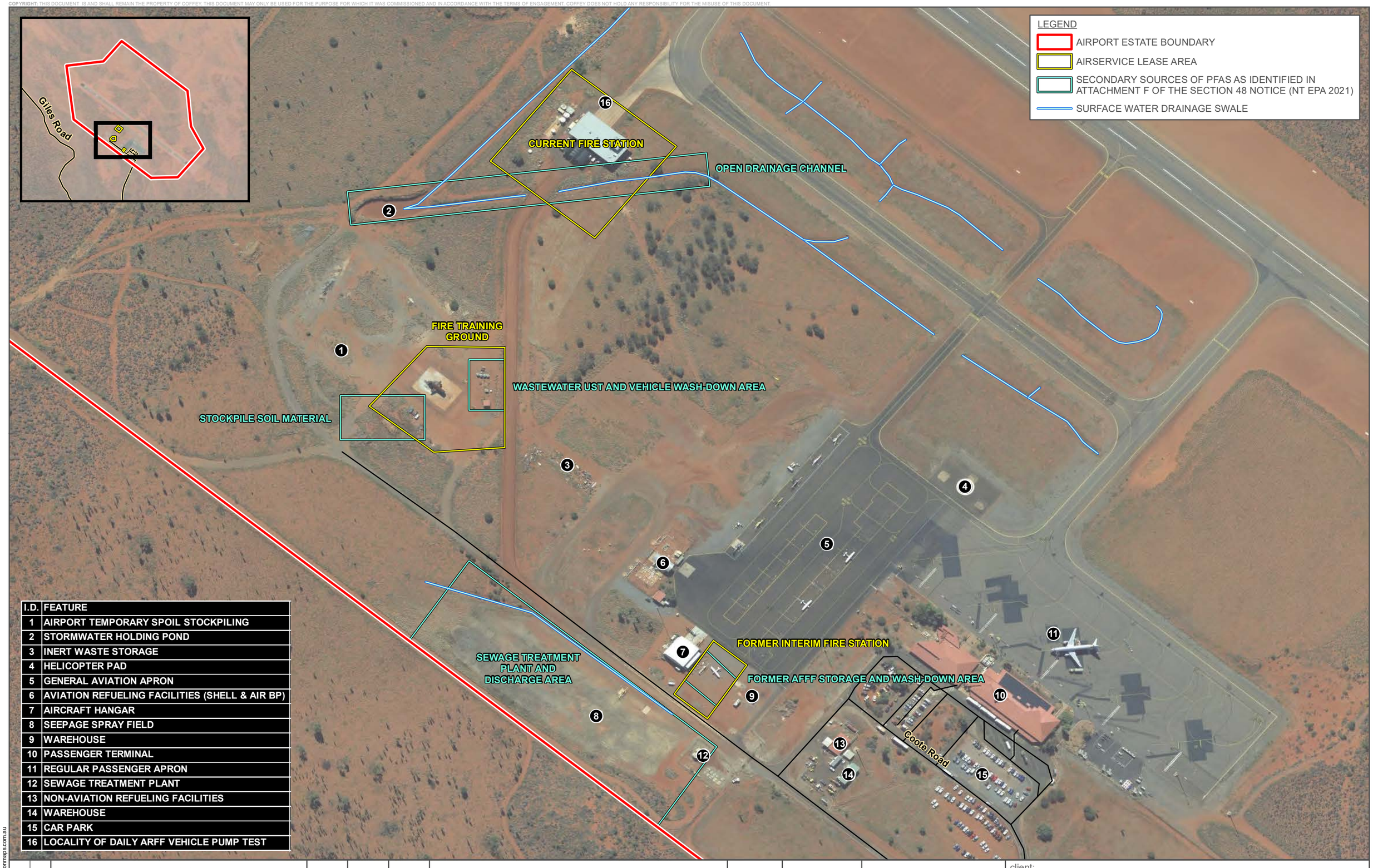
title: SITE LOCALITY PLAN

project no: 754-PEREN233360 | figure no: 1 | rev: A

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C:\GIS\Jobs\Coffey\754-PEREN233360 - Site Brief Report, Airservices Australia\Figures - Yalara\AYQ-TSI\754-PEREN233360-AYQ-TSI_Ayres_F01 Site Locality Plan_230828.mxd

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I.D.	FEATURE
1	AIRPORT TEMPORARY SPOIL STOCKPILING
2	STORMWATER HOLDING POND
3	INERT WASTE STORAGE
4	HELICOPTER PAD
5	GENERAL AVIATION APRON
6	AVIATION REFUELING FACILITIES (SHELL & AIR BP)
7	AIRCRAFT HANGAR
8	SEEPAGE SPRAY FIELD
9	WAREHOUSE
10	PASSENGER TERMINAL
11	REGULAR PASSENGER APRON
12	SEWAGE TREATMENT PLANT
13	NON-AVIATION REFUELING FACILITIES
14	WAREHOUSE
15	CAR PARK
16	LOCALITY OF DAILY ARFF VEHICLE PUMP TEST

revision	no.	description	drawn	approved	date
	A	ORIGINAL ISSUE			

0 25 50 75 100
Scale 1:3,000 (A3) METRES

drawn	ENVIRONMAPS
approved	MJ
date	28/08/2023
scale	AS SHOWN
original size	A3

TETRA TECH COFFEY

client: AIRSERVICES AUSTRALIA

project: AYERS ROCK AIRPORT (AYQ) - TSI REPORT

title: AIRPORT ESTATE FEATURES PLAN

project no: 754-PEREN233360 | figure no: 2 | rev: A

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C:\GIS\Jobs\Coffey\754-PEREN233360 - Site Brief Report, Airservices Australia\Figures - Yalara\AYQ-TSI\754-PEREN233360-AYQ-TSI_Ayres_F02 Airport Estate Features Plan_230828.mxd

Appendix C Targeted Site Investigation (TTC 2023c)

©JBS&G Australia Pty Ltd

PFAS Characterisation Program

Ayers Rock Airport (AYQ) – Targeted Site Investigation

Airservices Australia



Reference: 754-PEREN233360

26 September 2023

PFAS CHARACTERISATION PROGRAM

Ayers Rock Airport (AYQ) – Targeted Site Investigation

Report reference number: 754-PEREN233360_R30_AYQ_TSI_Rev0.IFU
26 September 2023

PREPARED FOR

Airservices Australia
Alan Woods Building
25 Constitution Avenue
Canberra ACT 2600

PREPARED BY

Tetra Tech Coffey
Level 1, 235 St Georges Terrace
Perth WA 6000
p: +61 6 218 2100
f: +61 3 9290 7499
ABN 55 139 460 521

QUALITY INFORMATION

Revision history

Revision	Description	Date	Author	Reviewer	Approver
Draft A	For internal review	21/04/2023	Brigitte Lyons	Cameron Baldock	
Draft B	For client review	28/04/2023	Brigitte Lyons	Cameron Baldock	Cameron Baldock
Draft C	Revised draft for client review	07/06/2023	Cameron Baldock	Wayne McFerran	Wayne McFerran
Draft D	Revised draft for client review	12/07/2023	Cameron Baldock	Wayne McFerran	Cameron Baldock
Draft E	Revised draft for client review	13/07/2023	Cameron Baldock	Wayne McFerran	Cameron Baldock
Draft F	Revised draft for client review	29/08/2023	Monika Janiak	Bryden Tiddy	Bryden Tiddy
Draft G	Revised draft for client review	12/09/2023	Monika Janiak	Bryden Tiddy	Bryden Tiddy
Rev0	Issued for use	26/09/2023	Monika Janiak	Bryden Tiddy	Monika Janiak

Distribution

Report Status	No. of copies	Format	Distributed to	Date
Draft B	1	PDF	Airservices Australia	28/04/2023
Draft C	1	PDF	Airservices Australia	07/06/2023
Draft D	1	PDF	Airservices Australia	12/07/2023
Draft E	1	PDF	Airservices Australia	13/07/2023
Draft F	1	PDF	Airservices Australia	29/08/2023

Draft G	1	PDF	Airservices Australia	12/09/2023
Rev0	1	PDF	Airservices Australia	26/09/2023

EXECUTIVE SUMMARY[1]

This Targeted Site Investigation was undertaken as part of the Airservices Australia Per- and Poly-Fluoroalkyl Substances Characterisation Program and to meet the requirements of a Regulatory Notice issued under Section 48 of the *Waste Management and Pollution Control Act, 1998* by Northern Territory Environmental Protection Agency to Voyages Indigenous Tourism Australia in December 2021. The focus of this program was to conduct investigations to further understand the magnitude and extent of any potential contamination resulting from Airservices current and historical operations at Ayers Rock Airport, Northern Territory.

The overall intent of the Targeted Site Investigation was to undertake a sufficient degree of site investigation, at and beyond Airservices occupied areas, such that an appropriate risk assessment could be completed.

The following technical objectives are the key investigation drivers to meet the requirements of the Section 48 Notice:

- Understanding activities undertaken by or in any way associated with Airservices activities at the premises, including Aviation Rescue and Fire Fighting services and related training activities, since Airservices began its occupation of the Airservices Lease Areas at the Ayres Rock Airport.
- Understanding activities conducted on or impacting Airservices lease areas, by Northern Territory Police, Fire and Emergency Services and Yulara Volunteer Firefighters prior to Airservices occupation of the lease areas.
- Appraising the types, amount, distribution and mobility of contaminants and waste, including but not limited to Per- and Poly-Fluoroalkyl Substances, present in the environment from activities undertaken by Airservices activities at Ayres Rock Airport.
- Appraising the nature and extent of contamination at and beyond the Airservices occupied areas, to a sufficient degree that an appropriate level of risk assessment may be undertaken and, if necessary, providing the basis for the development of an appropriate management strategy.

The Targeted Site Investigation was implemented in two phases, with the first phase conducted in June 2022 and the second in January and February 2023. This Targeted Site Investigation report presents the data from both phases of the investigation and provides detailed interpretation and discussion to inform a Tier 1 risk assessment and refine the conceptual site model to appraise actual or potential risks to identified receptors (if any).

Laboratory analytical results obtained over Phase I and Phase II of the site investigation works indicated the following:

- Soil analytical results for Per- and Poly-Fluoroalkyl Substances were reported above the laboratory Limit of Reporting at the Main (Current) Fire Station, Interim Fire Station, Fire Training Ground and in soil collected from the locations of monitoring well installations. The concentrations of PFAS reported were all below the adopted screening criteria for the protection of human health and ecological screening criteria for direct exposure. Concentrations of PFOS were reported above the screening criteria for protection of ecological receptors under an indirect exposure scenario at several locations around the Fire Training Ground and within sediments in the drainage pond between the Fire Training ground and the Fire Station.
- Leachability testing for Per- and Poly-Fluoroalkyl Substances from soils reported concentrations in the elutriant that were in above the PFAS NEMP Freshwater 95% guideline value at Interim Fire Station, Fire Training Ground and Sewage Treatment Plant, the PFAS NEMP Recreational Water guideline value at the Fire Training Ground and the PFAS NEMP Drinking Water guideline value at the Main Fire Station, Interim Fire Station, Fire Training Ground and Sewage Treatment Plant, noting that the concentrations from the leachability testing are inferred to represent 100 years of leaching in a landfill, and not

[1] This executive summary must be read in the context of the full report and the attached limitations.

necessarily representative of actual concentrations of contaminants that may leach under 'normal' conditions.

- Exceedances of the PFAS NEMP Drinking Water guideline value in groundwater were reported at the Sewage Treatment Plant, Interim Fire Station, Fire Training Ground and down-gradient delineation well location (GW11). Additionally, the PFAS NEMP 95% Freshwater guideline value was also exceeded at the Interim Fire Station and at down-gradient delineation well location GW11.
- Exceedances of the PFAS NEMP Ecological Indirect Exposure guideline value were identified in sediment samples collected from the drainage channel near the Interim Fire Station and Sewage Treatment Plant seepage spray field and from the drainage channel and stormwater holding pond near the Main Fire Station. Leachability testing for Per- and Poly-Fluoroalkyl Substances in sediments reported concentrations in the elutriant that were above the:
  - PFAS NEMP Freshwater 95% guideline value at the Main Fire Station, Interim Fire Station and Sewage Treatment Plant,
  - PFAS NEMP Recreational Water guideline value was also exceeded for leachability results at the Interim Fire Station and Sewage Treatment Plant, and the
  - PFAS NEMP Drinking Water guideline value at the Main Fire Station, Interim Fire Station and Sewage Treatment Plant.
- PFAS in sediment samples collected from pits and concrete samples were measured below the adopted assessment criteria. The C/A2: Environmental Guideline Value for leaching to groundwater and potable use of offsite groundwater and C/A6: Environmental Guideline Value for leaching, discharge to surface water and ecological food chain exposures were exceeded for leachable concentrations of Per- and Poly-Fluoroalkyl Substances in concrete.
- A water sample collected from the garage drain at the Main Fire Station exceeded the PFAS NEMP drinking water guideline value and the 95% Freshwater guideline value. This wash bay water flows to the fire station separator system and then discharges to the rising main which leads directly to the Sewage Treatment Plant. Exceedances of the PFAS NEMP Freshwater 95% guideline values, Recreational Water and Drinking Water guideline values were also reported in water samples collected from pits and drains at the Fire Training Ground. Per- and Poly-Fluoroalkyl Substances concentrations in the effluent sample from the Sewage Treatment Plant exceeded the PFAS NEMP Freshwater 95% guideline value and the Drinking Water guideline values. The influent sample reported PFAS concentrations below adopted guidelines.
- In general, groundwater samples did not show a material change in total fluorinated compound concentrations pre and post Total Oxidisable Precursor Assay, whereas samples collected in wash bay drainage at the Main Fire Station, sumps at the Fire Training Ground and effluent from the Sewage Treatment Plant indicated that precursor compounds could primarily form carboxylic acid compounds and, in some cases, could form minor sulfonic acid compounds, consistent with use of Ansulite in Airservices operations at the Airport.

The Source-Pathway-Receptor linkages established in the revised CSM indicate that only one potentially complete pathway and exposure route is present in relation to intrusive maintenance (in this case subsurface utility) workers within the wastewater drainage system at the Fire Training Ground and it is considered that the potential risk of exposure via incidental ingestion can be controlled through an appropriate Health and Safety Management Plan which applies to any intrusive maintenance within the Airservices Lease Areas.

An Indirect exposure pathway for ecological receptors is potentially present in soils at the Fire Training Area with concentrations of PFAS reported in soils and shallow sediment above the adopted PFAS NEMP screening criteria. As the current risk appraisal only utilises published screening criteria, it is proposed that additional assessment of risks to ecological receptors is undertaken to confirm any potential risks that require specific management controls to be applied.

Following the completion of the Targeted Site Investigation, a review of the initial data gap assessment established that two existing data gaps which formed the Data Quality Objectives remain open. The data gaps include:

- Groundwater impacts identified at both the STP and the location of GW11, and
- The extent of PFAS impacts in soils that may potentially present a risk to receptors (via indirect exposure to ecological receptors) has not been fully defined.

New or residual data gaps have been developed in consideration of the results obtained at the time of completion of this TSI, as follows:

- The source and extent of Per- and Poly-Fluoroalkyl Substances in groundwater up-gradient of Airservices Lease Areas and the Sewage Treatment Plant require further consideration through further testing of inflows and outflows, ongoing groundwater monitoring at GW01, GW07 and GW08 and increased certainty regarding Sewage Treatment Plant inputs, system maintenance and understanding of any historical overflow (if any) or uncontrolled discharge events.
- The source and extent of Per- and Poly-Fluoroalkyl Substances in groundwater at GW11 has not been established. The source of these impacts is currently uncertain as there are no currently known sources of PFAS in the vicinity of GW11, and Airservices operations were at least 1 km distant from the impacted well. Groundwater sample results between the Airservices operations and the impacts at GW11 are also not indicative of groundwater transport to this location. Additional sampling and analysis of this monitoring well should be undertaken in order to confirm the presence and appraise the potential source of impacts at GW11 with a higher degree of certainty.
- Concentrations of PFSA compounds identified across the areas investigated as part of the Phase I and Phase II TSI works are not characteristic of those observed solely from the use of F2 Class Foams (Ansulite). The source of short and long chain PFSA's such as PFHxS and PFOS which have been established to be entering the constructed stormwater drainage swale network and holding pond, along with the possible non-Airservices related inputs of PFAS containing products and/or wastewaters to the FTG should be further investigated to understand external sources of these compounds.

To address the requirements of the Section 48 Notice, Tetra Tech Coffey have undertaken Phase 1 and Phase 2 site investigation works during 2022 and 2023 respectively at Ayers Rock Airport and consider the scope and outcomes of these investigations to be sufficient to meet the requirements of the Environmental Audit Program as requested by NT EPA. The detail provided in this TSI report addresses the S48 requirements, noting that the above data gaps are not driven by any identified risk within, or outside of, the Airport Estate, as has been established in the revised Conceptual Site Model in this TSI report.

CONTENTS

1. INTRODUCTION 1
1.1 PFAS Characterisation Services – Ayers Rock Airport 1
1.1.1 Airport Estate Understanding 1
1.1.2 ARFF Services Operations Summary 2
1.2 Targeted Site Investigation Background 3
1.3 NT EPA Section 48 Environmental Audit Notice 4
1.4 Objectives 5
1.4.1 Ayers Rock Targeted Site Investigation 5
1.5 Scope of Works 5
1.5.1 Phase 1 Site Investigation Works 5
1.5.2 Phase 2 Site Investigation Works 6
2. AIRPORT ESTATE LOCATION AND LAND TENURE INFORMATION 7
2.1 Land Identification Details 7
2.1.1 Certificates of Title and Ownership 8
2.1.2 Airservices Lease Information 8
3. ENVIRONMENTAL SETTING 9
3.1 Topography 9
3.2 Drainage 9
3.2.1 Main Fire Station Trade Waste Drainage System 10
3.2.2 Fire Training Ground Trade Waste and Stormwater Drainage System 10
3.3 Climate and Rainfall 11
3.4 Geology 13
3.5 Hydrogeology 14
4. PRELIMINARY SOURCE PATHWAY RECEPTOR IDENTIFICATION 19
4.1 Potential Sources 19
4.1.1 Airservices Lease Areas 19
4.1.2 On-Airport Sources 20
4.1.3 Off-Airport Sources 21
4.2 Potential Migration Pathways 21
4.3 Receptors and Exposure Routes 21
4.3.1 Airservices Lease Areas 22
4.3.2 On-Airport and Off-Airport 22
5. DATA QUALITY OBJECTIVES 25

6. SUMMARY OF SITE INVESTIGATION WORKS 32
6.1 Guidelines and Standards 32
6.2 Fieldwork Methodology 32
6.3 Sampling Methodology 38
6.4 PFAS Sampling Requirements 39
6.5 Quality Assurance and Quality Control 40
6.6 Sampling and Analysis Quality Plans 40
6.7 Deviations from SAQP 40
7. APPLICABLE GUIDELINES AND ASSESSMENT CRITERIA 41
7.1 Applicable Guidelines 41
7.2 Assessment Criteria 41
7.2.1 Soil and Surface Sediment 41
7.2.2 Groundwater and Surface water 43
7.2.3 Concrete 44
8. FIELD DATA AND RESULTS 47
8.1 Site Investigation Dates 47
8.2 Site Specific Geological Profile 47
8.3 Groundwater Observations 48
8.4 Hydrogeology and aquifer Properties 51
9. ANALYTICAL RESULTS 52
9.1 Soil Analytical Results 52
9.1.1 Soil PFAS Analytical Results 52
9.1.1 Soil PFAS Analytical Leachability Results 64
9.1.2 Soil Supplementary Results 66
9.2 Groundwater Analytical Results 66
9.2.1 Groundwater PFAS Analytical Results 66
9.2.2 Groundwater Supplementary Results 82
9.3 Sediment Analytical Results 82
9.3.1 Sediment PFAS Analytical Results 82
9.3.2 Sediment PFAS Leachability Results 87
9.3.3 Sediment Supplementary Results 89
9.4 Infrastructure Investigations 89
9.4.1 Infrastructure PFAS Analytical Results – Solids 89
9.4.2 Infrastructure PFAS Leachability Analytical Results 98
9.4.3 Infrastructure Supplementary Results - Solids 100

9.4.4 Infrastructure PFAS Analytical Results – Waters 100
9.4.5 Infrastructure Supplementary Results – Waters 101
9.5 Total Oxidisable Precursor Assay 102
9.5.1 Soil, Drainage Sediment, and Trade Waste Infrastructure Sediment 103
9.5.2 Groundwater and Infrastructure Water 106
10. CONCEPTUAL SITE MODEL 109
10.1 Potential Sources of PFAS 109
10.2 Potential Migration Pathways 109
10.3 Potential Receptors and Exposure Routes 110
10.4 Updated Conceptual Site Model for PFAS 111
10.5 Preliminary CSM for Supplementary CoPCs 117
11. DISCUSSION 121
11.1 General Summary 121
11.2 Sewage Treatment Plant and Seepage Field 122
11.2.1 PFAS in Soil 122
11.2.2 PFAS in Sediment 123
11.2.3 PFAS in Groundwater 123
11.2.4 PFAS in STP Influent and Effluent 124
11.2.5 Supplementary CoPC Results 125
11.3 Interim Fire Station 125
11.3.1 PFAS in Soils 126
11.3.2 PFAS in Groundwater 126
11.4 Fire Training Ground 126
11.4.1 PFAS in Soils 127
11.4.2 PFAS in Sediment 128
11.4.3 PFAS in Trade Waste Drainage Waters 128
11.4.4 PFAS in Groundwater 129
11.4.5 PFAS in Other Media Types 130
11.4.6 Supplementary Results 130
11.5 Main Fire Station 131
11.5.1 PFAS in Soils 131
11.5.2 PFAS in Sediment 132
11.5.3 PFAS in Trade Waste Drainage Waters 132
11.5.4 PFAS in Groundwater 132
11.5.5 Supplementary CoPC Results 133

11.6 Stormwater Drainage and Holding Pond 133
11.6.1 PFAS in Sediment 133
11.6.2 PFAS in Groundwater 134
11.7 Delineation Wells and Off-Airport Upgradient Wells 134
11.7.1 PFAS in Groundwater 135
12. DATA GAP ASSESSMENT 136
12.1 Data Gaps from the Phase 1 Investigation 136
12.2 Data Gaps from the Phase II Investigation 139
12.3 Residual or New Data Gaps 140
13. CONCLUSION 141
14. REFERENCES 144

LIST OF TABLES

Table 1-1 Summary of Airport Uses 2
Table 1-2 Additional areas identified in Section 48 notice requiring to be assessed 5
Table 2-1: Airservices Lease Areas and Airport Information 7
Table 3-1: Registered Groundwater Wells Within 2 km of AYQ 16
Table 4-1: Potential Sources of Contamination within the Airservices Lease Areas 20
Table 4-2: Details of On-Airport Potentially Contaminating Activities and Land Uses 20
Table 4-3: Human Receptors within the Airservices Lease Areas 22
Table 4-4: Ecological Receptors within the Airservices Lease Areas 22
Table 4-5: On-Airport and Off-Airport Human Receptors 22
Table 4-6: On-Airport and Off-Airport Ecological Receptors 23
Table 5-1: Data Quality Objectives for the Phase 1 Site Investigation Works 26
Table 5-2: Data Quality Objectives for the Phase 2 Site Investigation Works 29
Table 6-1: Summary of Fieldworks Completed at AYQ During Both Phase 1 and Phase 2 32
Table 6-2: Sample Methodology 38
Table 6-3: PFAS Sampling Requirements 39
Table 7-1: Summary of Applicable Criteria for PFAS in Soil and Surface Sediment Samples 42
Table 7-2: Summary of Applicable Screening Criteria for PFAS in Groundwater and Surface Water 43
Table 7-3: EGVs for concrete 45
Table 8-1 Generalised Soil Lithology 47
Table 8-2 Groundwater Observations and Parameters Summary 49
Table 8-3: Summary of Hydrogeology and Aquifer Properties 51
Table 9-1: Summary of Soil PFAS Analytical Results by Source Zone Area 53
Table 9-2: Non-regulated PFAS compounds in soil reported above LOR at the Current Fire Station 54
Table 9-3: Non-regulated PFAS compounds in soil reported above LOR at the IFS including STP and Seepage Spray Field 56
Table 9-4: Non-regulated PFAS compounds in soil reported above LOR at the Fire Training Ground 58
Table 9-5: Non-regulated PFAS compounds in soil reported above LOR at the monitoring well locations 62
Table 9-6: Summary of Soil PFAS Leachability Analytical Results by Source Zone Area 65
Table 9-7: Groundwater PFAS Results at the FTG compared to the assessment criteria 67
Table 9-8: Groundwater PFAS Results at the IFS and STP compared to the assessment criteria 68

Table 9-9: Groundwater PFAS Results at the MFS compared to the assessment criteria 69
Table 9-10: Groundwater PFAS Results at Delineation Monitoring Well location compared to the assessment criteria 69
Table 9-11: Groundwater PFAS Results at the Upgradient Wells compared to the assessment criteria 71
Table 9-12: Non-regulated PFAS compounds in groundwater reported above LOR at the Fire Training Ground 72
Table 9-13: Non-regulated PFAS compounds in groundwater reported above LOR at the Sewage Treatment Plant and Interim Fire Station 74
Table 9-14: Non-regulated PFAS compounds in groundwater reported above LOR at the Main Fire Station 76
Table 9-15: Non-regulated PFAS compounds in groundwater reported above LOR at Delineation Well locations 78
Table 9-16: Non-regulated PFAS compounds in groundwater reported above LOR at the Upgradient Off-Airport Monitoring Well location 80
Table 9-17: Summary of Sediment PFAS Analytical Results 83
Table 9-18: Non-regulated PFAS compounds in sediment within Drainage Channel near IFS and Seepage Spray Field 83
Table 9-19: Non-regulated PFAS compounds in sediment within Drainage Channel and Holding Pond near MFS 85
Table 9-20: Summary of Sediment PFAS Leachability Analytical Results by Source Zone Area 88
Table 9-21: Summary of Trade Waste Drainage Sediment and Concrete Infrastructure PFAS Summary Results by Source Zone Area 90
Table 9-22: Non-regulated PFAS compounds in sediment reported above LOR for the samples SS05 pad sump and Pit1 (FTG) 91
Table 9-23: Non-regulated PFAS compounds in sediment reported above LOR for SS08, SS09 and SS12 (MFS) 93
Table 9-24: Non-regulated PFAS compounds in concrete reported above LOR for the CC01 FTG Concrete sample 95
Table 9-25: Non-regulated PFAS compounds in concrete reported above LOR for the CC02 FTG Concrete sample 97
Table 9-26: Infrastructure Sediment and Concrete PFAS Leachability Summary Results by Source Zone Area 99
Table 9-27: Infrastructure Water PFAS Summary Results by Source Zone Area 101
Table 10-1: Potential Sources of PFAS 109
Table 10-2: Potential on- and off-airport Receptors and Exposure Routes for PFAS 110
Table 10-3: Updated Conceptual Site Model for PFAS 112

LIST OF FIGURES

Figure 3-1 Graph of mean minimum and maximum temperatures at Yulara Airport (source BoM 2023) 11
Figure 3-2 Graph of mean rainfall for years 1983 to 2023 and actual measured rainfall for 2022 at Yulara Airport (source BoM 2023).....12
Figure 3-3 Graph of mean rainfall for years 1983 to 2023 and actual measured rainfall for 2023 at Yulara Airport (source BoM 2023).....12
Figure 3-4 Perspective block diagram showing solid geology map and cross-sections of Uluru and Kata-Tjuta area looking northwest. Superficial Cenozoic sediments omitted. (source: CloudGMS, 2019).....13
Figure 3-5 Dune Plains Aquifer extent and palaeovalley depth to bedrock (source Cloud GMS 2019, modified from English 1998) 14
Figure 3-6 Groundwater potentiometric surface and inferred groundwater flow direction (source Cloud GMS 2019).....15
Figure 3-7 Registered groundwater wells within 2 km of Airport.....17
Figure 9-1 PFAS Concentrations in Pre—and Post-Oxidised AFFF Samples (Gordon et al, 2019) 103
Figure 9-2 Soil, sediment, and infrastructure sediment results pre- and post- TOPA (PFOS+PFHxS).....103
Figure 9-3 Soil, sediment, and infrastructure sediment results pre- and post- TOPA (Total PFAS).....104
Figure 9-4 Compound concentrations in YAP3_0.0, pre- and post- TOPA (located at the FTG).....105
Figure 9-5 Compound concentrations in SB12_0.0, pre- and post- TOPA (located at the FTG) 105
Figure 9-6 Compound concentrations in SS02, pre- and post- TOPA (soil/accumulated sediment in Stormwater Holding Pond).....106
Figure 9-7 Groundwater and infrastructure water results pre- and post TOPA (Total PFAS) 107
Figure 9-8 Groundwater and infrastructure water results pre- and post TOPA (Total PFAS) 107
Figure 9-9 Compound concentrations in GW03, pre- and post TOPA.....108
Figure 9-10 Compound concentrations in WD05, pre- and post TOPA.....108

APPENDICES

APPENDIX A FIGURES

APPENDIX B TABLES

APPENDIX C BORELOGS AND WELL DEVELOPMENT

APPENDIX D GROUNDWATER QUALITY FORMS

APPENDIX E CALIBRATION CERTIFICATES

APPENDIX F SURVEY REPORTS

APPENDIX G LABORATORY CERTIFICATES AND COCS

APPENDIX H DATA QUALITY REPORT

APPENDIX I PHOTOGRAPHY LOG

APPENDIX J HYDRAULIC SERVICES DESIGN DRAWINGS

ACRONYMS/ ABBREVIATIONS

Acronyms/Abbreviations	Definition
ADWG	Australian Drinking Water Guideline
AFFF	Aqueous Film-Forming Foam
AGSO	Australian Geological Survey Organisation
AHD	Australian Height Datum
Airservices	Airservices Australia
ANZG	Australian and New Zealand Guidelines
ARFF	Aqueous Film-Forming Foam
ARFFS	Aviation Rescue Fire Fighting (activity)
ASLP	Australian Standard Leaching Procedure
ASS	Acid Sulfate Soils
AST	Aboveground Storage Tanks
AYQ	Ayers Rock Airport
BCL	Bore construction licenses
BGL	Below Ground Level
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
BTEXN	Benzene, Toluene, Ethylbenzene, Xylene, Naphthalene
BTOC	Below Top of Casing
CASA	Civil Aviation Safety Authority
CHC	Chlorinated Hydrocarbon
CLC	Central Land Council
COC	Chain of Custody
COPC	Contaminant of Potential Concern
CoTs	Certificates of Title
CSM	Conceptual Site Model
DAF	Dilution Attenuation Factor
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DO	Dissolved Oxygen
DQI	Data Quality Indicator
DQO	Data Quality Objective
DSI	Detailed Site Investigation
DTW	Depth to Groundwater
EGV	Environmental Guideline Values
EIL	Ecological Investigation level
EPA	Environment Protection Authority
ESL	Ecological Screening Level
ESWMS	Environment Safe Work Method Statements
FTG	Fire Training Ground

FTS	Fluorotelomer sulfonic acid
FTSAS	Fluoromercaptoalkylamido Sulphonate
GDE	Groundwater Dependent Ecosystems
GIL	Groundwater Investigation Levels
HDPE	High-Density Polyethylene
HHERA	Human Health and Ecological Risk Assessment
HIL-D	Health Investigation Level
HSL	Health Screening Level
HSSE	Health, Safety, Security and Environment
IATA	International Air Transport Association
IFS	Interim Fire Station
IPA	Indigenous Protected Area
LCS	Laboratory Control Samples
LMU	Large Mock-Up
LNAPL	Light Non-Aqueous Phase Liquid
MFS	Main Fire Station
NATA	National Association of Testing Authorities
NEPC	National Environment Protection Council
NEPM	National Environment Protection Measure
NPUG	Non-Potable Use Guideline
NT	Northern Territory
NTFRS	Northern Territory Fire and Rescue Service
NTPFES	Northern Territory Police, Fire and Emergency Services
PACM	Potential Asbestos Containing Materials
PAH	Polycyclic Aromatic Hydrocarbon
PFAA	Perfluoroalkyl Acids
PFAS	Per- and Polyfluoroalkyl Substances
PFCA	Perfuoroalkyl Carboxylic Acids
PFHxS	Perfluorohexane Sulfonate
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctane Sulfonate
PFSA	Perfluoroalkyl Sulfonic Acids
PMP	Project Mobilisation Plan
POP	Persistent Organic Pollutant
PPE	Personal Protective Equipment
PSI	Preliminary Site Investigation
PVC	Polyvinyl Chloride
Q&A	Questions and Answers
QA/QC	Quality Assurance / Quality Control
RPD	Relative Percentage Difference
SAQP	Sampling and Analysis Quality Plan

SBR	Site Brief Report
SCE	Stakeholder and Community Engagement
SI	Site Investigation
SOP	Standard Operating Procedure
SPR	Source Pathway Receptor
STP	Sewage Treatment Plant
SWL	Standing Water Level
SZA	Source Zone Area
TDS	Total Dissolved Solids
TOPA	Total Oxidisable Precursor Assay
TRH	Total Recoverable Hydrocarbon
TSI	Targeted Site Investigation
USCS	Unified Soil Classification System
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank
VITA	Voyages Indigenous Tourism Australia

1. INTRODUCTION

Airservices Australia (Airservices) are conducting a national PFAS Characterisation Program to understand the potential for impacts from their use of polyfluoroalkyl and perfluoroalkyl substances (PFAS) to be present at airports where they have provided Aviation Rescue and Fire Fighting (ARFF) Services. Tetra Tech Coffey Pty Ltd (Tetra Tech Coffey) are completing Targeted Site Investigations (TSI) to assess these potential impacts including those which may have occurred at Ayers Rock Airport (AYQ) in the Northern Territory (NT). This TSI considers all identified contaminants of potential concern but has a particular focus on PFAS impacts associated with the historical use of Aqueous Film Forming Foam (AFFF) at AYQ.

The scope of the TSI has been developed based on the requirements stipulated in a Regulatory Notice under Section 48 of the *Waste Management and Pollution Control Act, 1998* issued by Northern Territory (NT) Environmental Protection Agency (EPA) to the legal custodians of the Airport Estate, Voyages Indigenous Tourism Australia (VITA), in December 2021. The Section 48 (S48) Notice is a statutory directive for the landholder (VITA) to carry out an Environmental Audit Program at the Airservices Lease Areas within the Airport Estate. A detailed summary of the S48 requirements is provided in Section 1.4.

A location plan is included in Figure 1, Appendix A, which outlines the location of Airservices Lease Areas within the broader Airport Estate. Figure 2, Appendix A, presents a visual depiction of all notable land-uses and activities across the Airport Estate within and external to Airservices Lease Areas.

1.1 PFAS CHARACTERISATION SERVICES – AYERS ROCK AIRPORT

Airservices is a corporate Commonwealth entity constituted in 1995 under the *Air Services Act 1995* (Cth) for the provision of air navigation and emergency services at civil airports. The provider of the ARFF function is determined by aviation passenger numbers, where above a designated threshold Airservices is required by the Civil Aviation Safety Authority (CASA) to provide these services at Australian civil airport facilities. At Ayers Rock Airport, Airservices began the provision of the ARFF service in 2004 when the CASA passenger threshold was reached. Prior to Airservices establishment at Ayers Rock Airport, Northern Territory Police, Fire and Emergency Services (NTPFES) along with Yulara Volunteer Fire Brigade provided ARFF support to the Airport based out of the Yulara Township (*pers comm*. Ken Balmer – Airservices, Tetra Tech Coffey 2021, JBS&G 2022).

1.1.1 Airport Estate Understanding

Ayers Rock Airport is located 5 km north of the town of Yulara and 17 km north of Uluru. The airport is owned by the Northern Territory of Australia and operated under Head Lease Agreement by Voyages Indigenous Tourism Australia Pty Ltd (formerly ILC Tourism Pty Ltd) initially entered in to on 1st June 1999 and which primarily operates for tourism purposes which service both Uluru and Kata Tjuta national parks. The airport commenced operation in 1984. The Airport Estate occupies a footprint of approximately 500 hectares (ha).

The Airport has a single runway, taxiways, terminal building, aviation refuelling facilities, carparking facilities, light aircraft and helicopter parking, an ARFFS fire station, operational FTG and a Sewage Treatment Plant. Further information relating to these facilities is included in Table 1-1 and Ayers Rock Airport Site Brief Report (Tetra Tech Coffey, 2021). The location of these facilities are shown in Figure 2.

Table 1-1: Summary of Airport Uses

Land uses / feature	Comment
Runway and taxiway	A single runway is present at the Airport which is positioned on a northwest-southeast alignment (13/31). The runway is 2,599 m × 30 m (8,527 ft × 98 ft). It has a simple, single stage lighting system and T-VASIS[2].
Terminal building	The main terminal building is located on the southern side of the main runway. Hire vehicle services are also located within the main terminal building.
Aviation Fuel Facilities	There is an Air BP and Shell fuelling facility located the western side of the small aircraft parking apron. At both facilities, aviation fuel is stored within above and underground storage tanks. Anecdotally, there may have been the potential for AFFF storage (unknown volumes) at these facilities. We were unable to source information or identify any incidents related to historical fire or AFFF product release at these facilities.
Carparking facilities	Public carparking facilities are located on the southern side of the Airport terminal building.
Aircraft parking and hangars	The Airport has two hangars with airside access to a large aircraft parking apron which is located on the western side of the terminal. On the northern side is a single helipad.
ARFFS fire station (and interim station)	The ARFFS fire station which is currently operated by Airservices is away from the terminal building towards to the western end of the runway. Between May 2004 and October 2006, an interim fire station was temporarily located on the southern side of the light aircraft parking areas.
Firefighting Training Ground (FTG)	The FTG is located on the southern side of the ARFFS fire station and comprises a large mock-up aircraft which is positioned on a bunded concrete pad. On the eastern side of the FTG are several storage sheds.
Sewage Treatment Plant	The STP is located approximately 100 m to the west of the terminal building. It receives liquid waste from all areas of the airport including the ARFFS fire station and the FTG. It consists of primary and secondary treatment tanks, a biofilter, underground aeration chambers and clarifiers, and a treated effluent pumping station. Treated water is discharged to ground via drip irrigation across a broad seepage field to the west, north-west of the STP. Biosolids are removed on an 'as required' basis with no formal routine sludge removal maintenance. However, GHD (2013) recommended sludge removal every 2 to 3 years as a minimum.

1.1.2 ARFF Services Operations Summary

Airservices have been responsible for providing ARFF services at Ayers Rock Airport since May 2004. No formal airport specific ARFF services were based at the Airport prior to this time, with emergency response being provided by the Northern Territory Police, Fire and Emergency Services (NTPFES) and the Yulara Volunteer Firefighters who are based in the Yulara townsite.

Initially, ARFF services were temporarily based out of the Interim Fire Station (IFS), which was positioned on the western side of the general aviation (GA) tarmac area. The IFS was comprised of four demountable buildings (kitchen, store, classroom, and communication centre) and a temporary shelter to provide cover for the two-emergency response vehicles. Airservices ARFF services occupied the IFS for approximately 18 months until the Main (Current) Fire Station (MFS) was built and opened in October 2005.

AFFF containing PFAS compounds (Ansulite – an F2 Class Foam) was used and stored at the MFS and has historically been stored at the IFS as well. Transition to fluorine free foams occurred when Solberg RF6 (an F3 Class Foam) was introduced in December 2010 to replace Ansulite AFFF, however some remnant Ansulite containers remained on-site in bunded areas awaiting disposal (Tetra Tech Coffey, 2021). Based on the dates of operation and the type of AFFF products used at the Airport by Airservices along with anecdotal information by knowledgeable ARFFS personnel, 3M Light Water AFFF (an F1 Class Foam) has not been used by

[2] Tee Visual Approach Slope Indicator System or T-VASIS: Visual Approach Slope Indicator System which can be installed flush with the runway pavement surface to provide approach guidance to that runway.

Airservices in providing ARFF services to the Airport. No information regarding the types of foam used prior to Airservices operations at the site was available for review.

The MFS is located on the southern side of the runway, and approximately 500 m northwest of the passenger terminal. The station building is constructed with a double-height steel frame and concrete floor. Within the station building are offices, staff amenities, a gym, three drive-through vehicle bays, accommodation, mechanics workshop and stores. Outside the station building, fuels and foam products are contained within aboveground storage tanks located to the northwest of the building. Vehicle and equipment washdown occurs at a covered bay on the southern side of the station building. Wastewater which is generated is captured and treated by a coalescing plate separator before being pumped into the airport's STP. Sewage is treated at the STP, which discharges the treated effluent via drip irrigation to a seepage field west, north-west of the STP.

A Firefighting Training Ground (FTG) is located to the southwest of the MFS and Airport runway and is understood to have commenced operation in mid-late 2004 in order to comply with CASR ARFF training requirements. Initially, drills were undertaken at a rate of two per month. The FTG comprises of a large mock-up aircraft which is located on a concrete pad. Several foam and fuel stores are located on the eastern side of the FTG. Similar to the ARFFS fire station, a below ground separator is present to manage wastewater prior to discharge to the STP. Wastewater is also treated by an Anerobic Digester foam treatment system; however, this infrastructure was not part of the original trade waste treatment system design, with it only being installed and commissioned when Airservices transitioned from Ansulite to the fluorine free foam product currently in use (Solberg RF6).

It is important to note that Airservices use of PFAS containing AFFF at Ayers Rock Airport is understood to have only occurred between May 2004 and January 2010 when ARFF services used a fluorinated foam product called Ansulite which, at that time, was believed to have a composition consisting only of short-chain PFCAs and fluorotemeler compounds (primarily 6:2FTS) which could not degrade and form long-chain sulfonic acid compounds (i.e. PFOS and PFHxS etc).

More recent studies undertaken internationally (such as those cited by SWECO in 2019) indicate that Ansulite AFFF produced by Ansul is primarily flourotelemer based, however does contain both short and long chain PFAA's. The relative proportion of long chain PFSAs such as PFOS and PFHxS are significantly lower than in former AFFF products (such as 3M Lightwater), however are not entirely absent within the composition of Ansulite. Furthermore, supplier information collated by Wood Group (2020) had both short and long chain PFAA's cited in their SDS and other supplier information for Ansulite AFFF products.

1.2 TARGETED SITE INVESTIGATION BACKGROUND

The Ayers Rock Airport TSI program of works commenced in late 2020 as part of the Airservices National PFAS Characterisation Program. Initially the purpose of the TSI was based on the results of Trade Waste Reports prepared by Beca Consultants Pty Ltd (Beca) and following the outcomes of a number of limited sampling events to assess the presence of PFAS and a Preliminary Site Investigation (PSI) which was undertaken by GHD in 2017.

Initially the TSI scope was focused on desktop studies to improve knowledge of Airport operations, increase understanding of the geological profile and hydrogeological system within and surrounding the Airport, and using a multiple lines of evidence approach, validate the findings of the PSI (GHD, 2017a) which states:

> *There is a potential, albeit low, risk to groundwater in the area but groundwater is not extracted for any use in the immediate vicinity of the site.*

As described in Section 1, a S48 Notice was later issued by NT EPA to VITA in December 2021 requiring a substantial increase to the scope of works for the TSI and the extent of the investigation area. Based on this the following documents governing the TSI process and outcomes have been prepared:

1. Initial Sampling and Analysis Quality Plan (SAQP) (reference: *754-PEREN233360_R16_DraftH_AYQ SAQP*, Tetra Tech Coffey, dated 24 March 2022).
2. An Environmental Site Investigation factual summary report (reference: *754-PEREN233360_R26_AYQ_SI_E_20221011*, Tetra Tech Coffey, dated 11 October 2022).
3. An SAQP for Phase 2 TSI works (reference: *754-PEREN233360_R29_AYQ_supplementary SAQP_DraftD*, Tetra Tech Coffey, dated 16 December 2022).

This TSI report aims to collate the data from both Phase 1 and Phase 2 site investigation works undertaken in 2022 and 2023 respectively and provide detailed interpretation and discussion to inform a tier 1 risk assessment and expand on the conceptual site model to determine any actual or perceived risks to identified receptors (if any).

The scope of the Phase 1 and Phase 2 investigation works targeted the identified source zone areas (SZA); being the MFS, IFS, FTG and STP along with the seepage spray field, and the associated waste management and operational areas at AYQ.

1.3 NT EPA SECTION 48 ENVIRONMENTAL AUDIT NOTICE

A Notice to Carry Out Environmental Audit Program under Section 48(1) of the *Waste Management and Pollution Control Act 1998* (the Act) was issued to Voyages Indigenous Tourism Australia (VITA) by NT EPA on 14 December 2021 requiring an environmental audit program to be performed by a person who is registered under Section 68 of the Act. The requirements of the notice included, but was not limited to, the following:

- *The program must relate to all activities undertaken by or in any way associated with Airservices activities at the premises, including ARFF and related training, since Airservices began its occupation of the Airservices occupied areas within the premises.*
- *As part of the program, VITA must complete a detailed site investigation (DSI) to determine the types, amount, distribution and mobility of contaminants and waste, including but not limited to PFAS present in the environment from activities undertaken by or in any way associated with the Airservices activities within the premises.*
- *The DSI must determine the nature and extent of contamination at and beyond the Airservices occupied areas within the premises, to a sufficient degree that an appropriate level of risk assessment may be undertaken and, if necessary, provide the basis for the development of an appropriate remediation or management strategy.*
- *As part of the DSI, VITA must develop a SAQP. The SAQP must include, but not be limited to:*
    - *Assessment methods to be used to characterise soil, surface water and groundwater.*
    - *Data quality objectives.*
    - *Sampling locations within the premises; and*
    - *Extent and number of samples to be taken within the premises and any potential to extend beyond the boundary of the premises, the steps which will be taken to provide further sampling and analysis.*

In order to address the requirements of the Section 48 Notice, Tetra Tech Coffey have undertaken Phase 1 and Phase 2 site investigation works during 2022 and 2023 respectively and consider the scope and outcomes of these investigations to be sufficient to meet the requirements of the Environmental Audit Program.

In addition to the Airservices lease areas, namely the MFS (referred to in Section 48 as the *Current Fire Station*), FTG and IFS (referred to in the Section 48 Notice as the *Former Interim Fire Station*), the additional areas that are required in the Section 48 Notice to be assessed, are summarised in Table 1-2, and shown in Figure 1, Appendix A.

Table 1-2: Additional areas identified in Section 48 notice requiring to be assessed

Area	Details on where addressed
Open drainage channel	Included as part of *Stormwater drainage and holding pond* area, refer to discussion in Section 11.6 and Figures 4B and 5B
Wastewater UST and vehicle wash-down area	Included as part of *Fire training ground* area, refer to discussion in Section 11.4 and Figures 4C and 5C.
Stockpiled soil material	Included as part of *Fire training ground* area, refer to discussion in Section 11.4 and Figures 4C and 5C.
Sewage treatment plant and discharge area	Included as part of *Sewage treatment plant and seepage field* area, refer to discussion in Section 11.2 and Figures 4A and 5A.
Former AFFF storage and wash-down area	Included as part of f*ormer interim fire station* area, refer to discussion in Section 11.3 and Figures 4A and 5A.

1.4 OBJECTIVES

1.4.1 Ayers Rock Targeted Site Investigation

The overarching objective of this TSI at AYQ was to review available information and collect and interpret a scientifically robust data set related to the presence of PFAS impacts (and other relevant contaminants) at Airservices Lease Areas. The outcome of the TSI was to appraise whether a potential risk of exposure to sensitive receptors is present at the Airservices Lease Areas based on concentrations of contaminant compounds that may exceed applicable screening criteria.

The following technical objectives were the key investigation drivers to meet the requirements of the Section 48 Notice:

- Understanding activities undertaken by or in any way associated with Airservices activities at the premises, including ARFF and related training, since Airservices began its occupation of the Airservices occupied areas within the premises.
- Understanding activities conducted on or impacting Airservices lease areas, by Northern Territory Police, Fire and Emergency Services (NTPFES) and Yulara Volunteer Firefighters prior to Airservices occupation of the lease areas.
- Appraising the types, amount, distribution and mobility of contaminants and waste, including but not limited to PFAS present in the environment from activities undertaken by Airservices activities within the premises.
- Appraising the nature and extent of contamination at and beyond the Airservices occupied areas, to a sufficient degree that an appropriate level of risk assessment may be undertaken and, if necessary, providing the basis for the development of an appropriate management strategy.

1.5 SCOPE OF WORKS

1.5.1 Phase 1 Site Investigation Works

The scope of works for the Phase 1 site investigation conducted in June 2022 included the following:

- Desktop review of all available information regarding training at AYQ, including that of NTPFES and Yulara Volunteer Fire Brigade prior to, or after, 2004.
- Desktop review of all AFFF and other potentially contaminating products used by Airservices at AYQ.
- Desktop review of available hydrogeological information to assist in a better understanding of the risk to groundwater. The hydrogeological assessment included studying the geology, hydrogeology,

geochemistry, and contamination relating to the ARFFS lease areas, the AYQ and the broader Yulara area. An essential component of the hydrogeological assessment was the development of a CSM of the hydrogeology, the contamination, and the potential risks to relevant receptors.

- Soil, surface sediment and surface water (where possible) testing to build on existing data and describe the lateral and vertical extent of contamination.
- Groundwater investigation, via installation of six monitoring wells within the airport premises and testing of three existing wells upgradient and downgradient of the Airservices occupied areas.
- Infrastructure investigation (pit water/ sediment sampling, concrete and washdown sampling) to establish an understanding associated with the storage and use of PFAS containing products or the associated impacted drainage.
- Develop an updated conceptual model that provides specific detail about the nature, extent, mobility, and pathways to receptors. Where plausible pathways were identified, an appraisal of the potential risks to receptors was undertaken to assess if risk mitigation was required.
- The conceptual model and apparent magnitude of risk to receptors informed an assessment of potentially effective and proportionate management measures.

1.5.2 Phase 2 Site Investigation Works

The scope of works for the Phase 2 site investigation conducted in January/ February 2023 included the following:

- Soil testing at 13 locations to build on existing data and describe the lateral and vertical extent of contamination at the FTG, the STP and the stormwater drain. Soil testing was also conducted during installation of new groundwater monitoring wells.
- Groundwater investigation, via installation of five new groundwater wells within the airport premises and testing of seven existing wells upgradient and downgradient of the Airservices occupied areas.
- Collection and analysis of one influent and one effluent water sample to assess inputs and outputs of the STP and determine contaminant contribution from Airservices SZAs and the cumulative contaminant load being discharged to the seepage field.
- Updating the conceptual model that provides specific detail about the nature, extent, mobility, and pathways to receptors. Where plausible pathways were identified, an appraisal of the potential risks to receptors was undertaken to assess if risk mitigation was required.
- The updated conceptual model informed the apparent magnitude of risk to receptors and aided in assessment of potentially effective and proportionate management measures.

2. Airport Estate Location and Land Tenure Information

Land identification and tenure details have been sourced from publicly available data sets and historical reports along with information provided directly by Airservices and/or VITA at the commencement of the TSI works.

2.1 LAND IDENTIFICATION DETAILS

Table 2-1: Airservices Lease Areas and Airport Information

Airport	Ayers Rock Airport	
Airport Code	AYQ (International Air Transport Association [IATA] Code)	
Airport and Airservices Lease Areas Address	200 Coote Road, Yulara, Northern Territory	
Certificate of Title	CUFT 830 314 (order 1) being Lot 101 on deposited plan S 81/079	
Local Government	Unincorporated (Yulara)	
Zoning	No Zoning	
Approximate Coordinates of the Centroid of Each Area Source: Google Earth (MGA 94)	Main Fire Station	698872 E 7212953 N
	Former Interim fire station	698938 E 7212505 N
	Fire Training Ground	698748 E 7212739 N
	STP and seepage field	698889 E 7212430 N
Area	Airport Estate: Approximately 95 ha	
	Main Fire Station	1.1 ha
	Former Interim fire station	0.2 ha
	Fire Training Ground	0.6 ha
	STP seepage field	1.1 ha
Airservices Lease Areas Current Land Use	• MFS – Operating fire station and associated storage, offices, and workshop with wastewater capture in accordance with trade waste requirements. • FTG – Fire Training Ground and associated wastewater treatment plant. • Former Interim Fire Station (IFS) – decommissioned and demolished by mid-2006	
Other Areas related to Airservices activities	• STP and seepage field – Sewerage treatment plant and drip irrigated seepage field for treated effluent. STP services the MFS, FTG and non-Airservices facilities on the Airport.	
Airport Estate Land Uses	The remainder of the Airport Estate includes a variety of operational areas for the commercial carriers and private operators, including: • Ayers Rock Airport Terminal and facility office • Rental vehicle offices and parking • General parking • Facility warehouse and workshop • Aviation and non-aviation fuel storage and re-fuelling station • Regular Passenger and General Aviation aprons, helipads, taxiways, and runway Registered groundwater monitoring bore RN012065 is located approximately 95 m north of the CFS. The bore is listed for monitoring purposes. The municipal potable-water supply, which includes on site drinking water to the airport, is provided from bore-fields located approximately 4.5 km and 9.5 km southwest, operated by Power and Water Corporation.	

Neighbouring Land Use(s)	Land immediately surrounding AYQ is largely vacant with native vegetation, sand dunes and some constructed vehicle tracks. Key surrounding land uses include (GHD, 2017a): • The Uluru-Kata Tjuta National Park occupies 1,326 km^2 and is approximately 9 km to the south of AYQ at its closest point. • The Yulara Wastewater Treatment Plant and the Yulara Landfill are located greater than 5 km south of the AYQ. • The AYQ is located approximately 4.1 km northwest of Yulara Township • The municipal potable-water supply to the Yulara Township is provided from bore-fields located approximately 4.5 km and 9.5 km southwest of the AYQ, operated by Power Water Corporation.

2.1.1 Certificates of Title and Ownership

The Certificate of Title (CoT) obtained for the AYQ (CUFT 830 314 (order 1)) registered 29/11/2018, which includes the Airservices Lease Areas, was reviewed to assess the current and historical land ownerships and lease agreements. The Airport Estate land is owned by Northern Territory of Australia of C/- The Crown Solicitor, Dept. of Law, 5 Mitchell Street, Darwin NT 0800, and leased to Voyages Indigenous Tourism Australia Pty Ltd (formerly Ayers Rock Resort Company Limited and Voyages Hotels & Resorts Pty Ltd) who trades as ILC Tourism Pty Ltd. The current CoT obtained as part of the TSI program are included in the Appendix A of the Site Brief Report (Tetra Tech Coffey, July 2021).

2.1.2 Airservices Lease Information

Airservices sublet portions of the Airport Estate, which is currently occupied by the MFS, the IFS and the FTG, from VITA under lease agreement 533933. Particulars of the lease agreement are summarised below:

- Sub Lessor: Voyages Indigenous Tourism Australia Pty Ltd
- Sublessee: Airservices Australia
- Land Details: Volume 830, Folio 314, on Deposited Plan S 81/079
- Term of Lease: 1 September 2004 to initially 28 June 2007, with automatic extensions provided the Head Agreement and Service Agreement is extended. The current Service Agreement currently expires 1 September 2024.

Airservices does not currently, and historically has not, possessed a lease agreement for the STP or the seepage spray field area.

Airservices Lease Area boundaries have been illustrated on Figure 1 and Figure 2, Appendix A.

3. ENVIRONMENTAL SETTING

Environmental setting information has been sourced from publicly available literature and data sources along with known historical reports which have been reviewed by Tetra Tech Coffey. A summary of the key findings is detailed in the following sections.

3.1 TOPOGRAPHY

Topographical mapping viewed online at NT Natural Resource Maps (https://nrmaps.nt.gov.au/nrmaps.html) (1:2,500 5047-121223), indicates that the AYQ sits at an average elevation of approximately 495 m Australian Height Datum (AHD). The topography of the area is generally flat with ridges of sand dunes. No indicators of significant fill material were noted in the Preliminary Site Investigation (GHD, 2017a).

3.2 DRAINAGE

Surface water flow across the Airport Estate is directed along both natural and constructed flow paths which are influenced by an aeolian dune system predominantly aligned in a north-east – south-west orientation, with the most notable dune features evident towards the western end of the runway. Constructed drainage swales and culverts have been installed parallel to the main taxiway and aircraft apron which ultimately flow to a stormwater holding pond just south-west of the MFS. A south-east to north-west trending drainage swale is located along the northern side of the STP Seepage Field and is anticipated to direct rainfall run-off from the STP and the road between the STP Seepage Field and the IFS to an open area of natural ground north-west of the Seepage Field. Towards the eastern and western ends of the runway, surface flow and potential pooling/flooding of rainfall is directed away from this infrastructure and there is evidence of localised and isolated drainage features designed to capture and control sheet flow during significant rainfall events.

Independent constructed trade waste drainage systems divert wastewater generated by Airservices away from both the MFS and FTG into a preliminary treatment system containing a coalescing plate separator at each facility with discharge primarily directed to the STP via a common rising main. However, in the case of the FTG, a set of diversion valves can be used to direct stormwater runoff from the FTG pad through a diversion pipeline which is believed, anecdotally, to discharge to a leach drain and/or trench located to the south of the stormwater holding pond. However, the exact location of the outlet has not been identified and the location of the pipe beyond the Airservices lease area boundary has not been able to be confirmed during site inspections and investigation works.

The treated effluent pumping station at the end of the STP treatment train is shown in the design drawing for the Distal STP system (ref: Photograph 13, Appendix I) at AYQ for treated wastewaters to be directed to an irrigation storage tank to be discharged across the STP Seepage Field with excess treated effluent overflowing to an approved point of discharge. The location of this overflow discharge point is currently uncertain; however, it appears that there may be some features to the south and south-east of the STP which could represent discharge points for overflow to infiltration sumps or leach drains.

Constructed stormwater drainage swales/culverts are shown on Figure 2 and the drainage pipe network layout for wastewater flows from SZA's have been presented on Figures 4A to Figure 4C. Further detail related to the specific trade waste systems at the MFS and FTG is provided in 3.2.1 and Section 3.2.2 below.

3.2.1 Main Fire Station Trade Waste Drainage System

Vehicle and equipment washdown is undertaken inside the MFS building in the ARFF vehicle washdown bay and fire station rollout bay as shown in Figure 4B. A series of small drains in the floor of these bays collect wash down water which is then gravity transferred to an underground tank situated outside the MFS building to the north-west.

A diaphragm pump transfers wastewater from the underground concrete tank to the sewer discharge point via a coalescing plate separator housed in the separator enclosure shown in Figure 4B. The waste oil from the separator overflows to a removable drum and the effluent drains to an underground tank and sewer pumping station. The pumps start and stop automatically, unless in manual mode, based on tank level float switches.

Based on trade waste sampling reports by Beca Consultants Pty Ltd (Beca) between 2016 and 2017 and from underground hydraulic asset plans for the MFS provided by VITA discharge from this wastewater system only is directed to the STP and does not discharge to the stormwater swale to the south of the MFS. During site inspections for Phase I TSI works a discharge outlet was observed in the drainage swale to the south of the MFS, which appeared to possibly be connected to a storm water drainage point external to the MFS building.

Hydraulic services design plans for the MFS are provided in Appendix J.

3.2.2 Fire Training Ground Trade Waste and Stormwater Drainage System

The FTG consists of a concrete containment area that drains through a screen and silt trap into trade waste collection pits. Adjacent to the training pad there are in-ground manual diversion valves to send drainage to either a nearby stormwater swale, the digestion system, or the separator system.

Based on hydraulic services design drawings as shown in Appendix J, the combined stormwater and trade waste treatment system is comprised of the following assets, as shown on Figure 4C:

- Diversion valve – to stormwater swale and holding pond, trade waste tanks or anaerobic digester
- 3 trade waste collection pits
- Underground holding tank
- Coalescing plate separator
- Foam degradation system comprising:
  - Manual dosing pit
  - Anaerobic digestion tank (20,000 L)
  - Aerobic finishing tank (12,000 L)
  - Separator shed
  - Dosing shed
- Transfer pump station to STP.

The primary treatment method for accumulated wastewater and rainfall is evaporation. When diverted to the separator system, the wastewater drains to an underground holding tank. A progressive cavity pump draws from the tank to feed a coalescing plate separator. The waste oil from the separator is collected in a drum and the effluent drains to an unlined swale.

When the diversion valves are configured to divert wastewater to the foam degradation system, water runs off the pad into the anaerobic digestion tank via the manual dosing pit. The anaerobic digestion tank overflows into the finishing tank which has its contents pumped through the existing oil water separator by a new diaphragm pump that is located in the separator shed.

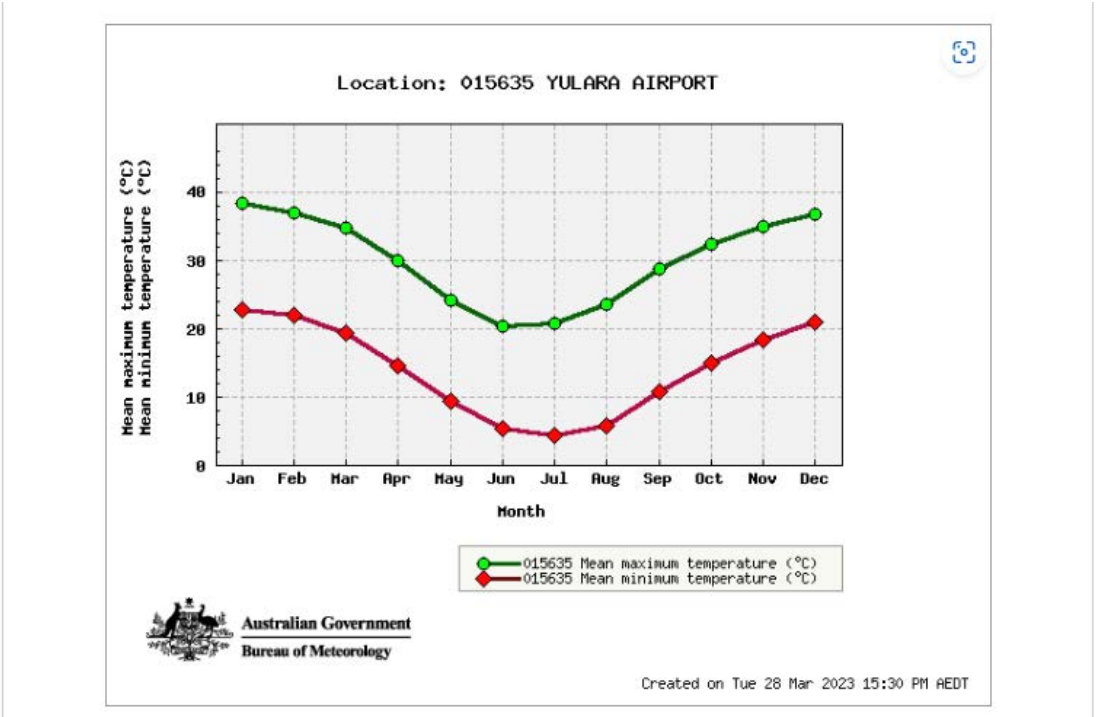
The diversion valve connected to the 150 mm stormwater discharge line should be closed by Airservices when fire training is in progress and/or during vehicle and fire deluge system washdown, and open when the FTG is not in use. The purpose of this stormwater discharge line and valve (when open) is to divert stormwater entering the drain in the FTG pad directly to a subsurface leach drain and/or trench located south of the stormwater holding pond (which is also located to the south of the MFS). The end point of the subsurface leach drain was unable to be determined, however was observed to lead north from the FTG.

3.3 CLIMATE AND RAINFALL

Information obtained from the Bureau of Meteorology (BoM) *Climate Statistics reporting Database* (BoM, 2023) indicates that Yulara (township) experiences a hot arid climate, with hot summers and cold winters. Yulara is situated in arid Central Australia where rainfall is low and unpredictable, and the majority of the rainfall falling between November to March (BoM, 2023). High evaporation rates experienced in the area mean water collected in temporary wetlands or creek lines soon dry up after the rain has stopped. Rainfall in the arid zone is highly variable, with some years receiving very low rainfall and floods in other years.

BoM weather station 015635 (Yulara Airport), which is located on airport land, indicates an average annual rainfall of 270 mm, an average monthly minimum temperature of between 4.4 ºC and 22.9 ºC and an average monthly maximum temperature of between 20.4 ºC and 38.4 ºC (data obtained from 1983 to 2023).

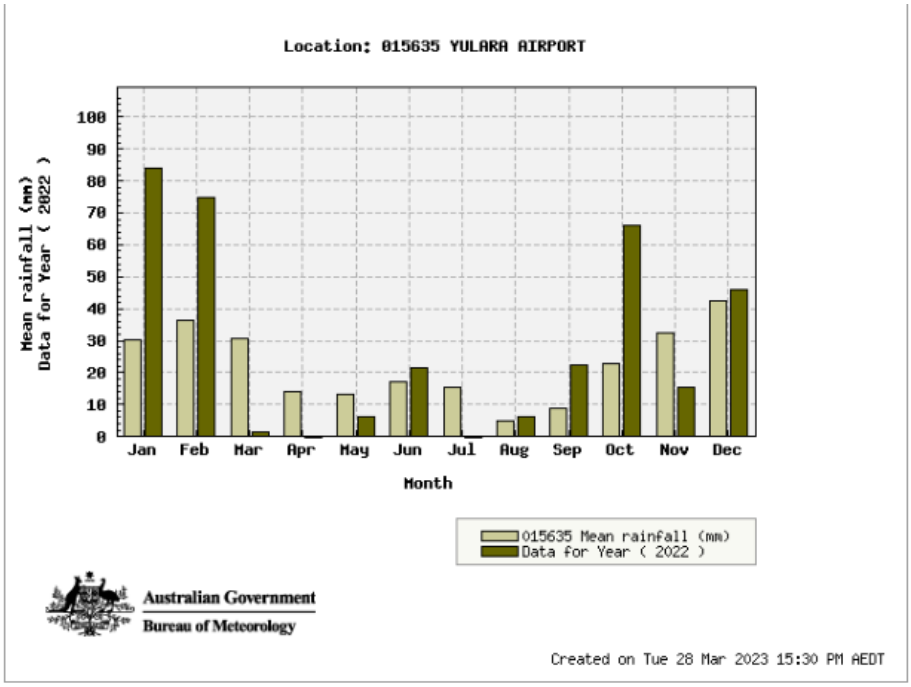
Rainfall recorded from June 2022 to February 2023 (the time between the last site investigation and the current SI) was near the long-term average; with well below average rainfall recorded for July 2022, November 2022 and February 2023, and well above average rainfall recorded in September 2022, October 2022 and January 2023. Refer to temperature and rainfall data graphs below obtained from the BoM website (Climate statistics for Australian locations (bom.gov.au)).



Statistics	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Years
Mean maximum temperature (°C) for years 1983 to 2023	38.4	37.0	34.7	30.1	24.3	20.4	20.8	23.7	28.8	32.4	35.0	36.7	30.2	36
Statistics	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Annual**	**Years**
Mean minimum temperature (°C) for years 1983 to 2023	22.9	22.1	19.5	14.6	9.4	5.5	4.4	5.9	10.8	15.1	18.5	21.0	14.1	36

12.3 = Not quality controlled

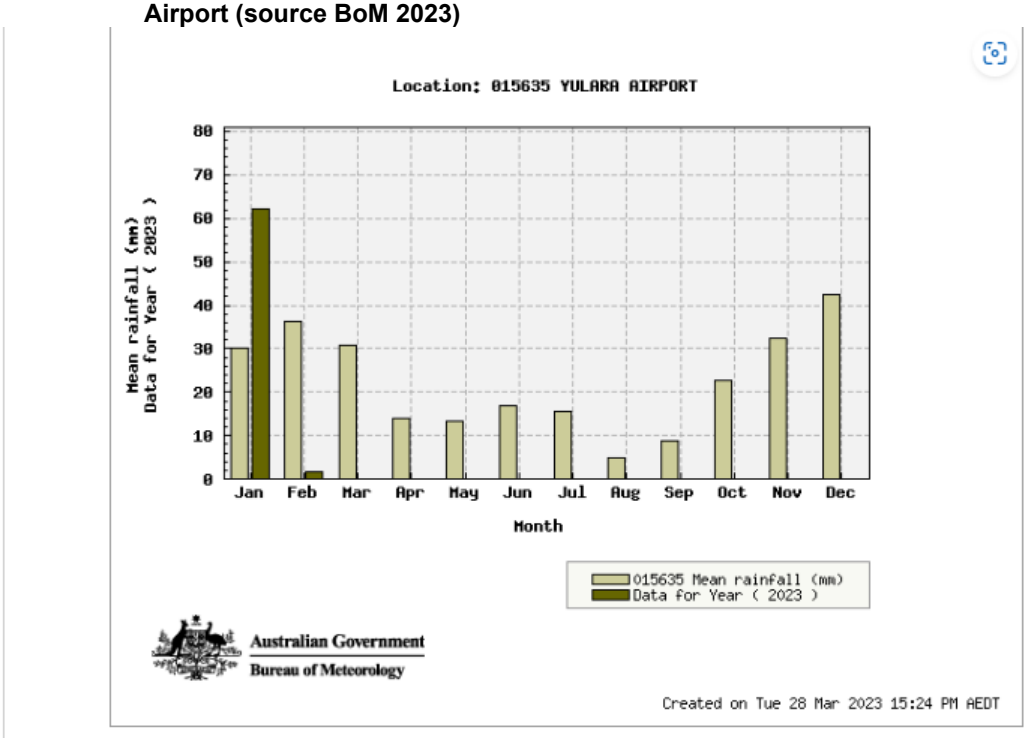
Figure 3-1 Graph of mean minimum and maximum temperatures at Yulara Airport (source BoM 2023)



Statistics	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Years
Mean rainfall (mm) for years 1983 to 2023	30.3	36.4	30.7	13.9	13.2	17.0	15.6	4.9	8.7	22.8	32.4	42.3	270.7	33
Statistics	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Annual**	**Years**
Rainfall (mm) for year 2022	*84.0*	*74.8*	*1.2*	*0.0*	*6.4*	*21.4*	*0.0*	*6.2*	*22.4*	*66.0*	*15.6*	*46.0*	*344.0*	1

12.3 = Not quality controlled

Figure 3-2 Graph of mean rainfall for years 1983 to 2023 and actual measured rainfall for 2022 at Yulara Airport (source BoM 2023)



Statistics	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Years
Mean rainfall (mm) for years 1983 to 2023	30.3	36.4	30.7	13.9	13.2	17.0	15.6	4.9	8.7	22.8	32.4	42.3	270.7	33
Statistics	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Annual**	**Years**
Rainfall (mm) for year 2023	*62.2*	*1.8*												0

12.3 = Not quality controlled

Figure 3-3 Graph of mean rainfall for years 1983 to 2023 and actual measured rainfall for 2023 at Yulara Airport (source BoM 2023)

3.4 GEOLOGY

Regional geological information obtained from the Australian Geological Survey Organisation (AGSO) and the Central Land Council (CLC) (accessed online at https://nrmaps.nt.gov.au/nrmaps.html) as presented on the 1:250,000 map sheet indicates that the AYQ is underlain by Quaternary (Qr) Aged; aeolian sand plains and sand dune deposits. To the west of the AYQ, the geology is described as Quaternary (Qr) Aged, red sand, mud and gravel, sheet wash deposits.

The geology identified in soil bores and groundwater wells installed by Tetra Tech Coffey was red/ brown in colour, with fine to medium grained sand to a depth of approximately 3 to 4 m below ground level (bgl), where a consolidated conglomerate layer was encountered ranging from a depth of approximately 3m bgl up to a maximum depth of 7m bgl, with a competent dolomitic sandstone lithology underlying until the limit of investigation depths at 15 m bgl.

The bore log prepared for RN012065 identified Quaternary aged sand and gravel to 3 m and Tertiary clay to 36 m, overlying dolomitic sandstone (Appendix C).

It is considered that the presence of the conglomerate layer overlying the sandstone represents a geological unconformity as has been formally established within the recorded lithological profile in the vicinity of Kata Tjuta and the Amadeus Basin (in which AYQ is located). The Mount Currie Conglomerate is mapped as the predominant shallow geological unit and outcrops in various areas across this region, inclusive of AYQ.

The Mount Currie Conglomerate and Mutitjulu Arkose unconformably overlie the known Neoproterozoic rocks and may themselves straddle the Neoproterozoic–Cambrian boundary, with the interpreted regional geological stratigraphy presented in Figure 3-4 below (CloudGMS, 2019).

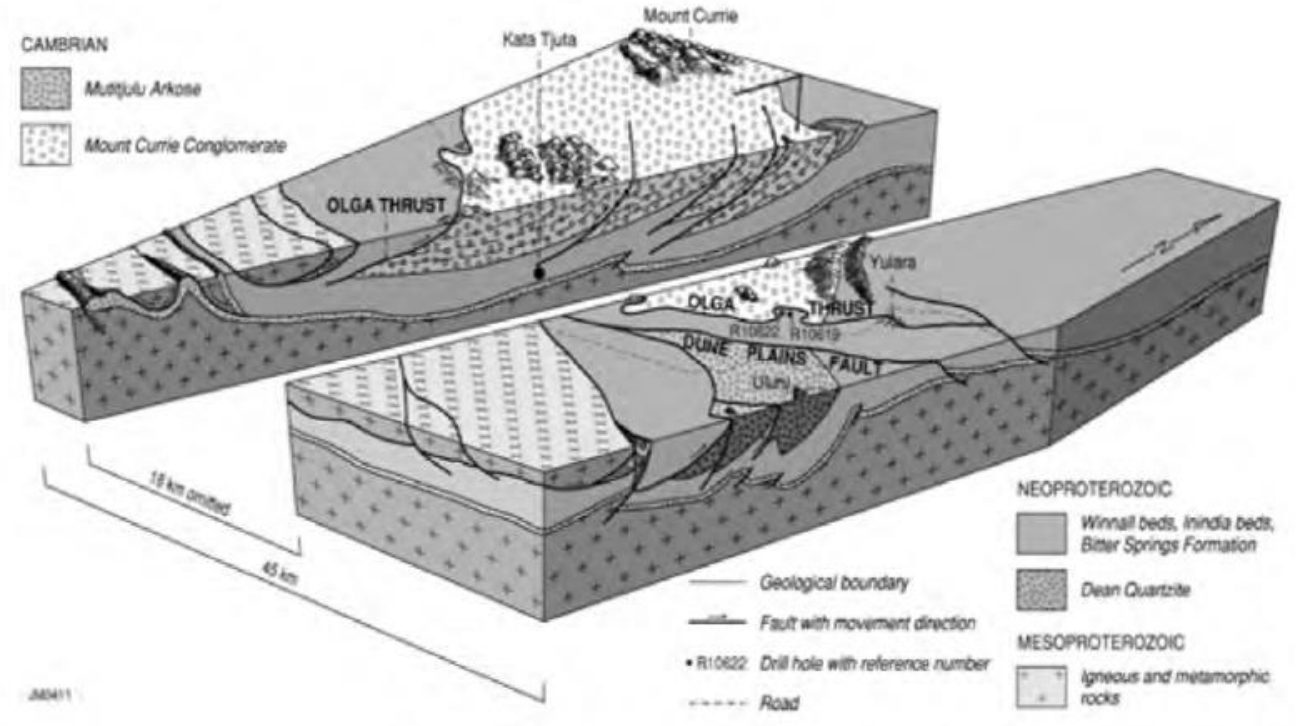


Figure 3-4 Perspective block diagram showing solid geology map and cross-sections of Uluru and Kata-Tjuta area looking northwest. Superficial Cenozoic sediments omitted. (source: CloudGMS, 2019)

3.5 HYDROGEOLOGY

Groundwater is the only reliable major water supply in the region for purposes such as irrigation, industrial process water and municipal drinking water supply. The region including Uluru, Yulara Pulka, Kata Tjuta and north to Lake Amadeus are within the Amadeus Basin. There are two main aquifer systems within the area covered by the basin, the Dune Plains Aquifer which is comprised of Cenozoic sediments, from which the Yulara Resort and Yulara township draws its water supply and the Bedrock Aquifer, which is the water supply for the Mutitjulu community. The recognised extent of the Dune Plains Aquifer is shown in Figure 3-5. The Dune Plains Aquifer extends beneath the Airport, although it is at the northern edge of the aquifer and the sediments are likely to be shallow (less than 40 m).

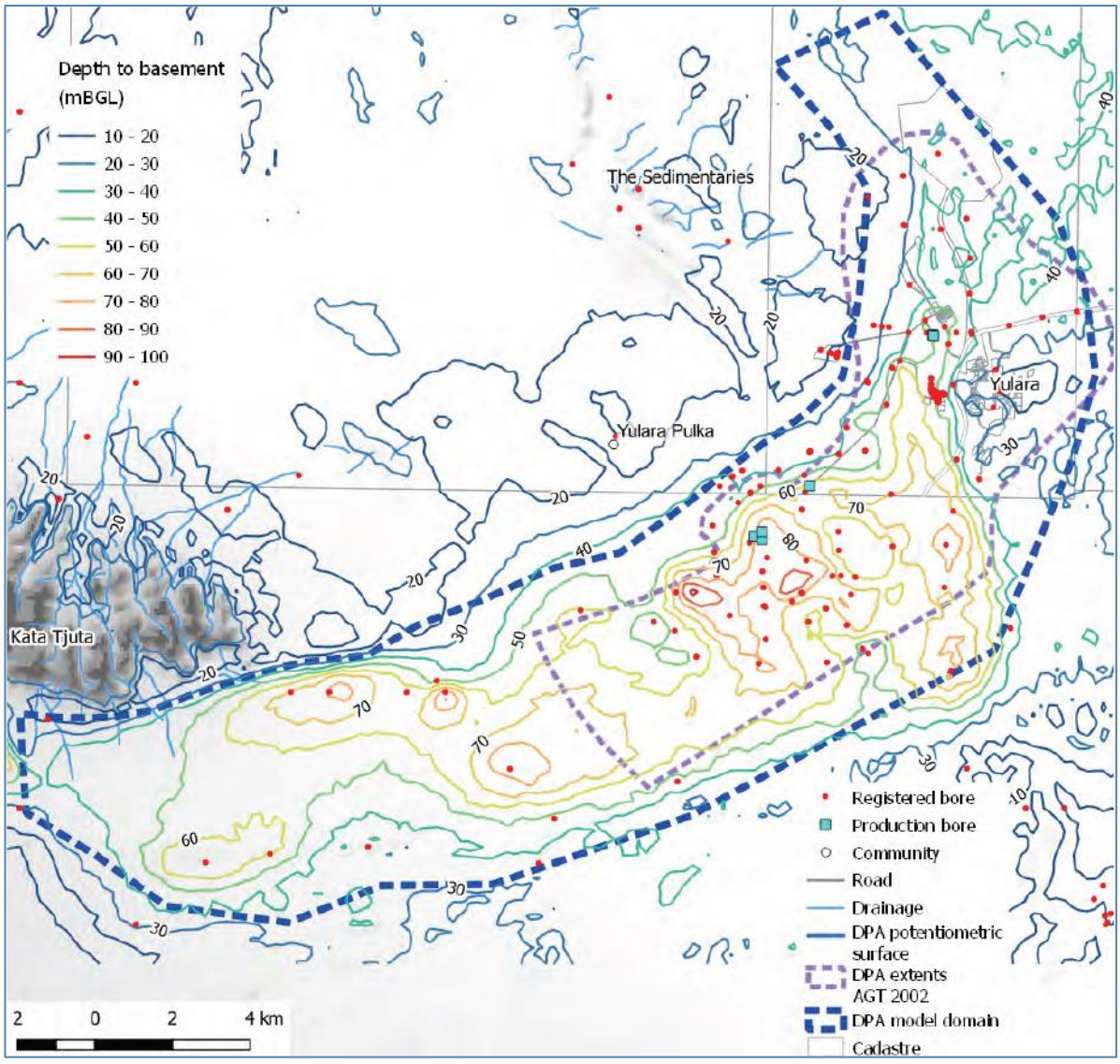


Figure 3-5 Dune Plains Aquifer extent and palaeovalley depth to bedrock (source Cloud GMS 2019, modified from English 1998)

Groundwater in the Amadeus Basin is understood to regionally flow to the north-east towards Lake Amadeus. Locally within the Dune Plains Aquifer, groundwater is inferred to flow in an arc, following the palaeovalley from the south of Kata Tjuta to the north of the Airport (refer Figure 3-6). However, recharge can differ considerably on a year-to-year basis and may result in localised groundwater gradient development in response to artificial drawdown and/or recharge (GHD, 2017a). Recharge of the Dune Plains Aquifer is associated with rare major rainfalls (Australian Government – Parks Australia, N.D). The conceptual model

developed by Cloud GMS for NT Power and Water (CloudGMS, 2019) concluded that recharge of the Dunes Plains Aquifer occurred predominantly on the western edge of the aquifer in small areas near Kata-Tjuta and the Sedimentaries with an estimated annual recharge across the whole aquifer of between 90 ML/yr and 850 ML/yr based on a range of studies and calculation approaches. The model also noted that recharge only occurred during large or sustained rain events, citing examples where rain events of up to 142 mm did not result in measurable changes in groundwater levels. Low and infrequent recharge is further supported by the age of shallow groundwater, which was estimated from Carbon 14 analysis as generally between 770 years and 5,000 years (CloudGMS, 2019). Isolated groundwater bores towards the south of the aquifer show some small-scale areas of the aquifer where groundwater was recharged within the last 50 years (Australian Government – Parks Australia (date of publication unknown). The modelled yield of the Dune Plains Aquifer towards its northern extents has been measured as <1 L/s (CloudGMS, 2019 – on behalf of NT Power & Water) indicating that the ability to abstract significant or consistent volumes of groundwater is highly limited.

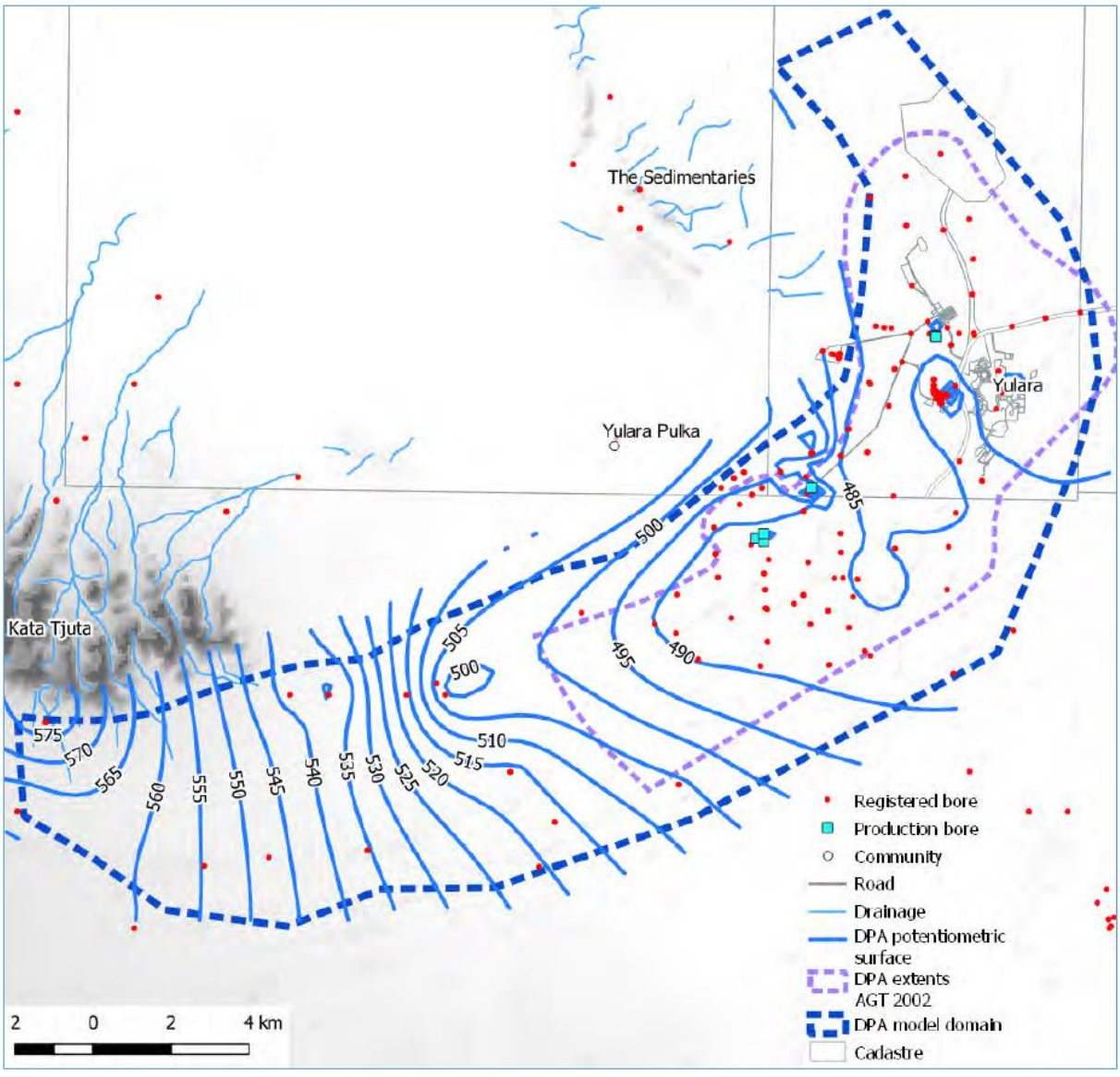


Figure 3-6 Groundwater potentiometric surface and inferred groundwater flow direction (source Cloud GMS 2019)

The municipal potable-water supply to the Yulara Township is abstracted from three bore-fields located more than 4 km to the south of AYQ and which are operated by NT Power and Water Corporation and are licensed for abstraction with an annual limit of 1,600 ML/year. The locations of these bore-fields relative to the AYQ are shown on Figure 3-6 and is also shown in Figure 3, Appendix A. Well installation details from the NT Government Water Licensing Portal indicates that the closest registered wells (RN13363 and RN13365) are screened between 41 and 56 m bgl and that groundwater is at approximately 23 m bgl. Bore construction logs (where available) are included in Appendix C of this TSI report.

Groundwater in the Bedrock Aquifer varies in age and some bores sampled near Uluru are known to contain ancient groundwater, up to 30,000 thousand years old. These waters occur in deep, buried alluvial channels and in the fractures of deep rock systems[3].

Groundwater flow direction beneath the airport is inferred to flow to the north/ north-west based on standing water levels (SWLs) measured during both Phase 1 and Phase 2 works. This is consistent with recharge near Kata-Tjuta and flow towards Lake Amadeus.

3.5.1.1 Groundwater Bore Search

A search of the Northern Territory Geographic Information System (http://www.ntlis.nt.gov.au), which was undertaken in April 2021, confirmed that no registered groundwater bores are located within the Airservices lease boundaries. It should be noted however that the Airport does not sit within a Water Control District and on this basis, there was no requirement for registration of groundwater bores.

The closest registered groundwater well (Bore: RN012065) is located approximately 95 m north of the MFS. The bore was installed in 1979 to a depth of 37.5 m bgl. The registered groundwater well is understood to have been historically utilised for monitoring purposes with a screened section installed from a depth of 30.58 m bgl to 37.04 m bgl. No other registered groundwater wells are present within the boundaries of the Airport Estate or within 30 km to the north-west in a hydraulically down-gradient direction of the Airport Estate, based on the established groundwater flow direction.

A further six current or historic bores (RN012074, RN012075, RN012076, RN012081, RN012082, RN012163) were listed on the Natural Resources (NR) Maps Database to be present within 2 km of the Airport Estate all of which are in a southerly direction and hydraulically up-gradient of the TSI study area. All six bores are listed for investigation or monitoring purposes and installed between 37.5 and 93 m bgl. Groundwater in the wells has historically been intercepted between 12.3 and 14.6 m bgl and are all interpreted to be in the Dune Plains Aquifer. Wells RN012065, RN012081 and RN012163 were gauged, and sampling was undertaken as part of the TSI scope.

The locations of the bores are presented on Figure 3-7, with the historical bore construction logs included in Appendix C and with key details summarised in Table 3-1 below.

Table 3-1: Registered Groundwater Wells Within 2 km of AYQ

Bore Number	Bore Name	Purpose	Status	Aquifer	Location from Airservices occupied areas	Drilled Depth (m bgl)	Water Level (m bgl)
RN012065	Monitoring Bore – AYQ	Monitoring	Current	Dune Plains	100m N	37.5	12.3
RN012074	-	Investigation	Historical	Dune Plains	1800m SW	39	14.8

[1] Water - DAWE https://www.awe.gov.au/parks-heritage/national-parks/uluru-kata-tjuta-national-park/natural-environment/water

Bore Number	Bore Name	Purpose	Status	Aquifer	Location from Airservices occupied areas	Drilled Depth (m bgl)	Water Level (m bgl)
RN012075	-	Investigation	Historical	Dune Plains	2000m SW	54	12.9
RN012076	-	Investigation	Historical	Dune Plains	900m W	37.5	12.6
RN012081	Monitoring Bore – Yulara Dune Plains	Monitoring	Current	Dune Plains	1450m S	93	14.6
RN012082	-	Investigation	Current	Dune Plains	1350m SE	53	-
RN012163	Replacement for RN012082	Investigation	Current	Dune Plains		63	14.2



Figure 3-7 Registered groundwater wells within 2 km of Airport

(Cross symbols indicate wells which are destroyed, out of service or decommissioned)

The closest licensed abstraction wells are the Yulara Townsite municipal water supply, which is located between 4.3 to 9.5 km south of the AYQ (presented on Figure 3, Appendix A). The town water supply is managed by NT Power and Water Corporation, who have included PFAS testing in the analytical suite since 2017. Results, which are reported on their website (https://www.powerwater.com.au/about/what-we-do/water-supply/drinking-water-quality/pfas) indicate that PFOS+PFHxS has been below the limit of detection (<0.001 µg/L) for all sampling events.

Abstraction of groundwater for use by remote Indigenous communities down-gradient of the airport estate is not fully understood, however through information obtained as part of the TSI works, no known permanent communities are listed by the Australian Government National Indigenous Australians Agency (Communities | Indigenous.gov.au). The Katiti-Petermann Indigenous Protected Area (IPA) Plan of Management (2015) indicates that groundwater occurrence to the north-west of the Airport Estate is extremely rare with a general absence of natural springs or soaks and depth to groundwater generally prohibitive to access when travelling on country. Water sources used and relied upon by transient Traditional Owners generally consist of creeks, floodways, waterholes, claypans and rockholes where water quality is typically more suitable for drinking (Central Land Council (CLC) Australia, 2015).

3.5.1.2 Surface Water Features

Surface water occurrence is typically temporary in nature, being ephemeral as a function of the arid-zone climate of the region in which AYQ is located. Wetland mapping across the region has identified isolated, but reliable, waterholes throughout the Uluru-Kata Tjuta National Park including Mutitjulu Waterhole (Glen Maggie Springs), approximately 18 km south-east of the AYQ, at the base of Uluru on the southern side. It is located over the Bedrock Aquifer and is the closest and most reliable natural source of surface water within 100 km of the AYQ. There is no pathway in surface water drainage or groundwater flow from the AYQ to the waterhole. The waterhole is a small waterhole which recharges the Bedrock Aquifer directly by inflow of water through the soil, generally in response to large flooding events and supports wetland vegetation (Duguid, 2005).

A brine infiltration basin is present between the township and the AYQ and receives an estimated 110 ML/year of reverse osmosis (RO) reject brine which occurs as outfall from the municipal water supply RO plant commissioned and operated by NT Power and Water Corporation and supplied and maintained by MAK Water Pty Ltd.

A large salt lake exists approximately 30 km north of the AYQ (Lake Amadeus) and potentially receives groundwater that flows beneath the AYQ. Several smaller salt ponds (claypans) are present between the AYQ and Lake Amadeus, with the nearest claypan approximately 9 km from the AYQ runway. Based on their location and geomorphology, these ephemeral surface water features are not considered to be surface water expressions of groundwater.

Tetra Tech Coffey has not identified any evidence of other surface water features that would potentially receive run-off from the site or be fed by groundwater down-gradient of the site. Geomorphological alterations to the landscape in the future may need to be considered in the event that these lead to new surface water occurrences down-gradient of the Airport Estate, if they are determined to be reliable water sources for use by off-airport receptors.

4. PRELIMINARY SOURCE PATHWAY RECEPTOR IDENTIFICATION

The NEPM risk-based approach to contaminated site management requires that investigations be sufficient such that a conceptual site model (CSM) can be developed to determine the source of potential contamination, understand the nature and extent of contaminant migration pathways, and assess any actual or perceived risk to human health and/or ecological values. Development of a CSM through assessing plausible source-pathway-receptor (SPR) linkages is an established and defined method in the human health and ecological risk assessment process. For a particular contaminant to present a risk, these three components must be present, however Tetra Tech Coffey also considers a fourth component that is a key determining factor in whether that risk is actual or perceived.

- **Source -** A land use, activity or industry which could potentially release hazardous substances into the environment, and which may cause harm.
- **Migration Pathways** - A mechanism by which the substance released from the source, or derivatives of the source, can be transported or migrate through the environment.
- **Receptors** - The human or ecological component which could potentially be exposed to the source, or derivatives of the source, and which could potentially be at risk from exposure to the substance released from the source.
- **Exposure Route** - The mechanism by which receptors can become exposed to a hazardous substance and which may have adverse effects following exposure to the source or derivatives of the source.

If one of these four components is missing from an exposure scenario, then there can be no risk. Relevant SPR connections identified for this study area are summarised below based on the findings of the SBR (Tetra Tech Coffey, 2021) and other previous studies and has been refined based on the analytical results of the intrusive works in both Phase 1 and Phase 2 of the site investigations. It should be noted that the conceptual site model presented within this report is focused primarily on PFAS-related risks. A secondary, high-level assessment of potential risks related to other contaminants is also included.

4.1 POTENTIAL SOURCES

A primary source of contamination is the first point at which a chemical has been introduced via a leak, spill or deliberate disposal released directly from the original source and/ or historical use. Secondary sources of contamination are associated with residual impacts which are present in different types of media as a result of the primary source release.

Based on the findings of the assessment, the potential primary and secondary sources of contamination which have been identified within the Airport Estate and off-airport which could be contributing to, or attributed by, contamination of Airservices Lease Areas, include those presented in Section 4.1.1 to Section 4.1.3 below.

Potential sources of PFAS on Airservices Lease Areas and across the broader Airport Estate (on-airport) are shown on Figure 2 and Figures 4A to 4C, Appendix A.

4.1.1 Airservices Lease Areas

The following source zone areas (SZA) within the Airservices lease areas which have the potential to cause contamination have been identified. These have been assessed based on the data collected as part of the TSI and are also presented in the updated conceptual site model in Section 10 of this TSI report.

Table 4-1: Potential Sources of Contamination within the Airservices Lease Areas

Airservices Lease Area	Source Zone Areas	Potentially Contaminating Activities	Contaminants of Potential Concern (CoPC)
IFS	• Former interim fire station (and surrounding unsealed areas)	• Hazardous chemical storage • Fuel storage and dispensing • Accidental spillage and discharge • Servicing of equipment including ARFF vehicle washdown	• PFAS [1] • Total Recoverable Hydrocarbons (TRH) • Benzene, Toluene, Ethylbenzene, Xylene, Naphthalene (BTEXN) • Polycyclic Aromatic Hydrocarbons (PAHs) • metals
MFS	• ARFFS fire station footprint • Drainage low point (including dam) • Washdown area/ pad • Underground interceptor and associated underground pipework • Former AFFF storage areas • Diesel storage area and refuelling point. • Mechanical Workshop Secondary sources relate to seepage from stormwater and sewerage pipes.	• Hazardous chemical storage • Fuel storage and dispensing • Accidental spillage and discharge • Servicing of equipment • Washdown of ARFF vehicles	• PFAS [1] • TRH • BTEXN • PAHs • Chlorinated hydrocarbons (CHCs) • Solvents • Pesticides/Herbicides • Surfactants.
FTG	• Large Mock-up (LMU) and concrete pad • Wastewater USTs and pits • Kerosene storage location • Interceptor location Secondary sources relate to seepage from stormwater and sewerage pipes.	• Hazardous chemical storage • Use of propellants • Firefighting Training • Treatment and transfer of wastewater	• TRH • PAHs • Solvents • Surfactants • PFAS [1]

[1] Due to the chronology of AFFF use by Airservices at AYQ, the PFAS compounds most likely to be relevant are those present in Ansulite™ and associated degradation compounds.

4.1.2 On-Airport Sources

The following activities and land use on the broader Airport Estate have been identified during the assessment which have the potential to contribute to contamination on-airport. The location of these is shown on Figure 2.

Table 4-2: Details of On-Airport Potentially Contaminating Activities and Land Uses

Facility	Owner/ Lessee	Activity	CoPC
Airport hangar	Unknown.	• Hazardous chemical storage • Fuel storage and dispensing • Accidental spillage and discharge • Servicing of equipment	• TRH • BTEX • PAHs • Chlorinated hydrocarbons (CHCs) • Solvents • PFAS • Surfactants

Facility	Owner/ Lessee	Activity	CoPC
Aviation fuel facilities Non-Aviation Fuel facilities	Viva Energy/ BP Car hire companies	• Hazardous chemical storage • Fuel storage and dispensing	• TRH • BTEX • PAHs • PFAS
Spoil stockpiling area	VITA	• Temporary stockpiling of excess soil and millings from on-airport projects	Not known
Sewage treatment plant (STP) and spray field (current and previous layouts)	VITA Receives wastewater from FTG and sewage from CFS	• Sewage Treatment	• Metals • Nutrients • Pathogens • PFAS (if present in influent)

4.1.3 Off-Airport Sources

No off-airport potential sources of contamination have been identified within 2.5 km of the airport estate boundary.

The municipal tip is approximately 5 km south-west of the airport and may present a source of various contaminants to groundwater.

A brine disposal pit associated with reverse osmosis treatment of the town water supply is approximately 2 km up-gradient of the airport and could potentially contain some trace contaminants from regional groundwater that have been concentrated in the brine.

4.2 POTENTIAL MIGRATION PATHWAYS

For the purpose of this assessment, possible migration pathways are identified as natural and/ or man-made pathways for the migration of contaminants of concern in the liquid and/ or gaseous state. Potential contaminant migration pathways for the contaminants of concern include:

- Vertical movement through soil profile naturally (for liquid phase contaminants).
- Vertical movement via the effects of rainfall infiltration (for leachable components of solid phase contaminants).
- Vertical upward movement of vapours and ground gas through volatilisation.
- Vertical movement through the vadose zone via seasonally and tidally induced aquifer fluctuation.
- Surface water flow along both natural and constructed drainage features during times of heavy rainfall and transport of contaminated sediments.
- Horizontal flow in the groundwater aquifer.
- Abstraction of contaminated groundwater.
- Transport in ambient air via wind action.

4.3 RECEPTORS AND EXPOSURE ROUTES

The following key ecological and human health receptors and their potential exposure routes have been identified within the Airservices lease areas, as well as on-airport and off-airport, as summarised below. At this point the possible exposure routes listed below are hypothetical and will be refined based on the findings of the TSI.

4.3.1 Airservices Lease Areas

Table 4-3: Human Receptors within the Airservices Lease Areas

Receptor	Potential Exposure Routes
Airservices workers and/ or visitors whose activities and exposure durations are similar to a commercial/ industrial scenario.	• Dermal contact with soil. • Incidental ingestion of soil. • Inhalation of soil/ sediment derived dusts. • Inhalation of vapours. • Dermal contact and/ or incidental ingestion of surface water and sediments (from surface water drainage networks).
Construction or maintenance workers who may be exposed to contamination via dermal contact, ingestion, or inhalation.	• Dermal contact with surface and excavated soil. • Incidental ingestion of surface and excavated soil. • Inhalation of soil/ sediment derived dusts. • Inhalation of vapours. • Dermal contact and/ or incidental ingestion of surface water and sediments (from surface water drainage networks). • Dermal contact and/ or incidental ingestion of groundwater.
Future users of groundwater for a non-potable purpose, should a bore be installed within the Airservices lease boundary.	• Incidental ingestion of shallow groundwater through potential future abstraction if bores are installed for non-potable purposes. • Inhalation of vapours.

Table 4-4: Ecological Receptors within the Airservices Lease Areas

Receptor	Potential Exposure Routes
Terrestrial flora and fauna (including plants, trees, birds, reptiles, mammals, insects).	• Direct contact and uptake of contamination from soils. • Direct contact and uptake of contamination in surface water and/ or sediments. • Direct contact with and uptake of contamination from groundwater (deep rooted trees or riparian plants). • Ingestion of contamination which has bio-accumulated within the food chain.

4.3.2 On-Airport and Off-Airport

Table 4-5: On-Airport and Off-Airport Human Receptors

Receptor	Potential Exposure Routes
Workers (including visitors to the Airport, workers in areas surrounding the Airport) whose activities and exposure durations are similar to a commercial/ industrial scenario.	• Inhalation of soil/ sediment derived dusts. • Inhalation of vapours. • Incidental ingestion of soil or sediment. • Dermal contact with soil or sediment. • Incidental ingestion of shallow groundwater through potential future abstraction if bores are installed for non-potable purposes (in the scenario where the Airport is utilising abstracted groundwater).
Construction or maintenance workers (including sub-surface workers).	• Dermal contact with surface and excavated soil.

Receptor	Potential Exposure Routes
	• Incidental ingestion of surface and excavated soil. • Inhalation of soil/ sediment derived dusts. • Inhalation of vapours. • Dermal contact and/ or incidental ingestion of surface water and sediments (from surface water drainage networks). • Dermal contact and/or incidental ingestion of groundwater.
Users of groundwater such as: • Yulara town water supply • Ayers Rock Resort accommodation facilities which is abstracted from the bore fields located 9.5 km south-west of the Airport. Groundwater abstraction or use has not been identified north or north-west of the airport and it is confirmed that no registered bores are present, however seasonal dining activities are known to take place approximately 2.5km north-west of the Airport Estate boundary. Groundwater salinity is prohibitive to potable uses without treatment, and there is no electricity supply or infrastructure down-gradient of the Airport Estate to support water treatment systems or repeated use.	• Ingestion of shallow groundwater through abstraction following use for potable and non-potable purposes. • Inhalation of vapours. • Current groundwater flow directions do not support a pathway between contamination sourced from the airport and the established water supply bores (located to the south-west of the Airport). However, future flow direction changes or installation of alternative bores may generate future connections. We note that these future connections, if established, would require some form of treatment to address salinity.

Table 4-6: On-Airport and Off-Airport Ecological Receptors

Receptor	Potential Exposure Routes
Terrestrial flora and fauna (including plants, trees, birds, reptiles, mammals, insects).	• Direct contact and uptake of contamination from soils. • Direct contact and uptake of contamination in surface water and/ or sediments. • Direct contact with and uptake of contamination from groundwater (deep rooted trees or riparian plants). • Ingestion of contamination which has bio-accumulated within the food chain.
Aquatic flora and fauna (ephemeral salt lake ecosystem).	• Direct contact and uptake of contamination in surface water and/ or sediments following groundwater migration and seepage into lakes.

Mutujulu waterhole, at the base of Uluru, is the closest and most reliable natural source of surface water for 100 km. Mutujulu waterhole is located approximately 30 km upgradient of the airport estate boundary and as such is not considered a plausible receptor of groundwater from the airport.

Lake Amadeus is down gradient of the airport and there may be a possible pathway between the airport and the lake. This considered highly unlikely based on information sourced from Jacobson (2019) which indicates that regional groundwater flowing from south of Mutujulu, in a northerly direction towards the Amadeus Basin may have a discharge zone within that Basin formation.

This is considered a plausible scenario based on the mapped potentiometric surface elevation of the fractured and weathered rock unconfined aquifer having a steeper gradient across this area. The mapped potentiometric surface elevation at Uluru is approximately 500 mAHD and at the eastern edge of the Amadeus Basin it is in the order of 450 mAHD (CloudGMS, 2019).

Groundwater at AYQ flows south-easterly to north-westerly, in the direction of the western end of Lake Amadeus, however there is expected to be limited/no discharge to the Amadeus Basin here due to the lower hydraulic gradient.

The likelihood of impact to ecological receptors in the lake is considered to be low, based on:

- the distance to the lake (approximately 30 km) north of AYQ, and
- the highly variable and infrequent rainfall in this arid zone climate, and the ephemeral presence of water in the lake as a result of this.

No identified connection between the airport and ephemeral un-named surface water features located between the airport and Lake Amadeus.

5. DATA QUALITY OBJECTIVES

The scope of works associated with the TSI generally complies with the Data Quality Objective (DQO) methodology outlined in the National Environment Protection Council (NEPC) National Environment Protection (Assessment of Site Contamination) Measure (NEPC, 2013), which provides a systematic planning approach to developing sampling designs for data collection activities that ultimately support the conclusions and recommendations provided in this report. The DQO process has seven steps, as presented below, which have been followed in the planning of this investigation.

1. State the problem
2. Identify the decision
3. Identify the information inputs
4. Define the boundaries of the study
5. Develop the analytical approach
6. Specify performance or acceptance criteria
7. Optimise the plan for obtaining data.

The process has been summarised below in Table 5-1, which presents the initial data quality objectives established in the Phase 1 SAQP (Tetra Tech Coffey, March 2022) and Table 5-2, which presents the refined data quality objectives established in the Phase 2 SAQP (Tetra Tech Coffey, December 2022).

Table 5-1: Data Quality Objectives for the Phase 1 Site Investigation Works

DQO	Data Gap 1	Data Gap 2	Data Gap 3	Data Gap 4	Data Gap 5
1. State the problem	There is insufficient information on CoPC impacts to soil at the MFS, IFS, FTG and STP to confidently characterise the magnitude and extent and determine risk to any relevant receptors.	There is insufficient information on CoPC impacts to the drainage channels which flow to a dam located to the south-west of the fire station, to assess compliance with Airservices's regulatory requirements.	Current analytical data does not cover secondary potential CoPCs.	Source and distribution of contamination in groundwater is not known.	Hydrogeological regime and future change may impact the risk posed by contamination from the airport on users of groundwater.
2. Identify the Decision	• Can the extent of CoPC impact in soil above relevant screening criteria, if any, be confidently defined to inform a risk assessment? • What is the extent of PFAS impacts to the soil at the Airservices Lease Areas? • Do the contaminants pose a risk to human health or environmental values? • Is there evidence of change in contaminant levels or risk over time?	• What is the extent of PFAS impacts to surface water or sediment in the drainage channels? • Is there potential migration of PFAS from the MFS via drainage channels? • Do the contaminants pose a risk to human health and environmental values?	• Has the range of potential CoPCs been addressed by available data?	• Are there impacts to groundwater from Airservices occupied areas within the AYQ investigation area? • What is the extent of impact, if any? • Does the impact present a risk to receptors that requires management?	• If groundwater flow direction and connection with other aquifers and surface water understood? • Is there potential for future change in flow direction or groundwater use understood?
3. Identify the information Inputs	Information inputs to address Data Gap 1 were based on the selection of soil sample locations at the MFS, IFS, FTG and STP to refine existing data and ensure adequate coverage of Airservices operational areas and/or areas	Undertake a surface water and/or sediment assessment to identify the presence or absence of and quantify PFAS impacts in the drainage channels. This will involve the following: • Identify surface water flow and determine the potential for migration of	Undertake supplementary analysis for secondary CoPCs (PAHs, VOCs, herbicides, pesticides) in targeted locations to assess presence/absence of broader contaminants. Locations to target areas where use of secondary contaminants may have	Undertake a groundwater assessment to assess the nature and extent of PFAS impacts associated with potential sources related to Airservices occupation. This will involve the following: • Review of existing literature on the site features and site hydrogeology and identification of surface water	A desktop assessment of available existing hydrogeological information. • Basin and aquifer information • Standing water levels reported in NT gov database.

DQO	Data Gap 1	Data Gap 2	Data Gap 3	Data Gap 4	Data Gap 5
	potentially affected by Airservices activities. Information inputs involve the following: • Collection and analysis of soil data for analysis of contaminants related to the land uses and activities carried out by Airservices, and as specified in the requirements of the S48 Notice. Some locations are aligned with those used as part of the Environmental Monitoring Program which Airservices undertakes annually. • Evaluation of the data against assessment criteria to support a Tier 1 Risk Assessment and discussion on the continuing suitability of the sampling locations. • Collection of additional shallow soil samples during Phase II to refine the understanding of contaminant distribution vertically and laterally at selected SZA's.	PFAS in drainage channels. • Opportunistic collection and analysis of run-off • Collection and analysis of surface water and sediment to obtain data from the on-airport stormwater drainage swales for assessment of the potential for these features to represent preferential migration pathways. • Collection and analysis of surface water and sediment from additional locations to expand the assessment and determine potential for inputs from other sources on-airport. • Evaluation of the data against adopted assessment criteria to support a Tier 1 Risk Assessment and discussion on the continuing suitability of the sampling locations.	occurred or been generated (i.e., TRH and VOCs as solvents stored at CFS, pesticides and herbicides stored and used at the CFS, VOCs as alternative propellants used at FTG)	flow to determine the potential for migration of PFAS to groundwater. • Installation of six groundwater monitoring wells at inferred up-gradient and down-gradient locations of the MFS, FTG, IFS and STP seepage field. • Survey of elevations and confirmation of location groundwater flow direction. • Collection and analysis of groundwater for CoPCs (PFAS, TRH) and geochemical parameters in the six new wells and three existing wells (one on airport, two up-gradient off-airport). • Supplementary analysis of PFAS TOPA in four of the seven wells. Analysis of VOCs in wells where detectable TRH C6-C10 is reported. • Evaluation of the data against adopted assessment criteria to support a Tier 1 Risk Assessment. • Interpretation of data to estimate current and future extent of contamination (if any).	• Climatic data • Episodic rainfall data • Recharge processes • NT Power & Water Corporation hydrogeological models
4. Define the Boundaries of the Study	The spatial boundaries of the TSI are largely constrained by the Airport Estate boundary and extend Off-Airport for sampling of pre-existing monitoring bores and determination of off-airport sources and receptors (where relevant). The temporal boundaries of the TSI are determined by timeframes required to meet the deadlines of the S48 Notice as opposed to assessing temporal variation between wet and dry season.				
5. Develop the	The CoPCs for the TSI are consistent with the requirements of the S48 Notice and are also inclusive of those for the		Analytes and target samples have been nominated to	Wells are to be positioned based on current available regional	Direct groundwater data (Data gap 4) will be used

DQO	Data Gap 1	Data Gap 2	Data Gap 3	Data Gap 4	Data Gap 5
Analytical Approach and Design	environmental monitoring program which Airservices is obligated to undertake under the Airport Regs, 1997. The SAQP for the TSI aimed at addressing the specific requirements of the S48 Notice and Data Gap 1 and 2 and opportunistically utilised the scope of sampling for the environmental monitoring program to supplement the data set used as part of the TSI. • The TSI and the monitoring program both have a primary focus on PFAS as the key CoPC. All soil, sediment, groundwater, and surface water samples will be analysed for PFAS. • TRH, BTEXN, PAH, metals, and MBAS[4] have also been specified in the minimum suite of CoPCs for assessment at some locations. Only select soil and surface water samples will undergo analysis for these CoPCs. The analytical program has been further extended to address specific secondary CoPCs relevant to activities at the SZA's. Due to the uncertainty about the former infrastructure layout and procedures at IFS, and in consideration of the results of Phase I investigation works for all SZA's, the location and extent of sampling is designed to optimise the collection of accurate and relevant analytical data for each CoPC being assessed.		assess the most likely secondary contaminants, if present. Sample collection methods will be consistent with NEPM (2013) recommendations and laboratory recommended containers and preservation (if relevant). If CoPC concentrations identified exceed the adopted assessment criteria, then further investigation and/or management may be recommended.	hydrogeological data to target up-gradient and down-gradient locations. To the extent possible, surface survey data will be collected in advance and groundwater elevation data interpreted as field works progress to refine subsequent well placement to ensure down-gradient data. Survey data must be suitable to interpret flow direction. Well installation must be suitable to assess impacts to groundwater from infiltration of contamination from the surface. Groundwater sampling and analysis must be suitable to characterise water condition and suitability for environmental values.	to verify hydrogeological CSM and inform the review of risk.
6. Specify Acceptance Criteria and Performance	The adopted assessment criteria are outlined in Section 7. The potential for significant decision errors will be minimised by completing a robust Quality Assurance / Quality Control (QA/QC) program in accordance with National Environment Protection (Assessment of Site Contamination) Measure (ASC NEPM 2013) guideline requirements. Standard operating procedures (SOP) will be closely followed in the field to ensure accurate and representative data acquisition. Data quality indicators (DQIs) will be applied to assess usability of data prior to making decisions, based on precision, accuracy, representativeness, comparability, and completeness. The acceptable limit on decision errors is as close to 100% compliance where possible with the applied DQIs. If any of the DQIs are not met, further assessment will be necessary to evaluate the significance of the non-conformance and any corrective actions.				
7. Optimise the plan for obtaining data	To meet Airservices's internal compliance requirements, collection, and analysis of representative samples from appropriate media, in accordance with the Airservices's Monitoring procedure (Version 5, May 2021) and location-specific Monitoring Plan. This data will also be used to		Additional analyses added to samples proposed to be collected from suspected source areas.	Groundwater assessment combines use of regional hydrogeological information and rapid assessment of groundwater levels to infer flow direction. Where possible, a contingency	Simple contaminant transport modelling is anticipated to refine estimate of current and future groundwater plume extent.

[4] Methylene Blue Active Substances, as an indicator of the presence of surfactants

DQO	Data Gap 1	Data Gap 2	Data Gap 3	Data Gap 4	Data Gap 5
	refine the CSM and understanding of the nature and extent of contamination. To expand on the current data set and provide confidence in understanding of the extent of impact in soil and drainage, additional samples will be collected beyond existing locations, and further samples analysed, if required. The full data set will inform characterisation of the sources of impact and guide management options, should migration be interpreted to present an unacceptable risk.			location will be cleared and approved to allow down-gradient locations to be positioned best to capture plume. Simple transport modelling is anticipated to refine estimate of current and future plume extent.	

Table 5-2: Data Quality Objectives for the Phase 2 Site Investigation Works

DQO	Data Gap 1	Data Gap 2	Data Gap 3	Data Gap 4
1. State the problem	Levels of PFAS in soil remain undelineated (to criteria) south and west of the FTG (laterally and vertically to the south, and vertically to the west).	Infiltration from stormwater and sewerage features not quantified at the stormwater dam and near the FTG wastewater holding tanks.	Insufficient soil data to characterise the source of observed groundwater impact around the STP.	Extent of contamination in groundwater to criteria is not known
2. Identify the Decision	• Can the extent of CoPC impact in soil above relevant screening criteria, if any, be confidently defined to inform a risk assessment? • Do the contaminants pose a risk to human health or environmental values?	• Is there evidence of seepage from drains and infrastructure that may be a source of impact to groundwater? • Do the contaminants pose a risk to human health or environmental values?	• Can the extent of CoPC impact in soil above relevant screening criteria, if any, be confidently defined to inform a risk assessment? • Is there evidence of a former source of PFAS impact to groundwater from the near surface? • Do the contaminants pose a risk to human health or environmental values?	• What is the extent of impact to groundwater from Airservices occupied areas within the AYQ investigation area? • Does the impact present a risk to receptors that requires management?
3. Identify the information Inputs	Undertake supplementary soil assessment at the FTG to refine existing data. This will involve the following: • Collection and analysis of soil data for analysis • Evaluation of the data against assessment criteria	Undertake supplementary soil assessment next to below ground tanks at the FTG and in the stormwater dam. This will involve the following: • Collection and analysis of soil data for analysis • Evaluation of the data against assessment	Undertake supplementary soil assessment SE of the STP to refine existing data. This will involve the following: • Explore site history to identify potential target areas around the STP based on former layouts.	Undertake a groundwater assessment to assess the nature and extent of PFAS impacts associated with potential sources related to Airservices occupation. This will involve the following: • Review of existing literature on the site features and site hydrogeology and identification of surface water flow to

DQO	Data Gap 1	Data Gap 2	Data Gap 3	Data Gap 4
	to support a Tier 1 Risk Assessment. Soil sampling locations are shown in Appendix A	criteria to support a Tier 1 Risk Assessment. Soil sampling locations are shown in Appendix A	• Collection and analysis of soil data for analysis • Evaluation of the data against assessment criteria to support a Tier 1 Risk Assessment. Soil sampling locations are shown in Appendix A	determine the potential for migration of PFAS to groundwater. • Install 5 groundwater monitoring wells at locations to further characterise the extent of impact identified during the initial investigation. Soil samples will be collected. • Survey of elevations and confirmation of location groundwater flow direction. • Collect and analyse groundwater for PFAS and geochemical parameters in the five new wells and seven existing wells. • Evaluation of the data against adopted assessment criteria to support a Tier 1 Risk Assessment. • Interpretation of data to estimate current and future extent of contamination (if any). Groundwater monitoring locations are shown in Appendix A In addition to direct groundwater assessment, the STP influent and effluent contaminant levels will be assessed by: • Collecting samples for analysis for PFAS from the STP influent sources and effluent
4. Define the Boundaries of the Study	The investigation area is defined as the CFS, IFS, FTG and STP (including seepage field) and associated off-lease contaminant migration pathways.			
5. Develop the Analytical Approach and Design	• This assessment and data gaps have a primary focus on PFAS as a CoPC. Soil samples will be analysed for PFAS. • TRH, BTEXN, PAH and metals were assessed in the initial investigation and data gaps were not identified.			• Wells are to be positioned to further characterise the extent of impact in groundwater, based on existing data. • Survey data must be suitable to interpret flow direction. • Well installation must be suitable to assess impacts to groundwater from infiltration of contamination from the surface. • Groundwater sampling and analysis must be suitable to characterise water condition and suitability for environmental values.

DQO	Data Gap 1	Data Gap 2	Data Gap 3	Data Gap 4
6. Specify Acceptance Criteria and Performance	The adopted assessment criteria are outlined in Section 7. The potential for significant decision errors will be minimised by completing a robust Quality Assurance / Quality Control (QA/QC) program in accordance with National Environment Protection (Assessment of Site Contamination) Measure (ASC NEPM 1999) guideline requirements. Standard operating procedures (SOP) will be closely followed in the field to ensure accurate and representative data acquisition. Data quality indicators (DQIs) will be applied to assess usability of data prior to making decisions, based on precision, accuracy, representativeness, comparability and completeness. The acceptable limit on decision errors is as close to 100% compliance where possible with the applied DQIs. If any of the DQIs are not met, further assessment will be necessary to evaluate the significance of the non-conformance and any corrective actions.			
7. Optimise the plan for obtaining data	To expand on the current data set and provide confidence in understanding of the extent of impact in soil and drainage, additional samples will be collected beyond existing locations, and further samples analysed, if required. The full data set will inform characterisation of the sources of impact and guide management options, should migration be interpreted to present an unacceptable risk.			The nominated locations build on the inferred flow directions and contaminant distribution observed in the initial investigation.

6. SUMMARY OF SITE INVESTIGATION WORKS

6.1 GUIDELINES AND STANDARDS

All fieldworks were completed consistent with the project's overarching and technical objectives as detailed in Section 2.1. Fieldworks were conducted in accordance with the SAQPs (Tetra Tech Coffey, March 2022, and December 2022) and Standard Operating Procedures (SOPs).

The fieldworks were also undertaken in general accordance with following guidelines and standards:

- ANZG, 2018. Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Australian and New Zealand Governments and Australian state and territory governments, Canberra ACT, Australia. Available at www.waterquality.gov.au/anz-guidelines
- ANZECC, 2018; Australia and New Zealand Australian and New Zealand Guidelines for Fresh and Marine Water Quality
- CSIRO (2016) Sediment Quality Assessment – A Practical Guide, Second Edition.
- GHD, 2021; Airservices PFAS Characterisation Assessment Criteria Derivation of PFAS criteria for sediment, concrete, asphalt and pore water (GHD, 2021)
- HEPA (2020) PFAS National Environmental Management Plan, Version 2.0 Final 2020. Heads of EPAs
- NT EPA (2017). Northern Territory Contaminated Land Guideline. Northern Territory Environmental Protection Authority, June 2017.
- Standards Australia, 1998; Water Quality Sampling: Guidance on the Design of Sampling Programs, Sampling Techniques and the Preservation and Handling of Samples. AS/NZS 5667.1
- Standards Australia, 1998; Water Quality Sampling: Guidance on Sampling of Groundwater. AS/NZ 5667.11
- Standards Australia, 1999; Water Quality Sampling: Guidance on Sampling of bottom sediments. AS/NZS 5667.12
- NEPC, 1999; National Environment Protection (Assessment of Site Contamination) Measure (1999) as amended 2013 (NEPM, 2013). WA Planning Commission (2006) State Planning Policy 2.9 Water resources (December 2009)

6.2 FIELDWORK METHODOLOGY

A summary of fieldworks undertaken for the implementation of the Phase 1 and Phase 2 site investigation works at AYQ in June 2022 and January/ February 2023 have been included within Table 6-1.

Table 6-1: Summary of Fieldworks Completed at AYQ During Both Phase 1 and Phase 2

Activity	Date	Details
Service Location	**20/06/2022 to 22/06/2022** **30/01/2023**	Prior to intrusive works, all proposed soil bore and monitoring well locations were cleared for the presence of underground and above ground services. This was done by: • A review of Dial Before You Dig plans by Tetra Tech Coffey and an experienced service locator. • Review of underground services plans provided by Voyages. • Tracing of known and redundant services by an experienced service locator.

Activity	Date	Details
		Any proposed soil bore locations that were within close proximity to services were relocated to a safe distance.
Soil and Surface Sediment Investigation		
Soil Bore Drilling	**20/06/2022 to 26/06/2022**	A total of 33 soil bores were drilled through a combination of hand auguring and mechanical drilling using direct push and solid stem auger techniques. Drilling was undertaken by a licenced driller from ProActive using a track mounted drilling rig (Comacchio GEO 305). Soil investigation locations were completed in each of the respective SZAs: • MFS: 7 soil bores were drilled to maximum depths of 1.0 m bgl using hand tools. • FTG: 12 soil bores were drilled to maximum depths of 0.5 – 2.0 m bgl using a combination of hand tools and drilling rig. • IFS: 8 soil bores were drilled to maximum depths of 0.5 – 1.1 m bgl using a combination of hand tools and drilling rig • STP and seepage spray field: 7 soil bores were drilled to maximum depths of 0.5 m bgl using hand tools. Where a drilling rig was used, push tube or solid auger techniques were used, depending on the density of the ground. No soil borehole encountered refusal, however YAP4 was not able to collect a discrete sample at the full depth, due to hole collapse. Each soil bore was backfilled with material excavated from the bore and reinstated with a surface finish similar to surrounding environment. Each borehole was logged, with information on soil lithology and other observations. Logging was undertaken in accordance with Unified Soil Classification System (USCS) (AS1726). Bore logs are provided in Appendix C.
	03/02/2023 to 04/02/2023	A total of 12 soil bores were drilled using a combination of hand auguring and mechanical drilling using solid stem auger techniques. Drilling was undertaken by a licenced driller from ProActive using a track mounted drilling rig (Comacchio GEO 305). Soil investigation locations were completed in each of the respective SZAs: • FTG: 9 soil bores (SB35 to SB43) were drilled to depths ranging between 2.0 and 3.0 m bgl using a combination of hand tools and drill rig. • STP: 3 soil bores (SB45 to SB47) were drilled to maximum depths of 2.0 m bgl using a combination of hand tools and drill rig. Refusal prior to target depth was encountered at SB42 (refusal at 2.5 m; target depth of 3.0 m) and SB44 (refusal at 1.0 m; target depth of 1.5 m) due to hard ground being encountered. Bore logs are provided in Appendix C.
Soil Sampling	**20/06/2022 to 28/06/2022**	Soil samples were collected from all soil bores during drilling at maximum intervals of 0.5 m through the soil profile. Samples were retrieved directly into laboratory supplied containers at discrete depths until the target depth was achieved. Soil samples were also collected where contamination indicators were identified or changes in the soil lithology were evident. Collected soil jars were stored in a cooled insulated carrier for transport to the selected National Association of Testing Authorities (NATA) accredited laboratory for analysis under chain of custody (COC) control.
	03/02/2023 to 04/02/2023	

Activity	Date	Details
		The following decontamination procedures were applied: • Dedicated sampling equipment (nitrile gloves and pushtube sleeves) was used where possible to prevent cross-contamination. Reusable sampling equipment (pushtube shoe, solid stem augers, hand auger and trowel) was decontaminated between sampling points in accordance with Australian Standards. • All equipment was scrubbed with a plastic brush and potable water to remove solids, then washed using PFAS-free detergent (Liquinox) solution and rinsed thoroughly in tap water. The equipment was then rinsed with PFAS free deionised water. • Any personnel that handled decontaminated equipment that directly contacted potentially contaminated material washed their hands with soap and rinsed thoroughly in tap water before using a new pair of disposable nitrile gloves. A new pair of nitrile gloves were worn for each different sample collection.
Surface Sediment Sampling	**20/06/2022 to 24/06/2022**	A total of seven surface sediment samples were collected from the drainage channel network (<15 cm) using a hand trowel (e.g., grab sample). Collected samples were stored in a cooled insulated carrier for transport to the selected NATA accredited laboratory for analysis under COC protocols. The following decontamination procedures were applied: • Reusable sampling equipment (trowel) was decontaminated between sampling points in accordance with Australian Standards. • Equipment was scrubbed with a plastic brush and potable water to remove solids, then washed using PFAS-free detergent (Liquinox) solution and rinsed thoroughly in tap water. The equipment was then rinsed with PFAS free deionised water. • A new pair of nitrile gloves were worn for each different sample collection.
	04/02/2023	One surface sediment sample location (SB44) was drilled in the stormwater drainage channel network using a hand auger. The soil bore location was drilled to a maximum depth of 1.0 m bgl. Refusal prior to target depth was encountered (refusal at 1.0 m; target depth of 1.5 m) due to hard ground being encountered. Collected samples were stored in a cooled insulated carrier for transport to the selected NATA accredited laboratory for analysis under COC control. The following decontamination procedures were applied: • Reusable sampling equipment (hand auger) was decontaminated between sampling points in accordance with Australian Standards.
Monitoring Wells		
Monitoring Well Installation	**20/06/2022 to 26/06/2022**	Bore construction licenses (BCL) are not required in the NT, outside of Water Control Areas, and were not obtained for this site. The wells were registered by the licensed driller following installation. A total of six monitoring wells (GW01 – GW06) were installed by ProActive Drilling in close proximity to identified potential SZA's. Each monitoring well was drilled utilising solid stem flight auger drilling techniques until refusal was encountered. Upon refusal, air hammer drilling techniques were utilised to maximum depths of between 14 – 15 m bgl.

Activity	Date	Details
		All monitoring wells were constructed using 50mm diameter Class 18 un-plasticised Polyvinyl Chloride (uPVC) screen and casing. All monitoring wells intersected the superficial aquifer and were installed with a slotted screen section of between 3 and 6 m in length and blank casing sections to the ground surface. Each monitoring well anulus was backfilled with graded sand and gravel pack to 1.0 m above the slotted screen, above which a 1 m long bentonite seal was established with the remainder of the hole sealed with backfilled soil and 5 m of grout to the surface. Monitoring wells GW01, GW02, GW03, GW06 were finished with flush-mounted steel gatic covers based on agreement with Airservices and AYQ. Wells GW04 and GW05 were installed with monuments for ease of visibility due to their locations near vegetation and sand dunes. Each monitoring well was logged, with information on soil profiles and observations, as well as groundwater monitoring well construction details. Logging was undertaken in accordance with Unified Soil Classification System (USCS) (AS1726). Bore logs are provided in Appendix C.
	31/01/2023 to 02/02/2023	A total of five monitoring wells were installed (GW07 – GW11) by ProActive Drilling across the Airport Estate primarily with the objective of delineating groundwater impacts identified in Phase I and were positioned up-gradient, cross-gradient and down-gradient of the SZA's. All monitoring wells intersected the superficial aquifer and were installed with a slotted screen section of between 5.5 and 6 m in length. Each monitoring well anulus was backfilled with graded sand and gravel pack to 0.5 or 1.0 m above the slotted screen, above which a 1 m long bentonite seal was established, with the remainder of the hole sealed with backfilled soil and 5 m of grout to the surface. Monitoring wells GW07 to GW11 were installed with monuments for ease of visibility due to their locations near vegetation and sand dunes. Borehole and monitoring well construction logs are provided in Appendix C.
Well Development	**26/06/2022 and 27/06/2022**	Each newly installed groundwater monitoring well was developed by utilising air lift development techniques by the drilling team if inflow was sufficient, or alternatively by bailer or wattera foot valve. Development continued until at least three bore volumes were retrieved and the clarity of the water was identified as clear, or the monitoring well went dry twice to ensure a good connectivity with the aquifer.
	02/02/2023 and 04/02/2023	Each newly installed groundwater monitoring well was developed by bailer.
Well Survey	**21/06/2022**	The newly installed groundwater monitoring wells and the three existing wells that were proposed for sampling were surveyed by Veris to GDA94 Zone 52 and Australian height datum (AHD) by a qualified surveyor. The surveyor's reports are provided in Appendix F.
	07/02/2023	
Groundwater Investigation		
Gauging	**27/06/2022 and 28/06/2022**	Nine groundwater monitoring wells, including three existing wells, were gauged using an oil/ water interface probe and measured for: • Depth to Light Non-Aqueous Phase Liquid (LNAPL) (not present in any well) • Standing Water Level (SWL) • Total well depth Gauging records are provided in Table 2a, Appendix B. Calibration certificates for the equipment utilised for the field activities are provided in Appendix E.

Activity	Date	Details
	04/02/2023 to 05/02/2023 and 07/02/2023	A total of 12 groundwater monitoring wells, including seven existing wells, were gauged. Gauging records are provided in Table 2b, Appendix B.
Groundwater Sampling	**28/06/2022** **05/02/2023 to 06/02/2023 and 08/02/2023**	Due to logistical constraints of undertaking sampling activities at AYQ, the equilibration of newly installed wells was reduced to a minimum period of 24 hours for some monitoring wells (typically most newly installed wells were sampled approximately 48 hours or more following installation). All newly installed wells were sufficiently developed following drilling and well construction which suggests that all particulates were removed, and fresh aquifer formation water was present in the well casings prior to deploying Hydrasleeves. These periods of equilibration still comply with the requirements of the ASC NEPM (2013) however due to variable recharge across the monitoring well network longer equilibration periods would generally be preferred to allow further stabilisation of the aquifer, if possible. Hydrasleeves were installed with the collars at least 2 m below the water level and within the screened section of the well casing. All wells sampled have a total well depth of 14 – 15 m below top of casing (m btoc), with the exception of RN012065, which was installed at 35m and RN012081 and RN012082 which were installed 45 m below top of casing (m BTOC) to target the perforated casing. The hydrasleeves were left for a period of 24 hours or greater to stabilise with the aquifer formation and were then retrieved for sample collection. Groundwater samples were collected in line with relevant Australian Standards and Tetra Tech Coffey's Standard Operating Procedures (SOPs). Following collection of the samples into laboratory supplied containers, remaining water in the hydrasleeve was utilised for water quality measurements. Water quality measurements were collected using a supplier calibrated water quality meter and included: • Dissolved oxygen (mg/L) • Temperature (°C) • Oxidation/reduction potential (mV) • Electrical conductivity (µS/cm) • pH Collected samples were stored in a cooled insulated carrier for transport to the selected NATA accredited laboratory for analysis under COC protocols. Water quality measurements are provided in Tables 2a & 2b, Appendix B. Calibration certificates for the water quality meter are provided in Appendix E. The following decontamination procedures were applied: • Dedicated sampling equipment (nitrile gloves, bailer cord and hydrasleeves) was used where possible to prevent cross-contamination. Reusable sampling equipment (Collars, clips, and interface probe) was decontaminated between sampling points in accordance with PFAS NEMP v2 (2020) and relevant Australian Standards. • All equipment was scrubbed with a plastic brush and potable water to remove solids, then washed using PFAS-free detergent (Liquinox) solution and rinsed thoroughly in tap water. The equipment was then rinsed with PFAS free deionised water.
Surface Water		
Surface Water Sampling	**2022**	No surface water samples were collected as part of the June 2022 investigation, due to the absence of surface water in the earthen drainage network.

Activity	Date	Details
Infrastructure Investigations		
Pit Water Sampling	**22/06/2022, 25/06/2022 and 28/06/2022**	Five water samples were collected from surface water contained within infrastructure drainage and pit networks. Each infrastructure surface water sample was collected by hand, either directly into laboratory provided sampling bottles, or via disposable bailers. Where the sample container was used directly, it was inserted with the opening pointing down and positioned to allow inflow only when fully submerged to avoid the collection of surface films. Collected samples were stored in a cooled insulated carrier for transport to the selected NATA accredited laboratory for analysis under COC protocols.
Pit Sediment Sampling	**22/06/2022, 25/06/2022 and 28/06/2022**	Four sediment samples were collected from sediment contained within infrastructure drainage and pit networks. Samples were collected using a trowel or sample jar on a pole (e.g., grab sample). Collected samples were stored in a cooled insulated carrier for transport to the selected NATA accredited laboratory for analysis under COC control. The following decontamination procedures were applied: • Reusable sampling equipment (trowel) was decontaminated between sampling points in accordance with Australian Standards. • Equipment was scrubbed with a plastic brush and potable water to remove solids, then washed using PFAS-free detergent (Liquinox) solution and rinsed thoroughly in tap water. The equipment was then rinsed with PFAS free deionised water. • A new pair of nitrile gloves were worn for each different sample collection.
Concrete Sampling	**26/06/2022**	Two concrete samples were collected from the FTG pad. Concrete sample CC01 was collected by attaching a wide diameter concrete corer to the head of the drill rig and coring the concrete until the soil surface was encountered. A sample of concrete was broken from the top and the bottom 5 cm of the core for testing. A soil sample was also collected from the soils beneath the bedding graven under the concrete. Concrete sample CC02 was collected by manually breaking up loose areas of weathered concrete. Concrete core samples were placed in zip locked bags. These samples were stored in a cooled insulated carrier for transport to the selected NATA accredited laboratory for analysis under COC control. A new pair of nitrile gloves were worn for each different sample collection.
Washdown Sampling	**25/06/2022 and 26/06/2022**	Five washdown samples were collected by washing down the concrete or asphalt with potable water and collecting run-off water into laboratory prepared containers. The area of wetting and run-off collection was targeted to be at least 2m x 2m. Collected samples were stored in a cooled insulated carrier for transport to the selected NATA accredited laboratory for analysis under COC control. The following decontamination procedures were applied: • Dedicated sampling equipment (nitrile gloves and new food safe bags) was used where possible to prevent cross-contamination.

Activity	Date	Details
		• The water sources used to conduct the tests (CFS outside tap and Driller's water tank) were sampled as QC samples to demonstrate suitability (both were below LOR for all PFAS compounds) • During the test, the field personnel did not walk through the wetted area. • A new pair of nitrile gloves were worn for each different sample collection.
Influent/ Effluent Water Sampling	**06/02/2023**	A total of two water samples (one influent and one effluent) were collected from the sewage treatment plant area. The influent sample was taken from the primary sewage tank and the effluent sample was taken from the treated effluent pumping station (refer to Photographs attached in Appendix I, that indicate the infrastructure system that forms the STP and the sampling point for the effluent sample (i.e., purple hose outlet)). Both the influent and effluent wastewater samples were collected by hand, directly into laboratory supplied sample containers. Collected samples were stored in a cooled insulated carrier for transport to the selected NATA accredited laboratory for analysis under COC control.
Waste Disposal		Excess soil cuttings and groundwater produced during the groundwater monitoring wells installation and development were stored in 240 L steel drums. A single sample was collected for waste characterisation with results for a range of analytical parameters shown in Tables 1a to 1f,Appendix B.

6.3 SAMPLING METHODOLOGY

The following sampling methodologies and procedures were followed for sample handling, preservation, and documentation of field records.

Table 6-2: Sample Methodology

Activity	Details
Sample Preservation	The selection of the appropriate sample containers, preservation procedures, sample storage requirements and holding times was undertaken in accordance with those recommended by the PFAS NEMP v2.0, 2020 (currently under revision) for PFAS analytical suites and Standards Australia (AS/NZS 5667.1:1998 as appropriate) for all other CoPC. All primary samples and associated QC samples were shipped to a National Association of Testing Authorities (NATA) accredited laboratory within required holding times and under Tetra Tech Coffey COC documentation. The laboratory was notified of the shipment of samples and their expected arrival. All samples were kept cool during the course of the working day prior to dispatch to the laboratory in cooler boxes packed with double-bagged ice.
Holding Times	All holding times complied with the requirements set out in the PFAS NEMP, 2020 (currently under revision) for PFAS analytical suites and Australian Standard AS/NZS 5567.1:1998 for other CoPC. The selected primary laboratory, ALS, was instructed to retain all the sampling extracts obtained for the analysis of organic parameters under refrigeration for at least 30 days after the issue of the laboratory report. This allowed time for the laboratory report to be reviewed and repeat tests or additional tests to be scheduled within the extract holding time. ALS has a thorough QA/QC protocol which reports the full sequence of laboratory sample receipt, handling, processing/reporting, and storage against specified storage times, ensuring that samples can be tracked and compared against the standards. Non-conformances associated with holding time breaches are discussed in the data quality assessment in Appendix H.
Sample Documentation	All sample documentation including field notebooks, reporting records, COC and equipment calibration certificates and procedures were retained within project files.

Activity	Details
	Field records included the sampling date and time, the name of the sampler, the weather conditions, the sample collection method, the sampling equipment decontamination procedures where non-disposable sampling equipment is utilised, the sample location and depth, and well development and purging records including water quality meter calibration records (where relevant). Each sample label included the consultant's name, a unique sample number, the date, and the name or initials of the sampler.
Chain of Custody	A COC form was completed to accompany the samples to the laboratory for submission for analysis. In each instance, the COC form was completed in full and provides a record of the custodians of the samples from collection through to laboratory sample receipt, along with clear analysis instructions to the laboratory. On delivery to the appointed laboratory, the receiving person inspected the cooler boxes, noted the presence or otherwise of ice if specified on the COC form, measured the temperature of the cooler boxes, and recorded each value on the relevant COC form. The completed COC form was transmitted to the Tetra Tech Coffey project manager within 24 hours of the delivery of samples to the laboratory for confirmation of instructions and COC forms are presented in Appendix G.
Laboratory Reports	Primary and duplicate samples were submitted to Australian Laboratory Services (ALS), with triplicate samples submitted to Eurofins Environment Testing Australia (Eurofins). Laboratory certificates of analysis are provided within Appendix G. Laboratory reports were issued in accordance with the requirements of NATA endorsement and included primary sample results, laboratory in-house duplicate results, laboratory in-house surrogate and matrix spike recovery determinations, and extraction (where applicable) and analysis dates used to determine compliance with permitted holding times.

6.4 PFAS SAMPLING REQUIREMENTS

Table 6-3: PFAS Sampling Requirements

Activity	Details
PFAS sampling requirements	Beyond the normal sample handling methodology as detailed above, the following was also applied: • Prior to sampling, the sampling personnel washed their hands with soap and rinsed thoroughly in tap water before donning a clean, new pair of disposable nitrile gloves. A new pair of nitrile gloves was worn for each sample collected. Additional hand washing prior to donning a new pair of gloves was necessary if the old pair of gloves was compromised or if the personnel's ungloved hands touched items that may represent potential PFAS contamination since last being washed. • Teflon® coated materials and aluminium foil did not come into contact with the sample. Sample handling equipment or tools made of HDPE or stainless steel were acceptable, provided they were decontaminated prior to use via scrubbing and rinsing thoroughly in tap water to clean away any debris or material, then triple-rinsed in distilled or deionised water (Grade 3 / Millipore water). • The use of chemical or gel-based coolant products to maintain samples at the appropriate temperature (4°C) following sample collection was not recommended. The acceptable alternative was ice which had been double-bagged (polyethylene plastic) and secured to avoid meltwater from contacting sample containers in the cooler box during overnight or same-day delivery to the analytical laboratory. • All laboratory provided sampling containers were requested without Teflon®-lined lids. Sample containers comprised of polypropylene or HDPE. Glass containers with lined lids were not used. • Equipment that contacts soil, sediment, or surface water did not contain or was coated with Teflon® unless the Teflon® was internal to the equipment and did not come into contact with the external environment. • Field personnel undertaking sampling did not use Tyvek suits or new field clothes. Personal decontamination was undertaken with soap and water, after any activity which may involve PFAS contaminated materials. • Field personnel undertaking water sampling via wading wore waders which had not been constructed from material subject to waterproof coatings. • Field personnel undertaking sampling took care in choosing PFAS-free sunscreen and insect repellent during the duration of the sampling program. A list of allowable products is found on https://www.michigan.gov/documents/pfasresponse/General_PFAS_Sampling_Guidance_634597_7.pdf. • During sample processing and storage, exposure of the samples to light was minimised.

6.5 QUALITY ASSURANCE AND QUALITY CONTROL

The investigation included a robust Quality Assurance and Quality Control (QA/ QC) program in line with the requirements of the PFAS NEMP v2.0 (HEPA, 2020 (currently under revision)).

In order to validate the accuracy and validity of primary sampling results, a range of field and laboratory QC samples were collected and assessed as part of the quality assurance process during the TSI.

A Data Quality Assessment report is provided in Appendix H which provides a full description of the results and outcome of the QA/QC program that was implemented across both the Phase 1 and Phase 2 site investigation works.

Based on the outcomes of the Data Quality Assessment, Tetra Tech Coffey considers the field and laboratory data that has been obtained has been verified to be acceptable and is suitable to be used as a basis for interpretation of the contamination status and risk profile of the study area.

6.6 SAMPLING AND ANALYSIS QUALITY PLANS

Detailed Sampling and Analysis Quality Plans (SAQP) were prepared for both the Phase 1 and Phase 2 investigation works and were endorsed by Airservices and the CS Auditor prior to executing fieldworks for implementation of the SAQPs.

- *754-PEREN233360_R16_DraftH_AYQ SAQP*, Tetra Tech Coffey, dated 24 March 2022: and
- *754-PEREN233360_R29_AYQ_supplementary SAQP_DraftD*, Tetra Tech Coffey, dated 16 December 2022.

The sampling strategy was developed with reference to the following:

- HEPA (2020) PFAS National Environmental Management Plan, Version 2.0
- NEPC (2013) ASC NEPM Schedule B2 – Guideline on Site Characterisation
- Airservices PFAS Characterisation Assessment Criteria Derivation of PFAS criteria for sediment, concrete, asphalt, and pore water (GHD, 2021)
- DQOs as detailed in Table 5-1 and Table 5-2.

For full details on the Phase 1 and Phase 2 sampling strategies, rationale and justification please refer to the SAQP documents as referenced above.

The sampling locations for soil, groundwater, sediment, concrete core samples and infrastructure investigations are shown on Figures 4A to 4C and Figure 6A, Appendix A of this TSI report.

6.7 DEVIATIONS FROM SAQP

There were no deviations from the Phase 1 and/ or Phase 2 SAQP that are considered significant in nature, or which could have the potential to affect the data integrity and outcomes of the TSI.

7. APPLICABLE GUIDELINES AND ASSESSMENT CRITERIA

7.1 APPLICABLE GUIDELINES

Applicable guidelines and standards relevant to the adoption of assessment criteria, include the following:

- ANZG, 2018. Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Australian and New Zealand Governments and Australian state and territory governments, Canberra ACT, Australia. Available at www.waterquality.gov.au/anz-guidelines
- ANZECC, 2018; Australia and New Zealand Australian and New Zealand Guidelines for Fresh and Marine Water Quality
- CRC CARE (2011) Technical Report No 10 – Health Screening Levels for petroleum hydrocarbons in soil and groundwater, Part 1: Technical development document
- CSIRO (2016) Sediment Quality Assessment – A Practical Guide, Second Edition.
- GHD, 2021; Airservices PFAS Characterisation Assessment Criteria Derivation of PFAS criteria for sediment, concrete, asphalt and pore water (GHD, 2021)
- HEPA (2020) PFAS National Environmental Management Plan, Version 2.0 Final 2020. Heads of EPAs
- NHMRC (2021). Australian Drinking Water Guidelines. National Health and Medical Research Council.
- NT EPA (2017). Northern Territory Contaminated Land Guideline. Northern Territory Environmental Protection Authority, June 2017.
- NEPC, 1999; National Environment Protection (Assessment of Site Contamination) Measure (1999) as amended 2013 (NEPM, 2013). WA Planning Commission (2006) State Planning Policy 2.9 Water resources (December 2009)
- WHO, 2008. Petroleum Products in Drinking-Water*: Background Document for Development of WHO Guidelines for Drinking-Water Quality.* World Health Organisation

7.2 ASSESSMENT CRITERIA

7.2.1 Soil and Surface Sediment

Based on the current land use of AYQ as a civilian Airport and the airside locations of the Airservices Lease Areas, the soil and sediment results have been compared to guidelines for industrial/ commercial land use to assess potential for risk to onsite users.

Whilst the term ‘sediment’ has been applied broadly within this TSI, it can be only be considered possibly relevant in relation to saturated and/or semi-saturated media deposited in the infrastructure associated with the trade waste systems.

By definition "sediment" exists in freshwater ecosystems resulting from fluvial deposition of particulates within the bounds of the banks and beds of rivers and streams and which is permanently submerged (or semi-permanently). For estuarine or coastal marine environments, the term refers to offshore deposition of particulates which are permanently submerged (in most cases), and typically contain a much higher organic carbon content which heavily influences PFAS partitioning between solid phase media and liquid phase media. AYQ is not in close proximity and/or influenced by these types of ecosystems and as such this term is not considered relevant.

In arid and semi-arid climates where highly intermittent rainfall and water flow occurs, particle deposition in features such as drainage channels and constructed culverts and swales, are representative of normal

colluvial deposits with the source of them being (in most cases) eroded mantle material as opposed to true "sediment".

In these instances, application of the soil screening criteria from the PFAS NEMP v2.0, 2020 is considered more appropriate when assessing these colluvial deposits in drainage channels and constructed culverts and swales as they are texturally and compositionally a standard soil material by geological definition.

Table 7-1: Summary of Applicable Criteria for PFAS in Soil and Surface Sediment Samples

Analyte	Assessment Criteria (Source HEPA (2020))		
	Industrial/ Commercial (HIL D) (mg/kg)	Ecological direct exposure (mg/kg)	Ecological indirect exposure (mg/kg)
PFOS	20	1	0.01
PFHxS	20	NE	NE
PFOA	50	10	NE
Sum of PFOS+PFHxS [1]	20	NE	NE
Sum of PFAS	NE	NE	NE

HIL = Health Investigation Level
NE = Not Established
[1] Where the guideline values refer to the sum of PFOS and PFHxS, this includes PFOS only, PFHxS only, and the sum of the two.

Screening criteria for non-PFAS analytes were primarily sourced from:

- NEPM (2013) health investigation level (HIL-D) and health screening level (HSL-D) for industrial/ commercial use.
- NEPM (2013) ecological investigation level (EIL) and ecological screening level (ESL) for industrial/ commercial use.
- NEPM (2013) petroleum hydrocarbons management limits for industrial/ commercial use.

With respect to the selection of soil type for the HSLs, it was considered that SAND was the most appropriate for use in accordance with the shallow lithology encountered across the Airport Estate. The HSLs for volatile petroleum hydrocarbons are specific to soil type and depth of impact. The criteria for coarse textured (SAND) soils have been adopted based on measured data and field observations (i.e., soil logs). The depth range of 0 m to <1 m has been generally adopted as the majority of impact is observed in this depth range, and this is the most conservative option. For assessments, specific depth ranges for the HSLs should generally be adopted to the specific depth of the analysed sample for comparison of criteria.

ESLs for petroleum hydrocarbons are provided for both fine and coarse textured soils. The criteria for coarse (SAND) textured soils have been adopted based on measured data and field observations (i.e., soil logs).

Unless otherwise stated, EILs for aged contamination (> 2 years) have been adopted.

ESLs apply from the surface to 2 m depth below the finished surface/ ground level, which corresponds to the root zone and habitation zone of many species.

It is emphasised within the NEPM that HILs, HSLs, EILs and ESLs are not intended for use as default remediation trigger or remediation target criteria but are intended to prompt an appropriate site-specific assessment when they are exceeded. However, it is considered reasonable in the first instance to use these investigations limits as default acceptance criteria, and only consider impacts more closely in the event of an investigation limit being exceeded.

7.2.2 Groundwater and Surface water

Groundwater is the only reliable major water supply in the region for purposes such as irrigation, industrial process water and municipal drinking water supply. The municipal potable-water supply to the Yulara Township is abstracted from three bore-fields located more than 4 km south (hydraulically up-gradient) of the AYQ, and which are operated by NT Power and Water Corporation. The location of these bore-fields relative to the airport is shown in Figure 3, Appendix A. Groundwater from AYQ does not currently flow towards the town water supply bores, however, extractive use criteria have been included to assess the potential sensitivity to future changes in flow direction or in the event that future down-gradient abstraction occurs for potable use purposes.

Mutitjulu waterhole, at the base of Uluru, is the closest and most reliable natural source of fresh surface water for 100 km. It is a small waterhole but is believed to be frequently recharged from surface run-off from Uluru, even during periods of low precipitation, and supports wetland vegetation. It is located approximately 30 km south (up-gradient) of the AYQ estate boundary and as such is not considered a viable pathway for PFAS impacted groundwater.

Ecological investigation levels have been included to indicate potential impact to subterranean aquatic fauna and potential impact to ecosystems in contact with on-airport surface water. The use of ecological investigation levels for off-airport surface water is not considered necessary for this assessment, and due to the ephemeral nature of any on-airport surface water systems and a general absence of secondary consumers (i.e. migratory birds and terrestrial fauna that consume aquatic fauna) through which bioaccumulation in the food chain could occur the Freshwater 95% guideline value for PFAS is considered an appropriate screening criteria to be applied within the boundary of the Airport Estate.

Although only limited studies have been undertaken in arid zones of the NT, stygofauna presence has been confirmed in karstic formations east, west, and south-west of Alice Springs and in calcrete formations and saline paleochannels in the south-western region of the NT (Duguid, 2005).

The Katiti-Petermann IPA Plan of Management (2015) indicates that the likelihood of groundwater and surface water interaction down-gradient of the Airport Estate is extremely low, and both local and regional geology/ hydrogeology suggests the lithology and aquifer properties present at the northern end of the Dune Plains Aquifer would likely limit the rate and extent of contaminant migration vertically through the vadose zone and horizontally in the saturated zone.

Applicable guideline values used as screening criteria for PFAS in groundwater and surface water are listed in Table 7-2.

Table 7-2: Summary of Applicable Screening Criteria for PFAS in Groundwater and Surface Water

Analyte	Assessment Criteria (Source HEPA (2020))		
	Freshwater 95% (µg/L)	Recreational use (µg/L)	Drinking water (µg/L)
PFOS	0.13	2	0.07
PFHxS	NE	2	0.07
PFOA	220	10	0.56
PFOS+PFHxS	NE	2	0.07
Sum of PFAS	NE	NE	NE

NE = Not Established

Screening criteria for non-PFAS analytes were sourced from:

- ANZG (2018) for aquatic ecological impact in surface water or groundwater that discharges to an aquatic setting.
- ADWG (2022) for potential potable uses of groundwater.
- WA Dept of Health (2014) for recreational and non-potable uses of surface waters and groundwater.
- WHO (2008) Petroleum Products in Drinking Water.

In the absence of established screening criteria for TRH and TPH within the NEPM, 2013 GILs, a 10-fold factor was conservatively applied to the WHO, 2008 guideline values to derive appropriate recreational/NPUG criteria for TRH.

As recreational/NPUG screening criteria for human health exposure are not published within NEPM, 2013, Schedule B1 guideline values for recreational and non-potable uses are based on a derived health screening value that is ten times the corresponding GILs and/or Australian Drinking Water Guideline (ADWG) health-related guideline values. As neither of these guideline sources provide criteria for TRH/TPH the same underlying principle has been applied to the drinking water guideline values in WHO, 2008.

This approach is consistent with the World Health Organisation (WHO, 2003) and National Health and Medical Research Council (NHMRC, 2008) to establish standards for recreational water use. The WA Department of Health *Contaminated Sites Ground and Surface Water Chemical Screening Guidelines, 2014* (DoH, 2014) expands on the NHMRC, 2008 guideline and stipulates that non-potable uses may include irrigation of gardens, parks, and reserves, growing vegetables, flushing toilets or washing vehicles and the recreational use of surface water. The application of the NPUG criteria is, however, not limited to only these types of groundwater uses.

7.2.3 Concrete

Assessment of PFAS concentrations in concrete and the associated risk is inherently complex and uncertain and there is no formally accepted standard for which this should be done. For the purposes of this TSI Tetra Tech Coffey have adopted human health assessment criteria for direct contact with concrete derived dusts, as defined in *Airservices PFAS Characterisation Assessment Criteria Derivation of PFAS criteria for sediment, concrete, asphalt and pore water* (GHD, 2021) The criteria that are established in GHD, 2021 as most appropriate for this exposure route are derived directly and unadjusted, from the current soil assessment criteria provided in the PFAS NEMP v2, 2020.

The EGVs selected in GHD,2021 for human health risk assessment of concrete derived dust are conservative Tier 1 screening criteria which are suitable for that particular exposure route only.

GHD, 2021 also suggests that for leaching from concrete to groundwater and/or surface water the current human and ecological protection criteria within the NEMP, 2020 may be adjusted to be less conservative based on the Dilution Attenuation Factor (DAF) established in US EPA, 1996 which adopts a standard DAF of 20. The adjusted assessment criteria for leaching from concrete have been applied in this TSI based on GHD, 2021 to assess potential for migration of PFAS (as a mass estimate in liquid phase) from areas of impacted concrete (as a secondary source of contamination). Leachate results are not used for the purpose of assessing risk for human health or ecological exposure in surface water and/or groundwater.

EGVs for concrete adopted in this TSI (Table 7-3) are as follows:

- Total concentrations of PFAS in concrete were compared to the EGV for human exposure to concrete dust, derived from PFAS NEMP v2.0, 2020 Commercial/Industrial (HIL D) criteria. This EGV is applicable to the incidental ingestion of impacted concrete dust relevant in exposure scenarios such as demolition of concrete pads and forecourts, and activities such as concrete cutting, maintenance works and sub-slab infrastructure installation/replacement.

- Leachable concentrations of PFAS in concrete were compared to the following EGVs for contextual purposes only:
  - C/A2: EGV *for leaching to groundwater and potable use of off-site groundwater,* derived from the PFAS NEMP drinking water guideline multiplied by a Dilution Attenuation Factor (DAF) of 20. This EGV is applicable to the direct ingestion of impacted groundwater via potable use exposure routes only. However, as C/A2 applies to the use of abstracted groundwater, this EGV may be considered applicable to the incidental ingestion of impacted groundwater in exposure scenarios such as recreational activities and non-potable uses of groundwater (i.e., irrigation, dust suppression, construction/process waters, and the consumption of crops, livestock or livestock products watered with impacted groundwater. In these non-potable exposure scenarios, the EGV is highly conservative and overprotective relative to risk via related exposure routes.
  - C/A3: EGV *for leaching, discharge to surface water and primary contact recreation (swimming)*, derived from the PFAS NEMP recreational water guideline multiplied by DAF of 20. This EGV is applicable to the incidental ingestion of impacted surface water during aquatic recreational activities and non-potable uses, where water is sourced from surface water systems.
  - C/A5: EGV *for 95% species protection, leaching, discharge to surface water and direct ecological exposures*, derived from the PFAS NEMP 95% aquatic ecosystem protection levels multiplied by DAF of 20. This EGV is applicable to the direct exposure of aquatic fauna to impacted surface water.
  - C/A6: EGV *for leaching, discharge to surface water and ecological food chain exposures*, derived from the PFAS NEMP 99% aquatic ecosystem protection levels multiplied by DAF of 20.

Table 7-3: EGVs for concrete

Exposure scenario	PFOS+ PFHxS	PFOA	Source
Direct human contact with concrete/asphalt dust (C/A1)	Onsite: 20 mg/kg	Onsite: 50 mg/kg	PFAS NEMP HIL D
Leaching to groundwater and potable use of off-site groundwater (C/A2)	1.4 µg/L	11.2 µg/L	PFAS NEMP drinking water guideline multiplied by a DAF of 20
Leaching, discharge to surface water and primary contact recreation (swimming) (C/A3)	40 µg/L	200 µg/L	PFAS NEMP recreational water guideline multiplied by a DAF of 20
Leaching, discharge to surface water and direct ecological exposures (C/A5)	2.6 µg/L	4400 µg/L	PFAS NEMP 95% aquatic ecosystem protection levels multiplied by a DAF of 20
Leaching, discharge to surface water and ecological food chain exposures (C/A6)	0.005 µg/L	380 µg/L	PFAS NEMP 99% aquatic ecosystem protection levels multiplied by a DAF of 20

Analytical results for leachate analysis have been assessed against the EGVs presented in GHD (2021) however it is generally accepted that, in some exposure scenarios, the comparison of leachate concentrations to standard or adjusted Tier 1 screening criteria is not appropriate or relevant for determining the potential for a risk to be present via this pathway.

The C/A2 to C/A6 criteria listed in Table 7-3 relevant to leaching of PFAS from concrete have been applied in this TSI based on GHD (2021) for the purpose of assessing the potential for migration via this pathway (as a mass estimate in liquid phase) from areas of impacted concrete (acting as a secondary source of contamination). Leachate results from concrete samples are not a primary line of evidence in these exposure

scenarios and may not be applicable for the purpose of assessing risk related to human health or ecological receptors in relation to surface water and/or groundwater.

8. FIELD DATA AND RESULTS

8.1 SITE INVESTIGATION DATES

The fieldworks for Phase 1 and Phase 2 site investigations were undertaken on the following dates:

- Phase 1 – 20 to 28 June 2022 –groundwater, soil, sediment, concrete core, and infrastructure water sampling; and
- Phase 2 – 30 January to 8 February 2023 –groundwater, soil, sediment, and infrastructure water sampling.

Site conditions on a regional scale and across the broader Airport Estate are detailed fully in the Site Brief Report (Tetra Tech, July 2021) and summarised in Section 2 and 3 of this TSI report.

The information, data and result obtained from within the field during the intrusive site investigation works for AYQ are detailed below.

8.2 SITE SPECIFIC GEOLOGICAL PROFILE

A detailed account of the soil investigation at each of the soil boreholes that were advanced during Phase 1 and Phase 2, including soil type descriptions as well as other observations are detailed in the soil bore logs within Appendix C. Generalised soil lithology based on dominant geological horizons encountered during drilling across the Airport Estate are presented in Table 8-1 below.

Soil sample locations are presented on Figures 4A to 4C.

Table 8-1: Generalised Soil Lithology

Former Interim Fire Station (Example GW08, 02/02/2023) **Maximum depth of investigation: 15 mbgl**	**Current ARFFS Fire Station (Example YAP1, 25/06/2022)*** **Maximum depth of investigation: 1.0 mbgl**	**Fire Training Ground (Example GW03, 23/06/2022)** **Maximum depth of investigation: 14 mbgl**	**Downgradient of Airservices Lease Areas (Example: GW04, 25/06/2022)** **Maximum depth of investigation: 15 mbgl**
Depth: 0-0.02 mbgl GRAVEL, grey, sub-rounded to sub-angular, with some sand, coarse, red brown, dry	Depth: 0 – 1.0 mbgl: silty SAND, fine to medium, red brown, dry	Depth: 0-0.25 mbgl FILL: GRAVEL, fine grained, crushed rock	Depth: 0 – 3.2 mbgl: silty SAND, fine to medium grained, red brown, moist
Depth: 0.02 - 2.5 mbgl Silty SAND, fine to medium grained, red brown, dry		Depth: 0.25 – 2.80 mbgl silty SAND, fine to medium grained, red brown, dry	
Depth: 2.5 - 3.5 mbgl Silty SAND, fine to medium grained, red brown, poorly sorted, with some sub-angular to sub-rounded gravel, dry		Depth: 2.80 - 4.0 mbgl CEMENTED CONGLOMERATE/ GRAVEL, white, dry	
Depth: 3.5 – 5.0 mbgl CONGLOMERATE (potentially calcrete), pale brown, weathered		Depth: 4.0 – 14.0 mbgl SANDSTONE, pale brown, highly weathered, dry, wet at 12.0 mbgl	Depth: 3.2 – 5.0: CONGLOMERATE, rounded, with some gravel, dry
Depth: 5.0 – 15.0 mbgl SANDSTONE, weathered, grey, brown at 5 – 6.5 mbgl, turning pale brown at 6.5 – 8.5			Depth: 5.0 – 15.0 mbgl: SANDSTONE, pale brown, extremely weathered, dry, turning

Former Interim Fire Station (Example GW08, 02/02/2023) Maximum depth of investigation: 15 mbgl	Current ARFFS Fire Station (Example YAP1, 25/06/2022)* Maximum depth of investigation: 1.0 mbgl	Fire Training Ground (Example GW03, 23/06/2022) Maximum depth of investigation: 14 mbgl	Downgradient of Airservices Lease Areas (Example: GW04, 25/06/2022) Maximum depth of investigation: 15 mbgl
mbgl, calcareous and brown at 8.5 – 11.0 mbgl, dry. turning red brown and moist at 11.5 – 15 mbgl.			red brown at 10.5 mbgl and moist at 11.5 mbgl

Table Notes:
* No groundwater wells were constructed at the Current ARFFS Fire Station in 2022 and 2023 and no soil bores were advanced at the ARFFS Fire station in 2023. The soil lithology for this Airservices lease area has been sourced from a borehole advanced at that location in 2022, YAP1.

Fill was not observed in soil bores completed around the STP but was observed in most locations in the FTG area.

No odours or staining of soils was observed during the drilling of soil bores or installation of monitoring wells. Visual/ olfactory signs of suspected contamination or potential asbestos containing materials (PACM) were not observed.

8.3 GROUNDWATER OBSERVATIONS

Six groundwater monitoring wells (GW01 to GW06) were installed in June 2022 and five groundwater monitoring wells (GW07 to GW11) were installed in January/ February 2023 across the area of investigation. A total of 14 wells are present across the study area, inclusive of existing wells (RN12065, RN012081 and RN012163). Groundwater monitoring well locations are shown on Figure 6A, Appendix A. Well construction details are provided within the drilling logs included in Appendix C and surveying results are included in Appendix F.

Groundwater gauging and groundwater quality parameters are provided within Tables 2a and 2b, Appendix B. A summary of the field observations is provided in the below Table 8-2.

Table 8-2 Groundwater Observations and Parameters Summary

Item	Groundwater Observations at the Former Interim Fire Station	Groundwater Observations at the Main Fire Station	Groundwater Observations at the Fire Training Ground	Groundwater Observations at the Delineation Wells	Groundwater Observations at the Off-Airport wells
Wells gauged/ sampled	June 2022: GW01 February 2023: GW01 and GW08	June 2022 and February 2023: GW06, GW04 and RN012065	June 2022 and February 2023: GW02, GW03 and GW05	February 2023: GW07, GW09, GW10 and GW11	June 2022: RN012081, RN012082/RN122163*
Depth to groundwater (DTW) (mbtoc)	June 2022: 9.690 (GW01) February 2023: 9.665 (GW08) - 9.692 (GW01)	June 2022: 8.810 (GW06) - 10.940 (GW04) February 2023: 8.896 (GW06) - 11.210 (GW04)	June 2022: 9.065 (GW02) - 11.435 (GW05) February 2023: 9.067 (GW02) - 11.655 (GW05)	8.874 (GW09) - 12.150 (GW10)	12.880 (RN012082) - 13.080 (RN012081)
Standing Water Level	Standing water levels in the groundwater monitoring wells gauged in February 2023, have decreased by an average of 0.1 m from those measured during the June 2022 monitoring event. The average decrease is generally consistent across all areas of the site, with the highest water level decreases observed in GW04 and GW05 located north/ north-west of the MFS. The decrease in SWL over this time period may be attributable to temporal variations affecting groundwater levels between the two monitoring events.				
Groundwater Elevation (mAHD)	June 2022: 482.93 (GW01) February 2023: 482.845 (GW08) - 482.928 (GW01)	June 2022: 482.435 (GW04) - 482.585 (GW06) February 2023: 481.280 (GW04) - 482.574 (GW06)	June 2022: 482.340 (GW05) - 482.730 (GW02) February 2023: 481.335 (GW05) - 482.843 (GW02)	481.100 (GW11) - 482.826 (GW07)	483.166 (RN012081)
Visual Observations	June 2022: Clear, no observable turbidity February 2023: Slightly cloudy, pale yellow, low turbidity	June 2022 and February 2023: Clear, no observable turbidity	June 2022: Slightly cloudy February 2023: Clear, no observable turbidity	Clear, no observable turbidity	Clear at RN012081 and very cloudy at RN012082
Odours	No noticeable odours were detected during either GME conducted in June 2022 and February 2023.				Slight rotten egg odour at RN012081

Item	Groundwater Observations at the Former Interim Fire Station	Groundwater Observations at the Main Fire Station	Groundwater Observations at the Fire Training Ground	Groundwater Observations at the Delineation Wells	Groundwater Observations at the Off-Airport wells
Light non-aqueous phase liquid (LNAPL)	No LNAPL or hydrocarbon sheen was observed in any of the wells.				
Dissolved Oxygen (DO) (mg/L)	June 2022: 5.94 (GW01) February 2023: 1.85 (GW08) - 3.16 (GW01)	June 2022: 2.50 (RN12065) - 6.62 (GW06) February 2023: 0.26 (RN12065) - 3.27 (GW04)	June 2022: 4.90 (GW02) - 5.95 (GW05) February 2023: 1.03 (GW02) - 4.87 (GW03)	0.63 (GW11) - 1.97 (GW10)	3.19 (RN012081) – 7.18 (RN012082)
Electrical Conductivity (EC) (µS/cm)	June 2022: 2782 (GW01) February 2023: 2466 (GW01) - 2662 (GW08)	June 2022: 826 (GW01) – 4436 (GW04) February 2023: 1015 (GW06) - 4614 (GW04)	June 2022: 1565 (GW03) – 3030 (GW02) February 2023: 1521 (GW03) - 2706 (GW02)	831 (GW09) - 3647 (GW10)	2939 (RN012081) - 4809 (RN012082)
Total Dissolved Solids (TDS) (mg/L)	June 2022: 1808 (GW01) February 2023: 1603 (GW01) - 1730 (GW08)	June 2022: 537 (GW06) - 2883 (GW04) February 2023: 660 (GW06) - 2999 (GW04)	June 2022: 1017 (GW03) - 1970 (GW02) February 2023: 989 (GW03) – 1759 (GW02)	540 (GW09) – 2371 (GW10)	1910 (RN012081) – 3126 (RN012082)
pH	June 2022: 7.35 (GW01) February 2023: 7.19 (GW08) - 7.48 (GW01)	June 2022: 7.20 (GW04) - 8.38 (RN12065) February 2023: 7.30 (GW04) - 8.62 (RN012065)	June 2022: 7.37 (GW02) - 7.53 (GW03) February 2023: 7.31 (GW02) – 7.66 (GW03)	7.08 (GW10) – 7.75 (GW09)	7.17 (RN012082) – 8.45 (RN012081)
Redox Conditions (mV)	June 2022: 265 mV (GW01) February 2023: 110.3 (GW08) – 126.0 (GW01)	June 2022: 72.5 (RN12065) - 146.0 (GW04) February 2023: 51.1 (RN012065) – 111.1 (GW04)	June 2022: 123.8 (GW03) - 141.0 (GW05) February 2023: 115.0 (GW05) – 121.0 (GW03)	91.9 (GW11) – 129.1 (GW10)	-10.0 (RN012081) – 282.7 (RN012082)
Temperature (°C)	June 2022: 23.2 °C (GW01) February 2023: 25.8 (GW08) - 30.4 (GW01)	June 2022: 24.3 (RN12065) – 24.8 (GW04. GW06) February 2023: 24.3 (RN12065) - 29.5 (GW04)	June 2022: 21.4 (GW03) – 25.6 (GW02) February 2023: 28.4 (GW05) - 29.7 (GW03)	26.1 (GW07) - 30.5 (GW09)	23.0 (RN012082) – 2.9 (RN012081)

8.4 HYDROGEOLOGY AND AQUIFER PROPERTIES

Field data collected during site investigation works related to hydrogeology and aquifer properties for AYQ is summarised in the table below.

Table 8-3: Summary of Hydrogeology and Aquifer Properties

Item	Description
Total dissolved solids (mg/L)	Field assessed water quality parameter results indicate that the TDS of groundwater beneath and within the vicinity of the site ranged between: • 2022 data; 537 mg/L (GW06) and 3,126 mg/L (RN12082). • 2023 data; 540 mg/L (GW09) and 2,999 mg/L (GW04). We note that according to the 2023 field assessed TDS results, the TDS of the groundwater recorded from four monitoring wells was less than 1,000 mg/L (GW03, GW06 and GW09) located nearest the CFS, and GW11) but generally the majority of monitoring wells reported a TDS between 1,000 mg/L and 3,000 mg/L which is consistent with the Dune Plains Aquifer Modelling report (CloudGMS, 2019). A TDS greater than 1,000 mg/L will generally exclude the beneficial use of the groundwater for drinking water purposes (ADWG, 2021 and WHO, 2004) without significant treatment to reduce the salinity levels prior to a designated drinking water discharge outlet.
Groundwater occurrence	Bore logs indicate that the site is underlain by a quaternary aquifer, which is characterised by fine to medium grained, variably cemented sands resembling sandstone. No evidence of perched aquifers was encountered during the soil and groundwater investigation at AYQ.
Groundwater flow direction	Based on the measured groundwater RL, localised groundwater flow is migrating north/ north-west for the 2022 and the 2023 investigations. Inferred groundwater surface contours are provided in Figures 6B and 6C, Appendix A.
Hydraulic conductivity	The hydraulic conductivity of the aquifer is estimated to range between 2.59 x 10^{-5} to 0.518 m/day (Dominico and Schwartz, 1998) based on a sandstone aquifer. The reported yield of <1 L/s at the northern end of the Dune Plains Aquifer (CloudGMS, 2019) suggests the likely seepage velocity is at the lower end of the range stated above.
Hydraulic gradient	The general groundwater flow direction is north/ north-west at a gradient of approximately 0.001 (measured between GW07 and GW11).
Groundwater velocity	Assuming an effective porosity of 0.18 for sandstone (Wiedemeir et al., 1995), the seepage velocity is estimated to be approximately 5.25 x 10^{-5} to 1.05 m/year. The reported yield of <1 L/s at the northern end of the Dune Plains Aquifer (CloudGMS, 2019) suggests the likely seepage velocity is at the lower end of the range stated above.
Recharge rate	During development of groundwater wells (GW08, GW09 and GW11) the recharge rate was considered slow (i.e., the wells were bailed dry and in each case, it took several minutes for groundwater to recharge into each of these wells).

9. ANALYTICAL RESULTS

Primary and duplicate samples were submitted to Australian Laboratory Services (ALS) with triplicate samples submitted to Eurofins Environment Testing Australia (Eurofins).

The results from the 2022 and 2023 investigations for AYQ are summarised in the below sections. All (matrices of soil, sediment, water, and concrete) tabulated analytical results are provided in Appendix B**,** with the adopted human health and ecological screening criteria.

9.1 SOIL ANALYTICAL RESULTS

9.1.1 Soil PFAS Analytical Results

A total of 111 primary soil samples collected from 56 soil investigation locations were analysed for PFAS full suite (28 analytes). The soil sampling regime for PFAS for each SZA is further detailed in Table 9-1.

Soil PFAS results were compared to the adopted assessment criteria from the PFAS NEMP v2.0, 2020 and are summarised by SZA in Figures 5A, 5B and 5C, Appendix A and presented in Tables 1a and 1b, Appendix B.

Non-regulated PFAS compounds in soil are presented in Table 9-2. Concentrations of non-regulated PFAS compounds are presented in Tables 1a and 1b, Appendix B.

Table 9-1: Summary of Soil PFAS Analytical Results by Source Zone Area

Source Zone Areas	Number of sample locations	Number of primary samples analysed	PFHxS (mg/kg)	PFOS (mg/kg)	PFOA (mg/kg)	PFHxS + PFOS (mg/kg)	Sum of PFAS (mg/kg)	Number of samples exceeding adopted screening criteria		
								Industrial/ Commercial (HIL D)	Ecological Direct Exposure	Ecological Indirect Exposure
Main Fire Station	6	14	<0.0002 – 0.0009	<0.0002 – 0.0013	<0.0004 – 0.0344	<0.0002 – 0.0013	<0.0002 – 0.309	0	0	0
Interim Fire Station	8	12	<0.0002 – 0.0219	<0.0002 – 0.0084	0.0002 – 0.108	<0.0002 – 0.026	<0.0002 – 0.145	0	0	0
STP and Seepage Field	10	23	<0.0002 - 0.0008	<0.0002 - 0.0078	<0.0002 - 0.0072	<0.0002 - 0.0078	<0.0002 - 0.0418	0	0	0
FTG	21	56	<0.0002 – 0.0642	<0.0002 – 0.370	<0.0002 – 0.283	<0.0002 – 0.383	<0.0002 – 0.401	0	0	15
Monitoring Wells	11	7	<0.0002	<0.0002 – 0.0002	<0.0002	<0.0002 – 0.0002	<0.0002 – 0.0002	0	0	0

Table 9-2: Non-regulated PFAS compounds in soil reported above LOR at the Current Fire Station

PFAS compound	LOR (mg/kg)	Minimum Concentration (mg/kg)	Maximum Concentration (mg/kg)	Samples exceeding Laboratory LOR, where no assessment criteria exist
Perfluorobutane sulfonic acid (PFBS)	0.0002	<0.0002	<0.0002	All samples were reported below the LOR.
Perfluoropentane sulfonic acid (PFPeS)	0.0002	<0.0002	<0.0002	All samples were reported below the LOR.
Perfluoroheptane sulfonic acid (PFHpS)	0.0002	<0.0002	<0.0002	All samples were reported below the LOR.
Perfluorodecane sulfonic acid (PFDS)	0.0002	<0.0002	<0.0002	All samples were reported below the LOR.
Perfluorobutanoic acid (PFBA)	0.001	<0.001	0.005	SB19_0.3, SB19_0.6 and SB20_0.3 exceeded the LOR.
Perfluoropentanoic acid (PFPeA)	0.0002	<0.0002	0.0094	SB17_0.6-0.75, SB19_0.3, SB19_0.6, SB20_0.0, SB20_0.3, SB20_0.85-1.0 and YAP1_0.6-0.75 exceeded the LOR.
Perfluorohexanoic acid (PFHxA)	0.0002	<0.0002	0.0049	SB17_0.6-0.75, SB19_0.3, SB19_0.6, SB20_0.3, SB20_0.85-1.0, YAP1_0.0-0.2 and YAP1_0.6-0.75 exceeded the LOR.
Perfluoroheptanoic acid (PFHpA)	0.0002	<0.0002	0.0094	SB17_0.6-0.75, SB19_0.0, SB19_0.3, SB19_0.6, SB20_0.3, SB20_0.85-1.0, YAP1_0.0-0.2 and YAP1_0.6-0.75 exceeded the LOR.
Perfluorodecanoic acid (PFDA)	0.0002	<0.0002	0.0081	SB19_0.0, SB20_0.0, SB20_0.3, SB20_0.85-1.0, SB21_0.0 and YAP1_0.0-0.2 exceeded the LOR.
Perfluorododecanoic acid (PFDoDA)	0.0002	<0.0002	0.0098	SB19_0.0, SB20_0.0, SB20_0.3 and YAP1_0.0-0.2 exceeded the LOR.
Perfluorononanoic acid (PFNA)	0.0002	<0.0002	0.0171	SB18_0.0, SB19_0.0, SB20_0.0, SB20_0.3, SB20_0.85-1.0, SB21_0.0 and YAP1_0.0-0.2 exceeded the LOR.
Perfluorotetradecanoic acid (PFTeDA)	0.0005	<0.0005	0.0017	SB19_0.0 and YAP1_0.0-0.2 exceeded the LOR.
Perfluorotridecanoic acid (PFTrDA)	0.0002	<0.0002	0.0016	SB19_0.0, SB20_0.0 and YAP1_0.0-0.2 exceeded the LOR.
Perfluoroundecanoic acid (PFUnDA)	0.0002	<0.0002	0.0018	SB19_0.0, SB20_0.0, SB20_0.3 and YAP1_0.0-0.2 exceeded the LOR.
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	0.0005	<0.0005	<0.0005	All samples were reported below the LOR.
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	0.0005	<0.0005	0.0099	SB19_0.0, SB19_0.3 and YAP1_0.0-0.2 exceeded the LOR.
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	0.0005	<0.0005	0.0898	SB19_0.0, SB19_0.3, SB20_0.0 and YAP1_0.0-0.2 exceeded the LOR.

PFAS compound	LOR (mg/kg)	Minimum Concentration (mg/kg)	Maximum Concentration (mg/kg)	Samples exceeding Laboratory LOR, where no assessment criteria exist
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	0.0005	<0.0005	0.0007	SB19_0.0 and YAP1_0.0-0.2 exceeded the LOR.
Perfluorooctane sulfonamide (FOSA)	0.0002	<0.0002	<0.0002	All samples were reported below the LOR.
N-Methyl perfluorooctane sulfonamide (MeFOSA)	0.0005	<0.0005	<0.0005	All samples were reported below the LOR.
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	0.0002	<0.0002	<0.0002	All samples were reported below the LOR.
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	0.0005	<0.0005	<0.0005	All samples were reported below the LOR.
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	0.0005	<0.0005	<0.0005	All samples were reported below the LOR.
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	0.0002	<0.0002	<0.0002	All samples were reported below the LOR.
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	0.0005	<0.0005	<0.0005	All samples were reported below the LOR.

Table 9-3: Non-regulated PFAS compounds in soil reported above LOR at the IFS including STP and Seepage Spray Field

PFAS compound	LOR (mg/kg)	Minimum Concentration (mg/kg)	Maximum Concentration (mg/kg)	Samples exceeding Laboratory LOR, where no assessment criteria exist
Perfluorobutane sulfonic acid (PFBS)	0.0002	<0.0002	0.0003	SB07_0.0 and SB34_0.3 at the IFS exceeded the LOR.
Perfluoropentane sulfonic acid (PFPeS)	0.0002	<0.0002	0.0011	SB47_0.4-0.5 at the IFS exceeded the LOR SB07_0.0 and SB34_0.3 at the IFS exceeded the LOR.
Perfluoroheptane sulfonic acid (PFHpS)	0.0002	<0.0002	0.0004	SB07_0.0 at the IFS exceeded the LOR.
Perfluorodecane sulfonic acid (PFDS)	0.0002	<0.0002	0.0003	SB02_0.0, SB29_0.0 at the STP exceeded the LOR SB34_0.3 at the IFS exceeded the LOR.
Perfluorobutanoic acid (PFBA)	0.001	<0.001	0.001	SB05_0.3 at the seepage sprayfield, western end exceeded the LOR.
Perfluoropentanoic acid (PFPeA)	0.0002	<0.0002	0.0018	SB02_0.0, SB02_0.3-0.5, SB03_0.0, SB05_0.3 and SB47_0.4-0.5 at the STP exceeded the LOR SB06_0.0-0.2, SB07_0.0, SB07_0.3-0.5, SB32_0.3, SB33_0.3-0.5 and SB34_0.3 at the IFS exceeded the LOR.
Perfluorohexanoic acid (PFHxA)	0.0002	<0.0002	0.0054	SB02_0.0, SB02_0.3-0.5, SB05_0.3, SB47_0.4-0.5 and SB47_0.9-1.0 at the STP exceeded the LOR SB07_0.0, SB07_0.3-0.5, SB32_0.3, SB33_0.0, SB33_0.3-0.5 and SB34_0.3 at the IFS exceeded the LOR.
Perfluoroheptanoic acid (PFHpA)	0.0002	<0.0002	0.0140	SB02_0.0, SB02_0.3-0.5, SB04_0.3, SB05_0.3, SB46_0.4-0.5 and SB47_0.4-0.5 at the STP exceeded SB07_0.0, SB07_0.3-0.5, SB08_0.0, SB30_0.3, SB31_0.0, SB33_0.0, SB33_0.3-0.5 and SB34_0.3 at the IFS exceeded the LOR.
Perfluorodecanoic acid (PFDA)	0.0002	<0.0002	0.0152	SB02_0.0, SB02_0.3-0.5, SB03_0.0, SB04_0.0 and SB05_0.0 at the STP exceeded the LOR SB06_0.0-0.2, SB06_0.3-0.5, SB07_0.0, SB08_0.0, SB30_0.3 and SB33_0.0 at the IFS exceeded the LOR.
Perfluorododecanoic acid (PFDoDA)	0.0002	<0.0002	0.0347	SB02_0.0, SB05_0.0 and SB29_0.0 at the STP exceeded the LOR SB06_0.0-0.2, SB06_0.3-0.5, SB07_0.0, SB08_0.0 and SB33_0.0 at the IFS exceeded the LOR.
Perfluorononanoic acid (PFNA)	0.0002	<0.0002	0.0126	SB02_0.0, SB02_0.3-0.5, SB03_0.0, SB04_0.0, SB05_0.0, SB05_0.3, SB28_0.0, SB29_0.0 and SB29_0.3 at the STP exceeded the LOR SB06_0.0-0.2, SB06_0.3-0.5, SB07_0.0, SB08_0.0, SB30_0.3, SB31_0.0, SB33_0.0 and SB33_0.3-0.5 at the IFS exceeded the LOR.

PFAS compound	LOR (mg/kg)	Minimum Concentration (mg/kg)	Maximum Concentration (mg/kg)	Samples exceeding Laboratory LOR, where no assessment criteria exist
Perfluorotetradecanoic acid (PFTeDA)	0.0005	<0.0005	0.0030	SB06_0.0 at the IFS exceeded the LOR.
Perfluorotridecanoic acid (PFTrDA)	0.0002	<0.0002	0.0045	SB06_0.0 and SB33_0.0 at the IFS exceeded the LOR.
Perfluoroundecanoic acid (PFUnDA)	0.0002	<0.0002	0.0360	SB02_0.0, SB03_0.0, SB05_0.0, SB28_0.0 and SB29_0.0 at the STP exceeded the LOR SB06_0.0-0.2, SB06_0.3-0.5, SB07_0.0, SB08_0.0 and SB33_0.0 at the IFS exceeded the LOR.
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	0.0005	<0.0005	<0.0005	All samples were reported below the LOR.
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	0.0005	<0.0005	0.0020	SB33_0.0 exceeded the LOR.
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	0.0005	<0.0005	0.0358	SB02_0.0, SB02_0.3-0.5, SB03_0.0, SB04_0.0, SB05_0.0, SB29_0.0 and SB29_0.3 at the STP exceeded the LOR SB06_0.0-0.2, SB06_0.3-0.5, SB07_0.0, SB08_0.0 and SB33_0.0 at the IFS exceeded the LOR.
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	0.0005	<0.0005	0.0059	SB02_0.0 at the STP exceeded the LOR SB06_0.0-0.2 at the IFS exceeded the LOR.
Perfluorooctane sulfonamide (FOSA)	0.0002	<0.0002	0.0003	SB34_0.3 at the IFS exceeded the LOR.
N-Methyl perfluorooctane sulfonamide (MeFOSA)	0.0005	<0.0005	<0.0005	All samples were reported below the LOR.
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	0.0002	<0.0002	<0.0002	All samples were reported below the LOR.
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	0.0005	<0.0005	<0.0005	All samples were reported below the LOR.
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	0.0005	<0.0005	<0.0005	All samples were reported below the LOR.
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	0.0002	<0.0002	<0.0002	All samples were reported below the LOR.
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	0.0005	<0.0005	<0.0005	All samples were reported below the LOR.

Table 9-4: Non-regulated PFAS compounds in soil reported above LOR at the Fire Training Ground

PFAS compound	LOR (mg/kg)	Minimum Concentration (mg/kg)	Maximum Concentration (mg/kg)	Samples exceeding adopted assessment criteria or LOR where no assessment criteria exist
Perfluorobutane sulfonic acid (PFBS)	0.0002	<0.0002	0.0072	YAP2_0.0_240622, YAP4_0.0_230622, YAP4_0.45_230622, SB10_0.45_240622, SB10_0.85-1.0, SB12_0.0_240622, SB13_0.0_230622, SB13_0.45_230622, SB22_0.0_230622, SB22_0.45-0.5, SB23_0.45-0.5, SB25_0.0_240622, SB25_0.45-0.5, SB26_0.0_230622, SB26_0.45-0.5, SB35_0-0.2, SB37_0.9-1.0, SB39_0.4-0.5, SB39_0.9-1.0, SB40_0.4-0.5, SB40_0.9-1.0, SB41_0.9-1.0, SB42_0.4-0.5, SB42_0.9-1.0, SB43_1.9-2.0 and SB43_2.9-3.0 exceeded the LOR.
Perfluoropentane sulfonic acid (PFPeS)	0.0002	<0.0002	0.0150	YAP2_0.0_240622, YAP2_0.6_240622, YAP4_0.45_230622, SB10_0.45_240622, SB10_0.85-1.0, SB12_0.0_240622, SB12_0.3_240622, SB12_0.9, SB13_0.0_230622, SB13_0.45_230622, SB22_0.0_230622, SB22_0.45-0.5, SB25_0.0_240622, SB25_0.45-0.5, SB26_0.0_230622, SB26_0.45-0.5, SB27_0.0_240622, SB35_0-0.2, SB37_0.4-0.5, SB37_0.9-1.0, SB39_0.4-0.5, SB40_0.4-0.5, SB40_0.9-1.0, SB42_0.4-0.5, SB42_0.9-1.0, SB43_1.9-2.0 AND SB43_2.9-3.0 exceeded the LOR.
Perfluoroheptane sulfonic acid (PFHpS)	0.0002	<0.0002	0.0158	YAP2_0.0_240622, YAP4_0.45_230622, SB10_0.45_240622, SB12_0.0_240622, SB12_0.3_240622, SB24_0.0_240622, SB25_0.0_240622, SB25_0.45-0.5, SB26_0.0_230622, SB26_0.45-0.5, SB27_0.0_240622 SB37_0-0.2, SB37_0.4-0.5, SB37_0.9-1.0, SB40_0-0.2 and SB41_0-0.2 exceeded the LOR.
Perfluorodecane sulfonic acid (PFDS)	0.0002	<0.0002	0.0002	YAP4_0.45_230622 and SB41_0-0.2 exceeded the LOR.
Perfluorobutanoic acid (PFBA)	0.001	<0.001	0.0440	YAP2_0.0_240622, YAP3_0.6_230622, YAP4_0.0_230622, YAP4_0.45_230622, SB10_0.45_240622, SB12_0.0_240622, SB12_0.3_240622, SB12_0.9, SB13_0.0_230622, SB13_0.45_230622, SB26_0.45-0.5, SB37_0.4-0.5, SB37_0.9-1.0, SB40_0.9-1.0, SB42_0.4-0.5, SB43_0.4-0.5, SB43_0.9-1.0, SB43_1.9-2.0 and SB43_2.9-3.0 exceeded the LOR.
Perfluoropentanoic acid (PFPeA)	0.0002	<0.0002	0.0475	YAP2_0.0_240622, YAP2_0.6_240622, YAP3_0.0_230622, YAP3_0.6_230622, YAP4_0.0_230622, YAP4_0.45_230622, SB10_0.0_240622, SB10_0.45_240622, SB10_0.85-1.0, SB12_0.0_240622, SB12_0.3_240622, SB12_0.9, SB13_0.0_230622, SB13_0.45_230622, SB22_0.0_230622, SB22_0.45-0.5, SB23_0.0_230622, SB23_0.45-0.5, SB24_0.45-0.5, SB25_0.0_240622, SB25_0.45-0.5, SB26_0.0_230622, SB26_0.45-0.5, SB35_0.4-0.5, SB36_0.9-1.0, SB37_0-0.2, SB37_0.4-0.5, SB37_0.9-1.0, SB38_0.4-0.5, SB38_0.9-1.0, SB39_0.4-0.5, SB39_0.9-1.0, SB40_0.4-0.5, SB40_0.9-1.0, SB41_0.4-0.5, SB41_0.9-1.0, SB42_0.4-0.5, SB42_0.9-1.0 SB43_0.4-0.5, SB43_0.9-1.0, SB43_1.9-2.0 and SB43_2.9-3.0 exceeded the LOR.
Perfluorohexanoic acid (PFHxA)	0.0002	<0.0002	0.0829	YAP2_0.0_240622, YAP2_0.6_240622, YAP3_0.0_230622, YAP3_0.6_230622, YAP4_0.0_230622, YAP4_0.45_230622, SB10_0.0_240622, SB10_0.45_240622, SB10_0.85-1.0, SB12_0.0_240622, SB12_0.3_240622, SB12_0.9,

PFAS compound	LOR (mg/kg)	Minimum Concentration (mg/kg)	Maximum Concentration (mg/kg)	Samples exceeding adopted assessment criteria or LOR where no assessment criteria exist
				SB13_0.0_230622, SB13_0.45_230622, SB13_0.85-1.0, SB22_0.0_230622, SB22_0.45-0.5, SB23_0.0_230622, SB23_0.45-0.5, SB24_0.45-0.5, SB25_0.0_240622, SB25_0.45-0.5, SB26_0.0_230622 , SB26_0.45-0.5, SB27_0.0_240622, SB35_0-0.2, SB35_0.4-0.5, SB27_0.0_240622, SB36_0.4-0.5, SB36_0.9-1.0, SB37_0-0.2, SB37_0.4-0.5, SB37_0.9-1.0, SB38_0.4-0.5, SB38_0.9-1.0, SB39_0.4-0.5, SB39_0.9-1.0, SB40_0.4-0.5, SB40_0.9-1.0, SB41_0-0.2, SB41_0.4-0.5, SB41_0.9-1.0, SB42_0.4-0.5, SB42_0.9-1.0, SB42_1.9-2.0, SB42_2.4-2.5, SB43_0.4-0.5, SB43_0.9-1.0, SB43_1.9-2.0 and SB43_2.9-3.0 exceeded the adopted assessment criteria.
Perfluoroheptanoic acid (PFHpA)	0.0002	<0.0002	0.08	YAP2_0.0_240622, YAP2_0.6_240622, YAP3_0.0_230622, YAP3_0.6_230622, YAP4_0.0_230622, YAP4_0.45_230622, SB10_0.0_240622, SB10_0.45_240622, SB12_0.0_240622, SB12_0.3_240622, SB12_0.9, SB13_0.0_230622, SB13_0.45_230622, SB22_0.0_230622, SB22_0.45-0.5, SB23_0.0_230622, SB23_0.45-0.5, SB24_0.0_240622, SB24_0.45-0.5, SB25_0.0_240622, SB25_0.45-0.5, SB26_0.0_230622 , SB26_0.45-0.5, SB27_0.0_240622, SB35_0.4-0.5, SB35_0.9-1.0, SB36_0.4-0.5, SB36_0.9-1.0, SB37_0-0.2, SB37_0.4-0.5, SB37_0.9-1.0, SB38_0-0.2, SB38_0.4-0.5, SB38_0.9-1.0, SB39_0.4-0.5, SB39_0.9-1.0, SB40_0-0.2, SB40_0.4-0.5, SB40_0.9-1.0, SB41_0-0.2, SB41_0.4-0.5, SB41_0.9-1.0, SB42_0.4-0.5, SB42_0.9-1.0, SB42_1.9-2.0, SB42_2.4-2.5, SB43_0.4-0.5, SB43_0.9-1.0, SB43_1.9-2.0 and SB43_2.9-3.0 exceeded the adopted assessment criteria.
Perfluorodecanoic acid (PFDA)	0.0002	<0.0002	0.0206	YAP2_0.0_240622, YAP3_0.0_230622, YAP3_0.6_230622, YAP4_0.45_230622, SB10_0.0_240622, SB12_0.0_240622, SB13_0.0_230622, SB13_0.45_230622, SB22_0.0_230622, SB24_0.0_240622, SB25_0.0_240622, SB25_0.45-0.5, SB35_0-0.2, SB36_0-0.2, SB37_0-0.2, SB38_0-0.2, SB40_0-0.2, SB41_0-0.2, SB42_0.9-1.0, SB43_0.4-0.5, SB43_0.9-1.0, SB43_1.9-2.0 and SB43_2.9-3.0 exceeded the LOR.
Perfluorododecanoic acid (PFDoDA)	0.0002	<0.0002	0.0054	YAP2_0.0_240622, YAP3_0.0_230622, YAP3_0.6_230622, YAP4_0.45_230622, SB10_0.0_240622, SB12_0.0_240622, SB13_0.0_230622, SB22_0.0_230622, SB24_0.0_240622, SB25_0.0_240622, SB25_0.45-0.5, SB36_0-0.2, SB40_0-0.2, SB41_0-0.2, SB43_0.4-0.5, SB43_0.9-1.0, SB43_1.9-2.0 and SB43_2.9-3.0 exceeded the LOR.
Perfluorononanoic acid (PFNA)	0.0002	<0.0002	0.0368	YAP2_0.0_240622, YAP3_0.0_230622, YAP3_0.6_230622, YAP4_0.0_230622, YAP4_0.45_230622, SB10_0.0_240622, SB12_0.0_240622, SB12_0.3_240622, SB13_0.0_230622, SB13_0.45_230622, SB22_0.0_230622, SB24_0.0_240622, SB24_0.45-0.5, SB25_0.0_240622, SB25_0.45-0.5, SB27_0.0_240622, SB35_0-0.2, SB35_0.4-0.5, SB36_0-0.2, SB37_0-0.2, SB37_0.4-0.5, SB37_0.9-1.0, SB38_0-0.2, SB40_0-0.2, SB41_0-0.2, SB41_0.4-0.5, SB42_0.9-1.0, SB43_0.4-0.5, SB43_0.9-1.0, SB43_1.9-2.0 and SB43_2.9-3.0 exceeded the LOR.

PFAS compound	LOR (mg/kg)	Minimum Concentration (mg/kg)	Maximum Concentration (mg/kg)	Samples exceeding adopted assessment criteria or LOR where no assessment criteria exist
Perfluorotetradecanoic acid (PFTeDA)	0.0005	<0.0005	0.0021	YAP3_0.0_230622, SB10_0.0_240622, SB13_0.0_230622, SB40_0-0.2, SB41_0-0.2 and SB43_0.9-1.0 exceeded the LOR.
Perfluorotridecanoic acid (PFTrDA)	0.0002	<0.0002	0.0011	YAP2_0.0_240622, YAP3_0.0_230622, YAP4_0.45_230622, SB10_0.0_240622, SB12_0.0_240622, SB13_0.0_230622, SB22_0.0_230622, SB24_0.0_240622, SB40_0-0.2, SB41_0-0.2 and SB43_0.9-1.0 exceeded the LOR.
Perfluoroundecanoic acid (PFUnDA)	0.0002	<0.0002	0.0055	YAP2_0.0_240622, YAP3_0.0_230622, YAP3_0.6_230622, YAP4_0.0_230622, YAP4_0.45_230622, SB10_0.0_240622, SB12_0.0_240622, SB13_0.0_230622, SB22_0.0_230622, SB24_0.0_240622, SB25_0.0_240622, SB36_0-0.2, SB40_0-0.2, SB41_0-0.2, SB43_0.4-0.5, SB43_0.9-1.0, SB43_1.9-2.0 and SB43_2.9-3.0 exceeded the LOR.
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	0.0005	<0.0005	<0.0005	All samples were reported below the LOR.
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	0.0005	<0.0005	0.0166	YAP2_0.0_240622, YAP3_0.0_230622, YAP4_0.0_230622, YAP4_0.45_230622, SB10_0.0_240622, SB12_0.0_240622, SB12_0.3_240622, SB13_0.0_230622, SB13_0.45_230622, SB22_0.0_230622, SB27_0.0_240622, SB37_0-0.2, SB40_0-0.2
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	0.0005	<0.0005	0.0413	YAP2_0.0_240622, YAP3_0.0_230622, YAP3_0.6_230622, YAP4_0.0_230622, YAP4_0.45_230622, SB10_0.0_240622, SB12_0.0_240622, SB12_0.3_240622, SB13_0.0_230622, SB13_0.45_230622, SB22_0.0_230622, SB24_0.0_240622, SB25_0.0_240622, SB27_0.0_240622, SB27_1.9_240622, SB36_0-0.2, SB37_0-0.2, SB38_0-0.2, SB40_0-0.2, SB41_0-0.2, SB42_0.9-1.0, SB43_0.4-0.5, SB43_0.9-1.0, SB43_1.9-2.0 and SB43_2.9-3.0 exceeded the LOR.
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	0.0005	<0.0005	0.0014	SB41_0-0.2 and SB43_0.9-1.0 exceeded the LOR.
Perfluorooctane sulfonamide (FOSA)	0.0002	<0.0002	0.0003	SB13_0.45_230622 exceeded the LOR.
N-Methyl perfluorooctane sulfonamide (MeFOSA)	0.0005	<0.0005	<0.0005	All samples were reported below the LOR.
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	0.0002	<0.0002	<0.0002	All samples were reported below the LOR.
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	0.0005	<0.0005	<0.0005	All samples were reported below the LOR.
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	0.0005	<0.0005	<0.0005	All samples were reported below the LOR.

PFAS compound	LOR (mg/kg)	Minimum Concentration (mg/kg)	Maximum Concentration (mg/kg)	Samples exceeding adopted assessment criteria or LOR where no assessment criteria exist
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	0.0002	<0.0002	<0.0002	All samples were reported below the LOR.
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	0.0005	<0.0005	<0.0005	All samples were reported below the LOR.

Table 9-5: Non-regulated PFAS compounds in soil reported above LOR at the monitoring well locations

PFAS compound	LOR (mg/kg)	Minimum Concentration (mg/kg)	Maximum Concentration (mg/kg)	Samples exceeding adopted assessment criteria or LOR where no assessment criteria exist
Perfluorobutane sulfonic acid (PFBS)	0.0002	<0.0002	<0.0002	All samples were reported below the LOR.
Perfluoropentane sulfonic acid (PFPeS)	0.0002	<0.0002	<0.0002	All samples were reported below the LOR.
Perfluoroheptane sulfonic acid (PFHpS)	0.0002	<0.0002	<0.0002	All samples were reported below the LOR.
Perfluorodecane sulfonic acid (PFDS)	0.0002	<0.0002	<0.0002	All samples were reported below the LOR.
Perfluorobutanoic acid (PFBA)	0.001	<0.001	<0.0002	All samples were reported below the LOR.
Perfluoropentanoic acid (PFPeA)	0.0002	<0.0002	<0.0002	All samples were reported below the LOR.
Perfluorohexanoic acid (PFHxA)	0.0002	<0.0002	<0.0002	All samples were reported below the LOR.
Perfluoroheptanoic acid (PFHpA)	0.0002	<0.0002	<0.0002	All samples were reported below the LOR.
Perfluorodecanoic acid (PFDA)	0.0002	<0.0002	<0.0002	All samples were reported below the LOR.
Perfluorododecanoic acid (PFDoDA)	0.0002	<0.0002	<0.0002	All samples were reported below the LOR.
Perfluorononanoic acid (PFNA)	0.0002	<0.0002	<0.0002	All samples were reported below the LOR.
Perfluorotetradecanoic acid (PFTeDA)	0.0005	<0.0005	<0.0002	All samples were reported below the LOR.
Perfluorotridecanoic acid (PFTrDA)	0.0002	<0.0002	<0.0002	All samples were reported below the LOR.
Perfluoroundecanoic acid (PFUnDA)	0.0002	<0.0002	<0.0002	All samples were reported below the LOR.
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	0.0005	<0.0005	<0.0002	All samples were reported below the LOR.
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	0.0005	<0.0005	<0.0002	All samples were reported below the LOR.
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	0.0005	<0.0005	<0.0002	All samples were reported below the LOR.
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	0.0005	<0.0005	<0.0002	All samples were reported below the LOR.
Perfluorooctane sulfonamide (FOSA)	0.0002	<0.0002	<0.0002	All samples were reported below the LOR.

PFAS compound	LOR (mg/kg)	Minimum Concentration (mg/kg)	Maximum Concentration (mg/kg)	Samples exceeding adopted assessment criteria or LOR where no assessment criteria exist
N-Methyl perfluorooctane sulfonamide (MeFOSA)	0.0005	<0.0005	<0.0002	All samples were reported below the LOR.
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	0.0002	<0.0002	<0.0002	All samples were reported below the LOR.
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	0.0005	<0.0005	<0.0002	All samples were reported below the LOR.
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	0.0005	<0.0005	<0.0002	All samples were reported below the LOR.
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	0.0002	<0.0002	<0.0002	All samples were reported below the LOR.
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	0.0005	<0.0005	<0.0002	All samples were reported below the LOR.

9.1.1 Soil PFAS Analytical Leachability Results

A total of 11 soil samples from nine soil investigation locations underwent leachability analysis using the ASLP method (using non pH buffered de-ionised water). Soil sampling regime for leachable PFAS for each SZA is further detailed in Table 9-6.

Leachable concentrations of PFAS in soil are summarised by SZA and attached in Tables 1a, 1b and 1g, Appendix B.

Table 9-6: Summary of Soil PFAS Leachability Analytical Results by Source Zone Area

Source Zone Areas	Number of sample locations	Number of primary samples analysed	PFHxS (µg/L)	PFOS (µg/L)	PFOA (µg/L)	PFHxS + PFOS (µg/L)	Sum of PFAS (µg/L)	Number of samples exceeding adopted screening criteria		
								PFAS NEMP 95% Freshwater	PFAS NEMP Recreational Water	PFAS NEMP Drinking Water
Current Fire Station	1	1	0.01	0.01	1.92	0.02	4.91	0	0	1
Interim Fire Station	1	1	<0.01	0.5	<0.02	0.5	4.14	1	0	1
STP and Seepage Field	1	1	<0.01	0.16	0.03	0.16	0.94	1	0	1
FTG	1	1	1.68	9.73	0.45	11.4	12.4	1	1	1

9.1.2 Soil Supplementary Results

Selected soil samples at AYQ were analysed for supplementary CoPCs, which included the following analytes:

- PAHs
- TRH/ BTEXN
- Metals
- VOC Screen

All supplementary reported soil results at SZA including the CFS, FTG and IFS (including STP and seepage spray field) were reported below the adopted human health and ecological investigation levels. Detectable concentrations of metals (chromium, copper, lead, nickel, and zinc) were reported above the LOR in several samples but below the adopted assessment criteria.

9.2 GROUNDWATER ANALYTICAL RESULTS

9.2.1 Groundwater PFAS Analytical Results

Groundwater PFAS results at the FTG, IFS, CFS, delineation wells and off-airport upgradient wells were compared with the adopted assessment criteria from the PFAS NEMP 2020, as presented in attached Tables 3a and 3b, Appendix B and on Figure 7, Appendix A. The groundwater results for regulated compounds and the sum of PFAS are also summarised by SZA in Tables 9-7 to 9-11, below.

Non-regulated PFAS results are presented in Table 9-12 to Table 9-16 below and Table 3a and 3b, Appendix B.

Table 9-7: Groundwater PFAS Results at the FTG compared to the assessment criteria

Well ID	PFHxS (µg/L)		PFOS (µg/L)		PFOA (µg/L)		PFOS + PFHxS (µg/L)		Sum of PFAS		Sample exceeds Drinking Water guideline values		Sample exceeds Freshwater 95% guideline value		Sample Exceeds Recreational Water guideline values	
	June 2022	February 2023	June 2022	February 2023	June 2022	February 2023	June 2022	February 2023	June 2022	February 2023	June 2022	February 2023	June 2022	February 2023	June 2022	February 2023
GW02*	<0.01	0.0006	<0.01	<0.0002	<0.01	<0.0005	<0.01	0.0006	<0.01	0.0012	No	No	No	No	No	No
GW03 (P)**	0.11	0.13	0.01	0.02	0.33	0.46	0.12	0.15	2.62	3.25	Yes	Yes	No	No	No	No
GW05***	0.03	0.04	0.09	0.10	0.20	0.23	0.12	0.14	0.71	0.74	Yes	Yes	No	No	No	No
Statistical Analysis																
Min	<0.01 GW02	0.0006 GW02	<0.01 GW02	<0.0002 GW02	<0.01 GW02	<0.0005 GW02	<0.01 GW02	0.0006 GW02	<0.01 GW02	0.0012 GW02						
Max	0.11 GW03	0.13 GW03	0.09 GW05	0.10 GW05	0.33 GW03	0.46 GW03	0.12 GW03 & GW05	0.15 GW03	2.62 GW03	3.25 GW03						
Mean	0.07	0.06	0.05	0.06	0.27	0.35	0.12	0.10	1.67	1.33						
Std Dev	0.06	0.07	0.06	0.06	0.09	0.16	0.00	0.08	1.35	1.70						
Mean + std dev	0.13	0.12	0.11	0.12	0.36	0.51	0.12	0.18	3.02	3.03						

Table Note: * Up-gradient of FTG

** Primary Well denotes immediately down-gradient of FTG

*** Down-gradient of FTG and Stormwater Holding Pond

Table 9-8: Groundwater PFAS Results at the IFS and STP compared to the assessment criteria

Well ID	PFHxS (µg/L)		PFOS (µg/L)		PFOA (µg/L)		PFOS + PFHxS (µg/L)		Sum of PFAS		Sample exceeds Drinking Water guideline values		Sample exceeds Freshwater 95% guideline value		Sample Exceeds Recreational Water guideline values	
	June 2022	February 2023	June 2022	February 2023	June 2022	February 2023	June 2022	February 2023	June 2022	February 2023	June 2022	February 2023	June 2022	February 2023	June 2022	February 2023
GW01*	1.65	1.92	0.06	0.07	0.72	0.82	1.71	1.99	12.0	12.9	Yes	Yes	No	No	No	No
GW08**	NA	0.498	NA	0.412	NA	0.145	NA	0.910	NA	4.22	NA	Yes	NA	Yes	NA	No
Min	1.65 GW01	0.498 GW08	0.06 GW01	0.07 GW01	0.72 GW01	0.145 GW08	1.71 GW01	0.91 GW08	12.0 GW01	4.22 GW08						
Max	1.65 GW01	1.92 GW01	0.06 GW01	0.412 GW08	0.72 GW01	0.82 GW01	1.71 GW01	1.99 GW01	12.0 GW01	12.9 GW01						
Mean	1.65	1.21	0.06	0.24	0.72	0.48	1.71	1.45	12.00	8.56						
Std Dev	NA	1.01	NA	0.24	NA	0.48	NA	0.76	NA	6.14						
Mean + std dev	NA	2.21	NA	0.48	NA	0.96	NA	2.21	NA	14.70						

Table Note: * Located immediately up-gradient of STP

** Located within former footprint of IFS

Table 9-9: Groundwater PFAS Results at the MFS compared to the assessment criteria

Well ID	PFHxS (µg/L)		PFOS (µg/L)		PFOA (µg/L)		PFOS + PFHxS (µg/L)		Sum of PFAS		Sample exceeds Drinking Water guideline values		Sample exceeds Freshwater 95% guideline value		Sample Exceeds Recreational Water guideline values	
	June 2022	February 2023	June 2022	February 2023	June 2022	February 2023	June 2022	February 2023	June 2022	February 2023	June 2022	February 2023	June 2022	February 2023	June 2022	February 2023
GW04*	<0.01	<0.0005	<0.01	<0.0002	<0.01	<0.0005	<0.01	<0.0002	<0.01	0.0042	No	No	No	No	No	No
GW06**	0.21	0.04	0.01	<0.01	<0.01	<0.01	0.22	0.04	0.45	0.06	Yes	No	No	No	No	No
RN12065***	0.03	0.0225	0.04	0.0389	<0.01	0.0013	0.07	0.0614	0.13	0.221	No	No	No	No	No	No
Min	<0.01 GW04	<0.0005 GW04	<0.01 GW04	<0.0002 GW04	<0.01 All wells	<0.0005 GW04	<0.01 GW04	<0.0002 GW04	<0.01 GW04	0.0042 GW04						
Max	0.21 GW06	0.04 GW06	0.04 RN12065	0.0389 RN12065	<0.01 All wells	0.0013 RN12065	0.22 GW06	0.0614 RN12065	0.45 GW06	0.221 RN12065						
Mean	0.12	0.03	0.03	0.04	NA	0.00	0.15	0.05	0.29	0.10						
Std Dev	0.13	0.01	0.02	NA	NA	NA	0.11	0.02	0.23	0.11						
Mean + std dev	0.25	0.04	0.05	NA	NA	NA	0.25	0.07	0.52	0.21						

Table Note: * Located down-gradient of MFS

**** Located up-gradient of MFS**

*** Located down-gradient of MFS and installed prior to TSI works

Table 9-10: Groundwater PFAS Results at Delineation Monitoring Well location compared to the assessment criteria

Well ID	PFHxS (µg/L)	PFOS (µg/L)	PFOA (µg/L)	PFOS + PFHxS (µg/L)	Sum of PFAS	Sample exceeds Drinking Water guideline values	Sample exceeds Freshwater 95% guideline value	Sample Exceeds Recreational Water guideline values
	February 2023	February 2023	February 2023	February 2023	February 2023	February 2023	February 2023	February 2023
GW07*	0.0096	0.0029	0.0007	0.0125	0.0373	No	No	No
GW09**	0.0428	0.0041	0.0113	0.0469	0.215	No	No	No
GW10***	0.0017	0.0091	0.0028	0.0108	0.0183	No	No	No
GW11****	0.481	0.776	0.0414	1.26	1.65	Yes	Yes	No
Min	0.0017 GW10	0.0029 GW07	0.0007 GW07	0.0108 GW10	0.0183 GW10			
Max	0.481 GW11	0.776 GW11	0.0414 GW11	1.26 GW11	1.65 GW11			
Mean	0.13	0.20	0.01	0.33	0.48			
Std Dev	0.23	0.39	0.02	0.62	0.78			
Mean + std dev	0.37	0.58	0.03	0.95	1.27			

Table Note: * Located up-gradient of all SZA's

** Located cross-gradient to the north of all SZA's

*** Located cross-gradient to the south of all SZA's

**** Located down-gradient of all SZA's

Table 9-11: Groundwater PFAS Results at the Upgradient Wells compared to the assessment criteria

Well ID	PFHxS (µg/L)	PFOS (µg/L)	PFOA (µg/L)	PFOS + PFHxS (µg/L)	Sum of PFAS	Sample exceeds Drinking Water guideline values	Sample exceeds Freshwater 95% guideline value	Sample Exceeds Recreational Water guideline values
	February 2023	February 2023	February 2023	February 2023	February 2023	February 2023	February 2023	February 2023
RN12081	<0.01	<0.01	<0.01	<0.01	<0.01	No	No	No
RN12082	<0.01	<0.01	<0.01	<0.01	<0.01	No	No	No
Min	<0.01 All wells	<0.01 All wells	<0.01 All wells	<0.01 All wells	<0.01 All wells			
Max	<0.01 All wells	<0.01 All wells	<0.01 All wells	<0.01 All wells	<0.01 All wells			
Mean	NA	NA	NA	NA	NA			
Std Dev	NA	NA	NA	NA	NA			
Mean + std dev	NA	NA	NA	NA	NA			

Table 9-12: Non-regulated PFAS compounds in groundwater reported above LOR at the Fire Training Ground

PFAS compound	LOR (µg/L)	Minimum Concentration (µg/L)	Maximum Concentration (µg/L)	Samples exceeding Laboratory LOR, where no assessment criteria exist
Perfluorobutane sulfonic acid (PFBS)	0.0005	<0.0005	0.04	GW03 (June 2022 and February 2023) exceeded the LOR.
Perfluoropentane sulfonic acid (PFPeS)	0.0005	<0.0005	0.03	GW03 (June 2022 and February 2023) exceeded the LOR.
Perfluoroheptane sulfonic acid (PFHpS)	0.0005	<0.0005	<0.02	All samples were reported below the LOR.
Perfluorodecane sulfonic acid (PFDS)	0.0005	<0.0005	<0.02	All samples were reported below the LOR.
Perfluorobutanoic acid (PFBA)	0.0002	<0.0020	0.40	GW03 (June 2022 and February 2023) exceeded the LOR.
Perfluoropentanoic acid (PFPeA)	0.0005	<0.0005	0.62	GW03 (June 2022 and February 2023) and GW05 (June 2022 and February 2023) exceeded the LOR.
Perfluorohexanoic acid (PFHxA)	0.0005	<0.02	0.74	GW02 (February 2023), GW03 (June 2022 and February 2023) and GW05 (June 2022 and February 2023) exceeded the LOR.
Perfluoroheptanoic acid (PFHpA)	0.0005	<0.0005	0.78	GW03 (June 2022 and February 2023) and GW05 (June 2022 and February 2023) exceeded the LOR.
Perfluorodecanoic acid (PFDA)	0.0005	<0.0005	0.02	GW05 (June 2022) exceeded the LOR.
Perfluorododecanoic acid (PFDoDA)	0.0005	<0.0005	<0.02	All samples were reported below the LOR.
Perfluorononanoic acid (PFNA)	0.0005	<0.0005	0.09	GW03 (February 2023) and GW05 (June 2022 and February 2023) exceeded the LOR.
Perfluorotetradecanoic acid (PFTeDA)	0.0005	<0.0005	<0.05	All samples were reported below the LOR.
Perfluorotridecanoic acid (PFTrDA)	0.0005	<0.0005	<0.02	All samples were reported below the LOR.
Perfluoroundecanoic acid (PFUnDA)	0.0005	<0.0005	<0.02	All samples were reported below the LOR.
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	0.001	<0.001	<0.05	All samples were reported below the LOR.
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	0.001	<0.001	<0.05	All samples were reported below the LOR.
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	0.001	<0.001	<0.05	All samples were reported below the LOR.

PFAS compound	LOR (µg/L)	Minimum Concentration (µg/L)	Maximum Concentration (µg/L)	Samples exceeding Laboratory LOR, where no assessment criteria exist
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	0.001	<0.001	<0.05	All samples were reported below the LOR.
Perfluorooctane sulfonamide (FOSA)	0.0005	<0.0005	<0.02	All samples were reported below the LOR.
N-Methyl perfluorooctane sulfonamide (MeFOSA)	0.001	<0.001	<0.05	All samples were reported below the LOR.
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	0.0005	<0.0005	<0.02	All samples were reported below the LOR.
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	0.001	<0.001	<0.05	All samples were reported below the LOR.
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	0.001	<0.001	<0.05	All samples were reported below the LOR.
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	0.0005	<0.0005	<0.02	All samples were reported below the LOR.
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	0.001	<0.001	<0.05	All samples were reported below the LOR.

Table 9-13: Non-regulated PFAS compounds in groundwater reported above LOR at the Sewage Treatment Plant and Interim Fire Station

PFAS compound	LOR (µg/L)	Minimum Concentration (µg/L)	Maximum Concentration (µg/L)	Samples exceeding Laboratory LOR, where no assessment criteria exist
Perfluorobutane sulfonic acid (PFBS)	0.0005	0.233	0.92	GW01 (June 2022 and February 2023) and GW08 (February 2023) exceeded the LOR.
Perfluoropentane sulfonic acid (PFPeS)	0.0005	0.137	0.69	GW01 (June 2022 and February 2023) and GW08 (February 2023) exceeded the LOR.
Perfluoroheptane sulfonic acid (PFHpS)	0.0005	0.0157	0.2	GW01 (February 2023) and GW08 (February 2023) exceeded the LOR.
Perfluorodecane sulfonic acid (PFDS)	0.0005	<0.0016	<0.02	All samples were reported below the LOR.
Perfluorobutanoic acid (PFBA)	0.0002	0.858	2.2	GW01 (June 2022 and February 2023) and GW08 (February 2023) exceeded the LOR.
Perfluoropentanoic acid (PFPeA)	0.0005	0.882	2.86	GW01 (June 2022 and February 2023) and GW08 (February 2023) exceeded the LOR.
Perfluorohexanoic acid (PFHxA)	0.0005	0.592	2.32	GW01 (June 2022 and February 2023) and GW08 (February 2023) exceeded the LOR.
Perfluoroheptanoic acid (PFHpA)	0.0005	0.443	1.27	GW01 (June 2022 and February 2023) and GW08 (February 2023) exceeded the LOR.
Perfluorodecanoic acid (PFDA)	0.0005	<0.0016	<0.02	All samples were reported below the LOR.
Perfluorododecanoic acid (PFDoDA)	0.0005	<0.0016	<0.02	All samples were reported below the LOR.
Perfluorononanoic acid (PFNA)	0.0005	<0.0016	<0.02	All samples were reported below the LOR.
Perfluorotetradecanoic acid (PFTeDA)	0.0005	<0.0040	<0.05	All samples were reported below the LOR.
Perfluorotridecanoic acid (PFTrDA)	0.0005	<0.0016	<0.02	All samples were reported below the LOR.
Perfluoroundecanoic acid (PFUnDA)	0.0005	<0.0016	<0.02	All samples were reported below the LOR.
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	0.001	<0.002	<0.05	All samples were reported below the LOR.
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	0.001	<0.002	<0.05	All samples were reported below the LOR.
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	0.001	<0.002	<0.05	All samples were reported below the LOR.

PFAS compound	LOR (µg/L)	Minimum Concentration (µg/L)	Maximum Concentration (µg/L)	Samples exceeding Laboratory LOR, where no assessment criteria exist
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	0.001	<0.002	<0.05	All samples were reported below the LOR.
Perfluorooctane sulfonamide (FOSA)	0.0005	<0.0016	<0.05	All samples were reported below the LOR.
N-Methyl perfluorooctane sulfonamide (MeFOSA)	0.001	<0.004	<0.05	All samples were reported below the LOR.
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	0.0005	<0.0016	<0.02	All samples were reported below the LOR.
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	0.001	<0.004	<0.05	All samples were reported below the LOR.
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	0.001	<0.004	<0.05	All samples were reported below the LOR.
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	0.0005	<0.0016	<0.02	All samples were reported below the LOR.
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	0.001	<0.004	<0.05	All samples were reported below the LOR.

Table 9-14: Non-regulated PFAS compounds in groundwater reported above LOR at the Main Fire Station

PFAS compound	LOR (µg/L)	Minimum Concentration (µg/L)	Maximum Concentration (µg/L)	Samples exceeding Laboratory LOR, where no assessment criteria exist
Perfluorobutane sulfonic acid (PFBS)	0.0005	<0.02	0.05	GW04 (February 2023), RN12065 (February 2023) and GW06 (June 2022 and February 2023) exceeded the LOR.
Perfluoropentane sulfonic acid (PFPeS)	0.0005	<0.0005	0.06	RN12065 (February 2023) and GW06 (June 2022) exceeded the LOR.
Perfluoroheptane sulfonic acid (PFHpS)	0.0005	<0.0005	<0.02	All samples were reported below the LOR.
Perfluorodecane sulfonic acid (PFDS)	0.0005	<0.0005	<0.02	All samples were reported below the LOR.
Perfluorobutanoic acid (PFBA)	0.0002	<0.0020	<0.1	All samples were reported below the LOR.
Perfluoropentanoic acid (PFPeA)	0.0005	<0.02	0.04	GW04 (February 2022), GW06 (June 2022) and RN12065 (February 2023) exceeded the LOR.
Perfluorohexanoic acid (PFHxA)	0.0005	0.06	0.09	RN12065 (June 2022 and February 2023) and GW06 (June 2022) exceeded the LOR.
Perfluoroheptanoic acid (PFHpA)	0.0005	<0.0005	0.0023	RN12065 (February 2023) exceeded the LOR.
Perfluorodecanoic acid (PFDA)	0.0005	<0.0005	0.0006	RN12065 (February 2023) exceeded the LOR.
Perfluorododecanoic acid (PFDoDA)	0.0005	<0.0005	<0.01	All samples were reported below the LOR.
Perfluorononanoic acid (PFNA)	0.0005	<0.0005	0.0009	RN12065 (February 2023) exceeded the LOR.
Perfluorotetradecanoic acid (PFTeDA)	0.0005	<0.0005	<0.05	All samples were reported below the LOR.
Perfluorotridecanoic acid (PFTrDA)	0.0005	<0.0005	<0.05	All samples were reported below the LOR.
Perfluoroundecanoic acid (PFUnDA)	0.0005	<0.0005	<0.02	All samples were reported below the LOR.
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	0.001	<0.001	<0.05	All samples were reported below the LOR.

PFAS compound	LOR (µg/L)	Minimum Concentration (µg/L)	Maximum Concentration (µg/L)	Samples exceeding Laboratory LOR, where no assessment criteria exist
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	0.001	<0.001	0.0060	RN12065 (February 2023) exceeded the LOR.
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	0.001	<0.001	<0.05	All samples were reported below the LOR.
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	0.001	<0.001	<0.05	All samples were reported below the LOR.
Perfluorooctane sulfonamide (FOSA)	0.0005	<0.0005	0.0006	RN12065 (February 2023) exceeded the LOR.
N-Methyl perfluorooctane sulfonamide (MeFOSA)	0.001	<0.001	0.0006	All samples were reported below the LOR.
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	0.0005	<0.0005	<0.02	All samples were reported below the LOR.
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	0.001	<0.001	<0.05	All samples were reported below the LOR.
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	0.001	<0.001	<0.05	All samples were reported below the LOR.
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	0.0005	<0.0005	<0.02	All samples were reported below the LOR.
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	0.001	<0.001	<0.05	All samples were reported below the LOR.

Table 9-15: Non-regulated PFAS compounds in groundwater reported above LOR at Delineation Well locations

PFAS compound	LOR (µg/L)	Minimum Concentration (µg/L)	Maximum Concentration (µg/L)	Samples exceeding Laboratory LOR, where no assessment criteria exist
Perfluorobutane sulfonic acid (PFBS)	0.0005	<0.0005	0.0499	GW07 (February 2023), GW09 (February 2023) and GW11 (February 2023) exceeded the LOR.
Perfluoropentane sulfonic acid (PFPeS)	0.0005	<0.0005	0.0562	GW07 (February 2023), GW09 (February 2023) and GW11 (February 2023) exceeded the LOR.
Perfluoroheptane sulfonic acid (PFHpS)	0.0005	<0.0005	0.018	GW11 (February 2023) exceeded the LOR.
Perfluorodecane sulfonic acid (PFDS)	0.0005	<0.0005	<0.0005	All samples were reported below the LOR.
Perfluorobutanoic acid (PFBA)	0.0002	0.0026	0.0543	GW07 (February 2023), GW09 (February 2023), GW10 (February 2023) and GW11 (February 2023) exceeded the LOR.
Perfluoropentanoic acid (PFPeA)	0.0005	<0.0005	0.0533	GW07 (February 2023), GW09 (February 2023), GW11 (February 2023) exceeded the LOR.
Perfluorohexanoic acid (PFHxA)	0.0005	0.0007	0.12	GW07 (February 2023), GW09 (February 2023), GW10 (February 2023) and GW11 (February 2023) exceeded the LOR.
Perfluoroheptanoic acid (PFHpA)	0.0005	<0.0005	0.0199	GW09 (February 2023) and GW11 (February 2023) exceeded the LOR.
Perfluorodecanoic acid (PFDA)	0.0005	<0.0005	0.0008	GW10 (February 2023) exceeded the LOR.
Perfluorododecanoic acid (PFDoDA)	0.0005	<0.0005	<0.0005	All samples were reported below the LOR.
Perfluorononanoic acid (PFNA)	0.0005	<0.0005	0.0006	GW10 (February 2023) exceeded the LOR.
Perfluorotetradecanoic acid (PFTeDA)	0.0005	<0.0005	<0.0005	All samples were reported below the LOR.
Perfluorotridecanoic acid (PFTrDA)	0.0005	<0.0005	<0.0005	All samples were reported below the LOR.
Perfluoroundecanoic acid (PFUnDA)	0.0005	<0.0005	<0.0005	All samples were reported below the LOR.
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	0.001	<0.001	<0.001	All samples were reported below the LOR.
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	0.001	<0.001	<0.001	All samples were reported below the LOR.

PFAS compound	LOR (µg/L)	Minimum Concentration (µg/L)	Maximum Concentration (µg/L)	Samples exceeding Laboratory LOR, where no assessment criteria exist
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	0.001	<0.001	<0.001	All samples were reported below the LOR.
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	0.001	<0.001	<0.001	All samples were reported below the LOR.
Perfluorooctane sulfonamide (FOSA)	0.0005	<0.0005	<0.0005	All samples were reported below the LOR.
N-Methyl perfluorooctane sulfonamide (MeFOSA)	0.001	<0.001	<0.001	All samples were reported below the LOR.
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	0.0005	<0.0005	<0.0005	All samples were reported below the LOR.
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	0.001	<0.001	<0.001	All samples were reported below the LOR.
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	0.001	<0.001	<0.001	All samples were reported below the LOR.
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	0.0005	<0.0005	<0.0005	All samples were reported below the LOR.
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	0.001	<0.001	<0.001	All samples were reported below the LOR.

Table 9-16: Non-regulated PFAS compounds in groundwater reported above LOR at the Upgradient Off-Airport Monitoring Well location

PFAS compound	LOR (µg/L)	Minimum Concentration (µg/L)	Maximum Concentration (µg/L)	Samples exceeding Laboratory LOR, where no assessment criteria exist
Perfluorobutane sulfonic acid (PFBS)	0.0005	<0.02	<0.02	All samples were reported below the LOR.
Perfluoropentane sulfonic acid (PFPeS)	0.0005	<0.02	<0.02	All samples were reported below the LOR.
Perfluoroheptane sulfonic acid (PFHpS)	0.0005	<0.02	<0.02	All samples were reported below the LOR.
Perfluorodecane sulfonic acid (PFDS)	0.0005	<0.02	<0.02	All samples were reported below the LOR.
Perfluorobutanoic acid (PFBA)	0.0002	<0.1	<0.1	All samples were reported below the LOR.
Perfluoropentanoic acid (PFPeA)	0.0005	<0.02	<0.02	All samples were reported below the LOR.
Perfluorohexanoic acid (PFHxA)	0.0005	<0.02	<0.02	All samples were reported below the LOR.
Perfluoroheptanoic acid (PFHpA)	0.0005	<0.02	<0.02	All samples were reported below the LOR.
Perfluorodecanoic acid (PFDA)	0.0005	<0.02	<0.02	All samples were reported below the LOR.
Perfluorododecanoic acid (PFDoDA)	0.0005	<0.02	<0.02	All samples were reported below the LOR.
Perfluorononanoic acid (PFNA)	0.0005	<0.02	<0.02	All samples were reported below the LOR.
Perfluorotetradecanoic acid (PFTeDA)	0.0005	<0.05	<0.05	All samples were reported below the LOR.
Perfluorotridecanoic acid (PFTrDA)	0.0005	<0.02	<0.02	All samples were reported below the LOR.
Perfluoroundecanoic acid (PFUnDA)	0.0005	<0.02	<0.02	All samples were reported below the LOR.
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	0.001	<0.05	<0.05	All samples were reported below the LOR.
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	0.001	<0.05	<0.05	All samples were reported below the LOR.
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	0.001	<0.05	<0.05	All samples were reported below the LOR.

PFAS compound	LOR (µg/L)	Minimum Concentration (µg/L)	Maximum Concentration (µg/L)	Samples exceeding Laboratory LOR, where no assessment criteria exist
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	0.001	<0.05	<0.05	All samples were reported below the LOR.
Perfluorooctane sulfonamide (FOSA)	0.0005	<0.02	<0.02	All samples were reported below the LOR.
N-Methyl perfluorooctane sulfonamide (MeFOSA)	0.001	<0.05	<0.05	All samples were reported below the LOR.
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	0.0005	<0.02	<0.02	All samples were reported below the LOR.
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	0.001	<0.05	<0.05	All samples were reported below the LOR.
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	0.001	<0.05	<0.05	All samples were reported below the LOR.
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	0.0005	<0.02	<0.02	All samples were reported below the LOR.
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	0.001	<0.05	<0.05	All samples were reported below the LOR.

9.2.2 Groundwater Supplementary Results

Water samples from groundwater monitoring wells (GW02, GW03 and GW05) were analysed for supplementary CoPCs including TRH and BTEXN.

All supplementary groundwater results were reported below the adopted human health and ecological investigation levels and below the LOR of GW05, which reported a concentration of toluene and TRH fraction C_{29}-C_{36} above the LOR, and with the exception of GW02, which reported a concentration of TRH fraction C_{10}-C_{14} above the LOR. Analytical results are presented in Table3c, Appendix B indicating all results are below the adopted assessment criteria.

9.3 SEDIMENT ANALYTICAL RESULTS

9.3.1 Sediment PFAS Analytical Results

Sediment samples were collected from seven locations: in source zone areas including the drainage channel near IFS and seepage spray field (SED10 and SED11), and drainage channel and stormwater holding pond near CFS (SS01, SS02, SS03, SS04 and SB44). Sediment samples were collected from areas including either drainage channels or the base of the pond.

Sediment PFAS results at AYQ were compared to the adopted assessment criteria from the PFAS NEMP 2020 as presented in Figure 5A to 5C, Appendix A, attached Tables 1a and 1b, Appendix B, and in-text table below.

Non-regulated PFAS compounds in sediment are presented in Table 9-17 and Table 9-18, below. Concentrations of non-regulated PFAS compounds are presented in attached Tables 1a and 1b, Appendix B.

Table 9-17: Summary of Sediment PFAS Analytical Results

Source Zone Areas	Number of sample locations	Number of primary samples analysed	PFHxS (mg/kg)	PFOS (mg/kg)	PFOA (mg/kg)	PFHxS + PFOS (mg/kg)	Sum of PFAS (mg/kg)	Number of samples exceeding adopted assessment criteria		
								Industrial/ Commercial (HIL D)	Ecological Direct Exposure	Ecological Indirect Exposure
Drainage Channel near IFS and Seepage Spray Field	2	2	<0.0002	0.0022 – 0.0465	<0.0002	0.0022 – 0.0465	0.0030 – 0.0493	0	0	1
Drainage Channel and Dam near MFS	5	6	<0.0002	0.0020 – 0.0479	<0.0002 – 0.0006	0.0020 – 0.0479	0.0088 – 0.360	0	0	3

Table 9-18: Non-regulated PFAS compounds in sediment within Drainage Channel near IFS and Seepage Spray Field

PFAS compound	LOR (mg/kg)	Minimum Concentration (mg/kg)	Maximum Concentration (mg/kg)	Samples exceeding Laboratory LOR, where no assessment criteria exist
Perfluorobutane sulfonic acid (PFBS)	0.0002	<0.0002	<0.0002	All samples were reported below the LOR.
Perfluoropentane sulfonic acid (PFPeS)	0.0002	<0.0002	<0.0002	All samples were reported below the LOR.
Perfluoroheptane sulfonic acid (PFHpS)	0.0002	<0.0002	<0.0002	All samples were reported below the LOR.
Perfluorodecane sulfonic acid (PFDS)	0.0002	<0.0002	<0.0002	All samples were reported below the LOR.
Perfluorobutanoic acid (PFBA)	0.001	<0.001	<0.001	All samples were reported below the LOR.
Perfluoropentanoic acid (PFPeA)	0.0002	<0.0002	<0.0002	All samples were reported below the LOR.
Perfluorohexanoic acid (PFHxA)	0.0002	<0.0002	<0.0002	All samples were reported below the LOR.
Perfluoroheptanoic acid (PFHpA)	0.0002	<0.0002	<0.0002	All samples were reported below the LOR.
Perfluorodecanoic acid (PFDA)	0.0002	0.0004	0.0016	SED10_200622 and SED11_200622 exceeded the LOR.

PFAS compound	LOR (mg/kg)	Minimum Concentration (mg/kg)	Maximum Concentration (mg/kg)	Samples exceeding Laboratory LOR, where no assessment criteria exist
Perfluorododecanoic acid (PFDoDA)	0.0002	<0.0002	0.0003	SED11_200622 exceeded the LOR.
Perfluorononanoic acid (PFNA)	0.0002	0.0004	0.0006	SED10_200622 and SED11_200622 exceeded the LOR.
Perfluorotetradecanoic acid (PFTeDA)	0.0005	<0.0005	<0.0005	All samples were reported below the LOR.
Perfluorotridecanoic acid (PFTrDA)	0.0002	<0.0002	<0.0002	All samples were reported below the LOR.
Perfluoroundecanoic acid (PFUnDA)	0.0002	<0.0002	0.0003	SED11_200622 exceeded the LOR.
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	0.0005	<0.0005	<0.0005	All samples were reported below the LOR.
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	0.0005	<0.0005	<0.0005	All samples were reported below the LOR.
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	0.0005	<0.0005	<0.0005	All samples were reported below the LOR.
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	0.0005	<0.0005	<0.0005	All samples were reported below the LOR.
Perfluorooctane sulfonamide (FOSA)	0.0002	<0.0002	<0.0002	All samples were reported below the LOR.
N-Methyl perfluorooctane sulfonamide (MeFOSA)	0.0005	<0.0005	<0.0005	All samples were reported below the LOR.
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	0.0002	<0.0002	<0.0002	All samples were reported below the LOR.
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	0.0005	<0.0005	<0.0005	All samples were reported below the LOR.
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	0.0005	<0.0005	<0.0005	All samples were reported below the LOR.
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	0.0002	<0.0002	<0.0002	All samples were reported below the LOR.
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	0.0005	<0.0005	<0.0005	All samples were reported below the LOR.

Table 9-19: Non-regulated PFAS compounds in sediment within Drainage Channel and Holding Pond near MFS

PFAS compound	LOR (mg/kg)	Minimum Concentration (mg/kg)	Maximum Concentration (mg/kg)	Samples exceeding Laboratory LOR, where no assessment criteria exist
Perfluorobutane sulfonic acid (PFBS)	0.0002	<0.0002	<0.0002	All samples were reported below the LOR.
Perfluoropentane sulfonic acid (PFPeS)	0.0002	<0.0002	<0.0002	All samples were reported below the LOR.
Perfluoroheptane sulfonic acid (PFHpS)	0.0002	<0.0002	<0.0002	All samples were reported below the LOR.
Perfluorodecane sulfonic acid (PFDS)	0.0002	<0.0002	0.0011	SS01_220622, SS02_220622 and SS04 exceeded the LOR.
Perfluorobutanoic acid (PFBA)	0.001	<0.001	<0.001	All samples were reported below the LOR.
Perfluoropentanoic acid (PFPeA)	0.0002	<0.0002	<0.0002	All samples were reported below the LOR.
Perfluorohexanoic acid (PFHxA)	0.0002	<0.0002	<0.0002	All samples were reported below the LOR.
Perfluoroheptanoic acid (PFHpA)	0.0002	<0.0002	0.0003	SS01_220622, SS02_220622 and SS03_220622 exceeded the LOR.
Perfluorodecanoic acid (PFDA)	0.0002	0.0019	0.0468	SS01_220622, SS02_220622, SS03_220622, SS04, SB44_0.4-0.5 and SB44_0.9-1.0 exceeded the LOR.
Perfluorododecanoic acid (PFDoDA)	0.0002	0.0008	0.131	SS01_220622, SS02_220622, SS03_220622 and SS04 exceeded the LOR.
Perfluorononanoic acid (PFNA)	0.0002	0.0005	0.0026	SS01_220622, SS02_220622, SS03_220622, SS04, SB44_0.4-0.5 and SB44_0.9-1.0 exceeded the LOR.
Perfluorotetradecanoic acid (PFTeDA)	0.0005	<0.0005	0.0123	SS01_220622 and SS02_220622 exceeded the LOR.
Perfluorotridecanoic acid (PFTrDA)	0.0002	<0.0002	0.0187	SS01_220622, SS02_220622, and SS04 exceeded the LOR.

PFAS compound	LOR (mg/kg)	Minimum Concentration (mg/kg)	Maximum Concentration (mg/kg)	Samples exceeding Laboratory LOR, where no assessment criteria exist
Perfluoroundecanoic acid (PFUnDA)	0.0002	<0.0002	0.0523	SS01_220622, SS02_220622, SS03_220622, SS04 and SB44_0.4-0.5 exceeded the LOR.
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	0.0005	<0.0005	<0.0005	All samples were reported below the LOR.
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	0.0005	<0.0005	<0.0005	All samples were reported below the LOR.
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	0.0005	0.0032	0.100	SS01_220622, SS02_220622, SS03_220622, SS04, SB44_0.4-0.5 and SB44_0.9-1.0 exceeded the LOR.
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	0.0005	<0.0005	0.0144	SS01_220622 and SS02_220622 exceeded the LOR.
Perfluorooctane sulfonamide (FOSA)	0.0002	<0.0002	<0.0002	All samples were reported below the LOR.
N-Methyl perfluorooctane sulfonamide (MeFOSA)	0.0005	<0.0005	<0.0005	All samples were reported below the LOR.
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	0.0002	<0.0002	<0.0002	All samples were reported below the LOR.
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	0.0005	<0.0005	<0.0005	All samples were reported below the LOR.
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	0.0005	<0.0005	<0.0005	All samples were reported below the LOR.
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	0.0002	<0.0002	<0.0002	All samples were reported below the LOR.
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	0.0005	<0.0005	<0.0005	All samples were reported below the LOR.

9.3.2 Sediment PFAS Leachability Results

Three sediment samples underwent leachability analysis using the Australian Standard Leaching Procedure (ASLP) method (using non pH buffered de-ionised water). Sediment leachability PFAS results at AYQ were compared to the adopted assessment criteria from the PFAS NEMP 2020 and are presented in attached Tables 1a and 1b, Appendix B, and in-text below.

Table 9-20: Summary of Sediment PFAS Leachability Analytical Results by Source Zone Area

Source Zone Areas	Number of sample locations	Number of primary samples analysed	PFHxS Range (µg/L)	PFOS Range (µg/L)	PFOA Range (µg/L)	PFHxS + PFOS Range (µg/L)	Sum of PFAS Range (µg/L)	Number of samples exceeding adopted assessment criteria		
								PFAS NEMP 95% Freshwater	PFAS NEMP Recreational Water	PFAS NEMP Drinking Water
Drainage Channel near IFS and Seepage Spray Field	1	1	<0.01	2.48	<0.01	2.48	2.57	1	1	1
Drainage Channel and Dam near CFS	2	3	<0.01	0.08 – 1.72	<0.01 – 0.04	0.08 – 1.72	0.31 – 7.19	2	0	3

9.3.3 Sediment Supplementary Results

Sediment samples collected at the drainage channel and holding pond near the MFS (SS01, SS02, SS03, SS04 and SB44) were analysed for supplementary CoPCs, which included the following analytes:

- PAHs
- TRH/ BTEXN
- Metals

All supplementary reported sediment results were reported below the adopted human health and ecological investigation levels. Detectable concentrations of metals (chromium, copper, lead, nickel, and zinc) were reported above the LOR but below the adopted assessment criteria.

9.4 INFRASTRUCTURE INVESTIGATIONS

Testing of waste waters (including vehicle wash downs or pit water in the trade waste drainage system), sediments in trade waste drainage pits and concrete was undertaken. Samples of the different media types were collected at locations within, or near to, the SZA's where AFFF storage had occurred, AFFF use or application is known or reported to have occurred, and/or within trade waste drainage systems where vehicle washdown has occurred (both past and present) or where PFAS contaminated liquid wastes have been generated which were disposed via the trade waste network.

9.4.1 Infrastructure PFAS Analytical Results – Solids

Analytical results for the PFAS full suite (28 analytes) in trade waste drainage pit sediments and concrete results are summarised by SZA in Table 9-21.

Concrete core sample CC01 was sliced into three distinct discs (top, bottom, soil) and each disc was analysed separately. This sample preparation methodology is in alignment with the following literature: *Perfluoroalkyl substances in a firefighting training ground (FTG), distribution and potential future release,* (Baudel et al, 2015) and is further discussed in Section 11.

CC02 was not sliced into separate discs and the entirety of the concrete core was analysed as one sample.

Concrete and sediment pit results at AYQ are presented in attached Tables 1a and 1b, Appendix B and in-text below.

Non-regulated PFAS compounds in concrete are presented in Table 9-22 to Table 9-25, below. Concentrations of non-regulated PFAS compounds are presented in attached Tables 1a and 1b, Appendix B.

Table 9-21: Summary of Trade Waste Drainage Sediment and Concrete Infrastructure PFAS Summary Results by Source Zone Area

Source Zone Areas	PFHxS Range (mg/kg)	PFOS Range (mg/kg)	PFOA Range (mg/kg)	PFOS+PFHxS Range (mg/kg))	Sum of PFAS Range (mg/kg)	Number of samples exceeding		
						EGV for human exposure to concrete dust (GHD, 2021), derived from PFAS NEMP 2020 Industrial/ Commercial (HIL D)	Industrial/ Commercial (HIL D)	Ecological Direct Exposure
Main Fire Station								
SS08 Sediment pit sample	<0.0002	0.0073	0.0087	0.0073	0.604	NA	0	0
SS09 Sediment surface sample	0.0004	0.0045	0.0019	0.0049	0.142	NA	0	0
SS12 Sediment in grated pit on AST slab	<0.0002	0.0011	<0.0002	0.0011	0.0300	NA	0	0
Fire Training Ground								
SS05 Pad sump	0.0011	0.0329	0.0170	0.0340	1.15	NA	0	1
Pit 1_Tradewaste pit sediments	<0.0002	0.0087	0.0005	0.0087	0.523	NA	0	0
CC01 FTG Concrete	0.0010 – 0.0237	0.0028 - 0.0526	0.0045 - 0.0327	0.0038 - 0.0763	0.0705 – 0.528	0	NA	NA
CC02 FTG Concrete	0.0009	0.0886	0.0198	0.0895	0.509	0	NA	NA

Table 9-22: Non-regulated PFAS compounds in sediment reported above LOR for the samples SS05 pad sump and Pit1 (FTG)

PFAS compound	LOR (mg/kg)	Minimum Concentration (mg/kg)	Maximum Concentration (mg/kg)	Samples exceeding Laboratory LOR, where no assessment criteria exist
Perfluorobutane sulfonic acid (PFBS)	0.0002	<0.0002	0.0006	SS05_220622 exceeded the LOR.
Perfluoropentane sulfonic acid (PFPeS)	0.0002	<0.0002	0.0005	SS05_220622 exceeded the LOR.
Perfluoroheptane sulfonic acid (PFHpS)	0.0002	<0.0002	<0.0005	All samples were reported below the LOR.
Perfluorodecane sulfonic acid (PFDS)	0.0002	<0.0005	0.0003	Pit1_sed exceeded the LOR.
Perfluorobutanoic acid (PFBA)	0.001	<0.001	0.004	SS05_220622 exceeded the LOR.
Perfluoropentanoic acid (PFPeA)	0.0002	0.0004	0.0020	SS05_220622 and Pit1_sed exceeded the LOR.
Perfluorohexanoic acid (PFHxA)	0.0002	0.0006	0.0045	SS05_220622 and Pit1_sed exceeded the LOR.
Perfluoroheptanoic acid (PFHpA)	0.0002	0.0008	0.0056	SS05_220622 and Pit1_sed exceeded the LOR.
Perfluorodecanoic acid (PFDA)	0.0002	0.0448	0.0904	SS05_220622 and Pit1_sed exceeded the LOR.
Perfluorododecanoic acid (PFDoDA)	0.0002	0.123	0.186	SS05_220622 and Pit1_sed exceeded the LOR.
Perfluorononanoic acid (PFNA)	0.0002	0.0179	0.0428	SS05_220622 and Pit1_sed exceeded the LOR.
Perfluorotetradecanoic acid (PFTeDA)	0.0005	0.0479	0.112	SS05_220622 and Pit1_sed exceeded the LOR.
Perfluorotridecanoic acid (PFTrDA)	0.0002	0.0479	0.114	SS05_220622 and Pit1_sed exceeded the LOR.
Perfluoroundecanoic acid (PFUnDA)	0.0002	0.0702	0.102	SS05_220622 and Pit1_sed exceeded the LOR.
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	0.0005	<0.0005	<0.0005	All samples were reported below the LOR.
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	0.0005	<0.0005	0.0035	SS05_220622 exceeded the LOR.
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	0.0005	0.145	0.398	SS05_220622 and Pit1_sed exceeded the LOR.

PFAS compound	LOR (mg/kg)	Minimum Concentration (mg/kg)	Maximum Concentration (mg/kg)	Samples exceeding Laboratory LOR, where no assessment criteria exist
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	0.0005	0.0346	0.0167	SS05_220622 and Pit1_sed exceeded the LOR.
Perfluorooctane sulfonamide (FOSA)	0.0002	<0.0002	<0.0005	All samples were reported below the LOR.
N-Methyl perfluorooctane sulfonamide (MeFOSA)	0.0005	<0.0005	<0.0012	All samples were reported below the LOR.
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	0.0002	<0.0002	<0.0005	All samples were reported below the LOR.
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	0.0005	<0.0005	<0.0012	All samples were reported below the LOR.
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	0.0005	<0.0005	<0.0012	All samples were reported below the LOR.
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	0.0002	<0.0002	<0.0005	All samples were reported below the LOR.
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	0.0005	<0.0012	0.0046	Pit1_sed exceeded the LOR.

Table 9-23: Non-regulated PFAS compounds in sediment reported above LOR for SS08, SS09 and SS12 (MFS)

PFAS compound	LOR (mg/kg)	Minimum Concentration (mg/kg)	Maximum Concentration (mg/kg)	Samples exceeding Laboratory LOR, where no assessment criteria exist
Perfluorobutane sulfonic acid (PFBS)	0.0002	<0.0002	<0.0002	All samples were reported below the LOR.
Perfluoropentane sulfonic acid (PFPeS)	0.0002	<0.0002	<0.0002	All samples were reported below the LOR.
Perfluoroheptane sulfonic acid (PFHpS)	0.0002	<0.0002	<0.0002	All samples were reported below the LOR.
Perfluorodecane sulfonic acid (PFDS)	0.0002	<0.0002	<0.0002	All samples were reported below the LOR.
Perfluorobutanoic acid (PFBA)	0.001	<0.001	0.010	SS08_250622 exceeded the LOR.
Perfluoropentanoic acid (PFPeA)	0.0002	<0.0002	0.0144	SS08_250622 and SS09_250622 exceeded the LOR.
Perfluorohexanoic acid (PFHxA)	0.0002	<0.0002	0.0014	SS08_250622 and SS09_250622 exceeded the LOR.
Perfluoroheptanoic acid (PFHpA)	0.0002	<0.0002	0.0011	SS08_250622 and SS09_250622 exceeded the LOR.
Perfluorodecanoic acid (PFDA)	0.0002	0.0010	0.0683	SS09_250622, SS08_250622 and SS12_250622 exceeded the LOR.
Perfluorododecanoic acid (PFDoDA)	0.0002	0.0110	0.0507	SS09_250622, SS08_250622 and SS12_250622 exceeded the LOR.
Perfluorononanoic acid (PFNA)	0.0002	0.0003	0.0458	SS09_250622, SS08_250622 and SS12_250622 exceeded the LOR.
Perfluorotetradecanoic acid (PFTeDA)	0.0005	0.0058	0.0357	SS09_250622, SS08_250622 and SS12_250622 exceeded the LOR.
Perfluorotridecanoic acid (PFTrDA)	0.0002	0.0037	0.0219	SS09_250622, SS08_250622 and SS12_250622 exceeded the LOR.

PFAS compound	LOR (mg/kg)	Minimum Concentration (mg/kg)	Maximum Concentration (mg/kg)	Samples exceeding Laboratory LOR, where no assessment criteria exist
Perfluoroundecanoic acid (PFUnDA)	0.0002	0.0021	0.0395	SS09_250622, SS08_250622 and SS12_250622 exceeded the LOR.
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	0.0005	<0.0005	<0.0005	All samples were reported below the LOR.
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	0.0005	<0.0005	0.0014	SS09_250622 exceeded the LOR.
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	0.0005	0.0043	0.327	SS09_250622, SS08_250622 and SS12_250622 exceeded the LOR.
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	0.0005	0.0007	0.0043	SS09_250622, SS08_250622 and SS12_250622 exceeded the LOR.
Perfluorooctane sulfonamide (FOSA)	0.0002	<0.0002	<0.0002	All samples were reported below the LOR.
N-Methyl perfluorooctane sulfonamide (MeFOSA)	0.0005	<0.0005	<0.0005	All samples were reported below the LOR.
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	0.0002	<0.0002	<0.0002	All samples were reported below the LOR.
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	0.0005	<0.0005	<0.0005	All samples were reported below the LOR.
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	0.0005	<0.0005	<0.0005	All samples were reported below the LOR.
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	0.0002	<0.0002	<0.0002	All samples were reported below the LOR.
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	0.0005	<0.0005	<0.0005	All samples were reported below the LOR.

Table 9-24: Non-regulated PFAS compounds in concrete reported above LOR for the CC01 FTG Concrete sample

PFAS compound	LOR (mg/kg)	Minimum Concentration (mg/kg)	Maximum Concentration (mg/kg)	Samples exceeding Laboratory LOR, where no assessment criteria exist
Perfluorobutane sulfonic acid (PFBS)	0.0002	0.0004	0.0033	CC01_Bottom_260622, CC01_Soil_260622 and CC01_Top_260622 exceeded the LOR.
Perfluoropentane sulfonic acid (PFPeS)	0.0002	<0.0002	0.0026	CC01_Soil_260622 and CC01_Top_260622 exceeded the LOR.
Perfluoroheptane sulfonic acid (PFHpS)	0.0002	<0.0002	0.0026	CC01_Soil_260622 and CC01_Top_260622 exceeded the LOR.
Perfluorodecane sulfonic acid (PFDS)	0.0002	<0.0002	<0.0002	All samples were reported below the LOR.
Perfluorobutanoic acid (PFBA)	0.001	0.005	0.072	CC01_Bottom_260622, CC01_Soil_260622 and CC01_Top_260622 exceeded the LOR.
Perfluoropentanoic acid (PFPeA)	0.0002	0.0062	0.0508	CC01_Bottom_260622, CC01_Soil_260622 and CC01_Top_260622 exceeded the LOR.
Perfluorohexanoic acid (PFHxA)	0.0002	0.0067	0.0744	CC01_Bottom_260622, CC01_Soil_260622 and CC01_Top_260622 exceeded the LOR.
Perfluoroheptanoic acid (PFHpA)	0.0002	0.0030	0.0325	CC01_Bottom_260622, CC01_Soil_260622 and CC01_Top_260622 exceeded the LOR.
Perfluorodecanoic acid (PFDA)	0.0002	0.0011	0.0057	CC01_Bottom_260622, CC01_Soil_260622 and CC01_Top_260622 exceeded the LOR.
Perfluorododecanoic acid (PFDoDA)	0.0002	0.0002	0.0012	CC01_Bottom_260622, CC01_Soil_260622 and CC01_Top_260622 exceeded the LOR.
Perfluorononanoic acid (PFNA)	0.0002	0.0024	0.0168	CC01_Bottom_260622, CC01_Soil_260622 and CC01_Top_260622 exceeded the LOR.
Perfluorotetradecanoic acid (PFTeDA)	0.0005	<0.0005	<0.0005	All samples were reported below the LOR.
Perfluorotridecanoic acid (PFTrDA)	0.0002	<0.0002	0.0003	CC01_Top_260622 exceeded the LOR.

PFAS compound	LOR (mg/kg)	Minimum Concentration (mg/kg)	Maximum Concentration (mg/kg)	Samples exceeding Laboratory LOR, where no assessment criteria exist
Perfluoroundecanoic acid (PFUnDA)	0.0002	0.0006	0.0012	CC01_Bottom_260622, CC01_Soil_260622 and CC01_Top_260622 exceeded the LOR.
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	0.0005	<0.0005	<0.0005	All samples were reported below the LOR.
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	0.0005	<0.0005	0.0353	CC01_Bottom_260622 and CC01_Top_260622 exceeded the LOR.
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	0.0005	0.0048	0.120	CC01_Bottom_260622, CC01_Soil_260622 and CC01_Top_260622 exceeded the LOR.
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	0.0005	<0.0005	0.0016	CC01_Bottom_260622 and CC01_Top_260622 exceeded the LOR.
Perfluorooctane sulfonamide (FOSA)	0.0002	<0.0002	0.0004	CC01_Top_260622 exceeded the LOR.
N-Methyl perfluorooctane sulfonamide (MeFOSA)	0.0005	<0.0005	<0.0005	All samples were reported below the LOR.
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	0.0002	<0.0002	<0.0002	All samples were reported below the LOR.
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	0.0005	<0.0005	<0.0005	All samples were reported below the LOR.
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	0.0005	<0.0005	<0.0005	All samples were reported below the LOR.
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	0.0002	<0.0002	<0.0002	All samples were reported below the LOR.
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	0.0005	<0.0005	<0.0005	All samples were reported below the LOR.

Table 9-25: Non-regulated PFAS compounds in concrete reported above LOR for the CC02 FTG Concrete sample

PFAS compound	LOR (mg/kg)	Minimum Concentration (mg/kg)	Maximum Concentration (mg/kg)	Samples exceeding Laboratory LOR, where no assessment criteria exist
Perfluorobutane sulfonic acid (PFBS)	0.0002	0.0002	0.0002	CC02 exceeded the LOR.
Perfluoropentane sulfonic acid (PFPeS)	0.0002	<0.0002	<0.0002	All samples were reported below the LOR.
Perfluoroheptane sulfonic acid (PFHpS)	0.0002	0.0006	0.0006	CC02 exceeded the LOR.
Perfluorodecane sulfonic acid (PFDS)	0.0002	0.0008	0.0008	CC02 exceeded the LOR.
Perfluorobutanoic acid (PFBA)	0.001	0.015	0.015	CC02 exceeded the LOR.
Perfluoropentanoic acid (PFPeA)	0.0002	0.0061	0.0061	CC02 exceeded the LOR.
Perfluorohexanoic acid (PFHxA)	0.0002	0.0112	0.0112	CC02 exceeded the LOR.
Perfluoroheptanoic acid (PFHpA)	0.0002	0.0073	0.0073	CC02 exceeded the LOR.
Perfluorodecanoic acid (PFDA)	0.0002	0.0230	0.0230	CC02 exceeded the LOR.
Perfluorododecanoic acid (PFDoDA)	0.0002	0.0139	0.0139	CC02 exceeded the LOR.
Perfluorononanoic acid (PFNA)	0.0002	0.0152	0.0152	CC02 exceeded the LOR.
Perfluorotetradecanoic acid (PFTeDA)	0.0005	0.0036	0.0036	CC02 exceeded the LOR.
Perfluorotridecanoic acid (PFTrDA)	0.0002	0.0038	0.0038	CC02 exceeded the LOR.
Perfluoroundecanoic acid (PFUnDA)	0.0002	0.0115	0.0115	CC02 exceeded the LOR.
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	0.0005	<0.0005	<0.0005	All samples were reported below the LOR.
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	0.0005	0.0061	0.0061	CC02 exceeded the LOR.
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	0.0005	0.273	0.273	CC02 exceeded the LOR.
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	0.0005	0.0083	0.0083	CC02 exceeded the LOR.
Perfluorooctane sulfonamide (FOSA)	0.0002	<0.0002	<0.0002	All samples were reported below the LOR.

PFAS compound	LOR (mg/kg)	Minimum Concentration (mg/kg)	Maximum Concentration (mg/kg)	Samples exceeding Laboratory LOR, where no assessment criteria exist
N-Methyl perfluorooctane sulfonamide (MeFOSA)	0.0005	<0.0005	<0.0005	All samples were reported below the LOR.
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	0.0002	<0.0002	<0.0002	All samples were reported below the LOR.
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	0.0005	<0.0005	<0.0005	All samples were reported below the LOR.
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	0.0005	<0.0005	<0.0005	All samples were reported below the LOR.
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	0.0002	<0.0002	<0.0002	All samples were reported below the LOR.
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	0.0005	<0.0005	<0.0005	All samples were reported below the LOR.

9.4.2 Infrastructure PFAS Leachability Analytical Results

Trade waste drainage sediment and concrete infrastructure samples analysed for leachability across the PFAS full suite (28 analytes) using the ASLP method (using non pH buffered de-ionised water) are summarised by SZA in Table 9-26**.** Leachable concentrations of PFAS in concrete are presented in attached Table 4a, Appendix B.

Table 9-26: Infrastructure Sediment and Concrete PFAS Leachability Summary Results by Source Zone Area

Source Zone Areas	Number of sample locations	PFHxS Range (µg/L)	PFOS (µg/L)	PFOA (µg/L)	PFOS+PFHxS (µg/L)	Sum of PFAS Range (µg/L)	Number of samples exceeding adopted assessment criteria			
Fire Training Ground							C/A2: EGV for leaching to groundwater and potable use of offsite groundwater	C/A3: EGV for leaching, discharge to surface water and primary contact recreation (swimming)	C/A5: EGV for 95% species protection, leaching, discharge to surface water and direct ecological exposures	C/A6: EGV for leaching, discharge to surface water and ecological food chain exposures
SS05 Pit sediment	1	0.03	0.17	0.66	0.2	5.15	0	0	0	1
CC01 Concrete	2	0.05 – 0.80	0.08 - 1.36	0.24 - 1.11	0.13 - 2.16	2.36 – 21.6	1	0	0	2

9.4.3 Infrastructure Supplementary Results - Solids

Infrastructure sediment samples collected from the SZA of CFS and FTG were analysed for supplementary CoPCs, which included the following analytes:

- PAHs
- Phenols
- TRH/ BTEXN
- Metals
- VOC Screen

All supplementary reported infrastructure sediment results were reported below the adopted human health and ecological investigation levels. Detectable concentrations of analytes including PAHs and metals (chromium, copper, lead, nickel, and zinc) were reported above the LOR but below the adopted assessment criteria for samples collected within SZA including the CFS. Detectable concentrations of TRH fractions were reported in samples collected from the CFS, however, the analytical results reported were below the adopted assessment criteria value for ecological criteria (NEMP 2013 ESL) and management limits value for commercial/ industrial land use.

Supplementary sediment results at the FTG were reported below the adopted human health and ecological investigation levels and/or below the LOR, with the exception of the following samples:

- TRH fractions C_{10} – C_{16} (F2) in soil samples SS05_0.0-0.2 was reported at 2,350 mg/kg and Pit1_sed was reported at 28,000 mg/kg, exceeding the ecological criteria (NEPM 2013 ESL) value of 170 mg/kg and management limits value of 1000 mg/kg for commercial/ industrial land use.
- TRH fractions C_{16} – C_{34} (F3) in soil samples SS05_0.0-0.2 was reported at 4,160 mg/kg and Pit1_sed was reported at 3,570 mg/kg, exceeding the ecological criteria (NEPM 2013 ESL) value of 1,700 mg/kg and management limits value of 3,500 mg/kg for commercial/ industrial land use.

9.4.4 Infrastructure PFAS Analytical Results – Waters

The PFAS full suite (28 analytes) results for trade waste drainage water and run-off water from washdown areas at the MFS and FTG, and influent and effluent samples from the STP are summarised by SZA in Table 9-27.

Water results from pits, washdown areas and influent and effluent samples from the STP are presented in attached Tables 4a and 4b, Appendix B.

Table 9-27: Infrastructure Water PFAS Summary Results by Source Zone Area

Source Zone Areas	PFHxS Range (mg/kg)	PFOS Range (µg/L)	PFOA Range (µg/L)	PFOS+PFHxS Range (µg/L)	Sum of PFAS Range (mg/kg)	Exceeding ecological value (freshwater 95%)	Exceeding recreational water value	Exceeding drinking water value
Main Fire Station								
SS07 Garage Drain	0.05	0.33	1.36	0.38	6.62	Yes	No	Yes
WD03 Washdown South driveway (asphalt)	<0.01	0.03	<0.01	0.03	0.03	No	No	No
WD04 Washdown North driveway (concrete)	<0.01	<0.01	0.02	<0.01	0.06	No	No	No
WD05 Washdown gutter next to AST pad	<0.01	0.03	0.16	0.03	1.66	No	No	No
Fire Training Ground								
SS06 Sealed pit on pad	16.8	17.6	196	34.4	1,440	Yes	Yes	Yes
Pit 1 Trade waste pit	0.16	0.74	4.33	0.9	31.0	Yes	No	Yes
Pit 2 Anaerobic digester	0.19	2.45	3.56	2.64	25.4	Yes	Yes	Yes
Pit 3 Aerobic polisher	0.19	1.37	4.02	1.56	25.4	Yes	No	Yes
WD01 & WD02 Washdown concrete	0.07-0.11	0.36 - 0.96	0.88 - 2.16	0.44 – 1.07	12.5 - 24.6	Yes	No	Yes
Sewage Treatment Plant								
IN01 (Influent)	<0.0016	<0.0016	0.0365	<0.0016	0.194	No	No	No
EF01 (Effluent)	0.0295	0.154	0.698	0.184	3.60	Yes	No	Yes

9.4.5 Infrastructure Supplementary Results – Waters

Selected water samples collected from pits at the CFS (SS07) and FTG (SS06, Pit 1, Pit 2, and Pit 3) were analysed for the following supplementary CoPCs:

- PAHs,
- VOCs,
- TRH/ BTEXN,
- Metals

All supplementary CoPCs were reported below the LOR with the exception of the following detects:

- Concentrations of metals (including cadmium, chromium, copper, lead, nickel, and zinc) were detected in water sample SS07 above the LOR and above the 95% and 99% Freshwater guideline levels.

- Concentrations of total xylene in the water samples collected from Pit 1 and Pit 3 were reported above the LOR but below the adopted assessment criteria.
- All TRH Fractions were reported in water samples collected from Pit 1, Pit 2, and Pit 3 above the LOR but below the adopted assessment criteria.
- TRH fractions C_{15}–C_{28}, C_{29}–C_{36} and total C_{10}–C_{36} in the water sample collected from SS07 were reported above the LOR but below the adopted assessment criteria.

9.5 TOTAL OXIDISABLE PRECURSOR ASSAY

The Total Oxidisable Precursor Assay (TOP assay or TOPA) is a standardised pre-treatment of water samples or sample extracts (soil and water) designed to expose underlying PFAS not amenable to standard analysis. The TOPA method oxidises samples in the laboratory using (alkaline) potassium persulfate which results in the transformation of some precursor poly-fluorinated compounds to terminal per-fluorinated compounds, which can then be analysed in the standard PFAS suite. The absolute concentrations produced post TOPA are not environmentally relevant and therefore are not compared with associated soil or water investigation levels. Although oxidation may occur in the environment, it would occur gradually compared to the immediate and near complete oxidation achieved in the laboratory test. In parallel with oxidation in the environment, leaching and dispersion would also occur, meaning that the full potential concentrations would not be realised at a site location, due to environmental oxidation. Higher concentrations of PFSA's and PFCA's post TOPA may occur on sites, where the media is contained and not leaching, and dispersion does not occur (such as closed pits and tanks). These isolated locations are sometimes not considered environmentally relevant, due to the isolation from pathways for migration.

The change in PFAS compound distribution pre- and post- TOPA may be useful in providing an indication of the era and type of PFAS source (i.e., F1 versus F2 foams).

A compositional analysis of PFAS compounds both pre- and post-oxidation in a range of common fluorine containing AFFF used in Australia was undertaken by Gordon et al, 2019 and identified that Ansulite, containing on average a Total Fluorine concentration of 6,140 mg/L produced a significantly different PFAS signature for PFCAs and PFSAs between pre- and post-oxidation analytical results.

Known compositional alteration in Ansulite batches over time also indicates the variable presence of sulfonate precursors and/or terminal PFSAs in minor quantities, which is generally most apparent when short and long chain PFSAs are identified post-TOPA. The relative proportion of these PFSAs occurring from the use of F2 Class Foams (particularly Ansulite) is generally around four to five orders of magnitude lower than the typical and expected FTS and PFCA signature most commonly observed on sites solely impacted by the application of these types of AFFF. In these cases, where considerable terminal PFSA compounds are present across various investigation media, the contribution of other (ongoing) PFAS sources must be considered.

Figure 9-1 below (Gordon et al, 2019) indicates how known precursor compounds (primarily 6:2FTS) and unknown or undetectable "parent polyfuoroalkyl precursors" (in the form of FTSAS and FTS compounds) can affect the transformation of both short and long chain PFCAs and PFSAs in common F2 Class foams and be used as a predictive tool for future PFAS impacts, if under the right environmental conditions.

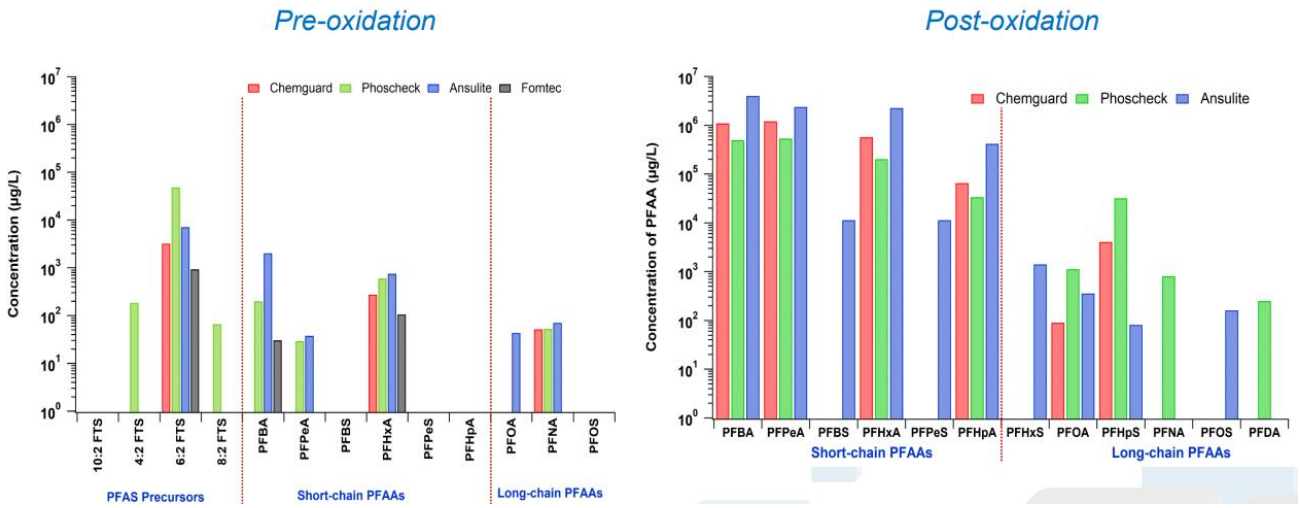


Figure 9-1 PFAS Concentrations in Pre—and Post-Oxidised AFFF Samples (Gordon et al, 2019)

9.5.1 Soil, Drainage Sediment, and Trade Waste Infrastructure Sediment

Selected samples were nominated for TOPA, with PFAS suite analysis pre and post assay. Results showing changes in concentrations of PFOS+PFHxS and Total PFAS are shown in Figure 9-2 to Figure 9-6 below. The charts present soils, sediments (SS02 and SS03) and sediments from within infrastructure (Pit1, SS05, SS12). Tabulated results are provided in Tables 1b and 4b, Appendix B.

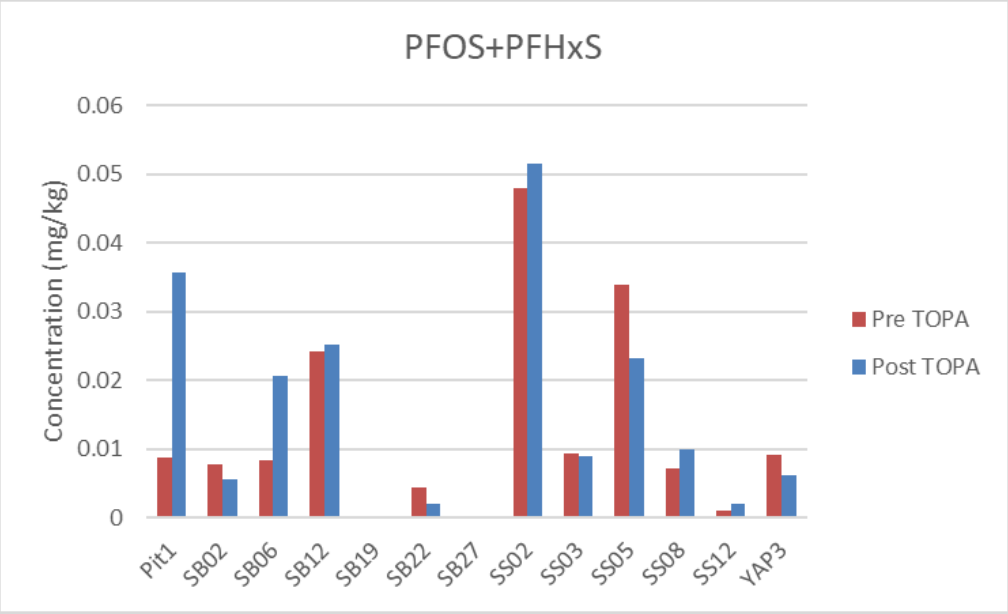


Figure 9-2 Soil, sediment, and infrastructure sediment results pre- and post- TOPA (PFOS+PFHxS)

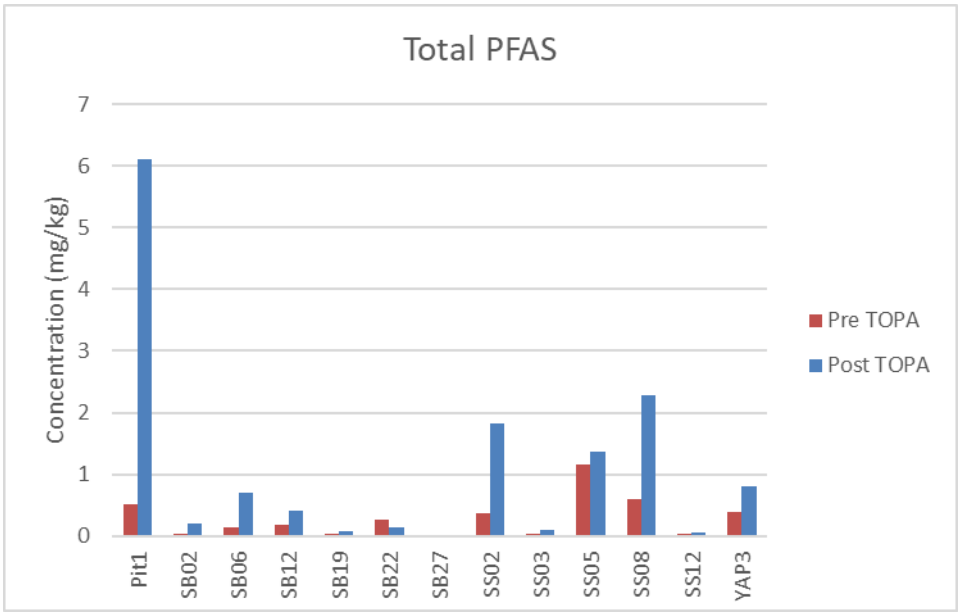


Figure 9-3 Soil, sediment, and infrastructure sediment results pre- and post- TOPA (Total PFAS)

A large change in total PFAS concentrations between pre and post TOPA may indicate that, in the case of SS02, post-2003 era products dominate the source of PFAS, and for Pit 1 and SS08 it is possible that considerable unknown parent polyfluoroalkyl precursors compounds are present and have been oxidised by the assay or the pit sediments are anoxic in nature thereby not degrading at a normal rate in the environment. A smaller change in concentrations may indicate older products dominate, or may indicate that environmental, or treatment processes have already caused precursors to oxidise.

Of note in Figure 9-3, samples Pit 1, SB06, SS02 and SS08 identified large changes in total concentrations post-TOPA. Pit 1 is the trade waste tank associated with the FTG, SB06 is on the western side of the IFS, SS02 is in the drainage dam and SS08 in next to the AST slab at the MFS. These results are consistent with what would be expected in an area of Ansulite use. Sample SS05 is sediment from the sump at the FTG and did not show a significant change with TOPA. This may indicate that fire training activities and environmental exposure (high temperatures, wet and dry cycles, significant exposure to air) may have already oxidised precursors, which had been present.

The following figures show the change in specific compound concentration in selected samples pre and post TOPA.

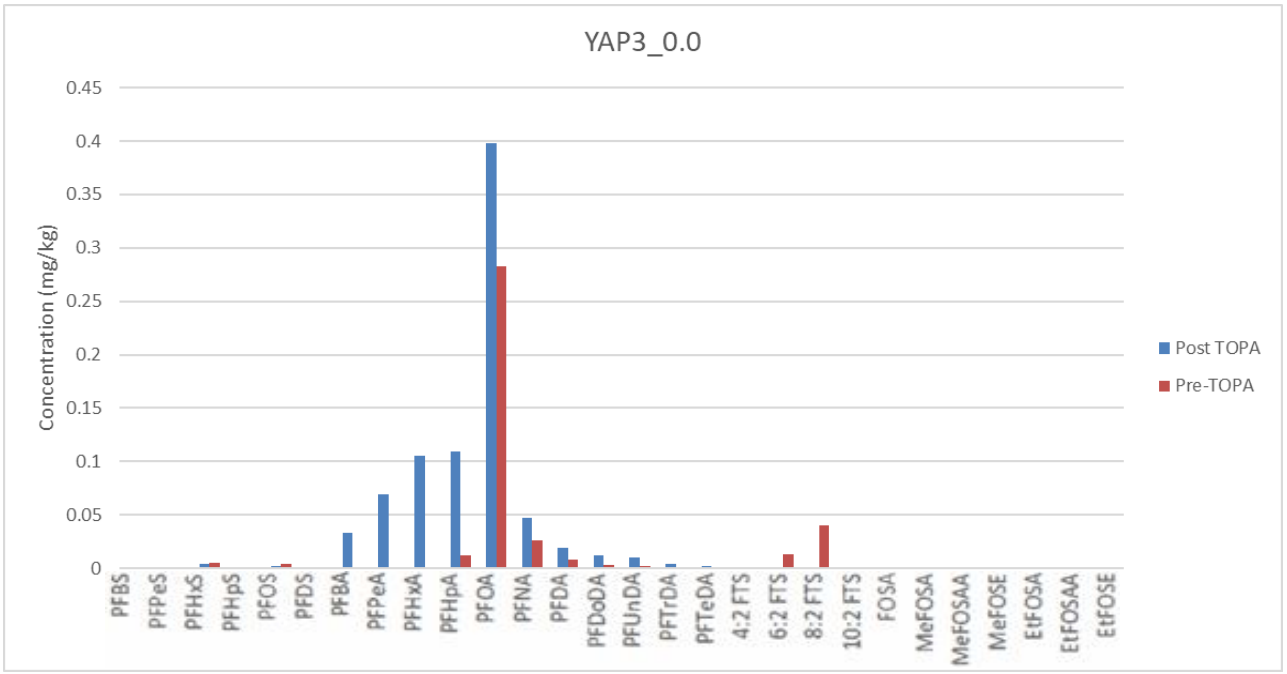


Figure 9-4 Compound concentrations in YAP3_0.0, pre- and post- TOPA (located at the FTG)

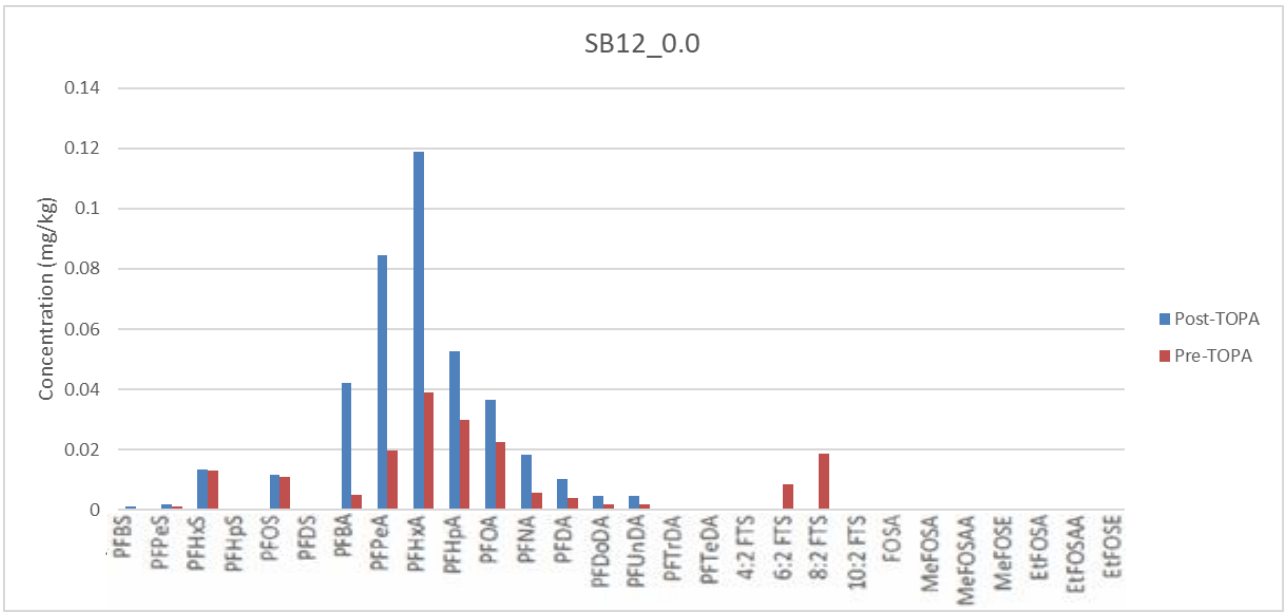


Figure 9-5 Compound concentrations in SB12_0.0, pre- and post- TOPA (located at the FTG)

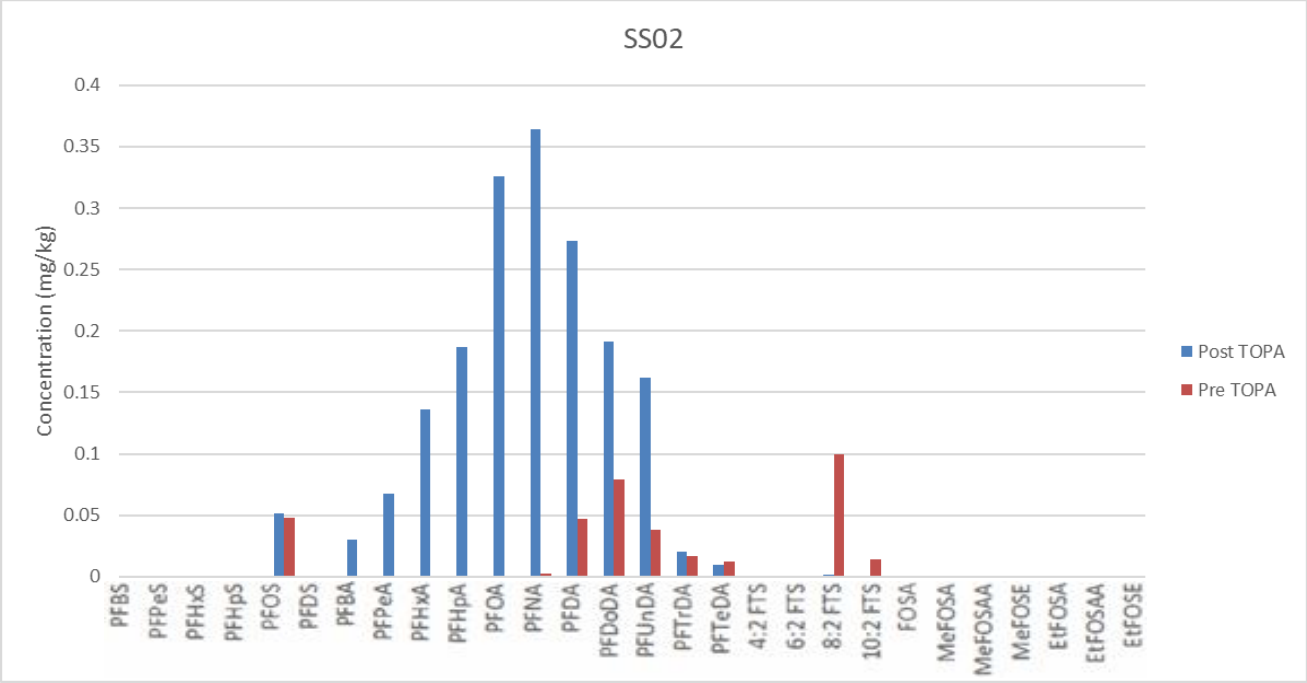


Figure 9-6 Compound concentrations in SS02, pre- and post- TOPA (soil/accumulated sediment in Stormwater Holding Pond)

9.5.2 Groundwater and Infrastructure Water

Selected samples were nominated for TOPA, with PFAS suite analysis pre and post assay. Results showing changes in concentrations of PFOS+PFHxS and Total PFAS are shown in Figure 9-7 and Figure 9-8. The charts present groundwater (GW01, GW02, GW03, GW04 and RN012065), infrastructure water (SS07) and pavement wash-down samples (WD01 to WD05). Tabulated results are provided in Table 12, Appendix B.

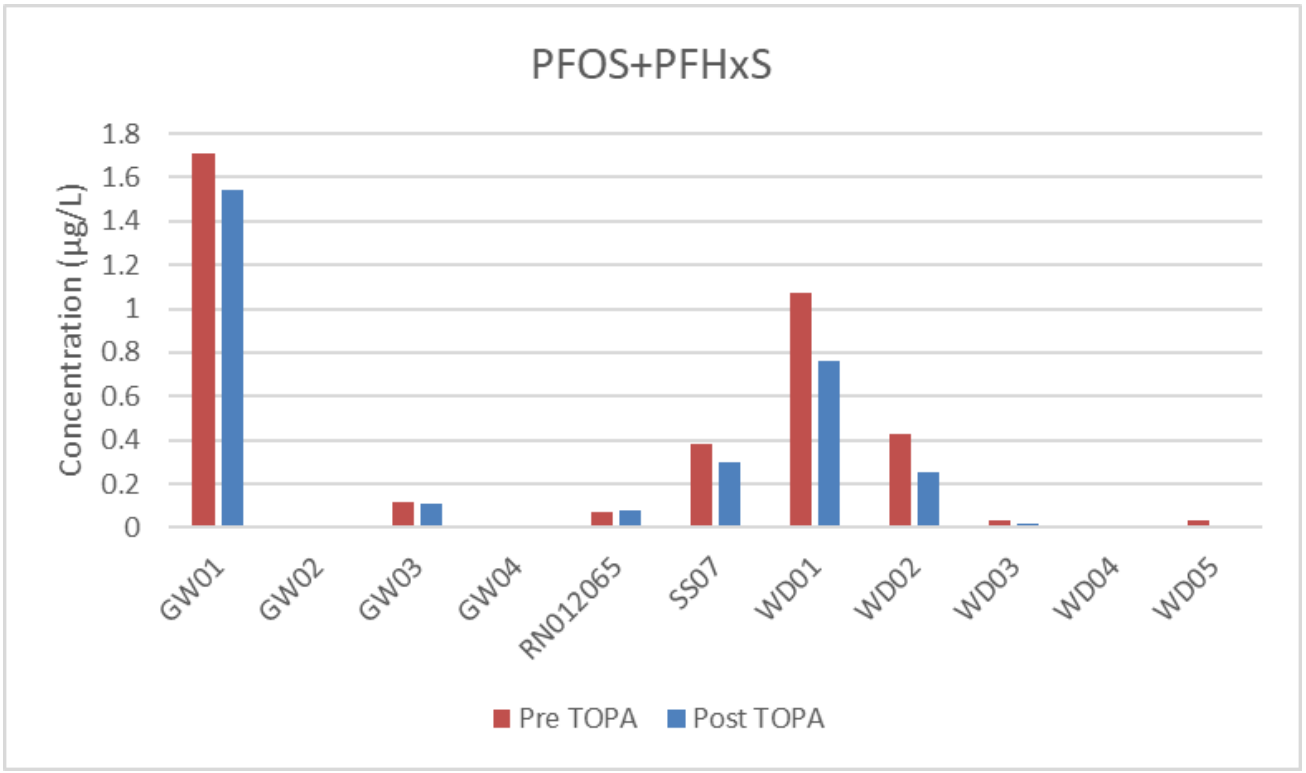


Figure 9-7 Groundwater and infrastructure water results pre- and post TOPA (Total PFAS)

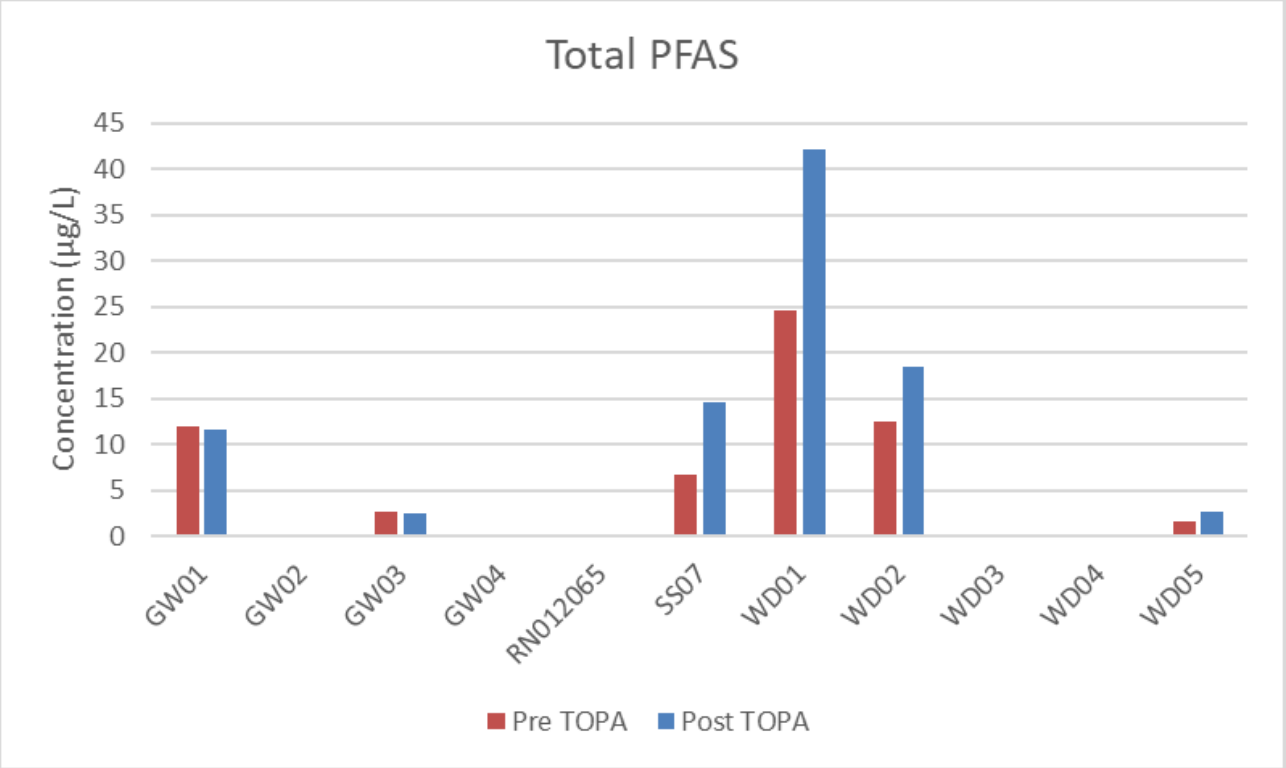


Figure 9-8 Groundwater and infrastructure water results pre- and post TOPA (Total PFAS)

In general, groundwater samples did not show change in total PFAS concentration pre and post TOPA, whereas washdown and infrastructure water may indicate that unknown precursor compounds are present and oxidation via TOPA has caused transformation to PFAS compounds which are not long chain PFSAs. This difference is potentially due to unknown precursors, which typically may be more polar, adsorbing to soils and concrete and not migrating to groundwater at the same rate as fully fluorinated compounds.

The distribution of PFAS compounds in a groundwater sample (GW03) and a wash-down sample (WD05) are shown in Figure 9-9 and Figure 9-10.

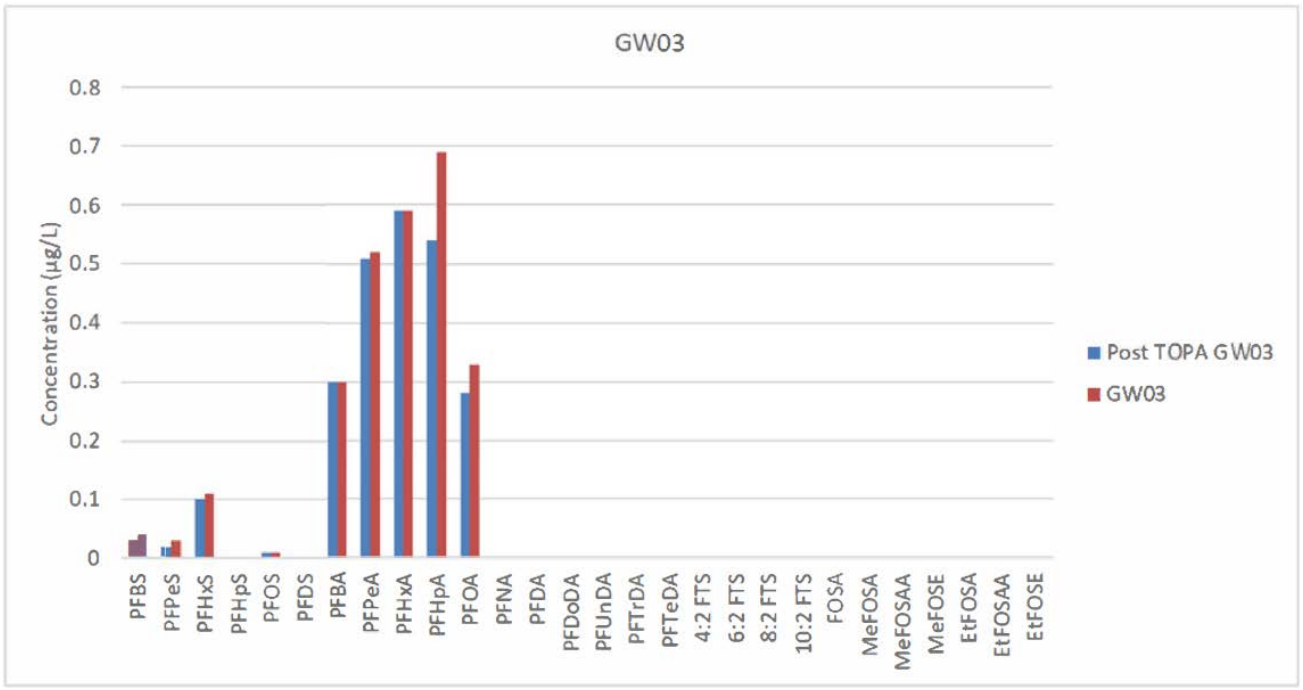


Figure 9-9 Compound concentrations in GW03, pre- and post TOPA

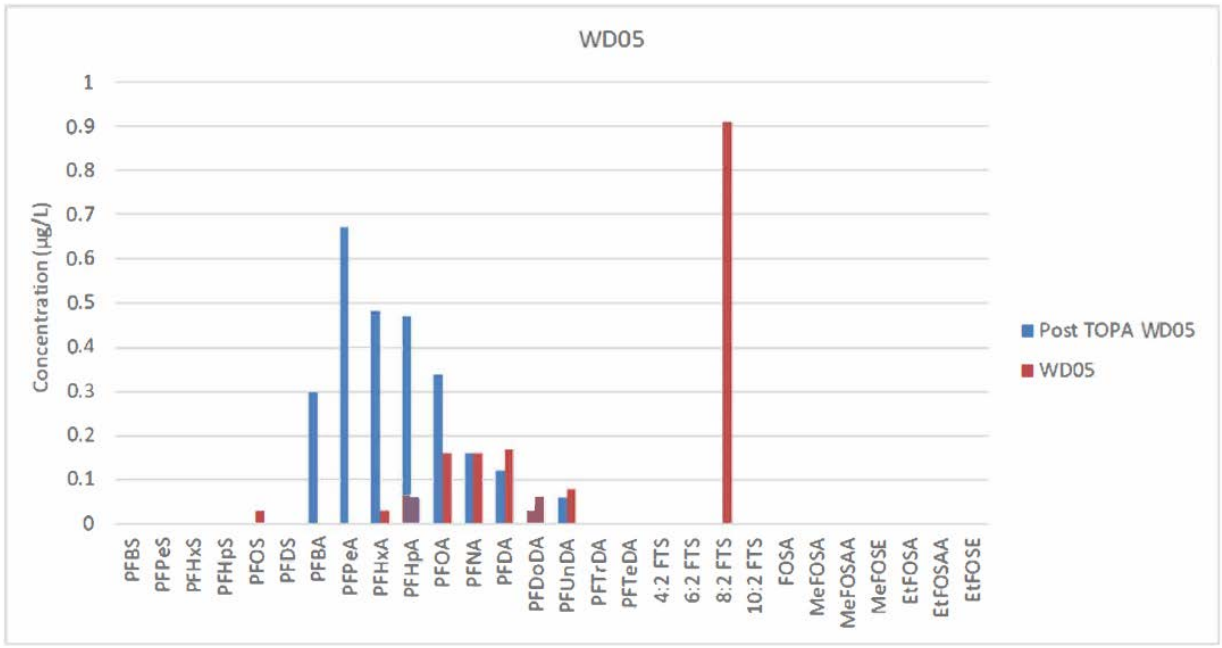


Figure 9-10 Compound concentrations in WD05, pre- and post TOPA

10. CONCEPTUAL SITE MODEL

10.1 POTENTIAL SOURCES OF PFAS

Based on the findings of the assessment, the following potential on-airport sources of contamination have been identified at AYQ and include sources within the ARFFS lease areas.

Table 10-1: Potential Sources of PFAS

Airservices Lease Area	Source Zone Areas
IFS	• Former interim fire station (and surrounding unsealed areas) • Secondary sources from sewer rising main and other wastewater inputs to STP with pipework alignments situated within or adjacent to the IFS
MFS	• ARFFS fire station footprint • Drainage low point (including stormwater holding pond to the south) • Washdown area/ pad • Underground interceptor and associated underground pipework • Former AFFF storage areas • Mechanical Workshop • Secondary sources from seepage from stormwater and sewerage pipes
FTG	• Large Mock-up (LMU) and concrete pad • Wastewater USTs and pits • Interceptor location • Secondary sources from seepage from stormwater and sewerage pipes
STP and Seepage Field	• Sewage Treatment Plant and Seepage Field
Down-gradient Monitoring Well GW11	• Unknown source of impacts at this location

10.2 POTENTIAL MIGRATION PATHWAYS

Potential contaminant migration pathways for PFAS include the following:

- Adsorption of contaminants onto shallow soils and sediments.
- Vertical migration through the soil profile via sustained episodic rainfall infiltration or leaching to groundwater.
- Transport of contaminants in surface water in storm water run-off via discharge to drainage systems and further migration within receiving environments.
- Lateral migration of contaminants in groundwater in the direction of groundwater flow and expression in surface water systems.
- Abstraction of groundwater via registered or unregistered bore.
- Transport in ambient air as dust via wind action.

10.3 POTENTIAL RECEPTORS AND EXPOSURE ROUTES

The following key ecological and human receptors and potential exposure pathways have been identified at AYQ for PFAS. The identified exposure pathways are not necessarily confirmed as complete.

Table 10-2: Potential on- and off-airport Receptors and Exposure Routes for PFAS

Receptor	Potential Exposure Pathway
On and off-airport workers and/ or visitors whose activities and exposure durations are similar to a commercial/ industrial scenario.	• Direct exposure via incidental ingestion of the contamination in soil or sediment, inhalation of soil or sediment derived dust and dermal contact. • Direct or indirect exposure via incidental ingestion of impacted surface water.
On- and off-airport construction or maintenance workers (including sub-surface works).	
Future users of groundwater for a non-potable purpose, should a bore be installed within the Airservices lease boundary and current users of groundwater such as: • Yulara town water supply • Ayers Rock Resort accommodation facilities which is abstracted from the bore fields located 9.5 km south-west of the Airport. Groundwater abstraction or use has not been identified north or north-west of the airport and it is confirmed that no registered bores are present, however seasonal dining activities are known to take place approximately 2.5km north-west of the Airport Estate boundary. Groundwater salinity is prohibitive to potable uses without treatment, and there is no electricity supply or infrastructure down-gradient of the Airport Estate to support water treatment systems or repeated use.	• Direct exposure via incidental ingestion of shallow groundwater through abstraction following use for potable and non-potable purposes. Current groundwater flow directions do not support a pathway between contamination sourced from the airport and the established water supply bores. However, future flow direction changes or installation of alternative bores may generate future connections. We note that these future connections, if established, would require some form of treatment to address salinity.
On and off-airport terrestrial flora and fauna (including plants, trees, birds, reptiles, mammals, insects).	• Direct exposure root water uptake for on-airport flora and the subsequent ingestion of the contamination by on-airport fauna. • Direct or indirect exposure via incidental ingestion of bioaccumulated PFAS within the food chain.
On and off-airport aquatic flora and fauna (ephemeral salt lake ecosystem).	• Direct or indirect exposure via incidental ingestion of contamination in surface water and/ or sediments following groundwater migration and seepage into water bodies.
Sub-surface fauna in the groundwater aquifer.	• Direct exposure via ingestion of groundwater.

With regards to seasonal dining facilities at the Tali Wiru Diner, it has been confirmed through discussions with knowledgeable persons and NT Power & Water that groundwater use does not occur at this location. It is understood that water is transported into the facility on an as-needed basis by the operator (Ayres Rock Resort) and is sourced from the municipal supply. There are no permanent kitchen facilities (cooking is done via open flame barbecue) or ablutions that require an ongoing water supply. As per Table 10-2 there is no electricity or infrastructure for abstraction, storage and treatment of groundwater and it is well established in earlier sections of this report that there are no surface water bodies in this area. Further to this, written correspondence from NT Power & Water confirms the site of the Tali Wiru Diner is not serviced by the municipal water supply network and they are not aware of any existing abstraction bores located at the site of the Tali Wiru Diner or anywhere in close proximity to it.

10.4 UPDATED CONCEPTUAL SITE MODEL FOR PFAS

Based on the reviewed information, the source, pathways, receptor (SPR) linkages outlined below have been assessed. This updated conceptual site model (CSM) (for PFAS only) has been developed to identify potential exposure risks to relevant receptors upon which subsequent phases of investigation could be based, as set out in Table 10-3. A visual CSM is presented in Figure 8, Appendix A.

Table 10-3: Updated Conceptual Site Model for PFAS

Airservices Lease Area	Source Zone Area	Pathway	Exposure Route	Receptor	SPR Linkage	Comment
Main Fire Station	• ARFFS fire station footprint • Drainage low point (including stormwater holding pond) • Washdown area/ pad • Underground interceptor and associated underground pipework • Former AFFF storage areas • Diesel storage area and refuelling point. • Mechanical Workshop • Secondary sources relate to seepage from stormwater and sewerage pipes.	Adsorption of contaminants onto shallow soils and sediments	Direct exposure via incidental ingestion of the contamination in soil or sediment, inhalation of soil or sediment derived dust.	On-airport workers and site users and intrusive maintenance workers (IMW).	Incomplete	Detectable concentrations of PFAS were reported above the LOR in almost all of the soil and in all of the soil (accumulated sediment) samples collected within the Main Fire Station area, however, concentrations were reported below the human health assessment criteria for a commercial/ industrial setting (HIL-D). It was noted that PFAS concentrations in soil generally decreased with depth and PFAS impact was generally reported in the surface sample (i.e., 0.0 to 0.2 m sample). While concentrations of PFAS in soil (accumulated sediment)samples collected from the drainage channel and dam located to the south of the MFS were reported higher than concentrations directly collected from the MFS, concentrations were reported below the human health assessment criteria for a commercial/ industrial setting (HIL-D).
			Direct exposure via root water uptake for on-airport flora and the subsequent ingestion of the contamination by on-airport fauna.	On-airport terrestrial flora and fauna.	Incomplete	All soil and sediment pit samples (i.e. infrastructure samples) collected from the MFS reported PFAS analytical results below the ecological direct exposure criteria and the indirect exposure criteria. Terrestrial flora and fauna is generally absent at ground level across the MFS lease area and there is a complete absence of these types of receptors within trade waste drainage infrastructure pits. Three soil (accumulated sediment)samples collected from sampling locations SS01, SS02 and SS04 located within the drainage channel and stormwater holding pond located adjacent to the MFS exceeded the ecological indirect exposure criteria of 0.01 mg/kg for PFOS. However, the area is within an intensively developed site which is fenced off, with limited opportunities for fauna to come into contact with impacted soil. Additionally, it was noted that vegetation was limited along the drainage channel and surrounding the holding pond and these are considered to be of very low ecological value.
		Lateral migration of contaminants in groundwater in the direction of groundwater flow and expression in surface water systems.	Direct or indirect exposure via ingestion of impacted groundwater or surface water.	Recreational and non-potable users of nearby water bodies.	Incomplete	Reported concentrations of PFAS in all groundwater samples from the MFS area were reported below the PFAS NEMP Recreational Water value. Leachable concentrations of PFAS in one soil sample from the MFS was reported below the PFAS NEMP Recreational Water value. Leachable concentrations of PFAS in three sediment samples collected from the drainage channel and dam located near the MFS were reported below the PFAS NEMP Recreational Water value.
			Direct or indirect exposure via ingestion of impacted groundwater or surface water and/ or from ingestion of bioaccumulated PFAS within the food chain.	Aquatic flora and fauna and consumers of aquatic fish, crustaceans, molluscs, or reptiles from within nearby rivers, creeks, flood plains and waterholes, etc and products sourced from surface water systems.	Incomplete	PFAS results in all groundwater samples collected at the MFS; including from GW04, GW06 and RN012065, were reported below the ecological assessment criteria for the 95% protection level. Leachable concentrations of PFAS in one soil sample from the CFS was reported below ecological assessment criteria. Leachable concentrations of PFAS in two soil (accumulated sediment) samples selected for ASLP from the drainage channel and stormwater holding pond located adjacent to the MFS exceeded the Freshwater ecosystem guideline value for the 95% species protection level. In the absence of pore water/elutriate analysis, this adopted guideline value is highly conservative and overly protective for this exposure scenario and has been used for contextual purposes as opposed to risk assessment.
		Vertical migration through the soil profile via rainfall infiltration to groundwater.	Direct exposure via ingestion of groundwater.	Subsurface fauna in the groundwater aquifer.		
		Abstraction of groundwater via registered or unregistered bore.	Direct exposure via incidental ingestion of abstracted groundwater used for non-potable uses (including irrigation or dust suppression etc).	Users of abstracted groundwater (includes intrusive maintenance workers, registered bore owners and other users) and those who may have limited and incidental contact with the water.	Incomplete	Reported concentrations of PFAS in all groundwater samples from the MFS area were reported below the PFAS NEMP Recreational Water value. Leachable concentrations of PFAS in one soil sample from the MFS was reported below the PFAS NEMP Recreational Water value. Leachable concentrations of PFAS in three soil (accumulated sediment) samples collected from the drainage channel and stormwater holding pond located adjacent to the MFS were reported below the PFAS NEMP Recreational Water value. Groundwater abstraction or use has not been identified within the airport estate boundary or off-site north or north-west of the airport. Groundwater salinity does not support potable use without treatment, and there is no established development down-gradient of the airport indicative of treatment systems or repeated use. Current groundwater flow directions do not support a pathway between contamination sourced from the airport and the established water supply bores (located to the south of the Airport Estate). However, future flow direction changes or installation of alternative bores may generate possible future connections. We note that these future connections, if established, would require some form of treatment to address salinity (as a minimum).

Airservices Lease Area	Source Zone Area	Pathway	Exposure Route	Receptor	SPR Linkage	Comment
		Transport of contaminants in surface water or in storm water run-off via discharge to drainage systems and further migration within receiving environments.	Direct and/or indirect exposure to impacted surface water or stormwater via incidental ingestion and/or from ingestion of bioaccumulated PFAS within the food chain.	Recreational users of nearby water bodies.	Incomplete	Water samples collected from drainage infrastructure at the MFS, including a garage drain and washdown bay drains and sumps, reported PFAS results below the PFAS NEMP Recreational Water value. Further to this, there is no recreational use of the drainage systems within the Airport Estate and the closest reliable surface water body is 18km south of the Airport Estate.
				Intrusive maintenance workers and other on-airport utility workers in a non-potable exposure scenario.	Incomplete	Water samples collected from the garage drain at the MFS contained PFAS results exceeding the Freshwater 95% and Drinking Water guideline values. The other infrastructure water samples collected (including washdown from driveways and AST pad) reported PFAS results below the adopted ecological and human health assessment criteria. The drain is located in the main garage and within the washdown area at the MFS, however, does not report to any high value or moderately disturbed surface water ecosystems and is not a plausible drinking water source
				On-airport and off-airport aquatic flora and fauna and consumers of aquatic fish, crustaceans, molluscs, or reptiles from within nearby rivers, creeks, flood plains and waterholes, etc.	Incomplete	All sediment pit samples (i.e., infrastructure samples) collected from the MFS reported PFAS analytical results below the ecological direct exposure criteria, the indirect exposure criteria and the human health assessment criteria for a commercial/ industrial setting (HIL-D). One soil (accumulated sediment) sample within the drainage channel located upstream of the MFS and two samples within the stormwater drainage holding pond located south of the MFS exceeded the ecological indirect exposure criteria of 0.01 mg/kg for PFOS. Leachable concentrations of PFAS in the drainage system samples exceeded the Freshwater 95% and Drinking Water guideline value. The drainage system waters are not a plausible source of drinking water and there is negligible ecological value associated with this infrastructure as surface water is only present for extremely short durations following highly infrequent and episodic rainfall events characteristic of this arid zone climate.
FTG	• Large Mock-up (LMU) and concrete pad • Wastewater USTs and pits • Interceptor location • Secondary sources from seepage from stormwater and sewerage pipes		Direct exposure via incidental ingestion of the contamination in soil or sediment, inhalation of soil or sediment derived dust.	On-airport workers and intrusive maintenance workers.	Incomplete	PFAS was reported above the LOR in all soil samples collected within the FTG area, with all samples reporting analytical results below the human health assessment criteria for a commercial/ industrial setting (HIL-D). All sediment pit samples (i.e., infrastructure samples) collected from the FTG reported PFAS analytical results below the human health assessment criteria for a commercial/ industrial setting (HIL-D). PFAS in concrete samples collected (CC01 and CC02) at the FTG were reported below the EGV *for human exposure to concrete dust* (GHD, 2021).
		Adsorption of contaminants onto shallow soils and sediments.	Direct exposure via root water uptake for on-airport flora and indirect exposure to secondary consumers via bioaccumulation in the food chain.	On-airport terrestrial flora and fauna.	Potentially complete	All soil samples were reported below the ecological direct exposure criteria of 1 mg/kg for PFOS. Fifteen soil samples exceeded the ecological indirect exposure assessment criteria of 0.01 mg/kg for PFOS. All sediment pit samples (i.e., trade waste drainage infrastructure samples) collected from the FTG reported PFAS analytical results below the Tier 1 ecological direct exposure criteria. One sediment sample (SS05) exceeded the ecological indirect exposure criteria. The footprint of the FTG lease area is largely cleared of native vegetation with only sparse isolated patches of vegetation remaining and therefore the potential for risk to on-airport flora is considered low however is still present within this lease area for on-airport flora and indirect exposure to secondary consumers. A Tier 2 ecological risk assessment would be required to identify if there is an actual risk to ecological receptors at this area.
		Lateral migration of contaminants in groundwater in the direction of groundwater flow and expression in surface water systems.	Direct or indirect exposure via ingestion of impacted groundwater or surface water.	Recreational and non-potable users of nearby water bodies.	Incomplete	Reported concentrations of PFAS in all groundwater samples from the FTG area were reported below the PFAS NEMP Recreational Water value. Leachable concentrations of PFAS in a concrete and a sediment pit sample at the FTG were reported below the C/A3: EGV *for leaching, discharge to surface water and primary contact recreation (swimming)*. Leachable concentrations of PFAS in one soil sample exceeded the PFAS NEMP Recreational Water value.
			Direct or indirect exposure via ingestion of impacted groundwater or surface water and/or from ingestion of bioaccumulated PFAS within the food chain.	Aquatic flora and fauna and consumers of aquatic fish, crustaceans, molluscs, or reptiles from within nearby rivers, creeks, flood plains and waterholes, etc.	Incomplete	PFAS results in all groundwater samples collected at the FTG; including from GW02, GW03 and GW05, were reported below the ecological assessment criteria for the 95% protection level. Leachable concentrations of PFAS in one soil sample exceeded the PFAS NEMP ecological assessment criteria. Leachable concentrations of PFAS in two concrete samples and one sediment pit sample (i.e., trade waste drainage infrastructure samples) exceeded the C/A6: EGV *for leaching, discharge to surface water and ecological food chain exposures*. However, reported analytical results were below the C/A5: EGV *for 95% species protection, leaching, discharge to surface water and direct ecological exposures.*
		Vertical migration through the soil profile via rainfall	Direct exposure via ingestion of groundwater.	Subsurface fauna in the groundwater aquifer.		

Airservices Lease Area	Source Zone Area	Pathway	Exposure Route	Receptor	SPR Linkage	Comment
		infiltration to groundwater.				It is generally accepted that, in some exposure scenarios, the comparison of leachate concentrations to standard or adjusted Tier 1 screening criteria is not appropriate or relevant for determining the potential for a risk to be present via this pathway. Relevant EGVs have been applied in this TSI based on GHD (2021) for the purpose of assessing the potential for migration via this pathway (as a mass estimate in liquid phase) from areas of impacted concrete (acting as a secondary source of contamination). Leachate results from concrete samples are not considered a primary line of evidence in the exposure scenario and may not be applicable for the purpose of assessing risk related to human health or ecological receptors relevant surface water and/or groundwater.
		Abstraction of groundwater via registered or unregistered bore.	Direct exposure via incidental ingestion of abstracted groundwater used for potable and/or non-potable uses (including irrigation or dust suppression etc).	Users of abstracted groundwater (includes intrusive maintenance workers, registered bore owners and users).	Incomplete	Reported concentrations of PFAS in all groundwater samples from the FTG area were reported below the PFAS NEMP Recreational Water value. Leachable concentrations of PFAS in a concrete sample were reported exceeding the C/A2: EGV *for leaching to groundwater and potable use of offsite groundwater*. Leachable PFAS results in a sediment pit sample (i.e., infrastructure sample) was reported below the C/A2: EGV *for leaching to groundwater and potable use of offsite groundwater*. Leachable concentrations of PFAS in a concrete and a sediment pit sample at the FTG were reported below the C/A3: EGV *for leaching, discharge to surface water and primary contact recreation (swimming)*. Leachable concentrations of PFAS in one soil sample exceeded the PFAS NEMP Recreational Water value. Groundwater abstraction or use has not been identified within the airport estate boundary or off-site north or north-west of the airport. Groundwater salinity does not support potable use without treatment. It has been confirmed with a high degree of certainty that no Indigenous communities are located down-gradient of the Airport Estate and transient TO's travelling on country would not access groundwater due to its scarcity as surface expressions and generally at a depth inaccessible using traditional hand tools for digging wells (CLC, 2015). Current groundwater flow directions do not indicate any plausible pathway between impacts identified at the FTG and the established Yulara town municipal water supply bores (located more than 4km to the south-west of the Airport).
		Transport of contaminants in surface water in storm water run-off via discharge to drainage systems and further migration within receiving environments.	Direct and/or indirect exposure to impacted surface water or stormwater via incidental ingestion and/or from ingestion of bioaccumulated PFAS within the food chain.	Recreational and non-potable users of nearby water bodies.	Incomplete	Water samples collected from infrastructure at the FTG, from two pits (SS06 and Pit2) reported PFAS results above the PFAS NEMP Recreational Water value. The other water infrastructure samples, which came from pits and washdown of infrastructure, reported PFAS results below the recreational assessment criteria.
				Intrusive maintenance workers and other on-airport utility workers in a non-potable exposure scenario.	Potentially complete	All water samples collected within the trade waste drainage system reported PFAS results exceeding the ecological and human health assessment criteria, indicating that residual PFAS is present in concrete, washdown areas, drainage lines and accumulated sediments within the pits at the FTG. Waters within the trade waste drainage system do not support any ecological value and are not a plausible drinking water source. Recreational guideline value exceedances could be relevant in the context of non-potable exposure scenarios for intrusive maintenance workers working in these subsurface utility systems. This scenario is considered extremely infrequent in occurrence; however, it is the only relevant exposure route via this pathway. The drainage system waters do not discharge to any natural surface water systems as these are absent on-airport and within an 18km radius of the Airport Estate.
				On-airport and off-airport aquatic flora and fauna and consumers of aquatic fish, crustaceans, molluscs, or reptiles from within nearby rivers, creeks, flood plains and waterholes, etc.	Incomplete	All sediment pit samples (i.e., infrastructure samples) collected from the FTG reported PFAS analytical results below the ecological direct exposure criteria, the adjusted indirect exposure criteria, and the human health assessment criteria for a commercial/ industrial setting (HIL-D). Surface water is typically ephemeral in nature both on-airport and off-airport, occurring sporadically following highly intermittent heavy rainfall events which are characteristic of arid zone climates. Current literature for the Katiti-Peterman IPA (CLC, 2015) indicates that the only semi-permanent surface water which supports ecological ecosystems is the Mutitjulu Waterhole, however this is located 18km south-east of the Airport Estate and is highly unlikely to receive surface water flows from AYQ. There is currently no scientific studies or literature indicating the presence of subsurface fauna (such as Stygofauna) in the regional aquifer.

Airservices Lease Area	Source Zone Area	Pathway	Exposure Route	Receptor	SPR Linkage	Comment
Interim Fire Station	• Former interim fire station (and surrounding unsealed areas) • Sewage Treatment Plant and Seepage Field • Secondary sources from seepage from sewerage pipes	Adsorption of contaminants onto shallow soils and sediments.	Direct exposure via incidental ingestion of the contamination in soil or sediment, inhalation of soil or sediment derived dust.	On-airport workers and intrusive maintenance workers.	Incomplete	PFAS was reported above the LOR in all soil samples collected within the IFS area, with all samples reporting analytical results below the human health assessment criteria for a commercial/ industrial setting (HIL-D). While concentrations of PFAS in sediment samples collected from the drainage channel located near the IFS to the west were reported higher than concentrations directly collected from the IFS, concentrations were reported below the human health assessment criteria for a commercial/ industrial setting (HIL-D). All of the PFAS results for soil samples collected and analysed from monitoring wells located within the vicinity of the IFS (i.e., GW08) reported results at or below the LOR. PFAS analytical results from this monitoring well was reported below the human health assessment criteria for a commercial/ industrial setting (HIL-D).
			Direct exposure via root water uptake for on-airport flora and the subsequent ingestion of the contamination by on-airport fauna.	On-airport terrestrial flora and fauna.	Incomplete	One sediment sample collected from sampling location SED11 located within the drainage channel located near the IFS exceeded the ecological indirect exposure criteria of 0.01 mg/kg for PFOS. However, the area is within an intensively developed site which is fenced off, with limited opportunities for fauna to come into contact with impacted soil and existing fauna and flora within the site is considered of low ecological value. Additionally, it was noted that vegetation was limited within the drainage channel and water dam based on the use of the channels. All soil samples collected from the monitoring wells located within the vicinity of the IFS were reported below both the ecological direct exposure criteria and the indirect exposure criteria.
		Lateral migration of contaminants in groundwater in the direction of groundwater flow and expression in surface water systems.	Direct or indirect exposure via ingestion of impacted groundwater or surface water.	Recreational and non-potable users of nearby water bodies.	Incomplete	Reported concentrations of PFAS in all groundwater samples from the IFS area were reported below the PFAS NEMP Recreational Water value. Leachable concentrations of PFAS in one sediment sample collected from the drainage channel located near the IFS exceeded the PFAS NEMP Recreational Water value. Leachable concentrations of PFAS in soil samples from the IFS and wider area (i.e., STP and seepage spray field) were reported below the PFAS NEMP Recreational Water value.
			Direct or indirect exposure via ingestion of impacted groundwater or surface water and/or from ingestion of bioaccumulated PFAS within the food chain.	Aquatic flora and fauna and consumers of aquatic fish, crustaceans, molluscs, or reptiles from within nearby rivers, creeks, flood plains and waterholes, etc.	**Incomplete**	PFAS results in groundwater samples collected at the IFS; including from GW01 and GW08, reported results exceeding the ecological assessment criteria for the 95% protection level for GW08, but below the adopted assessment criteria for GW01. The ecological assessment criteria for PFAS at the 95% species protection level was exceeded in one of the two IFS groundwater samples and in the well (GW11) located most downgradient of the airport. Leachable concentrations of PFAS in two soil samples from the IFS and wider area (i.e., STP and seepage spray field) were reported exceeding the ecological assessment criteria. Leachable concentrations of PFAS in one sediment sample selected for ASLP from the drainage channel located near the IFS exceeded the ecological assessment criteria for the 95% species protection level. Surface water is typically ephemeral in nature both on-airport and off-airport, occurring sporadically following highly intermittent heavy rainfall events which are characteristic of arid zone climates. Current literature for the Katiti-Peterman IPA (CLC, 2015) indicates that the only semi-permanent surface water which supports ecological ecosystems is the Mutitjulu Waterhole, however this is located 18km south-east of the Airport Estate and is highly unlikely to receive surface water flows from AYQ. There is currently no scientific studies or literature indicating the presence of subsurface fauna (such as Stygofauna) in the regional aquifer.
		Vertical migration through the soil profile via rainfall infiltration to groundwater.	Direct exposure via ingestion of groundwater.	Subsurface fauna in the groundwater aquifer.		
		Abstraction of groundwater via registered or unregistered bore.	Direct exposure via incidental ingestion of abstracted groundwater used for non-potable uses (including irrigation or dust suppression etc).	Users of abstracted groundwater (includes intrusive maintenance workers, registered bore owners and users).	Incomplete	Reported concentrations of PFAS in all groundwater samples from the IFS area were reported below the PFAS NEMP Recreational Water value. Leachable concentrations of PFAS in one soil (accumulated sediment) sample collected from the drainage channel located near the IFS exceeded the PFAS NEMP Recreational Water value. Leachable concentrations of PFAS in soil samples from the IFS and wider area (i.e., STP and seepage spray field) were reported below the PFAS NEMP Recreational Water value. Groundwater abstraction or use has not been identified within the airport estate boundary or off-site north or north-west of the airport. Groundwater salinity does not support potable use without treatment, and there is no established development down-gradient of the airport indicative of treatment systems or repeated use. Current groundwater flow directions do not support a pathway between contamination sourced from the airport and the established water supply bores (located to the south-west of the Airport). However, future flow direction changes or installation of alternative bores may generate future connections.

Airservices Lease Area	Source Zone Area	Pathway	Exposure Route	Receptor	SPR Linkage	Comment
		Transport of contaminants in surface water in storm water run-off via discharge to drainage systems and further migration within receiving environments.	Direct exposure to impacted surface water or stormwater via incidental ingestion and/ or from ingestion of bioaccumulated PFAS within the food chain.	Recreational and non-potable users of nearby water bodies.	Incomplete	Water samples were not collected from infrastructure at the IFS; however, influent, and effluent water samples were collected from the Sewage Treatment Plant; located near the IFS. The PFAS analytical results from these water samples were reported below the PFAS NEMP Recreational Water value.
				Intrusive maintenance workers and other on-airport utility workers in a non-potable exposure scenario		Water samples were not collected from infrastructure at the IFS; however, influent, and effluent water samples were collected from the Sewage Treatment Plant; located near the IFS. The PFAS analytical results for the effluent sample were reported exceeding the ecological and human health assessment criteria, indicating there is still PFAS impacted sediment within the STP holding tank the sample was collected from. PFAS results for the influent sample were reported below the ecological and human health assessment criteria. One soil (accumulated sediment) sample within the drainage channel located near the IFS exceeded the ecological indirect exposure criteria of 0.01 mg/kg for PFOS. Leachable concentrations of PFAS from the drainage channel located near the IFS in one soil (accumulated sediment) sample exceeded the ecological assessment criteria and the human health assessment criteria.
				On-airport and off-airport aquatic flora and fauna and consumers of aquatic fish, crustaceans, molluscs, or reptiles from within nearby rivers, creeks, flood plains and waterholes, etc.		
Outside of the Airservices Lease Area	• Groundwater monitoring well GW11; located in the north-western portion of the airport near the end of the runway	Abstraction of groundwater via registered or unregistered bore.	Direct exposure via incidental ingestion of abstracted groundwater used for potable or non-potable uses.	Users of abstracted groundwater (includes intrusive maintenance workers, registered bore owners and other users).	Incomplete	Reported concentrations of PFAS in GW11 were reported below the PFAS NEMP Recreational Water value but exceeding the ecological assessment criteria for the 95% protection level and drinking water values. Groundwater abstraction or use has not been identified within the airport estate boundary or off-site north or north-west of the airport, downgradient of GW11. However, the installation of registered or unregistered bores is possible but unlikely. It has been confirmed with a high degree of certainty that no Indigenous communities are located down-gradient of the Airport Estate and transient TO's travelling on country would not access groundwater due to its scarcity as surface expressions and generally at a depth inaccessible using traditional hand tools for digging wells (CLC, 2015). Groundwater salinity does not support potable use without treatment, and there is no established development down-gradient of the Airport Estate indicative of the need for abstraction and treatment systems or repeated use. We note that these future connections, if established, would require some form of treatment to address salinity to be suitable for potable purposes.

10.5 PRELIMINARY CSM FOR SUPPLEMENTARY COPCS

The following potential SPR linkages were identified for non-PFAS contaminants analysed within this investigation.

Table 10-4: CSM for Supplementary COPCs

Source	COPCs	Pathway	Exposure Route	Potential Receptor	SPR Linkage status	Discussion
SZAs from the Main Fire Station: • Diesel Bowser and AST • Washdown Bay • MFS Building footprint • Underground interceptor and associated trade waste drainage infrastructure SZAs from the IFS: • Former interim fire station (and surrounding unsealed areas) Hazardous chemical storage • Fuel storage and dispensing infrastructure	• TRH • BTEXN • PAHs • Solvent • Surfactants • Chlorinated hydrocarbons • PCB • Metals.	Adsorption of contaminants onto shallow soils and sediments	Direct contact with contaminated soil and the subsequent dermal exposure or ingestion of the contamination.	On-airport workers and site users and intrusive maintenance workers	Potentially complete	All supplementary soil results at the MFS, IFS and FTG indicated TRH concentrations below the LOR and the adopted human health assessment criteria for both direct contact and vapour intrusion exposure routes. All other hydrocarbon compounds (BTEX, PAH and MAH) were measured below the laboratory LOR in all cases. Hydrocarbons were detected at concentrations above the NEPM (2013) Management Limits within pit sediments at the base of the trade waste drainage infrastructure sumps at the FTG. As levels of TRH exceed the Management Limits in NEPM (2013), the potential for explosive atmospheres cannot be discounted within the FTG pad drainage sump and collection pits of the wastewater treatment system. The implementation of a HSE management system (including specific Health & Safety Plan and confined space entry protocols) for intrusive maintenance workers in sub-surface utilities may be an appropriate control mechanism to break this risk pathway. There was no evidence that could be obtained as part of this TSI which indicated a suitable HSE management system currently exists. Additionally, all supplementary samples of soils (accumulated sediment) and pit sediments in trade waste drainage systems at the MFS (including adjacent stormwater drainage culvert and holding pond) and IFS were reported at concentrations below the LOR and/or below the human health assessment criteria for both direct contact and vapour intrusion exposure routes.
		Vertical upward movement of vapours and ground gas through volatilisation	Vapour Intrusion			
		Adsorption of contaminants onto shallow soils and sediments	Root water uptake for on-airport flora and direct contact with contaminated	On airport terrestrial flora and fauna	Incomplete	All supplementary soil results from each of the Airservices Lease Areas indicated concentrations below the adopted human health and ecological assessment criteria and/or below the laboratory LOR for all CoPCs tested.

Source	COPCs	Pathway	Exposure Route	Potential Receptor	SPR Linkage status	Discussion
• ARFF vehicle washdown bay SZAs from the FTG: • Large Mock-up (LMU) and concrete pad • Wastewater USTs • Kerosene storage location • Interceptor location			soil and the subsequent dermal exposure or ingestion of the contamination or flora for on-airport fauna.			The exception to this is the FTG pad drainage sump and collection pits of the wastewater treatment system where concentrations of TRH in waste sediments were identified above the NEPM (2013) ESL. However, due to the nature, purpose and location of this subsurface infrastructure, there is no ecological value considered relevant in this scenario and no plausible exposure route for ecological receptors exists.
		Penetration of, or damage to, in-ground services by hydrocarbons	Direct contact of in-ground services with contaminated soil or groundwater	In-ground services	Incomplete	Hydrocarbons were detected at concentrations above the NEPM (2013) Management Limits within pit sediments at the base of the trade waste drainage infrastructure sumps at the FTG. Trade waste drainage infrastructure is purpose built for capture of industrial wash waters and the presence of short to long chain hydrocarbons at levels exceeding the Management Limits is not considered to be of immediate concern in the context of subsurface infrastructure damage as long as routine maintenance procedures are undertaken and with increased frequency of confirmation of structural integrity of this in ground infrastructure.
		Migration of contaminants via leaching through the unsaturated zone from shallow soils to groundwater, followed by lateral transport of contaminants within the aquifer.	Root water uptake for on-airport flora and direct contact with contaminated soil and the subsequent indirect exposure or incidental	on-airport environmental value of flora and fauna	Incomplete	Concentrations of supplementary CoPCs in soils at each of the Airservices Lease Areas were below the adopted ecological screening criteria and/or below the laboratory LOR in all cases and concentrations did not warrant further analysis of leachability. Groundwater samples for supplementary CoPCs were collected at GW02, GW03 and GW05 located as follows: • Immediately up-gradient of FTG – GW02 • Immediately down-gradient of FTG – GW03

Source	COPCs	Pathway	Exposure Route	Potential Receptor	SPR Linkage status	Discussion
		Transport of contaminants in surface water via storm water run-off into surface drainage swales and culverts and migration to the stormwater holding pond.	ingestion of the contamination			• Down-gradient of all Airservices Lease Areas – GW05 The concentrations of hydrocarbons were generally below the laboratory LOR at each monitoring well location with the exception of a marginal detection of Toluene in groundwater at GW05 (7 ug/L). This remains well below aesthetic limit for drinking water and this TSI has confirmed through multiple lines of evidence that there is no abstraction or use of groundwater for potable purposes on-airport and/or down-gradient off-airport.
		Abstraction of groundwater via registered or unregistered bore	Off-airport migration of contaminants via leaching through the unsaturated zone from shallow soils to groundwater, followed by lateral transport of contaminants within groundwater. Exposure via dermal contact or ingestion of abstracted groundwater	Off-airport groundwater users	Incomplete	

11. DISCUSSION

11.1 GENERAL SUMMARY

Based on the data reviewed and collected as a part of this TSI (including previous studies), concentrations of PFAS (and limited other COPCs) are present in soils and groundwater within (or associated with) the Airservices Lease Areas that has been partially contributed to as a result of activities undertaken by Airservices.

There is also evidence that PFAS within the Airport Estate has been contributed to by other land users and their activities. The Tier 1 risk assessment completed in this TSI to establish and/or update relevant source, pathway and receptor linkages and to inform the CSM, indicate that PFAS impacts within Airservices Lease Areas and other parts of the Airport Estate, present negligible potential risk to human health or ecological receptors both on-airport and off-airport (noting that Indirect Ecological exposure to PFAS within the FTG may present a potentially unacceptable risk to higher-trophic ecological receptors).

Concentrations of PFAS reported at the STP (including short and long-chain PFSAs and PFCAs) in groundwater and STP effluent are likely to have some contribution from other activities and land uses on the Airport Estate due to the varied sources of influent to the STP.

PFAS was reported in groundwater at monitoring well GW11 which is more than 1 km down-hydraulic gradient from the Airservices Lease Areas. The concentrations of PFAS at this location were unexpected (as this well was planned to be used as a down-gradient delineation well) as it is well beyond Airservices Lease Areas and any other known operations or activities undertaken by Airservices on the Airport Estate. There is uncertainty as to the source of the PFAS at this location as it reported a signature of short and long-chain PFSAs and PFCAs which are unique to this location compared with PFAS compositions from other SZAs. The PFAS impacts in groundwater between the FTG/MFS and GW11 are significantly lower (or below laboratory LORs) than those reported at GW11, indicating that the impacts from the FTG/MFS areas are unlikely to be associated with the impacts at GW11. Given the uncertainty as to the source of PFAS impacts at GW11, and that it is unlikely that the Airservices Lease Areas or their activities on the Airport have resulted in these impacts, further appraisal of the impacts at GW11 may be required.

Groundwater abstraction or use has not been identified within the airport estate boundary or off-site north or north-west of the airport. Groundwater salinity does not support potable use without treatment, and there is no established development down-gradient of the airport indicative of treatment systems or repeated use.

Regardless of the potential sources and detections of PFAS in groundwater which typically exceed the current Drinking Water guideline value for PFOS and PFHxS (with two monitoring well locations also exceeding Freshwater 95% protection level for PFOS) and isolated occurrence of PFOA above the Drinking Water guideline value, the potential for a risk to be present to any on-airport or off-airport groundwater receptors is considered to be very-low.

The assessment undertaken as a part of this study indicated that there are no confirmed human or ecological receptors that are at risk of exposure to PFAS with the exception of:

- The (highly conservative) exposure route for intrusive maintenance workers if working in the trade waste drainage system at the FTG without appropriate HSE measures or PPE, and
- Indirect exposure to ecological receptors from PFAS soil impacts within the FTG, the MFS drainage pond sediments, and an isolated sediment location at the western end of the STP seepage field perimeter drainage swale.

Further discussion of the results of this investigation are provided below.

11.2 SEWAGE TREATMENT PLANT AND SEEPAGE FIELD

The results received for soil, sediment, groundwater and wastewater inflow and outflow at the STP and STP Seepage Field are interpreted and discussed in detail in Section 11.2.1 to Section 11.2.5 below and shown in Figure 5A, Appendix A.

11.2.1 PFAS in Soil

Soil investigation at the STP was limited to collection of shallow soil samples across the treated wastewater seepage field to the north-west and directly adjacent of the STP to the east in the vicinity of monitoring well MW01. PFAS concentrations were measured in soils across these two areas at concentrations below the adopted human health and ecological screening criteria and with long-chain PFSA's (PFOS and PFHxS) and both short and long chain PFCA's marginally above the laboratory LOR on an individual compound basis. Concentrations of Total PFAS, for the current 28 compounds which are reported by the laboratory ranged from less than the LOR to 0.0418 mg/kg.

Leachability testing of soils collected from the STP Seepage Field reported concentrations of PFAS in the leachable elutriant which exceeded the Drinking Water guideline value and the Freshwater 95% protection level for PFOS (0.16 µg/L) with generally low concentrations of short and long chain PFCA's (which were generally PFOA and PFNA). Comparison of ASLP results against water quality criteria is a highly conservative appraisal of risk to groundwater receptors as the ASLP process is designed to replicate 100 years of leaching, rather than being representative of infiltration and leaching characteristics under normal rainfall conditions.

Based on the total and leachable concentrations of PFAS identified in soils at the STP seepage field and the area to the east around MW01 there is no direct exposure risk to human health receptors and no direct or indirect exposure risk to ecological receptors.

Leachable PFAS concentrations in soil at the STP Seepage Field exceed the adopted assessment criteria for drinking water and freshwater ecosystems (95% protection level) however this is not considered to present a plausible risk to human health or ecological receptors. As has been established in earlier sections of this TSI report, and the updated CSM in Section 10.4, there is no groundwater abstraction for potable purposes within the Airport Estate or down-gradient off-airport to the north-west and groundwater does not discharge nor is it expressed in any surface water features as depth to groundwater precludes this from occurring and these aquatic ecosystems are entirely absent both on-airport and down-gradient off-airport.

TOPA analysis of soil sample SB02 within the STP Seepage Field demonstrates that PFAS present in the soils at this location contain parent polyfluoroalkyl precursors which may have the potential, under oxidative environmental conditions and with the influence of biotic and abiotic transformation factors, degrade to a range of PFAA's primarily characterised by both short and long chain PFCA's. These results are consistent with what would be expected when assessing PFAS sources associated with F2 Class Foams (such as Ansulite). The STP primarily receives wastewater from the Terminal Building and treated greywater/trade waste waters from the MFS and FTG and only a very minor contribution from other operations on the Airport Estate. Further to this, wastewater samples analysed within the trade waste drainage pits at both the MFS (SS07) and the FTG (SS06, Pit 1, Pit2 and Pit3) indicate that wastewater outflow to the STP Rising Main contains both short and long chain PFSA's and PFCA's as discussed in Section 11.4.3 and Section 11.5.3 below.

The STP Seepage Field is the only known location of disposal of treated wastewater outflows from the STP and, as this is occurring frequently, soils in the STP Seepage Field are affected by an ongoing contribution of PFAS. Section 11.2.4 below discusses the STP outflow (effluent) concentration observed from the sample collected as part of this TSI which provides evidence of PFAS discharge to the STP Seepage Field.

11.2.2 PFAS in Sediment

PFAS has the potential to accumulate in sediments due to elevated organic carbon content and as such samples of accumulated sediments were collected from the drainage swale to the north of the STP Seepage field. Concentrations of PFAS in sediment sample SED11 located towards the western end of the swale indicated that PFAS is present (most notably long chain PFSA's in the form of PFOS at 0.0465 mg/kg) exceeding the ecological indirect criteria for soils, however as established in GHD, 2021, this is of little relevance as porewater in sediment is the driver of ecological risk, not the sediment itself.

Most notably however, are the results for leachability analysis at SED11 which indicated that this is also dominated by the PFOS compound with a measured concentration of 2.48 ug/L which exceeds the Freshwater 95% protection level along with the Human Health Drinking Water and Recreational Use guideline values. Comparison of ASLP results against water quality criteria is a highly conservative appraisal of risk to groundwater receptors as the ASLP process is designed to replicate 100 years of leaching, rather than being representative of infiltration and leaching characteristics under normal rainfall conditions.

Due to the highly sporadic and ephemeral nature of the drainage swale it is not considered to represent a freshwater ecosystem which could sustainably support ecological receptors and therefore, as established in the CSM, there is no plausible pathway for contamination migration which could lead to a relevant exposure route. Leaching and vertical migration to groundwater could possibly occur from these sediments however any impacts in groundwater as a result would be considered limited and there is no exposure route for human health receptors as established in earlier sections of this TSI report, and the updated CSM in Section 10.4.

11.2.3 PFAS in Groundwater

There are no monitoring wells installed within or directly adjacent (up-gradient or down-gradient) of the STP infrastructure footprint. As per the sampling strategy detailed in Table O of the SAQP for Phase I works (Tetra Tech Coffey, March 2022) monitoring wells GW01 and GW02 were installed for the purposes outlined below:

- GW01 – located in the inferred up-gradient direction of all potential sources identified on-airport and was intended to be used for the purposes of determining groundwater quality which is flowing on to the Airport Estate.
- GW02 – Located down-gradient of the STP Seepage Field and intended to assess whether the Seepage Field may be contributing to impacts in groundwater. GW02 also forms an up-gradient monitoring well for the FTG to determine if any identified impacts could potentially be affecting groundwater quality beneath the FTG Lease Area.

During the drilling of these new monitoring wells no soil samples were collected to assess PFAS in soils in the upper profile or at the capillary fringe, so it is uncertain whether point source impacts in soil are present at these locations.

Groundwater samples collected during both Phase I and Phase II TSI works however, presented variable analytical results, as discussed below:

- GW01 in the inferred/intended up-gradient location consistently indicated PFAS was present in groundwater in the form of both short and long chain PFSAs and PFCAs with PFHxS and PFOA both being measured at concentrations above the adopted Drinking Water guideline value and PFHxS concentrations only marginally below the Recreational Water guideline value. Most notably though, the Sum of PFAS (for the 28 PFAA compounds measured by the standard PFAS analytical suite) calculated at GW01 during both the Phase I and Phase II TSI works reported 12 ug/L and 12.9 ug/L, respectively. Compositionally, the Total PFAS measured during both sampling events was characterised by a dominant short and long chain PFCA signature with PFHxA being the greatest contributor at 2.60 ug/L (Phase I) and 2.86 ug/L (Phase II).

- Concentrations of PFAS were not reported in GW02 during the Phase I sampling event above the laboratory reporting limits. During the Phase II sampling event, low-level laboratory reporting limits were adopted and only minor concentrations of PFHxS (0.0006 ug/L) and PFHxA (0.0006 ug/L) were reported above the reporting limits. Reporting limits applied in both Phase I and Phase II analysis were below the adopted assessment criteria and suitable for appraising risks to receptors.

Whilst elevated PFAS results at GW01 were somewhat unexpected based on its inferred up-gradient location, historical maintenance and incident records related to the STP have been difficult to obtain as part of this TSI and as such it is uncertain as to whether the area to the east and/or south-east of the STP has been potentially affected by historical operational procedures (e.g. disposal or application of biosolids, discharge of untreated or semi-treated waste waters during tank maintenance) or incidents related to flooding, overtopping and/or uncontrolled release of waste waters, which may have tended to flow to the south-east based on the topography immediately surrounding the STP.

PFAS concentrations reported at GW02 are significantly lower compared with those reported at GW01 and are interpreted to indicate the following:

- The STP and STP Seepage Field are potentially contributing PFAS to the measured groundwater impacts in this area based on the very low groundwater gradient between wells GW01 and GW02. However, whilst it is possible that PFAS is being contributed to the measured groundwater impacts in this area from the STP infrastructure, the concentrations are relatively low and TOPA analytical results for the sample collected during Phase II TSI works from wells GW01 and GW02 do not indicate that any appreciable parent polyfluoroalkyl precursors are present.
- The recorded lithology as shown in the monitoring well construction logs presented in Appendix C indicate that the upper 3 metres of the profile is relatively low permeability silty sands which is then underlain by a moderately cemented conglomerate of low permeability and highly cemented sandstone formation of low to very low permeability and most probably semi-confining with regards to aquifer transmissivity. These low to very low permeability units hosting the upper aquifer are anticipated to reduce the potential for migration of PFAS in groundwater resulting in source areas generally being isolated from one another causing the absence of comingled plumes on the Airport Estate.

Based on the findings presented above and in consideration of additional groundwater results discussed in Section 11.7, there does not appear to be any other source area (on-airport or off-airport) which is contributing to the impacts at GW01. These impacts are, however, limited in spatial extent and there is an absence of groundwater abstraction for any purpose in the immediate vicinity of this monitoring well location. Groundwater occurs at a depth of approximately 10 mbgl and as such is not expressed at the ground surface or supporting any groundwater dependent ecosystems (GDEs). As a result, the SPR linkage assessment and updated CSM in Section 10.4 has established that no plausible risk is present to human health or ecological receptors.

PFAS results in groundwater samples collected at the IFS, primarily from GW08, indicated concentrations exceeding the freshwater ecosystem guideline for 95% species protection, which is consistent with the STP results, however, as has been established earlier in this TSI report no plausible risk can be identified due to absence of any freshwater ecosystems on-airport or immediately down-gradient of the Airport Estate.

11.2.4 PFAS in STP Influent and Effluent

Airservices currently does not, and/or have never, possessed a lease agreement for the STP area. The Section 48 Notice is specific in its requirements to assess PFAS impacts at Airservices occupied areas and areas affected by Airservices activities and as detailed in Section 3.2, wastewater (sewage, greywater, and trade waste) does discharge from the MFS and FTG to the STP at certain times and under certain conditions.

The sample referred to as “influent” was collected from the primary sewage tank and is representative of combined sewage, greywater, and wastewater inputs from the Terminal Building and the Airservices occupied

areas of the FTG and the MFS. The “effluent” sample was taken from the sampling pit at the treated effluent pumping station which directs the treated effluent to an irrigation storage tank and, at times of elevated throughput to the STP, can overflow to an unconfirmed but approved discharged point as detailed in Section 3.2. Photographs attached in Appendix I, include a schematic of the design layout of the Distal STP system and the sampling point for the effluent sample (i.e., purple hose outlet).

Analytical results for PFAS in the influent sample indicated that, at the time of sampling, the inputs to the STP were of relatively low concentration and generally consisting of short and long chain PFCA’s. The quality of wastewater reporting to the STP is anticipated to be variably influenced by the activities being undertaken at the Airservices Lease Areas and it is considered that the sample collected was generally representative of typical sewage and greywater input, which is consistent with the fact that there were no activities occurring at the FTG or vehicle washdown at the MFS immediately prior to (i.e. within the prior 48 hours) or during the time of collection of the influent sample.

Laboratory analytical results for the effluent sample were noticeably different and indicated elevated PFAS results in comparison to the influent sample and exhibited a broader range of PFAA’s with concentrations being orders of magnitude higher for both short and long chain PFSA’s and PFCA’s plus some 6:2 & 8:2 FTS being present.

The PFAS analytical results from both the influent and effluent samples were measured below the PFAS NEMP Recreational Water guideline values, however, PFAS analytical results for the effluent sample were reported exceeding the Freshwater 95% protection value and Drinking Water guideline value for PFOS and PFOA, which likely indicates that accumulated sediment and biosolids within the tanks of the STP treatment train and possibly within the irrigation storage tank are contributing to contamination as wastewaters pass through the different stages of the treatment process. Information gathered from interviews with Airservices personnel during the preparation of the Site Brief Report (Tetra Tech Coffey, July 2021) anecdotally suggests that biosolids and accumulated sediments in the STP are removed on an ‘as-required’ basis, and from review of GHD (2013) it is recommended that this should occur every 2 – 3 years as a minimum.

11.2.5 Supplementary CoPC Results

All supplementary reported soil and sediment results (including from the drainage channel and STP and seepage spray field) were reported below the adopted human health investigation levels. Detectable concentrations of metals (chromium, copper, lead, nickel, and zinc) were reported above the LOR in several soil and sediment samples but below the adopted assessment criteria.

All supplementary groundwater results were reported below the adopted ecological investigation levels and below the adopted human health investigation levels, and/ or below the LOR.

All supplementary infrastructure water results were reported below the adopted human health investigation levels and/ or below the LOR.

11.3 INTERIM FIRE STATION

The IFS was actively utilised by Airservices between 2004 and 2006 prior to the construction of the MFS and from anecdotal information provided by Airservices ARFF personnel (pers comms. Ken Balmer) it is known that storage of AFFF in the form of Ansulite occurred at the IFS. Other activities at the IFS included washdown of ARFF vehicles as and when required on an area covered by asphalt/bitumen hardstand.

11.3.1 PFAS in Soils

Analytical results for PFAS were recorded above the laboratory LOR at all soil sample locations within the IFS lease area, with compound signatures generally consistent with that observed in soils at the MFS. PFAS detected at the IFS consisted of minor long chain PFSA's and both short and long chain PFCA's and from analysis undertaken on samples at varying depths there is evidence that PFAS concentrations decrease considerably (with depth) within the upper 1 metre of the soil profile. These results are consistent with low-level impact to soils from the storage and use of F2 Class Foams, and PFAS concentrations for all samples were measured below the adopted ecological and human health screening criteria.

The leachable concentrations of PFAS in soils at the IFS are notably different compared with the MFS even though the PFAS concentrations in soil media appear to correlate well and can be assumed to be from the same source chemicals, based on the same activities generally occurring at both lease areas. The leachability results in soils from the IFS reported concentrations of PFOS in the leachable elutriant above the Drinking Water guideline value and Freshwater 95% protection level. There is uncertainty regarding the nature of the land use and activities at the IFS lease area undertaken prior to Airservices occupation of the area and in the period following Airservices use of the land.

TOPA analysis for PFAS at sample location SB06 suggests that some parent polyfluoroalkyl precursors may be present in the soils at the IFS. However, the TOPA results do not appear to affect the interpretation of risks to receptors in this area. The results do confirm that historical Ansulite storage and ARFF vehicle washdown at the IFS have contributed (to some extent) the presence of PFAS within soils in this lease area.

11.3.2 PFAS in Groundwater

Analytical results for PFAS were obtained for a sample collected at GW08 located within the IFS lease area footprint. Reported concentrations of PFAS at GW08 indicated a compound signature characterised by short and long chain PFSA's and PFCA's with concentrations of PFHxS exceeding the Drinking Water guideline value and PFOS exceeding both the Drinking Water guideline value and the Freshwater 95% protection level.

A relatively consistent magnitude of most detectable PFAA compounds was observed at GW08 (min: 0.137 ug/L PFPeS to max: 0.882 ug/L PFPeA) which is considered to be representative of inputs from both (possible) F1 Class Foams or liquid waste streams, and F2 Class Foams. The up-gradient activities occurring on the Airport Estate are primarily associated with the STP, along with limited activities by others, generally being non-aviation refuelling facilities and a warehouse structure with a substantial laydown area for vehicles, plant and equipment. It is possible that historical application of F1 Class Foams could have occurred at the non-aviation refuelling facility however no incidents are recorded that could be obtained from the airport operator or which Airservices personnel are aware of. Oily wastewaters are likely to be produced at the refuelling facility however the nature of the liquid waste capture system is unknown and the discharge and/or disposal location is uncertain.

11.4 FIRE TRAINING GROUND

The FTG is the only known location of AFFF application by Airservices within the Airport Estate and training activities occur on a frequent basis. The AFFF used by Airservices at the FTG was an F2 Class Foam (Ansulite), which was phased out as Airservices transitioned to an F3 Class Foam (Solberg RF6) in late 2010. Application of AFFF (prior to transitioning to Solberg in 2010) occurred at a frequency which met the legislative requirements of CASR and the international treaty obligations for ARFF Services at civil airport facilities.

The trade waste drainage system which captures liquids on the FTG concrete pad surrounding the LMU is directed through a preliminary treatment system before being directed to the wastewater rising main which extends between the MFS and STP. When training activities are not occurring, the system is designed to be

manually diverted so that stormwater run-off is directed to the Stormwater Holding Pond located to the north of the FTG via underground 150 mm diameter pipe. Inspections undertaken during the TSI confirmed the presence of the diversion valve and start of the drainage pipe (as shown on Figure 4C). However, underground service location inspections could not identify the outlet of the pipe, or that it was currently connected to the stormwater holding pond.

11.4.1 PFAS in Soils

Analytical results indicate PFAS is present in soils at the FTG and is comprised of short and long chain PFSA's and PFCA's along with fluorotelomer compounds. All soil samples had one or more PFAA and/or FTS compounds detected above the laboratory LOR, with a compound signature at all sample locations characterised by either PFOS or PFOA as the dominant compound and a smaller contribution (in general) of other PFAA's. The consistent occurrence of long chain PFSA's at the FTG suggests that one or more unknown sources of PFAS is contributing to the overall concentrations observed in soil, particularly considering that the only AFFF used by Airservices since it began operating at AYQ in 2004, was an F2Class Foam (Ansulite) known to primarily contain fluorotelemer substances and carboxylic acids with variable minor occurrences of PFSA's in some batches produced.

The analytical results observed at all sample locations were below the human health assessment criteria for a commercial/ industrial land use (HIL-D), and below the ecological direct exposure criteria of 1 mg/kg for PFOS.

Soils within the vicinity of the FTG have been delineated vertically in all locations with directions, with the exception of:soil bore SB25 where PFOS in the deepest sample analysed (0.4 – 0.5 mbgl) exceeded the ecological indirect exposure guideline of 0.01 mg/kg (0.228 mg/kg). However, soil bore SB37, located directly adjacent to this soil bore reported PFOS concentrations below the adopted ecological guideline in all three samples analysed including at 0.4 – 0.5 mbgl and the deeper sample of 0.9 – 1.0 mbgl.

Fourteen soil samples from nine soil bore locations (SB10, SB12, SB13, SB24, SB25, SB35, SB37, SB40 and SB41) exceeded the ecological indirect exposure guideline. Soils within the central and northern portion of the FTG were delineated laterally, however soils within the southern and southwestern portion this lease area (ie. SB10, SB24, SB25, SB37 and SB40), and south of the lease area (SB35 and SB41) have not been laterally delineated to below the Tier 1 ecological indirect exposure guideline. As outlined in Section 2.1.2 of Schedule B1 of the NEPM: "*Investigation and screening levels are not clean-up or response levels nor are they desirable soil quality criteria. Investigation and screening levels are intended for assessing existing contamination and to trigger consideration of appropriate site-specific risk-based approach or appropriate risk management options when they are exceeded*." These locations are shown in Figure 5C, Appendix A.

Leachable concentrations of PFOS exceeded all adopted assessment for ecological and human health receptors and PFHxS exceeded the Drinking Water guideline value and Freshwater 95% protection level at sample location SB25.

Despite the FTG being the primary area for direct application of AFFF by Airservices on the Airport Estate, soil samples exhibit concentrations (both total and leachable) which are considered unlikely to contribute to significant groundwater impact and this is supported by analytical results for groundwater monitoring well GW03 (as discussed in Section 11.4.4).

11.4.2 PFAS in Sediment

Accumulated sediments in the base of the main drainage sump within the FTG training pad (SS05) and in the base of the trade waste collection pits (Pit1_sed) were sampled to assess PFAS concentrations which may have accumulated in the FTG drainage system and could potentially act as a secondary source of impacts to wastewaters prior to discharge to the STP rising main (as shown in Figure 4C, Appendix A).

Samples of accumulated sediments which were collected at the FTG indicated that PFAS is present in these sediments comprising short and long chain PFSA's and PFCA's along with fluorotelemer compounds in the main drainage sump in the FTG training pad, with sediments in the trade waste collection pit characterised by long chain PFSA's, short and long chain PFCA's and long chain fluorotelemers.

Analytical results for these sediment samples contained measurable concentrations of PFAS however were reported by the laboratory at levels below the human health assessment criteria for a commercial/ industrial setting (HIL-D), and below the ecological direct exposure criteria and the adjusted ecological indirect exposure criteria, however as established in GHD, 2021, ecological screening criteria are of little relevance as porewater in sediment is the driver of ecological risk, not the sediment itself.

Sediment analytical results for PFAS post-TOPA indicate that the drainage sump in the FTG training pad (sample SS05) is unlikely to contain appreciable precursor compounds and this may be due to this drainage sump also receiving stormwater run-off from the concrete pad which is believed to be diverted to the stormwater holding pond when no activities are occurring at the FTG. It is noted that the exact location and end point of the diversion pipeline has not been able to be confirmed beyond the Airservices lease boundary (as shown in Figure 4C, Appendix A). The input of stormwater is anticipated to be maintaining aerobic conditions in the sump infrastructure which would mean that biotic and abiotic transformation process occur rapidly, and degradation of precursor compounds has already occurred.

In contrast the sediment sample collected in the trade waste collection pits (sample Pit1_sed) identified a substantial increase mostly in long chain PFCA compound concentrations as evident by an increase in Total PFAS concentrations between pre-TOPA and post-TOPA from 0.523 mg/kg to 6.1 mg/kg, respectively. It is evident that parent polyfluoroalkyl precursors are present in the trade waste pit sediments as this system operates in more anoxic conditions which may be limiting the degradation of PFAA precursor compounds.

11.4.3 PFAS in Trade Waste Drainage Waters

Water samples were collected from the drainage line within the FTG training pad, the trade waste collection pits (Pit1) and from the F3 Foam treatment system in both the anaerobic digestion tank (Pit2) and the aerobic finishing tank (Pit3). The analytical results for all samples were characterised by short and long chain PFSA's and PFCA's and fluorotelemer compounds and in general the dominant compound groups were PFCA's and fluorotelemers (mostly notably PFOA and 8:2 FTS), however also contained appreciable concentrations of long chain PFSA's, largely in the form of PFHxS and PFOS. As wastewater and washdown water run-off from the FTG training pad occurs frequently this indicates that PFAS discharging from this primary source via the drainage networks remains elevated.

Analytical results for the samples collected from trade waste drainage waters indicated that the drainage line from the FTG training pad (SS06) contained concentrations of PFHxS, PFOS and PFOA exceeding the Drinking Water guideline value and the Recreational Water guideline value, with PFOS also above the Freshwater 95% protection value. This sample also contained a Total PFAS concentration of 1,440 ug/L, however the persistence of levels such as this within the drainage line is uncertain. At the time of sampling no activities had occurred in the immediate period (i.e. <48 hours) prior to sample collection and as such the nature and source of the water at this sample location has not been confirmed, However, it is likely historic activities at the FTG may be a source of PFAS within the system and there remains the potential for materials (i.e. sediment) within the trade waste treatment system to absorb then desorb PFAS chemicals. Materials

within the trade waste systems can be addressed as part of a PFAS Management Plan for the site to manage and reduce and/or mitigate risk.

Samples collected from within the trade waste collection pits (Pit1) and the foam treatment system tanks (Pit2 and Pit3) contained concentrations of PFHxS, PFOS and PFOA exceeding the Drinking Water guideline value and PFOS also above the Freshwater 95% protection value. In contrast to Pit1, the concentrations for all compounds are orders of magnitude lower in the wastewater system and Total PFAS concentrations were measured at 31.0 ug/L in Pit 1, 25.4 ug/L in both Pit2 and Pit3. The concentrations identified indicate a reduced PFAS load is reporting to the trade waste system and foam treatment system which may be of greater concern in consideration of the stormwater diversion line which discharges to the stormwater holding pond south of the MFS.

Samples collected from FTG training pad run-off (WD01 and WD02) indicated concentrations of PFAS with a consistent compound signature to the samples from the wastewater collection pits, however the levels are significantly reduced compared to that of the water sampled from within FTG drainage line (SS06). Laboratory results indicate concentrations of PFHxS, PFOS and PFOA exceeding the Drinking Water guideline value and PFOS also above the Freshwater 95% protection value. This may potentially indicate that the run-off from the FTG training pad is, at all times, contributing to the PFAS load in the drainage line and reporting to the trade waste drainage or foam treatment systems. It should be noted however, that the sample method does not represent actual run-off conditions during rainfall events. The concentrations identified indicate a reduced PFAS load in washdown waters which, during training activities, would typically be diverted to the trade waste system and foam treatment system, however during rainfall events when the diversion valve is open to stormwater, this run-off may be of greater concern in consideration of the stormwater diversion line which discharges to a subsurface leach drain and infiltration trench located outside of the FTG lease area boundary.

Analytical results for PFAS post-TOPA which was carried out on these washdown samples indicate that total PFAS concentrations almost doubled in each sample and that parent polyfuoroalkyl precursors could lead to increase in long chain PFCA’s through degradation from biotic and abiotic transformation processes.

All results for the trade waste drainage water samples including washdown samples are provided in Table 4A and Table 4B, Appendix B.

11.4.4 PFAS in Groundwater

Groundwater monitoring well GW03 is the key location for assessing down-gradient PFAS impacts from the FTG. Concentrations of PFAS measured by the laboratory were characterised by short and long chain PFSA’s and PFCA’s with the concentration of PFHxS exceeding the Drinking Water guideline value. Considering the concentrations of all PFAA’s in the sediments and trade waste drainage waters, groundwater down-gradient of the FTG is only moderately impacted suggesting a relatively low contribution is potentially coming from direct release from leaking infrastructure and may possibly be more a factor of the PFAS leaching from soils and concrete within the FTG training pad and the surrounding unsealed ground.

It has previously been established in Section 11.2.3 that groundwater monitoring well GW02 located up-gradient of the FTG and down-gradient of the STP does not have elevated PFAS and therefore it is considered unlikely that impacted groundwater is flowing towards the FTG lease area. In addition to this, groundwater monitoring well GW05 located further down-gradient of both the FTG and stormwater holding pond is likely being contributed to, by combined inputs from the PFAS concentrations observed at the FTG and those leaching from sediment in the holding pond.

Groundwater monitoring analytical results are presented in Table 3A, Appendix B.

11.4.5 PFAS in Other Media Types

Assessment of PFAS concentrations in concrete and the associated risk is inherently complex and uncertain and there is no formally accepted standard for which this should be done. For the purposes of this TSI Tetra Tech Coffey have adopted human health assessment criteria for direct contact with concrete derived dusts, as defined in *Airservices PFAS Characterisation Assessment Criteria Derivation of PFAS criteria for sediment, concrete, asphalt and pore water* (GHD, 2021) The criteria that are established in GHD, 2021 as most appropriate for this exposure route are derived directly and unadjusted, from the current soil assessment criteria provided in the PFAS NEMP v2, 2020.

The EGVs selected in GHD,2021 for human health risk assessment of concrete derived dust are conservative Tier 1 screening criteria which are suitable for that particular exposure route only.

GHD, 2021 also suggests that for leaching from concrete to groundwater and/or surface water the current human and ecological protection criteria within the NEMP, 2020 may be adjusted to be less conservative based on the Dilution Attenuation Factor (DAF) established in US EPA, 1996 which adopts a standard DAF of 20. The adjusted assessment criteria for leaching from concrete have been applied in this TSI based on GHD, 2021 to assess potential for migration of PFAS (as a mass estimate in liquid phase) from areas of impacted concrete (as a secondary source of contamination). Leachate results are not used for the purpose of assessing risk for human health or ecological exposure in surface water and/or groundwater.

Leachable concentrations of PFAS in a concrete and a sediment pit sample at the FTG were reported below the C/A3: EGV *for leaching, discharge to surface water and primary contact recreation (swimming)*.

Leachable concentrations of PFAS in two concrete samples and one sediment pit sample (within the trade waste drainage system) exceeded the C/A6: EGV *for leaching, discharge to surface water and ecological food chain exposures*. However, reported analytical results were below the C/A5: EGV *for 95% species protection, leaching, discharge to surface water and direct ecological exposures.*

Leachable concentrations of PFAS in one concrete sample were reported exceeding the C/A2: EGV *for leaching to groundwater and potable use of offsite groundwater*. Leachable PFAS results in a sediment pit sample (i.e., infrastructure sample) was reported below the C/A2: EGV *for leaching to groundwater and potable use of offsite groundwater*.

PFAS in concrete samples collected (CC01 and CC02) at the FTG were reported below the EGV *for human exposure to concrete dust* (GHD, 2021).

11.4.6 Supplementary Results

All supplementary reported soil results were reported below the adopted human health investigation levels. Detectable concentrations of metals (chromium, copper, lead, nickel, and zinc) were reported above the LOR in several soil samples but below the adopted assessment criteria.

Impacts by petroleum hydrocarbons have been reported in infrastructure samples SS05_0.0-0.2 and Pit1_sed, collected from a drain and a pit at the FTG, at concentrations above the adopted assessment criteria for assessing risk to in-ground services by hydrocarbons (NEPM (2013) Management Limits), indicating the presence of Light Non-Aqueous Phase Liquid (LNAPL).

While exceedances of the ecological assessment criteria were reported in the infrastructure sediment samples SS05_0.0-0.2 and Pit1_sed, the site is considered to be in a commercial/ industrial setting and on-airport terrestrial fauna and flora is considered to be of low ecological value. Additionally, SS05 was collected from the bottom of the drain at the FTG in close proximity to the LMU and Pit1_sed was collected from a pit at the FTG, locations transient fauna is unlikely to come into contact with.

A report for underground service locating is not available, however, anecdotal evidence gathered from the field investigation and a phone call with the sub-surface utility locator on 20 April 2023 confirmed in-ground services are present within the FTG.

All supplementary groundwater results were reported below the adopted ecological investigation levels and below the adopted human health investigation levels, and/ or below the LOR.

All supplementary infrastructure water results were reported below the adopted human health investigation levels and/ or below the LOR.

11.5 MAIN FIRE STATION

Samples were collected in soils external to the MFS building, sediment and/or water in the trade waste drainage system and groundwater both up-gradient (GW06) and down-gradient (RN12065 and GW04) to determine whether diffuse PFAS impacts could be identified in, or nearby to, MFS infrastructure. RN12065 is the existing groundwater monitoring well location in which initial detection of PFAS occurred in 2019 (GHD, 2019) including PFHxS and PFOS above the laboratory detection limit, however at concentrations below the Freshwater 95% protection level and Drinking Water guideline value. Minor PFCA's and fluorotelemer compounds were also detected in RN12065, however have consistently been observed at low concentrations and are not considered of concern.

Results for soil and sediment sample analysis (including solid and leachate concentrations) are provided in Table 1a, Appendix B and results for PFAS post-TOPA are included in Table 1b, Appendix B. Groundwater sample analytical results are shown in Table 3a, Appendix B and Table 3b, Appendix B.

11.5.1 PFAS in Soils

Soil samples were collected across areas of natural ground surrounding the MFS building and hardstand to determine whether diffuse PFAS impacts in soil could be identified in close proximity to MFS infrastructure. Analytical results indicated that detectable concentrations of PFAS were present in these soil samples, generally at levels marginally above the laboratory LOR at all of the sample locations and at varying depths in the upper soil profile and provide evidence that PFAS concentrations decrease with depth within the upper 1 metre of the soil profile.

Concentrations were variably detected around the MFS consisting of short and long chain PFSA's and PFCA's and both short and long PFCA's, with PFHxS and PFOS detected in some samples and PFOA detected in almost all of the samples that were analysed. These PFAA compounds were all below adopted ecological and human health screening criteria. Based on these soil results it is considered that there is no evidence of direct or indirect risk to ecological receptors, and this is also the case for any human health receptors within this Lease Area.

The soil sample analysed from at SB19 from a depth 0.3 mbgl for PFAS post-TOPA indicated that only a moderate increase in PFCA's was observed and Total PFAS concentrations pre- and post-TOPA do not show an appreciable difference. This suggests that limited parent polyfluoroalkyl precursor compounds in these soils and future risk from PFAS in soils at the MFS is predicted to remain low.

Leachate analysis conducted on the surface sample collected at SB19 indicated that, despite relatively low concentrations in the solid soil media, PFOA was leachable at concentrations exceeding the Drinking Water guideline value. Other PFSA's and PFCA's measured in leachate extraction on this sample indicated levels only marginally above the laboratory LOR. There is the possibility that this could be considered to have the potential to cause elevated PFOA in groundwater however as detailed in the Section 11.5.4 groundwater samples collected down-gradient of the MFS do not support this.

11.5.2 PFAS in Sediment

Accumulated sediments were sampled in drainage and sediment capture areas adjacent to the MFS trade waste treatment system and the former Ansulite storage tank located on the north-western side of the MFS building. Analytical results reported by the laboratory indicate these sediments contain minor concentrations of PFSA's (in the form of PFOS) and short and long PFCA's, with the long chain compounds being dominant in all samples). Sediment samples also indicated the presence of fluorotelemer compounds (primarily 8:2 and 10:2 FTS).

PFAS analysis post-TOPA indicates a noticeable increase in PFCA's and Total PFAS in SS08 which suggests that sediments adjacent to the former Ansulite storage tank contain considerable precursor compounds. This indicates that in the vicinity of the former Ansulite storage tank, minor product releases or spills are likely to have occurred during refilling of the storage tanks or transfer of AFFF to ARFF vehicles. The PFAS signatures both pre- and post-TOPA are consistent with that expected from the storage and use of F2 Class Foams, however at the concentrations observed these impacts are unlikely to present any appreciable risk to ecological or human health receptors.

11.5.3 PFAS in Trade Waste Drainage Waters

Water reporting to the trade waste drainage system located on the north-western side of the MFS building were collected from drainage sumps within the MFS garage where vehicle and equipment washdown occurs. Sample SS07 collected in the garage drain indicated that long chain PFSA's (predominantly PFOS) and short and long chain PFCA's (predominantly PFOA, PFDA and PFNA).

PFOS concentrations were measured in SS07 at 0.33 ug/L, exceeding both the Freshwater 95% protection level and the Drinking Water guideline value and PFOA was measured at 1.36 ug/L which exceeds the Drinking Water guideline value.

The PFAS signature in this sample are inconsistent with results obtained for other types of sample media at the MFS and indicate an additional source contribution to water in the drain and which discharges to the trade waste drainage system at the MFS, and based on the plans in Appendix J, the drain may be influenced by potential inputs most likely associated with sewage wastewaters and/or greywaters containing high levels of surfactants. The MFS hydraulic services design drawing (H05) included in Appendix J show that wastewater from ablution facilities, the kitchen and the maintenance room all discharge from the MFS along a common drainage line and the drainage sump from which sample SS07 was collected appears to be hydraulically connected to this common drainage line.

11.5.4 PFAS in Groundwater

Groundwater sample analytical results indicated that up-gradient of the MFS (GW06) concentrations of PFAS were present flowing towards the Lease Area and predominantly consisted of short chain PFSA's with PFHxS exceeding the Drinking Water guideline value. RN12065 immediately down-gradient, and the location of initial PFAS detection in 2019, indicated laboratory analytical results during Phase I and Phase II TSI works which are largely consistent with those measured in 2019. PFAS results at this monitoring well remain low and are well below any adopted ecological or human health screening criteria. Further down-gradient, PFAS in groundwater at GW04 confirmed that minor detection of PFAS marginally above the laboratory LOR may be present, however almost all compounds in the PFAS suite were measured below the detection limit.

The results in groundwater suggest that no appreciable source of PFAS is present in soils, sediments or the trade waste system that could result in PFAS migration away from the MFS Lease Area on to the Airport Estate. No further consideration of PFAS within the MFS Lease Area is considered necessary.

11.5.5 Supplementary CoPC Results

All supplementary reported soil and sediment results (including from the drainage channel and dam located near the MFS) were reported below the adopted human health investigation levels. Detectable concentrations of metals (chromium, copper, lead, nickel, and zinc) were reported above the LOR in several soil and sediment samples but below the adopted assessment criteria.

While exceedances of the ecological assessment criteria were reported in the infrastructure water sample SS07, the site is considered to be in a commercial/ industrial setting and SS07 was collected from a drainage pit within the MFS building, a location transient fauna is unlikely to come into contact with. Further to this, it is considered unlikely that off-airport migration of contamination from surface water runoff across the external concrete pad would occur at this location based on the following factors:

- Yulara is situated in arid Central Australia where rainfall is low and unpredictable.
- High evaporation rates experienced in the area mean water collected in drains dry up after the rain has stopped.
- Additionally, the depth to groundwater is approximately 9-12 mbgl, indicating the low potential for surface water impacts to migrate to groundwater.

All supplementary groundwater results were reported below the adopted ecological investigation levels and below the adopted human health investigation levels, and/ or below the LOR.

11.6 STORMWATER DRAINAGE AND HOLDING POND

Sediment within the constructed stormwater drainage swale running parallel to the runway and then in a south-westerly alignment, passing the MFS to the stormwater holding pond located approximately 120 metres south of the MFS building, was sampled at two (2) locations along the swale drain and three (3) locations within the holding pond (Figure 5B, Appendix A).

The analytical results are interpreted and discussed in detail in Section 11.6.1 below.

11.6.1 PFAS in Sediment

As shown in Figure 2 the main stormwater drainage swales are designed to direct stormwater runoff towards the stormwater holding pond where infiltration through the soil profile to groundwater occurs.

Laboratory analytical results for surface samples of accumulated sediment collected along the swale drain alignment and within the stormwater holding pond indicated that PFAS was present in these drainage sediments consisting long chain PFCA’s, together with long chain PFSA’s plus minor 8:2 FTS.

PFOS concentrations at the sample location upstream of the MFS (SS04) were measured at a level exceeding the ecological indirect guideline value for soil and downstream of the MFS (SS03) marginally below that level. This indicates an input of PFSA’s to the stormwater drainage system which may be from a source other than Airservices operations, however at this point in time it is uncertain what this source is or whether there is also a contribution from ARFF activities. As noted in Section 11.2.2 it was established in GHD, 2021 that assessment criteria for soil are of little relevance as porewater in sediment is the driver of ecological risk, not the sediment itself.

Results for PFOS in the stormwater holding pond were consistent with the drainage alignment concentrations, although sample location SS02 was greater than those reported at all other locations and the calculated concentration of Total PFAS was an order of magnitude higher. Increased concentrations within the holding pond are not unexpected as this represents an end-point for drainage flow and accumulation of sediments.

Leachable concentrations of PFAS in sediment collected at SS02 indicated a consistent PFAS signature with solid soil media results, with PFOS measured at a level in excess of the Freshwater 95% protection value and

Drinking Water guideline vale at 1.72 ug/L which is only marginally below the Recreational Water guideline value. This suggests that concentrations leaching to groundwater could potentially result in impacts being present dependent on the level of attenuation as PFAS migrates through the unsaturated zone soils.

PFAS analysis post-TOPA shows a notable decrease of Total PFAS at SS02 and a moderate increase in concentration at SS03 indicating that limited parent polyfluoroalkyl precursors are present in the drainage swale system, however, this infrastructure should be affected by both biotic and abiotic transformation process which are likely to have degraded most precursors to the terminal compounds (primarily being PFOS and PFOA) as can be seen by the current concentrations measured pre-TOPA being largely consistent with post-TOPA results.

The interpreted risk profile of these PFAS impacts in sediment in the stormwater drainage system, as outlined in the SPR linkage assessment and CSM in Section 10.4, indicates that due to the highly sporadic and ephemeral nature of the stormwater drainage system it is not considered to represent a freshwater ecosystem which could sustainably support ecological receptors and therefore there is no plausible pathway for contaminant migration which could lead to a relevant exposure route. Leaching and vertical migration to groundwater could possibly occur from these sediments however any impacts in groundwater as a result would be considered limited and there is no exposure route for human health receptors as established in earlier sections of this TSI report and outline in the CSM.

11.6.2 PFAS in Groundwater

Groundwater monitoring well GW05 is located down-gradient of the stormwater holding pond and could potentially be affected by a contribution of leaching from holding pond sediment sediments along with possible migration from the FTG.

The risk profile related to PFAS in groundwater at GW05 is considered to be negligible and no exposure route was established in the CSM based on the following:

- The recorded lithology as shown in the monitoring well construction logs presented in Appendix C indicate that the upper 3 metres of the profile is relatively low permeability silty sands which is then underlain by a moderately cemented conglomerate of low permeability and highly cemented sandstone formation of low to very low permeability and most probably semi-confining with regards to aquifer transmissivity. These low to very low permeability units hosting the upper aquifer are anticipated to reduce the potential for migration of PFAS in groundwater resulting in source areas generally being isolated from one another causing the absence of comingled plumes on the Airport Estate.

Even though GW05 is located down-gradient of the drainage infrastructure the impacts in groundwater are expected to be limited in spatial extent and there is no groundwater abstraction for any purpose in the immediate vicinity of this monitoring well location. Groundwater occurs at a depth of approximately 10 mbgl and as such is not expressed at the ground surface or supporting any groundwater dependent ecosystems (GDEs). As a result, the SPR linkage assessment and updated CSM in Section 10.4 has established that no plausible risk is present to human health or ecological receptors.

11.7 DELINEATION WELLS AND OFF-AIRPORT UPGRADIENT WELLS

Phase I TSI works included the sampling and analysis of existing off-airport up-gradient groundwater bores RN012163 and RN12081 located approximately 600 metres south-east and 1 km south, respectively, of the Airport Estate boundary.

Following the results obtained for the Phase I TSI works it was established that PFAS in groundwater was not delineated and, as part of the Phase II TSI works, an additional five (5) on-airport monitoring wells were installed, intended to act as delineation wells in all four directions.

11.7.1 PFAS in Groundwater

The existing off-airport up-gradient groundwater bores and the delineation monitoring wells positioned up-gradient and cross-gradient of all airport infrastructure (GW07, GW09 and GW10) reported concentrations of PFAS below all adopted assessment criteria.

GW11 however indicated laboratory analytical results characterised by short and long chain PFSA's and PFCA's with concentrations of PFHxS and PFOS (and its sum) exceeding the Freshwater 95% protection level of 0.13 µg/L for PFOS and the Drinking Water guideline value of 0.07 µg/L. PFCA compounds were dominated by PFHxA and in general consisted of more short chain PFCA's as opposed to long chain PFCA's.

Groundwater monitoring well GW11 is in the north-western portion of the airport (near the end of the runway) and is outside of the operational areas on the Airport estate including Airservices Lease Areas. The results obtained at this location were unexpected based on no known evidence of any activities that could have contributed to PFAS impacts in groundwater, particularly those characterised by long-chain PFSA's. The detection of elevated PFAS at this location is from an unknown source and exhibits a compound signature of short and long-chain PFSA's and PFCA's which are isolated from other SZA's. Furthermore, the concentrations of PFAS (notably PFOS and sum of PFAS) in groundwater at GW11 is higher than that reported at GW08, the latter of which was located within the IFS indicating a sustained and ongoing source of PFAS would have been required within the vicinity of GW11 for such concentrations to be maintained.

Delineation of PFAS impact has been achieved within close proximity, up-gradient, down-gradient and cross-gradient of all SZA's, however broad scale delineation has not been achieved in the down-gradient direction at GW11. The PFAA compound signature at GW11 suggests that an additional unknown source of PFAS in groundwater (and possibly soils) is likely to be present towards the north-western end of the airport runway. The source of impact is possibly inconsistent with a contribution solely from F2 Class Foams and it is considered that an uncertain source consisting short-chain PFSA's is the key contributor to PFAS impacts in this area.

As the rate of PFAS migration across the airport estate is considered to be limited based on the arid zone climate and episodic rainfall which is characteristic of the region, along with the identified lithology of the unsaturated zone soils and superficial aquifer formation, and the expected seepage velocity or transmissivity of the aquifer, it is considered that PFAS impacts at GW11 are discrete and cannot be contributed to any known on-airport land uses and/or any Airservices activities undertaken since it commenced provision of ARFF Services at AYQ in 2004. Further investigation as to the source of the impact would be required including, but not limited to, an investigation into the history of the disturbed soil visible in the aerial photograph approximately 200 m south west of GW11 (as can be seen in Figure 6A, Appendix A).

Groundwater abstraction does not occur for any purpose within the Airport Estate boundary, and it has been established through multiple sources and via multiple lines of evidence that groundwater abstraction down-gradient off-airport to the north and/or north-west does not occur for any purpose. Registration of groundwater bores is not mandatory by NT Government however none have been identified, groundwater salinity is not considered suitable to support potable uses without significant treatment, and there are no indigenous communities or permanently established infrastructure down-gradient of the airport inclusive of any abstraction and treatment systems at the Tali Wiru Dinner site. Groundwater expression at surface is reported to be extremely rare (CLC, 2015) and groundwater is not discharged or expressed at any surface water bodies as these are entirely absent between the Airport Estate boundary and Lake Amadeus more than 25 kms to the north, north-west.

12. DATA GAP ASSESSMENT

In total nine (9) existing data gaps were identified; five (5) data gaps from the Phase 1 investigation (Tetra Tech, October 2022) and four (4) data gaps from the supplementary Phase 2 SAQP (Tetra Tech, December 2022) and were considered as requiring further investigation to refine the existing CSM for Airservices lease areas. The findings from the investigations have been used to address the objectives of the TSI and update the status of the data gaps, as discussed below.

12.1 DATA GAPS FROM THE PHASE 1 INVESTIGATION

Data Gap 1: There is insufficient information on CoPC impacts to soil at the MFS, IFS, FTG and STP to confidently characterise extent and risk, or assess compliance with Airservices's regulatory requirements.

111 primary soil samples collected from 56 soil investigation locations were analysed for PFAS. This included samples collected and analysed from the following SZA's.

- 14 soil samples, six (6) sediment samples and three (3) trade waste drainage sediment samples were analysed from the MFS Lease Area.
- 34 soil samples and two (2) sediment samples were analysed from the IFS, STP and STP Seepage Field and the stormwater drainage swale immediately north of the seepage field.
- 56 soil samples, two (2) trade waste drainage sediment samples and two (2) concrete samples were analysed from the FTG area.
- 11 new monitoring wells were installed at AYQ (within the Airport Estate), which included collection and analysis of seven soil samples during the drilling process.
- Additionally, 11 soil samples, three (3) stormwater drainage sediment samples, one (1) trade waste drainage sediment sample and two (2) concrete infrastructure samples underwent leachability analysis using the Australian Standard Leaching Procedure method.

Soil samples were primarily collected from each sampling location at depths of 0.0 mbgl (surface), 0.5 mbgl and 1.0 mbgl. Additional soil samples were collected at depths of 2.0 mbgl and 3.0 mbgl at selected locations. This data has assisted in characterising the vertical and lateral extent and nature of PFAS impacts within the SZA's.

Exceedances of the ecological indirect exposure were reported from the IFS and MFS areas, and exceedances were reported of the adjusted ecological indirect exposure criteria for the FTG area only. No exceedances of the ecological direct exposure criteria or the adopted human health criteria were reported at any of the SZA's.

No exceedances of the EGV for human exposure to concrete dust, discharge to surface water and primary contact recreation (swimming) and for 95% species protection direct ecological exposures (GHD, 2021) were reported. The EGVs (GHD, 2021) for assessing risk via leaching to groundwater and potable use of off-site groundwater and ecological food chain exposures were exceeded for leachable concentrations of PFAS in one concrete and one sediment sample collected from the FTG.

Leachable concentrations of PFAS were reported exceeding the ecological assessment criteria, the recreational water value, and the drinking water value.

Based on the analytical data obtained as part of the Phase I TSI works, this data gap is considered **closed.**

Data Gap 2: There is insufficient information on CoPC impacts to the drainage channels which flow to a dam located to the south-west of the fire station, to assess compliance with Airservices's regulatory requirements.

Six (6) sediment samples were collected and analysed from five (5) sampling locations within the drainage channel and water dam that are located south-west of the MFS. Two sediment samples underwent leachability analysis using the ASLP method. Samples were generally collected from the surface, and at depths of 0.5 mbgl and 1.0 mbgl at SB44 to assist with characterisation of the vertical extent (if necessary) of PFAS impact in this area.

PFAS results for the sediment samples were reported below the human health assessment criteria for a commercial/ industrial setting (HIL-D) and below the ecological direct exposure criteria. Exceedances of the ecological indirect exposure were reported. Leachable concentrations of PFAS were reported below the recreational water value but exceeded the ecological assessment criteria and the drinking water value.

Based on the analytical data obtained as part of the Phase I TSI works, this data gap is considered **closed.**

Data Gap 3: Current analytical data does not cover secondary potential CoPCs.

Laboratory analysis for the following secondary potential COPCs was completed during the Phase 1 site investigation and data gaps were not identified.

- For soil samples, TRH, BTEXN, PAHs, MAHs, metals, VOCs, OCPs, OPPs, cyanide, chlorinated hydrocarbons, solvents, and herbicides were assessed. All supplementary reported soil results at SZA including the MFS, FTG and IFS (including the STP and seepage field) were reported below the adopted human health and ecological investigation levels.
- For groundwater samples, TRH and BTEXN were assessed. All supplementary groundwater results were reported below the adopted human health and ecological investigation levels.
- For sediment samples, TRH, BTEXN, PAHs and metals were assessed. All supplementary reported sediment results were reported below the adopted human health and ecological investigation levels.
- For water infrastructure samples, TRH, BTEXN, PAHs, MAHs, metals, VOCs, chlorinated hydrocarbons, and solvents were assessed. All supplementary COPC results were reported below the adopted human health and ecological investigation levels.
- For solid infrastructure samples, TRH, BTEXN, PAHs, MAHs, phenols, metals, VOCs, OCPs, OPPs, cyanide, chlorinated hydrocarbons, solvents, and herbicides were assessed. All supplementary reported infrastructure sediment results were reported below the adopted human health and ecological investigation levels, except for samples SS05_0.0-0.2 and Pit1_sed.

Impacts by petroleum hydrocarbons have been reported in infrastructure samples SS05_0.0-0.2 and Pit1_sed, collected from a drain and a pit at the FTG, respectively, at concentrations above the adopted assessment criteria for assessing risk to in-ground services by hydrocarbons (NEPM (2013) Management Limits), indicating the potential for degradation of subsurface infrastructure. While exceedances of the ecological assessment criteria were reported in the infrastructure sediment samples SS05_0.0-0.2 and Pit1_sed, the site is considered to be in a commercial/ industrial setting and on-airport terrestrial fauna and flora is considered to be of low ecological value. Additionally, SS05 was collected from the bottom of the drain at the FTG near the LMU and Pit1_sed was collected from a pit at the FTG, locations transient fauna is unlikely to come into contact with.

Based on the analytical data obtained as part of the Phase I TSI works, this data gap is considered **closed.**

Data Gap 4: Source and distribution of contamination in groundwater is not known.

Six (6) new monitoring wells were constructed at AYQ (within the airport premises), gauged, and sampled for PFAS. This included installing monitoring wells upgradient and downgradient and within the Airservices Lease Areas (specifically the monitoring well within the Lease Areas was located at the IFS). Additionally, three (3) existing wells located on, and off-airport were gauged and sampled for PFAS. A total of nine (9) monitoring wells (including existing on-Airport and off-Airport locations) were sampled during the Phase I sampling event.

PFAS results in all groundwater samples collected were reported below the Freshwater 95% protection value and the PFAS NEMP Recreational Water guideline value. Exceedances of the PFAS NEMP Drinking Water guideline value were identified at wells GW01 and GW05 during the Phase I sampling event.

The source of contamination in groundwater has not been fully established in relation to PFAS impacts up-gradient or down-gradient of Airservices occupied areas and/or infrastructure that may potentially be affected by Airservices operations.

Based on the analytical data obtained as part of the Phase I TSI works, this data gap was considered to remain **open.**

Data Gap 5: Hydrogeological regime and future change may impact the risk posed by contamination from the airport on users of groundwater.

The following findings from the TSI support a further understanding of the hydrogeological model of AYQ.

- 11 new monitoring wells were constructed at AYQ (within the airport premises), gauged, and sampled for PFAS. This included installing upgradient wells, downgradient wells, boundary wells and one well within the Airservices lease areas (specifically at the IFS area). Additionally, 3 existing wells located on, and off-airport were gauged and sampled for PFAS.
- Bore logs indicate that the site was underlain by the Quaternary aged aeolian sand plains and sand dune deposits, and an unconfined quaternary aquifer was encountered, which was made up of fine to medium cemented sand.
- No evidence of perched aquifers was encountered during the soil and groundwater investigation at AYQ.
- The groundwater elevation at AYQ ranged from 481.1 m RL (GW11) to 482.9 m RL (GW01) during the 2023 investigation.
- During development of groundwater wells (GW08, GW09 and GW11) the recharge rate was considered slow (i.e., the wells were bailed dry and in each case it took several minutes for groundwater to recharge into each of these wells).
- Field assessed TDS results indicate a range between 540 mg/L and 2,999 mg/L for wells monitored during the 2023 investigation. We note that according to the 2023 field assessed TDS results, the TDS of the groundwater recorded from four monitoring wells was less than 1,000 mg/L (GW03, GW06 and GW09; located nearest the MFS, and GW11) but generally the majority of monitoring wells reported a TDS between 1,000 mg/L and 3,000 mg/L which is consistent with the Dune Plains Aquifer Modelling report (CloudGMS, 2019).
- The inferred groundwater flow direction was to the north/ north-west, based on standing water levels from the 2023 investigation. The inferred groundwater flow is consistent with findings from the Phase I TSI works conducted in June 2022.
- The seepage velocity for AYQ was calculated at approximately 5.25×10^{-5} to 1.05 m/year. The reported yield of <1 L/s at the northern end of the Dune Plains Aquifer (CloudGMS, 2019) suggests the likely seepage velocity is at the lower end of the range stated above.
- Surface water flow across the Airport Estate is directed along both natural and constructed flow paths which are influenced by an aeolian dune system predominantly aligned in a north-east – south-west orientation, with the most notable dune features evident towards the western end of the runway. Constructed drainage swales and culverts have been installed parallel to the main taxiway and aircraft apron which ultimately flow to a stormwater holding pond just south-west of the ARFFS fire station. Surface flow and drainage from the runway is directed away from this infrastructure and there is evidence of localised and isolated drainage features designed to capture and control sheet flow in large rainfall events.
- A constructed stormwater drainage system diverts surface water away from the ARFFS fire station towards the stormwater holding pond located to the south-west of the ARFFS fire station. Wastewater

generated at both the ARFFS fire station and FTG is directed through a coalescing plate separator before being pumped into the airport's sewer system.

Based on the analytical data obtained as part of the Phase II TSI works, this data gap is considered **closed.**

12.2 DATA GAPS FROM THE PHASE II INVESTIGATION

Data Gap 1: Levels of PFAS in soil remain undelineated (to criteria) south and west of the FTG (laterally and vertically to the south, and vertically to the west).

56 soil samples were analysed from the FTG area which included samples collected at depths including at 0.0 mbgl (surface), 0.5 mbgl and 1.0 mbgl. Additional soil samples were collected at depths of 2.0 mbgl and 3.0 mbgl at selected locations. This data assisted in the characterisation of the vertical and lateral extent and nature of PFAS impacts at the FTG.

PFAS was reported above the LOR in all soil samples collected within the FTG area, with all samples reporting analytical results below the human health assessment criteria for a commercial/ industrial setting (HIL-D). All soil samples were reported below the ecological direct exposure criteria of 1 mg/kg for PFOS. Concentrations of PFOS ranged from <0.0002 to 0.370 mg/kg across all soil sampling locations (21 sampling locations in this SZA).

Soils within the vicinity of the FTG have been delineated laterally and vertically in all directions, except to the south based on the ecological indirect criteria being exceeded at four locations (SB25, SB35, SB40 and SB41).

Seven soil samples exceeded the ecological indirect exposure assessment criteria of 0.01 mg/kg for PFOS.

Based on the analytical data obtained as part of the Phase II TSI works, this data gap is considered **to remain open.** An ecological risk assessment in the FTG area would determine if the exceedances of the Tier 1 ecological guidelines constitute an actual risk to the indirect ecological receptors and subsequently if the area has been adequately delineated to below risk-based guidelines in that area.

It should be noted that active management or small-scale remediation of shallow soils at isolated areas in the FTG may be warranted.

Data Gap 2: Infiltration from stormwater and sewerage features not quantified at the stormwater dam and near the FTG wastewater holding tanks.

Refer to **Data Gap 1** above (Section 12.2) and **Data Gap 2** (Section 12.1).

This data gap is considered **closed.**

Data Gap 3: Insufficient soil data to characterise the source of observed groundwater impact around the STP.

Seven soil samples were collected and analysed from three soil sampling locations within the area around the STP. Three soil samples underwent leachability analysis using the ASLP method. Samples were generally collected from the surface, and at depths of 0.5 mbgl and 1.0 mbgl to assist with characterisation of the vertical extent of PFAS impact in this area.

All PFAS results for the soil samples analysed were either reported below the LOR or at concentrations below the human health assessment criteria, the ecological direct exposure criteria, and the ecological indirect exposure. Leachable concentrations of PFAS were reported below the recreational water value, the ecological assessment criteria, and the drinking water value.

Based on the analytical data obtained as part of the Phase I and Phase II TSI works, this data gap is considered **closed.**

Data Gap 4: Extent of contamination in groundwater to criteria is not known.

Refer to **Data Gap 4** above (Section 12.1).

Based on the analytical data obtained as part of the Phase I and Phase II TSI works, this data gap was considered to remain **open.**

12.3 RESIDUAL OR NEW DATA GAPS

The data collected to date provides a comprehensive understanding of the contamination status of soils, sediments, and waters within the Airservices Lease Areas and at specific other areas within the Airport Estate, with PFAS impacts in soil generally suggesting a low mass is present for any ongoing contribution to groundwater impacts.

Impacts in groundwater appear to be largely a function of PFAS contamination in sediments above acceptable levels in the stormwater drainage swales and holding pond which may represent preferential pathways for contaminant transport and potential migration to the water table. The PFAS concentrations in groundwater surrounding the SZAs, along with the STP and PFAS concentrations observed at GW11, suggest there is a high likelihood that up to three separate PFAS groundwater plumes are present within the Airport Estate with the only SZA derived plume attributable to Airservices operations is the current Airservices Lease Area associated with the FTG.

Based on the findings of the two phases of investigation works undertaken for this TSI it is considered plausible that the STP is a key contributor to PFAS impacts in groundwater and historical incidents, events and/or infrastructure not associated with Airservices could be the source of the PFAS occurrence observed at GW11.

Based on the above, residual, or new data gaps relevant to Airservices Lease Areas identified at the completion of this TSI include the following:

- The extent of PFAS contamination in groundwater up-gradient of Airservices Lease Areas and potentially migrating north-west from the STP require further consideration with assessment potentially through additional testing of inflows and outflows, ongoing groundwater monitoring at GW01, GW07 and GW08 and increased certainty regarding STP operation/maintenance and historical overflow or uncontrolled discharge events.
- The source and extent of PFAS in groundwater at GW11 has not been established however is clearly isolated from Airservices operations and/or any other (currently) known on-airport activities. Whilst the source of these impacts is uncertain, this TSI has clearly established that there is no plausible risk to receptors both on-airport and off-airport.
- Concentrations of PFSA compounds identified across the areas investigated as part of the Phase I and Phase II TSI works are not characteristic of those observed solely from the use of F2 Class Foams (Ansulite). The source of short and long chain PFSA’s such as PFHxS and PFOS which have been established to be entering the constructed stormwater drainage swale network and holding pond, along with the possible non-Airservices related inputs of PFAS containing products and/or wastewaters to the FTG should be further investigated to understand external sources of these compounds.

13. CONCLUSION

This TSI at Ayers Rock Airport was undertaken as part of the Airservices PFAS Characterisation Program and to address the requirements of the Section 48 Notice issued by the NT EPA to VITA in December 2021. The focus of this program was to conduct investigations to further understand the magnitude and extent of any potential PFAS contamination resulting from Airservices current and historical operations at Ayers Rock Airport, Northern Territory.

The overarching objective of this TSI was to collect and interpret a scientifically robust data set related to the presence of PFAS impacts (and other relevant contaminants) and through review of available information, determine whether a potential risk of exposure to sensitive receptors is present based on concentrations of contaminant compounds that may exceed applicable screening criteria.

The S48 Notice requirements specified that the TSI must undertake a sufficient degree of site investigation, at and beyond Airservices occupied areas, such that an appropriate risk assessment can be completed.

The following technical objectives were the key investigation drivers to meet the requirements of the Section 48 Notice:

- Understanding activities undertaken by or in any way associated with Airservices activities at the premises, including ARFF and related training activities, since Airservices began its occupation of the Airservices Lease Areas within the premises.
- Understanding activities conducted on or impacting Airservices lease areas, by Northern Territory Police, Fire and Emergency Services (NTPFES) and Yulara Volunteer Firefighters prior to Airservices occupation of the lease areas.
- Appraising the types, amount, distribution and mobility of contaminants and waste, including but not limited to PFAS present in the environment from activities undertaken by Airservices activities within the premises.
- Appraising the nature and extent of contamination at and beyond the Airservices occupied areas, to a sufficient degree that an appropriate level of risk assessment may be undertaken and, if necessary, providing the basis for the development of an appropriate management strategy.

The TSI was implemented in two phases, with the first phase conducted in June 2022 and the second in January and February 2023. This TSI report presents the data from both phases of the investigation and provides detailed interpretation and discussion to inform a tier 1 risk assessment and refine the conceptual site model to assess any actual or potential risks to identified receptors (if any).

Laboratory analytical results obtained over Phase I and Phase II of the site investigation works indicate the following:

- Soil analytical results for PFAS were reported above the laboratory Limit of Reporting at the Main (Current) Fire Station, Interim Fire Station, Fire Training Ground and in soil collected from the locations of monitoring well installations. The only exceedances of the assessment criteria were reported at the Fire Training Ground, with exceedances predominantly in the southern portion and south of the lease area exceeding the ecological indirect exposure criteria and thereby, in accordance with the NEPM, triggering consideration of a site-specific risk-based assessment such as a Tier 2 ecological risk assessment.
- Leachability testing for Per- and Poly-Fluoroalkyl Substances from soils reported concentrations above:
    - the PFAS NEMP Freshwater 95% guideline value at the Interim Fire Station, Fire Training Ground and Sewage Treatment Plant,
    - the PFAS NEMP Recreational Water guideline value at the Fire Training Ground, and the
    - NEMP Drinking Water guideline value at the Main Fire Station, Interim Fire Station, Fire Training Ground and Sewage Treatment Plant.

It is noted that the concentrations from the leachability testing are inferred to represent 100 years of leaching in a landfill, and not necessarily representative of actual concentrations of contaminants that may leach under 'normal' conditions.

- Exceedances of the PFAS NEMP Drinking Water guideline value in groundwater were reported at the Sewage Treatment Plant, Interim Fire Station, Fire Training Ground and down-gradient delineation well location (GW11). Given this, prohibition on consuming groundwater sourced from the airport estate is recommended. Additionally, the PFAS NEMP 95% Freshwater guideline value was also exceeded at the Interim Fire Station and at down-gradient delineation well location GW11.
- Exceedances of the PFAS NEMP Ecological Indirect Exposure guideline value were identified in sediment samples collected from the drainage channel near the Interim Fire Station and Sewage Treatment Plant seepage spray field and from the drainage channel and stormwater holding pond near the Main Fire Station. Leachability testing for Per- and Poly-Fluoroalkyl Substances in sediments reported concentrations above:
  - PFAS NEMP Freshwater 95% at the Main Fire Station, Interim Fire Station and Sewage Treatment Plant,
  - PFAS NEMP Recreational Water guideline value at the Interim Fire Station and Sewage Treatment Plant, and the
  - PFAS NEMP Drinking Water guideline value at the Main Fire Station, Interim Fire Station and Sewage Treatment Plant.
- PFAS in sediment samples collected from pits and concrete samples was measured below the adopted assessment criteria. The C/A2: Environmental Guideline Value for leaching to groundwater and potable use of offsite groundwater and C/A6: Environmental Guideline Value for leaching, discharge to surface water and ecological food chain exposures were exceeded for leachable concentrations of PFAS in concrete. The C/A6 was also exceeded for leachable concentration of PFAS in a pit sediment sample.
- A water sample collected from the garage drain at the Main Fire Station exceeded the PFAS NEMP drinking water guideline value and the 95% Freshwater guideline value. Exceedances of the PFAS NEMP Freshwater 95% guideline values, Recreational Water and Drinking Water guideline values were reported in water samples collected from pits and drains at the Fire Training Ground. PFAS concentrations in the effluent sample from the Sewage Treatment Plant exceeded the PFAS NEMP Freshwater 95% guideline value and the Drinking Water guideline values.
- In general, groundwater samples did not show a material change in total fluorinated compound concentrations pre and post Total Oxidisable Precursor Assay, whereas samples collected in wash bay drainage at the Main Fire Station, sumps at the Fire Training Ground and effluent from the Sewage Treatment Plant indicated that precursor compounds could primarily form carboxylic acid compounds and, in some cases could form minor sulfonic acid compounds, consistent with use of Ansulite in Airservices operations at the Airport.

The Source-Pathway-Receptor linkages established in the revised CSM indicate that only one potentially complete pathway and exposure route is present in relation to intrusive maintenance workers within the wastewater drainage system at the Fire Training Ground, and it is considered that the potential risk of exposure via incidental ingestion can be controlled through an appropriate Health and Safety Management Plan which applies to any intrusive maintenance within the Airservices Lease Areas. Indirect ecological receptors have also been identified as a potential risk within and south of the FTG, however further investigation (such as a Tier 2 ecological risk assessment) is required to determine if there is an identified risk from the low level PFAS concentrations in soil identified in this area.

Following the completion of the Targeted Site Investigation, a review of the initial data gap assessment established that two existing data gaps which formed the Data Quality Objectives remain open. The data gaps include:

- Groundwater impacts identified at both the STP and the location of GW11, and
- The extent of PFAS impacts in soils that may potentially present a risk to receptors (via indirect exposure to ecological receptors) has not been fully defined.

New or residual data gaps have been developed in consideration of the results obtained at the time of completion of this TSI, as follows:

- The source and extent of PFAS in groundwater up-gradient of Airservices Lease Areas and the Sewage Treatment Plant require further consideration through further testing of inflows and outflows, ongoing groundwater monitoring at GW01, GW07 and GW08 and increased certainty regarding Sewage Treatment Plant inputs, system maintenance and historical overflow or uncontrolled discharge events.
- The source and extent of Per- and Poly-Fluoroalkyl Substances in groundwater at GW11 has not been established. The source of these impacts is currently uncertain as there are no currently known sources of PFAS in the vicinity of GW11, and Airservices operations were at least 1 km distant from the impacted well. Groundwater sample results between the Airservices operations and the impacts at GW11 are also not indicative of groundwater transport to this location. Additional sampling and analysis of this monitoring well should be undertaken in order to confirm the presence and appraise the potential source of impacts at GW11 with a higher degree of certainty.
- Concentrations of PFSA compounds identified across the areas investigated as part of the Phase I and Phase II TSI works are not characteristic of those observed solely from the use of F2 Class Foams (Ansulite). The source of short and long chain PFSA's such as PFHxS and PFOS which have been established to be entering the constructed stormwater drainage swale network and holding pond, along with the possible non-Airservices related inputs of PFAS containing products and/or wastewaters to the FTG should be further investigated to understand external sources of these compounds.

In order to mitigate risks to receptors from PFAS impacts at and in the vicinity of the Airport, a PFAS Management Plan should be prepared for implementation at the site. The PFAS Management Plan can include, but not be limited to:

- Hotspot removal of PFAS impacted sediment (as identified within the FTG trade waste collection points) and/or soil (pending further investigation to confirm if actual risks are present from the reported concentrations on site).
- Water treatment of captured water from the Fire Training Ground Trade Waste treatment and/or sewage treatment plant.

Furthermore, given the groundwater concentrations of PFAS within the airport estate exceeding the PFAS NEMP Drinking Water guidelines in six on-airport wells, consuming groundwater sourced from groundwater bores within the airport estate should be prohibited. It is noted that potable water for drinking purposes is currently sourced from the municipal potable water supply provided from bore-fields located approximately 4.5 and 9.5 km southwest of the airport, operated by Power Water Corporation.

To address the requirements of the Section 48 Notice, Tetra Tech Coffey have undertaken Phase 1 and Phase 2 site investigation works during 2022 and 2023 respectively at Ayers Rock Airport and consider the scope and outcomes of these investigations to be sufficient to meet the requirements of the Environmental Audit Program as requested by NT EPA. The detail provided in this TSI report addresses the S48 requirements, noting that the above data gaps are not driven by any identified risk within, or outside of, the Airport Estate, as has been established in the revised CSM in this TSI report.

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APPENDIX A - FIGURES

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Giles Road

RUNWAY

CURRENT FIRE STATION

OPEN DRAINAGE CHANNEL

FIRE TRAINING GROUND

STOCKPILE SOIL MATERIAL

WASTEWATER UST AND VEHICLE WASH-DOWN AREA

FORMER INTERIM FIRE STATION

FORMER AFFF STORAGE AND WASH-DOWN AREA

SEWAGE TREATMENT PLANT AND DISCHARGE AREA

Coote Road

LEGEND

- AIRPORT ESTATE BOUNDARY
- AIRSERVICE LEASE AREA (INDICATIVE)
- SECONDARY SOURCES OF PFAS AS IDENTIFIED IN ATTACHMENT F OF THE SECTION 48 NOTICE (NT EPA 2021)

revision	no.	description	drawn	approved	date
	A	ORIGINAL ISSUE			

0 200 400 600 800

Scale 1:15,000 (A3) METRES

drawn	ENVIRONMAPS
approved	MJ
date	28/08/2023
scale	AS SHOWN
original size	A3

TETRA TECH COFFEY

client: AIRSERVICES AUSTRALIA

project: AYERS ROCK AIRPORT (AYQ) - TSI REPORT

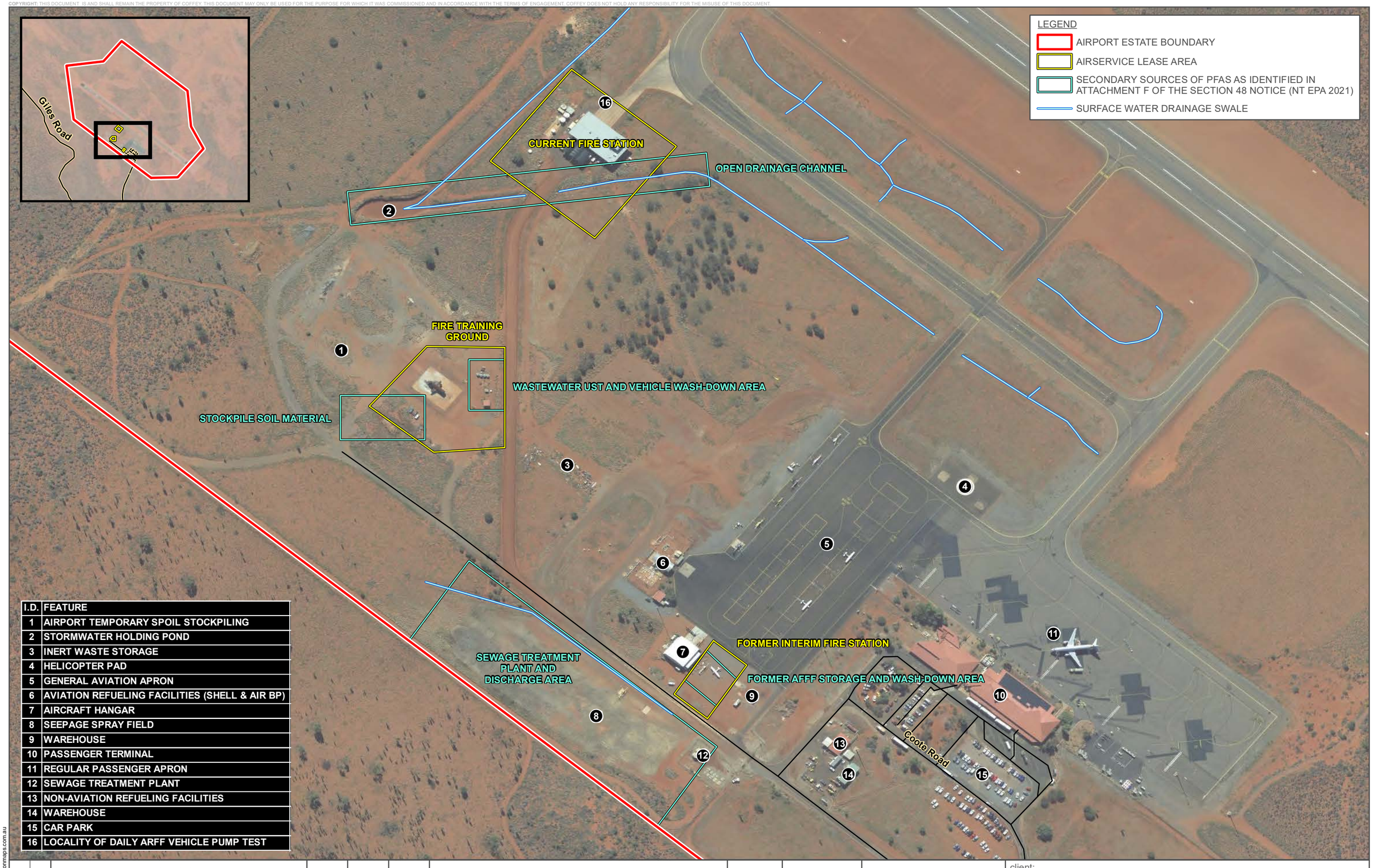
title: SITE LOCALITY PLAN

project no: 754-PEREN233360 | figure no: 1 | rev: A

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C:\GIS\Jobs\Coffey\754-PEREN233360 - Site Brief Report, Airservices Australia\Figures - Yalara\AYQ-TSI\754-PEREN233360-AYQ-TSI_Ayres_F01 Site Locality Plan_230828.mxd

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I.D.	FEATURE
1	AIRPORT TEMPORARY SPOIL STOCKPILING
2	STORMWATER HOLDING POND
3	INERT WASTE STORAGE
4	HELICOPTER PAD
5	GENERAL AVIATION APRON
6	AVIATION REFUELING FACILITIES (SHELL & AIR BP)
7	AIRCRAFT HANGAR
8	SEEPAGE SPRAY FIELD
9	WAREHOUSE
10	PASSENGER TERMINAL
11	REGULAR PASSENGER APRON
12	SEWAGE TREATMENT PLANT
13	NON-AVIATION REFUELING FACILITIES
14	WAREHOUSE
15	CAR PARK
16	LOCALITY OF DAILY ARFF VEHICLE PUMP TEST

revision	no.	description	drawn	approved	date
	A	ORIGINAL ISSUE			

0 25 50 75 100
Scale 1:3,000 (A3) METRES

drawn	ENVIRONMAPS
approved	MJ
date	28/08/2023
scale	AS SHOWN
original size	A3

TETRA TECH COFFEY

client: AIRSERVICES AUSTRALIA

project: AYERS ROCK AIRPORT (AYQ) - TSI REPORT

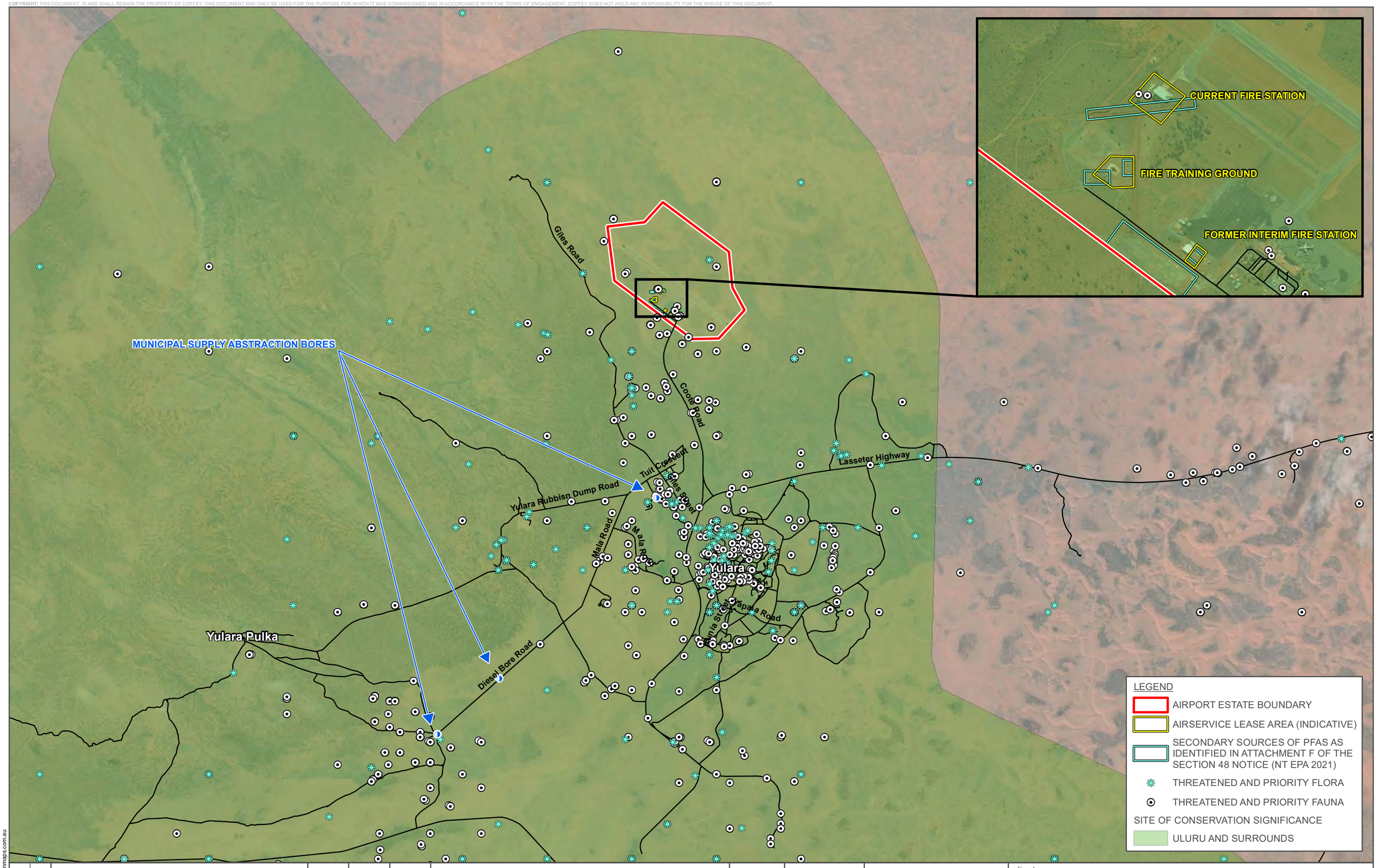
title: AIRPORT ESTATE FEATURES PLAN

project no: 754-PEREN233360 | figure no: 2 | rev: A

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C:\GIS\Jobs\Coffey\754-PEREN233360 - Site Brief Report, Airservices Australia\Figures - Yalara\AYQ-TSI\754-PEREN233360-AYQ-TSI_Ayres_F02 Airport Estate Features Plan_230828.mxd

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revision no.	description	drawn	approved	date
A	ORIGINAL ISSUE			

0 0.75 1.5 2.25 3
Scale 1:75,000 (A3) KM

drawn	ENVIRONMAPS
approved	MJ
date	28/08/2023
scale	AS SHOWN
original size	A3

TETRA TECH COFFEY

client: AIRSERVICES AUSTRALIA

project: AYERS ROCK AIRPORT (AYQ) - TSI REPORT

title: WATER BORES AND IDENTIFIED RECEPTORS

project no: 754-PEREN233360 | figure no: 3 | rev: A

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C:\GIS\Jobs\Coffey\754-PEREN233360 - Site Brief Report, Airservices Australia\Figures - Yulara\AYQ-TSI\754-PEREN233360-AYQ-TSI_Ayres_F03 Water Bores and Identified Receptors_230828.mxd

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revision	no.	description	drawn	approved	date
	A	ORIGINAL ISSUE			

0 10 20 30 40
Scale 1:1,000 (A3) METRES

drawn	ENVIRONMAPS
approved	MJ
date	28/08/2023
scale	AS SHOWN
original size	A3

TETRA TECH COFFEY

client: AIRSERVICES AUSTRALIA

project: AYERS ROCK AIRPORT (AYQ) - TSI REPORT

title: FORMER INTERIM FIRE STATION SITE FEATURES AND SEWAGE TREATMENT PLANT, SAMPLING LOCATIONS AND SOURCES OF PFAS

project no: 754-PEREN233360 | figure no: 4A | rev: A

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C:\GIS\Jobs\Coffey\754-PEREN233360 - Site Brief Report, Airservices Australia\Figures - Yalara\AYQ-TSI\754-PEREN233360-AYQ-TSI_Ayres_F04a Former Interim Fire Station Site Features and Sewage Treatment Plant, Sampling Locations and Sources of PFAS_230828.mxd

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LEGEND

- AIRPORT ESTATE BOUNDARY
- AIRSERVICES LEASE AREA
- SECONDARY SOURCES OF PFAS AS IDENTIFIED IN ATTACHMENT F OF THE SECTION 48 NOTICE (NT EPA 2021)
- SOURCE ZONE AREA
- TRADE WASTE DRAINAGE
- RISING MAIN TO STP
- SOIL SAMPLE LOCATION (LOW ECOLOGICAL SERVICES, 2012)
- SEDIMENT SAMPLE LOCATION (GHD, 2017)
- SOIL BORE LOCATION (GHD, 2017)
- STOCKPILE SAMPLE LOCATION (GHD, 2017)

INVESTIGATION LOCATIONS (TETRA TECH COFFEY, 2023)
- SURFACE SEDIMENT

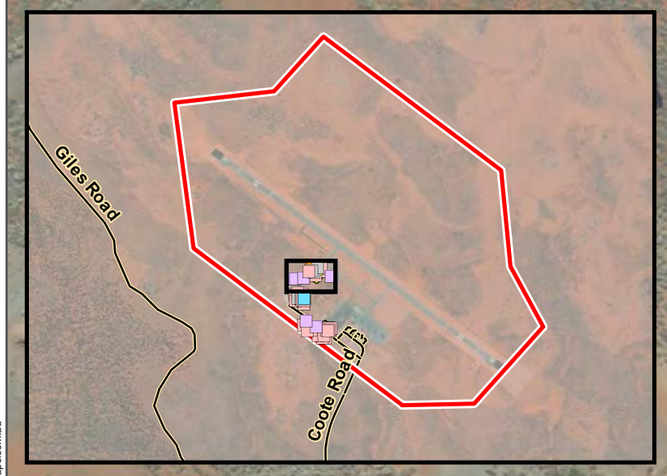
INVESTIGATION LOCATIONS (TETRA TECH COFFEY, 2022)
- GROUNDWATER

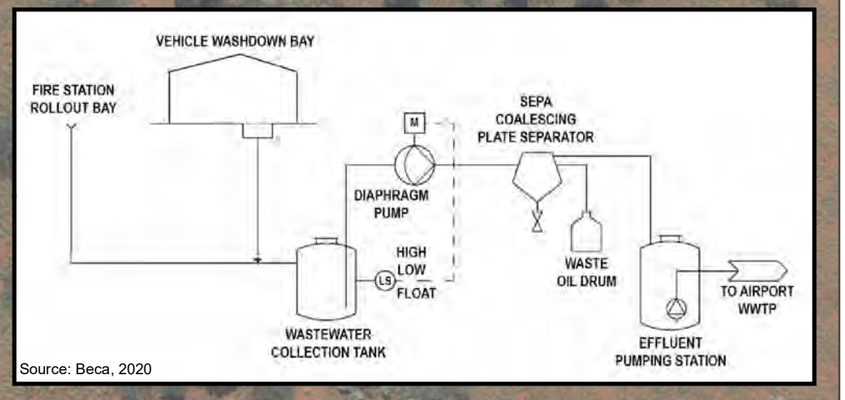
SOIL
- SOIL

SEDIMENT
- SURFACE SEDIMENT

INFRASTRUCTURE
- CONCRETE
- CONCRETE WASHDOWN
- PIT SEDIMENT
- PIT WATER
- PIT WATER / SEDIMENT

WASTEWATER COLLECTION TANK
SHIPPING CONTAINER FOR STORAGE OF AFFF (SOLBERG) IBCs
SB17
WD04
SEWER PUMPING STATION
SEPARATOR ENCLOSURE
SS12
OIL & HAZARDOUS CHEMICAL STORAGE LOCATION
FIRE WATER TANK (x2)
WASTE OIL AST
SB19
SB20
HOSE STORE LOCATION
WORKSHOP
FORMER ANSULITE AFFF AST
SS07
MAIN GARAGE
SS08
SS09
WD05
WASHDOWN AREA (IN GARAGE)
HAZARDOUS CHEMICAL STORAGE
DRAIN
DRAIN
DRAIN
YAP1
YAP1
SB18
SB18
PURPLE K STORAGE LOCATION
WD03
SB16
SB21
SB21
GENERATOR
TRANSFORMER
SS04
SS03
SS03
SB44
SS01
SS01
SS02
SS02
OPEN DRAINAGE CHANNEL
CURRENT FIRE STATION





Source: Beca, 2020

revision	no.	description	drawn	approved	date
	A	ORIGINAL ISSUE			

0 10 20 30 40
Scale 1:1,000 (A3) METRES

drawn	ENVIRONMAPS
approved	MJ
date	28/08/2023
scale	AS SHOWN
original size	A3

TETRA TECH COFFEY

client: AIRSERVICES AUSTRALIA

project: AYERS ROCK AIRPORT (AYQ) - TSI REPORT

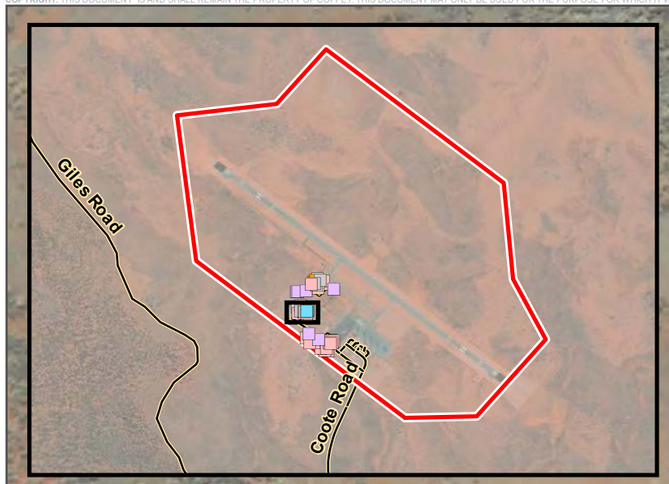
title: CURRENT FIRE STATION SITE FEATURES AND DRAINAGE CHANNELS, SAMPLING LOCATIONS AND SOURCES OF PFAS

project no: 754-PEREN233360 | figure no: 4B | rev: A

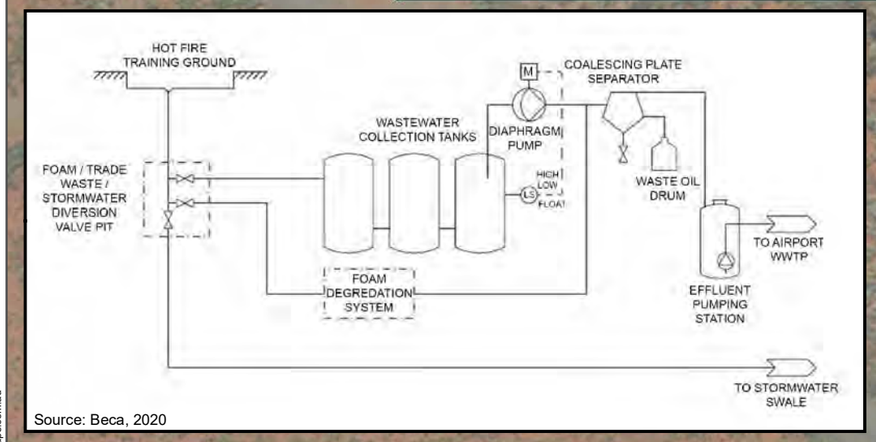
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C:\GIS\Jobs\Coffey\754-PEREN233360 - Site Brief Report, Airservices Australia\Figures - Yalara\AYQ-TSI\754-PEREN233360-AYQ-TSI_Ayres_F04b Current Fire Station Site Features and Drainage Channels, Sampling Locations and Sources of PFAS_230828.mxd

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SB15
SB26
SB22
SB22
SB23
SB23
FIRE TRAINING GROUND
WASTEWATER UST AND VEHICLE WASH-DOWN AREA
DIVERSION VALVE PIT
KEROSENE STORAGE (TRAILER)
SB12
SB12
SB13
SB13
YAP2
YAP2
OLD WASTEWATER TANKS
SB38
TRAINING PAD & MOCK PLANE
CC02
CC01
WD01
WD02
SS06
SB14
SB42
TRADEWASTE COLLECTION PITS (x3)
PIT 1
PIT 2
PIT 3
x2 ODOUR VENTS, x2 AUTOMATED DOSING SYSTEMS
SB43
SB27
TO AIRPORT SEWER TREATMENT PLANT
WATER PUMPING STATION
DIAPHRAM PUMP, SAMPLE POINT AND OIL SEPARATOR
SB11
SB10
SB10
SS05
YAP4
SB39
SP03
SB25
YAP3
TRUCK DRAINING AREA
SB36
SP04
SP02
SB37
SB25
SP05
ANAEROBIC DIGESTION TANK 20,000 L
FINISHING / AEROBIC TANK 12,000 L
STOCKPILE SOIL MATERIAL
SP01
SB40
SB24
SB24
SB09
YAP5
SB35
SB41



Source: Beca, 2020

LEGEND

- AIRPORT ESTATE BOUNDARY
- AIRSERVICES LEASE AREA (indicative)
- SECONDARY SOURCES OF PFAS AS IDENTIFIED IN ATTACHMENT F OF THE SECTION 48 NOTICE (NT EPA 2021)
- SOURCE ZONE AREA
- RISING MAIN TO STP
- TRADE WASTE DRAINAGE
- TREATED WATER DISCHARGE TO RISING MAIN
- STORMWATER DRAINAGE PIPE
- SOIL SAMPLE LOCATION (LOW ECOLOGICAL SERVICES, 2012)
- SEDIMENT SAMPLE LOCATION (GHD, 2017)
- SOIL BORE LOCATION (GHD, 2017)
- STOCKPILE SAMPLE LOCATION (GHD, 2017)

INVESTIGATION LOCATIONS (TETRA TECH COFFEY, 2023)
- SOIL

INVESTIGATION LOCATIONS (TETRA TECH COFFEY, 2022)
- GROUNDWATER

SOIL
- SOIL

SEDIMENT
- SURFACE SEDIMENT

INFRASTRUCTURE
- CONCRETE
- CONCRETE WASHDOWN
- PIT SEDIMENT
- PIT WATER
- PIT WATER / SEDIMENT

no.	description	drawn	approved	date
A	ORIGINAL ISSUE			

revision

Scale 1:650 (A3) METRES (0, 7.5, 15, 22.5, 30)

drawn	ENVIRONMAPS
approved	MJ
date	28/08/2023
scale	AS SHOWN
original size	A3

client: AIRSERVICES AUSTRALIA

project: AYERS ROCK AIRPORT (AYQ) - TSI REPORT

title: FIRE TRAINING GROUND SITE FEATURES, SAMPLING LOCATIONS AND SOURCES OF PFAS

project no: 754-PEREN233360 | figure no: 4C | rev: A

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C:\GIS\Jobs\Coffey\754-PEREN233360 - Site Brief Report, Airservices Australia\Figures - Yalara\AYQ-TSI\754-PEREN233360-AYQ-TSI_Ayres_F04c Fire Training Ground Site Features, Sampling Locations and Sources of PFAS_230828.mxd

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I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
SED11	20 Jun 2022	-	-	-
SED11_200622	20 Jun 2022	**0.0465**	<0.0002	**0.0465**

SED11

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
SB05_0.0_200622	20 Jun 2022	**0.0030**	<0.0002	**0.0030**
SB05_0.3	20 Jun 2022	<0.0002	**0.0027**	**0.0002**

SB05

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
SED10_200622	20 Jun 2022	**0.0022**	<0.0002	**0.0022**

SED10

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
SB04_0.0_200622	20 Jun 2022	**0.0004**	<0.0002	**0.0004**
SB04_0.3	20 Jun 2022	<0.0002	**0.0002**	<0.0002

SB04

SB28

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
SB28_0.0_200622	20 Jun 2022	**0.0004**	**0.0003**	**0.0004**
SB28_0.3	20 Jun 2022	<0.0002	**0.0003**	<0.0002
SB28_0.3_220622	22 Jun 2022	<0.0002	**0.0004**	<0.0002

SEEPAGE SPRAY FIELD

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
SB29_0.0_200622	20 Jun 2022	**0.0014**	**0.0003**	**0.0014**
SB29_0.3_200622	20 Jun 2022	**0.0003**	**0.0004**	**0.0003**

SB29

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
SB03_0.0_200622	20 Jun 2022	**0.0007**	**0.0004**	**0.0007**
SB03_0.3	20 Jun 2022	<0.0002	**0.0042**	<0.0002

SB03

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
SB02_0.0-0.2	20 Jun 2022	-	-	-
SB02_0.0_200622	20 Jun 2022	**0.0078**	**0.0022**	**0.0078**
SB02_0.3-0.5	20 Jun 2022	**0.0026**	**0.0072**	**0.003**

SB02

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
SB01_0.0_200622	20 Jun 2022	<0.0002	**0.0014**	<0.0002
SB01_0.3-0.5	20 Jun 2022	<0.0002	<0.0002	<0.0002

SB01

STP

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
SB06_0.0-0.2	20 Jun 2022	-	-	-
SB06_0.0_200622	20 Jun 2022	**0.0084**	**0.0003**	**0.0084**
SB06_0.3-0.5	20 Jun 2022	**0.0051**	**0.0004**	**0.0051**

SB06

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
SB33_0.0_240622	24 Jun 2022	**0.0024**	**0.108**	**0.0049**
SB33_0.3-0.5	20 Jun 2022	**0.0003**	**0.0073**	**0.0008**
SB33_0.85-1.0	20 Jun 2022	<0.0002	**0.0006**	<0.0002

SB33

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
SB30_0.3_240622	24 Jun 2022	**0.0025**	**0.0045**	**0.0029**

SB30

FORMER INTERIM FIRE STATION

FOREMER INTERIM FIRE STATION, STORAGE & WASHDOWN AREA

GW08

SB31

SB08

SB07

SB32

SB34

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
SB31_0.0_240622	24 Jun 2022	**0.0003**	**0.0040**	**0.0013**

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
GW08_1.9-2.0	02 Feb 2023	**0.0002**	<0.0002	**0.0002**
GW08_9.9-10.0	02 Feb 2023	<0.0002	<0.0002	<0.0002

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
SB07_0.0_240622	24 Jun 2022	**0.0041**	**0.0391**	**0.0260**
SB07_0.3-0.5	20 Jun 2022	**0.0016**	**0.0026**	**0.0047**

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
SB08_0.0_240622	24 Jun 2022	**0.0048**	**0.0121**	**0.0052**

GW07

700m

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
GW07_9.9-10.0	02 Feb 2023	<0.0002	<0.0002	<0.0002

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
SB32_0.3_240622	24 Jun 2022	**0.0023**	**0.0002**	**0.0039**

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
SB34_0.3_240622	24 Jun 2022	**0.0081**	**0.0010**	**0.0146**

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
SB47_0.4-0.5	03 Feb 2023	**0.0005**	**0.0003**	**0.0013**
SB47_0.9-1.0	03 Feb 2023	**0.0002**	<0.0002	**0.0008**

SB47

SB46

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
SB46_0.4-0.5	03 Feb 2023	<0.0002	<0.0002	<0.0002
SB46_0.9-1.0	03 Feb 2023	<0.0002	<0.0002	<0.0002

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
SB45_0-0.2	03 Feb 2023	**0.0003**	**0.0029**	**0.0005**
SB45_0.4-0.5	03 Feb 2023	<0.0002	<0.0002	<0.0002
SB45_0.9-1.0	03 Feb 2023	<0.0002	<0.0002	<0.0002

SB45

GW01

	PFOS mg/kg	PFOA mg/kg	PFHxS + PFOS mg/kg
EQL	0.0002	0.0002	0.0002
PFAS NEMP 2020 Ecological direct exposure	1	10	-
PFAS NEMP 2020 Ecological indirect exposure	0.01	-	-
PFAS NEMP 2020 Industrial/ commercial (HIL D)	-	50	20

LEGEND

- AIRPORT ESTATE BOUNDARY
- AIRSERVICE LEASE AREA (INDICATIVE)
- SECONDARY SOURCES OF PFAS AS IDENTIFIED IN ATTACHMENT F OF THE SECTION 48 NOTICE (NT EPA 2021)
- SURFACE WATER DRAINAGE SWALE
- SOURCE ZONE AREA
- MONITORING WELL INSTALLED 2023

INVESTIGATION LOCATIONS (TETRA TECH COFFEY, 2023)

- SOIL

INVESTIGATION LOCATIONS (TETRA TECH COFFEY, 2022)

- GROUNDWATER

SOIL

- SOIL

SEDIMENT

- SURFACE SEDIMENT

INFRASTRUCTURE

- CONCRETE
- CONCRETE WASHDOWN
- PIT SEDIMENT
- PIT WATER
- PIT WATER / SEDIMENT

revision no.	description	drawn	approved	date
A	ORIGINAL ISSUE			

0 10 20 30 40
Scale 1:1,000 (A3) METRES

drawn	ENVIRONMAPS
approved	MJ
date	28/08/2023
scale	AS SHOWN
original size	A3

TETRA TECH COFFEY

client: AIRSERVICES AUSTRALIA

project: AYERS ROCK AIRPORT (AYQ) - TSI REPORT

title: FORMER INTERIM FIRE STATION
SOIL AND SEDIMENT PFAS ANALYTICAL RESULTS (2022 - 2023)

project no: 754-PEREN233360 | figure no: 5A | rev: A

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GW11 1000m

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
GW11_1.9-2.0	02 Feb 2023	<0.0002	<0.0002	<0.0002
GW11_7.9-8.0	02 Feb 2023	<0.0002	<0.0002	<0.0002

GW10 700m

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
GW10_9.9-10.0	02 Feb 2023	<0.0002	<0.0002	<0.0002

GW09 200m

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
GW09_7.9-8.0	02 Feb 2023	<0.0002	<0.0002	<0.0002

WASTEWATER COLLECTION TANK

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
SB17_0.0_260622	26 Jun 2022	<0.0002	<0.0002	<0.0002
SB17_0.6-0.75	20 Jun 2022	**0.0002**	<0.0002	**0.0002**

SHIPPING CONTAINER FOR STORAGE OF AFFF (SOLBERG) IBCs

SB17
SB17

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
SS12_0.0-0.2	20 Jun 2022	-	-	-
SS12_250622	25 Jun 2022	**0.0011**	<0.0002	**0.0011**

WD04

SEWER PUMPING STATION

SEPARATOR ENCLOSURE

OIL & HAZARDOUS CHEMICAL STORAGE LOCATION

SS12

WASTE OIL AST

FIRE WATER TANK (x2)

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
SB19_0.0-0.2	20 Jun 2022	-	-	-
SB19_0.0_250622	25 Jun 2022	<0.0002	**0.0344**	**0.0003**
SB19_0.3_250622	25 Jun 2022	<0.0002	**0.0060**	**0.0002**
SB19_0.6-0.75	20 Jun 2022	<0.0002	**0.0012**	<0.0002

SB19

SB20

HOSE STORE LOCATION

WORKSHOP

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
SB20_0.0_250622	25 Jun 2022	**0.0004**	**0.0004**	**0.0004**
SB20_0.3_250622	25 Jun 2022	**0.0003**	**0.0030**	**0.0003**
SB20_0.85-1.0	20 Jun 2022	<0.0002	**0.0009**	<0.0002

FORMER ANSULITE AFFF AST

SS07

MAIN GARAGE

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
SS08_0.0-0.2	20 Jun 2022	-	-	-
SS08_250622	25 Jun 2022	**0.0073**	**0.0087**	**0.0073**

SS08

SS09

WD05

WASHDOWN AREA (IN GARAGE)

HAZARDOUS CHEMICAL STORAGE

DRAIN
DRAIN
DRAIN

SB18

SB18

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
SB18_0.0_250622	25 Jun 2022	**0.0002**	<0.0002	**0.0002**
SB18_0.6-0.75	20 Jun 2022	<0.0002	<0.0002	<0.0002

YAP1
YAP1

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
SS09_0.0-0.2	20 Jun 2022	-	-	-
SS09_250622	25 Jun 2022	**0.0045**	**0.0019**	**0.0049**

PURPLE K STORAGE LOCATION

WD03

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
SS07_250622	25 Jun 2022	-	-	-

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
YAP1_0.0-0.2	20 Jun 2022	<0.0002	**0.185**	**0.0009**
YAP1_0.0_250622	25 Jun 2022	-	-	-
YAP1_0.3_250622	25 Jun 2022	-	-	-
YAP1_0.6-0.75	20 Jun 2022	<0.0002	**0.0124**	<0.0002

SB16

SB21
SB21

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
SB21_0.0_260622	26 Jun 2022	**0.0013**	**0.0004**	**0.0013**
SB21_0.6_260622	26 Jun 2022	<0.0002	**0.0004**	**0.0007**

GENERATOR
TRANSFORMER

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
SB44_0.4-0.5	04 Feb 2023	**0.0046**	<0.0002	**0.0046**
SB44_0.9-1.0	04 Feb 2023	**0.0020**	<0.0002	**0.0020**

SB44

SS01
SS01

SS02
SS02

SS03
SS03

SS04

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
SS04	24 Jun 2022	**0.0150**	<0.0002	**0.0150**
SS04_0.0-0.2	20 Jun 2022	-	-	-

CURRENT FIRE STATION

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
SS03_220622	22 Jun 2022	**0.0093**	**0.0004**	**0.0093**

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
SS01_220622	22 Jun 2022	**0.0128**	**0.0006**	**0.0128**

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
SS02_0.0-0.2	20 Jun 2022	-	-	-
SS02_220622	22 Jun 2022	**0.0479**	**0.0006**	**0.0479**

LEGEND

- AIRPORT ESTATE BOUNDARY
- AIRSERVICES LEASE AREA
- SECONDARY SOURCES OF PFAS AS IDENTIFIED IN ATTACHMENT F OF THE SECTION 48 NOTICE (NT EPA 2021)
- TRADE WASTE DRAINAGE
- RISING MAIN TO STP
- SOURCE ZONE AREA
- MONITORING WELL INSTALLED 2023
- SOIL SAMPLE LOCATION (LOW ECOLOGICAL SERVICES, 2012)
- SEDIMENT SAMPLE LOCATION (GHD, 2017)
- SOIL BORE LOCATION (GHD, 2017)
- STOCKPILE SAMPLE LOCATION (GHD, 2017)

INVESTIGATION LOCATIONS (TETRA TECH COFFEY, 2023)
- SURFACE SEDIMENT

INVESTIGATION LOCATIONS (TETRA TECH COFFEY, 2022)
- GROUNDWATER

SOIL
- SOIL

SEDIMENT
- SURFACE SEDIMENT

INFRASTRUCTURE
- CONCRETE
- CONCRETE WASHDOWN
- PIT SEDIMENT
- PIT WATER
- PIT WATER / SEDIMENT

	PFOS mg/kg	PFOA mg/kg	PFHxS + PFOS mg/kg
EQL	0.0002	0.0002	0.0002
PFAS NEMP 2020 Ecological direct exposure	1	10	-
PFAS NEMP 2020 Ecological indirect exposure	0.01	-	-
PFAS NEMP 2020 Industrial/ commercial (HIL D)	-	50	20

revision no.	description	drawn	approved	date
A	ORIGINAL ISSUE			

Scale 1:1,000 (A3) METRES (0, 10, 20, 30, 40)

drawn	ENVIRONMAPS
approved	MJ
date	28/08/2023
scale	AS SHOWN
original size	A3

TETRA TECH COFFEY

client: AIRSERVICES AUSTRALIA

project: AYERS ROCK AIRPORT (AYQ) - TSI REPORT

title: CURRENT FIRE STATION
SOIL AND SEDIMENT PFAS ANALYTICAL RESULTS (2022 and 2023)

project no: 754-PEREN233360 | figure no: 5B | rev: A

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	PFOS	PFOA	PFHxS + PFOS
	mg/kg	mg/kg	mg/kg
EQL	0.0002	0.0002	0.0002
PFAS NEMP 2020 Ecological direct exposure	1	10	-
PFAS NEMP 2020 Ecological indirect exposure	0.01	-	-
PFAS NEMP 2020 Industrial/ commercial (HIL D)	-	50	20

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
CC02	24 Jun 2022	0.0886	0.0198	0.0895

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
SB26_0.0_230622	22 Jun 2022	0.0090	0.0172	0.0222
SB26_0.45-0.5	20 Jun 2022	0.0065	0.0011	0.0122

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
SB12_0.0-0.2	20 Jun 2022	-	-	-
SB12_0.0_240622	24 Jun 2022	0.0111	0.0224	0.0243
SB12_0.3_240622	24 Jun 2022	0.0491	0.0253	0.0586
SB12_0.9	24 Jun 2022	0.0011	0.0013	0.0028

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
SB23_0.0_230622	22 Jun 2022	0.0004	0.0044	0.0019
SB23_0.45-0.5	20 Jun 2022	0.0002	0.0003	0.0011

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
SB22_0.0-0.2	20 Jun 2022	-	-	-
SB22_0.0_230622	23 Jun 2022	0.0019	0.0426	0.0045
SB22_0.45-0.5	20 Jun 2022	<0.0002	0.0055	0.0008

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
SB13_0.0-0.2	20 Jun 2022	-	-	-
SB13_0.0_230622	22 Jun 2022	0.0124	0.0130	0.0175
SB13_0.45_230622	22 Jun 2022	0.0616	0.0289	0.0702
SB13_0.85-1.0	20 Jun 2022	0.0004	0.0003	0.0008

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
YAP2_0.0_240622	24 Jun 2022	0.0058	0.0254	0.0110
YAP2_0.0_240622	24 Jun 2022	-	-	-
YAP2_0.6_240622	24 Jun 2022	0.0021	0.0016	0.0046

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
CC01_Bottom_260622	26 Jun 2022	0.0028	0.0045	0.0038
CC01_Soil_260622	26 Jun 2022	0.0263	0.0101	0.0452
CC01_Top_260622	26 Jun 2022	0.0526	0.0327	0.0763

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
SB38_0-0.2	03 Feb 2023	0.0040	0.0308	0.0045
SB38_0.4-0.5	03 Feb 2023	<0.0002	0.0010	0.0003
SB38_0.9-1.0	03 Feb 2023	<0.0002	0.0007	<0.0002

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
SB42_0.4-0.5	04 Feb 2023	<0.0002	0.0018	0.0017
SB42_0.9-1.0	04 Feb 2023	0.0004	0.0025	0.0013
SB42_1.9-2.0	03 Feb 2023	<0.0002	0.0002	<0.0002
SB42_2.4-2.5	03 Feb 2023	<0.0002	0.0002	<0.0002

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
Pit1_sed	20 Jun 2022	0.0087	0.005	0.0087
Pit1_sed	26 Jun 2022	-	-	-

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
SB43_0.4-0.5	04 Feb 2023	0.0008	0.0037	0.0013
SB43_0.9-1.0	04 Feb 2023	0.0033	0.0098	0.0038
SB43_1.9-2.0	03 Feb 2023	0.0009	0.0039	0.0015
SB43_2.9-3.0	03 Feb 2023	0.0014	0.0045	0.0021

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
SB27_0.0_240622	24 Jun 2022	0.0043	0.154	0.0390
SB27_1.4_240622	24 Jun 2022	<0.0002	<0.0002	<0.0002
SB27_1.9_240622	24 Jun 2022	0.0003	0.0002	0.0003

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
SB39_0.4-0.5	04 Feb 2023	0.0006	0.0002	0.0032
SB39_0.9-1.0	04 Feb 2023	0.0007	0.0004	0.0011

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
SB10_0.0_240622	24 Jun 2022	0.0072	0.0484	0.0107
SB10_0.45_240622	24 Jun 2022	0.0354	0.0036	0.0453
SB10_0.85-1.0	20 Jun 2022	<0.0002	<0.0002	0.0004

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
SS05_0.0-0.2	20 Jun 2022	-	-	-
SS05_220622	22 Jun 2022	0.0329	0.0170	0.0340

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
SB36_0-0.2	03 Feb 2023	0.0046	0.0002	0.0046
SB36_0.4-0.5	03 Feb 2023	0.0005	0.0017	0.0018
SB36_0.9-1.0	03 Feb 2023	0.0005	0.0007	0.0016

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
YAP4_0.0_230622	23 Jun 2022	0.0020	0.0026	0.0025
YAP4_0.45_230622	23 Jun 2022	0.0457	0.0111	0.0512

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
YAP3_0.0-0.2	20 Jun 2022	-	-	-
YAP3_0.0_230622	22 Jun 2022	0.0042	0.283	0.0092
YAP3_0.6_230622	23 Jun 2022	0.0010	0.0102	0.0015

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
SB25_0.0_240622	24 Jun 2022	0.370	0.0037	0.383
SB25_0.45-0.5	20 Jun 2022	0.228	0.0084	0.259

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
SB37_0-0.2	03 Feb 2023	0.0411	0.161	0.0658
SB37_0.4-0.5	03 Feb 2023	0.0010	0.0056	0.0124
SB37_0.9-1.0	03 Feb 2023	0.0062	0.0032	0.0704

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
SB40_0-0.2	03 Feb 2023	0.0314	0.0234	0.0362
SB40_0.4-0.5	03 Feb 2023	0.0005	0.0013	0.0034
SB40_0.9-1.0	03 Feb 2023	0.0006	0.0036	0.0050

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
SB24_0.0_240622	24 Jun 2022	0.0298	0.0213	0.0304
SB24_0.45-0.5	20 Jun 2022	0.0012	0.0341	0.005

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
SB35_0-0.2	03 Feb 2023	0.0123	0.0003	0.0139
SB35_0.4-0.5	03 Feb 2023	0.0003	0.0008	0.0003
SB35_0.9-1.0	03 Feb 2023	<0.0002	0.0002	<0.0002

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
SB41_0-0.2	03 Feb 2023	0.152	0.0148	0.153
SB41_0.4-0.5	03 Feb 2023	0.0104	0.0033	0.0136
SB41_0.9-1.0	03 Feb 2023	0.0025	0.0008	0.0054

SB15 SB26 SB22 SB23 SB12 SB13 SB38 SB14 SB42 SB11 SB10 SB43 SB27 SB39 SB25 SB36 SB37 SB40 SB09 SB24 SB35 SB41

SP01 SP02 SP03 SP04 SP05

YAP2 YAP3 YAP4 YAP5

FIRE TRAINING GROUND
DRAIN
TRAINING PAD & MOCK PLANE
KEROSENE STORAGE (TRAILER)
OLD WASTEWATER TANKS
TRADEWASTE COLLECTION PITS (x3)
x2 ODOUR VENTS, x2 AUTOMATED DOSING SYSTEMS
TO AIRPORT SEWER TREATMENT PLANT
WATER PUMPING STATION
DIAPHRAM PUMP, SAMPLE POINT AND OIL SEPARATOR
TRUCK DRAINING AREA
ANAEROBIC DIGESTION TANK 20,000 L
FINISHING / AEROBIC TANK 12,000 L

CC02 CC01 WD01 WD02 SS06 SS05 PIT 1 PIT 2 PIT 3

LEGEND

- AIRPORT ESTATE BOUNDARY
- AIRSERVICES LEASE AREA (indicative)
- SECONDARY SOURCES OF PFAS AS IDENTIFIED IN ATTACHMENT F OF THE SECTION 48 NOTICE (NT EPA 2021)
- STORMWATER DRAINAGE PIPE
- TREATED WATER DISCHARGE TO RISING MAIN
- TRADE WASTE DRAINAGE
- RISING MAIN TO STP
- SOURCE ZONE AREA
- SOIL SAMPLE LOCATION (LOW ECOLOGICAL SERVICES, 2012)
- SEDIMENT SAMPLE LOCATION (GHD, 2017)
- SOIL BORE LOCATION (GHD, 2017)
- STOCKPILE SAMPLE LOCATION (GHD, 2017)

INVESTIGATION LOCATIONS (TETRA TECH COFFEY, 2023)
- SOIL

INVESTIGATION LOCATIONS (TETRA TECH COFFEY, 2022)
- GROUNDWATER

SOIL
- SOIL

SEDIMENT
- SURFACE SEDIMENT

INFRASTRUCTURE
- CONCRETE
- CONCRETE WASHDOWN
- PIT SEDIMENT
- PIT WATER
- PIT WATER / SEDIMENT

revision	no.	description	drawn	approved	date
	A	ORIGINAL ISSUE			

Scale 1:650 (A3) METRES (0, 7.5, 15, 22.5, 30)

drawn	ENVIRONMAPS
approved	MJ
date	28/08/2023
scale	AS SHOWN
original size	A3

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TETRA TECH COFFEY

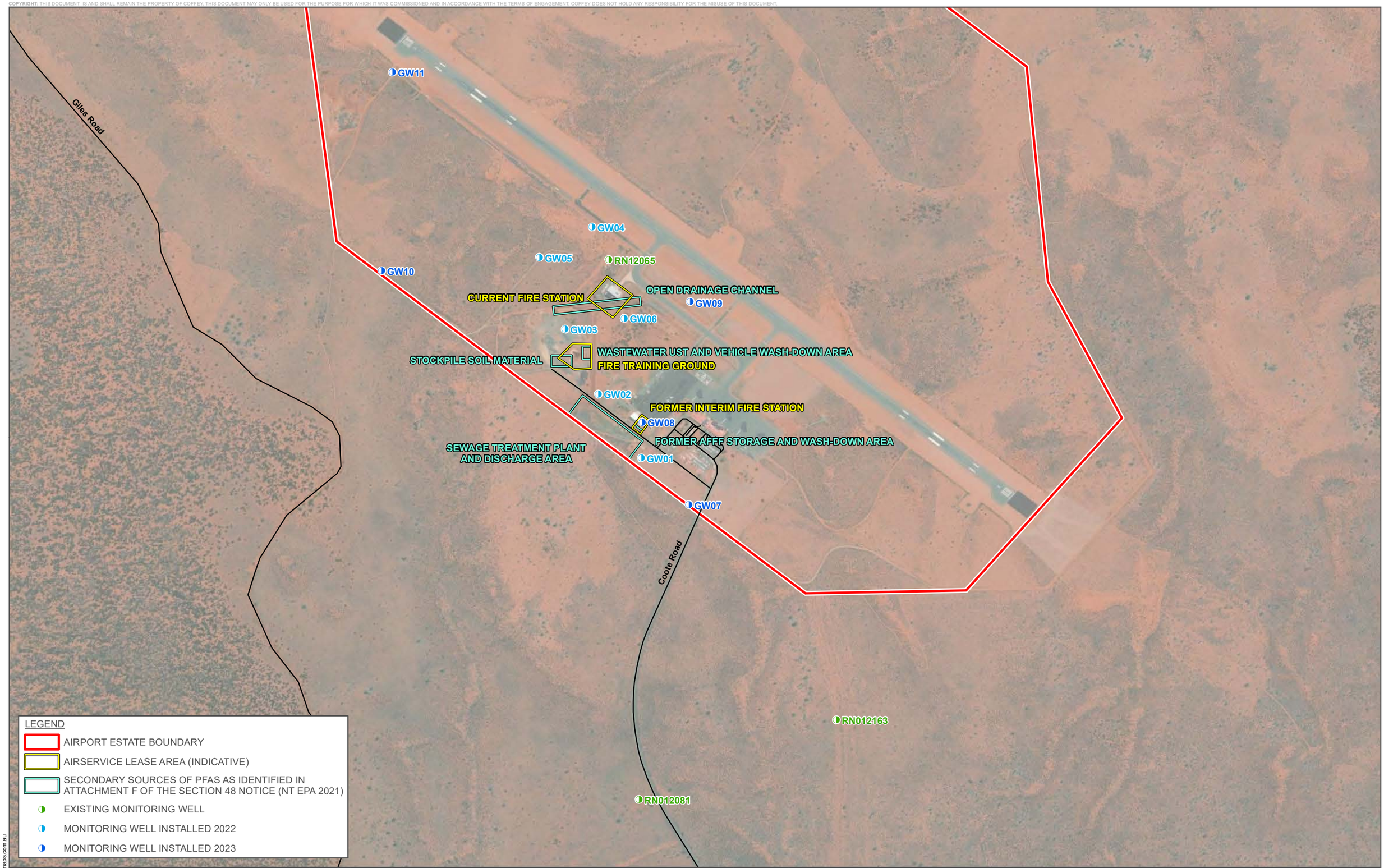
client: AIRSERVICES AUSTRALIA

project: AYERS ROCK AIRPORT (AYQ) - TSI REPORT

title: FIRE TRAINING GROUND SOIL PFAS ANALYTICAL RESULTS (2022 - 2023)

project no: 754-PEREN233360 | figure no: 5C | rev: A

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	A	ORIGINAL ISSUE			

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Scale 1:12,500 (A3) M

drawn	ENVIRONMAPS
approved	MJ
date	28/08/2023
scale	AS SHOWN
original size	A3

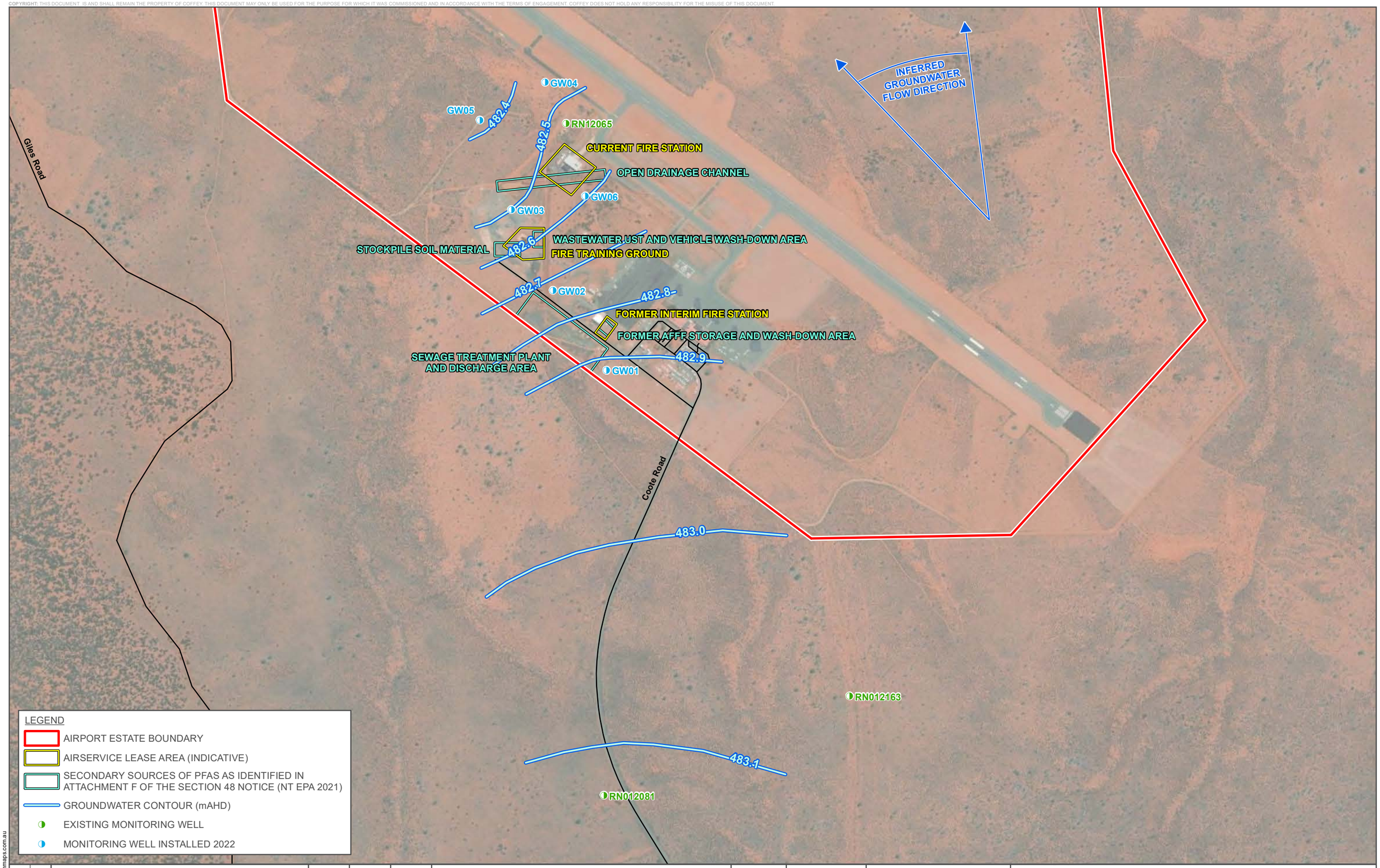
TETRA TECH COFFEY

client:	AIRSERVICES AUSTRALIA
project:	AYERS ROCK AIRPORT (AYQ) - TSI REPORT
title:	GROUNDWATER ASSESSMENT LOCATION PLAN
project no:	754-PEREN233360
figure no:	6A
rev:	A

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	A	ORIGINAL ISSUE			

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Scale 1:10,000 (A3) M

drawn	ENVIRONMAPS
approved	MJ
date	28/08/2023
scale	AS SHOWN
original size	A3

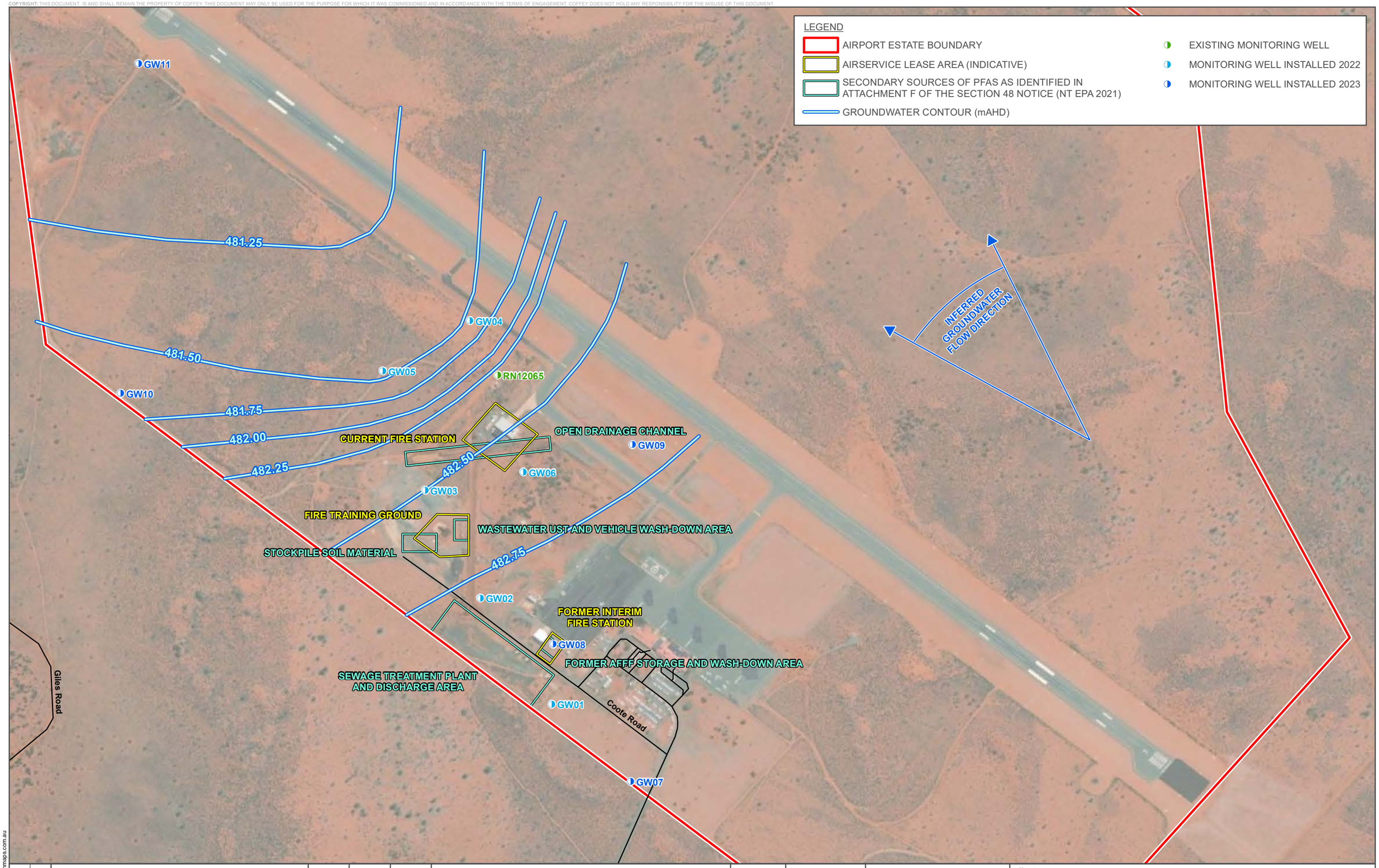
TETRA TECH COFFEY

client:	AIRSERVICES AUSTRALIA
project:	AYERS ROCK AIRPORT (AYQ) - TSI REPORT
title:	GROUNDWATER CONTOURS (2022)
project no:	754-PEREN233360
figure no:	6B
rev:	A

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A	ORIGINAL ISSUE			

0 75 150 225 300
Scale 1:7,500 (A3) M

drawn	ENVIRONMAPS
approved	MJ
date	28/08/2023
scale	AS SHOWN
original size	A3

TETRA TECH COFFEY

client: AIRSERVICES AUSTRALIA

project: AYERS ROCK AIRPORT (AYQ) - TSI REPORT

title: GROUNDWATER CONTOURS (2023)

project no: 754-PEREN233360 | figure no: 6C | rev: A

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Giles Road

Coote Road

CURRENT FIRE STATION

FIRE TRAINING GROUND

FORMER INTERIM FIRE STATION

LEGEND

- AIRPORT ESTATE BOUNDARY
- AIRSERVICE LEASE AREA (INDICATIVE)
- SECONDARY SOURCES OF PFAS AS IDENTIFIED IN ATTACHMENT F OF THE SECTION 48 NOTICE (NT EPA 2021)
- EXISTING MONITORING WELL
- MONITORING WELL INSTALLED 2022
- MONITORING WELL INSTALLED 2023

INVESTIGATION LOCATIONS (TETRA TECH COFFEY, 2022)

- CONCRETE WASHDOWN
- PIT WATER
- PIT WATER / SEDIMENT

GW11

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
GW11	06 Feb 2023	0.776	0.0414	1.26

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
RN12065	28 Jun 2022	0.04	<0.01	0.07
RN12065	08 Feb 2023	0.0389	0.0013	0.0614

GW04

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
GW04	28 Jun 2022	<0.01	<0.01	<0.01
GW04	06 Feb 2023	<0.0002	<0.0005	<0.0002

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
GW05	28 Jun 2022	0.09	0.20	0.12
GW05	06 Feb 2023	0.10	0.23	0.14

GW05

RN12065

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
GW10	06 Feb 2023	0.0091	0.0028	0.0108

GW10

GW09

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
GW09	06 Feb 2023	0.0041	0.0113	0.0469

GW06

GW03

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
GW02	28 Jun 2022	<0.01	<0.01	<0.01
GW02	05 Feb 2023	<0.0002	<0.0005	0.0006

GW02

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
GW08	06 Feb 2023	0.412	0.145	0.910

GW08

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
GW01	28 Jun 2022	0.06	0.72	1.71
GW01	05 Feb 2023	0.07	0.82	1.99

GW01

GW07

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
GW07	06 Feb 2023	0.0029	0.0007	0.0125

RN012082

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
RN12082	28 Jun 2022	<0.01	<0.01	<0.01

RN012081

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
RN12081	28 Jun 2022	<0.01	<0.01	<0.01

WD04

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
WD04_260622	26 Jun 2022	<0.01	0.02	<0.01

SS07

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
SS07_250622	25 Jun 2022	0.33	1.36	0.38

WD05

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
WD05_250622	25 Jun 2022	0.03	0.16	0.03

WD03

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
WD03_250622	25 Jun 2022	0.03	<0.01	0.03

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
GW06	28 Jun 2022	0.01	<0.01	0.22
GW06	06 Feb 2023	<0.01	<0.01	0.04

GW06

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
GW03	28 Jun 2022	0.01	0.33	0.12
GW03	05 Feb 2023	0.02	0.46	0.15

GW03

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
WD01_260622	26 Jun 2022	0.96	2.16	1.07

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
WD02_260622	26 Jun 2022	0.36	0.88	0.43

PIT 1

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
Pit1_280622	28 Jun 2022	0.74	4.33	0.90

PIT 2

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
Pit2_280622	28 Jun 2022	2.45	3.56	2.64

PIT 3

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
Pit3_280622	28 Jun 2022	1.37	4.02	1.56

WD01 WD02

SS06

I.D.	DATE	PFOS	PFOA	PFHxS + PFOS
SS06_220622	22 Jun 2022	17.6	196	34.4

	PFOS	PFOA	PFHxS +PFOS
	µg/L	µg/L	µg/L
EQL	0.0002	0.0005	0.0002
PFAS NEMP 2020 Drinking Water	-	0.56	0.07
PFAS NEMP 2020 Freshwater 95%	0.13	220	-
PFAS NEMP 2020 Recreational Water	-	10	2

revision	no.	description	drawn	approved	date
	A	ORIGINAL ISSUE			

0 110 220 330 440

Scale 1:11,000 (A3) M

drawn	ENVIRONMAPS
approved	MJ
date	28/08/2023
scale	AS SHOWN
original size	A3

TETRA TECH COFFEY

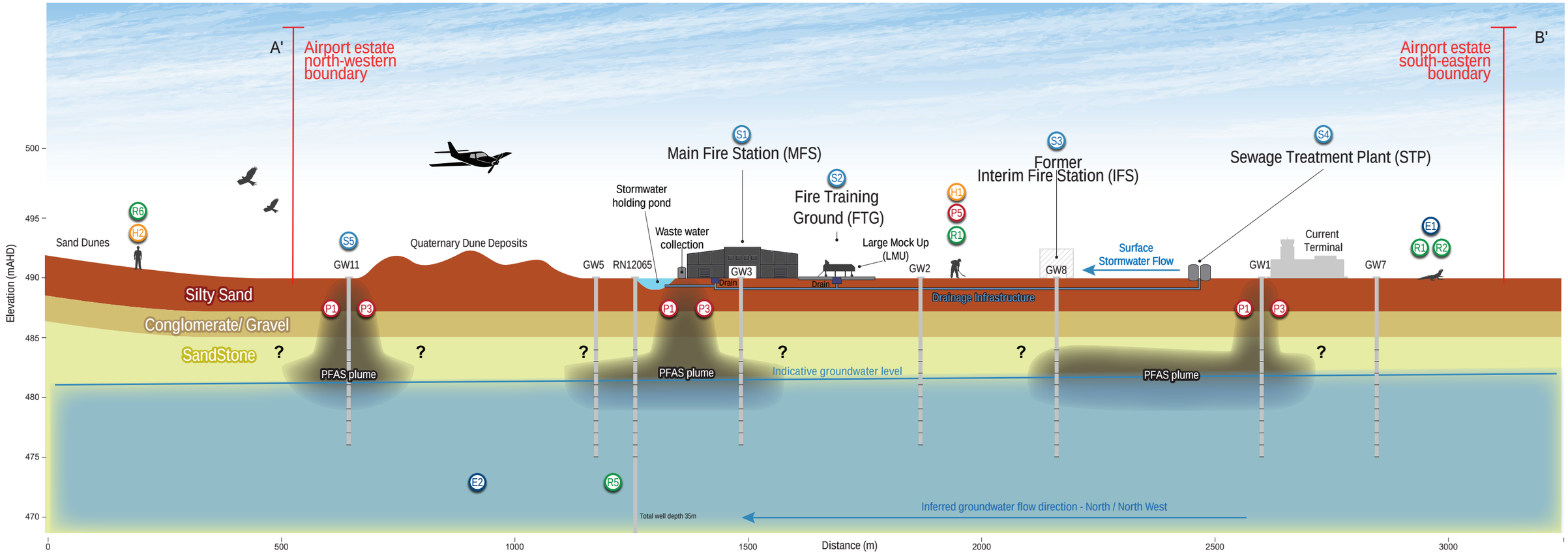
client: AIRSERVICES AUSTRALIA

project: AYERS ROCK AIRPORT (AYQ) - TSI REPORT

title: GROUNDWATER AND SURFACE WATER PFAS ANALYSIS RESULTS (2022 - 2023)

project no: 754-PEREN233360 | figure no: 7 | rev: A

ENVIRONMAPS Environmental Mapping Solutions t: 0406 590 006 www.environmaps.com.au



LEGEND

Potential Sources

- S1 Main Fire Station (MFS)
- S2 Fire Training Ground (FTG)
- S3 Interim Fire Station (IFS)
- S4 Sewage Treatment Plant (STP)
- S5 Unknown

Potential Pathways

- P1 Adsorption of contaminants onto shallow soils and sediments
- P2 Lateral migration of contaminants in groundwater in the direction of groundwater flow and expression in surface water systems
- P3 Vertical migration through the soil profile via rainfall infiltration to groundwater
- P4 Abstraction of groundwater via registered or unregistered bore
- P5 Transport of contaminants in surface water in storm water run-off via discharge to drainage systems and discharge to sensitive receiving environments

Potential Exposure Routes

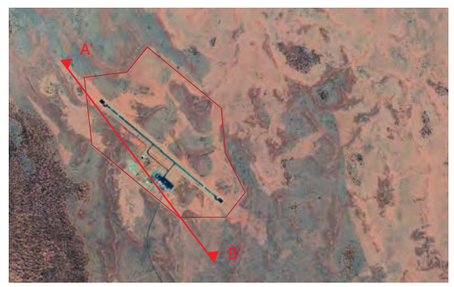
- R1 Direct exposure via incidental ingestion of the contamination in soil or sediment, inhalation of soil or sediment derived dust
- R2 Direct exposure via root water uptake for on-airport flora and the subsequent ingestion of the contamination by on-airport fauna
- R3 Direct or indirect exposure via ingestion of impacted groundwater or surface water
- R4 Direct or indirect exposure via ingestion of impacted groundwater or surface water and/or from ingestion of bio-accumulated PFAS within the food chain.
- R5 Direct exposure via ingestion of groundwater
- R6 Direct exposure via incidental ingestion of abstracted groundwater used for non-potable uses

Receptors

- H1 On-airport workers and site users and intrusive maintenance workers
- H2 Off-airport transient Traditional Owners and short duration seasonal users of Tali Wiru Dinner
- H3 Consumers of aquatic fish, crustaceans, molluscs or reptiles from within nearby rivers, creeks, flood plains and bays, etc an products sourced from surface water systems
- H4 Users of abstracted groundwater

Receptors

- E1 On airport terrestrial flora and fauna
- E2 Subsurface fauna in the groundwater aquifer
- E3 Aquatic flora and fauna, crustaceans, molluscs or reptiles from within nearby rivers, creeks, flood plains and bays



AIRSERVICES AUSTRALIA

AYERS ROCK AIRPORT (AYQ) TSI, REPORT

FIGURE 8 DRAFT

Conceptual Site Model

TETRA TECH COFFEY

DATE: 21.04.23 PROJECT: 754-PEREN233360 FILE:PEREN233360_R30_F008_GRA DOC REFERENCE: \\ETSS772GISFS1\DATA$\GIS\233360_PEREN_AIRSERVICES\GRAPHICS\PEREN233360_R30_GRA001.AI_4 SAVED BY: MG 20.04.23

DISCLAIMER: THIS FIGURE HAS BEEN PRODUCED FOR INTERNAL REVIEW ONLY AND MAY CONTAIN INCONSISTENCIES OR OMISSIONS. IT IS NOT INTENDED FOR PUBLICATION.

APPENDIX B - TABLES

Table 1a
PFAS in Soil, Sediment and Concrete - Total and Leachable Concentrations
Ayres Rock Airport - Targeted Site Investigation

| | | | Perfluoroalkane Sulfonic Acids | | | | | | | | | | | | Perfluoroalkane Carboxylic Acids | | | | | | | | | | | |

Table 1b
PFAS in Soil, Sediment and Concrete - Total Oxidizable Precursor Assay - Total and Leachable Concentrations
Ayres Rock Airport - Targeted Site Investigation

| | | | PFAS Total Oxidizable Precursor Assay | | |

Table 1c
Metals in Soil and Sediment
Ayres Rock Airport - Targeted Site Investigation

			Metals											
			Arsenic	Cadmium	Chromium (hexavalent)	Chromium (III+VI)	Copper	Lead	Mercury	Molybdenum	Nickel	Silver	Tin	Zinc	Selenium
			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL			**5**	**1**	**0.5**	**2**	**5**	**5**	**0.1**	**2**	**2**	**2**	**5**	**5**	**5**
NEPM 2013 HILs Commercial/			3,000	900	3,600	-	240,000	1,500	730	-	6,000	-	-	400,000	10,000
NEPM 2013 Table 1B(5) Generic EIL - Comm/Ind			160	-	-	-	-	1800	-	-	-	-	-	-	-
Field ID	**Date**	**Lab Report Number**													
Seepage Field - Soil Bores															
SB01_0.0_200622	20 Jun 2022	ES2223133	<5	<1	-	**16**	<5	<5	<0.1	-	<2	-	-	<5	-
SB02_0.0_200622	20 Jun 2022	ES2223133	<5	<1	-	**14**	<5	<5	<0.1	-	<2	-	-	**31**	-
SB03_0.0_200622	20 Jun 2022	ES2223133	<5	<1	-	**20**	**7**	<5	<0.1	-	**6**	-	-	**12**	-
SB04_0.0_200622	20 Jun 2022	ES2223133	<5	<1	-	**17**	<5	<5	<0.1	-	**2**	-	-	<5	-
SB05_0.0_200622	20 Jun 2022	ES2223133	<5	<1	-	**19**	<5	<5	<0.1	-	**2**	-	-	**6**	-
SB28_0.0_200622	20 Jun 2022	ES2223133	<5	<1	-	**18**	<5	<5	<0.1	-	**2**	-	-	**6**	-
SB29_0.0_200622	20 Jun 2022	ES2223133	<5	<1	-	**17**	<5	<5	<0.1	-	**2**	-	-	**8**	-
Interim Fire Station - Soil Bores															
SB06_0.0_200622	20 Jun 2022	ES2223151	<5	<1	-	**17**	<5	<5	<0.1	-	**2**	-	-	**15**	-
SB07_0.0_240622	24 Jun 2022	ES2223151	<5	<1	-	**25**	**8**	**5**	<0.1	-	**4**	-	-	**5**	-
SB08_0.0_240622	24 Jun 2022	ES2223151	<5	<1	-	**21**	**16**	<5	<0.1	-	**4**	-	-	**6**	-
SB31_0.0_240622	24 Jun 2022	ES2223151	<5	<1	-	**22**	<5	<5	<0.1	-	**3**	-	-	<5	-
SB33_0.0_240622	24 Jun 2022	ES2223334	<5	<1	-	**16**	**7**	<5	<0.1	-	**5**	-	-	**6**	-
ARFFS Fire Station - Soil Bores															
SB17_0.0_260622	26 Jun 2022	ES2223334	<5	<1	-	**22**	<5	<5	<0.1	-	**2**	-	-	<5	-
SB18_0.0_250622	25 Jun 2022	ES2223154	<5	<1	-	**20**	<5	<5	<0.1	-	<2	-	-	<5	-
SB19_0.0_250622	25 Jun 2022	ES2223154	<5	<1	-	**22**	<5	<5	<0.1	-	**3**	-	-	**7**	-
YAP1_0.0_250622	25 Jun 2022	ES2223155	<5	<1	-	**20**	<5	<5	<0.1	-	<2	-	-	<5	-
ARFFS Fire Station - Sediment Samples															
SS12_250622	25 Jun 2022	ES2223155	<5	<1	-	**28**	**2,340**	**21**	<0.1	-	**19**	-	-	**1,380**	-
FTG - Soil Bores															
YAP2_0.0_240622	24 Jun 2022	ES2223152	<5	<1	-	**22**	**8**	<5	<0.1	-	**6**	-	-	<5	-
YAP3_0.0_230622	22 Jun 2022	ES2223150	<5	<1	-	**57**	**8**	<5	<0.1	-	**4**	-	-	**7**	-
YAP4_0.0_230622	23 Jun 2022	ES2223150	<5	<1	-	**38**	**6**	<5	<0.1	-	**4**	-	-	<5	-
YAP4_0.45_230622	23 Jun 2022	ES2223150	<5	<1	-	**27**	<5	<5	<0.1	-	**2**	-	-	<5	-
SB10_0.0_240622	24 Jun 2022	ES2223152	<5	<1	-	**24**	**6**	**6**	<0.1	-	**4**	-	-	<5	-
SB10_0.45_240622	24 Jun 2022	ES2223152	<5	<1	-	**18**	<5	<5	<0.1	-	**4**	-	-	**6**	-
SB12_0.0_240622	24 Jun 2022	ES2223153	<5	<1	-	**25**	**8**	<5	<0.1	-	**4**	-	-	**6**	-
SB12_0.3_240622	24 Jun 2022	ES2223153	<5	<1	-	**26**	**6**	<5	<0.1	-	**3**	-	-	**5**	-
SB13_0.0-0.2	20 Jun 2022	ES2226831	<5	<1	-	**24**	**44**	<5	<0.1	-	**13**	-	-	**16**	-
SB13_0.45_230622	22 Jun 2022	ES2223150	<5	<1	-	**20**	<5	<5	<0.1	-	<2	-	-	<5	-
FTG - Sediment Samples															
SS05_220622	22 Jun 2022	ES2223133	<5	<1	-	**65**	**23**	**12**	<0.1	-	**12**	-	-	**961**	-
Pit1_sed	26 Jun 2022	ES2223157	<5	<1	<0.5	-	**13**	**5**	<0.1	<2	**8**	<2	<5	**59**	<5
Stormwater Drain - Sediment Samples															
SS01_220622	22 Jun 2022	ES2223157	<5	<1	-	**32**	**17**	**10**	<0.1	-	**12**	-	-	**15**	-
SS03_220622	22 Jun 2022	ES2223150	<5	<1	-	**24**	**5**	<5	<0.1	-	**3**	-	-	<5	-
SS04_0.0-0.2	20 Jun 2022	ES2226831	<5	<1	-	**25**	**10**	**6**	<0.1	-	**4**	-	-	**8**	-
Miscellaneous															
Waste_drum1	27 Jun 2022	ES2223157	<5	<1	<0.5	-	**12**	<5	<0.1	<2	**8**	<2	<5	**14**	<5

Environmental Standards
NEPM, NEPM 2013 HILs Commercial/Industrial D Soil
NEPM, NEPM 2013 Table 1B(5) Generic EIL - Comm/Ind

Table 1d
Hydrocarbons in Soil and Sediment
Ayrea Rock Airport - Targeted Site Investigation

			Total Recoverable Hydrocarbons							BTEX								Monocylic Aromatic Hydrocarbons										Polycyclic Aromatic Hydrocarbons																	
			C6 - C10 Fraction	F1 (C6-C10) minus BTEX	>C10 - C16 Fraction	F2 (>C10 - C16) minus Naphthalene	>C16 - C34 Fraction	>C34 - C40 Fraction	C10 - C40 Fraction (sum)	Naphthalene (VOC)	Benzene	Toluene	Ethylbenzene	Xylene (m & p)	Xylene (o)	Xylene Total	Total BTEX	1,3,5-trimethylbenzene	1,2,4-trimethylbenzene	Isopropylbenzene	Styrene	n-butylbenzene	n-propylbenzene	p-isopropyltoluene	sec-butylbenzene	tert-butylbenzene	Monocylic aromatic hydrocarbons EPAVic	Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a) pyrene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Benzo(b+j+k)fluoranthene	Chrysene	Benzo(b+j)fluoranthene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Phenanthrene	Pyrene	Naphthalene	PAHs (Sum of total)	PAHs (Vic EPA List)
			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL			**10**	**10**	**50**	**50**	**100**	**100**	**50**	**1**	**0.2**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.2**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.2**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**1**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**
NEPM 2013 HILs Commercial/			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4,000	-
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand, Depth 0 m to <1 m			-	260	-	-	-	-	-	-	3	-	-	-	-	230	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NEPM 2013 Table 1B(5) Generic EIL - Comm/Ind			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	370	-	-
NEPM 2013 Table 1B(6) ESLs for Comm/Ind, Coarse Soil >0m - <2m			-	215	170	-	1,700	3,300	-	-	75	135	165	-	-	180	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.4	-	-	-	-	-	-	-	-	-	-	-	-
NEPM 2013 Table 1B(7) Management Limits Comm / Ind, Coarse Soil			700	-	1,000	-	3,500	10,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PFAS NEMP 2020 Ecological direct exposure			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PFAS NEMP 2020 Ecological indirect exposure			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PFAS NEMP 2020 Industrial/ commercial (HIL D			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Field ID	**Date**	**Lab Report Number**																																											
Interim Fire Station - Soil Bores																																													
SB30_0.3_240622	24 Jun 2022	ES2223151	<10	<10	<50	<50	<100	<100	<50	<1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	-	-	-	-	-	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-
SB32_0.3_240622	24 Jun 2022	ES2223151	<10	<10	<50	<50	<100	<100	<50	<1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	-	-	-	-	-	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-
SB34_0.3_240622	24 Jun 2022	ES2223154	<10	<10	<50	<50	<100	<100	<50	<1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ARFFS Fire Station - Soil Bores																																													
SB19_0.3_250622	25 Jun 2022	ES2223154	<10	<10	<50	<50	<100	<100	<50	<1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
YAP1_0.3_250622	25 Jun 2022	ES2223155	<10	<10	<50	<50	<100	<100	<50	<1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-
ARFFS Fire Station - Sediment Samples																																													
SS07_250622	25 Jun 2022	ES2223155	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-
SS08_250622	25 Jun 2022	ES2223155	<10	<10	<50	<50	<100	<100	<50	<1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SS09_0.0-0.2	20 Jun 2022	ES2226831	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-
SS09_250622	25 Jun 2022	ES2223155	<10	<10	<50	<50	**450**	**310**	**760**	<1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SS12_250622	25 Jun 2022	ES2223155	<10	<10	<50	<50	**120**	<100	**120**	<1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
FTG - Soil Bores																																													
YAP2_0.0_240622	24 Jun 2022	ES2223152	<10	<10	<50	<50	<100	<100	<50	<1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	-	-	-	-	-	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-
YAP2_0.6_240622	24 Jun 2022	ES2223152	<10	<10	<50	<50	<100	<100	<50	<1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
YAP3_0.0_230622	22 Jun 2022	ES2223150	<10	<10	<50	<50	<100	<100	<50	<1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	-	-	-	-	-	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-
YAP3_0.6_230622	23 Jun 2022	ES2223150	<10	<10	<50	<50	<100	<100	<50	<1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
YAP4_0.0_230622	23 Jun 2022	ES2223150	<10	<10	<50	<50	<100	<100	<50	<1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	-	-	-	-	-	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-
SB10_0.0_240622	24 Jun 2022	ES2223152	<10	<10	<50	<50	<100	<100	<50	<1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	-	-	-	-	-	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-
SB12_0.0_240622	24 Jun 2022	ES2223153	<10	<10	<50	<50	<100	<100	<50	<1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	-	-	-	-	-	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-
SB13_0.0-0.2	20 Jun 2022	ES2226831	<10	<10	<50	<50	<100	<100	<50	<1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	-	-	-	-	-	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-
SB27_1.4_240622	24 Jun 2022	ES2223152	-	-	-	-	-	-	-	<1	<0.2	<0.5	<0.5	<0.5	<0.5	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
FTG - Sediment Samples																																													
SS05_220622	22 Jun 2022	ES2223133	**16**	**16**	**2,350**	**2,350**	**4,160**	<100	**6,510**	<1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	**1.0**	<0.5	**1.0**	-
Pit1_sed	20 Jun 2022	ES2226831	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pit1_sed	26 Jun 2022	ES2223157	**80**	**80**	**28,000**	**28,000**	**3,570**	<100	**31,600**	**2**	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	<0.5	-	-	-	-	-	<0.2	**1.3**	**1.7**	**0.6**	**0.6**	**0.6**	**0.7**	-	**1.3**	**0.6**	-	<0.5	**2.6**	**2.2**	<0.5	**2.7**	**4.4**	**6.4**	-	**25.7**
Stormwater Drain - Sediment Samples																																												
SS01_220622	22 Jun 2022	ES2223157	<10	<10	<50	<50	<100	<100	<50	<1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	-	-	-	-	-	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-
SS03_220622	22 Jun 2022	ES2223150	<10	<10	<50	<50	<100	<100	<50	<1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	-	-	-	-	-	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-
SS04	24 Jun 2022	ES2223153	<10	<10	<50	<50	<100	<100	<50	<1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Miscellaneous																																													
Waste_drum1	27 Jun 2022	ES2223157	<10	<10	<50	<50	<100	<100	<50	<1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	<0.5	-	-	-	-	-	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<1.0	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5

Environmental Standards
NEPM, NEPM 2013 HILs Commercial/Industrial D Soil
NEPM, NEPM 2013 Table 1B(7) Management Limits Comm / Ind, Coarse Soil
NEPM, NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand, Depth 0 m to <1 m
NEPM, NEPM 2013 Table 1B(5) Generic EIL - Comm/Ind
NEPM, NEPM 2013 Table 1B(6) ESLs for Comm/Ind, Coarse Soil

Table 1d
Pesticides and Herbicides in Soil and Sediment
Ayres Rock Airport - Targeted Site Investigation

| | | | Organochlorine Pesticides | | | | | | | | | | | | | | | | | | | | | | | | | | Organophosphorous Pesticides | | | | | | | | | | | | | | | | | | |

Table 1F
Volatile Organic Compounds in Soil and Sediment
Ayres Rock Airport - Targeted Site Investigation

| | | PCBs | Volatile Organic Compounds | | |

Table 1g
Soil ASLP Analytical Results - 2023
Airservices Australia Ayers Rock Airport (AYQ) – Targeted Site Investigation

				NA	Inorganics	Perfluoroalkane Sulfonic Acids						Perfluoroalkane Carboxylic Acids										(n:2) Fluorotelomer Sulfonic Acids				Perfluoroalkyl Sulfonamides							PFAS	
				Sum of PFAS (WA DER List)_	pH (Final)	Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorodecanoic acid (PFDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorononanoic acid (PFNA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluoroundecanoic acid (PFUnDA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFHxS and PFOS	Sum of PFAS
				µg/L	-	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL				**0.01**	**0.1**	**0.02**	**0.02**	**0.01**	**0.02**	**0.01**	**0.02**	**0.1**	**0.02**	**0.02**	**0.02**	**0.01**	**0.02**	**0.02**	**0.02**	**0.05**	**0.02**	**0.02**	**0.05**	**0.05**	**0.05**	**0.05**	**0.02**	**0.05**	**0.02**	**0.05**	**0.05**	**0.02**	**0.05**	**0.01**	**0.01**
Field ID	**Date**	**Lab Report Number**	**Sample Code**																																
Stormwater Drain																																			
S844_0.4-0.5	04 Feb 2023	ES2309421	ES2309421002	**0.33**	**8.2**	<0.02	<0.02	<0.01	<0.02	**0.13**	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	**0.13**	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	**0.20**	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	**0.13**	**0.46**
S844_0.9-1.0	04 Feb 2023	ES2309421	ES2309421003	**0.21**	**9.0**	<0.02	<0.02	<0.01	<0.02	**0.08**	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	**0.05**	<0.02	**0.05**	<0.05	<0.02	<0.02	<0.05	<0.05	**0.13**	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	**0.08**	**0.31**
Sewage Treatment Plant																																			
S845_0-0.2	03 Feb 2023	ES2309421	ES2309421001	**0.12**	**6.5**	<0.02	<0.02	**0.01**	<0.02	**0.01**	<0.02	<0.1	<0.02	<0.02	<0.02	**0.10**	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	**0.02**	**0.12**
S847_0.4-0.5	03 Feb 2023	ES2309421	ES2309421004	**0.15**	**7.6**	<0.02	<0.02	**0.04**	<0.02	**0.02**	<0.02	<0.1	<0.02	**0.08**	<0.02	**0.01**	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	**0.06**	**0.15**
S847_0.9-1.0	03 Feb 2023	ES2309421	ES2309421005	**0.04**	**7.0**	<0.02	<0.02	**0.02**	<0.02	<0.01	<0.02	<0.1	<0.02	**0.02**	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	**0.02**	**0.04**

TETRA TECH COFFEY

Table 2a

Groundwater Gauging and Water Quality Parameters - 2022

Ayers Rock Airport (AYQ) – Targeted Site Investigation

Well ID	Easting	Northing	RL TOC (mAHD)	Date Measured	Time Measured	Depth to Water (mBTOC)	SWL (mAHD)	Total Well Depth (mBTOC)	Date Hydrosleeve Deployed	Dissovled Oxygen (mg/L)	Electrical Conductivity (µS/cm)	TDS* (mg/L)	pH (pH units)	Redox Potential (mV)	Temperature (°C)	Comments
GW01	698,962.23	7,212,359.25	492.62	27/06/2022	4:46 PM	9.690	482.930	15.00	28/06/2022	5.94	2782	1808	7.35	265.0	23.2	Clear
GW02	698,824.01	7,212,592.63	491.91	28/06/2022	9:27 AM	9.065	482.730	14.00	28/06/2022	4.90	3030	1970	7.37	140.0	25.6	Slightly cloudy
GW03	698,717.86	7,212,828.81	492.17	27/06/2022	4:10 PM	9.610	482.500	14.00	28/06/2022	-	1565	1017	7.53	123.8	21.4	Slightly cloudy
GW04	698,812.00	7,213,197.00	492.49	28/06/2022	8:59 AM	10.940	482.435	15.00	28/06/2022	5.35	4436	2883	7.20	146.0	24.8	Clear
GW05	698,638.00	7,213,090.00	492.99	28/06/2022	9:13 AM	11.435	482.340	15.00	28/06/2022	5.95	2445	1589	7.40	141.0	23.9	Clear
GW06	698,913.33	7,212,865.66	491.47	28/06/2022	1:24 PM	8.810	482.585	15.00	28/06/2022	6.62	826	537	7.68	121.1	24.8	Clear
RN12065	698,865.43	7,213,077.70	492.64	-	-	-	482.542	-	28/06/2022	2.50	2576	1674	8.38	72.5	24.3	Clear
RN12081	698,936.46	7,211,120.69	496.19	27/06/2022	10:13 AM	13.080	483.166	90.00	28/06/2022	3.19	2939	1910	8.45	-10.0	23.9	Clear. Slight rotten egg odour
RN12082	699,627.00	7,211,398.00	-	27/06/2022	9:38 AM	12.880	-	-	28/06/2022	7.18	4809	3126	7.17	282.7	23.0	Very cloudy
RN12163	699,627.38	7,211,397.86	495.30	27/06/2022	9:09 AM	13.090	483.056	14.06 (blocked)	-	-	-	-	-	-	-	

Australian height datum (AHD)

* = TDS gained by multiplying electrical conductivity by 0.65

TETRA TECH COFFEY

Table 2b
Groundwater Gauging and Water Quality Parameters - 2023
Ayers Rock Airport (AYQ) – Targeted Site Investigation

Well ID	Easting	Northing	RL TOC (mAHD)	Date Measured	Time Measured	Depth to Water (mBTOC)	SWL (mAHD)	Total Well Depth (mBTOC)	Date Hydrasleeve Deployed	Dissovled Oxygen (mg/L)	Electrical Conductivity (µS/cm)	TDS* (mg/L)	pH (pH units)	Redox Potential (mV)	Temperature (°C)	Comments
GW01	698962.228	7212359.252	492.62	04/02/2023	12:15	9.692	482.928	15	04/02/2023	3.16	2466	1603	7.48	126.0	30.4	Clear, no observable turbidity
GW02	698824.009	7212592.625	491.91	04/02/2023	13:00	9.067	482.843	14	04/02/2023	1.03	2706	1759	7.31	119.7	29.2	Clear, no observable turbidity
GW03	698717.856	7212828.808	492.17	04/02/2023	13:40	9.659	482.511	14	04/02/2023	4.87	1521	989	7.66	121.0	29.7	Clear, no observable turbidity
GW04	698812.153	7213196.930	492.49	05/02/2023	9:00	11.210	481.280	15	05/02/2023	3.27	4614	2999	7.30	111.1	29.5	Clear, no observable turbidity
GW05	698637.731	7213089.898	492.99	05/02/2023	8:10	11.655	481.335	15	05/02/2023	1.43	2318	1507	7.37	115.0	28.4	Clear, no observable turbidity
GW06	698913.329	7212865.655	491.47	05/02/2023	7:30	8.896	482.574	15	05/02/2023	2.07	1015	660	7.58	100.2	29.3	Clear, no observable turbidity
GW07	699116.243	7212188.066	494.33	05/02/2023	12:00	11.504	482.826	15	05/02/2023	1.38	2520	1638	7.38	102.4	26.1	Clear, no observable turbidity
GW08	698966.861	7212489.676	492.51	05/02/2023	12:30	9.665	482.845	15	05/02/2023	1.85	2662	1730	7.19	110.3	25.8	Slightly cloudy, pale yellow, low turbidity
GW09	699130.608	7212922.144	491.40	05/02/2023	9:30	8.874	482.526	15	05/02/2023	1.89	831	540	7.75	92.8	30.5	Slightly cloudy, pale yellow, low turbidity
GW10	698117.293	7213048.706	493.75	05/02/2023	10:10	12.150	481.600	15	05/02/2023	1.97	3647	2371	7.08	129.1	28.4	Clear, no observable turbidity
GW11	698163.310	7213766.856	490.25	05/02/2023	10:30	9.150	481.100	14	05/02/2023	0.63	861	560	7.68	91.9	27.3	Clear, no observable turbidity
RN012065	698865.434	7213077.704	492.64	7/02/2023	10:00	10.240	482.400	35	7/02/2023	0.26	2368	1539	8.62	51.1	24.3	Clear, no observable turbidity

Australian height datum (AHD)

* = TDS gained by multiplying electrical conductivity by 0.65

Table 3a
PFAS in Groundwater
Ayres Rock Airport - Targeted Site Investigation

				Perfluoroalkane Sulfonic Acids						Perfluoroalkane Carboxylic Acids											Fluorotelomer Sulfonic Acids				Perfluoroalkyl Sulfonamides							PFAS	
				Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorodecanoic acid (PFDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorononanoic acid (PFNA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluoroundecanoic acid (PFUnDA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFHxS and PFOS	Sum of PFAS
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL				**0.0005**	**0.0005**	**0.0005**	**0.0005**	**0.0002**	**0.0005**	**0.002**	**0.0005**	**0.0005**	**0.0005**	**0.0005**	**0.0005**	**0.0005**	**0.0005**	**0.0005**	**0.0005**	**0.0005**	**0.001**	**0.001**	**0.001**	**0.001**	**0.0005**	**0.001**	**0.0005**	**0.001**	**0.001**	**0.001**	**0.0005**	**0.001**	**0.0002**	**0.0002**
PFAS NEMP 2020 Drinking Water				-	-	0.07	-	0.07	-	-	-	-	-	0.56	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.07	-
PFAS NEMP 2020 Freshwater 95%				-	-	-	-	0.13	-	-	-	-	-	220	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PFAS NEMP 2020 Recreational Water				-	-	2	-	2	-	-	-	-	-	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-
Field ID	**Date**	**Lab Report Number**	**Sample Code**																														
Monitoring Wells																																	
GW01	28 Jun 2022	ES2223156	ES2223156007	**0.92**	**0.69**	**1.65**	<0.02	**0.06**	<0.02	**1.8**	**2.60**	**2.32**	**1.27**	**0.72**	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	**1.71**	**12.0**
GW01	05 Feb 2023	ES2305043	ES2305043080	**0.81**	**0.69**	**1.92**	**0.02**	**0.07**	<0.02	**2.2**	**2.86**	**2.31**	**1.23**	**0.82**	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	**1.99**	**12.9**
GW02	28 Jun 2022	ES2223156	ES2223156008	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01
GW02	05 Feb 2023	ES2305043	ES2305043077	<0.0005	<0.0005	**0.0006**	<0.0005	**0.0003**[#]	<0.0005	<0.0020	<0.0005	**0.0006**	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.0005	<0.001	<0.001	<0.001	<0.0005	**0.0006**	**0.0035**[#]
GW03	28 Jun 2022	ES2223156	ES2223156009	**0.04**	**0.03**	**0.11**	<0.02	**0.01**	<0.02	**0.3**	**0.52**	**0.59**	**0.69**	**0.33**	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	**0.12**	**2.62**
GW03	05 Feb 2023	ES2305043	ES2305043079	**0.04**	**0.03**[#]	**0.13**	<0.02	**0.02**	<0.02	**0.4**	**0.62**	**0.74**	**0.78**	**0.46**	<0.02	<0.02	**0.04**	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	**0.15**	**3.25**
GW04	28 Jun 2022	ES2223156	ES2223156011	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01
GW04	06 Feb 2023	ES2305043	ES2305043083	**0.0032**	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0020	**0.0010**	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.0005	<0.001	<0.001	<0.001	<0.0005	<0.0002	**0.0042**
GW05	28 Jun 2022	ES2223156	ES2223156012	<0.02	<0.02	**0.03**	<0.02	**0.09**	<0.02	<0.1	**0.07**	**0.07**	**0.14**	**0.20**	**0.02**	<0.02	**0.09**	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	**0.12**	**0.71**
GW05	06 Feb 2023	ES2305043	ES2305043084	<0.02	<0.02	**0.04**	<0.02	**0.10**	<0.02	<0.1	**0.07**	**0.07**	**0.15**	**0.23**	<0.02	<0.02	**0.08**	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	**0.14**	**0.74**
GW06	28 Jun 2022	ES2223156	ES2223156013	**0.05**	**0.06**	**0.21**	<0.02	**0.01**	<0.02	<0.1	**0.03**	**0.09**	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	**0.22**	**0.45**
GW06	06 Feb 2023	ES2305043	ES2305043085	**0.02**	<0.02	**0.04**	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	**0.04**	**0.06**
GW07	06 Feb 2023	ES2305043	ES2305043086	**0.0058**	**0.0038**	**0.0096**	<0.0005	**0.0029**	<0.0005	**0.0029**	**0.0106**	**0.0010**	<0.0005	**0.0007**	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.0005	<0.001	<0.001	<0.0005	<0.001	**0.0125**	**0.0373**
GW08	06 Feb 2023	ES2305043	ES2305043087	**0.233**	**0.137**	**0.498**	**0.0157**	**0.412**	<0.0016	**0.858**	**0.882**	**0.592**	**0.443**	**0.145**	<0.0016	<0.0016	<0.0016	<0.0040	<0.0016	<0.0016	<0.002	<0.002	<0.002	<0.002	<0.0016	<0.004	<0.0016	<0.004	<0.004	<0.0016	<0.004	**0.910**	**4.22**
GW09	06 Feb 2023	ES2305043	ES2305043088	**0.0082**	**0.0073**	**0.0428**	<0.0005	**0.0041**	<0.0005	**0.0543**	**0.0510**	**0.0207**	**0.0151**	**0.0113**	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.0005	<0.001	<0.001	<0.0005	<0.001	**0.0469**	**0.215**
GW10	06 Feb 2023	ES2305043	ES2305043089	<0.0005	<0.0005	**0.0017**	<0.0005	**0.0091**	<0.0005	**0.0026**	<0.0005	**0.0007**	<0.0005	**0.0028**	**0.0008**	<0.0005	**0.0006**	<0.0005	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.0005	<0.001	<0.001	<0.0005	<0.001	**0.0108**	**0.0183**
GW11	06 Feb 2023	ES2305043	ES2305043090	**0.0499**	**0.0562**	**0.481**	**0.0180**	**0.776**	<0.0005	**0.0374**	**0.0533**	**0.120**	**0.0199**	**0.0414**	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.0005	<0.001	<0.001	<0.0005	<0.001	**1.26**	**1.65**
RN12065	28 Jun 2022	ES2223156	ES2223156006	<0.02	<0.02	**0.03**	<0.02	**0.04**	<0.02	<0.1	<0.02	**0.06**	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	**0.07**	**0.13**
RN12065	08 Feb 2023	ES2305043	ES2305043095	**0.0167**	**0.0074**	**0.0225**	<0.0005	**0.0389**	<0.0005	<0.0020	**0.0438**	**0.0800**	**0.0023**	**0.0013**	**0.0006**	<0.0005	**0.0009**	<0.0005	<0.0005	<0.0005	<0.001	**0.006**	<0.001	<0.001	**0.0006**	<0.001	<0.0005	<0.001	<0.001	<0.0005	<0.001	**0.0614**	**0.221**
RN12081	28 Jun 2022	ES2223156	ES2223156004	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01
RN12082	28 Jun 2022	ES2223156	ES2223156003	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01

[#] Duplicate sample is reported as this is higher than the primary sample

Table 3b
Total Oxidisable Precursor Assay for PFAS in Groundwater
Ayres Rock Airport - Targeted Site Investigation

				PFAS TOPA																																
				N-Ethyl perfluorooctane sulfonamide (EtFOSA)_	N-Ethyl perfluorooctane sulfonamidoacetic acid (Et	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE	N-Methyl perfluorooctane sulfonamide (MeFOSA)_	N-Methyl perfluorooctane sulfonamidoacetic acid (M	N-Methyl perfluorooctane sulfonamidoethanol (MeFOS_	Perfluorooctane sulfonamide (FOSA)_	Post-Perfluoroheptane sulfonate (PFHpS)	Post-Perfluorohexane sulfonate (PFHxS)	Post-Perfluorooctane sulfonate (PFOS)	Post-Perfluorooctanoic acid (PFOA)	Sum of PFHxS and PFOS_	Sum of TOP C4 - C14 as Fluorine	Sum of TOP C4 - C14 Carboxylates and C4 - C8 Sulfo	10:2 FTS (TOPA)	4:2 FTS (TOPA)	6:2 FTS (TOPA)	8:2 FTS (TOPA)	Perfluorobutanesulfonic acid (TOPA)	Perfluorobutanoic acid (TOPA)	Perfluorodecanesulfonic acid_	Perfluorodecanoic acid (TOPA)	Perfluorododecanoic acid (TOPA)	Perfluoroheptanoic acid (TOPA)	Perfluorohexanoic acid (TOPA)	Perfluorononanoic acid (TOPA)	Perfluoropentanesulfonic acid (TOPA)	Perfluoropentanoic acid (TOPA)	Perfluorotetradecanoic acid (TOPA)	Perfluorotridecanoic acid (TOPA)	Perfluoroundecanoic acid (TOPA)	Sum of PFASs (n=30) TOPA
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL				**0.05**	**0.02**	**0.05**	**0.05**	**0.02**	**0.05**	**0.02**	**0.02**	**0.01**	**0.01**	**0.01**	**0.01**	**0.01**	**0.01**	**0.01**	**0.05**	**0.05**	**0.05**	**0.05**	**0.02**	**0.1**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.05**	**0.02**	**0.02**	**0.01**
PFAS NEMP 2020 Drinking Water				-	-	-	-	-	-	-	-	0.07	0.07	0.56	0.07	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PFAS NEMP 2020 Freshwater 95%				-	-	-	-	-	-	-	-	-	0.13	220	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PFAS NEMP 2020 Recreational Water				-	-	-	-	-	-	-	-	2	2	10	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Field ID	**Date**	**Lab Report Number**	**Sample Code**																																	
Monitoring Wells																																				
GW01	28 Jun 2022	ES2223156	ES2223156007	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.02	**1.49**	**0.05**	**0.59**	**1.54**	**7.44**	**11.6**	<0.05	<0.05	<0.05	<0.05	**0.85**	**1.9**	<0.02	<0.02	<0.02	**1.12**	**2.45**	<0.02	**0.62**	**2.55**	<0.05	<0.02	<0.02	**11.6**
GW02	28 Jun 2022	ES2223156	ES2223156008	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01
GW03	28 Jun 2022	ES2223156	ES2223156009	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.02	**0.10**	**0.01**	**0.28**	**0.11**	**1.57**	**2.38**	<0.05	<0.05	<0.05	<0.05	**0.03**	**0.3**	<0.02	<0.02	<0.02	**0.54**	**0.59**	<0.02	**0.02**	**0.51**	<0.05	<0.02	<0.02	**2.38**
GW04	28 Jun 2022	ES2223156	ES2223156011	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01
RN12065	28 Jun 2022	ES2223156	ES2223156006	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.02	**0.02**	**0.06**	<0.01	**0.08**	**0.15**	**0.23**	<0.05	<0.05	<0.05	<0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	**0.09**	<0.02	<0.02	**0.06**	<0.05	<0.02	<0.02	**0.23**

Table 3c
Hydrocarbons in Groundwater
Ayres Rock Airport - Targeted Site Investigation

				TPH										Total Recoverable Hydrocarbons	BTEX							
				F1 (C6-C10) less BTEX	F2 C10-C16 (minus Naphthalene)	C6 - C9	C10 - C14	C15 - C28	C29-C36	+C10 - C36 (Sum of total)	F1 (C6-C10_)	F2 (C10-C16 Hydrocarbons)	F3 (C16-C34 Hydrocarbons)	C34-C40	C10 - C40 (Sum of total)	Naphthalene (VOC)	Benzene	Toluene	Ethylbenzene	Xylene (m & p)	Xylene (o)	Xylene Total	Total BTEX
				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL				**0.02**	**0.05**	**0.02**	**0.05**	**0.1**	**0.05**	**0.05**	**0.02**	**0.05**	**0.1**	**0.1**	**0.1**	**0.005**	**1**	**1**	**1**	**2**	**1**	**2**	**1**
ADWG 2022 Aesthetic				-	-	-	-	-	-	-	-	-	-	-	-	-	-	25	3	-	-	20	-
ADWG 2022 Health				-	-	-	-	-	-	-	-	-	-	-	-	-	1	800	300	-	-	600	-
ANZG (2018) Freshwater 95% LOSP Toxicant DGVs				-	-	-	-	-	-	-	-	-	-	-	-	-	950	180	80	-	350	-	-
ANZG (2018) Freshwater 95% toxicant DGVs				-	-	-	-	-	-	-	-	-	-	-	-	-	950	-	-	-	350	-	-
DOH 2014 (WA) Domestic Non-Potable Groundwater Use (NPUG)				-	-	-	-	-	-	-	-	-	-	-	-	-	10	25	3	-	-	20	-
WHO (2008) Domestic Non-Potable Domestic Use, derived by applying a 10x multiplication factor to the drinking water guideline value.				-	1	-	-	-	-	-	3	-	0.9	0.9	-	-	-	-	-	-	-	-	-
WHO DWQG 4th Ed				-	-	-	-	-	-	-	-	-	-	-	-	-	10	700	300	-	-	500	-
Field ID	Date	Lab Report Number	Sample Code																				
Monitoring Wells																							
GW02	28 Jun 2022	ES2223156	ES2223156008	**<0.02**	**<0.1**	**<0.02**	**0.07**	**<0.1**	**<0.05**	**0.07**	**<0.02**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.005**	**<1**	**<2**	**<2**	**<2**	**<2**	**<2**	**<1**
GW03	28 Jun 2022	ES2223156	ES2223156009	**<0.02**	**<0.1**	**<0.02**	**<0.05**	**<0.1**	**<0.05**	**<0.05**	**<0.02**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.005**	**<1**	**<2**	**<2**	**<2**	**<2**	**<2**	**<1**
GW05	28 Jun 2022	ES2223156	ES2223156012	**<0.02**	**<0.1**	**<0.02**	**<0.05**	**<0.1**	**0.06**	**0.06**	**<0.02**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.005**	**<1**	**7**	**<2**	**<2**	**<2**	**<2**	**7**

Environmental Standards
NHMRC, May 2022, ADWG 2022 Aesthetic
NHMRC, May 2022, ADWG 2022 Health
ANZG, March 2021, ANZG (2018) Freshwater 95% LOSP Toxicant DGVs
ANZG, 2018, ANZG (2018) Freshwater 95% toxicant DGVs
World Health Organization, 2011, WHO DWQG 4th Ed

Table 4a
PFAS in Infrastructure
Ayres Rock Airport - Targeted Site Investigation

				Perfluoroalkane Sulfonic Acids						Perfluoroalkane Carboxylic Acids											Fluorotelomer Sulfonic Acids				Perfluoroalkyl Sulfonamides							PFAS	
				Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorodecanoic acid (PFDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorononanoic acid (PFNA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluoroundecanoic acid (PFUnDA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFHxS and PFOS	Sum of PFAS
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL				**0.0005**	**0.0005**	**0.0005**	**0.0005**	**0.0002**	**0.0005**	**0.002**	**0.0005**	**0.0005**	**0.0005**	**0.0005**	**0.0005**	**0.0005**	**0.0005**	**0.0005**	**0.0005**	**0.0005**	**0.001**	**0.001**	**0.001**	**0.001**	**0.0005**	**0.001**	**0.0005**	**0.001**	**0.001**	**0.0005**	**0.001**	**0.0002**	**0.0002**
PFAS NEMP 2020 Drinking Water				-	-	0.07	-	0.07	-	-	-	-	-	0.56	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.07	-
PFAS NEMP 2020 Freshwater 95%				-	-	-	-	0.13	-	-	-	-	-	220	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PFAS NEMP 2020 Recreational Water				-	-	2	-	2	-	-	-	-	-	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-
Field ID	**Date**	**Lab Report Number**	**Sample Code**																													
FTG - Wash down samples																																
WD01_260622	26 Jun 2022	ES2223155	ES2223155020	<0.02	<0.02	**0.11**	**0.02**	**0.96**	<0.02	**3.4**	**1.09**	**2.28**	**1.32**	**2.16**	**1.72**	**0.18**	**1.60**	<0.05	**0.04**	**0.34**	<0.05	**0.66**	**8.70**	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	**1.07**	**24.6**
WD02_260622	26 Jun 2022	ES2223155	ES2223155021	<0.02	<0.02	**0.07**	<0.02	**0.36**	<0.02	**2.4**	**0.60**	**0.71**	**0.86**	**0.88**	**0.53**	**0.10**	**0.65**	<0.05	**0.03**	**0.14**	<0.05	**0.57**	**4.59**	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	**0.43**	**12.5**
FTG - Water pit sample																																
SS06_220622	22 Jun 2022	ES2223133	ES2223133024	**1.82**	**2.57**	**16.8**	**1.87**	**17.6**	<0.02	**219**	**174**	**258**	**253**	**196**	**7.72**	**0.04**	**92.3**	<0.05	<0.02	**0.16**	<0.05	**8.52**	**195**	<0.05	**0.23**	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	**34.4**	**1,440**
Pit1_280622	28 Jun 2022	ES2223157	ES2223157004	**0.03**	<0.02	**0.16**	**0.02**	**0.74**	<0.02	**3.5**	**1.90**	**3.59**	**2.42**	**4.33**	**2.09**	**0.19**	**3.38**	<0.05	<0.02	**1.02**	<0.05	**0.83**	**6.83**	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	**0.90**	**31.0**
Pit2_280622	28 Jun 2022	ES2223157	ES2223157005	<0.02	<0.02	**0.19**	**0.03**	**2.45**	<0.02	**1.2**	**1.01**	**2.18**	**1.59**	**3.56**	**2.35**	**0.27**	**2.16**	<0.05	<0.02	**1.08**	<0.05	**0.47**	**6.76**	**0.05**	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	**2.64**	**25.4**
Pit3_280622	28 Jun 2022	ES2223157	ES2223157006	<0.02	<0.02	**0.19**	**0.03**	**1.37**	<0.02	**1.7**	**1.22**	**2.82**	**1.93**	**4.02**	**2.01**	**0.15**	**2.28**	<0.05	<0.02	**0.66**	<0.05	**0.60**	**6.38**	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	**1.56**	**25.4**
ARFFS Fire Station - Wash down samples																																
WD03_250622	25 Jun 2022	ES2223155	ES2223155010	<0.02	<0.02	<0.01	<0.02	**0.03**	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	**0.03**	**0.03**
WD04_260622	26 Jun 2022	ES2223155	ES2223155022	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	**0.02**	**0.02**	**0.02**	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	**0.06**
WD05_250622	25 Jun 2022	ES2223155	ES2223155011	<0.02	<0.02	<0.01	<0.02	**0.03**	<0.02	<0.1	<0.02	**0.03**	**0.06**	**0.16**	**0.17**	**0.06**	**0.16**	<0.05	<0.02	**0.08**	<0.05	<0.05	**0.91**	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	**0.03**	**1.66**
ARFFS Fire Station - Water pit sample																																
SS07_250622	25 Jun 2022	ES2223155	ES2223155008	<0.02	<0.02	**0.05**	<0.02	**0.33**	<0.02	**0.1**	**0.06**	**0.20**	**0.36**	**1.36**	**1.34**	**0.18**	**1.17**	<0.05	**0.03**	**0.22**	<0.05	**0.26**	**0.96**	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	**0.38**	**6.62**
Influent/ Effluent Samples																																
IN01	06 Feb 2023	ES2305043	ES2305043091	<0.0016	<0.0016	<0.0016	<0.0016	<0.0016	<0.0016	<0.0080	<0.0016	**0.0280**	**0.0217**	**0.0365**	**0.0212**	**0.0018**	**0.0217**	<0.0040	<0.0016	**0.0076**	<0.002	<0.002	**0.055**	<0.002	<0.0016	<0.004	<0.0016	<0.004	<0.004	<0.0016	<0.004	<0.0016	**0.194**
EF01	06 Feb 2023	ES2305043	ES2305043092	**0.0102**	**0.0032**	**0.0295**	**0.0045**	**0.154**	<0.0005	**0.841**	**0.363**	**0.388**	**0.404**	**0.698**	**0.110**	**0.0103**	**0.210**	<0.0005	<0.0005	**0.0372**	<0.001	**0.041**	**0.300**	<0.001	<0.0005	<0.001	<0.0005	<0.001	<0.001	<0.0005	<0.001	**0.184**	**3.60**

Table 4b
Total Oxidisable Precursor Assay for PFAS in Infrastructure
Ayres Rock Airport - Targeted Site Investigation

				PFAS TOPA																																
				N-Ethyl perfluorooctane sulfonamide (EtFOSA)_	N-Ethyl perfluorooctane sulfonamidoacetic acid (Et	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE	N-Methyl perfluorooctane sulfonamide (MeFOSA)_	N-Methyl perfluorooctane sulfonamidoacetic acid (M	N-Methyl perfluorooctane sulfonamidoethanol (MeFOS_	Perfluorooctane sulfonamide (FOSA)_	Post-Perfluoroheptane sulfonate (PFHpS)	Post-Perfluorohexane sulfonate (PFHxS)	Post-Perfluorooctane sulfonate (PFOS)	Post-Perfluorooctanoic acid (PFOA)	Sum of PFHxS and PFOS_	Sum of TOP C4 - C14 as Fluorine	Sum of TOP C4 - C14 Carboxylates and C4 - C8 Sulfo	10:2 FTS (TOPA)	4:2 FTS (TOPA)	6:2 FTS (TOPA)	8:2 FTS (TOPA)	Perfluorobutanesulfonic acid (TOPA)	Perfluorobutanoic acid (TOPA)	Perfluorodecanesulfonic acid_	Perfluorodecanoic acid (TOPA)	Perfluorododecanoic acid (TOPA)	Perfluoroheptanoic acid (TOPA)	Perfluorohexanoic acid (TOPA)	Perfluorononanoic acid (TOPA)	Perfluoropentanesulfonic acid (TOPA)	Perfluoropentanoic acid (TOPA)	Perfluorotetradecanoic acid (TOPA)	Perfluorotridecanoic acid (TOPA)	Perfluoroundecanoic acid (TOPA)	Sum of PFASs (n=30) TOPA
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL				**0.05**	**0.02**	**0.05**	**0.05**	**0.02**	**0.05**	**0.02**	**0.02**	**0.01**	**0.01**	**0.01**	**0.01**	**0.01**	**0.01**	**0.05**	**0.05**	**0.05**	**0.05**	**0.02**	**0.1**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.05**	**0.02**	**0.02**	**0.01**
PFAS NEMP 2020 Drinking Water				-	-	-	-	-	-	-	-	0.07	0.07	0.56	0.07	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PFAS NEMP 2020 Freshwater 95%				-	-	-	-	-	-	-	-	-	0.13	220	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PFAS NEMP 2020 Recreational Water				-	-	-	-	-	-	-	-	2	2	10	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Field ID	**Date**	**Lab Report Number**	**Sample Code**																																	
FTG - Wash down samples																																				
WD01_260622	26 Jun 2022	ES2223155	ES2223155020	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	**0.02**	**0.11**	**0.65**	**4.45**	**0.76**	**27.6**	**41.8**	<0.05	<0.05	<0.05	**0.30**	<0.02	**7.2**	<0.02	**1.09**	**0.02**	**7.31**	**8.92**	**1.46**	<0.02	**10.5**	<0.05	<0.02	**0.12**	**42.2**
WD02_260622	26 Jun 2022	ES2223155	ES2223155021	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.02	**0.05**	**0.20**	**1.95**	**0.25**	**12.0**	**18.1**	<0.05	<0.05	<0.05	**0.28**	<0.02	**3.4**	<0.02	**0.26**	<0.02	**3.96**	**3.76**	**0.54**	<0.02	**3.98**	<0.05	<0.02	**0.04**	**18.4**
ARFFS Fire Station - Wash down samples																																				
WD03_250622	25 Jun 2022	ES2223155	ES2223155010	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.02	<0.01	**0.02**	<0.01	**0.02**	**0.01**	**0.02**	<0.05	<0.05	<0.05	<0.05	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	**0.02**
WD04_260622	26 Jun 2022	ES2223155	ES2223155022	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	**0.03**	<0.01	**0.13**	**0.20**	<0.05	<0.05	<0.05	<0.05	<0.02	<0.1	<0.02	<0.02	<0.02	**0.05**	**0.05**	<0.02	<0.02	**0.07**	<0.05	<0.02	<0.02	**0.20**
WD05_250622	25 Jun 2022	ES2223155	ES2223155011	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.02	<0.01	<0.01	**0.34**	<0.01	**1.75**	**2.63**	<0.05	<0.05	<0.05	<0.05	<0.02	**0.3**	<0.02	**0.12**	**0.03**	**0.47**	**0.48**	**0.16**	<0.02	**0.67**	<0.05	<0.02	**0.06**	**2.63**
ARFFS Fire Station - Water pit sample																																				
SS07_250622	25 Jun 2022	ES2223155	ES2223155008	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.02	**0.05**	**0.25**	**1.94**	**0.30**	**9.65**	**14.4**	<0.05	<0.05	<0.05	**0.06**	<0.02	**1.4**	<0.02	**0.90**	**0.02**	**3.36**	**2.94**	**0.98**	<0.02	**2.46**	<0.05	<0.02	**0.13**	**14.5**

Table 4c
Inorganic and metals in infrastructure
Ayres Rock Airport Airport - Targeted Site Investigation

				Surfactants	Inorganics	Metals															
				Anionic Surfactants as MBAS	Biochemical Oxygen Demand (BOD)	Arsenic	Arsenic (filtered)	Cadmium	Cadmium (filtered)	Chromium (III+VI)	Chromium (III+VI) (filtered)	Copper	Copper (filtered)	Lead	Lead (filtered)	Mercury	Mercury (filtered)	Nickel	Nickel (filtered)	Zinc	Zinc (filtered)
				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
EQL				**0.1**	**2**	**0.001**	**0.001**	**0.0001**	**0.0001**	**0.001**	**0.001**	**0.001**	**0.001**	**0.001**	**0.001**	**0.0001**	**0.0001**	**0.001**	**0.001**	**0.005**	**0.005**
ADWG 2022 Aesthetic					-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	3	3
ADWG 2022 Health					-	0.01	0.01	0.002	0.002	-	-	2	2	0.01	0.01	0.001	0.001	0.02	0.02	-	-
ANZG (2018) Freshwater 95% LOSP Toxicant DGVs					-	-	-	0.0002	0.0002	-	-	0.0014	0.0014	0.0034	0.0034	0.0006	0.0006	0.011	0.011	0.008	0.008
ANZG (2018) Freshwater 95% toxicant DGVs					-	-	-	0.0002	0.0002	-	-	0.0014	0.0014	0.0034	0.0034	0.0006	0.0006	0.011	0.011	0.008	0.008
DOH 2014 (WA) Domestic Non-Potable Groundwater Use (NPUG)					-	-	-	0.02	0.02	-	-	1	1	0.1	0.1	0.01	0.01	0.2	0.2	3	3
WHO (2005)					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WHO DWQG 4th Ed					-	0.01	0.01	0.003	0.003	0.05	0.05	2	2	0.01	0.01	0.006	0.006	0.07	0.07	-	-
Field ID	Date	Lab Report Number	Sample Code																		
FTG - Water pit sample																					
Pit1_280622	28 Jun 2022	ES2223157	ES2223157004	**0.3**	**14**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pit2_280622	28 Jun 2022	ES2223157	ES2223157005	**0.2**	**2**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pit3_280622	28 Jun 2022	ES2223157	ES2223157006	**0.4**	**7**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ARFFS Fire Station - Water pit sample																					
SS07_250622	25 Jun 2022	ES2223155	ES2223155008		-	**<0.001**	-	**0.0001**	-	**0.001**	-	**0.056**	-	**0.004**	-	**<0.0001**	-	**0.013**	-	**0.066**	-
Influent/ Effluent Samples																					
EF01	06 Feb 2023	ES2305043	ES2305043092		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
IN01	06 Feb 2023	ES2305043	ES2305043091		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Environmental Standards
NHMRC, May 2022, ADWG 2022 Aesthetic
NHMRC, May 2022, ADWG 2022 Health
ANZG, March 2021, ANZG (2018) Freshwater 95% LOSP Toxicant DGVs
ANZG, 2018, ANZG (2018) Freshwater 95% toxicant DGVs
World Health Organization, 2011, WHO DWQG 4th Ed

Table 4d
Hydrocarbons in Infrastructure
Ayres Rock Airport - Targeted Site Investigation

	TPH											Total Recoverable Hydrocarbons	BTEX								Monocyclic aromatic hydrocarbons					MAH				Polycyclic Aromatic Hydrocarbons	PAH																		Volatile Organic Compounds		
	C6 (C6-C10) less BTEX	>C2-C6 (>C6 minus Naphthalene)	>C6 - C9	>C10 - C14	>C15 - C28	>C29-C36	>C10 - C16 (Sum of total)	>C16 - C36 (Sum of total)	>C1 (C6-C10_)	>C2 (C10-C16 Hydrocarbons)	>C2 (C10-C16 minus Naphthalene)	>C16 (C16-C34 Hydrocarbons)	>C34-C40	>C10 - C40 (Sum of total)	Naphthalene [VOC]	Benzene	Toluene	Ethylbenzene	Xylene (m & p)	Xylene (o)	Xylene Total	Total BTEX	n-butylbenzene	n-propylbenzene	p-isopropyltoluene	sec-butylbenzene	tert-butylbenzene	1,3,5-trimethylbenzene	1,2,4-trimethylbenzene	Isopropylbenzene	Styrene	Naphthalene	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b+j)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Phenanthrene	Pyrene	PAHs (Sum of total)	cis-1,4-Dichloro-2-butene	trans-1,4-Dichloro-2-butene	Pentachloroethane
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL	0.02	0.05	0.02	0.05	0.1	0.05	0.05	0.02	0.05	0.1	0.1	0.1	0.1	0.1	0.005	1	1	1	2	1	2	1	5	5	5	5	5	5	5	5	5	1	1	1	1	1	0.5	1	1	1	1	0.001	1	1	1	1	1	1	0.5	5	5	5
ADWG 2022 Aesthetic	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	25	3	-	-	20	-	-	-	-	-	-	-	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ADWG 2022 Health	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	800	300	-	-	600	-	-	-	-	-	-	-	-	-	30	-	-	-	-	-	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ANZG (2018) Freshwater 95% LOSP Toxicant DGVs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	950	180	80	-	350	-	-	-	-	-	-	-	-	-	30	16	-	-	0.4	-	0.2	-	-	-	-	1.4	-	-	2	-	-	-	80
ANZG (2018) Freshwater 95% toxicant DGVs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	950	-	-	-	350	-	-	-	-	-	-	-	-	-	-	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DOH 2014 (WA) Domestic Non-Potable Groundwater Use (NPUG)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	25	3	-	-	20	-	-	-	-	-	-	-	-	-	4	-	-	-	-	-	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WHO (2008) Domestic Non-Potable Domestic Use, derived by applying a 10x multiplication factor to the drinking water guideline value.	-	1	-	-	-	-	-	3	-	0.9	0.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WHO DWQG 4th Ed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	700	300	-	-	500	-	-	-	-	-	-	-	-	-	20	-	-	-	-	-	0.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Field ID	Date	Lab Report Number	Sample Code																																																		
FTG - Water pit sample																																																				
SS06_220622	22 Jun 2022	ES2223133	ES2223133024												<0.005	<1	<2	<2	<2	<2	<2	-	-	<5	<5	<5	<5	<5	<5	<5	<5	<5																								
Pit1_280622	28 Jun 2022	ES2223157	ES2223157004	**0.07**	**0.56**	**0.02**	**0.38**	**0.62**	**0.06**	**1.06**	**0.07**	**0.56**	**0.49**	**<0.1**	**1.05**	**<0.005**	**<1**	**<2**	**<2**	**<2**	**<2**	**4**	**4**	**4**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pit2_280622	28 Jun 2022	ES2223157	ES2223157005	**0.04**	**0.19**	**0.03**	**0.09**	**0.41**	**<0.05**	**0.5**	**0.04**	**0.19**	**0.32**	**<0.1**	**0.51**	**<0.005**	**<1**	**<2**	**<2**	**<2**	**<2**	**<2**	**<2**	**<1**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pit3_280622	28 Jun 2022	ES2223157	ES2223157006	**0.14**	**0.69**	**0.03**	**0.49**	**0.66**	**<0.05**	**1.15**	**0.14**	**0.7**	**0.46**	**<0.1**	**1.16**	**0.011**	**<1**	**<2**	**<2**	**<2**	**<2**	**4**	**4**	**4**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ARFFS Fire Station - Water pit sample																																																			
SS07_250622	25 Jun 2022	ES2223155	ES2223155008	**<0.02**	**<0.1**	**<0.02**	**<0.05**	**0.31**	**0.2**	**0.51**	**<0.02**	**<0.1**	**0.44**	**<0.1**	**0.44**	**<0.005**	**<1**	**<2**	**<2**	**<2**	**<2**	**<2**	**<2**	**<1**	**<5**	**<5**	**<5**	**<5**	**<5**	**<5**	**<5**	**<5**	**<5**	**<1.0**	**<1.0**	**<1.0**	**<1.0**	**<1.0**	**<0.5**	**<1.0**	**<1.0**	**<1.0**	**<0.0010**	**<1.0**	**<1.0**	**<1.0**	**<1.0**	**<1.0**	**<1.0**	**<0.5**	**<5**	**<5**	**<5**

Environmental Standards
NHMRC, May 2022, ADWG 2022 Aesthetic
NHMRC, May 2022, ADWG 2022 Health
ANZG, March 2021, ANZG (2018) Freshwater 95% LOSP Toxicant DGVs
ANZG, 2018, ANZG (2018) Freshwater 95% toxicant DGVs
World Health Organization, 2011, WHO DWQG 4th Ed

Table 4e
Other Organics in Infrastructure
Ayres Rock Airport - Targeted Site Investigation

	Chlorinated Hydrocarbons																													Halogenated Hydrocarbons					Halogenated Benzenes										Solvents				
	1,1,1,2-tetrachloroethane	1,1,1-trichloroethane	1,1,2,2-tetrachloroethane	1,1,2-trichloroethane	1,1-dichloroethane	1,1-dichloroethene	1,1-dichloropropene	1,2,3-trichloropropane	1,2-dibromo-3-chloropropane	1,2-dichloroethane	1,2-dichloropropane	1,3-dichloropropene	2,2-dichloropropane	Bromodichloromethane	Bromoform	Carbon tetrachloride	Chlorodibromomethane	Chloroethane	Chloroform	Chloromethane	cis-1,2-dichloroethene	cis-1,3-dichloropropene	Dibromomethane	Hexachlorobutadiene	Trichloroethene	Tetrachloroethene	trans-1,2-dichloroethene	trans-1,3-dichloropropene	Vinyl chloride	1,2-dibromoethane	Bromomethane	Dichlorodifluoromethane	Iodomethane	Trichlorofluoromethane	1,2,3-trichlorobenzene	1,2,4-trichlorobenzene	1,2-dichlorobenzene	1,3-dichlorobenzene	1,4-dichlorobenzene	2-chlorotoluene	4-chlorotoluene	Bromobenzene	Chlorobenzene	Methyl Ethyl Ketone	4-Methyl-2-pentanone	Carbon disulfide	2-hexanone (MBK)	Vinyl acetate
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	50	5	50	5	5	5	5	5	5	5	5	50	5	50	50	5	50	5	5	5	5	5	5	5	5	50	50	50	50	50
ADWG 2022 Aesthetic	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	20	0.3	-	-	-	-	10	-	-	-	-
ADWG 2022 Health	-	-	-	-	-	30	-	-	-	3	-	-	-	-	-	3	-	-	-	-	-	-	-	0.7	-	50	-	-	0.3	1	1	-	-	-	-	-	1,500	-	40	-	-	-	300	-	-	-	-	-
ANZG (2018) Freshwater 95% LOSP Toxicant DGVs	-	270	400	6,500	-	700	-	-	-	1,900	900	1,100	-	-	-	240	-	-	770	-	-	-	-	-	330	70	-	-	100	-	-	-	-	10	170	160	260	60	-	-	-	55	-	-	-	-	-
ANZG (2018) Freshwater 95% toxicant DGVs	-	-	-	6,500	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	170	160	260	60	-	-	-	-	-	-	-	-	-
DOH 2014 (WA) Domestic Non-Potable Groundwater Use (NPUG)	-	-	-	-	-	300	-	-	-	30	-	-	-	-	-	30	-	-	-	-	-	-	-	7	-	500	-	-	3	-	10	-	-	5	-	1	20	0.3	-	-	-	10	-	-	-	-	-
WHO (2008) Domestic Non-Potable Domestic Use, derived by applying a 10x multiplication factor to the drinking water guideline value.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WHO DWQG 4th Ed	-	-	-	-	-	-	-	-	1	30	40	-	-	-	60	100	4	100	-	-	300	-	-	0.6	20	40	-	-	0.3	0.4	-	-	-	-	-	-	1,000	-	300	-	-	-	-	-	-	-	-	-

Field ID	Date	Lab Report Number	Sample Code																																														
ETG - Water pit sample																																																	
SS06_220622	22 Jun 2022	ES2223133	ES22231333024	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<50	<5	<50	<5	<50	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<50	<50	<50	<50	<50
ARFFS Fire Station - Water pit sample																																																	
SS07_250622	25 Jun 2022	ES2223155	ES22231555008	**<5**	**<5**	**<5**	**<5**	**<5**	**<5**	**<5**	**<5**	**<5**	**<5**	**<5**	**<5**	**<5**	**<5**	**<5**	**<5**	**<5**	**<50**	**<5**	**<50**	**<5**	**<5**	**<5**	**<5**	**<5**	**<5**	**<5**	**<5**	**<50**	**<5**	**<50**	**<50**	**<5**	**<50**	**<5**	**<5**	**<5**	**<5**	**<5**	**<5**	**<5**	**<5**	**<5**	**<50**	**<50**	**<5**	**<50**	**<50**

Environmental Standards
NHMRC, May 2022, ADWG 2022 Aesthetic
NHMRC, May 2022, ADWG 2022 Health
ANZG, March 2021, ANZG (2018) Freshwater 95% LOSP Toxicant DGVs
ANZG, 2018, ANZG (2018) Freshwater 95% toxicant DGVs
World Health Organization, 2011, WHO DWQG 4th Ed

TETRA TECH COFFEY

5a

Duplicate Soil Analytical Results - 2022

Airservices Australia Ayers Rock Airport (AYQ) – Environmental Site Investigation

PFAS Characterisation Program

								Perfluoroalkane Carboxylic Acids										(n:2
				Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorodecanoic acid (PFDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorononanoic acid (PFNA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluoroundecanoic acid (PFUnDA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				**0.0002**	**0.0002**	**0.0002**	**0.0002**	**0.0002**	**0.0002**	**0.001**	**0.0002**	**0.0002**	**0.0002**	**0.0002**	**0.0002**	**0.0002**	**0.0002**	**0.0005**	**0.0002**	**0.0002**	**0.0005**
Field ID	**Date**	**Lab Report Number**	**Matrix Type**																		
SB33_0.3-0.5	20 Jun 2022	ES2226831	Soil	<0.0002	<0.0002	**0.0005**	<0.0002	**0.0003**	<0.0002	<0.001	**0.0018**	**0.0054**	**0.007**	**0.0073**	<0.0002	<0.0002	**0.0002**	<0.0005	<0.0002	<0.0002	<0.0005
QC05_240622	24 Jun 2022	ES2227426	Soil	<0.0002	<0.0002	**0.0012**	<0.0002	**0.0003**	<0.0002	**0.001**	**0.0021**	**0.0071**	**0.0132**	**0.0205**	<0.0002	<0.0002	**0.0007**	<0.0005	<0.0002	<0.0002	<0.0005
RPD				**0**	**0**	**82**	**0**	**0**	**0**	**0**	**15**	**27**	**61**	**95**	**0**	**0**	**111**	**0**	**0**	**0**	**0**
SB04_0.0_200622	20 Jun 2022	ES2223133	Soil	<0.0002	<0.0002	<0.0002	<0.0002	**0.0004**	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	**0.0004**	<0.0002	**0.0009**	<0.0005	<0.0002	<0.0002	<0.0005
QC03_200622	20 Jun 2022	ES2223133	Soil	<0.0002	<0.0002	<0.0002	<0.0002	**0.0004**	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	**0.0004**	<0.0002	**0.0007**	<0.0005	<0.0002	<0.0002	<0.0005
RPD				**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**25**	**0**	**0**	**0**	**0**
SS02_220622	22 Jun 2022	ES2223150	Soil	<0.0002	<0.0002	<0.0002	<0.0002	**0.0479**	**0.0007**	<0.001	<0.0002	<0.0002	**0.0003**	**0.0006**	**0.0468**	**0.0794**	**0.0026**	**0.0123**	**0.0170**	**0.0379**	<0.0005
QC15_220622	22 Jun 2022	ES2223150	Soil	<0.0002	<0.0002	<0.0002	<0.0002	**0.0449**	**0.0008**	<0.001	<0.0002	<0.0002	**0.0006**	**0.0007**	**0.0382**	**0.0687**	**0.0040**	**0.0108**	**0.0146**	**0.0336**	<0.0005
RPD				**0**	**0**	**0**	**0**	**6**	**13**	**0**	**0**	**0**	**67**	**15**	**20**	**14**	**42**	**13**	**15**	**12**	**0**
YAP3_0.0_230622	22 Jun 2022	ES2223150	Soil	<0.0002	<0.0002	**0.0050**	<0.0002	**0.0042**	<0.0002	<0.001	**0.0004**	**0.0005**	**0.0118**	**0.283**	**0.0079**	**0.0032**	**0.0258**	**0.0015**	**0.0010**	**0.0022**	<0.0005
QC17	23 Jun 2022	ES2223150	Soil	<0.0002	<0.0002	**0.0008**	<0.0002	**0.0007**	<0.0002	<0.001	**0.0020**	**0.0057**	**0.0118**	**0.0140**	**0.0012**	**0.0006**	**0.0028**	<0.0005	<0.0002	**0.0003**	<0.0005
RPD				**0**	**0**	**145**	**0**	**143**	**0**	**0**	**133**	**168**	**0**	**181**	**147**	**137**	**161**	**100**	**133**	**152**	**0**
SB22_0.0_230622	23 Jun 2022	ES2223152	Soil	**0.0053**	**0.0016**	**0.0026**	<0.0002	**0.0019**	<0.0002	**0.026**	**0.0475**	**0.0829**	**0.0470**	**0.0426**	**0.0016**	**0.0009**	**0.0026**	<0.0005	**0.0002**	**0.0007**	<0.0005
QC27	24 Jun 2022	ES2223153	Soil	**0.0054**	**0.0012**	**0.0013**	<0.0002	**0.0003**	<0.0002	**0.019**	**0.0484**	**0.102**	**0.0485**	**0.0294**	<0.0002	<0.0002	**0.0003**	<0.0005	<0.0002	**<0.0002**	<0.0005
RPD				**2**	**29**	**67**	**0**	**145**	**0**	**31**	**2**	**21**	**3**	**37**	**156**	**127**	**159**	**0**	**0**	**111**	**0**
SB12_0.0_240622	24 Jun 2022	ES2223153	Soil	**0.0004**	**0.0011**	**0.0132**	**0.0005**	**0.0111**	<0.0002	**0.005**	**0.0197**	**0.0391**	**0.0300**	**0.0224**	**0.0039**	**0.0020**	**0.0057**	<0.0005	**0.0004**	**0.0018**	<0.0005
QC25	24 Jun 2022	ES2223153	Soil	**0.0007**	**0.0005**	**0.0062**	**0.0004**	**0.0070**	<0.0002	**0.010**	**0.0403**	**0.0629**	**0.0273**	**0.0061**	**0.0020**	**0.0009**	**0.0031**	<0.0005	<0.0002	**0.0010**	<0.0005
RPD				**55**	**75**	**72**	**22**	**45**	**0**	**67**	**69**	**47**	**9**	**114**	**64**	**76**	**59**	**0**	**67**	**57**	**0**
SB27_1.4_240622	24 Jun 2022	ES2223152	Soil	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005
QC19	24 Jun 2022	ES2223152	Soil	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005
RPD				**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
SB27_1.4_240622	24 Jun 2022	ES2223152	Soil	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005
QC20	24 Jun 2022	904156	Soil	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
RPD				**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
SB30_0.3_240622	24 Jun 2022	ES2223151	Soil	<0.0002	<0.0002	**0.0004**	<0.0002	**0.0025**	<0.0002	<0.001	<0.0002	<0.0002	**0.0041**	**0.0045**	**0.0005**	<0.0002	**0.0012**	<0.0005	<0.0002	<0.0002	<0.0005
QC07_240622	24 Jun 2022	ES2223151	Soil	<0.0002	<0.0002	**0.0005**	<0.0002	**0.0034**	<0.0002	<0.001	<0.0002	**0.0002**	**0.0054**	**0.0060**	**0.0007**	<0.0002	**0.0017**	<0.0005	<0.0002	<0.0002	<0.0005
RPD				**0**	**0**	**22**	**0**	**31**	**0**	**0**	**0**	**0**	**27**	**29**	**33**	**0**	**34**	**0**	**0**	**0**	**0**
YAP2_0.0_240622	24 Jun 2022	ES2223152	Soil	**0.0009**	**0.0009**	**0.0052**	**0.0005**	**0.0058**	<0.0002	**0.013**	**0.0155**	**0.0133**	**0.0132**	**0.0254**	**0.0011**	**0.0008**	**0.0047**	<0.0005	**0.0002**	**0.0005**	<0.0005
QC21	24 Jun 2022	ES2223152	Soil	**0.0007**	**0.0008**	**0.0041**	**0.0003**	**0.0032**	<0.0002	**0.010**	**0.0124**	**0.0108**	**0.0106**	**0.0177**	**0.0007**	**0.0006**	**0.0028**	<0.0005	<0.0002	**0.0003**	<0.0005
RPD				**25**	**12**	**24**	**50**	**58**	**0**	**26**	**22**	**21**	**22**	**36**	**44**	**29**	**51**	**0**	**0**	**50**	**0**
SS08_250622	25 Jun 2022	ES2223155	Soil	<0.0002	**<0.0002**	**<0.0002**	**<0.0002**	**0.0073**	<0.0002	**0.010**	**0.0144**	**0.0014**	**0.0011**	**0.0087**	**0.0683**	**0.0507**	**0.0458**	**0.0114**	**0.0123**	**0.0395**	<0.0005
QC09_250622	25 Jun 2022	ES2223155	Soil	<0.0002	**<0.0002**	**<0.0002**	**<0.0002**	**0.0078**	<0.0002	**0.009**	**0.0137**	**0.0014**	**0.0011**	**0.0076**	**0.0775**	**0.0674**	**0.0414**	**0.0170**	**0.0162**	**0.0476**	<0.0005
RPD				**0**	**0**	**0**	**0**	**7**	**0**	**11**	**5**	**0**	**0**	**13**	**13**	**28**	**10**	**39**	**27**	**19**	**0**
SS08_250622	25 Jun 2022	ES2223155	Soil	<0.0002	<0.0002	<0.0002	<0.0002	**0.0073**	<0.0002	**0.010**	**0.0144**	**0.0014**	**0.0011**	**0.0087**	**0.0683**	**0.0507**	**0.0458**	**0.0114**	**0.0123**	**0.0395**	<0.0005
QC10_250622	25 Jun 2022	903934	Soil	<0.005	<0.005	<0.005	<0.005	**0.01**	<0.005	**0.0098**	**0.011**	<0.005	<0.005	**0.0084**	**0.056**	**0.048**	**0.032**	**0.0099**	**0.014**	**0.037**	<0.005
RPD				**0**	**0**	**0**	**0**	**31**	**0**	**2**	**27**	**0**	**0**	**4**	**20**	**5**	**35**	**14**	**13**	**7**	**0**
CC01_Top_260622	26 Jun 2022	ES2223155	Soil	**0.0020**	**0.0026**	**0.0237**	**0.0026**	**0.0526**	<0.0002	**0.072**	**0.0508**	**0.0744**	**0.0325**	**0.0327**	**0.0057**	**0.0012**	**0.0168**	<0.0005	**0.0003**	**0.0012**	<0.0005
QC41	26 Jun 2022	903934	Soil	<0.005	<0.005	**0.019**	<0.005	**0.047**	<0.005	**0.016**	**0.0054**	**0.016**	**0.016**	**0.023**	<0.005	<0.005	**0.012**	<0.005	<0.005	<0.005	<0.005
RPD				**0**	**0**	**22**	**0**	**11**	**0**	**127**	**162**	**129**	**68**	**35**	**13**	**0**	**33**	**0**	**0**	**0**	**0**
SB17_0.0_260622	26 Jun 2022	ES2223334	Soil	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005
QC36	26 Jun 2022	ES2223334	Soil	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005
RPD				**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
SB21_0.0_260622	26 Jun 2022	ES2223334	Soil	<0.0002	<0.0002	<0.0002	<0.0002	**0.0013**	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	**0.0004**	**0.0004**	<0.0002	**0.0003**	<0.0005	<0.0002	<0.0002	<0.0005
QC38	26 Jun 2022	ES2223334	Soil	<0.0002	<0.0002	<0.0002	<0.0002	**0.0007**	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	**0.0002**	**0.0004**	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.0005
RPD				**0**	**0**	**0**	**0**	**60**	**0**	**0**	**0**	**0**	**0**	**67**	**0**	**0**	**40**	**0**	**0**	**0**	**0**

*RPDs have only been considered where a concentration is greater than 1 times the EQL.

**Elevated RPDs are highlighted as per QAQC Profile settings (Acceptable RPDs for each EQL multiplier range are: 50 (1 - 10 x EQL); 50 (10 - 10 x EQL); 30 (> 10 x EQL))

***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory

5a

Duplicate Soil Analytical Results - 2022

Airservices Australia Ayers Rock Airport (AYQ) – Environmental Site Investigation

PFAS Characterisation Program

				:) Fluorotelomer Sulfonic Acids			Perfluoroalkyl Sulfonamides							PFAS	
				6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFHxS and PFOS	Sum of PFAS
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				**0.0005**	**0.0005**	**0.0005**	**0.0002**	**0.0005**	**0.0002**	**0.0005**	**0.0005**	**0.0002**	**0.0005**	**0.0002**	**0.0002**
Field ID	**Date**	**Lab Report Number**	**Matrix Type**												
SB33_0.3-0.5	20 Jun 2022	ES2226831	Soil	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	**0.0008**	**0.0225**
QC05_240622	24 Jun 2022	ES2227426	Soil	**0.0005**	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	**0.0015**	**0.0466**
RPD				**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**61**	**70**
SB04_0.0_200622	20 Jun 2022	ES2223133	Soil	<0.0005	**0.0008**	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	**0.0004**	**0.0025**
QC03_200622	20 Jun 2022	ES2223133	Soil	<0.0005	**0.0009**	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	**0.0004**	**0.0024**
RPD				**0**	**12**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**4**
SS02_220622	22 Jun 2022	ES2223150	Soil	<0.0005	**0.100**	**0.0144**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	**0.0479**	**0.360**
QC15_220622	22 Jun 2022	ES2223150	Soil	<0.0005	**0.0910**	**0.0128**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	**0.0449**	**0.321**
RPD				**0**	**9**	**12**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**6**	**11**
YAP3_0.0_230622	22 Jun 2022	ES2223150	Soil	**0.0129**	**0.0399**	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	**0.0092**	**0.399**
QC17	23 Jun 2022	ES2223150	Soil	<0.0005	**0.0023**	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	**0.0015**	**0.0422**
RPD				**185**	**178**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**144**	**162**
SB22_0.0_230622	23 Jun 2022	ES2223152	Soil	**0.0029**	**0.0049**	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	**0.0045**	**0.271**
QC27	24 Jun 2022	ES2223153	Soil	**0.0016**	**0.0006**	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	**0.0016**	**0.258**
RPD				**58**	**156**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**95**	**5**
SB12_0.0_240622	24 Jun 2022	ES2223153	Soil	**0.0085**	**0.0188**	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	**0.0243**	**0.184**
QC25	24 Jun 2022	ES2223153	Soil	**0.0024**	**0.0127**	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	**0.0132**	**0.184**
RPD				**112**	**39**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**59**	**0**
SB27_1.4_240622	24 Jun 2022	ES2223152	Soil	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	**<0.0002**	**<0.0002**
QC19	24 Jun 2022	ES2223152	Soil	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	**<0.0002**	**<0.0002**
RPD				**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
SB27_1.4_240622	24 Jun 2022	ES2223152	Soil	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002
QC20	24 Jun 2022	904156	Soil	<0.01	<0.005	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.005	<0.005	<0.05
RPD				**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
SB30_0.3_240622	24 Jun 2022	ES2223151	Soil	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	**0.0029**	**0.0132**
QC07_240622	24 Jun 2022	ES2223151	Soil	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	**0.0039**	**0.0179**
RPD				**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**29**	**30**
YAP2_0.0_240622	24 Jun 2022	ES2223152	Soil	**0.0010**	**0.0011**	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	**0.0110**	**0.103**
QC21	24 Jun 2022	ES2223152	Soil	**0.0008**	**0.0006**	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	**0.0073**	**0.0764**
RPD				**22**	**59**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**40**	**30**
SS08_250622	25 Jun 2022	ES2223155	Soil	**0.0014**	**0.327**	**0.0043**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	**0.0073**	**0.604**
QC09_250622	25 Jun 2022	ES2223155	Soil	**0.0012**	**0.330**	**0.0056**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	**0.0078**	**0.644**
RPD				**15**	**1**	**26**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**7**	**6**
SS08_250622	25 Jun 2022	ES2223155	Soil	**0.0014**	**0.327**	**0.0043**	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	**0.0073**	**0.604**
QC10_250622	25 Jun 2022	903934	Soil	<0.01	**0.29**	**0.0059**	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.005	**0.01**	**0.532**
RPD				**0**	**12**	**31**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**31**	**13**
CC01_Top_260622	26 Jun 2022	ES2223155	Soil	**0.0353**	**0.120**	**0.0016**	**0.0004**	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	**0.0763**	**0.528**
QC41	26 Jun 2022	903934	Soil	**0.03**	**0.077**	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.005	**0.066**	**0.2614**
RPD				**16**	**44**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**14**	**68**
SB17_0.0_260622	26 Jun 2022	ES2223334	Soil	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002
QC36	26 Jun 2022	ES2223334	Soil	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002
RPD				**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
SB21_0.0_260622	26 Jun 2022	ES2223334	Soil	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	**0.0013**	**0.0024**
QC38	26 Jun 2022	ES2223334	Soil	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	**0.0007**	**0.0013**
RPD				**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**60**	**59**

*RPDs have only been considered where a concentration is greater than 1 times the EQL.

**Elevated RPDs are highlighted as per QAQC Profile settings (Acceptable RPDs for each EQL multiplier range ar

***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any meth

5b

Duplicate Soil Analytical Results - 2022

Airservices Australia Ayers Rock Airport (AYQ) – Environmental Site Investigation

PFAS Characterisation Program

				Asbestos	PAH									
				Moisture Content	Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a) pyrene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Benzo(b+j)fluoranthene	Dibenz(a,h)anthracene
				%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				**0.1**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**
Field ID	**Date**	**Lab Report Number**	**Matrix Type**											
SB04_0.0_200622	20 Jun 2022	ES2223133	Soil	**1.9**	-	-	-	-	-	-	-	-	-	-
QC11_200622	20 Jun 2022	ES2223133	Soil	**1.8**	-	-	-	-	-	-	-	-	-	-
RPD				5	-	-	-	-	-	-	-	-	-	-
YAP3_0.0_230622	22 Jun 2022	ES2223150	Soil	**4.6**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
QC17	23 Jun 2022	ES2223150	Soil	**4.5**	-	-	-	-	-	-	-	-	-	-
RPD				2	-	-	-	-	-	-	-	-	-	-
SB12_0.0_240622	24 Jun 2022	ES2223153	Soil	**5.7**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
QC25	24 Jun 2022	ES2223153	Soil	**5.2**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
RPD				9	0	0	0	0	0	0	0	0	0	0
SB27_1.4_240622	24 Jun 2022	ES2223152	Soil	**3.8**	-	-	-	-	-	-	-	-	-	-
QC19	24 Jun 2022	ES2223152	Soil	**4.6**	-	-	-	-	-	-	-	-	-	-
RPD				19	-	-	-	-	-	-	-	-	-	-
SB30_0.3_240622	24 Jun 2022	ES2223151	Soil	**3.5**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
QC07_240622	24 Jun 2022	ES2223151	Soil	**3.5**	-	-	-	-	-	-	-	-	-	-
RPD				0	-	-	-	-	-	-	-	-	-	-
YAP2_0.0_240622	24 Jun 2022	ES2223152	Soil	**20.0**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
QC21	24 Jun 2022	ES2223152	Soil	**3.7**	-	-	-	-	-	-	-	-	-	-
RPD				**138**	-	-	-	-	-	-	-	-	-	-
SB17_0.0_260622	26 Jun 2022	ES2223334	Soil	**1.4**	-	-	-	-	-	-	-	-	-	-
QC36	26 Jun 2022	ES2223334	Soil	**1.8**	-	-	-	-	-	-	-	-	-	-
RPD				25	-	-	-	-	-	-	-	-	-	-

*RPDs have only been considered where a concentration is greater than 1 times the EQL.

**Elevated RPDs are highlighted as per QAQC Profile settings (Acceptable RPDs for each EQL multiplier range are: 50 (1 - 10 x EQL); 50 (10 - 10 x EQL); 30 (> 10 x EQL))

***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory

5b

Duplicate Soil Analytical Results - 2022

Airservices Australia Ayers Rock Airport (AYQ) – Environmental Site Investigation PFAS Characterisation Program

												Metals	
				Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Phenanthrene	Pyrene	PAHs (Sum of total)	Arsenic	Cadmium	Chromium (III+VI)	Copper	Lead
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**2**	**0.4**	**2**	**5**	**5**
Field ID	**Date**	**Lab Report Number**	**Matrix Type**											
SB04_0.0_200622	20 Jun 2022	ES2223133	Soil	-	-	-	-	-	-	<5	<1	**17**	<5	<5
QC11_200622	20 Jun 2022	ES2223133	Soil	-	-	-	-	-	-	<5	<1	**20**	<5	<5
RPD				-	-	-	-	-	-	0	0	16	0	0
YAP3_0.0_230622	22 Jun 2022	ES2223150	Soil	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<1	**57**	**8**	<5
QC17	23 Jun 2022	ES2223150	Soil	-	-	-	-	-	-	<5	<1	**29**	<5	<5
RPD				-	-	-	-	-	-	0	0	65	46	0
SB12_0.0_240622	24 Jun 2022	ES2223153	Soil	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<1	**25**	**8**	<5
QC25	24 Jun 2022	ES2223153	Soil	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<1	**27**	**9**	<5
RPD				0	0	0	0	0	0	0	0	8	12	0
SB27_1.4_240622	24 Jun 2022	ES2223152	Soil	-	-	-	-	-	-	-	-	-	-	-
QC19	24 Jun 2022	ES2223152	Soil	-	-	-	-	-	-	-	-	-	-	-
RPD				-	-	-	-	-	-	-	-	-	-	-
SB30_0.3_240622	24 Jun 2022	ES2223151	Soil	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-
QC07_240622	24 Jun 2022	ES2223151	Soil	-	-	-	-	-	-	-	-	-	-	-
RPD				-	-	-	-	-	-	-	-	-	-	-
YAP2_0.0_240622	24 Jun 2022	ES2223152	Soil	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<1	**22**	**8**	<5
QC21	24 Jun 2022	ES2223152	Soil	-	-	-	-	-	-	<5	<1	**30**	**6**	<5
RPD				-	-	-	-	-	-	0	0	31	29	0
SB17_0.0_260622	26 Jun 2022	ES2223334	Soil	-	-	-	-	-	-	<5	<1	**22**	<5	<5
QC36	26 Jun 2022	ES2223334	Soil	-	-	-	-	-	-	<5	<1	**21**	<5	<5
RPD				-	-	-	-	-	-	0	0	5	0	0

*RPDs have only been considered where a concentration is greater than 1 times the EQL.

**Elevated RPDs are highlighted as per QAQC Profile settings (Acceptable RPDs for each EQL multiplier range a

***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any met

5b

Duplicate Soil Analytical Results - 2022

Airservices Australia Ayers Rock Airport (AYQ) – Environmental Site Investigation PFAS Characterisation Program

								BTEX							
				Mercury	Nickel	Zinc	Naphthalene (VOC)	Benzene	Toluene	Ethylbenzene	Xylene (m & p)	Xylene (o)	Xylene Total	Total BTEX
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				**0.1**	**2**	**5**	**0.5**	**0.1**	**0.1**	**0.1**	**0.2**	**0.1**	**0.3**	**0.2**
Field ID	**Date**	**Lab Report Number**	**Matrix Type**											
SB04_0.0_200622	20 Jun 2022	ES2223133	Soil	<0.1	**2**	<5	-	-	-	-	-	-	-	-
QC11_200622	20 Jun 2022	ES2223133	Soil	<0.1	**2**	<5	-	-	-	-	-	-	-	-
RPD				0	0	0	-	-	-	-	-	-	-	-
YAP3_0.0_230622	22 Jun 2022	ES2223150	Soil	<0.1	**4**	**7**	<1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2
QC17	23 Jun 2022	ES2223150	Soil	<0.1	**2**	<5	-	-	-	-	-	-	-	-
RPD				0	67	33	-	-	-	-	-	-	-	-
SB12_0.0_240622	24 Jun 2022	ES2223153	Soil	<0.1	**4**	**6**	<1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2
QC25	24 Jun 2022	ES2223153	Soil	<0.1	**5**	**6**	<1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2
RPD				0	22	0	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
SB27_1.4_240622	24 Jun 2022	ES2223152	Soil	-	-	-	<1	<0.2	<0.5	<0.5	<0.5	<0.5	-	-
QC19	24 Jun 2022	ES2223152	Soil	-	-	-	<1	<0.2	<0.5	<0.5	<0.5	<0.5	-	-
RPD				-	-	-	**0**	**0**	**0**	**0**	**0**	**0**	-	-
SB30_0.3_240622	24 Jun 2022	ES2223151	Soil	-	-	-	<1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2
QC07_240622	24 Jun 2022	ES2223151	Soil	-	-	-	<1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2
RPD				-	-	-	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
YAP2_0.0_240622	24 Jun 2022	ES2223152	Soil	<0.1	**6**	**<5**	<1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2
QC21	24 Jun 2022	ES2223152	Soil	<0.1	**4**	**<5**	-	-	-	-	-	-	-	-
RPD				0	40	0	-	-	-	-	-	-	-	-
SB17_0.0_260622	26 Jun 2022	ES2223334	Soil	<0.1	**2**	**<5**	-	-	-	-	-	-	-	-
QC36	26 Jun 2022	ES2223334	Soil	<0.1	**2**	**<5**	-	-	-	-	-	-	-	-
RPD				0	0	0	-	-	-	-	-	-	-	-

*RPDs have only been considered where a concentration is greater than 1 times the EQL.

**Elevated RPDs are highlighted as per QAQC Profile settings (Acceptable RPDs for each EQL multiplier range a

***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any me

5b

Duplicate Soil Analytical Results - 2022

Airservices Australia Ayers Rock Airport (AYQ) – Environmental Site

Investigation PFAS Characterisation Program

				Total Recoverable Hydrocarbons	TPH										
				C10 - C40 (Sum of total)	F1 (C6-C10) less BTEX	F2 C10-C16 (minus Naphthalene)	C6 - C9	C10 - C14	C15 - C28	C29-C36	+C10 - C36 (Sum of total)	F1 (C6-C10_)	F2 (C10-C16 Hydrocarbons)	F3 (C16-C34 Hydrocarbons)
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				**50**	**10**	**50**	**10**	**20**	**50**	**50**	**50**	**10**	**50**	**100**
Field ID	**Date**	**Lab Report Number**	**Matrix Type**											
SB04_0.0_200622	20 Jun 2022	ES2223133	Soil	-	-	-	-	-	-	-	-	-	-	-
QC11_200622	20 Jun 2022	ES2223133	Soil	-	-	-	-	-	-	-	-	-	-	-
RPD				-	-	-	-	-	-	-	-	-	-	-
YAP3_0.0_230622	22 Jun 2022	ES2223150	Soil	<50	<10	<50	<10	<50	<100	<100	<50	<10	<50	<100
QC17	23 Jun 2022	ES2223150	Soil	-	-	-	-	-	-	-	-	-	-	-
RPD				-	-	-	-	-	-	-	-	-	-	-
SB12_0.0_240622	24 Jun 2022	ES2223153	Soil	<50	<10	<50	<10	<50	<100	<100	<50	<10	<50	<100
QC25	24 Jun 2022	ES2223153	Soil	<50	<10	<50	<10	<50	<100	<100	<50	<10	<50	<100
RPD				**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
SB27_1.4_240622	24 Jun 2022	ES2223152	Soil	-	-	-	-	-	-	-	-	-	-	-
QC19	24 Jun 2022	ES2223152	Soil	-	-	-	-	-	-	-	-	-	-	-
RPD				-	-	-	-	-	-	-	-	-	-	-
SB30_0.3_240622	24 Jun 2022	ES2223151	Soil	<50	<10	<50	<10	<50	<100	<100	<50	<10	<50	<100
QC07_240622	24 Jun 2022	ES2223151	Soil	<50	<10	<50	<10	<50	<100	<100	<50	<10	<50	<100
RPD				**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
YAP2_0.0_240622	24 Jun 2022	ES2223152	Soil	<50	<10	<50	<10	<50	<100	<100	<50	<10	<50	<100
QC21	24 Jun 2022	ES2223152	Soil	-	-	-	-	-	-	-	-	-	-	-
RPD				-	-	-	-	-	-	-	-	-	-	-
SB17_0.0_260622	26 Jun 2022	ES2223334	Soil	-	-	-	-	-	-	-	-	-	-	-
QC36	26 Jun 2022	ES2223334	Soil	-	-	-	-	-	-	-	-	-	-	-
RPD				-	-	-	-	-	-	-	-	-	-	-

*RPDs have only been considered where a concentration is greater than 1 times the EQL.

**Elevated RPDs are highlighted as per QAQC Profile settings (Acceptable RPDs for each EQL multiplier range a

***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any met

Duplicate Soil Analytical Results - 2022

Airservices Australia Ayers Rock Airport (AYQ) – Environmental Site Investigation PFAS Characterisation Program

				C34-C40
				mg/kg
EQL				**100**
Field ID	**Date**	**Lab Report Number**	**Matrix Type**	
SB04_0.0_200622	20 Jun 2022	ES2223133	Soil	-
QC11_200622	20 Jun 2022	ES2223133	Soil	-
RPD				-
YAP3_0.0_230622	22 Jun 2022	ES2223150	Soil	<100
QC17	23 Jun 2022	ES2223150	Soil	-
RPD				-
SB12_0.0_240622	24 Jun 2022	ES2223153	Soil	<100
QC25	24 Jun 2022	ES2223153	Soil	<100
RPD				**0**
SB27_1.4_240622	24 Jun 2022	ES2223152	Soil	-
QC19	24 Jun 2022	ES2223152	Soil	-
RPD				-
SB30_0.3_240622	24 Jun 2022	ES2223151	Soil	<100
QC07_240622	24 Jun 2022	ES2223151	Soil	<100
RPD				**0**
YAP2_0.0_240622	24 Jun 2022	ES2223152	Soil	<100
QC21	24 Jun 2022	ES2223152	Soil	-
RPD				-
SB17_0.0_260622	26 Jun 2022	ES2223334	Soil	-
QC36	26 Jun 2022	ES2223334	Soil	-
RPD				-

*RPDs have only been considered where a concentration is greater than 1 times the EQL.

**Elevated RPDs are highlighted as per QAQC Profile settings (Acceptable RPDs for each EQL multiplier range a

***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any met

Table 5c
Duplicate and Triplicate Soil Analytical Results - 2023
Airservices Australia Ayers Rock Airport (AYQ) – Targeted Site Investigation

				Physical Parameters	Asbestos	NA			Perfluoroalkane Sulfonic Acids								Perfluoroalkane Carboxylic Acids									
				Moisture Content (dried @ 103°C)	Moisture Content	Sum of PFAS (WA DER List)_		Sum of US EPA PFAS (PFOS + PFOA)*	Perfluoropropanesulfonic acid (PFPrS)	Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorononanesulfonic acid (PFNS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorodecanoic acid (PFDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorononanoic acid (PFNA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluoroundecanoic acid (PFUnDA)
				%	%	µg/L	mg/kg	UG/L	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				**1**	**0.1**	**10**		**5**	**0.005**	**0.0002**	**0.0002**	**0.0002**	**0.0002**	**0.0002**	**0.005**	**0.0002**	**0.001**	**0.0002**	**0.0002**	**0.0002**	**0.0002**	**0.0002**	**0.0002**	**0.0002**	**0.0005**	**0.0002**	**0.0002**
Field ID	**Date**	**Lab Report Number**	**Matrix Type**																								
SB40_0.4-0.5	03 Feb 2023	ES2305043	Soil	-	**3.8**	-	**0.0216**	-	-	**0.0010**	**0.0010**	**0.0029**	<0.0002	**0.0005**	-	<0.0002	<0.001	**0.0015**	**0.0092**	**0.0052**	**0.0013**	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
QC19	03 Feb 2023	ES2305042	Soil	-	**3.9**	-	**0.0221**	-	-	**0.0009**	**0.0010**	**0.0033**	<0.0002	**0.0006**	-	<0.0002	<0.001	**0.0018**	**0.0093**	**0.0048**	**0.0014**	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
RPD				-	3	-	2	-	-	11	0	13	0	18	-	0	0	18	1	8	7	0	0	0	0	0	0
SB40_0.4-0.5	03 Feb 2023	ES2305043	Soil	-	**3.8**	-	**0.0216**	-	-	**0.0010**	**0.0010**	**0.0029**	<0.0002	**0.0005**	-	<0.0002	<0.001	**0.0015**	**0.0092**	**0.0052**	**0.0013**	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
QC20	03 Feb 2023	966290	Soil	**3.0**	-	<10	-	<5	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	**0.0066**	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
RPD				-	-	-	-	-	-	0	0	0	0	0	-	0	0	0	**33**	4	0	0	0	0	0	0	0
SB45_0.4-0.5	03 Feb 2023	ES2305042	Soil	-	**3.5**	-	<0.0002	-	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	-	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
QC15	03 Feb 2023	ES2305042	Soil	-	**2.9**	-	<0.0002	-	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	-	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
RPD				-	19	-	0	-	-	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	0	0	0
SB45_0.4-0.5	03 Feb 2023	ES2305042	Soil	-	**3.5**	-	<0.0002	-	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	-	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
QC16	03 Feb 2023	966290	Soil	**1.6**	-	<10	-	<5	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
RPD				-	-	-	-	-	-	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	0	0	0
SB46_0.4-0.5	03 Feb 2023	ES2305042	Soil	-	**3.5**	-	**0.0002**	-	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	-	<0.0002	<0.001	<0.0002	<0.0002	**0.0002**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
QC17	03 Feb 2023	ES2305042	Soil	-	**3.5**	-	**0.0002**	-	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	-	<0.0002	<0.001	<0.0002	<0.0002	**0.0002**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
RPD				-	0	-	0	-	-	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	0	0	0
SB46_0.4-0.5	03 Feb 2023	ES2305042	Soil	-	**3.5**	-	**0.0002**	-	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	-	<0.0002	<0.001	<0.0002	<0.0002	**0.0002**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
QC18	03 Feb 2023	966290	Soil	**2.6**	-	<10	-	<5	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
RPD				-	-	-	-	-	-	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	0	0	0
SB42_0.4-0.5	04 Feb 2023	ES2305043	Soil	-	**2.8**	-	**0.0232**	-	-	**0.0016**	**0.0009**	**0.0017**	<0.0002	<0.0002	-	<0.0002	**0.002**	**0.0041**	**0.0084**	**0.0036**	**0.0018**	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
QC25	04 Feb 2023	ES2305043	Soil	-	**2.6**	-	**0.0208**	-	-	**0.0012**	**0.0009**	**0.0017**	<0.0002	<0.0002	-	<0.0002	**0.002**	**0.0045**	**0.0073**	**0.0026**	**0.0015**	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
RPD				-	7	-	11	-	-	29	0	0	0	0	-	0	0	9	14	**32**	18	0	0	0	0	0	0
SB42_0.4-0.5	04 Feb 2023	ES2305043	Soil	-	**2.8**	-	**0.0232**	-	-	**0.0016**	**0.0009**	**0.0017**	<0.0002	<0.0002	-	<0.0002	**0.002**	**0.0041**	**0.0084**	**0.0036**	**0.0018**	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
QC26	04 Feb 2023	966290	Soil	**2.2**	-	<10	-	<5	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	**0.0079**	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
RPD				-	-	-	-	-	-	0	0	0	0	0	-	0	0	0	6	0	0	0	0	0	0	0	0
SB43_0.4-0.5	04 Feb 2023	ES2305043	Soil	-	**7.2**	-	**0.0243**	-	-	<0.0002	<0.0002	**0.0005**	<0.0002	**0.0008**	-	<0.0002	**0.001**	**0.0029**	**0.0027**	**0.0078**	**0.0037**	**0.0011**	**0.0005**	**0.0013**	<0.0005	<0.0002	**0.0004**
QC23	04 Feb 2023	ES2305043	Soil	-	**7.2**	-	**0.0288**	-	-	<0.0002	<0.0002	**0.0006**	<0.0002	**0.0009**	-	<0.0002	**0.002**	**0.0042**	**0.0032**	**0.0080**	**0.0050**	**0.0012**	**0.0006**	**0.0011**	<0.0005	<0.0002	**0.0005**
RPD				-	0	-	17	-	-	0	0	18	0	12	-	0	**67**	**37**	17	3	30	9	18	17	0	0	22
SB43_0.4-0.5	04 Feb 2023	ES2305043	Soil	-	**7.2**	-	**0.0243**	-	-	<0.0002	<0.0002	**0.0005**	<0.0002	**0.0008**	-	<0.0002	**0.001**	**0.0029**	**0.0027**	**0.0078**	**0.0037**	**0.0011**	**0.0005**	**0.0013**	<0.0005	<0.0002	**0.0004**
QC24	04 Feb 2023	966290	Soil	**6.5**	-	<10	-	<5	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
RPD				-	-	-	-	-	-	0	0	0	0	0	-	0	0	0	0	**44**	0	0	0	0	0	0	0

red where a concentration is greater than 1 times the EQL.
able RPDs for each EQL multiplier range are: 50 (1 - 10 x EQL); 30 (10 - 10 x EQL); 30 (> 10 x EQL))
ry between laboratories. Any methods in the row header relate to those used in the primary laboratory

Table 5c
Duplicate and Triplicate Soil Analytical Results - 2023
Airservices Australia Ayers Rock Airport (AYQ) – Targeted Site Investigation

				(n:2) Fluorotelomer Sulfonic Acids				Perfluoroalkyl Sulfonamides							PFAS		
				4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFHxS and PFOS	Sum of PFAS	Sum of enHealth PFAS (PFHxS + PFOS + PFOA)
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				**0.0005**	**0.0005**	**0.0005**	**0.0005**	**0.0002**	**0.0005**	**0.0002**	**0.0005**	**0.0005**	**0.0002**	**0.0005**	**0.0002**	**0.0002**	**0.005**
Field ID	**Date**	**Lab Report Number**	**Matrix Type**														
SB40_0.4-0.5	03 Feb 2023	ES2305043	Soil	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	**0.0034**	**0.0226**	-
QC19	03 Feb 2023	ES2305042	Soil	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	**0.0039**	**0.0231**	-
RPD				0	0	0	0	0	0	0	0	0	0	0	14	2	-
SB40_0.4-0.5	03 Feb 2023	ES2305043	Soil	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	**0.0034**	**0.0226**	-
QC20	03 Feb 2023	966290	Soil	<0.005	<0.01	<0.005	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.005	<0.005	<0.05	<0.005
RPD				0	0	0	0	0	0	0	0	0	0	0	0	0	-
SB45_0.4-0.5	03 Feb 2023	ES2305042	Soil	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	-
QC15	03 Feb 2023	ES2305042	Soil	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	-
RPD				0	0	0	0	0	0	0	0	0	0	0	0	0	-
SB45_0.4-0.5	03 Feb 2023	ES2305042	Soil	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	-
QC16	03 Feb 2023	966290	Soil	<0.005	<0.01	<0.005	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.005	<0.005	<0.05	<0.005
RPD				0	0	0	0	0	0	0	0	0	0	0	0	0	-
SB46_0.4-0.5	03 Feb 2023	ES2305042	Soil	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	**0.0002**	-
QC17	03 Feb 2023	ES2305042	Soil	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	**0.0002**	-
RPD				0	0	0	0	0	0	0	0	0	0	0	0	0	-
SB46_0.4-0.5	03 Feb 2023	ES2305042	Soil	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	**0.0002**	-
QC18	03 Feb 2023	966290	Soil	<0.005	<0.01	<0.005	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.005	<0.005	<0.05	<0.005
RPD				0	0	0	0	0	0	0	0	0	0	0	0	0	-
SB42_0.4-0.5	04 Feb 2023	ES2305043	Soil	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	**0.0017**	**0.0241**	-
QC25	04 Feb 2023	ES2305043	Soil	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	**0.0017**	**0.0217**	-
RPD				0	0	0	0	0	0	0	0	0	0	0	0	10	-
SB42_0.4-0.5	04 Feb 2023	ES2305043	Soil	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	**0.0017**	**0.0241**	-
QC26	04 Feb 2023	966290	Soil	<0.005	<0.01	<0.005	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.005	<0.005	<0.05	<0.005
RPD				0	0	0	0	0	0	0	0	0	0	0	0	0	-
SB43_0.4-0.5	04 Feb 2023	ES2305043	Soil	<0.0005	<0.0005	**0.0049**	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	**0.0013**	**0.0276**	-
QC23	04 Feb 2023	ES2305043	Soil	<0.0005	<0.0005	**0.0049**	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	**0.0015**	**0.0322**	-
RPD				0	0	0	0	0	0	0	0	0	0	0	14	15	-
SB43_0.4-0.5	04 Feb 2023	ES2305043	Soil	<0.0005	<0.0005	**0.0049**	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	**0.0013**	**0.0276**	-
QC24	04 Feb 2023	966290	Soil	<0.005	<0.01	<0.005	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.005	<0.005	<0.05	<0.005
RPD				0	0	0	0	0	0	0	0	0	0	0	0	0	-

red where a concentration is greater than 1 times the EQL.
able RPDs for each EQL multiplier range are: 50 (1 - 10 x EQL); 30 (10 - 10 x EQL); 30 (> 10 x EQL))
ry between laboratories. Any methods in the row header relate to those used in the primary laboratory

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Duplicate Water Analytical Results - 2022

Airservices Australia Ayers Rock Airport (AYQ) – Environmental Site Investigation

PFAS Characterisation Program

				Sum of PFAS (WA DER List)_	Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)
				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**	**0.05**	**0.01**
Field ID	**Date**	**Lab Report Number**	**Matrix Type**									
RN12081	28 Jun 2022	ES2223156	Water	<0.01	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02
QC42	28 Jun 2022	ES2223156	Water	<0.01	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02
RPD				0	0	0	0	0	0	0	0	0
GW03	28 Jun 2022	ES2223156	Water	**2.59**	**0.04**	**0.03**	**0.11**	<0.02	**0.01**	<0.02	**0.3**	**0.52**
QC44	28 Jun 2022	ES2223156	Water	**2.37**	**0.04**	**0.03**	**0.11**	<0.02	**0.01**	<0.02	**0.3**	**0.48**
RPD				**9**	0	0	0	0	0	0	0	**8**

*RPDs have only been considered where a concentration is greater than 1 times the EQL.

**Elevated RPDs are highlighted as per QAQC Profile settings (Acceptable RPDs for each EQL multiplier range are: 40 (1 - 10 x EQL); 40 (10 - 20 x EQL); 25 (> 20 x EQL))

***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory

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Duplicate Water Analytical Results - 2022

Airservices Australia Ayers Rock Airport (AYQ) – Environmental Site Investigation

PFAS Characterisation Program

				Perfluoroalkane Carboxylic Acids								
				Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorodecanoic acid (PFDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorononanoic acid (PFNA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluoroundecanoic acid (PFUnDA)
				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	**Date**	**Lab Report Number**	**Matrix Type**									
RN12081	28 Jun 2022	ES2223156	Water	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02
QC42	28 Jun 2022	ES2223156	Water	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02
RPD				0	0	0	0	0	0	0	0	0
GW03	28 Jun 2022	ES2223156	Water	**0.59**	**0.69**	**0.33**	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02
QC44	28 Jun 2022	ES2223156	Water	**0.53**	**0.61**	**0.29**	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02
RPD				**11**	**12**	**13**	0	0	0	0	0	0

*RPDs have only been considered where a concentration is greater than 1 times the EQL.

**Elevated RPDs are highlighted as per QAQC Profile settings (Acceptable RPDs for each EQL multiplier range ar

***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any meth

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Duplicate Water Analytical Results - 2022

Airservices Australia Ayers Rock Airport (AYQ) – Environmental Site Investigation

PFAS Characterisation Program

				(n:2) Fluorotelomer Sulfonic Acids				Perfluoroalkyl Sulfonamides				
				4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL				**0.01**	**0.05**	**0.01**	**0.01**	**0.02**	**0.05**	**0.02**	**0.05**	**0.05**
Field ID	**Date**	**Lab Report Number**	**Matrix Type**									
RN12081	28 Jun 2022	ES2223156	Water	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05
QC42	28 Jun 2022	ES2223156	Water	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05
RPD				0	0	0	0	0	0	0	0	0
GW03	28 Jun 2022	ES2223156	Water	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05
QC44	28 Jun 2022	ES2223156	Water	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05
RPD				0	0	0	0	0	0	0	0	0

*RPDs have only been considered where a concentration is greater than 1 times the EQL.

**Elevated RPDs are highlighted as per QAQC Profile settings (Acceptable RPDs for each EQL multiplier range ar

***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any meth

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Duplicate Water Analytical Results - 2022

Airservices Australia Ayers Rock Airport (AYQ) – Environmental Site Investigation

PFAS Characterisation Program

						PFAS	
				N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFHxS and PFOS	Sum of PFAS
				µg/L	µg/L	µg/L	µg/L
EQL				**0.02**	**0.05**	**0.01**	**0.01**
Field ID	**Date**	**Lab Report Number**	**Matrix Type**				
RN12081	28 Jun 2022	ES2223156	Water	<0.02	<0.05	<0.01	<0.01
QC42	28 Jun 2022	ES2223156	Water	<0.02	<0.05	<0.01	<0.01
RPD				0	0	0	0
GW03	28 Jun 2022	ES2223156	Water	<0.02	<0.05	**0.12**	**2.62**
QC44	28 Jun 2022	ES2223156	Water	<0.02	<0.05	**0.12**	**2.40**
RPD				0	0	0	**9**

*RPDs have only been considered where a concentration is greater than 1 times the EQL.

**Elevated RPDs are highlighted as per QAQC Profile settings (Acceptable RPDs for each EQL multiplier range ar

***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any meth

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Duplicate Water Analytical Results - 2022

Airservices Australia Ayers Rock Airport (AYQ) – Environmental Site Investigation

PFAS Characterisation Program

				BTEX								
				Benzene	Toluene	Ethylbenzene	Xylene (m & p)	Xylene (o)	Xylene Total	Total BTEX	F1 (C6-C10) less BTEX	F2 C10-C16 (minus Naphthalene)
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	mg/L
EQL				**1**	**1**	**1**	**2**	**1**	**2**	**1**	**0.02**	**0.05**
Field ID	**Date**	**Lab Report Number**	**Matrix Type**									
GW03	28 Jun 2022	ES2223156	Water	<1	<2	<2	<2	<2	<2	<1	<0.02	<0.1
QC44	28 Jun 2022	ES2223156	Water	<1	<2	<2	<2	<2	<2	<1	<0.02	<0.1
RPD				0	0	0	0	0	0	0	0	0
GW03	28 Jun 2022	ES2223156	Water	<1	<2	<2	<2	<2	<2	<1	<0.02	<0.1
QC45	28 Jun 2022	904215	Water	<1	<1	<1	<2	<1	<3	-	<0.02	<0.05
RPD				0	0	0	0	0	0	-	0	0

*RPDs have only been considered where a concentration is greater than 1 times the EQL.

**Elevated RPDs are highlighted as per QAQC Profile settings (Acceptable RPDs for each EQL multiplier range are: 40 (1 - 10 x EQL); 40 (10 - 20 x EQL); 25 (> 20 x EQL))

***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory

TETRA TECH COFFEY

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Duplicate Water Analytical Results - 2022

Airservices Australia Ayers Rock Airport (AYQ) – Environmental Site Investigation

PFAS Characterisation Program

				TPH								
				C6 - C9	C10 - C14	C15 - C28	C29-C36	+C10 - C36 (Sum of total)	F1 (C6-C10_)	F2 (C10-C16 Hydrocarbons)	F3 (C16-C34 Hydrocarbons)	C34-C40
				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
EQL				**0.02**	**0.05**	**0.1**	**0.05**	**0.05**	**0.02**	**0.05**	**0.1**	**0.1**
Field ID	**Date**	**Lab Report Number**	**Matrix Type**									
GW03	28 Jun 2022	ES2223156	Water	<0.02	<0.05	<0.1	<0.05	<0.05	<0.02	<0.1	<0.1	<0.1
QC44	28 Jun 2022	ES2223156	Water	<0.02	<0.05	<0.1	<0.05	<0.05	<0.02	<0.1	<0.1	<0.1
RPD				0	0	0	0	0	0	0	0	0
GW03	28 Jun 2022	ES2223156	Water	<0.02	<0.05	<0.1	<0.05	<0.05	<0.02	<0.1	<0.1	<0.1
QC45	28 Jun 2022	904215	Water	<0.02	<0.05	<0.1	<0.1	<0.1	<0.02	<0.05	<0.1	<0.1
RPD				0	0	0	0	0	0	0	0	0

*RPDs have only been considered where a concentration is greater than 1 times the EQL.

**Elevated RPDs are highlighted as per QAQC Profile settings (Acceptable RPDs for each EQL multiplier range ar

***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any meth

Table 5f
Duplicate and Triplicate Water Analytical Results - 2023
Airservices Australia Ayers Rock Airport (AYQ) – Targeted Site Investigation

				NA		Perfluoroalkane Sulfonic Acids								Perfluoroalkane Carboxylic Acids									
				Sum of PFAS (WA DER List)_	Sum of US EPA PFAS (PFOS + PFOA)*	Perfluoropropanesulfonic acid (PFPrS)	Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorononanesulfonic acid (PFNS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorodecanoic acid (PFDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorononanoic acid (PFNA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluoroundecanoic acid (PFUnDA)
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL				**0.0002**	**0.001**	**0.001**	**0.0005**	**0.0005**	**0.0005**	**0.0005**	**0.0001**	**0.001**	**0.0005**	**0.002**	**0.0005**	**0.0005**	**0.0005**	**0.0005**	**0.0005**	**0.0005**	**0.0005**	**0.0005**	**0.0005**	**0.0005**
Field ID	**Date**	**Lab Report Number**	**Matrix Type**																					
GW02	05 Feb 2023	ES2305043	Water	**0.0012**	-	-	<0.0005	<0.0005	**0.0006**	<0.0005	<0.0002	-	<0.0005	<0.0020	<0.0005	**0.0006**	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
QC29	05 Feb 2023	ES2305043	Water	**0.0035**	-	-	<0.0005	<0.0005	**0.0007**	<0.0005	<0.0002	-	<0.0005	**0.0023**	<0.0005	**0.0005**	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
RPD				98	-	-	0	0	15	0	0	-	0	14	0	18	0	0	0	0	0	0	0	0
GW02	05 Feb 2023	ES2305043	Water	**0.0012**	-	-	<0.0005	<0.0005	**0.0006**	<0.0005	<0.0002	-	<0.0005	<0.0020	<0.0005	**0.0006**	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
QC30	05 Feb 2023	966290	Water	<0.005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	**0.0003**	<0.001	<0.001	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
RPD				0	-	-	0	0	0	0	40	-	0	0	0	0	0	0	0	0	0	0	0	0
GW03	05 Feb 2023	ES2305043	Water	**3.19**	-	-	**0.04**	**0.02**	**0.13**	<0.02	**0.02**	-	<0.02	**0.4**	**0.62**	**0.74**	**0.78**	**0.46**	<0.02	<0.02	**0.04**	<0.05	<0.02	<0.02
QC31	05 Feb 2023	ES2305043	Water	**2.64**	-	-	**0.04**	**0.03**	**0.14**	<0.02	**0.02**	-	<0.02	**0.4**	**0.48**	**0.57**	**0.61**	**0.38**	<0.02	<0.02	**0.03**	<0.05	<0.02	<0.02
RPD				19	-	-	0	40	7	0	0	-	0	0	25	26	24	19	0	0	29	0	0	0
GW03	05 Feb 2023	ES2305043	Water	**3.19**	-	-	**0.04**	**0.02**	**0.13**	<0.02	**0.02**	-	<0.02	**0.4**	**0.62**	**0.74**	**0.78**	**0.46**	<0.02	<0.02	**0.04**	<0.05	<0.02	<0.02
QC32	05 Feb 2023	966290	Water	**2.99**	**0.49**	**0.03**	**0.04**	**0.02**	<0.01	<0.01	**0.02**	<0.01	<0.01	**0.45**	**0.60**	**0.62**	**0.79**	**0.47**	<0.01	<0.01	**0.05**	<0.01	<0.01	<0.01
RPD				6	-	-	0	0	171	0	0	-	0	12	3	18	1	2	0	0	22	0	0	0

*RPDs have only been considered where a concentration is greater than 1 times the EQL.
**Elevated RPDs are highlighted as per QAQC Profile settings (Acceptable RPDs for each EQL multiplier range are: 25 (1 - 20 x EQL); 10 (20 - 20 x EQL); 10 (> 20 x EQL))
***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory

Table 5f
Duplicate and Triplicate Water Analytical Results - 2023
Airservices Australia Ayers Rock Airport (AYQ) – Targeted Site Investigation

				(n:2) Fluorotelomer Sulfonic Acids				Perfluoroalkyl Sulfonamides							PFAS		
				4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFHxS and PFOS	Sum of PFAS	Sum of enHealth PFAS (PFHxS + PFOS + PFOA)
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL				**0.001**	**0.001**	**0.001**	**0.001**	**0.0005**	**0.001**	**0.0005**	**0.001**	**0.001**	**0.0005**	**0.001**	**0.0002**	**0.0002**	**0.001**
Field ID	**Date**	**Lab Report Number**	**Matrix Type**														
GW02	05 Feb 2023	ES2305043	Water	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.0005	<0.001	<0.001	<0.0005	<0.001	**0.0006**	**0.0012**	-
QC29	05 Feb 2023	ES2305043	Water	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.0005	<0.001	<0.001	<0.0005	<0.001	**0.0007**	**0.0035**	-
RPD				0	0	0	0	0	0	0	0	0	0	0	15	**98**	-
GW02	05 Feb 2023	ES2305043	Water	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.001	<0.0005	<0.001	<0.001	<0.0005	<0.001	**0.0006**	**0.0012**	-
QC30	05 Feb 2023	966290	Water	<0.001	<0.005	<0.001	<0.001	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.001	<0.005	<0.001
RPD				0	0	0	0	0	0	0	0	0	0	0	0	0	-
GW03	05 Feb 2023	ES2305043	Water	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	**0.15**	**3.25**	-
QC31	05 Feb 2023	ES2305043	Water	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	**0.16**	**2.70**	-
RPD				0	0	0	0	0	0	0	0	0	0	0	6	18	-
GW03	05 Feb 2023	ES2305043	Water	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	**0.15**	**3.25**	-
QC32	05 Feb 2023	966290	Water	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	**0.02**	**3.09**	**0.49**
RPD				0	0	0	0	0	0	0	0	0	0	0	**153**	5	-

*RPDs have only been considered where a concentration is greater than 1 times the EQL.
**Elevated RPDs are highlighted as per QAQC Profile settings (Acceptable RPDs for each EQL multiplier range ar
***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any meth

Table 6a
Field QAQC Blank Soil Analytical Results - 2023
Airservices Australia Ayers Rock Airport (AYQ) – Targeted Site Investigation

				Asbestos	NA	Perfluoroalkane Sulfonic Acids						Perfluoroalkane Carboxylic Acids										
				Moisture Content	Sum of PFAS (WA DER List)_	Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorodecanoic acid (PFDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorononanoic acid (PFNA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluoroundecanoic acid (PFUnDA)
				%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				**0.1**		**0.0002**	**0.0002**	**0.0002**	**0.0002**	**0.0002**	**0.0002**	**0.001**	**0.0002**	**0.0002**	**0.0002**	**0.0002**	**0.0002**	**0.0002**	**0.0002**	**0.0005**	**0.0002**	**0.0002**
Field ID	**Date**	**Sample Code**	**Sample Type**																			
QC36	06 Feb 2023	ES2305043094	Trip_B (Lab supplied)	**0.6**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002

Table 6b
Field QAQC Blank Soil Analytical Results - 2023
Airservices Australia Ayers Rock Airport (AYQ) – Targeted Site Investigation

				(n:2) Fluorotelomer Sulfonic Acids				Perfluoroalkyl Sulfonamides							PFAS	
				4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFHxS and PFOS	Sum of PFAS
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				**0.0005**	**0.0005**	**0.0005**	**0.0005**	**0.0002**	**0.0005**	**0.0002**	**0.0005**	**0.0005**	**0.0002**	**0.0005**	**0.0002**	**0.0002**
Field ID	**Date**	**Sample Code**	**Sample Type**													
QC36	06 Feb 2023	ES2305043094	Trip_B (Lab supplied)	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002

APPENDIX C - BORELOGS AND WELL DEVELOPMENT

TETRA TECH COFFEY

Environmental Log - Borehole

Hole ID.	***SB01***
sheet:	1 of 1
project no.	***754-PEREN233360***
date started:	***20 Jun 2022***
date completed:	***20 Jun 2022***
logged by:	***JH***
checked by:	***SR***

client: ***Airservices***

principal: ***Sarah Richards***

project: ***Airservices PFAS Characterisation Program***

location: ***Ayers Rock Airport, Yulara, NT***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

equipment type: Hand Auger | drilling fluid: N/A | hole diameter : 150 mm

drilling information						material substance					
method & support	water	samples & field tests	photoionization detector (ppmv)	RL (m)	depth (m)	graphic log	soil group symbol	material description **SOIL NAME**: plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency / relative density	soil origin, structure and additional observations
HA N	Not Encountered	E: SB01_0.0_200622						**FILL: SILTY SAND**: fine to medium grained, pale red, trace rootlets.	M		**FILL**
							SM	**SILTY SAND**: fine to medium grained, pale red.			**SAND DUNE DEPOSIT** no rootlets
		E: SB01_0.3_200622			0.5						
								Borehole SB01 terminated at 0.60 m Target depth			

CDF_0_10_00.3_LIBRARY.GLB rev:CDF_0_10_00.3 2020-08-25 Log COF BOREHOLE: ENVIRONMENTAL 754-PEREN233360 YULARA.GPJ <<DrawingFile>> 30/06/2022 15:49

method
- AD auger drilling*
- HA hand auger
- MR mud rotary
- W washbore
- PT push tube
- HS hollow stem
- SS solid stem
- SD sonic drilling
- * bit shown by suffix e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nill

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- WS water sample
- HB hammer bouncing
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- R refusal

soil group symbol & material description
based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

TETRA TECH COFFEY

Environmental Log - Borehole

Hole ID.	***SB02***
sheet:	1 of 1
project no.	***754-PEREN233360***
client:	***Airservices***
date started:	***20 Jun 2022***
principal:	***Sarah Richards***
date completed:	***20 Jun 2022***
project:	***Airservices PFAS Characterisation Program***
logged by:	***JH***
location:	***Ayers Rock Airport, Yulara, NT***
checked by:	***SR***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

equipment type: Hand Auger | drilling fluid: N/A | hole diameter : 150 mm

drilling information | **material substance**

method & support	water	samples & field tests	photoionization detector (ppmv)	RL (m)	depth (m)	graphic log	soil group symbol	material description **SOIL NAME**: plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency / relative density	soil origin, structure and additional observations
HA N	Not Encountered	E: SB02_0.0_200622						**FILL: SILTY SAND**: fine to medium grained, pale red, rootlets.	M		**FILL**
		E: SB02_0.3_200622					SM	**SILTY SAND**: fine to medium grained, red.			**SAND DUNE DEPOSIT** no rootlets
					0.5			Borehole SB02 terminated at 0.50 m Target depth			

CDF_0_10_00.3_LIBRARY.GLB rev:CDF_0_10_00.3 2020-08-25 Log COF BOREHOLE: ENVIRONMENTAL 754-PEREN233360 YULARA.GPJ <<DrawingFile>> 01/07/2022 11:31

method
- AD auger drilling*
- HA hand auger
- MR mud rotary
- W washbore
- PT push tube
- HS hollow stem
- SS solid stem
- SD sonic drilling
- * bit shown by suffix e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nill

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- WS water sample
- HB hammer bouncing
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- R refusal

soil group symbol & material description
based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

TETRA TECH COFFEY

Environmental Log - Borehole

Hole ID.	***SB03***
sheet:	1 of 1
project no.	***754-PEREN233360***
date started:	***20 Jun 2022***
date completed:	***20 Jun 2022***
logged by:	***JH***
checked by:	***SR***

client: ***Airservices***

principal: ***Sarah Richards***

project: ***Airservices PFAS Characterisation Program***

location: ***Ayers Rock Airport, Yulara, NT***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

equipment type: Hand Auger | drilling fluid: N/A | hole diameter : 150 mm

drilling information						material substance					
method & support	water	samples & field tests	photoionization detector (ppmv)	RL (m)	depth (m)	graphic log	soil group symbol	material description **SOIL NAME**: plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency / relative density	soil origin, structure and additional observations
HA N	Not Encountered	E: SB03_0.0_200622						**FILL: SILTY SAND**: fine to medium grained, red - brown, with medium gravel.	M		**FILL**
							SM	**SILTY SAND**: fine to medium grained, red - brown, trace cobble, sub angular.			**SAND DUNE DEPOSIT**
		E: SB03_0.3_200622						0.3 m: becoming red			
					0.5			Borehole SB03 terminated at 0.50 m Target depth			

CDF_0_10_00.3_LIBRARY.GLB rev:CDF_0_10_00.3 2020-08-25 Log COF BOREHOLE: ENVIRONMENTAL 754-PEREN233360 YULARA.GPJ <<DrawingFile>> 01/07/2022 11:34

method
- AD auger drilling*
- HA hand auger
- MR mud rotary
- W washbore
- PT push tube
- HS hollow stem
- SS solid stem
- SD sonic drilling
- * bit shown by suffix e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nill

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- WS water sample
- HB hammer bouncing
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- R refusal

soil group symbol & material description
based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

TETRA TECH COFFEY

Environmental Log - Borehole

Hole ID.	***SB04***
sheet:	1 of 1
project no.	***754-PEREN233360***
client:	***Airservices***
date started:	***20 Jun 2022***
principal:	***Sarah Richards***
date completed:	***22 Jun 2022***
project:	***Airservices PFAS Characterisation Program***
logged by:	***SR***
location:	***Ayers Rock Airport, Yulara, NT***
checked by:	***SR***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

equipment type: Hand Auger | drilling fluid: N/A | hole diameter : 150 mm

drilling information | **material substance**

method & support	water	samples & field tests	photoionization detector (ppmv)	RL (m)	depth (m)	graphic log	soil group symbol	material description **SOIL NAME**: plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency / relative density	soil origin, structure and additional observations
HA N	Not Encountered	E: SB04_0.0_200622						**FILL: SILTY SAND**: fine to medium grained, red brown, with gravel.	D	MD	**FILL**
							SM	**SILTY SAND**: fine to medium grained, red brown.	M		**SAND DUNE DEPOSIT**
		E: SB04_0.3_220622									
					0.5			Borehole SB04 terminated at 0.50 m Target depth			

CDF_0_10_00.3_LIBRARY.GLB rev:CDF_0_10_00.3 2020-08-25 Log COF BOREHOLE: ENVIRONMENTAL 754-PEREN233360 YULARA.GPJ <<DrawingFile>> 02/07/2022 11:22

method
- AD auger drilling*
- HA hand auger
- MR mud rotary
- W washbore
- PT push tube
- HS hollow stem
- SS solid stem
- SD sonic drilling
- * bit shown by suffix
- e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nill

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- WS water sample
- HB hammer bouncing
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- R refusal

soil group symbol & material description
based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

TETRA TECH COFFEY

Environmental Log - Borehole

Hole ID.	***SB05***
sheet:	1 of 1
project no.	***754-PEREN233360***
date started:	***20 Jun 2022***
date completed:	***22 Jun 2022***
logged by:	***SR***
checked by:	***SR***

client: ***Airservices***

principal: ***Sarah Richards***

project: ***Airservices PFAS Characterisation Program***

location: ***Ayers Rock Airport, Yulara, NT***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

equipment type: Hand Auger | drilling fluid: N/A | hole diameter : 150 mm

drilling information						material substance					
method & support	water	samples & field tests	photoionization detector (ppmv)	RL (m)	depth (m)	graphic log	soil group symbol	material description **SOIL NAME**: plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency / relative density	soil origin, structure and additional observations
HA N	Not Encountered	E: SB05_0.0_200622						**FILL: SILTY SAND**: fine to medium grained, red brown, with fine to medium gravel.	D	MD	**FILL**
							SM	**SILTY SAND**: fine to medium grained, red brown.	M	L	**SAND DUNE DEPOSIT**
		E: SB05_0.3_220622						0.4 m: loosely cemented		MD	
					0.5			Borehole SB05 terminated at 0.50 m Target depth			

CDF_0_10_00.3_LIBRARY.GLB rev:CDF_0_10_00.3 2020-08-25 Log COF BOREHOLE: ENVIRONMENTAL 754-PEREN233360 YULARA.GPJ <<DrawingFile>> 02/07/2022 11:27

method
- AD auger drilling*
- HA hand auger
- MR mud rotary
- W washbore
- PT push tube
- HS hollow stem
- SS solid stem
- SD sonic drilling
- * bit shown by suffix e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nill

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- WS water sample
- HB hammer bouncing
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- R refusal

soil group symbol & material description
based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

TETRA TECH COFFEY

Environmental Log - Borehole

Hole ID.	***SB06***
sheet:	1 of 1
project no.	***754-PEREN233360***
date started:	***24 Jun 2022***
date completed:	***24 Jun 2022***
logged by:	***JH***
checked by:	***SR***

client: ***Airservices***

principal: ***Sarah Richards***

project: ***Airservices PFAS Characterisation Program***

location: ***Ayers Rock Airport, Yulara, NT***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

equipment type: Hand Auger | drilling fluid: N/A | hole diameter : 150 mm

drilling information | **material substance**

method & support	water	samples & field tests	photoionization detector (ppmv)	RL (m)	depth (m)	graphic log	soil group symbol	material description **SOIL NAME**: plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency / relative density	soil origin, structure and additional observations
HA N	Not Encountered	E: SB06_0.0_240622						**FILL: SILTY SAND**: fine grained, red brown, trace rootlets.	D		**FILL**
									M		
							SM	**SILTY SAND**: fine grained, red, no rootlets.			**SAND DUNE DEPOSIT**
		E: SB06_0.3_240622									
					0.5			Borehole SB06 terminated at 0.50 m Target depth			

CDF_0_10_00.3_LIBRARY.GLB rev:CDF_0_10_00.3 2020-08-25 Log COF BOREHOLE: ENVIRONMENTAL 754-PEREN233360 YULARA.GPJ <<DrawingFile>> 01/07/2022 14:12

method
- AD auger drilling*
- HA hand auger
- MR mud rotary
- W washbore
- PT push tube
- HS hollow stem
- SS solid stem
- SD sonic drilling
- * bit shown by suffix e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nill

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- WS water sample
- HB hammer bouncing
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- R refusal

soil group symbol & material description
based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

TETRA TECH COFFEY

Environmental Log - Borehole

Hole ID.	***SB07***
sheet:	1 of 1
project no.	***754-PEREN233360***
client:	***Airservices***
date started:	***24 Jun 2022***
principal:	***Sarah Richards***
date completed:	***24 Jun 2022***
project:	***Airservices PFAS Characterisation Program***
logged by:	***SR***
location:	***Ayers Rock Airport, Yulara, NT***
checked by:	***SR***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

equipment type: Hand Auger | drilling fluid: N/A | hole diameter : 150 mm

drilling information | **material substance**

method & support	water	samples & field tests	photoionization detector (ppmv)	RL (m)	depth (m)	graphic log	soil group symbol	material description **SOIL NAME**: plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency / relative density	soil origin, structure and additional observations
HA N	Not Encountered	E: SB07_0.0_240622						**FILL: SILTY SAND**: fine to medium grained, red brown, with fine to medium limestone gravel, rounded.	D		**FILL** no odours
							SM	**SILTY SAND**: fine to medium grained, red brown.	M		**SAND DUNE DEPOSIT**
		E: SB07_0.3_240622									
					0.5			Borehole SB07 terminated at 0.50 m Target depth			

CDF_0_10_00.3_LIBRARY.GLB rev:CDF_0_10_00.3 2020-08-25 Log COF BOREHOLE: ENVIRONMENTAL 754-PEREN233360 YULARA.GPJ <<DrawingFile>> 01/07/2022 14:21

method
- AD auger drilling*
- HA hand auger
- MR mud rotary
- W washbore
- PT push tube
- HS hollow stem
- SS solid stem
- SD sonic drilling
- * bit shown by suffix e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nill

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- WS water sample
- HB hammer bouncing
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- R refusal

soil group symbol & material description
based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

TETRA TECH COFFEY

Environmental Log - Borehole

Hole ID.	***SB08***
sheet:	1 of 1
project no.	***754-PEREN233360***
date started:	***24 Jun 2022***
date completed:	***24 Jun 2022***
logged by:	***SR***
checked by:	***SR***

client: ***Airservices***

principal: ***Sarah Richards***

project: ***Airservices PFAS Characterisation Program***

location: ***Ayers Rock Airport, Yulara, NT***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

equipment type: Hand Auger | drilling fluid: N/A | hole diameter : 150 mm

drilling information						material substance					
method & support	water	samples & field tests	photoionization detector (ppmv)	RL (m)	depth (m)	graphic log	soil group symbol	material description **SOIL NAME**: plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency / relative density	soil origin, structure and additional observations
HA N	Not Encountered	E: SB08_0.0_240622						**FILL: SILTY SAND**: fine to medium grained, red brown, with fine gravel, crushed rock.	M	MD	**FILL**
							SM	**SILTY SAND**: fine to medium grained, red brown.			**SAND DUNE DEPOSIT**
										L	
		E: SB08_0.3_240622									
					0.5			Borehole SB08 terminated at 0.50 m Target depth			

CDF_0_10_00.3_LIBRARY.GLB rev:CDF_0_10_00.3 2020-08-25 Log COF BOREHOLE: ENVIRONMENTAL 754-PEREN233360 YULARA.GPJ <<DrawingFile>> 01/07/2022 14:17

method
- AD auger drilling*
- HA hand auger
- MR mud rotary
- W washbore
- PT push tube
- HS hollow stem
- SS solid stem
- SD sonic drilling
- * bit shown by suffix e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nill

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- WS water sample
- HB hammer bouncing
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- R refusal

soil group symbol & material description
based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

TETRA TECH COFFEY

Environmental Log - Borehole

Hole ID.	***SB10***
sheet:	1 of 1
project no.	***754-PEREN233360***
date started:	***24 Jun 2022***
date completed:	***24 Jun 2022***
logged by:	***JH***
checked by:	***SR***

client: ***Airservices***

principal: ***Sarah Richards***

project: ***Airservices PFAS Characterisation Program***

location: ***Ayers Rock Airport, Yulara, NT***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

equipment type: Comachio GEO 305, Track mounted | drilling fluid: N/A | hole diameter : 85 mm

drilling information						material substance					
method & support	water	samples & field tests	photoionization detector (ppmv)	RL (m)	depth (m)	graphic log	soil group symbol	material description **SOIL NAME**: plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency / relative density	soil origin, structure and additional observations
PT C	Not Encountered	E: SB10_0.0_240622						**FILL: Gravelly SAND**: fine grained, red-brown, fine to medium gravel, sub angular.	D		**FILL**
							SM	**SILTY SAND**: fine grained, red.	M		**SAND DUNE DEPOSIT**
		E: SB10_0.45_240622			0.5						
		E: SB10_0.6_240622									
		E: SB10_0.85_240622			1.0						
								Borehole SB10 terminated at 1.10 m Target depth			

CDF_0_10_00.3_LIBRARY.GLB rev:CDF_0_10_00.3 2020-08-25 Log COF BOREHOLE: ENVIRONMENTAL 754-PEREN233360 YULARA.GPJ <<DrawingFile>> 01/07/2022 13:56

method
- AD auger drilling*
- HA hand auger
- MR mud rotary
- W washbore
- PT push tube
- HS hollow stem
- SS solid stem
- SD sonic drilling
- * bit shown by suffix e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nill

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- WS water sample
- HB hammer bouncing
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- R refusal

soil group symbol & material description
based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

TETRA TECH COFFEY

Environmental Log - Borehole

Hole ID.	***SB12***
sheet:	1 of 1
project no.	***754-PEREN233360***
client:	***Airservices***
date started:	***24 Jun 2022***
principal:	***Sarah Richards***
date completed:	***24 Jun 2022***
project:	***Airservices PFAS Characterisation Program***
logged by:	***JH***
location:	***Ayers Rock Airport, Yulara, NT***
checked by:	***SR***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

equipment type: Hand Auger | drilling fluid: N/A | hole diameter : 150 mm

drilling information | **material substance**

method & support	water	samples & field tests	photoionization detector (ppmv)	RL (m)	depth (m)	graphic log	soil group symbol	material description **SOIL NAME**: plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency / relative density	soil origin, structure and additional observations
HA N	Not Encountered	E: SB12_0.0_240622						**FILL: SILTY SAND**: fine grained, red, trace gravel, fine to medium, sub angular, crushed rock.	M		**FILL**
								0.2 m: no gravel			
		E: SB12_0.3_240622									
					0.5			0.5 m: gravel layer			
		E: SB12_0.6_240622					SM	**SILTY SAND**: fine grained, red, trace organic matter.			**SAND DUNE DEPOSIT**
		E: SB12_0.9_240622			1.0			Borehole SB12 terminated at 1.00 m Target depth			

CDF_0_10_00.3_LIBRARY.GLB rev:CDF_0_10_00.3 2020-08-25 Log COF BOREHOLE: ENVIRONMENTAL 754-PEREN233360 YULARA.GPJ <<DrawingFile>> 01/07/2022 11:35

method
- AD auger drilling*
- HA hand auger
- MR mud rotary
- W washbore
- PT push tube
- HS hollow stem
- SS solid stem
- SD sonic drilling
- * bit shown by suffix e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nill

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- WS water sample
- HB hammer bouncing
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- R refusal

soil group symbol & material description
based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

TETRA TECH COFFEY

Environmental Log - Borehole

Hole ID.	***SB13***
sheet:	1 of 1
project no.	***754-PEREN233360***
date started:	***23 Jun 2022***
date completed:	***23 Jun 2022***
logged by:	***JH***
checked by:	***SR***

client: ***Airservices***

principal: ***Sarah Richards***

project: ***Airservices PFAS Characterisation Program***

location: ***Ayers Rock Airport, Yulara, NT***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

equipment type: Comachio GEO 305, Track mounted | drilling fluid: N/A | hole diameter : 85 mm

drilling information						material substance					
method & support	water	samples & field tests	photoionization detector (ppmv)	RL (m)	depth (m)	graphic log	soil group symbol	material description **SOIL NAME**: plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency / relative density	soil origin, structure and additional observations
HA N		E: SB13_0.0_230622						**FILL: Gravelly SAND**: fine to medium grained, red-brown, fine to medium gravel, sub rounded to sub angular.	D		**FILL**
								FILL: SILTY SAND: fine grained, red.	M		
							SM	**SILTY SAND**: fine grained, red.			**SAND DUNE DEPOSIT**
PT C	Not Encountered	E: SB13_0.45_230622			0.5						
		E: SB13_0.6_230622									
		E: SB13_0.85_230622									
					1.0			Borehole SB13 terminated at 1.00 m Target depth			

CDF_0_10_00.3_LIBRARY.GLB rev:CDF_0_10_00.3 2020-08-25 Log COF BOREHOLE: ENVIRONMENTAL 754-PEREN233360 YULARA.GPJ <<DrawingFile>> 01/07/2022 11:37

method
- AD auger drilling*
- HA hand auger
- MR mud rotary
- W washbore
- PT push tube
- HS hollow stem
- SS solid stem
- SD sonic drilling
- * bit shown by suffix e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nill

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- WS water sample
- HB hammer bouncing
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- R refusal

soil group symbol & material description
based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

TETRA TECH COFFEY

Environmental Log - Borehole

Hole ID.	***SB17***
sheet:	1 of 1
project no.	***754-PEREN233360***
client:	***Airservices***
date started:	***25 Jun 2022***
principal:	***Sarah Richards***
date completed:	***25 Jun 2022***
project:	***Airservices PFAS Characterisation Program***
logged by:	***JH***
location:	***Ayers Rock Airport, Yulara, NT***
checked by:	***SR***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

equipment type: Hand Auger | drilling fluid: N/A | hole diameter : 150 mm

drilling information | **material substance**

method & support	water	samples & field tests	photoionization detector (ppmv)	RL (m)	depth (m)	graphic log	soil group symbol	material description **SOIL NAME**: plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency / relative density	soil origin, structure and additional observations
HA N	Not Encountered	E: SB17_0.0_250622					SM	**SILTY SAND**: fine to medium grained, red brown.	D		**SAND DUNE DEPOSIT**
									M		
		E: SB17_0.45_250622			0.5			0.4 m: improved moisture content			
		E: SB17_0.6_250622									
		E: SB17_0.85_250622			1.0			Borehole SB17 terminated at 1.00 m Target depth			

CDF_0_10_00.3_LIBRARY.GLB rev:CDF_0_10_00.3 2020-08-25 Log COF BOREHOLE: ENVIRONMENTAL 754-PEREN233360 YULARA.GPJ <<DrawingFile>> 01/07/2022 15:32

method
- AD auger drilling*
- HA hand auger
- MR mud rotary
- W washbore
- PT push tube
- HS hollow stem
- SS solid stem
- SD sonic drilling
- * bit shown by suffix e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nill

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- WS water sample
- HB hammer bouncing
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- R refusal

soil group symbol & material description
based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

TETRA TECH COFFEY

Environmental Log - Borehole

Hole ID.	***SB18***
sheet:	1 of 1
project no.	***754-PEREN233360***
client:	***Airservices***
date started:	***25 Jun 2022***
principal:	***Sarah Richards***
date completed:	***25 Jun 2022***
project:	***Airservices PFAS Characterisation Program***
logged by:	***JH***
location:	***Ayers Rock Airport, Yulara, NT***
checked by:	***SR***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

equipment type: Hand Auger | drilling fluid: N/A | hole diameter : 150 mm

drilling information | **material substance**

method & support	water	samples & field tests	photoionization detector (ppmv)	RL (m)	depth (m)	graphic log	soil group symbol	material description **SOIL NAME**: plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency / relative density	soil origin, structure and additional observations
HA N	Not Encountered	E: SB18_0.0_250622					SM	**SILTY SAND**: fine grained, red, with fine gravel, sub rounded to sub angular, rootlets.	D		**SAND DUNE DEPOSIT**
								0.2 m: no gravel. no rootlets	M		
		E: SB18_0.45_250622			0.5						
		E: SB18_0.6_250622									
		E: SB18_0.85_250622			1.0			Borehole SB18 terminated at 1.00 m Target depth			

CDF_0_10_00.3_LIBRARY.GLB rev:CDF_0_10_00.3 2020-08-25 Log COF BOREHOLE: ENVIRONMENTAL 754-PEREN233360 YULARA.GPJ <<DrawingFile>> 01/07/2022 16:21

method
- AD auger drilling*
- HA hand auger
- MR mud rotary
- W washbore
- PT push tube
- HS hollow stem
- SS solid stem
- SD sonic drilling
- * bit shown by suffix e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nill

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- WS water sample
- HB hammer bouncing
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- R refusal

soil group symbol & material description
based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

TETRA TECH COFFEY

Environmental Log - Borehole

Hole ID.	***SB19***
sheet:	1 of 1
project no.	***754-PEREN233360***
client:	***Airservices***
date started:	***25 Jun 2022***
principal:	***Sarah Richards***
date completed:	***25 Jun 2022***
project:	***Airservices PFAS Characterisation Program***
logged by:	***SR***
location:	***Ayers Rock Airport, Yulara, NT***
checked by:	***SR***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

equipment type: Hand Auger | drilling fluid: N/A | hole diameter : 150 mm

drilling information | **material substance**

method & support	water	samples & field tests	photoionization detector (ppmv)	RL (m)	depth (m)	graphic log	soil group symbol	material description **SOIL NAME**: plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency / relative density	soil origin, structure and additional observations
HA N	Not Encountered	E: SB19_0.0_250622			0.0		SM	**SILTY SAND**: fine to medium grained, red brown.	D	L	**SAND DUNE DEPOSIT**
									M		
		E: SB19_0.3_250622									
					0.5						
		E: SB19_0.6_250622									
		E: SB19_0.85_250622									
					1.0			Borehole SB19 terminated at 1.00 m Target depth			

CDF_0_10_00.3_LIBRARY.GLB rev:CDF_0_10_00.3 2020-08-25 Log COF BOREHOLE: ENVIRONMENTAL 754-PEREN233360 YULARA.GPJ <<DrawingFile>> 01/07/2022 15:26

method
- AD auger drilling*
- HA hand auger
- MR mud rotary
- W washbore
- PT push tube
- HS hollow stem
- SS solid stem
- SD sonic drilling
- * bit shown by suffix e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nill

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- WS water sample
- HB hammer bouncing
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- R refusal

soil group symbol & material description
based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

TETRA TECH COFFEY

Environmental Log - Borehole

Hole ID.	***SB20***
sheet:	1 of 1
project no.	***754-PEREN233360***
client: ***Airservices***	date started: ***25 Jun 2022***
principal: ***Sarah Richards***	date completed: ***25 Jun 2022***
project: ***Airservices PFAS Characterisation Program***	logged by: ***JH***
location: ***Ayers Rock Airport, Yulara, NT***	checked by: ***SR***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

equipment type: Hand Auger | drilling fluid: N/A | hole diameter : 150 mm

drilling information						material substance					
method & support	water	samples & field tests	photoionization detector (ppmv)	RL (m)	depth (m)	graphic log	soil group symbol	material description **SOIL NAME**: plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency / relative density	soil origin, structure and additional observations
HA N	Not Encountered	E: SB20_0.0_250622					SM	**SILTY SAND**: fine grained, red brown, with rootlets.	D		**SAND DUNE DEPOSIT**
									M		
								0.15 m: no rootlets			
		E: SB20_0.3_250622									
								0.4 m: cemented sands	D		
					0.5						
		E: SB20_0.6_250622						0.6 m: iron cemented			
							SP	**Gravelly SAND**: fine grained, red brown, with fine gravel, iron cemented.			**BRECCIA**
		E: SB20_0.85_250622									
					1.0			Borehole SB20 terminated at 1.00 m Target depth			

CDF_0_10_00.3_LIBRARY.GLB rev:CDF_0_10_00.3 2020-08-25 Log COF BOREHOLE: ENVIRONMENTAL 754-PEREN233360 YULARA.GPJ <<DrawingFile>> 01/07/2022 16:17

method
- AD auger drilling*
- HA hand auger
- MR mud rotary
- W washbore
- PT push tube
- HS hollow stem
- SS solid stem
- SD sonic drilling
- * bit shown by suffix e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nill

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- WS water sample
- HB hammer bouncing
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- R refusal

soil group symbol & material description
based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

TETRA TECH COFFEY

Environmental Log - Borehole

Hole ID.	***SB21***
sheet:	1 of 1
project no.	***754-PEREN233360***
date started:	***26 Jun 2022***
date completed:	***26 Jun 2022***
logged by:	***JH***
checked by:	***SR***

client: ***Airservices***

principal: ***Sarah Richards***

project: ***Airservices PFAS Characterisation Program***

location: ***Ayers Rock Airport, Yulara, NT***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

equipment type: Hand Auger | drilling fluid: N/A | hole diameter : 150 mm

drilling information						material substance					
method & support	water	samples & field tests	photoionization detector (ppmv)	RL (m)	depth (m)	graphic log	soil group symbol	material description **SOIL NAME**: plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency / relative density	soil origin, structure and additional observations
HA N	Not Encountered	E: SB21_0.0_260622					SM	**SILTY SAND**: fine to medium grained, red brown, with fine gravel. sub rounded to sub angular, rootlets.	D		**SAND DUNE DEPOSIT**
									M		
								0.2 m: no gravel, no rootlets			
		E: SB21_0.3_260622									
					0.5						improved strength, improved moisture content
		E: SB21_0.6_260622									
		E: SB21_0.85_260622									
					1.0			Borehole SB21 terminated at 1.00 m Target depth			

CDF_0_10_00.3_LIBRARY.GLB rev:CDF_0_10_00.3 2020-08-25 Log COF BOREHOLE: ENVIRONMENTAL 754-PEREN233360 YULARA.GPJ <<DrawingFile>> 01/07/2022 16:14

method

AD	auger drilling*
HA	hand auger
MR	mud rotary
W	washbore
PT	push tube
HS	hollow stem
SS	solid stem
SD	sonic drilling
*	bit shown by suffix
e.g.	AD/T
B	blank bit
T	TC bit
V	V bit

support

M	mud
C	casing
N	nill

water

10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests

B	bulk disturbed sample
D	disturbed sample
E	environmental sample
SS	split spoon sample
U##	undisturbed sample ##mm diameter
WS	water sample
HB	hammer bouncing
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
R	refusal

soil group symbol & material description
based on AS 1726:2017

moisture condition

D	dry
M	moist
W	wet
Wp	plastic limit
Wl	liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

TETRA TECH COFFEY

Environmental Log - Borehole

Hole ID.	***SB22***
sheet:	1 of 1
project no.	***754-PEREN233360***
client:	***Airservices***
date started:	***24 Jun 2022***
principal:	***Sarah Richards***
date completed:	***24 Jun 2022***
project:	***Airservices PFAS Characterisation Program***
logged by:	***JH***
location:	***Ayers Rock Airport, Yulara, NT***
checked by:	***SR***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

equipment type: Comachio GEO 305, Track mounted | drilling fluid: N/A | hole diameter : 85 mm

drilling information | **material substance**

method & support	water	samples & field tests	photoionization detector (ppmv)	RL (m)	depth (m)	graphic log	soil group symbol	material description **SOIL NAME**: plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency / relative density	soil origin, structure and additional observations
PT C	Not Encountered	E: SB22_0.0_240622						**FILL: Gravelly SAND**: fine grained, red, fine to medium gravel, sub angular to sub rounded, crushed rock.	D		**FILL**
							SM	**SILTY SAND**: fine grained, red, trace fine gravel.	M		**SAND DUNE DEPOSIT**
		E: SB22_0.45_240622			0.5						
								Borehole SB22 terminated at 0.70 m Target depth			

CDF_0_10_00.3_LIBRARY.GLB rev:CDF_0_10_00.3 2020-08-25 Log COF BOREHOLE: ENVIRONMENTAL 754-PEREN233360 YULARA.GPJ <<DrawingFile>> 01/07/2022 14:05

method
- AD auger drilling*
- HA hand auger
- MR mud rotary
- W washbore
- PT push tube
- HS hollow stem
- SS solid stem
- SD sonic drilling
- * bit shown by suffix e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nill

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- WS water sample
- HB hammer bouncing
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- R refusal

soil group symbol & material description
based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

Environmental Log - Borehole

Hole ID.	***SB23***
sheet:	1 of 1
project no.	***754-PEREN233360***
client:	***Airservices***
date started:	***23 Jun 2022***
principal:	***Sarah Richards***
date completed:	***23 Jun 2022***
project:	***Airservices PFAS Characterisation Program***
logged by:	***JH***
location:	***Ayers Rock Airport, Yulara, NT***
checked by:	***SR***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

equipment type: Comachio GEO 305, Track mounted | drilling fluid: N/A | hole diameter : 85 mm

drilling information | **material substance**

method & support	water	samples & field tests	photoionization detector (ppmv)	RL (m)	depth (m)	graphic log	soil group symbol	material description **SOIL NAME**: plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency / relative density	soil origin, structure and additional observations
HA N		E: SB23_0.0_230622						**FILL: Sandy GRAVEL**: fine to medium grained, sub-rounded to sub-angular, red-brown.	D		**FILL**
								FILL: SILTY SAND: fine to medium grained, red.	M		
PT C	Not Encountered						SM	**SILTY SAND**: fine to medium grained, red.			**SAND DUNE DEPOSIT**
		E: SB23_0.45_230622			0.5						
								Borehole SB23 terminated at 0.50 m Target depth			

CDF_0_10_00.3_LIBRARY.GLB rev:CDF_0_10_00.3 2020-08-25 Log COF BOREHOLE: ENVIRONMENTAL 754-PEREN233360 YULARA.GPJ <<DrawingFile>> 01/07/2022 11:31

method

AD	auger drilling*
HA	hand auger
MR	mud rotary
W	washbore
PT	push tube
HS	hollow stem
SS	solid stem
SD	sonic drilling
*	bit shown by suffix
e.g.	AD/T
B	blank bit
T	TC bit
V	V bit

support

M	mud
C	casing
N	nill

water

10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests

B	bulk disturbed sample
D	disturbed sample
E	environmental sample
SS	split spoon sample
U##	undisturbed sample ##mm diameter
WS	water sample
HB	hammer bouncing
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
R	refusal

soil group symbol & material description
based on AS 1726:2017

moisture condition

D	dry
M	moist
W	wet
Wp	plastic limit
Wl	liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

TETRA TECH COFFEY

Environmental Log - Borehole

Hole ID.	***SB24***
sheet:	1 of 1
project no.	***754-PEREN233360***
client:	***Airservices***
date started:	***24 Jun 2022***
principal:	***Sarah Richards***
date completed:	***24 Jun 2022***
project:	***Airservices PFAS Characterisation Program***
logged by:	***JH***
location:	***Ayers Rock Airport, Yulara, NT***
checked by:	***SR***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

equipment type: Comachio GEO 305, Track mounted | drilling fluid: N/A | hole diameter : 85 mm

drilling information | **material substance**

method & support	water	samples & field tests	photoionization detector (ppmv)	RL (m)	depth (m)	graphic log	soil group symbol	material description **SOIL NAME**: plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency / relative density	soil origin, structure and additional observations
PT C	Not Encountered	E: SB24_0.0_240622						**FILL: Gravelly SAND**: fine grained, red-brown, fine to medium gravel, sub angular.	D		**FILL**
							SM	**SILTY SAND**: fine grained, red.	M		**SAND DUNE DEPOSIT**
		E: SB24_0.45_240622			0.5						
								Borehole SB24 terminated at 0.70 m Target depth			

method
- AD auger drilling*
- HA hand auger
- MR mud rotary
- W washbore
- PT push tube
- HS hollow stem
- SS solid stem
- SD sonic drilling
- * bit shown by suffix
- e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nill

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- WS water sample
- HB hammer bouncing
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- R refusal

soil group symbol & material description
based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

CDF_0_10_00.3_LIBRARY.GLB rev:CDF_0_10_00.3 2020-08-25 Log COF BOREHOLE: ENVIRONMENTAL 754-PEREN233360 YULARA.GPJ <<DrawingFile>> 01/07/2022 13:51

TETRA TECH COFFEY

Environmental Log - Borehole

Hole ID.	***SB25***
sheet:	1 of 1
project no.	***754-PEREN233360***
client:	***Airservices***
date started:	***24 Jun 2022***
principal:	***Sarah Richards***
date completed:	***24 Jun 2022***
project:	***Airservices PFAS Characterisation Program***
logged by:	***JH***
location:	***Ayers Rock Airport, Yulara, NT***
checked by:	***SR***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

equipment type: Comachio GEO 305, Track mounted | drilling fluid: N/A | hole diameter : 85 mm

drilling information | **material substance**

method & support	water	samples & field tests	photoionization detector (ppmv)	RL (m)	depth (m)	graphic log	soil group symbol	material description **SOIL NAME**: plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency / relative density	soil origin, structure and additional observations
PT C	Not Encountered	E: SB25_0.0_240622						**FILL: Gravelly SAND**: fine grained, red, fine to medium gravel, sub angular.	D		**FILL**
								FILL: SILTY SAND: fine grained, red, with fine gravel, sub angular.	M		
		E: SB25_0.45_240622			0.5			Borehole SB25 terminated at 0.50 m Target depth			

method
- AD auger drilling*
- HA hand auger
- MR mud rotary
- W washbore
- PT push tube
- HS hollow stem
- SS solid stem
- SD sonic drilling
- * bit shown by suffix e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nill

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- WS water sample
- HB hammer bouncing
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- R refusal

soil group symbol & material description
based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

CDF_0_10_00.3_LIBRARY.GLB rev:CDF_0_10_00.3 2020-08-25 Log COF BOREHOLE: ENVIRONMENTAL 754-PEREN233360 YULARA.GPJ <<DrawingFile>> 01/07/2022 14:01

TETRA TECH COFFEY

Environmental Log - Borehole

Hole ID.	***SB26***
sheet:	1 of 1
project no.	***754-PEREN233360***
client:	***Airservices***
date started:	***23 Jun 2022***
principal:	***Sarah Richards***
date completed:	***23 Jun 2022***
project:	***Airservices PFAS Characterisation Program***
logged by:	***JH***
location:	***Ayers Rock Airport, Yulara, NT***
checked by:	***SR***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

equipment type: Comachio GEO 305, Track mounted | drilling fluid: N/A | hole diameter : 85 mm

drilling information | **material substance**

method & support	water	samples & field tests	photoionization detector (ppmv)	RL (m)	depth (m)	graphic log	soil group symbol	material description **SOIL NAME**: plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency / relative density	soil origin, structure and additional observations
HA N	Not Encountered	E: SB26_0.0_230622						**FILL: Sandy GRAVEL**: fine to medium grained, sub-rounded to sub-angular, red-brown.	D		**FILL**
								FILL: SILTY SAND: fine to medium grained, red-brown.	M		
							SM	**SILTY SAND**: fine to medium grained, red-brown.			**SAND DUNE DEPOSIT**
PT C		E: SB26_0.45_230622			0.5			0.3 m: becoming red			
								Borehole SB26 terminated at 0.80 m Target depth			

CDF_0_10_00.3_LIBRARY.GLB rev:CDF_0_10_00.3 2020-08-25 Log COF BOREHOLE: ENVIRONMENTAL 754-PEREN233360 YULARA.GPJ <<DrawingFile>> 01/07/2022 11:41

method
- AD auger drilling*
- HA hand auger
- MR mud rotary
- W washbore
- PT push tube
- HS hollow stem
- SS solid stem
- SD sonic drilling
- * bit shown by suffix e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nill

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- WS water sample
- HB hammer bouncing
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- R refusal

soil group symbol & material description
based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

TETRA TECH COFFEY

Environmental Log - Borehole

Hole ID.	***SB27***
sheet:	1 of 1
project no.	***754-PEREN233360***
client:	***Airservices***
date started:	***24 Jun 2022***
principal:	***Sarah Richards***
date completed:	***24 Jun 2022***
project:	***Airservices PFAS Characterisation Program***
logged by:	***JH***
location:	***Ayers Rock Airport, Yulara, NT***
checked by:	***SR***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

equipment type: Comachio GEO 305, Track mounted | drilling fluid: N/A | hole diameter : 85 mm

drilling information | **material substance**

method & support	water	samples & field tests	photoionization detector (ppmv)	RL (m)	depth (m)	graphic log	soil group symbol	material description **SOIL NAME**: plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency / relative density	soil origin, structure and additional observations
HA, N	Not Encountered	E: SB27_0.0_240622						**FILL: Gravelly SAND**: fine to medium grained, red brown.	D		**FILL**
								0.2 m: trace cobble			
		E: SB27_0.3_240622						0.3 m: becoming red	M		
					0.5		SM	**FILL: SILTY SAND**: fine grained, red.			
		E: SB27_0.85_240622			1.0						
PT, C		E: SB27_1.40_240622			1.5						
								1.8 m: trace fine gravel, sub angular, brown mottling			improved strength
		E: SB27_1.90_240622			2.0						
								Borehole SB27 terminated at 2.00 m Target depth			

CDF_0_10_00.3_LIBRARY.GLB rev:CDF_0_10_00.3 2020-08-25 Log COF BOREHOLE: ENVIRONMENTAL 754-PEREN233360 YULARA.GPJ <<DrawingFile>> 01/07/2022 10:55

method
- AD auger drilling*
- HA hand auger
- MR mud rotary
- W washbore
- PT push tube
- HS hollow stem
- SS solid stem
- SD sonic drilling
- * bit shown by suffix e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nill

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- WS water sample
- HB hammer bouncing
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- R refusal

soil group symbol & material description
based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

TETRA TECH COFFEY

Environmental Log - Borehole

Hole ID.	***SB28***
sheet:	1 of 1
project no.	***754-PEREN233360***
client:	***Airservices***
date started:	***20 Jun 2022***
principal:	***Sarah Richards***
date completed:	***22 Jun 2022***
project:	***Airservices PFAS Characterisation Program***
logged by:	***SR***
location:	***Ayers Rock Airport, Yulara, NT***
checked by:	***SR***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

equipment type: Hand Auger | drilling fluid: N/A | hole diameter : 150 mm

drilling information | **material substance**

method & support	water	samples & field tests	photoionization detector (ppmv)	RL (m)	depth (m)	graphic log	soil group symbol	material description **SOIL NAME**: plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency / relative density	soil origin, structure and additional observations
HA N	Not Encountered	E: SB28_0.0_200622					SM	**SILTY SAND**: fine to medium grained, red brown.	D	L	**SAND DUNE DEPOSIT**
									M		
		E: SB28_0.3_220622									
					0.5			Borehole SB28 terminated at 0.50 m Target depth			

CDF_0_10_00.3_LIBRARY.GLB rev:CDF_0_10_00.3 2020-08-25 Log COF BOREHOLE: ENVIRONMENTAL 754-PEREN233360 YULARA.GPJ <<DrawingFile>> 02/07/2022 11:31

method
- AD auger drilling*
- HA hand auger
- MR mud rotary
- W washbore
- PT push tube
- HS hollow stem
- SS solid stem
- SD sonic drilling
- * bit shown by suffix e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nill

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- WS water sample
- HB hammer bouncing
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- R refusal

soil group symbol & material description
based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

TETRA TECH COFFEY

Environmental Log - Borehole

Hole ID.	***SB29***
sheet:	1 of 1
project no.	***754-PEREN233360***
client:	***Airservices***
date started:	***20 Jun 2022***
principal:	***Sarah Richards***
date completed:	***20 Jun 2022***
project:	***Airservices PFAS Characterisation Program***
logged by:	***JH***
location:	***Ayers Rock Airport, Yulara, NT***
checked by:	***SR***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

equipment type: Hand Auger | drilling fluid: N/A | hole diameter : 150 mm

drilling information | **material substance**

method & support	water	samples & field tests	photoionization detector (ppmv)	RL (m)	depth (m)	graphic log	soil group symbol	material description **SOIL NAME**: plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency / relative density	soil origin, structure and additional observations
HA N	Not Encountered	E: SB29_0.0_200622						**FILL: Sandy SILT**: fine to medium grained, pale red, trace rootlets.	M		**FILL**
							SM	**Sandy SILT**: fine to medium grained, red.			**SAND DUNE DEPOSIT** no rootlets
		E: SB29_0.3_200622									
					0.5			Borehole SB29 terminated at 0.50 m Target depth			

CDF_0_10_00.3_LIBRARY.GLB rev:CDF_0_10_00.3 2020-08-25 Log COF BOREHOLE: ENVIRONMENTAL 754-PEREN233360 YULARA.GPJ <<DrawingFile>> 30/06/2022 16:20

method
- AD auger drilling*
- HA hand auger
- MR mud rotary
- W washbore
- PT push tube
- HS hollow stem
- SS solid stem
- SD sonic drilling
- * bit shown by suffix e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nill

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- WS water sample
- HB hammer bouncing
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- R refusal

soil group symbol & material description
based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

TETRA TECH COFFEY

Environmental Log - Borehole

Hole ID.	***SB30***
sheet:	1 of 1
project no.	***754-PEREN233360***
client:	***Airservices***
date started:	***24 Jun 2022***
principal:	***Sarah Richards***
date completed:	***24 Jun 2022***
project:	***Airservices PFAS Characterisation Program***
logged by:	***SR***
location:	***Ayers Rock Airport, Yulara, NT***
checked by:	***SR***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

equipment type: Hand Auger | drilling fluid: N/A | hole diameter : 150 mm

drilling information						material substance					
method & support	water	samples & field tests	photoionization detector (ppmv)	RL (m)	depth (m)	graphic log	soil group symbol	material description **SOIL NAME**: plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency / relative density	soil origin, structure and additional observations
HA N	Not Encountered	E: SB30_0.0_240622						**FILL: SILTY SAND**: fine to medium grained, red brown and grey, with fine gravel, crushed rock.	D		**FILL**
							SM	**SILTY SAND**: fine to medium grained, red brown.	M		**SAND DUNE DEPOSIT** no odour
		E: SB30_0.3_240622									
					0.5						
		E: SB30_0.6_240622									
		E: SB30_0.85_240622									
					1.0			Borehole SB30 terminated at 1.00 m Target depth			

CDF_0_10_00.3_LIBRARY.GLB rev:CDF_0_10_00.3 2020-08-25 Log COF BOREHOLE: ENVIRONMENTAL 754-PEREN233360 YULARA.GPJ <<DrawingFile>> 01/07/2022 14:34

method
- AD auger drilling*
- HA hand auger
- MR mud rotary
- W washbore
- PT push tube
- HS hollow stem
- SS solid stem
- SD sonic drilling
- * bit shown by suffix e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nill

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- WS water sample
- HB hammer bouncing
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- R refusal

soil group symbol & material description
based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

TETRA TECH COFFEY

Environmental Log - Borehole

Hole ID.	***SB31***
sheet:	1 of 1
project no.	***754-PEREN233360***
date started:	***24 Jun 2022***
date completed:	***24 Jun 2022***
logged by:	***SR***
checked by:	***SR***

client: ***Airservices***

principal: ***Sarah Richards***

project: ***Airservices PFAS Characterisation Program***

location: ***Ayers Rock Airport, Yulara, NT***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

equipment type: Hand Auger | drilling fluid: N/A | hole diameter : 150 mm

drilling information						material substance					
method & support	water	samples & field tests	photoionization detector (ppmv)	RL (m)	depth (m)	graphic log	soil group symbol	material description **SOIL NAME**: plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency / relative density	soil origin, structure and additional observations
HA N	Not Encountered	E: SB31_0.0_240622						**FILL: Gravelly SAND**: fine grained, red, fine to medium gravel, sub rounded to sub angular.	D M		**FILL**
		E: SB31_0.3_240622			0.5		SM	**SILTY SAND**: fine to medium grained, red brown.			**SAND DUNE DEPOSIT**
		E: SB31_0.6_240622									
		E: SB31_0.85_240622			1.0			Borehole SB31 terminated at 1.00 m Target depth			

CDF_0_10_00.3_LIBRARY.GLB rev:CDF_0_10_00.3 2020-08-25 Log COF BOREHOLE: ENVIRONMENTAL 754-PEREN233360 YULARA.GPJ <<DrawingFile>> 01/07/2022 14:29

method
- AD auger drilling*
- HA hand auger
- MR mud rotary
- W washbore
- PT push tube
- HS hollow stem
- SS solid stem
- SD sonic drilling
- * bit shown by suffix e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nill

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- WS water sample
- HB hammer bouncing
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- R refusal

soil group symbol & material description
based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

TETRA TECH COFFEY

Environmental Log - Borehole

Hole ID.	***SB32***
sheet:	1 of 1
project no.	***754-PEREN233360***
client:	***Airservices***
date started:	***24 Jun 2022***
principal:	***Sarah Richards***
date completed:	***24 Jun 2022***
project:	***Airservices PFAS Characterisation Program***
logged by:	***SR***
location:	***Ayers Rock Airport, Yulara, NT***
checked by:	***SR***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

equipment type: Hand Auger | drilling fluid: N/A | hole diameter : 150 mm

drilling information | **material substance**

method & support	water	samples & field tests	photoionization detector (ppmv)	RL (m)	depth (m)	graphic log	soil group symbol	material description **SOIL NAME**: plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency / relative density	soil origin, structure and additional observations
HA N	Not Encountered	E: SB32_0.0_240622						**FILL: SILTY SAND**: fine to medium grained, red brown, with fine gravel, crushed rock.	D		**FILL**
							SM	**SILTY SAND**: fine to medium grained, red brown.	M		**SAND DUNE DEPOSIT**
		E: SB32_0.3_240622			0.5						
		E: SB32_0.6_240622									
		E: SB32_0.85_240622			1.0			Borehole SB32 terminated at 1.00 m Target depth			

CDF_0_10_00.3_LIBRARY.GLB rev:CDF_0_10_00.3 2020-08-25 Log COF BOREHOLE: ENVIRONMENTAL 754-PEREN233360 YULARA.GPJ <<DrawingFile>> 01/07/2022 14:46

method
- AD auger drilling*
- HA hand auger
- MR mud rotary
- W washbore
- PT push tube
- HS hollow stem
- SS solid stem
- SD sonic drilling
- * bit shown by suffix e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nill

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- WS water sample
- HB hammer bouncing
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- R refusal

soil group symbol & material description
based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

TETRA TECH COFFEY

Environmental Log - Borehole

Hole ID.	***SB33***
sheet:	1 of 1
project no.	***754-PEREN233360***
date started:	***24 Jun 2022***
date completed:	***24 Jun 2022***
logged by:	***JH***
checked by:	***SR***

client: ***Airservices***

principal: ***Sarah Richards***

project: ***Airservices PFAS Characterisation Program***

location: ***Ayers Rock Airport, Yulara, NT***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

equipment type: Comachio GEO 305, Track mounted | drilling fluid: N/A | hole diameter : 85 mm

drilling information						material substance					
method & support	water	samples & field tests	photoionization detector (ppmv)	RL (m)	depth (m)	graphic log	soil group symbol	material description **SOIL NAME**: plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency / relative density	soil origin, structure and additional observations
PT C	Not Encountered	E: SB33_0.0_240622						**FILL: Gravelly SAND**: fine grained, red brown, fine to medium gravel, sub rounded to sub angular.	D		**FILL**
							SM	**SILTY SAND**: fine grained, red.	M		**SAND DUNE DEPOSIT**
		E: SB33_0.3_240622			0.5						
		E: SB33_0.6_240622									
		E: SB33_0.85_240622			1.0						
								Borehole SB33 terminated at 1.10 m Target depth			

CDF_0_10_00.3_LIBRARY.GLB rev:CDF_0_10_00.3 2020-08-25 Log COF BOREHOLE: ENVIRONMENTAL 754-PEREN233360 YULARA.GPJ <<DrawingFile>> 01/07/2022 14:42

method
- AD auger drilling*
- HA hand auger
- MR mud rotary
- W washbore
- PT push tube
- HS hollow stem
- SS solid stem
- SD sonic drilling
- * bit shown by suffix e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nill

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- WS water sample
- HB hammer bouncing
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- R refusal

soil group symbol & material description
based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

TETRA TECH COFFEY

Environmental Log - Borehole

Hole ID.	***SB34***
sheet:	1 of 1
project no.	***754-PEREN233360***
client:	***Airservices***
date started:	***24 Jun 2022***
principal:	***Sarah Richards***
date completed:	***24 Jun 2022***
project:	***Airservices PFAS Characterisation Program***
logged by:	***JH***
location:	***Ayers Rock Airport, Yulara, NT***
checked by:	***SR***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

equipment type: Comachio GEO 305, Track mounted | drilling fluid: N/A | hole diameter : 85 mm

drilling information | **material substance**

method & support	water	samples & field tests	photoionization detector (ppmv)	RL (m)	depth (m)	graphic log	soil group symbol	material description **SOIL NAME**: plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency / relative density	soil origin, structure and additional observations
PT C	Not Encountered	E: SB34_0.0_240622						**FILL: Gravelly SAND**: fine grained, red brown, fine to medium gravel, sub rounded to sub angular.	D		**FILL**
							SM	**SILTY SAND**: fine grained, red.	M		**SAND DUNE DEPOSIT**
		E: SB34_0.3_240622									
					0.5						
		E: SB34_0.6_240622									
		E: SB34_0.85_240622									
					1.0			Borehole SB34 terminated at 1.00 m Target depth			

CDF_0_10_00.3_LIBRARY.GLB rev:CDF_0_10_00.3 2020-08-25 Log COF BOREHOLE: ENVIRONMENTAL 754-PEREN233360 YULARA.GPJ <<DrawingFile>> 01/07/2022 14:38

method
- AD auger drilling*
- HA hand auger
- MR mud rotary
- W washbore
- PT push tube
- HS hollow stem
- SS solid stem
- SD sonic drilling
- * bit shown by suffix
- e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nill

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- WS water sample
- HB hammer bouncing
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- R refusal

soil group symbol & material description
based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

TETRA TECH COFFEY

Environmental Log - Borehole

Hole ID.	***YAP1***
sheet:	1 of 1
project no.	***754-PEREN233360***
client:	***Airservices***
date started:	***25 Jun 2022***
principal:	***Sarah Richards***
date completed:	***25 Jun 2022***
project:	***Airservices PFAS Characterisation Program***
logged by:	***SR***
location:	***Ayers Rock Airport, Yulara, NT***
checked by:	***SR***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

equipment type: Hand Auger | drilling fluid: N/A | hole diameter : 150 mm

drilling information | **material substance**

method & support	water	samples & field tests	photoionization detector (ppmv)	RL (m)	depth (m)	graphic log	soil group symbol	material description **SOIL NAME**: plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency / relative density	soil origin, structure and additional observations
HA N	Not Encountered	E: YAP1_0.0_250622					SM	**SILTY SAND**: fine to medium grained, red brown.	D	L	**SAND DUNE DEPOSIT**
									M		
		E: YAP1_0.3_250622									
					0.5						
		E: YAP1_0.6_250622									
		E: YAP1_0.85_250622									
					1.0			Borehole YAP1 terminated at 1.00 m Target depth			

CDF_0_10_00.3_LIBRARY.GLB rev:CDF_0_10_00.3 2020-08-25 Log COF BOREHOLE: ENVIRONMENTAL 754-PEREN233360 YULARA.GPJ <<DrawingFile>> 01/07/2022 15:08

method
- AD auger drilling*
- HA hand auger
- MR mud rotary
- W washbore
- PT push tube
- HS hollow stem
- SS solid stem
- SD sonic drilling
- * bit shown by suffix e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nill

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- WS water sample
- HB hammer bouncing
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- R refusal

soil group symbol & material description
based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

TETRA TECH COFFEY

Environmental Log - Borehole

Hole ID.	***YAP2***
sheet:	1 of 1
project no.	***754-PEREN233360***
client:	***Airservices***
date started:	***24 Jun 2022***
principal:	***Sarah Richards***
date completed:	***24 Jun 2022***
project:	***Airservices PFAS Characterisation Program***
logged by:	***JH***
location:	***Ayers Rock Airport, Yulara, NT***
checked by:	***SR***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

equipment type: Comachio GEO 305, Track mounted | drilling fluid: N/A | hole diameter : 85 mm

drilling information | **material substance**

method & support	water	samples & field tests	photoionization detector (ppmv)	RL (m)	depth (m)	graphic log	soil group symbol	material description **SOIL NAME**: plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency / relative density	soil origin, structure and additional observations
HA, N	Not Encountered	E: YAP2_0.0_240622						**FILL: Gravelly SAND**: fine grained, red-brown, fine to medium gravel, sub angular.	D		**FILL**
								0.3 m: becoming red	M		
		E: YAP2_0.45_240622					SM	**SILTY SAND**: fine grained, red.			**SAND DUNE DEPOSIT**
					0.5						
		E: YAP2_0.6_240622									
PT, C								0.8 m: trace gravel, fine to medium, sub angular			
		E: YAP2_0.85_240622									
					1.0						
								Borehole YAP2 terminated at 1.10 m Target depth			

CDF_0_10_00.3_LIBRARY.GLB rev:CDF_0_10_00.3 2020-08-25 Log COF BOREHOLE: ENVIRONMENTAL 754-PEREN233360 YULARA.GPJ <<DrawingFile>> 01/07/2022 11:50

method
- AD auger drilling*
- HA hand auger
- MR mud rotary
- W washbore
- PT push tube
- HS hollow stem
- SS solid stem
- SD sonic drilling
- * bit shown by suffix e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nill

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- WS water sample
- HB hammer bouncing
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- R refusal

soil group symbol & material description
based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

TETRA TECH COFFEY

Environmental Log - Borehole

Hole ID.	***YAP3***
sheet:	1 of 1
project no.	***754-PEREN233360***
client:	***Airservices***
date started:	***23 Jun 2022***
principal:	***Sarah Richards***
date completed:	***23 Jun 2022***
project:	***Airservices PFAS Characterisation Program***
logged by:	***JH***
location:	***Ayers Rock Airport, Yulara, NT***
checked by:	***SR***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

equipment type: Hand Auger | drilling fluid: N/A | hole diameter : 150 mm

drilling information | **material substance**

method & support	water	samples & field tests	photoionization detector (ppmv)	RL (m)	depth (m)	graphic log	soil group symbol	material description **SOIL NAME**: plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency / relative density	soil origin, structure and additional observations
HA N	Not Encountered	E: YAP3_0.0_230622						**FILL: Gravelly SAND**: fine to medium grained, red, fine to medium gravel, sub rounded to sub angular.	D		**FILL**
							SM	**SILTY SAND**: fine grained, red.	M		**SAND DUNE DEPOSIT**
		E: YAP3_0.45_230622			0.5						
		E: YAP3_0.6_230622									
		E: YAP3_0.85_230622			1.0			Borehole YAP3 terminated at 1.00 m Target depth			

CDF_0_10_00.3_LIBRARY.GLB rev:CDF_0_10_00.3 2020-08-25 Log COF BOREHOLE: ENVIRONMENTAL 754-PEREN233360 YULARA.GPJ <<DrawingFile>> 01/07/2022 10:37

method

AD	auger drilling*
HA	hand auger
MR	mud rotary
W	washbore
PT	push tube
HS	hollow stem
SS	solid stem
SD	sonic drilling
*	bit shown by suffix
e.g.	AD/T
B	blank bit
T	TC bit
V	V bit

support

M	mud
C	casing
N	nill

water

10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests

B	bulk disturbed sample
D	disturbed sample
E	environmental sample
SS	split spoon sample
U##	undisturbed sample ##mm diameter
WS	water sample
HB	hammer bouncing
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
R	refusal

soil group symbol & material description
based on AS 1726:2017

moisture condition

D	dry
M	moist
W	wet
Wp	plastic limit
Wl	liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

TETRA TECH COFFEY

Environmental Log - Borehole

Hole ID.	***YAP4***
sheet:	1 of 1
project no.	***754-PEREN233360***
client:	***Airservices***
date started:	***23 Jun 2022***
principal:	***Sarah Richards***
date completed:	***23 Jun 2022***
project:	***Airservices PFAS Characterisation Program***
logged by:	***JH***
location:	***Ayers Rock Airport, Yulara, NT***
checked by:	***SR***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

equipment type: Comachio GEO 305, Track mounted | drilling fluid: N/A | hole diameter : 150 mm

drilling information | **material substance**

method & support	water	samples & field tests	photoionization detector (ppmv)	RL (m)	depth (m)	graphic log	soil group symbol	material description **SOIL NAME**: plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency / relative density	soil origin, structure and additional observations
HA N PT C SS N	Not Encountered	E: YAP4_0.0_230622						**FILL: Gravelly SAND**: fine to medium grained, red, fine to coarse gravel, sub rounded to sub angular.	D		**FILL**
								FILL: SILTY SAND: fine grained, red.	M		
		E: YAP4_0.45_230622			0.5						
								Borehole YAP4 terminated at 0.70 m Collapse			

CDF_0_10_00.3_LIBRARY.GLB rev:CDF_0_10_00.3 2020-08-25 Log_COF BOREHOLE: ENVIRONMENTAL 754-PEREN233360 YULARA.GPJ <<DrawingFile>> 01/07/2022 11:06

method
AD auger drilling*
HA hand auger
MR mud rotary
W washbore
PT push tube
HS hollow stem
SS solid stem
SD sonic drilling
* bit shown by suffix
e.g. AD/T
B blank bit
T TC bit
V V bit

support
M mud
C casing
N nill

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
B bulk disturbed sample
D disturbed sample
E environmental sample
SS split spoon sample
U## undisturbed sample ##mm diameter
WS water sample
HB hammer bouncing
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
R refusal

soil group symbol & material description
based on AS 1726:2017

moisture condition
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

consistency / relative density
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

TETRA TECH COFFEY

Environmental Log - Monitoring Well

Hole ID.	***GW01***
sheet:	1 of ï
project no.	***754-PEREN233360***
client: ***Air Services Australia***	date started: ***20 Jun 2022***
principal: **Sarah Richards**	date completed: ***21 Jun 2022***
project: ***Airservices PFAS Characterisation Program***	logged by: ***JH***
location: ***Ayers Rock Airport, Yulara, NT***	checked by: **SR**

position: E 698962.23, N 7212359.25 | surface elevation: 492.62 mAHD | angle from horizontal: 90°

equipment type: Comacchio, Track mounted | Specified drilling fluid: N/A | hole diameter : 150 mm

drilling information | **well details** | **material substance**

method & support	water	samples & field tests	photoionization detector (ppmv)	GW01	depth (m)	graphic log	soil group symbol	material description	moisture condition	consistency / relative density	soil origin, structure and additional observations
SS							SP	**SILTY SAND**: fine to medium grained, red brown.	D		**NATUAL**
					2.0				M		
								CONGLOMERATE: calcareous, cemented.		H	**RESIDUAL SOIL**
					4.0			**SANDSTONE**: fine to medium grained, brown, extremely weathered.			
					6.0						
					8.0						
					10.0						
					12.0			becoming red brown			**well details:** drilling company: Proactive driller: Marcus **standpipe piezometer GW01 details:** 12.0-15.0m: screen
AH	23/06/22				14.0			Borehole GW01 terminated at 15.00 m Target depth			
N											

CDF_0_10_00.4_LIBRARY.GLB rev:CDF_0_10_00.4 2021-09-30 Log COF PIEZOMETER: ENVIRONMENTAL 754-PEREN233360.GPJ <<DrawingFile>> 29/08/2022 15:56

method
- AD auger drilling*
- HA hand auger
- MR mud rotary
- W washbore
- PT push tube
- HS hollow stem
- SS solid stem
- SD sonic drilling
- * bit shown by suffix e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nill

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- WS water sample
- HB hammer bouncing
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- R refusal

soil group symbol & material description based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

TETRA TECH COFFEY

Environmental Log - Monitoring Well

Hole ID.	***GW02***
sheet:	1 of 1
project no.	***754-PEREN233360***
client: ***Air Services Australia***	date started: ***21 Jun 2022***
principal: **Sarah Richards**	date completed: ***21 Jun 2022***
project: ***Airservices PFAS Characterisation Program***	logged by: ***JH***
location: ***Ayers Rock Airport, Yulara, NT***	checked by: **SR**

position: E 698824.01, N 7212592.63 | surface elevation: 491.91 mAHD | angle from horizontal: 90°

equipment type: Comacchio, Track mounted | Specified drilling fluid: N/A | hole diameter : 150 mm

drilling information				well details	material substance						
method & support	water	samples & field tests	photoionization detector (ppmv)	GW02	depth (m)	graphic log	soil group symbol	material description **SOIL NAME**: plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency / relative density	soil origin, structure and additional observations
SS							SP	**SILTY SAND**: fine to medium grained, red brown.	D		**DUNE SAND**
					2.0				M		
					4.0		GP	**CONGLOMERATE**: pale brown, cemented, calcareous.	D	H	**RESIDUAL SOIL**
								SANDSTONE: fine to medium grained, pale brown, extremely weathered, low strength.			
					6.0						
					8.0						
					10.0						
					12.0				M		
N					14.0			Borehole GW02 terminated at 14.00 m Target depth			**well details:** drilling company: Proactive driller: Marcus **standpipe piezometer GW02 details:** 9.5-14.0m: screen
AH	23/06/22										

CDF_0_10_00.4_LIBRARY.GLB rev:CDF_0_10_00.4 2021-09-30 Log COF PIEZOMETER: ENVIRONMENTAL 754-PEREN233360.GPJ <<DrawingFile>> 29/08/2022 15:56

method

AD	auger drilling*
HA	hand auger
MR	mud rotary
W	washbore
PT	push tube
HS	hollow stem
SS	solid stem
SD	sonic drilling
*	bit shown by suffix
e.g.	AD/T
B	blank bit
T	TC bit
V	V bit

support

M	mud
C	casing
N	nill

water

10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests

B	bulk disturbed sample
D	disturbed sample
E	environmental sample
SS	split spoon sample
U##	undisturbed sample ##mm diameter
WS	water sample
HB	hammer bouncing
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
R	refusal

soil group symbol & material description
based on AS 1726:2017

moisture condition

D	dry
M	moist
W	wet
Wp	plastic limit
Wl	liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

TETRA TECH COFFEY

Environmental Log - Monitoring Well

Hole ID.	***GW03***
sheet:	1 of 1
project no.	***754-PEREN233360***
client: ***Air Services Australia***	date started: ***23 Jun 2022***
principal: **Sarah Richards**	date completed: ***23 Jun 2022***
project: ***Airservices PFAS Characterisation Program***	logged by: ***JH***
location: ***Ayers Rock Airport, Yulara, NT***	checked by: **SR**

position: E 698717.86, N 7212828.81 | surface elevation: 492.17 mAHD | angle from horizontal: 90°

equipment type: Comacchio, Track mounted | Specified drilling fluid: N/A | hole diameter : 150 mm

drilling information | **well details** | **material substance**

method & support	water	samples & field tests	photoionization detector (ppmv)	GW03	depth (m)	graphic log	soil group symbol	material description	moisture condition	consistency / relative density	soil origin, structure and additional observations
SS					0		SP	**FILL: GRAVEL**: fine grained, crushed rock.	D		**FILL**
								SILTY SAND: fine to medium grained, red brown.			**DUNE SAND**
					2.0		GP	**CEMENTED CONGLOMERATE / GRAVEL**: white.		H	**RESIDUAL SOIL**
					4.0			**SANDSTONE**: pale brown, highly weathered.			
N	24/06/22				6.0						
					8.0						
					10.0						
					12.0				W		
AH					14.0			Borehole GW03 terminated at 14.00 m Target depth			**well details:** drilling company: Proactive driller: Marcus **standpipe piezometer GW03 details:** 9.5-14.0m: screen

CDF_0_10_00.4_LIBRARY.GLB rev:CDF_0_10_00.4 2021-09-30 Log COF PIEZOMETER: ENVIRONMENTAL 754-PEREN233360.GPJ <<DrawingFile>> 29/08/2022 15:56

method

AD	auger drilling*
HA	hand auger
MR	mud rotary
W	washbore
PT	push tube
HS	hollow stem
SS	solid stem
SD	sonic drilling
*	bit shown by suffix
e.g.	AD/T
B	blank bit
T	TC bit
V	V bit

support

M	mud
C	casing
N	nill

water

10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests

B	bulk disturbed sample
D	disturbed sample
E	environmental sample
SS	split spoon sample
U##	undisturbed sample ##mm diameter
WS	water sample
HB	hammer bouncing
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
R	refusal

soil group symbol & material description based on AS 1726:2017

moisture condition

D	dry
M	moist
W	wet
Wp	plastic limit
Wl	liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

TETRA TECH COFFEY

Environmental Log - Monitoring Well

Hole ID.	***GW04***
sheet:	1 of ï
project no.	***754-PEREN233360***
client: ***Air Services Australia***	date started: ***25 Jun 2022***
principal: **Sarah Richards**	date completed: ***25 Jun 2022***
project: ***Airservices PFAS Characterisation Program***	logged by: ***JH***
location: ***Ayers Rock Airport, Yulara, NT***	checked by: **SR**

position: E 698812, N 7213197 | surface elevation: 492.49 mAHD | angle from horizontal: 90°

equipment type: Comacchio, Track mounted | Specified drilling fluid: N/A | hole diameter : 150 mm

drilling information				well details	material substance						
method & support	water	samples & field tests	photoionization detector (ppmv)	GW04	depth (m)	graphic log	soil group symbol	material description **SOIL NAME**: plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency / relative density	soil origin, structure and additional observations
SS							SP	**SILTY SAND**: fine to medium grained, red brown.	M		**DUNE SAND**
					2.0		GP	**CONGLOMERATE**: rounded, with some gravel.		H	**RESIDUAL SOIL**
					4.0			**SANDSTONE**: pale brown, extremely weathered.	D		
N					6.0						
					8.0						
					10.0			becoming red brown			
					12.0			becoming highly weathered, coarse grained	M		
AH					14.0						**well details:** drilling company: Proactive driller: Marcus **standpipe piezometer GW04 details:** 9.0-15.0m: screen
								Borehole GW04 terminated at 15.00 m Target depth			

CDF_0_10_00.4_LIBRARY.GLB rev:CDF_0_10_00.4 2021-09-30 Log COF PIEZOMETER: ENVIRONMENTAL 754-PEREN233360.GPJ <<DrawingFile>> 29/08/2022 15:56

method
- AD auger drilling*
- HA hand auger
- MR mud rotary
- W washbore
- PT push tube
- HS hollow stem
- SS solid stem
- SD sonic drilling
- * bit shown by suffix
- e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nill

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- WS water sample
- HB hammer bouncing
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- R refusal

soil group symbol & material description
based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

TETRA TECH COFFEY

Environmental Log - Monitoring Well

Hole ID.	***GW05***
sheet:	1 of ï
project no.	***754-PEREN233360***
client: ***Air Services Australia***	date started: ***26 Jun 2022***
principal: **Sarah Richards**	date completed: ***26 Jun 2022***
project: ***Airservices PFAS Characterisation Program***	logged by: ***SR***
location: **Ayers Rock Airport, Yulara, NT**	checked by: **SR**

position: E 698638, N 7213090 | surface elevation: 492.99 mAHD | angle from horizontal: 90°

equipment type: Comacchio, Track mounted | Specified drilling fluid: N/A | hole diameter: 150 mm

drilling information				well details	material substance						
method & support	water	samples & field tests	photoionization detector (ppmv)	GW05	depth (m)	graphic log	soil group symbol	material description **SOIL NAME**: plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency / relative density	soil origin, structure and additional observations
SS					0.0		SP	**FILL: Gravelly SAND**: fine to medium grained, (conglomerate gravel).	D		**FILL / DISTURBED NATURAL**
								SILTY SAND: fine to medium grained, red brown.	M		**DUNE SAND**
					2.0						
					4.0						
								CONGLOMERATE: highly weathered.	D		**RESIDUAL SOIL**
					6.0			**SANDSTONE**: pale brown, highly weathered.			
					8.0						
					10.0						
									M		
					12.0			becoming red brown, increased silt content			very muddy
AH					14.0						**well details:** drilling company: Proactive driller: Marcus **standpipe piezometer GW05 details:** 9.0-15.0m: screen
N								Borehole GW05 terminated at 15.00 m Target depth			

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method
- AD auger drilling*
- HA hand auger
- MR mud rotary
- W washbore
- PT push tube
- HS hollow stem
- SS solid stem
- SD sonic drilling
- * bit shown by suffix
- e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nill

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- WS water sample
- HB hammer bouncing
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- R refusal

soil group symbol & material description
based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

TETRA TECH COFFEY

Environmental Log - Monitoring Well

Hole ID.	***GW06***
sheet:	1 of ï
project no.	***754-PEREN233360***
client: ***Air Services Australia***	date started: ***22 Jun 2022***
principal: **Sarah Richards**	date completed: ***22 Jun 2022***
project: ***Airservices PFAS Characterisation Program***	logged by: ***JH***
location: ***Ayers Rock Airport, Yulara, NT***	checked by: **SR**

position: E 698913.33, N 7212865.66 | surface elevation: 491.47 mAHD | angle from horizontal: 90°

equipment type: Comacchio, Track mounted | Specified drilling fluid: N/A | hole diameter: 150 mm

drilling information				well details	material substance					
method & support	water	samples & field tests	photoionization detector (ppmv)	GW06	depth (m)	graphic log	soil group symbol	material description **SOIL NAME**: plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency / relative density	soil origin, structure and additional observations
SS					0		SP	**FILL: SILTY SAND**: fine to medium grained, red brown, with fine to medium grained calcareous gravel.	M		**FILL**
								SILTY SAND: fine to medium grained, red brown.			**DUNE SAND**
					2.0			**CONGLOMERATE**: cemented calcareous layer, hard calcite gravel.	D	H	**RESIDUAL SOIL**
					4.0						
					6.0			**SANDSTONE**: pale brown, extremely weathered.			
					8.0						
					10.0			increasing clay content			
					12.0			becoming red brown	M		**well details:** drilling company: Proactive driller: Marcus **standpipe piezometer GW06 details:** 10.5-15.0m: screen
					14.0			Borehole GW06 terminated at 15.00 m Target depth			
N	23/06/22										
AH											

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method
- AD auger drilling*
- HA hand auger
- MR mud rotary
- W washbore
- PT push tube
- HS hollow stem
- SS solid stem
- SD sonic drilling
- * bit shown by suffix e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nill

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- WS water sample
- HB hammer bouncing
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- R refusal

soil group symbol & material description
based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

TETRA TECH COFFEY

Well Development Form

PROJECT NAME	Airservices TSI	DATE	27/06/2022
PROJECT NUMBER	754-PEREN233360	WELL ID	GW01
FIELD PERSONNEL	SM	PAGE	1 of 1
WELL INFORMATION PRE-DEVELOPMENT			
Depth to water (mbtoc)	N/A	Total well depth (mbtoc)	N/A
Well diameter (mm)	50	Depth to top of screen (m)	N/A
Casing stick up (mm)	N/A	Length of screened interval (m)	N/A
Development method (pumps, bailer etc)	Bailer		
Equipment type (IP, WQM):	Interface Probe	Equipment type (IP, WQM):	Water Quality Meter
Equipment serial number:		Equipment serial number:	N/A

OBSERVATIONS DURING DEVELOPMENT

Date	Time of Day	Depth to water (mbtoc)	Fluid Removed		Electrical Conductivity (mS or µS/cm)	pH (pH units)	Temperature (°C)	CLARITY – tick one				COMMENTS
			Litres	Total				Clear	Slightly Cloudy	Cloudy	Turbid	ODOUR, COLOUR, SEDIMENT, SHEEN
27/06	AM	-	40	40	N/A	N/A	N/A		✓			Brown, Pale-Brown

Bailer

WELL INFORMATION – POST DEVELOPMENT	
Total well depth (mbtoc)	
Depth to water (mbtoc)	

TETRA TECH COFFEY

Well Development Form

PROJECT NAME	Airservices TSI	DATE	26/6/22
PROJECT NUMBER	754-PEREN233360	WELL ID	GW02
FIELD PERSONNEL	JM	PAGE	1 of 1
WELL INFORMATION PRE-DEVELOPMENT			
Depth to water (mbtoc)	9.114	Total well depth (mbtoc)	13.965 (no hard bounce - silts)
Well diameter (mm)	50	Depth to top of screen (m)	–
Casing stick up (mm)	–	Length of screened interval (m)	–
Development method (pumps, bailer etc)	AIR LIFT (compressor) – 26/06	Bailer – 27/06	
Equipment type (IP, WQM):	Interface Probe	Equipment type (IP, WQM):	Water Quality Meter
Equipment serial number:	348 889	Equipment serial number:	N/A

OBSERVATIONS DURING DEVELOPMENT

Date	Time of Day	Depth to water (mbtoc)	Fluid Removed		Electrical Conductivity (mS or µS/cm)	pH (pH units)	Temperature (°C)	CLARITY – tick one				COMMENTS
			Litres	Total				Clear	Slightly Cloudy	Cloudy	Turbid	ODOUR, COLOUR, SEDIMENT, SHEEN
Air lift												
26/6	14:30	9.114	2		N/A	N/A	N/A		✓	✓	–	BROWN
26/6	14:35	–	8	10	↓	↓	↓		↓	✓		COLOURATION
26/6	14:40	–	10	20	↓	↓	↓		✓	↓		" "
Bailer												
27/6	10:00	–	30	41	↓	↓	↓		✓	↓		" "
27/6	10:30	–	10	50	↓	↓	↓		✓	↓		" "

WELL INFORMATION – POST DEVELOPMENT	
Total well depth (mbtoc)	13.965
Depth to water (mbtoc)	–

– NO CHANGE IN TOTAL DEPTH
– CLARITY IMPROVEMENT IN FINAL LITRE

TETRA TECH COFFEY

Well Development Form

PROJECT NAME	Airservices TSI	DATE	26/6/22
PROJECT NUMBER	754-PEREN233360	WELL ID	GW03
FIELD PERSONNEL	JM	PAGE	1 of 1
WELL INFORMATION PRE-DEVELOPMENT			
Depth to water (mbtoc) 15:00	9.610	Total well depth (mbtoc)	14.025
Well diameter (mm)	50	Depth to top of screen (m)	–
Casing stick up (mm)	–	Length of screened interval (m)	–
Development method (pumps, bailer etc)	AIR LIFT – COMPRESSOR		
Equipment type (IP, WQM):	Interface Probe	Equipment type (IP, WQM):	Water Quality Meter
Equipment serial number:	348889	Equipment serial number:	[redacted]

OBSERVATIONS DURING DEVELOPMENT

Date	Time of Day	Depth to water (mbtoc)	Fluid Removed		Electrical Conductivity (mS or µS/cm)	pH (pH units)	Temperature (°C)	CLARITY – tick one				COMMENTS
			Litres	Total				Clear	Slightly Cloudy	Cloudy	Turbid	ODOUR, COLOUR, SEDIMENT, SHEEN
Air lift 26/6/22	15:08	–	10		N/A	N/A	N/A			✓		Brown – Pale Brown
26/6/22	15:12	–	[redacted]	15					✓			"
26/6/22	15:23	–	[redacted]	20					✓			Brown – Pale Brown
26/6/22	15:45	–	15	35					✓			" "
26/6/22	15:47	–	5	40					✓			" "
Bailer 27/6/22	10:53	–	15	55					✓			Pale brown

WELL INFORMATION – POST DEVELOPMENT

Total well depth (mbtoc)	14.027
Depth to water (mbtoc)	–

TETRA TECH COFFEY

Well Development Form

PROJECT NAME	Airservices TSI	DATE	27/6/22
PROJECT NUMBER	754-PEREN233360	WELL ID	GW04
FIELD PERSONNEL	SH, SR	PAGE	1 of 1
WELL INFORMATION PRE-DEVELOPMENT			
Depth to water (mbtoc)	10.935	Total well depth (mbtoc)	16 ~
Well diameter (mm)	50	Depth to top of screen (m)	—
Casing stick up (mm)	+ 900	Length of screened interval (m)	—
Development method (pumps, bailer etc)	Waterra Foot Valve		
Equipment type (IP, WQM):	Interface Probe	Equipment type (IP, WQM):	Water Quality Meter
Equipment serial number:	348 889	Equipment serial number:	N/A

OBSERVATIONS DURING DEVELOPMENT

Date	Time of Day	Depth to water (mbtoc)	Fluid Removed		Electrical Conductivity (mS or µS/cm)	pH (pH units)	Temperature (°C)	CLARITY – tick one				COMMENTS
			Litres	Total				Clear	Slightly Cloudy	Cloudy	Turbid	ODOUR, COLOUR, SEDIMENT, SHEEN
27/6/22	15:29	—	25	25	N/A	N/A	N/A			✓		Red-Brown

WELL INFORMATION – POST DEVELOPMENT

Total well depth (mbtoc)	~
Depth to water (mbtoc)	15.280 (Purged Dry) – NO FLOW

TETRA TECH COFFEY

Well Development Form

PROJECT NAME	Airservices TSI	DATE	27/6/2022
PROJECT NUMBER	754-PEREN233360	WELL ID	GW05
FIELD PERSONNEL	JH, SR	PAGE	1 of 1
WELL INFORMATION PRE-DEVELOPMENT			
Depth to water (mbtoc)	11.420	Total well depth (mbtoc)	15.04
Well diameter (mm)	80	Depth to top of screen (m)	—
Casing stick up (mm)		Length of screened interval (m)	—
Development method (pumps, bailer etc)	Waterra Foot Valve		
Equipment type (IP, WQM):	Interface Probe	Equipment type (IP, WQM):	Water Quality Meter
Equipment serial number:	348 889	Equipment serial number:	N/A

OBSERVATIONS DURING DEVELOPMENT

Date	Time of Day	Depth to water (mbtoc)	Fluid Removed		Electrical Conductivity (mS or µS/cm)	pH (pH units)	Temperature (°C)	CLARITY – tick one				COMMENTS
			Litres	Total				Clear	Slightly Cloudy	Cloudy	Turbid	ODOUR, COLOUR, SEDIMENT, SHEEN
27/6/22	14:30	12.070	5	5	N/A	N/A	N/A				✓	Brown - Red
27/6/22	14:51	13.43	35	40	↓	↓	↓			✓		↓
27/6/22	15:38	11.445	20	60	↓	↓	↓			↓		↓
27/6/22	16:02	—	20	80	↓	↓	↓		✓			↓

WELL INFORMATION – POST DEVELOPMENT	
Total well depth (mbtoc)	
Depth to water (mbtoc)	

TETRA TECH COFFEY

Well Development Form

PROJECT NAME	Airservices TSI	DATE	27/6/22
PROJECT NUMBER	754-PEREN233360	WELL ID	GW06
FIELD PERSONNEL	JM, SR	PAGE	1 of
WELL INFORMATION PRE-DEVELOPMENT			
Depth to water (mbtoc)	8.845 (11:16)	Total well depth (mbtoc)	15 ~
Well diameter (mm)	50	Depth to top of screen (m)	
Casing stick up (mm)	-90	Length of screened interval (m)	
Development method (pumps, bailer etc)	Waterra Foot Valve MORE Bailer		
Equipment type (IP, WQM):	Interface Probe	Equipment type (IP, WQM):	Water Quality Meter
Equipment serial number:	348 889	Equipment serial number:	N/A

OBSERVATIONS DURING DEVELOPMENT

Date	Time of Day	Depth to water (mbtoc)	Fluid Removed		Electrical Conductivity (mS or µS/cm)	pH (pH units)	Temperature (°C)	CLARITY – tick one				COMMENTS
			Litres	Total				Clear	Slightly Cloudy	Cloudy	Turbid	ODOUR, COLOUR, SEDIMENT, SHEEN
	11:20											
Waterra 27/6/22	[redacted]	[redacted]	8	8	N/A	N/A	N/A				✓	Brown
	11:34	-	12	20	↓	↓	↓			✓		
	11:39	-	10	30	↓	↓	↓			✓		
↓	11:43	12.899	10	40	↓	↓	↓			✓		
Bailer	12:02	11.408	3	43	↓	↓	↓			✓		
	12:10	-	7	50	↓	↓	↓			✓		
	12:22	10.3	5	55	↓	↓	↓			✓		
WATERRA	12:37	12.452	15	70	↓	↓	↓			✓		↓

WELL INFORMATION – POST DEVELOPMENT	
Total well depth (mbtoc)	~
Depth to water (mbtoc)	[redacted]

TETRA TECH COFFEY

Environmental Log - Monitoring Well

Hole ID.	***GW07***
sheet:	1 of 1
project no.	***754-PEREN233360***
client:	***AirServices***
date started:	***31 Jan 2023***
principal:	***Sarah Richards***
date completed:	***31 Jan 2023***
project:	***Ayers Rock Airport - PFAS Characterisation***
logged by:	***SA***
location:	***200 Coote Road, Yulara***
checked by:	***BL***

position: E 699116.243, N 7212188.066 GDA94 | surface elevation: 494.33 mAHD | angle from horizontal: 90°

equipment type: Comacchio GEO305, Track mounted | drilling fluid: N/A | hole diameter : 150 mm

drilling information | **well details** | **material substance**

method & support	water	samples & field tests	photoionization detector (ppmv)	GW07	depth (m)	graphic log	soil group symbol	material description **SOIL NAME**: plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency / relative density	soil origin, structure and additional observations
HA, SS, N, AH	31/01/23 ▽	GW07 / 0.0-0.2					SM	**SILTY SAND**: fine to medium grained, poorly graded, red brown.	M		**NATURAL**
		GW07 / 0.4-0.5									
		GW07 / 0.6-0.75									
		GW07 / 0.9-1.0									
		GW07 / 1.4-1.5									
		GW07 / 1.9-2.0			2.0						
		GW07 / 3.9-4.0			4.0		SM	**SILTY SAND**: fine to medium grained, poorly graded, red brown, with some sub-angular to sub-rounded gravel.			
		GW07 / 5.9-6.0			6.0			**SANDSTONE**: pale brown.	D		
		GW07 / 7.9-8.0			8.0						
		GW07 / 9.9-10.0			10.0				M		
		GW07 / 11.9-12.0			12.0			12.0 m: becoming red brown			
								13.0 m: increasing silt content			
		GW07 / 13.9-14.0			14.0						
		GW07 / 14.9-15.0						Borehole GW07 terminated at 15.00 m Target depth			**standpipe piezometer GW07 details:** 9.0-15.0m: screen

CDF_0_10_00.4_LIBRARY.GLB rev:CDF_0_10_00.4 2021-09-30 Log_COF PIEZOMETER: ENVIRONMENTAL 754-PEREN233360 AYRES ROCK AIRPORT.GPJ <<DrawingFile>> 09/03/2023 16:04

method
- AD auger drilling*
- HA hand auger
- MR mud rotary
- W washbore
- PT push tube
- HS hollow stem
- SS solid stem
- SD sonic drilling
- * bit shown by suffix
- e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nill

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- WS water sample
- HB hammer bouncing
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- R refusal

soil group symbol & material description
based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

TETRA TECH COFFEY

Environmental Log - Monitoring Well

Hole ID.	***GW08***
sheet:	1 of 1
project no.	***754-PEREN233360***
client:	***AirServices***
date started:	***02 Feb 2023***
principal:	***Sarah Richards***
date completed:	***02 Feb 2023***
project:	***Ayers Rock Airport - PFAS Characterisation***
logged by:	***SA***
location:	***200 Coote Road, Yulara***
checked by:	***BL***

position: E 698966.861, N 7212489.676 | surface elevation: 492.51 mAHD | angle from horizontal: 90°

equipment type: Comacchio GEO305, Track mounted | drilling fluid: N/A | hole diameter : 150 mm

drilling information | **well details** | **material substance**

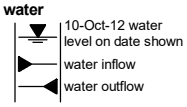
method & support	water	samples & field tests	photoionization detector (ppmv)	GW08	depth (m)	graphic log	soil group symbol	material description (SOIL NAME: plasticity or particle characteristics, colour, secondary and minor components)	moisture condition	consistency / relative density	soil origin, structure and additional observations
HA		GW08 / 0.0-0.2					SM	**FILL: GRAVEL**: fine to medium grained, grey, with some red-brown sand.	D		**COMPACTED IMPORTED FILL**
		GW08 / 0.4-0.5						**SILTY SAND**: fine to medium grained, red brown.			**NATURAL**
		GW08 / 0.6-0.75									
		GW08 / 0.9-1.0									
		GW08 / 1.4-1.5									
SS		GW08 / 1.9-2.0			2.0						
		GW08 / 2.9-3.0					SM	**SILTY SAND**: fine to medium grained, poorly graded, red brown, with some sub-angular to sub-rounded gravel.			
		GW08 / 3.9-4.0			4.0			**CONGLOMERATE**: pale brown, weathered.			
		GW08 / 5.9-6.0			6.0			**SANDSTONE**: grey-brown, calcareous.			
		GW08 / 7.9-8.0			8.0			6.5 to 8.5 m: calcareous, pale brown			
AH	02/02/23	GW08 / 9.9-10.0			10.0				M		
		GW08 / 11.9-12.0			12.0			11.5 m: becoming red-brown			
		GW08 / 13.9-14.0			14.0						
N		GW08 / 14.9-15.0						Borehole GW08 terminated at 15.00 m Target depth			**standpipe piezometer GW08 details:** 9.0-15.0m: screen

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method
- AD auger drilling*
- HA hand auger
- MR mud rotary
- W washbore
- PT push tube
- HS hollow stem
- SS solid stem
- SD sonic drilling
- * bit shown by suffix
- e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nill

water



samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- WS water sample
- HB hammer bouncing
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- R refusal

soil group symbol & material description
based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

TETRA TECH COFFEY

Environmental Log - Monitoring Well

Hole ID.	***GW09***
sheet:	1 of 1
project no.	***754-PEREN233360***
client:	***AirServices***
date started:	***02 Feb 2023***
principal:	***Sarah Richards***
date completed:	***02 Feb 2023***
project:	***Ayers Rock Airport - PFAS Characterisation***
logged by:	***SA***
location:	***200 Coote Road, Yulara***
checked by:	***BL***

position: E 699130.608, N 7212922.144 | surface elevation: 491.4 mAHD | angle from horizontal: 90°

equipment type: Comacchio GEO305, Track mounted | drilling fluid: N/A | hole diameter : 150 mm

drilling information				well details	material substance					
method & support	water	samples & field tests	photoionization detector (ppmv)	GW09	depth (m)	graphic log	soil group symbol	material description **SOIL NAME**: plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency / relative density	soil origin, structure and additional observations
HA SS N AH	02/02/23	GW09 / 0.0-0.2 GW09 / 0.4-0.5 GW09 / 0.6-0.75 GW09 / 0.9-1.0 GW09 / 1.4-1.5 GW09 / 1.9-2.0 GW09 / 2.9-3.0 GW09 / 3.9-4.0 GW09 / 5.9-6.0 GW09 / 7.9-8.0 GW09 / 9.9-10.0 GW09 / 11.9-12.0 GW09 / 13.9-14.0 GW09 / 14.9-15.0			2.0 4.0 6.0 8.0 10.0 12.0 14.0		SM SM	**SILTY SAND**: fine to medium grained, poorly graded, red-brown. **SILTY SAND**: fine to medium grained, poorly graded, red-brown, with some sub-rounded to sub-angular gravel. **CONGLOMERATE**: pale brown, grey, calcareous. **SANDSTONE**: red-brown, weathered. 6.5 to 7.5 m: becoming pale brown, calcareous 7.0 to 8.0 m: increasing silt content 7.5 to 11.5 m: becoming brown 7.8 to 8.0 m: increasing silt content 11.5 m: becoming red-brown 14.0 m: increasing clay content Borehole GW09 terminated at 15.00 m Target depth	D M		**NATURAL** **standpipe piezometer GW09 details:** 9.0-15.0m: screen

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method

AD	auger drilling*
HA	hand auger
MR	mud rotary
W	washbore
PT	push tube
HS	hollow stem
SS	solid stem
SD	sonic drilling
*	bit shown by suffix
e.g.	AD/T
B	blank bit
T	TC bit
V	V bit

support

M	mud
C	casing
N	nill

water

10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests

B	bulk disturbed sample
D	disturbed sample
E	environmental sample
SS	split spoon sample
U##	undisturbed sample ##mm diameter
WS	water sample
HB	hammer bouncing
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
R	refusal

soil group symbol & material description
based on AS 1726:2017

moisture condition

D	dry
M	moist
W	wet
Wp	plastic limit
Wl	liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

TETRA TECH COFFEY

Environmental Log - Monitoring Well

Hole ID.	***GW10***
sheet:	1 of 1
project no.	***754-PEREN233360***
client: ***AirServices***	date started: ***31 Jan 2023***
principal: ***Sarah Richards***	date completed: ***01 Feb 2023***
project: ***Ayers Rock Airport - PFAS Characterisation***	logged by: ***SA***
location: ***200 Coote Road, Yulara***	checked by: ***BL***

position: E 698117.293, N 7213048.706 | surface elevation: 493.75 mAHD | angle from horizontal: 90°

equipment type: Comacchio GEO305, Track mounted | drilling fluid: N/A | hole diameter : 150 mm

drilling information				well details	material substance					
method & support	water	samples & field tests	photoionization detector (ppmv)	GW10	depth (m)	graphic log	soil group symbol	material description **SOIL NAME**: plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency / relative density	soil origin, structure and additional observations
HA	Not Observed	GW10 / 0.0-0.2					SM	**SILTY SAND**: fine to medium grained, poorly graded, red brown.	D		**NATURAL**
		GW10 / 0.4-0.5									
		GW10 / 0.6-0.75									
		GW10 / 0.9-1.0									
		GW10 / 1.4-1.5									
SS		GW10 / 1.9-2.0			2.0						
							SM	**SILTY SAND**: fine to medium grained, poorly graded, red brown, with some sub-rounded to sub-angular gravel.			
		GW10 / 3.9-4.0			4.0						
							SM	**SILTY SAND**: fine to medium grained, pale brown, with some sub-rounded to sub-angular gravel.			
		GW10 / 5.9-6.0			6.0			**SANDSTONE**: pale brown, weathered.			
N		GW10 / 7.9-8.0			8.0			8.0 m: becoming brown			
AH		GW10 / 9.9-10.0			10.0			10.0 m: becoming red-brown	M		
		GW10 / 11.9-12.0			12.0			12.0 m: increasing silt content			
		GW10 / 13.9-14.0			14.0						
		GW10 / 14.9-15.0						Borehole GW10 terminated at 15.00 m Target depth			**standpipe piezometer GW10 details:** 9.0-15.0m: screen

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method
- AD auger drilling*
- HA hand auger
- MR mud rotary
- W washbore
- PT push tube
- HS hollow stem
- SS solid stem
- SD sonic drilling
- * bit shown by suffix
- e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nill

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- WS water sample
- HB hammer bouncing
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- R refusal

soil group symbol & material description
based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

TETRA TECH COFFEY

Environmental Log - Monitoring Well

Hole ID.	***GW11***
sheet:	1 of 1
project no.	***754-PEREN233360***
date started:	***01 Feb 2023***
date completed:	***01 Feb 2023***
logged by:	***SA***
checked by:	***BL***

client: ***AirServices***

principal: ***Sarah Richards***

project: ***Ayers Rock Airport - PFAS Characterisation***

location: ***200 Coote Road, Yulara***

position: E 698163.31, N 7213766.856 | surface elevation: 490.25 mAHD | angle from horizontal: 90°

equipment type: Comacchio GEO305, Track mounted | drilling fluid: N/A | hole diameter : 150 mm

drilling information				well details	material substance						
method & support	water	samples & field tests	photoionization detector (ppmv)	GW11	depth (m)	graphic log	soil group symbol	material description **SOIL NAME**: plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency / relative density	soil origin, structure and additional observations
HA	Not Observed	GW11 / 0.0-0.2			0		SM	**SILTY SAND**: fine to medium grained, poorly graded, red brown, with trace rootlets.	D		**NATURAL**
		GW11 / 0.4-0.5					SM	**SILTY SAND**: fine to medium grained, poorly graded, red brown.			
		GW11 / 0.6-0.75									
		GW11 / 0.9-1.0									
		GW11 / 1.4-1.5									
SS		GW11 / 1.9-2.0			2.0		SM	**SILTY SAND**: fine to medium grained, red brown, with some sub-angular to sub-rounded gravel.			
								CONGLOMERATE: pale brown, grey, cemented gravel, calcareous.			
		GW11 / 3.9-4.0			4.0			**SANDSTONE**: pale brown, weathered.			
		GW11 / 5.9-6.0			6.0			7.0 m: becoming brown			
		GW11 / 7.9-8.0			8.0			9.0 m: becoming dark brown	M		
N		GW11 / 9.9-10.0			10.0						
		GW11 / 11.9-12.0			12.0						
AH		GW11 / 13.9-14.0			14.0			Borehole GW11 terminated at 14.00 m Target depth			**standpipe piezometer GW11 details:** 8.0-14.0m: screen

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method
- AD auger drilling*
- HA hand auger
- MR mud rotary
- W washbore
- PT push tube
- HS hollow stem
- SS solid stem
- SD sonic drilling
- * bit shown by suffix
- e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nill

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- WS water sample
- HB hammer bouncing
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- R refusal

soil group symbol & material description
based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

TETRA TECH COFFEY

Environmental Log - Borehole

Hole ID.	***SB35***
sheet:	1 of 1
project no.	***754-PEREN233360***
date started:	***03 Feb 2023***
date completed:	***03 Feb 2023***
logged by:	***SA***
checked by:	***BL***

client: ***AirServices***

principal: ***Sarah Richards***

project: ***Ayers Rock Airport - PFAS Characterisation***

location: ***200 Coote Road, Yulara***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

equipment type: Comacchio GEO305, Track mounted | drilling fluid: N/A | hole diameter : 150 mm

drilling information | **material substance**

method & support	water	samples & field tests	photoionization detector (ppmv)	RL (m)	depth (m)	graphic log	soil group symbol	material description (SOIL NAME: plasticity or particle characteristics, colour, secondary and minor components)	moisture condition	consistency / relative density	soil origin, structure and additional observations
HA, SS, N	Not Observed	SB35 / 0.0-0.2						**FILL: Gravelly SAND**: fine to medium grained, red brown, black, fine to medium grained, sub-rounded to sub-angular gravel.	D		**IMPORTED FILL** contains road-base
		SB35 / 0.4-0.5									plastic layer encountered at 0.3 mbgl
		SB35 / 0.6-0.75			0.5		SM	**SILTY SAND**: fine to medium grained, red brown.			**NATURAL**
		SB35 / 0.9-1.0			1.0						
		SB35 / 1.4-1.5			1.5		SM	**SILTY SAND**: fine to medium grained, red brown, with some sub-angular to sub-rounded gravel.			
		SB35 / 1.9-2.0			2.0			Borehole SB35 terminated at 2.00 m Target depth			
					2.5						
					3.0						
					3.5						

method

AD	auger drilling*
HA	hand auger
MR	mud rotary
W	washbore
PT	push tube
HS	hollow stem
SS	solid stem
SD	sonic drilling
*	bit shown by suffix
e.g.	AD/T
B	blank bit
T	TC bit
V	V bit

support

M	mud
C	casing
N	nill

water

10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests

B	bulk disturbed sample
D	disturbed sample
E	environmental sample
SS	split spoon sample
U##	undisturbed sample ##mm diameter
WS	water sample
HB	hammer bouncing
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
R	refusal

soil group symbol & material description based on AS 1726:2017

moisture condition

D	dry
M	moist
W	wet
Wp	plastic limit
Wl	liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

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TETRA TECH COFFEY

Environmental Log - Borehole

Hole ID.	***SB36***
sheet:	1 of 1
project no.	***754-PEREN233360***
client:	***AirServices***
date started:	***03 Feb 2023***
principal:	***Sarah Richards***
date completed:	***03 Feb 2023***
project:	***Ayers Rock Airport - PFAS Characterisation***
logged by:	***SA***
location:	***200 Coote Road, Yulara***
checked by:	***BL***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

equipment type: Comacchio GEO305, Track mounted | drilling fluid: N/A | hole diameter : 150 mm

drilling information | **material substance**

method & support	water	samples & field tests	photoionization detector (ppmv)	RL (m)	depth (m)	graphic log	soil group symbol	material description **SOIL NAME**: plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency / relative density	soil origin, structure and additional observations
HA SS N	Not Observed	SB36 / 0.0-0.2			0.0			**FILL: Gravelly SAND**: fine to medium grained, red brown, sub-rounded to sub-angular grey and black gravel.	D		**IMPORTED FILL**
		SB36 / 0.4-0.5			0.5		SM	**SILTY SAND**: fine to medium grained, poorly graded, red brown.	M		**NATURAL**
		SB36 / 0.6-0.75									
		SB36 / 0.9-1.0			1.0						
		SB36 / 1.4-1.5			1.5						
		SB36 / 1.9-2.0			2.0			Borehole SB36 terminated at 2.00 m Target depth			
					2.5						
					3.0						
					3.5						

method
- AD auger drilling*
- HA hand auger
- MR mud rotary
- W washbore
- PT push tube
- HS hollow stem
- SS solid stem
- SD sonic drilling
- * bit shown by suffix
- e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nill

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- WS water sample
- HB hammer bouncing
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- R refusal

soil group symbol & material description
based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

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TETRA TECH COFFEY

Environmental Log - Borehole

Hole ID.	***SB37***
sheet:	1 of 1
project no.	***754-PEREN233360***
client:	***AirServices***
date started:	***03 Feb 2023***
principal:	***Sarah Richards***
date completed:	***03 Feb 2023***
project:	***Ayers Rock Airport - PFAS Characterisation***
logged by:	***SA***
location:	***200 Coote Road, Yulara***
checked by:	***BL***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

equipment type: Comacchio GEO305, Track mounted | drilling fluid: N/A | hole diameter : 150 mm

drilling information | **material substance**

method & support	water	samples & field tests	photoionization detector (ppmv)	RL (m)	depth (m)	graphic log	soil group symbol	material description **SOIL NAME**: plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency / relative density	soil origin, structure and additional observations
HA SS N	Not Observed	SB37 / 0.0-0.2			0.0			**FILL: Gravelly SAND**: fine to medium grained, red brown, sub-rounded to sub-angular grey and black gravel.	D		**IMPORTED FILL**
		SB37 / 0.4-0.5			0.5		SM	**SILTY SAND**: fine to medium grained, poorly graded, red brown.	M		**NATURAL**
		SB37 / 0.6-0.75									
		SB37 / 0.9-1.0			1.0				D		
		SB37 / 1.4-1.5			1.5						
		SB37 / 1.9-2.0			2.0			Borehole SB37 terminated at 2.00 m Target depth			
					2.5						
					3.0						
					3.5						

CDF_0_10_00.4_LIBRARY.GLB rev:CDF_0_10_00.4 2021-09-30 Log COF BOREHOLE: ENVIRONMENTAL 754-PEREN233360 AYRES ROCK AIRPORT.GPJ <<DrawingFile>> 09/03/2023 16:06

method
- AD auger drilling*
- HA hand auger
- MR mud rotary
- W washbore
- PT push tube
- HS hollow stem
- SS solid stem
- SD sonic drilling
- * bit shown by suffix
- e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nill

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- WS water sample
- HB hammer bouncing
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- R refusal

soil group symbol & material description
based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

TETRA TECH COFFEY

Environmental Log - Borehole

Hole ID.	***SB38***
sheet:	1 of 1
project no.	***754-PEREN233360***
client:	***AirServices***
date started:	***03 Feb 2023***
principal:	***Sarah Richards***
date completed:	***03 Feb 2023***
project:	***Ayers Rock Airport - PFAS Characterisation***
logged by:	***SA***
location:	***200 Coote Road, Yulara***
checked by:	***BL***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

equipment type: Comacchio GEO305, Track mounted | drilling fluid: N/A | hole diameter : 150 mm

drilling information | **material substance**

method & support	water	samples & field tests	photoionization detector (ppmv)	RL (m)	depth (m)	graphic log	soil group symbol	material description **SOIL NAME**: plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency / relative density	soil origin, structure and additional observations
HA SS N	Not Observed	SB38 / 0.0-0.2			0.0			**FILL: Gravelly SAND**: fine to medium grained, red brown, sub-rounded to sub-angular grey and black gravel.	D		**IMPORTED FILL**
		SB38 / 0.4-0.5			0.5		SM	**SILTY SAND**: fine to medium grained, poorly graded, red brown.	M		**NATURAL**
		SB38 / 0.6-0.75									
		SB38 / 0.9-1.0			1.0						
		SB38 / 1.4-1.5			1.5						
		SB38 / 1.9-2.0			2.0			Borehole SB38 terminated at 2.00 m Target depth			
					2.5						
					3.0						
					3.5						

method
- AD auger drilling*
- HA hand auger
- MR mud rotary
- W washbore
- PT push tube
- HS hollow stem
- SS solid stem
- SD sonic drilling
- * bit shown by suffix
- e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nill

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- WS water sample
- HB hammer bouncing
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- R refusal

soil group symbol & material description
based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

CDF_0_10_00.4_LIBRARY.GLB rev:CDF_0_10_00.4 2021-09-30 Log COF BOREHOLE: ENVIRONMENTAL 754-PEREN233360 AYRES ROCK AIRPORT.GPJ <<DrawingFile>> 09/03/2023 16:07

TETRA TECH COFFEY

Environmental Log - Borehole

Hole ID.	***SB39***
sheet:	1 of 1
project no.	***754-PEREN233360***
client: ***AirServices***	date started: ***04 Feb 2023***
principal: ***Sarah Richards***	date completed: ***04 Feb 2023***
project: ***Ayers Rock Airport - PFAS Characterisation***	logged by: ***SA***
location: ***200 Coote Road, Yulara***	checked by: ***BL***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

equipment type: Comacchio GEO305, Track mounted | drilling fluid: N/A | hole diameter : 150 mm

drilling information | **material substance**

method & support	water	samples & field tests	photoionization detector (ppmv)	RL (m)	depth (m)	graphic log	soil group symbol	material description **SOIL NAME**: plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency / relative density	soil origin, structure and additional observations
HA	Not Observed	SB39 / 0.0-0.2			0.0			**FILL: SILTY SAND**: fine to medium grained, poorly graded, red brown.	D		**FILL**
		SB39 / 0.4-0.5			0.5						
		SB39 / 0.6-0.75									
		SB39 / 0.9-1.0			1.0						
N											
SS		SB39 / 1.4-1.5			1.5			**FILL: SILTY SAND**: fine to medium grained, red brown, with some sub-angular to sub-rounded gravel.			
		SB39 / 1.9-2.0			2.0			Borehole SB39 terminated at 2.00 m Target depth			
					2.5						
					3.0						
					3.5						

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method
- AD auger drilling*
- HA hand auger
- MR mud rotary
- W washbore
- PT push tube
- HS hollow stem
- SS solid stem
- SD sonic drilling
- * bit shown by suffix
- e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nill

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- WS water sample
- HB hammer bouncing
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- R refusal

soil group symbol & material description
based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

TETRA TECH COFFEY

Environmental Log - Borehole

Hole ID.	***SB40***
sheet:	1 of 1
project no.	***754-PEREN233360***
client:	***AirServices***
date started:	***03 Feb 2023***
principal:	***Sarah Richards***
date completed:	***03 Feb 2023***
project:	***Ayers Rock Airport - PFAS Characterisation***
logged by:	***SA***
location:	***200 Coote Road, Yulara***
checked by:	***BL***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

equipment type: Comacchio GEO305, Track mounted | drilling fluid: N/A | hole diameter : 150 mm

drilling information | **material substance**

method & support	water	samples & field tests	photoionization detector (ppmv)	RL (m)	depth (m)	graphic log	soil group symbol	material description **SOIL NAME**: plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency / relative density	soil origin, structure and additional observations
HA	Not Observed	SB40 / 0.0-0.2			0.0			**FILL: Gravelly SAND**: fine to medium grained, red brown, sub-rounded to sub-angular grey and black gravel.	D		**IMPORTED FILL**
SS / N		SB40 / 0.4-0.5 (QC19-QC20)			0.5		SM	**SILTY SAND**: fine to medium grained, poorly graded, red brown.	M		**NATURAL**
		SB40 / 0.6-0.75									
		SB40 / 0.9-1.0			1.0						
		SB40 / 1.4-1.5			1.5						
		SB40 / 1.9-2.0			2.0			Borehole SB40 terminated at 2.00 m Target depth			
					2.5						
					3.0						
					3.5						

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method
- AD auger drilling*
- HA hand auger
- MR mud rotary
- W washbore
- PT push tube
- HS hollow stem
- SS solid stem
- SD sonic drilling
- * bit shown by suffix
- e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nill

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- WS water sample
- HB hammer bouncing
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- R refusal

soil group symbol & material description
based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

TETRA TECH COFFEY

Environmental Log - Borehole

Hole ID.	***SB41***
sheet:	1 of 1
project no.	***754-PEREN233360***
client:	***AirServices***
date started:	***03 Feb 2023***
principal:	***Sarah Richards***
date completed:	***03 Feb 2023***
project:	***Ayers Rock Airport - PFAS Characterisation***
logged by:	***SA***
location:	***200 Coote Road, Yulara***
checked by:	***BL***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

equipment type: Comacchio GEO305, Track mounted | drilling fluid: N/A | hole diameter : 150 mm

drilling information | **material substance**

method & support	water	samples & field tests	photoionization detector (ppmv)	RL (m)	depth (m)	graphic log	soil group symbol	material description **SOIL NAME**: plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency / relative density	soil origin, structure and additional observations
HA N SS	Not Observed	SB41 / 0.0-0.2 SB41 / 0.4-0.5 SB41 / 0.6-0.75 SB41 / 0.9-1.0 SB41 / 1.4-1.5 SB41 / 1.9-2.0			0.5 1.0 1.5 2.0		SM	**SILTY SAND**: fine to medium grained, poorly graded, red brown.	D		**NATURAL**
					2.0			Borehole SB41 terminated at 2.00 m Target depth			
					2.5 3.0 3.5						

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method
- AD auger drilling*
- HA hand auger
- MR mud rotary
- W washbore
- PT push tube
- HS hollow stem
- SS solid stem
- SD sonic drilling
- * bit shown by suffix
- e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nill

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- WS water sample
- HB hammer bouncing
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- R refusal

soil group symbol & material description
based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

TETRA TECH COFFEY

Environmental Log - Borehole

Hole ID.	**SB42**
sheet:	1 of 1
project no.	**754-PEREN233360**
client:	**AirServices**
date started:	**04 Feb 2023**
principal:	**Sarah Richards**
date completed:	**04 Feb 2023**
project:	**Ayers Rock Airport - PFAS Characterisation**
logged by:	**SA**
location:	**200 Coote Road, Yulara**
checked by:	**BL**

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

equipment type: Comacchio GEO305, Track mounted | drilling fluid: N/A | hole diameter : 150 mm

drilling information | **material substance**

method & support	water	samples & field tests	photoionization detector (ppmv)	RL (m)	depth (m)	graphic log	soil group symbol	material description **SOIL NAME**: plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency / relative density	soil origin, structure and additional observations
HA SS N	Not Observed	SB42 / 0.0-0.2			0.0			**FILL: Gravelly SAND**: fine to medium grained, red brown, sub-angular to sub-rounded gravel.	D		**IMPORTED FILL**
		SB42 / 0.4-0.5 (QC25-QC26)			0.5						concrete at 0.4 m BGL, abandoned for new hole
		SB42 / 0.6-0.75									
		SB42 / 0.9-1.0			1.0						
		SB42 / 1.4-1.5			1.5		SM	**SILTY SAND**: fine to medium grained, poorly graded, red brown.	M		**NATURAL**
		SB42 / 1.9-2.0			2.0			**Gravelly SAND**: fine to medium grained, pale brown, sub-rounded to sub-angular gravel, with some silt.			
		SB42 / 2.4-2.5			2.5			Borehole SB42 terminated at 2.50 m Refusal			
					3.0						
					3.5						

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method
- AD auger drilling*
- HA hand auger
- MR mud rotary
- W washbore
- PT push tube
- HS hollow stem
- SS solid stem
- SD sonic drilling
- * bit shown by suffix
- e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nill

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- WS water sample
- HB hammer bouncing
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- R refusal

soil group symbol & material description
based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

TETRA TECH COFFEY

Environmental Log - Borehole

Hole ID.	***SB43***
sheet:	1 of 1
project no.	***754-PEREN233360***
client:	***AirServices***
date started:	***04 Feb 2023***
principal:	***Sarah Richards***
date completed:	***04 Feb 2023***
project:	***Ayers Rock Airport - PFAS Characterisation***
logged by:	***SA***
location:	***200 Coote Road, Yulara***
checked by:	***BL***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

equipment type: Comacchio GEO305, Track mounted | drilling fluid: N/A | hole diameter : 150 mm

drilling information | **material substance**

method & support	water	samples & field tests	photoionization detector (ppmv)	RL (m)	depth (m)	graphic log	soil group symbol	material description **SOIL NAME**: plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency / relative density	soil origin, structure and additional observations
HA	Not Observed	SB43 / 0.0-0.2			0.0			**FILL: Gravelly SAND**: fine to medium grained, red brown, sub-angular to sub-rounded gravel.	D		**IMPORTED FILL**
		SB43 / 0.4-0.5 (QC23-QC24)			0.5				M		
		SB43 / 0.6-0.75									
		SB43 / 0.9-1.0			1.0						
SS		SB43 / 1.4-1.5			1.5			**FILL: SILTY SAND**: fine to medium grained, poorly graded, red brown.			
		SB43 / 1.9-2.0			2.0						
		SB43 / 2.4-2.5			2.5			**Gravelly SAND**: fine to medium grained, pale brown, sub-rounded to sub-angular grey gravel.			**NATURAL**
N		SB43 / 2.9-3.0			3.0			Borehole SB43 terminated at 3.00 m Target depth			
					3.5						

method
- AD auger drilling*
- HA hand auger
- MR mud rotary
- W washbore
- PT push tube
- HS hollow stem
- SS solid stem
- SD sonic drilling
- * bit shown by suffix
- e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nill

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- WS water sample
- HB hammer bouncing
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- R refusal

soil group symbol & material description
based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

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TETRA TECH COFFEY

Environmental Log - Borehole

Hole ID.	***SB44***
sheet:	1 of 1
project no.	***754-PEREN233360***
date started:	***04 Feb 2023***
date completed:	***04 Feb 2023***
logged by:	***SA***
checked by:	***BL***

client: ***AirServices***

principal: ***Sarah Richards***

project: ***Ayers Rock Airport - PFAS Characterisation***

location: ***200 Coote Road, Yulara***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

equipment type: Comacchio GEO305, Track mounted | drilling fluid: N/A | hole diameter : 150 mm

drilling information | **material substance**

method & support	water	samples & field tests	photoionization detector (ppmv)	RL (m)	depth (m)	graphic log	soil group symbol	material description **SOIL NAME**: plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency / relative density	soil origin, structure and additional observations
HA N	Not Observed	SB44 / 0.0-0.2 SB44 / 0.4-0.5 SB44 / 0.6-0.75 SB44 / 0.9-1.0			0.5		SC	**CLAYEY SAND**: fine to medium grained, red brown, with some sub-rounded to sub-angular gravel.	M		**NATURAL** Ground Level (drain) for SB44 is 2 m below ground level at site
					1.0			**Gravelly SAND**: fine to medium grained, pale brown, sub-rounded to sub-angular grey gravel.			
					1.5			Borehole SB44 terminated at 1.00 m Refusal			
					2.0						
					2.5						
					3.0						
					3.5						

method
- AD auger drilling*
- HA hand auger
- MR mud rotary
- W washbore
- PT push tube
- HS hollow stem
- SS solid stem
- SD sonic drilling
- * bit shown by suffix
- e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nill

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- WS water sample
- HB hammer bouncing
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- R refusal

soil group symbol & material description
based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

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TETRA TECH COFFEY

Environmental Log - Borehole

Hole ID.	***SB45***
sheet:	1 of 1
project no.	***754-PEREN233360***
date started:	***03 Feb 2023***
date completed:	***03 Feb 2023***
logged by:	***SA***
checked by:	***BL***

client: ***AirServices***

principal: ***Sarah Richards***

project: ***Ayers Rock Airport - PFAS Characterisation***

location: ***200 Coote Road, Yulara***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

equipment type: Comacchio GEO305, Track mounted | drilling fluid: N/A | hole diameter : 150 mm

drilling information | **material substance**

method & support	water	samples & field tests	photoionization detector (ppmv)	RL (m)	depth (m)	graphic log	soil group symbol	material description **SOIL NAME**: plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency / relative density	soil origin, structure and additional observations
HA, N, PT	Not Observed	SB45 / 0.0-0.2 (QC13-QC14)			0.0			**SILTY SAND**: fine to medium grained, poorly graded, red brown.	D		**NATURAL**
		SB45 / 0.4-0.5 (QC15-QC16)			0.5				M		
		SB45 / 0.6-0.75									
		SB45 / 0.9-1.0			1.0						
		SB45 / 1.4-1.5			1.5						
		SB45 / 1.9-2.0			2.0			Borehole SB45 terminated at 2.00 m Target depth			
					2.5						
					3.0						
					3.5						

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method
- AD auger drilling*
- HA hand auger
- MR mud rotary
- W washbore
- PT push tube
- HS hollow stem
- SS solid stem
- SD sonic drilling
- * bit shown by suffix
- e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nill

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- WS water sample
- HB hammer bouncing
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- R refusal

soil group symbol & material description
based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

TETRA TECH COFFEY

Environmental Log - Borehole

Hole ID.	***SB46***
sheet:	1 of 1
project no.	***754-PEREN233360***
date started:	***03 Feb 2023***
date completed:	***03 Feb 2023***
logged by:	***SA***
checked by:	***BL***

client: ***AirServices***

principal: ***Sarah Richards***

project: ***Ayers Rock Airport - PFAS Characterisation***

location: ***200 Coote Road, Yulara***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

equipment type: Comacchio GEO305, Track mounted | drilling fluid: N/A | hole diameter : 150 mm

drilling information | **material substance**

method & support	water	samples & field tests	photoionization detector (ppmv)	RL (m)	depth (m)	graphic log	soil group symbol	material description **SOIL NAME**: plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency / relative density	soil origin, structure and additional observations
HA, N, SS	Not Observed	SB46 / 0.0-0.2			0.0		SM	**SILTY SAND**: fine to medium grained, poorly graded, red brown.	D		**NATURAL**
		SB46 / 0.4-0.5 (QC17-QC18)			0.5				M		
		SB46 / 0.6-0.75									
		SB46 / 0.9-1.0			1.0						
		SB46 / 1.4-1.5			1.5						
		SB46 / 1.9-2.0			2.0			Borehole SB46 terminated at 2.00 m Target depth			
					2.5						
					3.0						
					3.5						

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method

AD	auger drilling*
HA	hand auger
MR	mud rotary
W	washbore
PT	push tube
HS	hollow stem
SS	solid stem
SD	sonic drilling
*	bit shown by suffix
e.g.	AD/T
B	blank bit
T	TC bit
V	V bit

support

M	mud
C	casing
N	nill

water

10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests

B	bulk disturbed sample
D	disturbed sample
E	environmental sample
SS	split spoon sample
U##	undisturbed sample ##mm diameter
WS	water sample
HB	hammer bouncing
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
R	refusal

soil group symbol & material description
based on AS 1726:2017

moisture condition

D	dry
M	moist
W	wet
Wp	plastic limit
Wl	liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

TETRA TECH COFFEY

Environmental Log - Borehole

Hole ID.	***SB47***
sheet:	1 of 1
project no.	***754-PEREN233360***
client:	***AirServices***
date started:	***03 Feb 2023***
principal:	***Sarah Richards***
date completed:	***03 Feb 2023***
project:	***Ayers Rock Airport - PFAS Characterisation***
logged by:	***SA***
location:	***200 Coote Road, Yulara***
checked by:	***BL***

position: Not Specified | surface elevation: Not Specified | angle from horizontal: 90°

equipment type: Comacchio GEO305, Track mounted | drilling fluid: N/A | hole diameter : 150 mm

drilling information | **material substance**

method & support	water	samples & field tests	photoionization detector (ppmv)	RL (m)	depth (m)	graphic log	soil group symbol	material description **SOIL NAME**: plasticity or particle characteristics, colour, secondary and minor components	moisture condition	consistency / relative density	soil origin, structure and additional observations
HA, N, SS	Not Observed	SB47 / 0.0-0.2			0.0		SM	**SILTY SAND**: fine to medium grained, poorly graded, red brown.	D		**NATURAL**
		SB47 / 0.4-0.5			0.5				M		
		SB47 / 0.9-1.0			1.0						
		SB47 / 1.4-1.5			1.5						
		SB47 / 1.9-2.0			2.0		SM	**SILTY SAND**: fine to medium grained, red brown, with some sub-angular to sub-rounded gravel.			
								Borehole SB47 terminated at 2.00 m Target depth			
					2.5						
					3.0						
					3.5						

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method
- AD auger drilling*
- HA hand auger
- MR mud rotary
- W washbore
- PT push tube
- HS hollow stem
- SS solid stem
- SD sonic drilling
- * bit shown by suffix
- e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nill

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- WS water sample
- HB hammer bouncing
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- R refusal

soil group symbol & material description
based on AS 1726:2017

moisture condition
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density
- VS very soft
- S soft
- F firm
- St stiff
- VSt very stiff
- H hard
- Fb friable
- VL very loose
- L loose
- MD medium dense
- D dense
- VD very dense

Well Development Form

PROJECT NAME	Ayers Rock Airport - Airservices	DATE	02/02/2023 – 04/02/2023
PROJECT NUMBER	754-PEREN233360	WELL ID	GW07 – GW11
FIELD PERSONNEL	S.A.	PAGE	1 of 1
WELL INFORMATION PRE-DEVELOPMENT			
Depth to water (mbtoc)	Various- see below	Total well depth (mbtoc)	Various- see below
Well diameter (mm)	50	Depth to top of screen (m)	Various- see below
Casing stick up (mm)	Various- see below	Length of screened interval (m)	Various- see below
Development method (pumps, bailer etc)	Bailer		
Equipment type (IP, WQM):	N/A	Equipment type (IP, WQM):	N/A
Equipment serial number:	N/A	Equipment serial number:	N/A

OBSERVATIONS DURING DEVELOPMENT

Date	Well ID	Depth to water (mbtoc)	Stick-up	Depth to water (mbgl)	Well Depth (mbgl)	Water column (m)	Fluid removed (L) (based on min of 3.7L per m of water column, 2x well volumes)	CLARITY – tick one				COMMENTS
								Clear	Slightly Cloudy	Cloudy	Turbid	ODOUR, COLOUR, SEDIMENT, SHEEN
02/02/2023	GW07	11.525	0.85	10.675	15	4.3	30	x				
04/02/2023	GW08	9.689	0	9.689	15	5.4	33		x			Purged until dry
04/02/2023	GW09	8.905	0	8.905	15	6.1	34		x			Purged until dry
02/02/2023	GW10	12.456	0.854	11.602	15	3.3	24	x				
02/02/2023	GW11	9.251	0.9	8.351	14	5.6	35		x			Purged until dry

THE NORTHERN TERRITORY OF AUSTRALIA

Control of Waters Ordinance

IN 2/273

RN 12065

FULL STATEMENT OF BORE

From	To	Description of Strata
0.00	6.00	RED & LIGHT BROWN STONE
6.00	12.00	LIGHT BROWN STONE
12.00	18.00	BROWN SANDY STONE.
18.00	24.00	WHITE & BROWN STONE.
24.00	30.00	WHITE CLAY & BROWN STONE
30.00	36.00	BROWN CLAY & WHITE STONE.
36.00	42.00	WHITEISH GREY STONE

Name of Bore -

RN 12065

Name of Property -

Ayers Rock

Description of Property -

N.T.

Name of Owner -

N.T.R.B

Name of Contractor -

N.T.B

Name of Driller -

B. L. Darby

Location of Bore (or supply sketch on back hereof) - SITE 5'N

.....5. K/L..... ~~Miles~~

(a) N NE S SE E NW W SW of (b) 12061.....

.....+ NEW Village.....

(a) Circle appropriate direction.

(b) Use known point such as existing bore, homestead, outstation, etc.

Date of Commencement -

10/3/79

Date of Completion -

10/3/79

Total Depth - ??

37.49m

Particulars of Casing - SET BETWEEN 30.58m LENGTH OF 6" 3/8 WALL + 37.04m

Particulars of Perforations or Screens -

37.08 x 6" BLANK.

Additional information of interest about the bore - Pilton Allmon with 7" Hammer Bit

Map No: SG 52-8

Grid Reference: 398869

Samples of strata and water supplies

~~have been~~ *

will be *

left at the following trading place -

N.T.B. OFFICE A/S.....

.....

Signature

* Strike out which does not apply.

For office use only -

Water	1st Supply	2nd Supply	3rd Supply
Struck at	18.00m	36.00m	
Standing Water Level		12.30m	
Pumping Supply: G.P.M.	1 L/S	2½ L/S	
Duration of Pump Test			
Water Level During Test			
Quality: Good, Fair, Bad	CONDUCTIVITY 3,500 PPM 2170 TDS		

0 - 30.58 6" Blank

30.58 - 37.04 6" Perf

37.04 - 39.54 6" Blank

WATER ANALYSIS

Department of Transport & Works
Water Division, Darwin N.T.

WR 4/1A

Laboratory Register No.	84/85/1760
Date received in Laboratory	3/5/85 ✓

Bottle No.	Time of sampling	Date of sampling
PT39	1030	18/4/85

LOCATION AND DETAILS
AYERS ROCK YULARA 6" BORE REN 12065 DEPTH 28m DISCH 1.0LPS WRA6019

RSP1259

Proposed water use:- Domestic, Stock, Irrigation, other (specify)

ANALYSIS — PHYSICAL

☐ pH	7.5	☐ Colour (Hazen units)	
☐ Specific conductance (microsiemens/cm at 25° C)	3390	☐ Turbidity (NTU's)	
☒ Total dissolved solids (mg/L - by evaporation at 180° C)	2170	☐ Suspended solids (mg/L)	

ANALYSIS — CHEMICAL (mg/L)

☐ Sodium, Na	490	☒ Chloride, Cl	670
☐ Potassium, K	59	☒ Sulphate, SO_4	532
☐ Calcium, Ca	117	☒ Nitrate, NO_3	69
☐ Magnesium, Mg	73	☐ Bicarbonate, HCO_3	214
☐ Total Hardness (as $CaCO_3$)	592	☐ Carbonate, CO_3	
☐ Total Alkalinity (as $CaCO_3$)	176	☐ Fluoride, F	1.1
☐ Iron, (total) Fe	0.7	☐ Orthosphosphate, PO_4	
☐ Silica, SiO_2	81	☒ NaCl (calc. from chloride)	1109

ANALYSIS — ADDITIONAL (mg/L)

☐ Copper, Cu	☐ Lead, Pb	☐ Arsenic, As
☐ Manganese, Mn	☐ Zinc, Zn	☐ Cadmium, Cd
☐	☐	☐

THE SAMPLE AS ANALYSED ~~COMPLIES~~/DOES NOT COMPLY WITH NORTHERN TERRITORY DRINKING WATER STANDARDS AS RECOMMENDED BY THE NORTHERN TERRITORY DEPARTMENT OF HEALTH.

This Laboratory is registered by the National Association of Testing Authorities, Australia. The test(s) reported herein have been performed in accordance with its terms of registration. This document shall not be reproduced except in full.

Analysed By: J. COOK Date 15 / 5 /85

Boxes marked thus ☒ indicate levels considered undesirable for drinking water by the Northern Territory Department of Health.

4278.846 G. L. DUFFIELD, Government Printer of the Northern Territory

BORE SAMPLING DETAILS

R.N. : 12065

LOCATION OF BORE : A/Rock Airport

BORE NAME :

Temp 25°C

TOTAL DEPTH : 37.49 m

S.W.L. : 11.22

CST

DATE : 18.4.85 Samples 1030 am

DETAILS OF CASING : 6"

LITRES PER METRE : 16

DETAILS OF PUMPING : Pumped for 45 mins @ 1.4p
Pump set at 28.00 mtrs

TYPE OF PUMP TO BE USED : Sub

COMMENTS :

Samples
PT 39
PQ 79

AS80/113

WATER CONDUCTIVITY ANALYSIS

BORE:

REGISTERED NUMBER 12065

LOCATION: AYERS ROCK

TESTED BY: V GARNER ✓

DATE TESTED: 29.2.80.

BOTTLE NO.	DATE	TIME	DEPTH	DISCHARGE	SAMPLER		CONDUCTIVITY
2495	19.2.80	1050			N. WASSARA		3500

WATER ANALYSIS

Department of Transport & Works
Water Division, Darwin NT

WR 4/1

Laboratory Register No: 80/0064

Date received in Laboratory: 10.1.80

Bottle No	Time of Sampling	Date of Sampling
ZC 38	1530	14.12.79

LOCATION AND DETAILS
Yulara Village – RN 12065 – Disch: 3.4 lps Tap RSP. 1259 (H)

Proposed water use:-Domestic, Stock, Irrigation, other (specify)

ANALYSIS – PHYSICAL

☐ pH	7.4	☐ Colour (Hazen units)	
☐ Specific conductance (microsiemens/cm at 25° C)	4000	☐ Turbidity (NTU's)	
☐ Total dissolved solids (mg/l - by evaporation at 180 ° C)	2540	☐ Suspended solids (mg /l)	

ANALYSIS – CHEMICAL (mg/l)

☐ Sodium, Na	530	☒ Chloride, Cl	755
☐ Potassium, K	85	☒ Sulphate, SO_4	630
☐ Calcium, Ca	167	☒ Nitrate, NO_3	64
☐ Magnesium, Mg	90	☐ Bicarbonate, HCO_3	251
☐ Total Hardness (as $CaCO_3$)	787	☐ Carbonate, CO_3	
☐ Total Alkalinity (as $CaCO_3$)	206	☒ Fluoride, F	1.6
☐ Iron, (total) Fe	0.3	☐ Orthophosphate, PO_4	
☐ Silica, SiO_2	85	☐ NaCl (calc. from chloride)	1244

ANALYSIS – ADDITIONAL (mg/l)

☐ Copper, Cu	☐ Lead, Pb	☐ Arsenic, As
☐ Maganese, Mn	☐ Zinc, Zn	☐ Cadmium, Cd

Analysed By: H. HENKEL Date 18/ 1 / 80

WATER INVESTIGATIONS UNIT
ALICE SPRS
23 JAN 1980
DEPT. OF TRANSPORT & WORKS

REMARKS

The sample as analysed is considered suitable for:–

Drinking water – YES/NO
Irrigation – YES/NO
Stock watering – YES/NO
Other (specify) – YES/NO

Boxes marked thus ☒ indicate levels considered undesirable for drinking water by the Northern Territory Department of Health.

Note:– Advice and Water quality information can be obtained by contacting the Senior Engineer Water Quality, Darwin Phone 89 6072.

15303/79
A.B. CAUDELL, Government Printer of the Northern Territory.

WATER ANALYSIS

		Laboratory Register No.	79/0688
		Date received in Laboratory	1.6.79
WR 4/1	Bottle No. YU 96	Time of sampling (hrs) 0850	Date of sampling 16.5.79

LOCATION AND DETAILS

Ylara Village Site – Ayers Rock File 60.6 SG.52.8 398868 Depth: 29.5m

RSP.1259(h) Disch: 3.5 lps. Temp: 26°c Discharge Pipe Pumping Test Final

Sample RN/12065 Sampler: R. Kneebone

ANALYSIS - PHYSICAL

pH	7.3	Colour (Hazen units)	
Specific conductance (microsiemens/cm at 25°C)	3990	Turbidty (A.P.H.A. units)	
Total dissolved solids (mg/l - by evaporation at 180°C)	2550	Suspended solids (mg/l)	

ANALYSIS - CHEMICAL (mg/l)

Total dissolved solids (by summation)	2657	Total alkalinity (as $CaCO_3$)	200
Sodium chloride (calc from chloride)	1259	Total hardness (as $CaCO_3$)	731
Chloride, Cl	764	Sodium, Na	550
Sulphate, SO_4	638	Patassium, K	86
Nitrate NO_3	65	Calcium, Ca	148
Bicarbonate, HCO_3	244	Magnesium, Mg	88
Carbonate, CO_3		Iron (total), Fe	0.3
Fluoride, F	1.6	Silica, SiO_2	72

ANALYLIS - ADDITIONAL (mg/l)

ANALYSED BY: Holger Henkel Date 21 / 6 / 79

REMARKS: The sample as analysed is chemically unsuitable for human consumption according to 1971 W.H.O. International Standards for drinking water, as the total dissolved solids exceed the maximum permissable level.

Suitable for stock.

"Information or discussion on the analysis shown above, can be obtained by contacting the Senior Engineer, Water Quality, Water Recources Branch, Darwin".

90999—5/78 C. J. THOMPSON, Commonwealth Government Printer, Darwin

WATER ANALYSIS

Laboratory Register No. 79/0396

Date received in Laboratory 27/3/79

WR 4/1

Bottle No. ZQ 01 | Time of sampling (hrs) 1300 | Date of sampling 10/3/79

LOCATION AND DETAILS Yulara Village RN 12065 Depth 42 M Discharge 3.0 lps Airlift

RSP 1259 H. Sampler R. Darby.

ANALYSIS - PHYSICAL

pH	7.8	Colour (Hazen units)	
Specific conductance (microsiemens/cm at 25°C)	4010	Turbidty (A.P.H.A. units)	
Total dissolved solids (mg/l - by evaporation at 180°C)	2587	Suspended solids (mg/l)	

ANALYSIS - CHEMICAL (mg/l)

Total dissolved solids (by summation)	2572	Total alkalinity (as $CaCO_3$)	185
Sodium chloride (calc from chloride)	1388	Total hardness (as $CaCO_3$)	730
Chloride, Cl	842	Sodium, Na	570
Sulphate, SO_4	625	Patassium, K	85
Nitrate NO_3	24	Calcium, Ca	148
Bicarbonate, HCO_3	226	Magnesium, Mg	90
Carbonate, CO_3		Iron (total), Fe	33.4
Fluoride, F	2.0	Silica, SiO_2	73

ANALYLIS - ADDITIONAL (mg/l)

ANALYSED BY: G. Johnston Date 17/4/79

REMARKS: The total dissolved solids, iron and fluoride all exceed the 1971 W.H.O. International Standards for drinking Water. Unsuitable for human consumption. Suitable for Stock.

"Information or discussion on the analysis shown above, can be obtained by contacting the Senior Engineer, Water Quality, Water Recources Branch, Darwin".

90999—5/78 C. J. THOMPSON, Commonwealth Government Printer, Darwin

WATER CONDUCTIVITY ANALYSIS.

BORE: REGISTERED NUMBER: 12065

LOCATION: AHERS ROCK

DATE TESTED: 23.3.79 TESTED BY: V. GARNER

BOTTLE No.	DATE	TIME	DEPTH	DISCHARGE	SAMPLER		CONDUCTIVITY
ZK91	10-3-79	1200	18M	1.0	R.DARBY		3500
ZH69	"	1230	36M	2.5	"		4100
ZQ1	"	1300	42M	3.0	"		4200

YULARA VILLAGE WATER RESOURCES 60.6D

RN 12065
IN 2/273
5047 Mt Olga

DEPTH (m)				DESCRIPTION
0	-	3	SAND AND GRAVEL	Poorly sorted reddish brown sand and gravel.
3	-	6	SAND	Poorly sorted angular sand cemented together in a calcareous matrix.
6	-	15	CLAY	Light and dark brown clay with sand grains.
15	-	24	CLAY	Dark brown clay with sand grains.
24	-	36	CLAY	White to light brown calcareous clay with minor amounts oflignite. Sand content varies.
36	-	42	SILTSTONE	White dolomitic siltstone with hard bands of reddish purple IRONSTONE and CHERT.

SUMMARY

0	-	3	Sand and gravel - Quaternary
3	-	36	Clay, minor sand - Tertiary
36	-	42	Dolomitic Siltstone

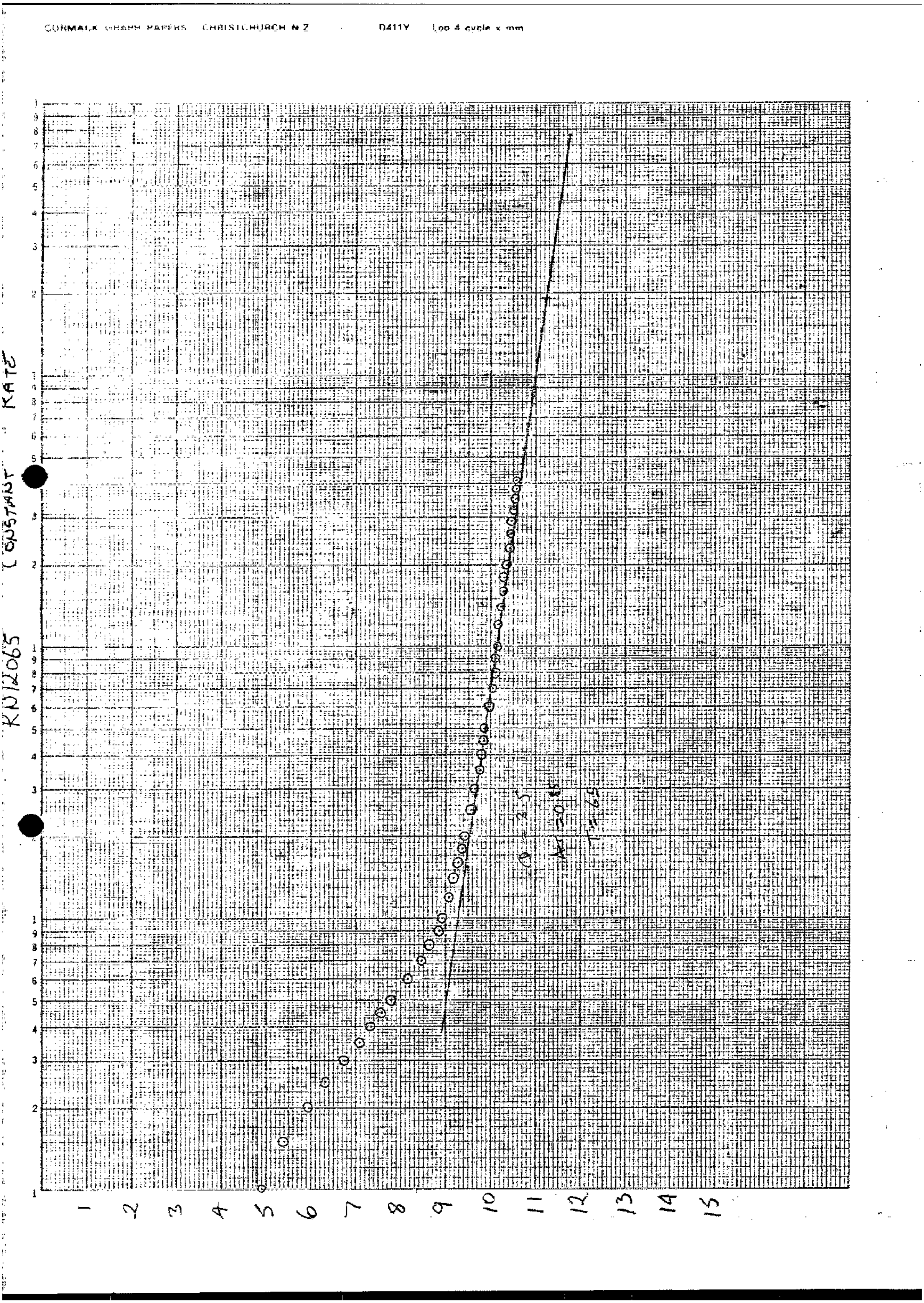
MAJOR AQUIFERS

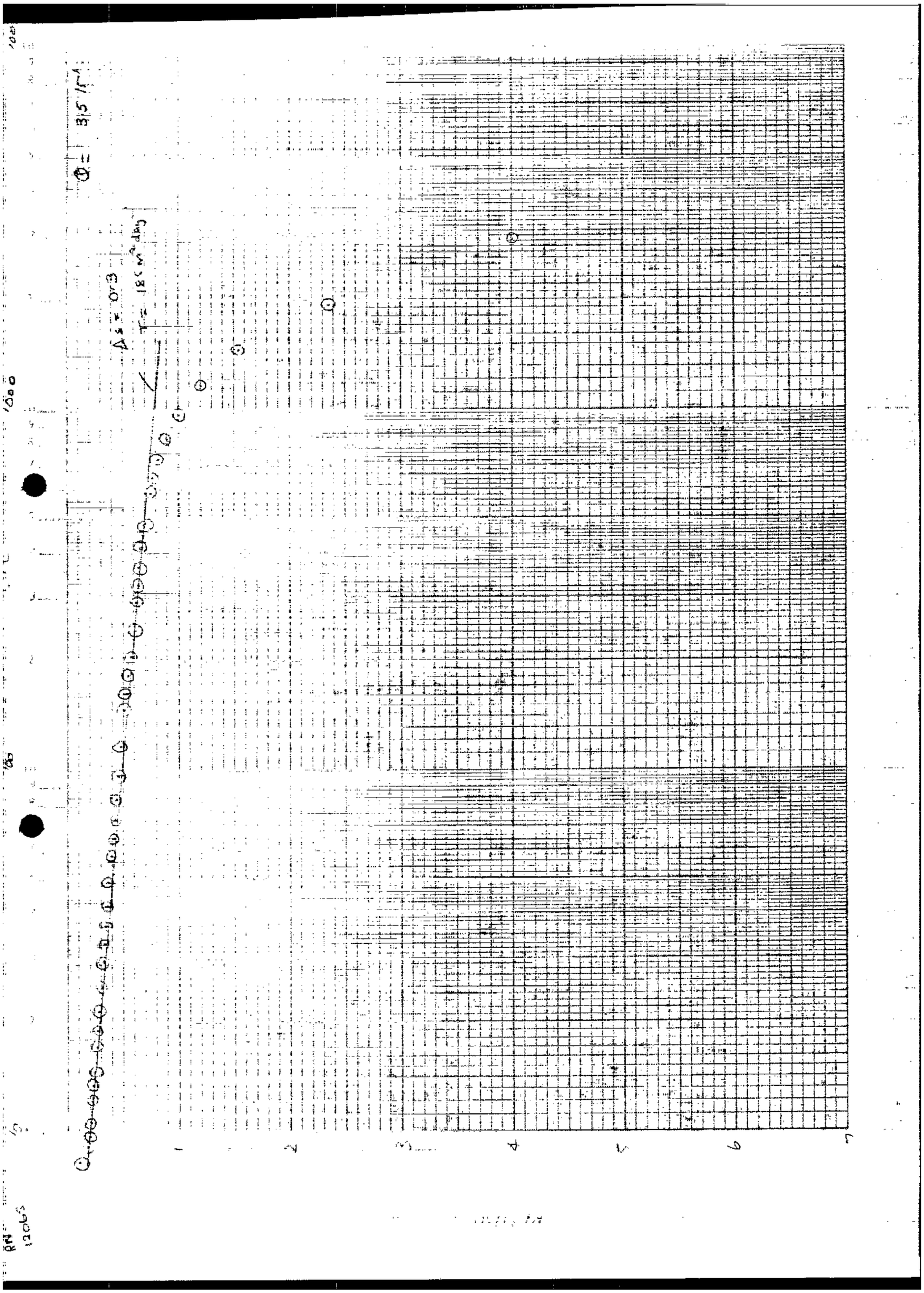
18m	1 ls^{-1}	Tertiary sand
35.5 ~~36~~m	1.5 ls^{-1}	Base of Tertiary clay

Geoff Knott

GEOFF KNOTT
HYDROGEOLOGIST

MARCH '79


CORMALK GRAPH PAPERS CHRISTCHURCH N Z
D411Y Log 4 cycle x mm
KN12065
COASTAL
KATE
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15



NTA 1718

DATE 10/3/79 BORE No. RN 12065 Driller: Davey

Time	Depth	Feet drilled	Mins lapsed	Drillers remark, casing details
1000	/	/		START FROM RN 12064 TO RN 12065
				SET UP & DRILL 8" SURF CASING IN
				8" CASING IN BROWN CLAY 4.6m
				DRILL TO 6m WITH 7" HAMMER
				& REEM OUT TO 4.6m WITH 9 5/8 Rock BIT
1110	6m	6m		RED & LIGHT BROWN STONE
1140	/	/	35	ADD D/C
1145	12m	6m		LIGHT BROWN STONE
			10	ADD D/C
1155	18m	6m		BROWN SANDY STONE DAMP. W/S N° CN-1 - ZR-91 CONDUCTIVITY 3,500 PPM
			10	ADD D/P W/C 18m L/S.
1205	24m	6m		WHITE & BROWN STONE
			10	ADD D/P
1215	30m	6m		WHITE clay & BROWN STONE
			15	ADD D/P
1230	36m	6m		BROWN clay & WHITE STONE INCREASE TO 3 L/S AT 36.6m
			20	ADD D/P ZQ-6m - ZH-69 3,500 PPM.
1250	42m	6m		WHITE & GREY STONE W/S N° 5 ZQ-1 - ZQ-44
				PUMP DEPT. 3,500 PPM

BIT DATA No.	Size	Type	Worn cond'n
17418	9 7/8	Roll	USED
39045	7"	DOT	USED
15 BIT			

STRING DATA Item	O.D.	Length	Prog. tally
HAMMER BIT & SUB			1.75
D/C	4½	5.73	7.48
D/C	4½	6.01	13.49
D/P	4½	6.00	19.49
D/P	4½	6.00	25.49
D/P	4½	6.00	31.49
D/P	4½	6.00	37.49

MUD DATA

RAN IN 6" CASING. - CASING DETAILS

BLANK	1	2.50.		5	5.40	27.07	
3/8 PERF	2	6.46	8.96	6	6.25	33.32	
	3	6.15	15.11	7	6.22	39.54	
	4	6.56	21.67				

SWL 12.30m

14702/69.... W. G. Murray, Government Printing Office, Canberra

DEPARTMENT OF TRANSPORT & WORKS

WATER & SEWERAGE DIVISION

GEOPHYSICAL BORE LOG

R.N.: 12065 AREA: AYERS ROCK STATUS: INVESTIGATION

MAP REFERENCE: SG 52-8 GRID CO-ORD:. 398 869

ELEVATION: S.W.L.: 12·3m

CASING DETAILS: 39·54 m x 6"

DRILLER: W. R. B. DATE COMMENCED: 10·3·79

DEPTH DRILLED: DATE COMPLETED: 10·3·79

RADIOMETRIC LOG DATA

SERVICE: W. R. B. LOG TYPE: GAMMA RAY DATE: 28·3·79

RUN NO.: 2 SCALE: V: 1 = 100 H:

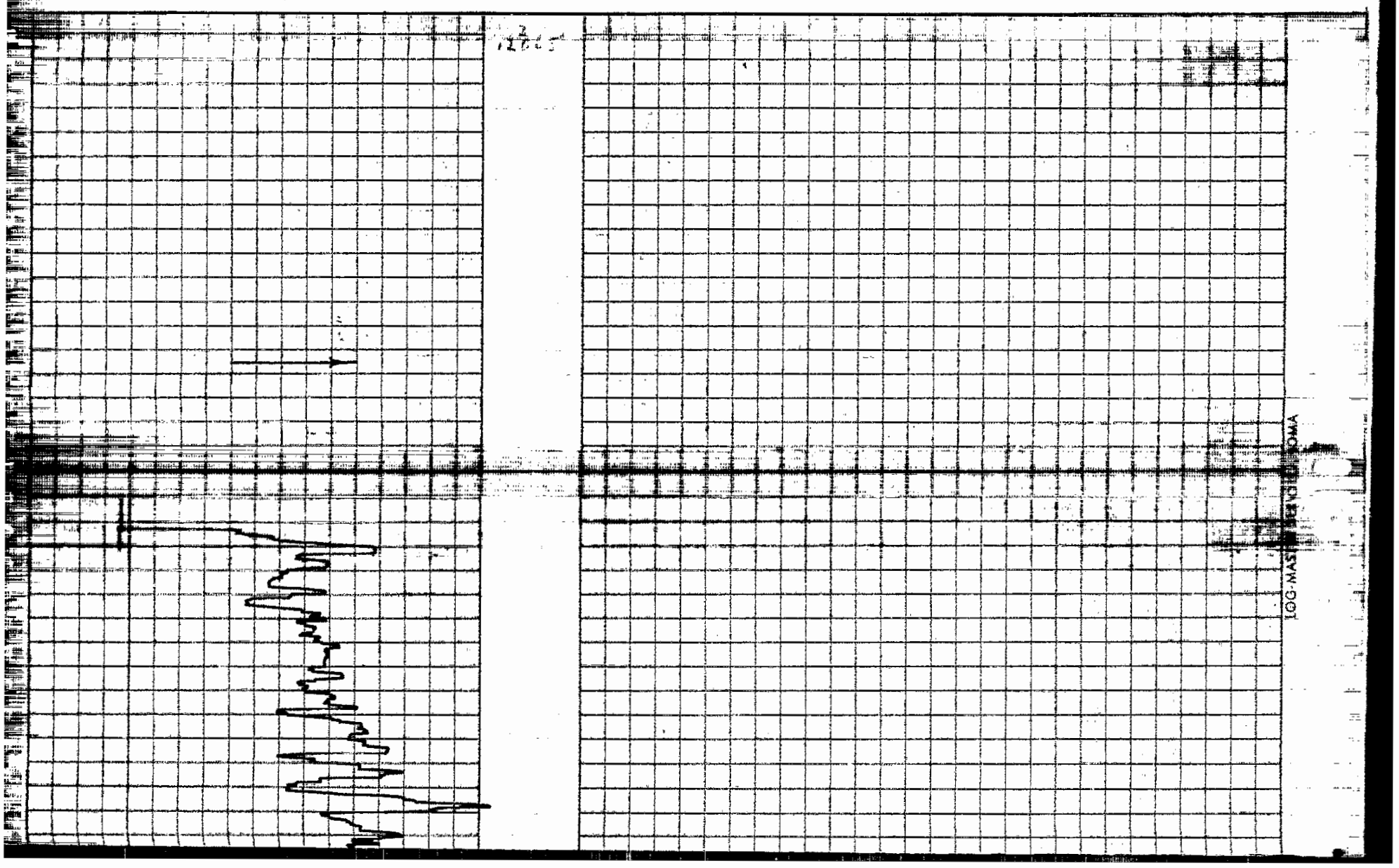
SENSITIVITY: RANGE: 4

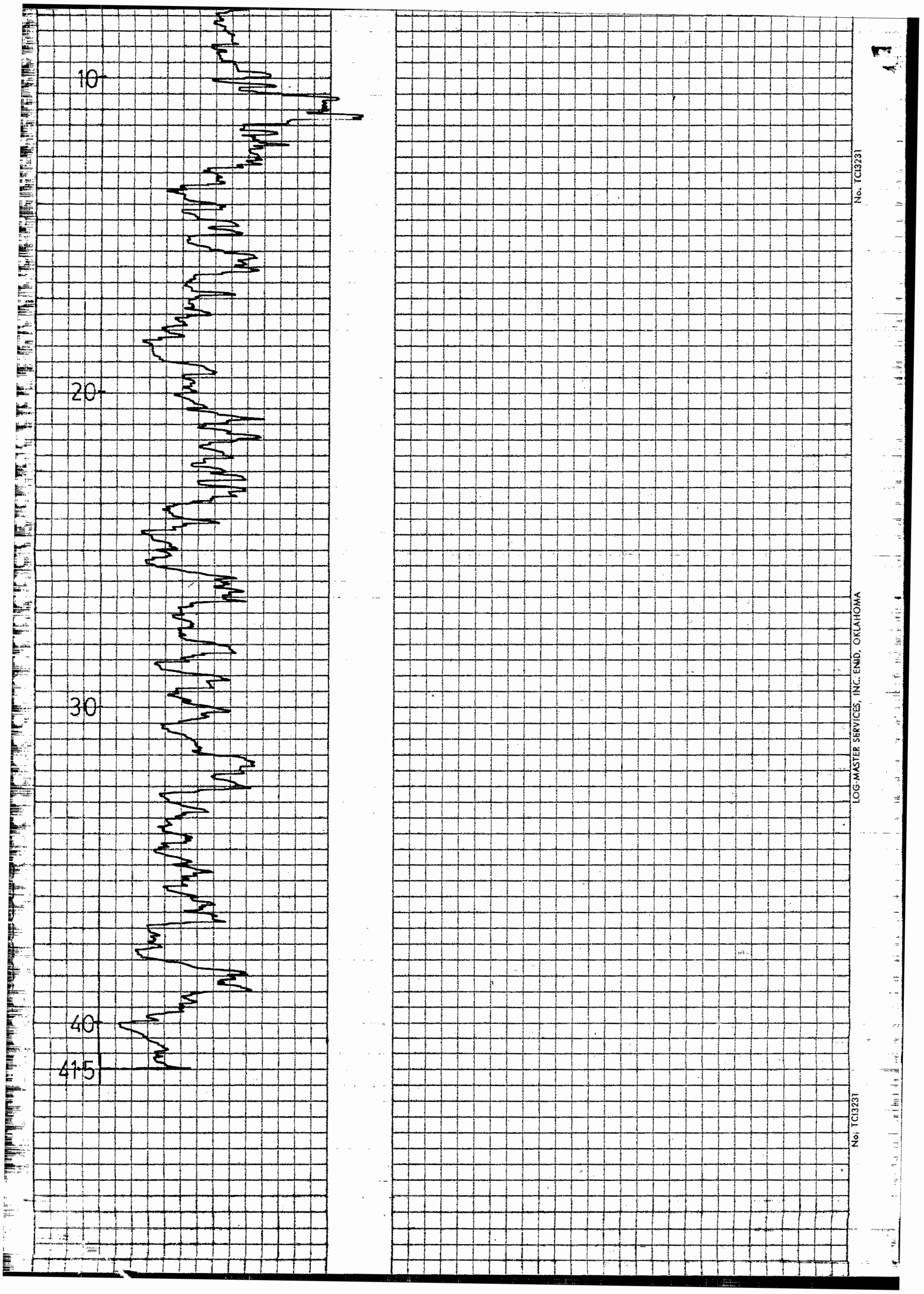
TIME CONSTANT: 2 sec SPEED: 4·3 M/MIN.

1st READING: 41·5 m INSTRUMENT: LM444 B LMG 15

LAST READING: 1·2 m OBSERVER: R. P.

INTERVAL: 40·3 m




10
20
30
40
41.5
No. TCI3231
LOG-MASTER SERVICES, INC. ENID, OKLAHOMA
No. TCI3231

DEPARTMENT OF TRANSPORT & WORKS

WATER & SEWERAGE DIVISION

GEOPHYSICAL BORE LOG

R. N. 12065 AREA: AYERS ROCK STATUS: INVESTIGATION

MAP REFERENCE: SG 52-8 GRID CO-ORD: 398 869

ELEVATION: S. W. L.: 12·3 m

CASING DETAILS: 39·54 m x 6"

DRILLER: W. R. B. DATE COMMENCED: 10·3·79

DEPTH DRILLED: DATE COMPLETED: 10·3·79

RADIOMETRIC LOG DATA

SERVICE: W. R. B. LOG TYPE: GAMMA RAY DATE: 28·3·79

RUN NO: 3 SCALE: V: 1 =100 H:

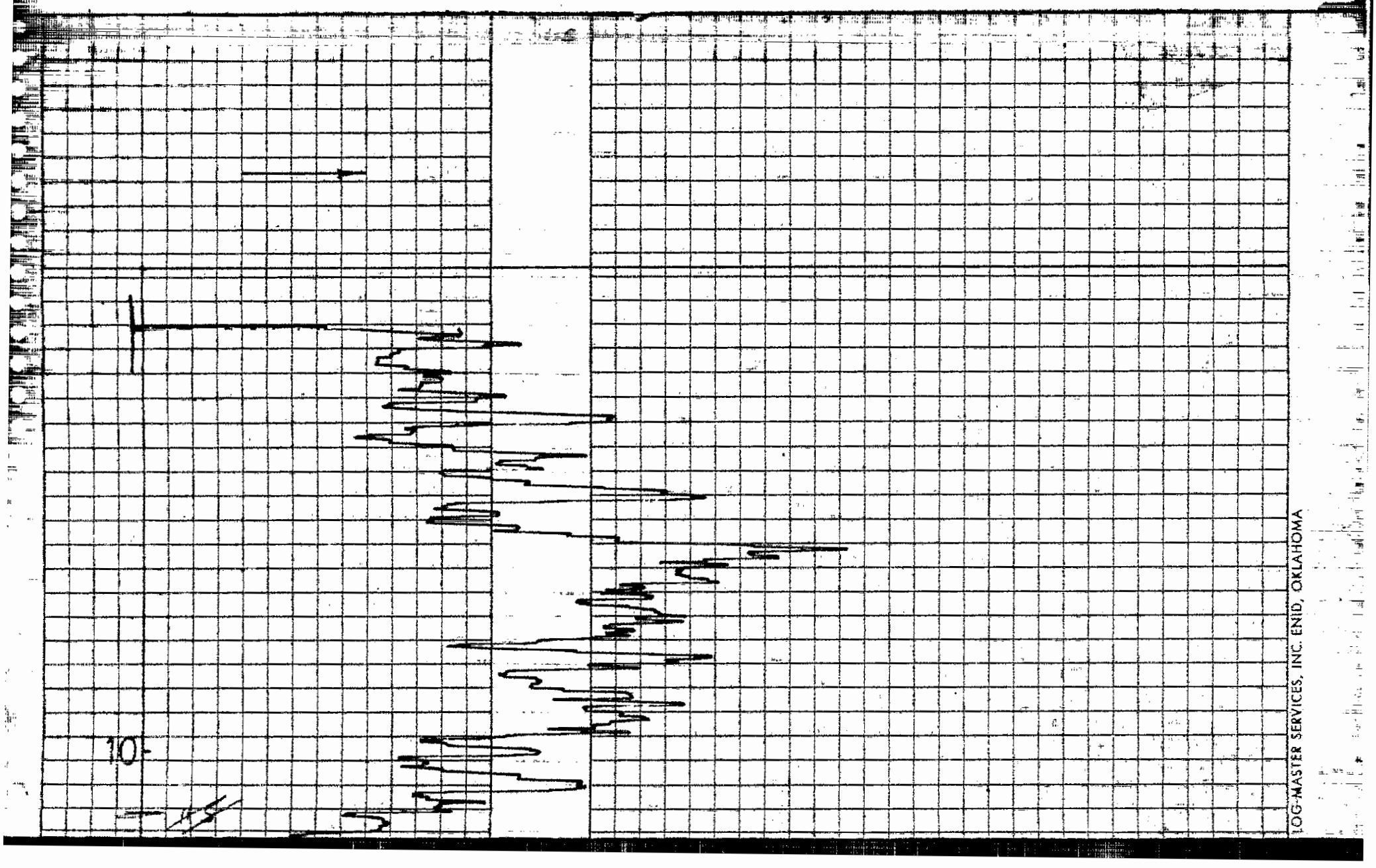
SENSITIVITY RANGE: 2

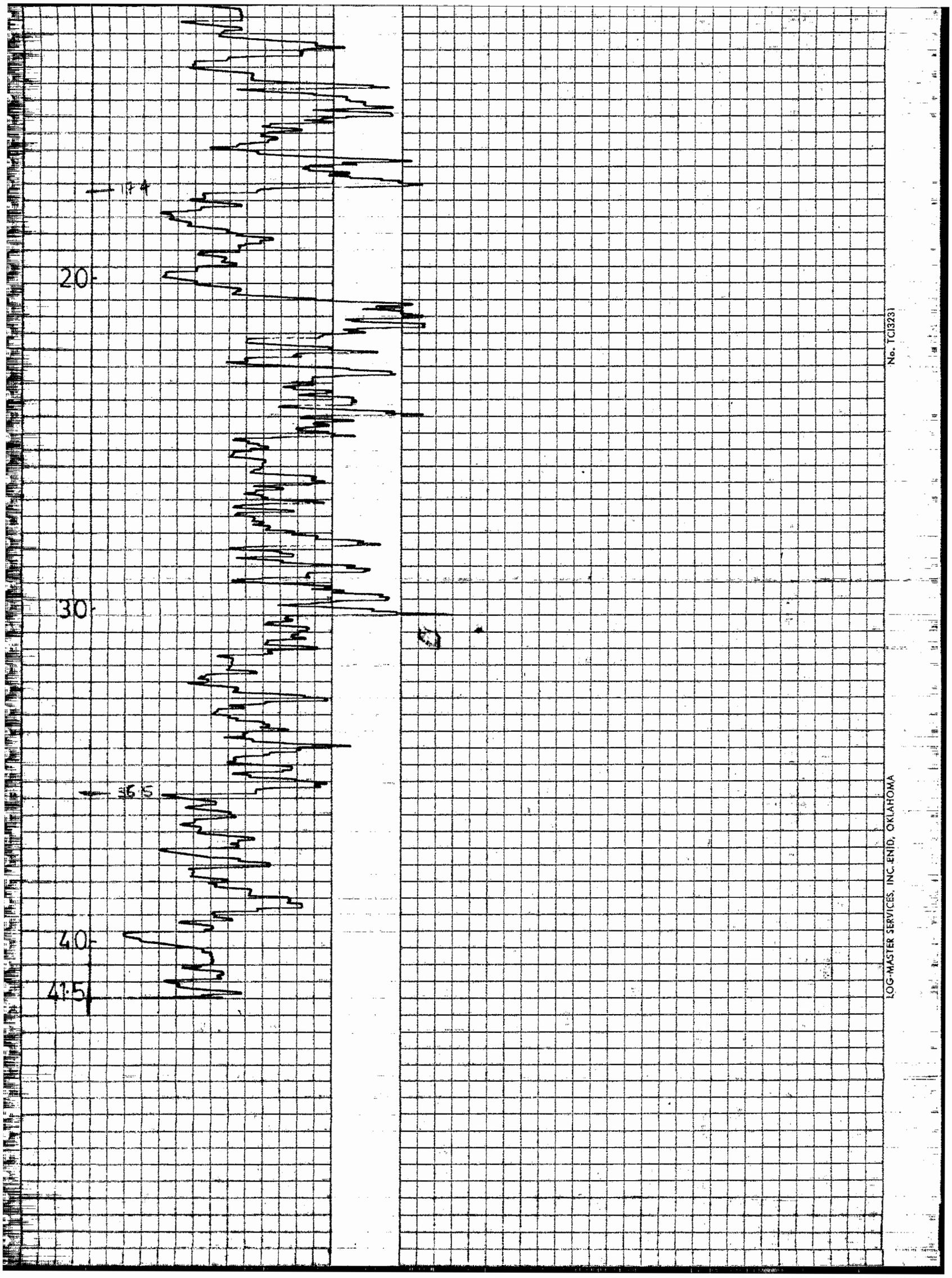
TIME CONSTANT: 2 sec SPEED: 5 M/MIN

1st READING: 41·5 m INSTRUMENT: LM 444 B LMG 15

LAST READING 1·2 m OBSERVER: R P.

INTERVAL: 40·3 m




17.4
20
30
36.5
40
41.5
No. TCI3231
LOG-MASTER SERVICES, INC. ENID, OKLAHOMA

RN012065

IN 2/273

RN 12065

THE NORTHERN TERRITORY OF AUSTRALIA

Control of Waters Ordinance

FINAL STATEMENT OF BORE

From	To	Description of Strata
0.00	6.00	RED & LIGHT BROWN STONE
6.00	12.00	LIGHT BROWN STONE
12.00	18.00	BROWN SANDY STONE.
18.00	24.00	WHITE & BROWN STONE.
24.00	30.00	WHITE CLAY & BROWN STONE
30.00	36.00	BROWN CLAY & WHITE STONE.
36.00	42.00	WHITISH GREY STONE

Location of Bore (or supply sketch on back hereof) - SITE SN

.....5..K/L..... ~~Miles~~

(a) N NE S SE E NW W SW of (b) 12061.....

.....& NEW Village.....

(a) Circle appropriate direction.
(b) Use known point such as existing bore, homestead, outstation, etc.

Additional information of interest about the bore - Drilled allway with 7" Hammer Bit

Map No: SG 52-8
Grid Reference: 398869

Samples of strata and water supplies
~~have been~~ *
will be *
left at the following trading place -

.W.R.B....OFFICE....A/S.....

.....R.Daly.....
Signature

* Strike out which does not apply.

For office use only -

Name of Bore - RN 12065

Name of Property - Ayers Rock

Description of Property - N.T.

Name of Owner - NTRB

Name of Contractor - WRB

Name of Driller - B. R. Daly

Date of Commencement - 10/3/79

Date of Completion - 10/3/79

Total Depth - 37.49m

Particulars of Casing - SET BETWEEN 30.58m LENGTH OF 6" 3/8 GALV + 37.04m

Particulars of Perforations or Screens - 37.08 x 6" BLANK.

Water	1st Supply	2nd Supply	3rd Supply
Struck at	18.00m	36.00m	
Standing Water Level		12.30m	
Pumping Supply: ~~G.P.H.~~ L/S	1 L/S	2½ L/S	
Duration of Pump Test			
Water Level During Test		[redacted]	
Quality: Good, Fair, Bad	CONDUCTIVITY 3,500 PPM		

2/273

WATER ANALYSIS

Department of Transport & Works
Water Division, Darwin N.T.

WR 4/1A

Laboratory Register No.	84/85/1760
Date received in Laboratory	3/5/85

Bottle No.	Time of sampling	Date of sampling
PT39	1030	18/4/85

LOCATION AND DETAILS
AYERS ROCK YULARA 6" BORE [illegible]EN 12065 DEPTH 28m DISCH 1.0LPS WRA6019

RSP1259

Proposed water use:- Domestic, Stock, Irrigation, other (specify)

ANALYSIS — PHYSICAL

☐ pH	7.5	☐ Colour (Hazen units)	
☐ Specific conductance (microsiemens/cm at 25° C)	3390	☐ Turbidity (NTU's)	
☒ Total dissolved solids (mg/L - by evaporation at 180° C)	2170	☐ Suspended solids (mg/L)	

ANALYSIS — CHEMICAL (mg/L)

☐ Sodium, Na	490	☒ Chloride, Cl	670
☐ Potassium, K	59	☒ Sulphate, SO_4	532
☐ Calcium, Ca	117	☒ Nitrate, NO_3	69
☐ Magnesium, Mg	73	☐ Bicarbonate, HCO_3	214
☐ Total Hardness (as $CaCO_3$)	592	☐ Carbonate, CO_3	
☐ Total Alkalinity (as $CaCO_3$)	176	☐ Fluoride, F	1.1
☐ Iron, (total) Fe	0.7	☐ Orthosphosphate, PO_4	
☐ Silica, SiO_2	81	☒ NaCl (calc. from chloride)	1109

ANALYSIS — ADDITIONAL (mg/L)

☐ Copper, Cu	☐ Lead, Pb	☐ Arsenic, As
☐ Manganese, Mn	☐ Zinc, Zn	☐ Cadmium, Cd
☐	☐	☐

THE SAMPLE AS ANALYSED ~~COMPLIES~~/DOES NOT COMPLY WITH NORTHERN TERRITORY DRINKING WATER STANDARDS AS RECOMMENDED BY THE NORTHERN TERRITORY DEPARTMENT OF HEALTH.

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Analysed By: J. COOK Date 15 / 5 /85

Boxes marked thus ☒ indicate levels considered undesirable for drinking water by the Northern Territory Department of Health.

4278.846 G. L. DUFFIELD, Government Printer of the Northern Territory

WATER ANALYSIS

2/273

Laboratory Register No. 79/0688

Date received in Laboratory 1.6.79

[redacted] WR 4/1

Bottle No.	Time of sampling (hrs)	Date of sampling
YU 96	0850	16.5.79

LOCATION AND DETAILS

Yulara Village Site - Ayers Rock File 60.6 SG.52.8 398868 Depth: 29.5m

RSP.1259(h) Disch: 3.5 lps. Temp: 26°c Discharge Pipe Pumping Test Final

Sample RN/12065

ANALYSIS - PHYSICAL

Sampler: R. Kneebone

pH	7.3	Colour (Hazen units)	
Specific conductance (microsiemens/cm at 25°C)	3990	Turbidty (A.P.H.A. units)	
Total dissolved solids (mg/l - by evaporation at 180°C)	2550	Suspended solids (mg/l)	

ANALYSIS - CHEMICAL (mg/l)

Total dissolved solids (by summation)	2657	Total alkalinity (as $CaCO_3$)	200
Sodium chloride (calc from chloride)	1259	Total hardness (as $CaCO_3$)	731
Chloride, Cl	764	Sodium, Na	550
Sulphate, SO_4	638	Patassium, K	86
Nitrate NO_3	65	Calcium, Ca	148
Bicarbonate, HCO_3	244	Magnesium, Mg	88
Carbonate, CO_3		Iron (total), Fe	0.3
Fluoride, F	1.6	Silica, SiO_2	72

ANALYLIS - ADDITIONAL (mg/l)

ANALYSED BY: Holger Henkel Date 21 / 6 / 79

REMARKS: The sample as analysed is chemically unsuitable for human consumption according to 1971 W.H.O. International Standards for drinking water, as the total dissolved solids exceed the maximum permissable level.

Suitable for stock.

"Information or discussion on the analysis shown above, can be obtained by contacting the Senior Engineer, Water Quality, Water Recources Branch, Darwin".

90999—5/78 C. J. THOMPSON, Commonwealth Government Printer, Darwin

WATER ANALYSIS

IN 2/273

Laboratory Register No. 79/0396

Date received in Laboratory 27/3/79

[redacted] WR 4/1 | Bottle No. ZQ 01 | Time of sampling (hrs) 1300 | Date of sampling 10/3/79

LOCATION AND DETAILS Yulara Village RN 12065 Depth 42 M Discharge 3.0 lps Airlift

RSP 1259 H. Sampler R. Darby.

ANALYSIS - PHYSICAL

pH	7.8	Colour (Hazen units)	
Specific conductance (microsiemens/cm at 25°C)	4010	Turbidty (A.P.H.A. units)	
Total dissolved solids (mg/l - by evaporation at 180°C)	2587	Suspended solids (mg/l)	

ANALYSIS - CHEMICAL (mg/l)

Total dissolved solids (by summation)	2572	Total alkalinity (as $CaCO_3$)	185
Sodium chloride (calc from chloride)	1388	Total hardness (as $CaCO_3$)	730
Chloride, Cl	842	Sodium, Na	570
Sulphate, SO_4	625	Patassium, K	85
Nitrate NO_3	24	Calcium, Ca	148
Bicarbonate, HCO_3	226	Magnesium, Mg	90
Carbonate, CO_3		Iron (total), Fe	33.4
Fluoride, F	2.0	Silica, SiO_2	73

ANALYLIS - ADDITIONAL (mg/l)

ANALYSED BY: G. Johnston Date 17/4/79

REMARKS: The total dissolved solids, iron and fluoride all exceed the 1971 W.H.O. International Standards for drinking Water. Unsuitable for human consumption. Suitable for Stock.

"Information or discussion on the analysis shown above, can be obtained by contacting the Senior Engineer, Water Quality, Water Recources Branch, Darwin".

90999—5/78 C. J. THOMPSON, Commonwealth Government Printer, Darwin

Regulation 8 N.T.A. 181

THE NORTHERN TERRITORY OF AUSTRALIA

Control of Waters Ordinance IN 2/282

FINAL STATEMENT OF BORE RN 12074

From	To	Description of Strata
0·00	24·00	BROWN STONE + SAND
24·00	30 m	BROWN STONE + CLAY
30·00	36 m	WHITE CLAY, STONE + SAND

Location of Bore (or supply sketch on back hereof) -

.....Miles

(a) N NE S SE E NW W SW of (b) ...(2 NW).....

.....,.....

(a) Circle appropriate direction.
(b) Use known point such as existing bore, homestead, outstation, etc.

Additional information of interest about the bore - Drilled Always with 7" Hammer Bit

Map No: 5047

Grid Reference: NAG 76 2 117

Samples of strata and water supplies
~~have been~~
will be *
left at the following trading place -

...W.T.B...OKHCO...A/K.....

.....R. Rose.....
Signature

* Strike out which does not apply.

For office use only -
PIPE PULLED HOLE BACK FILLED
RH 1-5-79

Name of Bore - RN12074 (2 NW)

Name of Property - AYERS Rock

Description of Property - N.P.

Name of Owner - NTBR

Name of Contractor - W-T-B

Name of Driller - R. Darby

Date of Commencement - 22/3/74

Date of Completion - 22/3/74

Total Depth - 39.m

Particulars of Casing - N/L

Particulars of Perforations or Screens - 2" G.W.P. To Bottom + Bottom 12 Holes ONLY Plugs

Water	1st Supply	2nd Supply	3rd Supply
Struck at	W/C 32m		
Standing Water Level	14.85m		
Pumping Supply: 4 g.p.m.	145		
Duration of Pump Test			
Water Level During Test			
Quality: Good, Fair, Bad	CONDUCT 3,500	WAST SAMPLE 3,900	

(4)

WATER ANALYSIS

Laboratory Register No. 79/0568

Date received in Laboratory 9.3.79

WR 4/1

Bottle No.	Time of sampling (hrs)	Date of sampling
Z0 30	1345	22.3.79

LOCATION AND DETAILS
Ayers Rock RN/12074 Depth: 39 m Disch: 1.0 lps Airlift

RSP. 88

ANALYSIS - PHYSICAL

pH	7.6	Colour (Hazen units)	
Specific conductance (microsiemens/cm at 25°C)	3580	Turbidty (A.P.H.A. units)	
Total dissolved solids (mg/l - by evaporation at 180°C)	2520	Suspended solids (mg/l)	

ANALYSIS - CHEMICAL (mg/l)

Total dissolved solids (by summation)	2582	Total alkalinity (as $CaCO_3$)	161
Sodium chloride (calc from chloride)	1002	Total hardness (as $CaCO_3$)	998
Chloride, Cl	608	Sodium, Na	393
Sulphate, SO_4	850	Patassium, K	63
Nitrate NO_3	65	Calcium, Ca	253
Bicarbonate, HCO_3	196	Magnesium, Mg	89
Carbonate, CO_3		Iron (total), Fe	unsuitable for determination
Fluoride, F	1.9	Silica, SiO_2	63

ANALYLIS - ADDITIONAL (mg/l)

ANALYSED BY: G.JOHNSTON Date 21/5/79

REMARKS:

WATER [illegible]
ALICE [illegible]
30 AUG 1979
DEPT. OF TRANSPORT & WORKS

"Information or discussion on the analysis shown above, can be obtained by contacting the Senior Engineer, Water Quality, Water Recources Branch, Darwin".

90999—5/78 C. J. THOMPSON, Commonwealth Government Printer, Darwin

WATER CONDUCTIVITY ANALYSIS.

BORE: REGISTERED NUMBER: 12074

LOCATION: Ayers Rock

DATE TESTED: 3-5-79 TESTED BY: R Boerger

BOTTLE No.	DATE	TIME	DEPTH	DISCHARGE	SAMPLER	CONDUCTIVITY
ZH 62	22-3-79	1430	34 M	1.0 l/sec	R. Derby	3700
ZH 96	22-3-79	1445	39 M	1.0 l/sec	"	3700

YULARA VILLAGE.WATER RESOURCES 60.6D

RN 12074
IN 2/282
5047 Mt Olga

Depth (m)			Description
0	-	6	SAND, Reddish brown, and gravel.
6	-	18	SAND, Light brown poorly sorted sand, minor clay.
18	-	30	CLAY & SAND, Reddish brown clay with sand
30	-	39	SILTSTONE, White sandy calcareous siltstone

SUMMARY

0	-	6	Sand and gravel	Tertiary
6	-	18	Sand	
18	-	30	Clay and sand	
30	-	39	Siltstone	

MAJOR AQUIFER

~~52m~~ 33.5 1.0 ls^{-1} Fractured siltstone.

Geoff Knott

GEOFF KNOTT
HYDROGEOLOGIST

October 1979

NTA 1718

DATE 22/3/74 BORE No. RN 12074 (2 NW) Driller: DAVEY

Time	Depth	Feet drilled	Mins lapsed	Drillers remark, casing details
1100				CHANGE HAMMER SUB & DRILL TO
				6m WITH HAMMER BIT ROLL
				OUT & RUN 9 7/8 ROLL TO 4.40m
				PULL OUT & RUN IN SURFACE CASING
1200	6m	6m		ADD D/C BROWN SAND & STONE.
1220	12m	6m		AS ABOVE
				ADD D/C
1235	18m	6m		BROWN STONE & SAND
				ADD D/P
1255	24m	6m		AS ABOVE
				ADD D/P
1320	30m	6m		BROWN STONE & CLAY
				ADD D/P
1345	36m	6m		WHITE CLAY & STONE & SAND W/C 32m 1L/S
				ADD D/P CONDUCTIVITY 3,500
1430	39m	3m		WITH CLAY PULL OUT 20.30 - 2H.96
				TOTAL DEPTH 39.00m 2A.47 - YL.62 CONDUCTIVITY 3,900
				PULL OUT & RUN 2" GWP.
				SWL 16.85m

BIT DATA No.	Size	Type	Worn cond'n
13648	9 7/8	RC	USED
39046	7"	30S	USED

STRING DATA Item	O.D.	Length	Prog. tally
HAMMER BIT			5.03
			1.75
D/C	4 1/2	5.73	7.48
D/P	4 1/2	6.01	13.49
D/P	4 1/2	6.00	19.49
D/P	4 1/2	6.00	25.49
D/P	4 1/2	6.00	31.49
D/P	4 1/2	6.00	43.49

MUD DATA

14702/69.... W. G. Murray, Government Printing Office, Canberra

DEPARTMENT OF TRANSPORT & WORKS
WATER INVESTIGATION UNIT
GEOPHYSICAL BORE LOG

R N : 12074 AREA: ~~ARYES~~ AYERS ROCK STATUS : INVESTIGATION

MAP REFERENCE : 5047 GRID CO ORDS : 982 – 117 AMG

ELEVATION : S. W. L. : 14·85 M

CASING DETAILS : NIL

DRILLER : W.I.U. \ AS DATE COMMENCED : 22-3-'79

DEPTH DRILLED : 39·00 M DATE COMPLETED : 22-3-'79

RADIOMETRIC LOG DATA

SERVICE : W.I.U. \ AS LOG TYPE : GAMMA DATE : 2\4\'79

RUN NO. : 4 SCALE : V : 1=100 H :

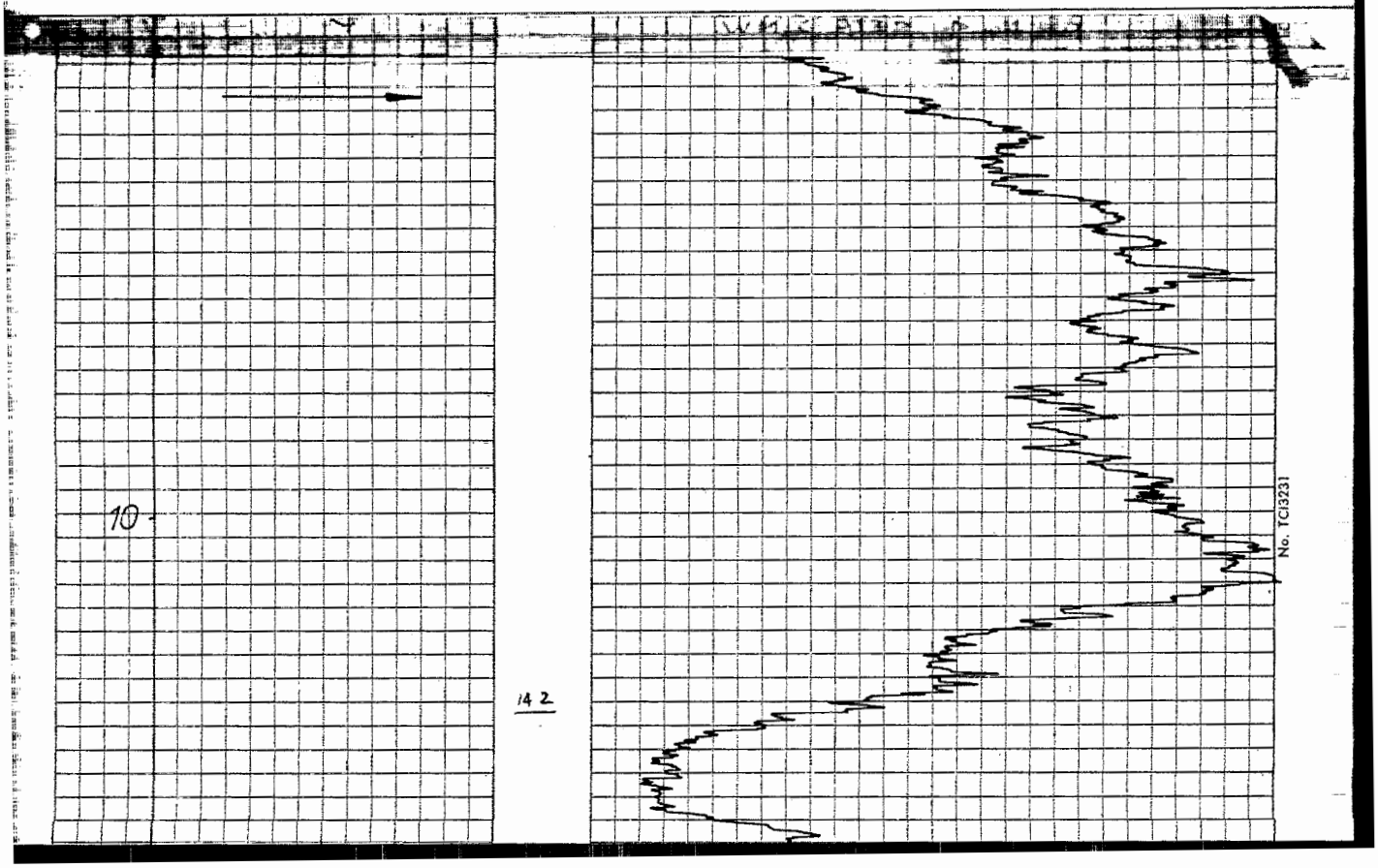
SENSITIVITY : RANGE : 4

TIME CONSTANT : 4 SPEED : 11 M/ MIN :

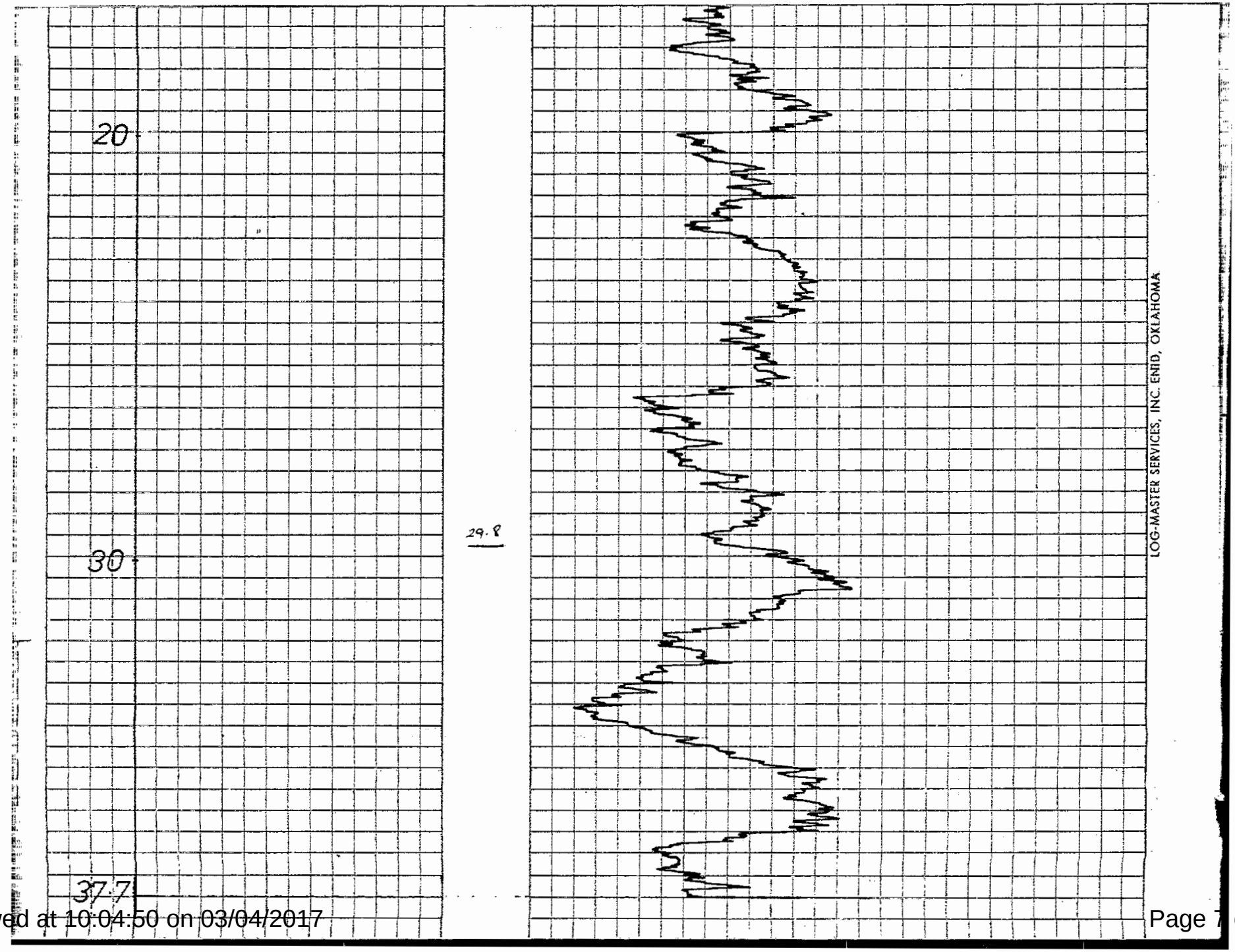
1st READING : 37·7 M INSTRUMENT : LM444B LMG 15

LAST READING : 1·10 M OBSERVER : R.P

INTERVAL : 36.6 M



DEPARTMENT OF TRANSPORT & WORKS



DEPARTMENT OF TRANSPORT & WORKS

WATER INVESTIGATION UNIT

GEOPHYSICAL BORE LOG

R.N 12074 AREA: ~~ARYES~~ AYERS ROCK

STATUS : INVESTIGATION

MAP REFERENCE : 5047

GRID CO ORDS : AMG 982 117

ELEVATION :

S. W. L. : 14·85 M

CASING DETAILS : NIL

DRILLER : W.I.U.\AS

DATE COMMENCED : 22-3-79

DEPTH DRILLED : 39 00 M.

DATE COMPLETED : 22-3-79

RADIOMETRIC LOG DATA

SERVICE : W.I.U.\AS

LOG TYPE : GAMMA

DATE : 2\4\79

RUN NO. : 2

SCALE : V : 1=100 H :

SENSITIVITY :

RANGE : 4

TIME CONSTANT : 4

SPEED : 16 M/ MIN :

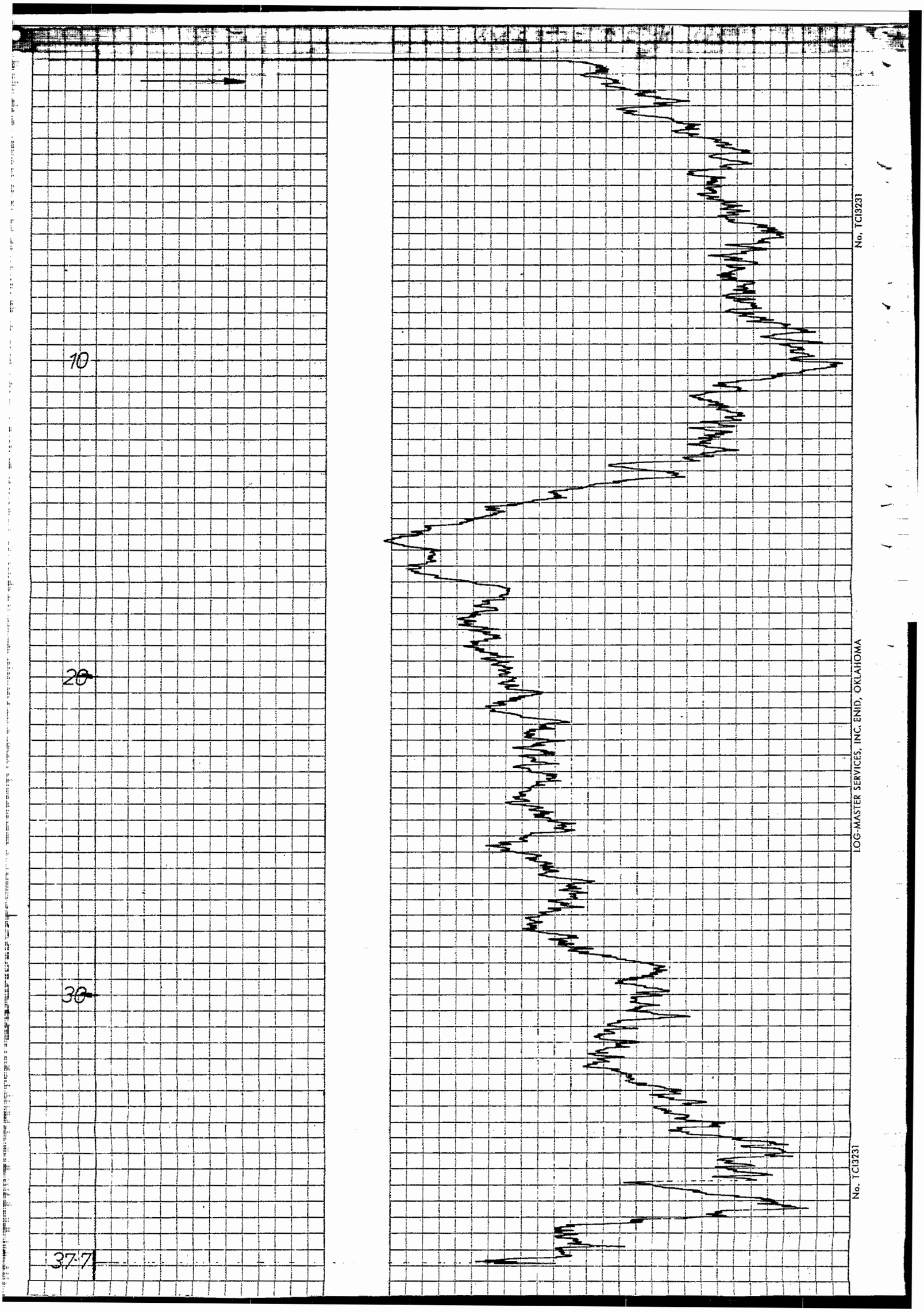
1st READING : 37·7 M

INSTRUMENT : LM. 444B LMG. 15

LAST READING : 1 10 M

OBSERVER : RP

INTERVAL : 36·6 M


10
20
30
37.7
No. TCI3231
LOG-MASTER SERVICES, INC. ENID, OKLAHOMA
No. TCI3231

Regulation 8

RN012074

N.T.A. 181

THE NORTHERN TERRITORY OF AUSTRALIA

Control of Waters Ordinance IN 2/282

FINAL STATEMENT OF BORE RN 12074

From	To	Description of Strata
0.00	24.00	BROWN STONE & SAND
24.00	30m	BROWN STONE & CLAY
30.00	76m	WHITE CLAY, STONE & SAND

Location of Bore (or supply sketch on back hereof) -

.....Miles

(a) N NE S SE E NW W SW of (b) ...(2 N.W).....

(a) Circle appropriate direction.
(b) Use known point such as existing bore, homestead, outstation, etc.

Additional information of interest about the bore - Pavilion shown with 7" Hammer Bit

Map No: 5047

Grid Reference: ANG 152 117

Samples of strata and water supplies
~~have been~~ *
will be *
left at the following trading place -

...W.T.B....OK.Hico....A/S.....

.....R Rose.....
Signature

* Strike out which does not apply.

For office use only -

Name of Bore - RN12074 (2NW)

Name of Property - Ayers Rock

Description of Property - N.A.

Name of Owner - NTRB

Name of Contractor - W.T.B

Name of Driller - R. Dodby

Date of Commencement - 22/3/74

Date of Completion - 22/3/74

Total Depth - 39.m

Particulars of Casing - Nil

Particulars of Perforations or Screens - 2" G.W.P. To Bottom + Bottom Length Oxy Pe

Water	1st Supply	2nd Supply	3rd Supply
Struck at	W/C 32m		
Standing Water Level	14.85m		
Pumping Supply: ~~C.B.A.~~ 4/8	14/5		
Duration of Pump Test			
Water Level During Test			
Quality: Good, Fair, Bad	CONDUCT 3,500	LAST SAMPLE 3,900	

WATER ANALYSIS

2/282

WR 4/1

Laboratory Register No.	Bottle No.	Time of sampling (hrs)	Date of sampling
79/0568	ZO 30	1345	22.3.79

Date received in Laboratory: 9.5.79

LOCATION AND DETAILS
Ayers Rock, RN/12074 Depth: 39 m. Disch: 1 lps. Airlift RSP. 88

Sampler: R. Darby

ANALYSIS - PHYSICAL

pH	7.6	Colour (Hazen units)	
Specific conductance (microsiemens/cm at 25°C)	3580	Turbidty (A.P.H.A. units)	
Total dissolved solids (mg/l - by evaporation at 180°C)	2520	Suspended solids (mg/l)	

ANALYSIS - CHEMICAL (mg/l)

Total dissolved solids (by summation)	2582	Total alkalinity (as $CaCO_3$)	161
Sodium chloride (calc from chloride)	1002	Total hardness (as $CaCO_3$)	998
Chloride, Cl	608	Sodium, Na	393
Sulphate, SO_4	850	Patassium, K	63
Nitrate NO_3	65	Calcium, Ca	253
Bicarbonate, HCO_3	196	Magnesium, Mg	89
Carbonate, CO_3		Iron (total), Fe	N.D.
Fluoride, F	1.9	Silica, SiO_2	63

ANALYLIS - ADDITIONAL (mg/l)

ANALYSED BY: Holger Henkel Date 21/5/79

REMARKS: The sample as analysed is chemically unsuitable for human consumption according to 1971 W.H.O. International Standards for drinking water as the Total Dissolved Solids exceed the maximum permissible level. Suitable for Stock.

"Information or discussion on the analysis shown above, can be obtained by contacting the Senior Engineer, Water Quality, Water Recources Branch, Darwin".

90999—5/78 C. J. THOMPSON, Commonwealth Government Printer, Darwin

Viewed at 15:08:46 on 25/08/2016

RN012081

Uluru Water Quality - Field Parameters

SAMPLE No.	DATE SAMPLED	WATER WELL No.	GPS POSITION			PUMP TYPE	TPS PARAMETERS					Colorim.
			Datum	South	East		Dis.Ox. (mg/L)	E.C. (uS/cm)	pH	Redox (mV)	Temp (Deg.C)	NO_3^- (mg/L)
UL98/1	18/08/98	RN 12161	AGD 66	25 13' 14"	131 01' 40"	Grundfos	-	3060	7.18	-40	27.2	72
UL98/2	19/08/98	RN 12066	AGD 66	25 13' 42"	130 57' 54"	Grundfos	5.30	2517	6.92	-6	26.2	122
UL98/3	19/08/98	RN 12081	AGD 66	25 12' 16"	130 58' 24"	Grundfos	4.83	4200	6.95	90	27.3	38
UL98/4	19/08/98	RN 12164	AGD 66	25 13' 43"	130 58' 54"	Grundfos	6.05	4430	7.19	-51	27.2	52
UL98/5	20/08/98	RN 12058	AGD 66	25 16' 39"	130 55' 41"	Grundfos	5.19	2442	6.97	50	26.1	77
UL98/6	20/08/98	RN 10693	AGD 66	25 16' 56"	130 56' 23"	Grundfos	3.62	2435	6.97	-125	26.0	77
UL98/7	20/08/98	RN 13363	AGD 66	25 13' 45"	130 58' 18"	Grundfos	5.29	2959	7.01	90	26.3	-
UL98/8	21/08/98	RN 12453	AGD 66	25 15' 24"	130 56' 52"	Grundfos	2.30	2090	7.24	-10	25.7	120
UL98/9	21/08/98	RN 12454	AGD 66	25 15' 03"	130 57' 00"	Grundfos	0.85	2280	7.16	49	25.6	26
UL98/10	21/08/98	RN 10689	AGD 66	25 17' 23"	130 54' 24"	Grundfos	4.05	2637	6.96	-11	26.4	60
UL98/11	21/08/98	RN 12453	AGD 66	25 15' 24"	130 56' 52"	Grundfos	2.30	2090	7.24	-10	25.7	120
UL98/12	21/08/98	RN 12453	AGD 66	25 15' 24"	130 56' 52"	Grundfos	2.30	2090	7.24	-10	25.7	120
UL98/13	23/08/98	RN 11547	AGD 66	25 12' 37"	131 00' 55"	Grundfos	6.57	1284	7.19	29	26.5	71
UL98/14	24/08/98	RN 11541	AGD 66	25 22' 14"	131 01' 22"	Grundfos	0.48	2500	6.92	-91	26.6	-
UL98/15	24/08/98	RN 16195	AGD 66	25 21' 28"	131 02' 40"	Grundfos	2.30	1320	7.00	6	27.2	21
UL98/16	24/08/98	RN 11605	AGD 66	25 22' 11"	131 02' 41"	Grundfos	5.70	1185	7.00	73	26.5	53
UL98/17	25/08/98	RN 6380	AGD 66	25 21' 47"	131 02' 50"	Grundfos	1.00	2491	7.03	-168	26.9	Lo
UL98/18	26/08/98	RN 11545	AGD 66	25 21' 49"	131 01' 04"	Grundfos	3.30	1348	7.21	133	26.6	80
UL98/19	26/08/98	RN 11545	AGD 66	25 21' 49"	131 01' 04"	Grundfos	3.30	1348	7.21	133	26.6	80
UL98/20	26/08/98	RN 11545	AGD 66	25 21' 49"	131 01' 04"	Grundfos	3.30	1348	7.21	133	26.6	80
UL98/21	26/08/98	RN 11551	AGD 66	25 21' 42"	131 01' 22"	Grundfos	2.54	1060	7.29	111	27.0	71
UL98/22	26/08/98	RN 10 692	AGD 66	25 16' 10	130 58' 37"	Grundfos	2.80	4000	7.17	-36	27.0	47

Bore Report RN012081

Uluru Water Quality Chemical Data

Sample No.	RN 12161 UL98/1 980105	RN 12066 UL98/2 980106	RN 12081 UL98/3 980107	RN 12164 UL98/4 980108	RN 12058 UL98/5 980109	RN 10693 UL98/6 980110	RN 13363 UL98/7 980111
Sampling Date: 1998	18-Aug	19-Aug	19-Aug	19-Aug	20-Aug	20-Aug	20-Aug
Temp	27.2	26.2	27.3	27.2	26.1	26	26.3
pH	7.18	6.92	6.95	7.19	6.97	6.97	7.01
Total Dissolved Solids mg/L	1880	1610	2850	2680	1620	1600	2020
Electric Conductance mS/cm	3060	2517	4200	4430	2442	2435	2959
Dissolved Oxygen mg/L as O_2	-	5.3	4.83	6.05	5.19	3.62	5.29
Nitrate mg/L as N	72	122	38	52	77	77	69
Fluoride mg/L as F	1.2	0.83	0.95	1.2	0.98	0.95	1.1
T. Alkalinity mg/L as $CaCO_3$	173.75	158.75	188.75	212.5	180	182.5	187.5
Chloride mg/L as Cl	508	432	713	811	420	424	543
T. Hardness mg/L as $CaCO_3$	564.1	546.2	973.4	728.9	603	580.9	704.3
Sulphate mg/L as SO_4	454	331	763	618	364	358	496
Calcium mg/L as Ca	137	116	215	142	130	120	160
Magnesium mg/L as Mg	53.9	62.3	106	90.9	67.6	68.3	74
Sodium mg/L as Na	380	279	497	593	263	271	371
Potassium mg/L as K	46	46.6	65.3	73.4	36.6	38.1	48.1
T. Iron mg/L as Fe	0.028	0.064	0.015	0.022	0.034	0.128	0.022
Manganese mg/L as Mn	0.044	0.031	0.062	<.005	0.006	0.112	0.007
Selenium mg/L as Se	2	3.9	3.1	3.6	2.6	2.5	3
Zinc mg/L as Zn	0.093	0.08	0.086	0.088	0.161	0.106	0.13
Copper mg/L as Cu	<.005	<.005	<.005	<.005	<.005	0.006	<.005
Aluminium mg/L as Al	<.005	<.005	<.005	<.005	<.005	<.005	<.005
Uranium ^{238} mg/L	2.5	1.1	2.5	3.2	1.6	1.7	2
Bromide mg/L as Br	1.92	2.44	3.49	4.12	1.92	1.94	2.68
Gross Alpha Conc. Bq/L	<.05	<.04	0.12	0.2	<.05	<.03	<.05
Gross Beta Conc. Bq/L	1.08	1.21	1.86	2.09	0.96	1.1	1.28
Silicon mg/L as Si	37.7	35.5	36.9	34.6	35.5	36.4	39
Sulphur mg/L as S	155	107	292	221	122	122	175
Iodide mg/L as I	-	-	-	-	-	-	-
Boron mg/L as B	0.701	0.82	1.13	0.7	0.999	0.698	0.823
Barium mg/L as Ba	0.02	0.021	0.038	0.025	0.02	0.049	0.021
Strontium mg/L as Sr	1.22	1.34	1.65	1.2	2.06	1.19	1.38
Arsenic mg/L	0.5	0.2	0.3	0.4	0.2	0.3	0.3
Tritium Activity (T unit + error)	<0.4	<0.3	<0.4	<0.4	<0.4	<0.3+/- 0.2	<0.3+/- 0.2
Oxygen as ^{18}O ‰ SMOW	-6.18	-5.76	-5.8	-5.71	-5.91	-6.04	-5.91
Deuterium as D ‰ SMOW	-46.8	-43.8	-44.6	-44.8	-45.3	-44.3	-43.6

RN 12081

JOB # 9874

Sample #	Code #	$\delta^{13}C$	^{14}C	^{16}C	R.N.
UL98//1	cs 1653	-8.2	29.7 ± 1.0	9750 ± 270	12161
UL98//2	cs 1654	-7.3	27.7 ± 1.0	10330 + 290 - 280	12060
UL98//3	cs 1655	-8.6	19.1 ± 1.5	13320 + 680 - 630	12081
UL98//4	cs 1660	-9.3	31.7 ± 1.0	9240 ± 250	12164
UL98//5	cs 1664	-9.2	33.2 ± 1.0	8860 ± 240	12058
UL98//6	cs 1665	-9.5	41.5 ± 1.0	7060 ± 200	10693
UL98//7	cs 1666	-8.6	23.9 ± 0.9	11510 ± 300	13363
UL98//8	cs 1667	-6.9	24.2 ± 0.9	11410 ± 300	12453
UL98//9	cs 1668	-9.2	Background <2 % MC	> 30000	12454
UL98//10	cs 1669	-8.9	33.2 ± 0.9	8860 ± 200	10689
UL98//13	cs 1670	-11.5	93.5 ± 1.3	540 ± 120	11547
UL98//14	cs 1671	-10.6	Background <2 % MC	> 30000	11541
UL98//15	cs 1672	-9.1	25.8 ± 0.9	10880 ± 290	16195
UL98//16	cs 1673	-8.6	39.1 ± 1.0	7550 ± 200	11605
UL98//17	cs 1674	-9.9	Background <2 % MC	> 30000	6380
UL98//18	cs 1677	-8.8	28.1 ± 0.9	10210 ± 250	11545
UL98//21	cs 1679	-7.9	40.6 ± 1.7	7240 + 350 - 330	11551
UL98//22	cs 1680	-9.5	36.1 ± 1.0	8200 ± 230	10692

Please note that the age given assumes that there is no interaction between water and the rock matrix and assumes that the C-14 activity of the DIC in the groundwater is 100 PMC when recharged.

A surcharge of $100 per sample is charged for providing ages assuming different hydrochemical evolutionary paths for the groundwater. Please contact me if this service is required.

002 ENVGEO & GWATER AGSO 03/05 '99 MON 15:56 FAX +61 2 6249 9970

Viewed at 15:08:46 on 25/08/2016

Bore Report RN012081

'raw' time based on radioactive decay equation

Uluru

REG N°	12126	12066	[redacted]	12164	12058	10693	13363	12453	12454
Sample No.	UL98/1	UL98/2	UL98/3	UL98/4	UL98/5	UL98/6	UL98/7	UL98/8	UL98/9
Date: 1998	18-Aug	19-Aug	19-Aug	19-Aug	20-Aug	20-Aug	20-Aug	21-Aug	21-Aug
$\delta^{13}C$ (‰ PDB)	-8.2	-7.3	-8.6	-9.3	-9.2	-9.5	-8.6	-6.9	-9.2
^{14}C (pMC+/-σ)	29.7 +/-1.0	27.7 +/- 1.0	19.1 +/- 1.5	31.7 +/- 1.0	33.2 +/- 1.0	41.5 +/- 1.0	23.9 +/- 0.9	24.2 +/- 0.9	Background <2 % MC
^{14}C (yrBP+/-1σ)	9750 +/- 270	10330 +290 -280	13320 +680 -630	9240+/-250	8860 +/- 240	7060 +/- 200	11510 +/- 300	11410 +/- 300	>30000
36Cl/Cl (x10-15)	90	156	132	152	121	116	112	146	152
36Cl (x106)	777	1145	1599	2094	863	835	1033	823	1105

(x 10^6 atoms/L)

REG N°	10689	11547	11541	16195	11605	6380	11545	11551	10692
Sample No.	UL98/10	UL98/13	UL98/14	UL98/15	UL98/16	UL98/17	UL98/18	UL98/21	UL98/22
Date: 1998	21-Aug	23-Aug	24-Aug	24-Aug	24-Aug	25-Aug	26-Aug	26-Aug	26-Aug
$\delta^{13}C$ (‰ PDB)	-8.9	-11.5	-10.6	-9.1	-8.6	-9.9	-8.8	-7.9	-9.5
^{14}C (pMC+/-σ)	33.2 +/- 0.9	93.5 +/- 1.3	Background <2 % MC	25.8 +/- 0.9	39.1 +/- 1.0	Background <2 % MC	28.1 +/- 0.9	40.6 +/- 1.7	36.1 +/- 1.0
^{14}C (yrBP+/-1σ)	8860 +/- 200	540 +/- 120	>30000	10880 +/- 290	7550 +/- 200	>30000	10210 +/- 250	7240 +350 -330	8200 +/- 230
36Cl/Cl (x10-15)	113	335	113	129	130	80	169	160	137
36Cl (x106)	919	564	802	370	238	537	373	204	1696

RN 12081

preliminary, statistical errors to be supplied.

Regulation 8

N.T.A. 181

THE NORTHERN TERRITORY OF AUSTRALIA

Control of Water Ordinance

IN. 2/289

RN 12081

WELL STARTING OF BORE

From	To	Description of Strata
0.00	6.00	BROWN STONE.
6.00	12.00	BROWN & LIGHT BROWN STONE
12.00	18.00	LIGHT BROWN & SANDY STONE
18.00	33.00	LIGHT BROWN CLAY & STONE
33.00	43.00	BROWN STONE.
43.00	48.00	BROWN CLAY & STONE.
48.00	68.00	BROWN SANDY STONE
68.00	90.00	GREY & BROWN STONE & CLAY FALLING IN

Location of Bore (or supply sketch on back hereof) -

.....Miles

(a) N NE S SE E NW W SW of (b) ...(3NNW.).....

(a) Circle appropriate direction.
(b) Use known point such as existing bore, homestead, outstation, etc.

Additional information of interest about the bore - TOP WATER CASED OFF TO 43.46m. Drill TO 43.00m WITH 7" BUTT BIT. From 43.00m TO 86.00 (43.19) 5½ BUTT BIT. From 86.00 TO 89.00m 5½ BLADE BIT

Map No: AMG Sheet

Grid Reference: 990 89.

Samples of strata and water supplies
~~have been~~ *
will be *
left at the following trading place -

W.R.B. OFFICE A/S

R Bonney
Signature

* Strike out which does not apply.

For office use only -
Bore not certified 12.8.79 PR

1D82.80

Name of Bore - RN 12081 (3NNW)

Name of Property - Ayers Rock

Description of Property - N.P.

Name of Owner - N.T.R.B.

Name of Contractor - W.R.B

Name of Driller - R Bonney

Date of Commencement - 29/3/79

Date of Completion - 30/3/79

Total Depth - ~~Original~~ 93.00m

Particulars of Casing - 43.46 x 6" Blank casing

Particulars of Perforations or Screens - Nil

Water	1st Supply	2nd Supply	3rd Supply
Struck at	~~46.29~~ seepage	W/L (20.45) ~~20.45~~	~~43.00~~
Standing ~~Water level~~ 5 ¼ls"	~~56.43~~ ~~66.09~~ 3,500 ppm ½l/s	75.25m 3900 ppm 2l/s	78.83m 3700 ppm 2l/s
Pumping Supply: ~~G.P.M.~~ l/s		½ l/s	~~1/2 l/s~~
~~Duration of~~ Pump Test	S.W.L	46-65m	
Water Level During Test			
Quality: Good, Fair, Bad		CONDUCT 3,500 ppm	CONDUCT 3,500 ppm

	AQUIFERS	20.29	29.45	56.93	66.09	75.25	79.83	FINAL
	seepage		½ l/s	< ¼ l/s	1.0	1.0	2.0	4.0.

Cased off

WATER ANALYSIS

Department of Transport & Works
Water Division, Darwin N.T.

WR 4/1A

Laboratory Register No.	Bottle No.	Time of sampling	Date of sampling
84/85/1759	PQ73	1630	17/4/85

Date received in Laboratory: 3/5/85

LOCATION AND DETAILS
AYERS ROCK 6" BORE RN 12081 DEPTH 28m DISCH 0.5LPS WRA6019

RSP1259

Proposed water use:- Domestic, Stock, Irrigation, other (specify)

ANALYSIS — PHYSICAL

☐ pH	7.7	☐ Colour (Hazen units)	
☐ Specific conductance (microsiemens/cm at 25° C)	3710	☐ Turbidity (NTU's)	
☒ Total dissolved solids (mg/L - by evaporation at 180° C)	2470	☐ Suspended solids (mg/L)	

ANALYSIS — CHEMICAL (mg/L)

☐ Sodium, Na	492	☒ Chloride, Cl	690
☐ Potassium, K	57	☒ Sulphate, SO_4	672
☐ Calcium, Ca	166	☒ Nitrate, NO_3	55
☐ Magnesium, Mg	87	☐ Bicarbonate, HCO_3	243
☒ Total Hardness (as $CaCO_3$)	772	☐ Carbonate, CO_3	
☐ Total Alkalinity (as $CaCO_3$)	199	☐ Fluoride, F	0.8
☐ Iron, (total) Fe	0.3	☐ Orthosphosphate, PO_4	
☐ Silica, SiO_2	84	☒ NaCl (calc. from chloride)	1142

ANALYSIS — ADDITIONAL (mg/L)

☐ Copper, Cu	☐ Lead, Pb	☐ Arsenic, As
☐ Manganese, Mn	☐ Zinc, Zn	☐ Cadmium, Cd
☐	☐	☐

THE SAMPLE AS ANALYSED ~~COMPLIES~~/DOES NOT COMPLY WITH NORTHERN TERRITORY DRINKING WATER STANDARDS AS RECOMMENDED BY THE NORTHERN TERRITORY DEPARTMENT OF HEALTH.

This Laboratory is registered by the National Association of Testing Authorities, Australia. The test(s) reported herein have been performed in accordance with its terms of registration. This document shall not be reproduced except in full.

Analysed By: J. COOK Date 15 / 5 85

Boxes marked thus ☒ indicate levels considered undesirable for drinking water by the Northern Territory Department of Health.

4278.846

G. L. DUFFIELD, Government Printer of the Northern Territory

BORE SAMPLING DETAILS

R.N. : 12081

LOCATION OF BORE : A/Rock

TEMP 26°C

BORE NAME :

TOTAL DEPTH : 88.99

Time

SAMPLES 1630

S.W.L. : 14

DATE : 17·4·85

DETAILS OF CASING : 6" 43.66 CASING.

LITRES PER METRE : 16

DETAILS OF PUMPING : PUMPED FOR 150 mins @ ½ l/s

PUMP SET 28 MTRS

TYPE OF PUMP TO BE USED : SUB

COMMENTS :

SAMPLES

PQ73 ✓

PJ53

WATER ANALYSIS

Department of Transport & Works
Water Division, Darwin NT

WR 4/1

Laboratory Register No: 80/0065

Date received in Laboratory: 10.1.80

Bottle No	Time of Sampling	Date of Sampling
ZN 88	1515	14.12.79

LOCATION AND DETAILS
Ayers Rock - RN 12081 - Disch: 1.2 lps Tap RSP. 88

Proposed water use:-Domestic, Stock, Irrigation, other (specify)

ANALYSIS – PHYSICAL

☐ pH	7.5	☐ Colour (Hazen units)	
☐ Specific conductance (microsiemens/cm at 25° C)	3760	☐ Turbidity (NTU's)	
☒ Total dissolved solids (mg/l - by evaporation at 180° C)	2520	☐ Suspended solids (mg /l)	

ANALYSIS – CHEMICAL (mg/l)

☐ Sodium, Na	477	☒ Chloride, Cl	711
☐ Potassium, K	79	☒ Sulphate, SO_4	665
☐ Calcium, Ca	188	☒ Nitrate, NO_3	59
☐ Magnesium, Mg	92	☐ Bicarbonate, HCO_3	238
☒ Total Hardness (as $CaCO_3$)	847	☐ Carbonate, CO_3	
☐ Total Alkalinity (as $CaCO_3$)	195	☐ Fluoride, F	1.5
☐ Iron, (total) Fe	0.3	☐ Orthophosphate, PO_4	
☐ Silica, SiO_2	84	☐ NaCl (calc. from chloride)	1172

ANALYSIS – ADDITIONAL (mg/l)

☐ Copper, Cu	☐ Lead, Pb	☐ Arsenic, As
☐ Maganese, Mn	☐ Zinc, Zn	☐ Cadmium, Cd

Analysed By: H. HENKEL

WATER INVESTIGATIONS UNIT
ALICE SPRINGS
21 JAN 1980
DEPT. OF TRANSPORT & WORKS

Date 17/ 1 / 80

REMARKS

The sample as analysed is considered suitable for:–

Drinking water – ~~YES~~/NO
Irrigation – YES/NO
Stock watering – YES/~~NO~~
Other (specify) – YES/NO

Boxes marked thus ☒ indicate levels considered undesirable for drinking water by the Northern Territory Department of Health.

Note:– Advice and Water quality information can be obtained by contacting the Senior Engineer Water Quality, Darwin Phone 89 6072.

15303/79
A.B. CAUDELL, Government Printer of the Northern Territory.

WATER ANALYSIS

		Laboratory Register No.	79/0573
		Date received in Laboratory	9.5.79
WR 4/1	Bottle No. YK 35	Time of sampling (hrs) 0915	Date of sampling 31.3.79

LOCATION AND DETAILS

Ayers Rock - RN/12081 Depth: 93 m. Disch: 4.0 lps. Airlift RSP. 88

Sampler: Darby

ANALYSIS - PHYSICAL

pH	7.9	Colour (Hazen units)	
Specific conductance (microsiemens/cm at 25°C)	3770	Turbidty (A.P.H.A. units)	
Total dissolved solids (mg/l - by evaporation at 180°C)	2580	Suspended solids (mg/l)	

ANALYSIS - CHEMICAL (mg/l)

Total dissolved solids (by summation)	2558	Total alkalinity (as $CaCO_3$)	179
Sodium chloride (calc from chloride)	1195	Total hardness (as $CaCO_3$)	784
Chloride, Cl	725	Sodium, Na	480
Sulphate, SO_4	670	Patassium, K	75
Nitrate NO_3	62	Calcium, Ca	166
Bicarbonate, HCO_3	218	Magnesium, Mg	90
Carbonate, CO_3		Iron (total), Fe	1.2
Fluoride, F	1.5	Silica, SiO_2	70

ANALYLIS - ADDITIONAL (mg/l)

ANALYSED BY: Holger Henkel Date 30 / 5 / 79

REMARKS:

The sample as analysed is chemically unsuitable for human consumption according to 1971 W.H.O. International Standards for drinking water as the total dissolved solids exceed the maximum permissible level. suitable for stock.

"Information or discussion on the analysis shown above, can be obtained by contacting the Senior Engineer, Water Quality, Water Recources Branch, Darwin".

90999—5/78 C. J. THOMPSON, Commonwealth Government Printer, Darwin

WATER CONDUCTIVITY ANALYSIS.

BORE: REGISTERED NUMBER: 12081

LOCATION: Ayers Rock

DATE TESTED: 3-5-79 TESTED BY: R. Boerger

BOTTLE No.	DATE	TIME	DEPTH	DISCHARGE	SAMPLER	CONDUCTIVITY
ZN 69	29-3-79	1545	28 M	½ l/sec	R. Darby	3800
YU 71	"	1600	33 M	½ l/sec	"	3800
ZQ 79	30-3-79	0820	43 M	½ l/sec	"	3600
ZQ 36	"	1315	58 M	¼ l/sec	"	4000
ZD 18	"	1410	68 M	1.0 l/sec	"	4000
ZN 72	"	1445	78 M	2.0 l/sec	"	3900
ZH 98	"	1530	83 M	4.0 l/sec	"	4000
ZK 09	31-3-79	0915	93 M	4.0 l/sec	"	4000

YULARA VILLAGE WATER RESOURCES 60.6D

RN 12081
IN 2/289
5047 Mt Olga

Depth (m)			Description
0	-	3	SAND. Dark reddish brown, with minor silt.
3	-	20	SAND. Light brown poorly sorted well rounded sand with silt.
20	-	58	CLAY & SAND. Brown clay with sand. Minor carbonaceous material from 30 to 33m.
58	-	75	SANDSTONE. Poorly sorted angular sand.
75	-	93	SILTSTONE. White siltstone with sand.

SUMMARY

0	-	3	Sand	Tertiary
3	-	20	Sand	
20	-	58	Clay and sand	
58	-	75	Sandstone	
75	-	93	Siltstone	

MAJOR AQUIFERS

66.09 [illegible]m 1.0 ls^{-1} Sandstone
75.25 [illegible]m 1.0 ls^{-1} [illegible]
79.88 [illegible]m 2.0 ls^{-1} Fractured Siltstone

Geoff Knott.

GEOFF KNOTT
HYDROGEOLOGIST

October 1979

Viewed at 15:08:46 on 25/08/2016

Bore Report RN012081

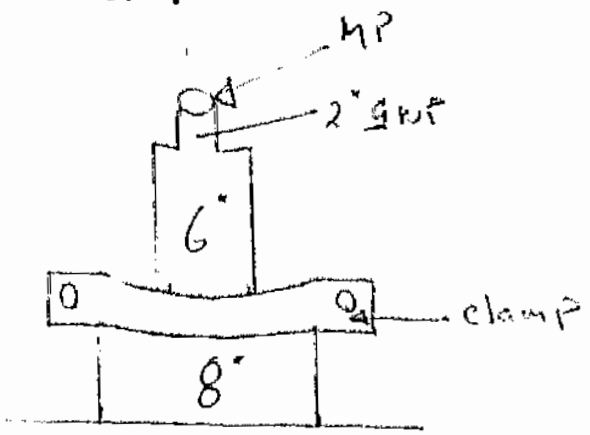
RG SURVEY INFORMATION

BORE NAME _____ R.N. 12081. LOCALITY YALARA

VERTICAL Datum AHD. Level Book 32/22. P19. Date 15-1-82.

Point	R. L.	Remarks
GL.	495·40	
top of 8"	495·933	
MP. 2" brass.	496·218	

Bore sketch



Locality sketch

HORIZONTAL

Co-ordinates Easting	Co-ordinates Northing	Grid	Field Book	Remarks

BENCHMARK Name 12081.

R.N. 12081.

R.L. 496·140

Particulars Deck Spike in Desert Oak.

NTA 1718

DATE 24/3/79 BORE No. RN12081 (3NNW) Driller: DOOLEY

Time	Depth	Feet drilled	Mins lapsed	Drillers remark, casing details	BIT DATA No.	Size	Type	Worn cond'n	STRING DATA Item	O.D.	Length	Prog. tally	MUD DATA
				TO BOGEY TO GET INTO 12080									KELLY 6.80 + 1.75 = 8.55
1330				MOVE TO RN81 + SET UP. DRILL TO			BOOT						
				6m WITH 7" HAMMER + RSEM		7"	[illegible]	USED					
				TO 4.0m WITH 9⅞ Roll o/ALL		9⅞	ROLLER	USED	HAMMER BIT + SUB				
				LENGTH OF 8" 4.60m								1.75	
1440	6m	6m		BROWN STONE									8.55
				AND D/C					D/C	4½	5.77	2.68	
1500	12m	6m		BROWN & LIGHT BROWN STONE									14.28
				AND D/C					D/C	4½	6.01	13.49	
1510	18m	6m		LIGHT BROWN SANDY STONE (SEE PACKET)									20.29
				AND D/P					D/P	4½	4.58	14.07	
1530	23m	5m		LIGHT BROWN clay STONE									23.87
				AND D/P					D/P	4½	4.58	22.65	
1545	28m	5m		AS ABOVE : W/C ½L/S 3,500 PPM									30.45
				AND D/P ZN69 - ZQ.29					D/P	4½	4.58	27.23	
1600	33m	5m		AS ABOVE									34.03
				PULL UP ZQ.33 - YU.71		½L/S	3,500PPM						

14702/69....

W. G. Murray, Government Printing Office, Canberra

NTA 1718

DATE 30/3/79 BORE No. RN12081 3RNW Driller: DARBY

Time	Depth	~~Feet~~ drilled	Mins lapsed	Drillers remark, casing details	BIT DATA No.	Size	Type	Worn cond'n	STRING DATA Item	O.D.	Length	Prog. tally	MUD DATA
0730	33m	✓		COMM Drilling								27·23	34·03
				ADD D/P		7"	BUTT	USED	D/P	4½	4·58	31·41	
0805	38m	5m		BROWN STONE									38 61
				ADD D/P					D/P	4½	4·58	36·39	
820	43m	5m		AS ABOVE									43·19
				PULL OUT & CASE OFF TOB WATER									
				THEN RUN IN & DRILL ON WITH 5½ HAMMER BIT									
				KS-½ DB-4315 "WH" NEW									
				6" CASING all BLANK 34421									
				5·52 x SHOE									
				6·28 11·58 LAST SAMPLE BEFORE RUNNING CASING 3,500 RPM									
				5·92 17·50 ZR·79 - ZN·78 ½ 45									
				5·70 23·20									
				5·65 28·85									
				6·21 35·06 [redacted]									
				[redacted]									
				6·40 41·46									
				5·50 46·96 CUTOFF 3·50m TOTAL 43·46m									

14702/69....

W. G. Murray, Government Printing Office, Canberra

NTA 1718

DATE 20/3/79 BORE No. RN 12081 3NNW Driller: JAMES

Time	Depth	Met drilled	Mins lapsed	Drillers remark, casing details	BIT DATA No.	Size	Type	Worn cond'n	STRING DATA Item	O.D.	Length	Prog. tally	MUD DATA		
1200	43			RUN IN COLLARS & RODS & BLOWHOLE	39420	5½	BUT	HGW	HAMMER		BIT	1·30			
				DRY.								36·39	-·45		43·19
1205				ADD D/P					D/P	4½	4·58	[redacted]	40·97		
1220	48m	5m		BROWN CLAY & STONE											47·77
				ADD D/P					D/P	4½	4·58	[redacted]	45·55		
1255	53m	5m		BROWN SANDY STONE											52·35
				ADD D/P					D/P	4½	4·58	[redacted]	50·13		
1315	58m	5m		AS ABOVE SOME CLAY	SEIZED	LESS THAN	¼	4/5	3,500 RPM			24·5-28·36			56·93
				ADD D/P					D/P	4½	4·58	[redacted]	54·71		
1340	63m	5m		AS ABOVE SOME CLAY											67·51
				ADD D/P					D/P	4½	4·58	[redacted]	59·29		
1410	68m	5m		BROWN SANDY STONE INCREASE TO	1	4/5	3,500	RPM		28·68-28·18					66·09
				ADD D/P					D/P	4½	4·58	[redacted]	[redacted]		
1425	73m	5m		CLAY & BROWN STONE & CLAY								63·87			70·67
				ADD D/P					D/P	4½	4·58	[redacted]	68·65		
1445	78m	5m		AS ABOVE INCREASE TO	2	4/5	3,900	RPM		24·72-27·10					75·25
				ADD D/P					D/P	4½	4·58	[redacted]	73·03		
1530	83m	5m		AS ABOVE INCREASE TO	4	4/5	3,700	RPM							79·83
				ADD D/P					D/P	4½	4·58	[redacted]	77·61		
1550	88m	5m		CLAY & BROWN STONE + CLAY											84·41
				MUD D/P					D/P	4½	4·58	[redacted]	82·19	KELLY	
1630	90m	2m		AS ABOVE							TOTAL	88·99			88·99
				PULL UP. [redacted]											

14702/69.... W. G. Murray, Government Printing Office, Canberra

NTA 1718

DATE 31/3/74 BORE No. RN 12081 3NNW Driller: Dardy

Time	Depth	Feet drilled	Mins lapsed	Drillers remark, casing details	BIT DATA No.	Size	Type	Worn cond'n	STRING DATA Item	O.D.	Length	Prog. tally	MUD DATA
0730				CHANGE OVER TO 5½ RLADE BIT + DRILL ON TO 100.00m									
0915	93	93		CAVY CRUMBLY CHAN RALLIED IN POLL OUT & SHUT FINAL									

DEPARTMENT OF TRANSPORT & WORKS
WATER INVESTIGATION UNIT
GEOPHYSICAL BORE LOG

R.N. 12081 AREA AYERS ~~AYRES~~. ROCK. STATUS INVESTIGATION

MAP REFERENCE 5047 GRID CO ORDS : A.M.G. 990114

ELEVATION : S. W. L. : 14·65 M

CASING DETAILS : 43·46 M x 6 BLANK. CASING.

DRILLER : W.I.U./A.S. DATE COMMENCED : 29·3·79

DEPTH DRILLED : 88·99 M DATE COMPLETED : 30·3·79

RADIOMETRIC LOG DATA

SERVICE : W.I.U./A.S. LOG TYPE : GAMMA DATE : 2·4·79

RUN NO. : 1 SCALE : V : 1 : 100 H :

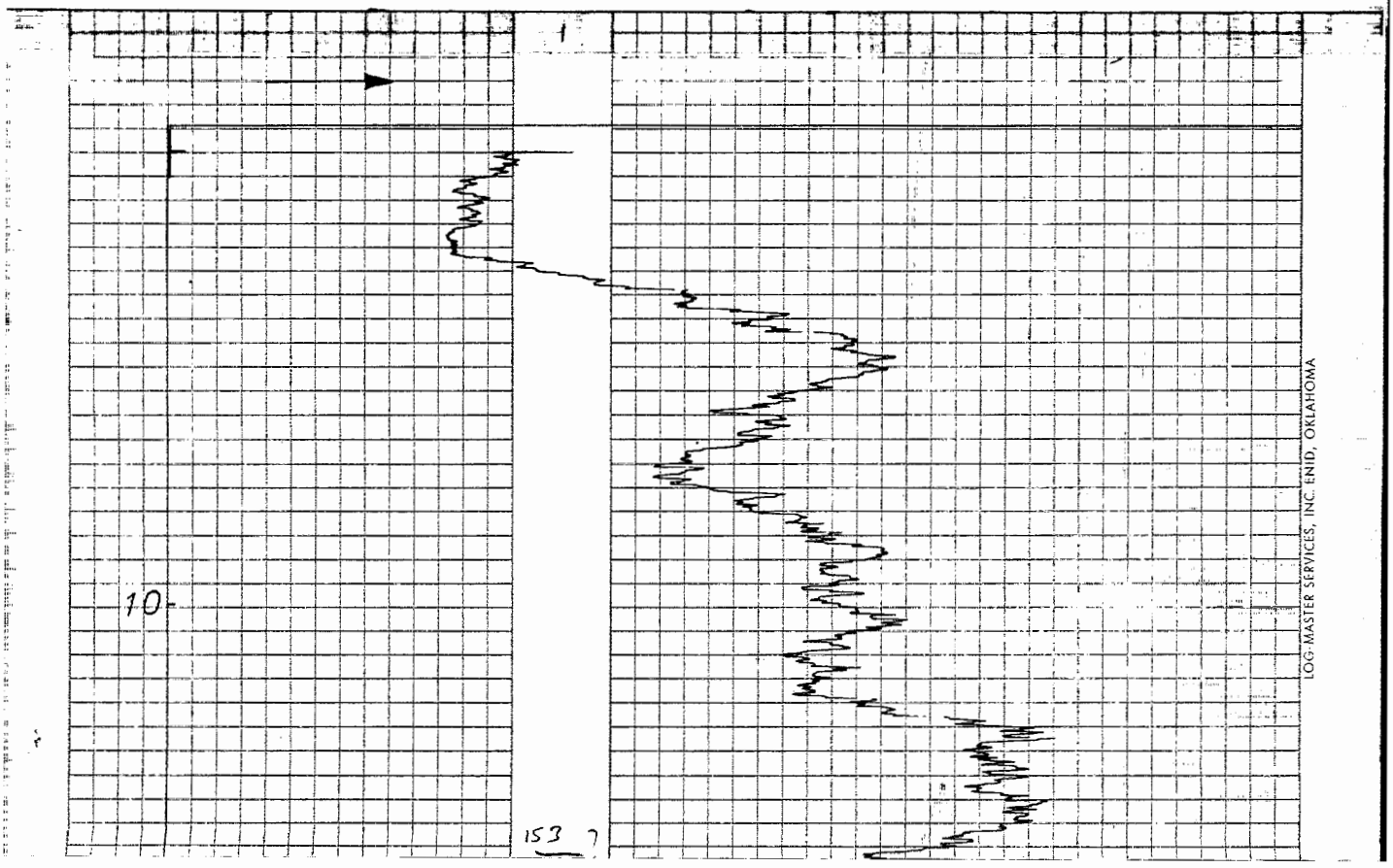
SENSITIVITY : RANGE : 4

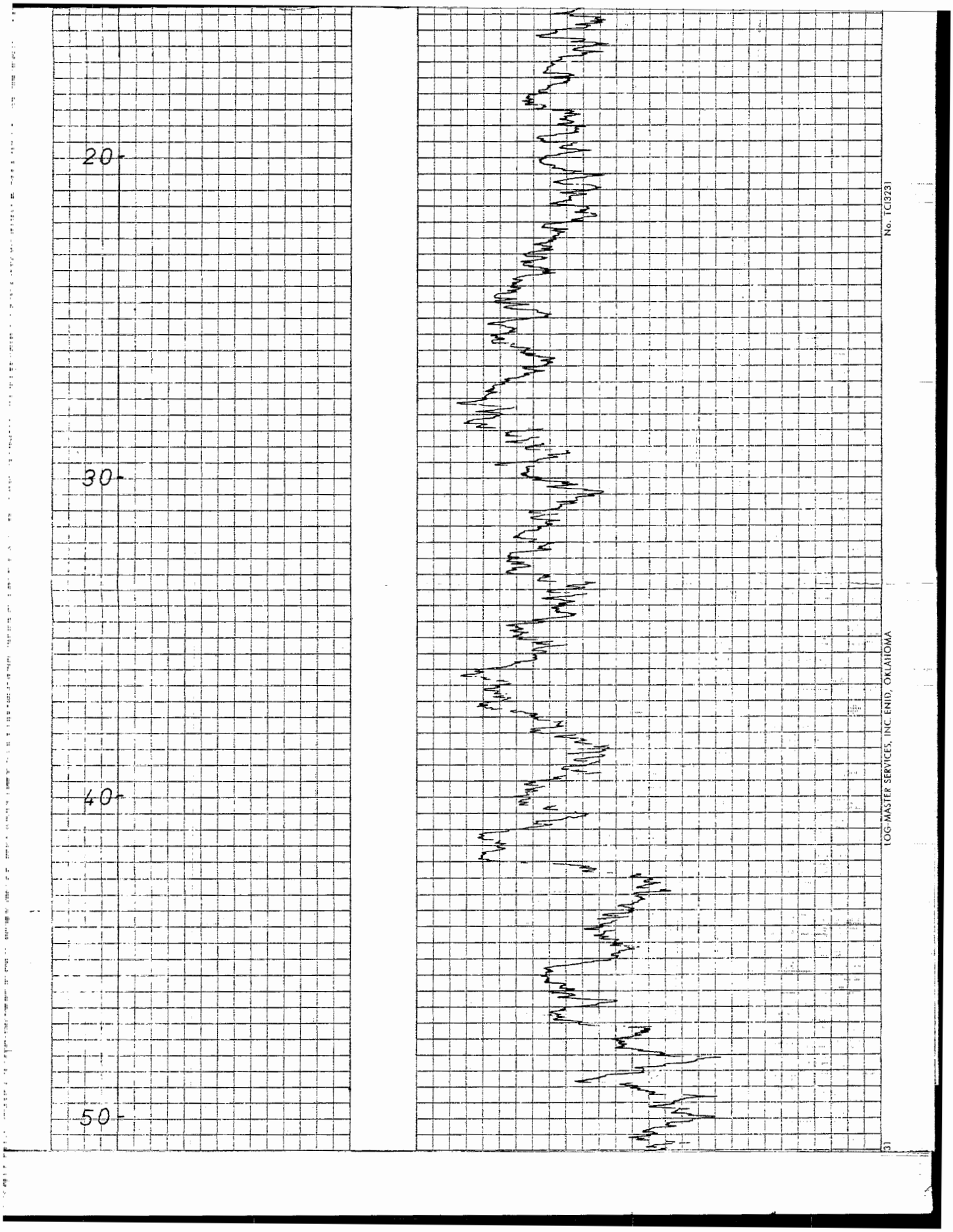
TIME CONSTANT : 4 SPEED : 12 M/ MIN :

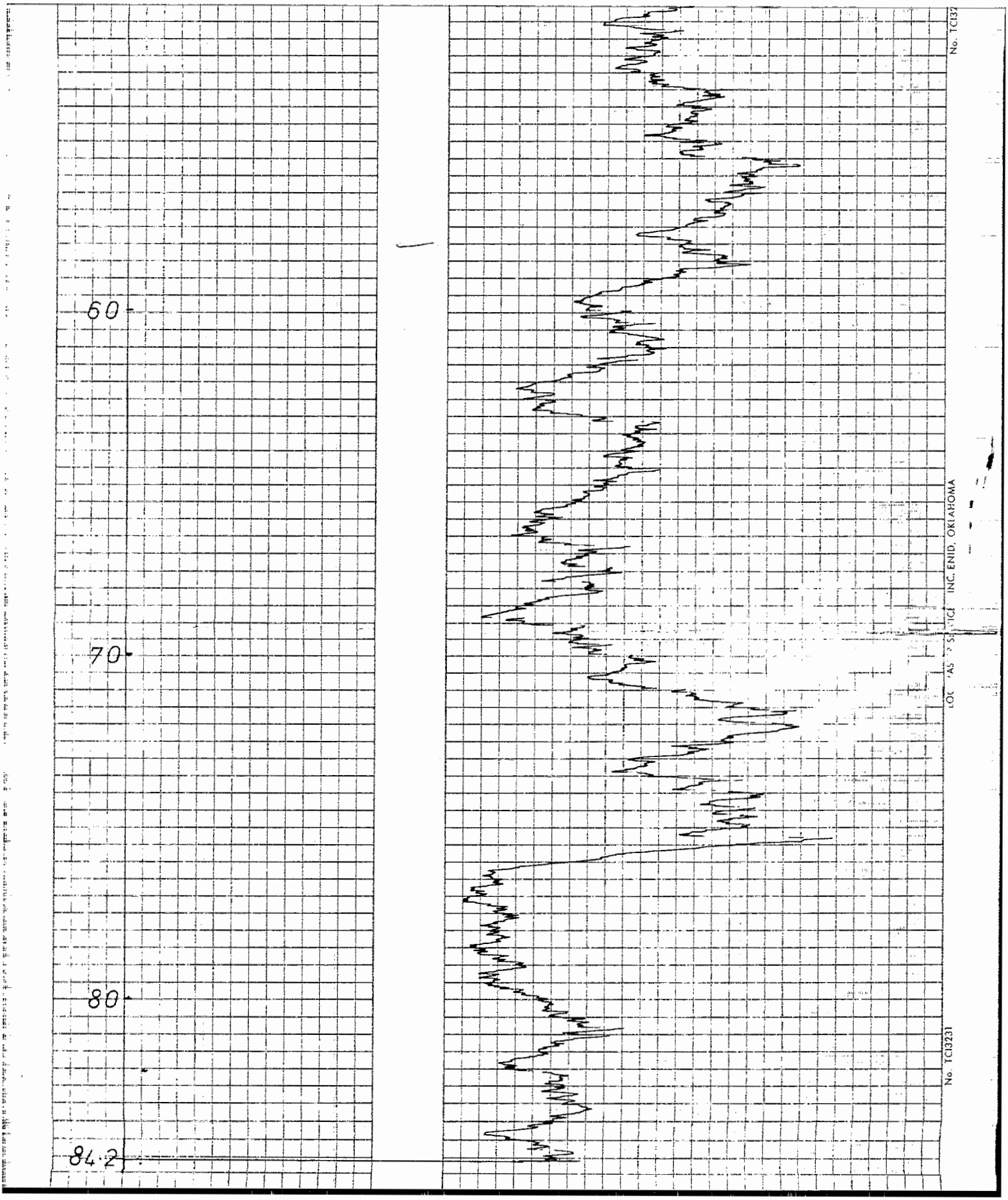
1st READING : 1·10 M INSTRUMENT : LM 444 B

LAST READING : 84·2 M OBSERVER : R.P.

INTERVAL : 83·1 M




20
30
40
50
No. TCI3231
LOG-MASTER SERVICES, INC. ENID, OKLAHOMA


60
70
80
84.2
No. TCI3231
INC. ENID, OKLAHOMA

DEPARTMENT OF TRANSPORT & WORKS

WATER INVESTIGATION UNIT

GEOPHYSICAL BORE LOG

R.N. 12081 AREA: AYERS. ROCK. STATUS: INVESTIGATION

MAP REFERENCE: 5047 GRID CO ORDS: A.M.G. 990114.

ELEVATION: S.W.L.: 14·65 M

CASING DETAILS: 43·46 Mx 6" BLANK. CASIN G.

DRILLER: W.I.U./AS. DATE COMMENCED: 29·3·79

DEPTH DRILLED: 88·99 M DATE COMPLETED: 30·3·79

RADIOMETRIC LOG DATA

SERVICE: W.I.U./AS. LOG TYPE: GAMMA DATE: 2·4·79

RUN NO.: 2 SCALE: V: 1 : 100 H:

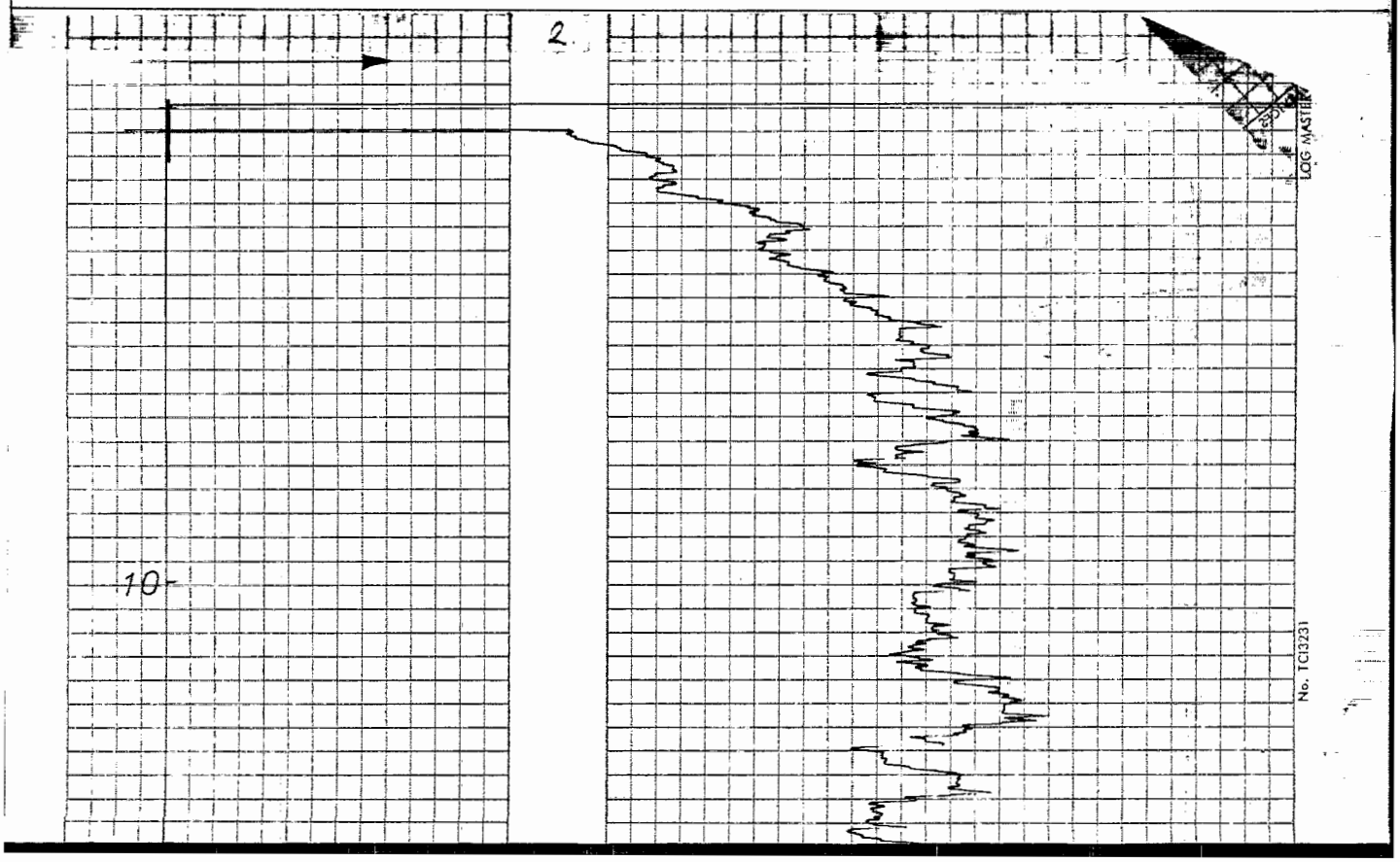
SENSITIVITY: RANGE: 4

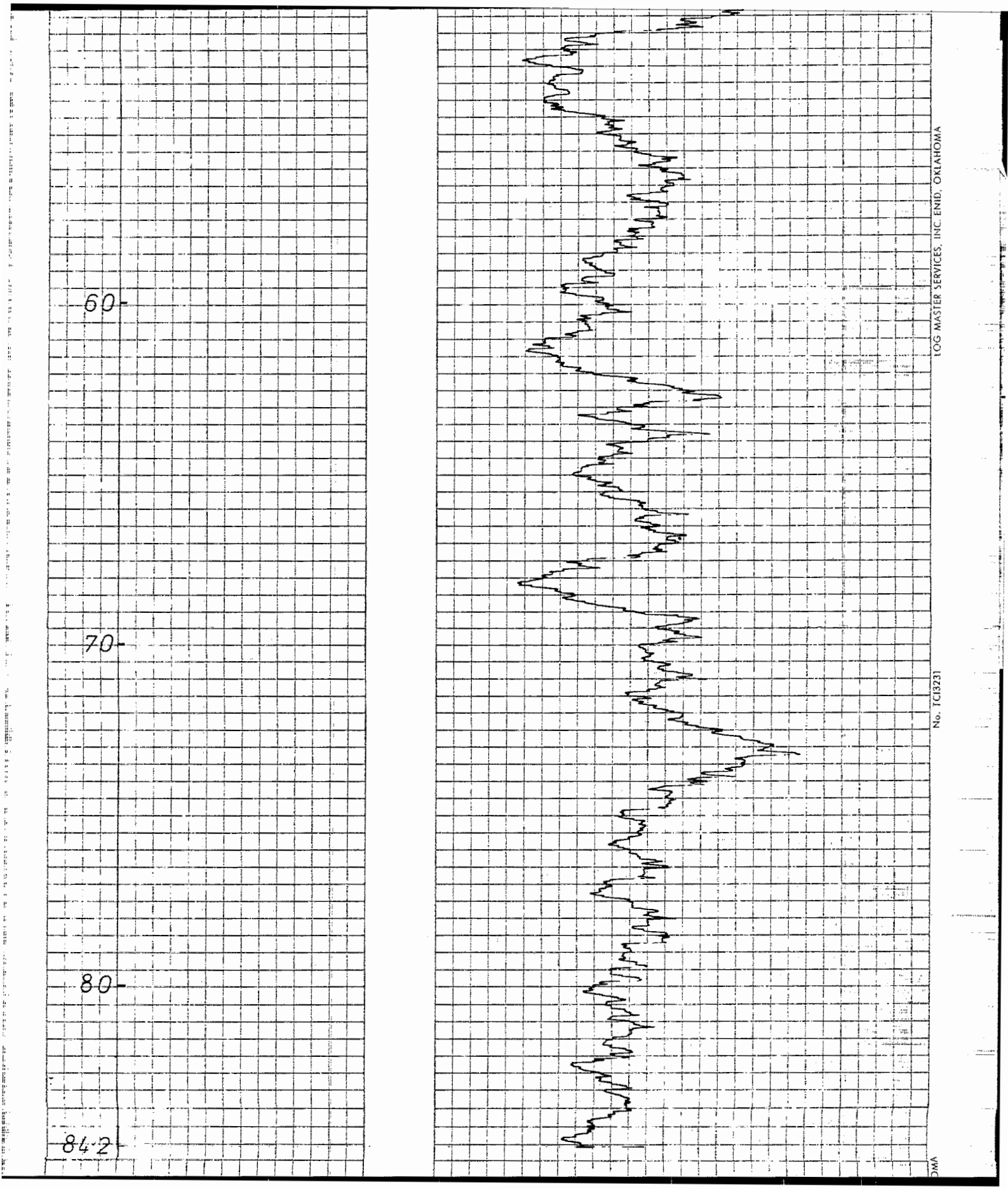
TIME CONSTANT: 4 SPEED: 18 M/ MIN:

1st READING: 84·2 M INSTRUMENT: LM 444 B

LAST READING: 1·10 M OBSERVER: R.P.

INTERVAL: 83·10 M




60
70
80
84.2
LOG MASTER SERVICES, INC. ENID, OKLAHOMA
No. TCI3231

DEPARTMENT OF TRANSPORT & WORKS
WATER INVESTIGATION UNIT
GEOPHYSICAL BORE LOG

R N12081 AREA: AYERS. ROCK. STATUS: INVESTIGATION

MAP REFERENCE: 5047 GRID CO ORDS: A.M.G. 990114

ELEVATION: S. W. L.: 14·65 M

CASING DETAILS: 43·46 M × 6" BLANK. CASING.

DRILLER: W.I.U. / AS. DATE COMMENCED: 29·3·79

DEPTH DRILLED: 88·99 M DATE COMPLETED: 30·3·79

RADIOMETRIC LOG DATA

SERVICE: W.I.U. / AS. LOG TYPE: GAMMA DATE: 2·4·79

RUN NO.: 3 SCALE: V: 1:100 H:

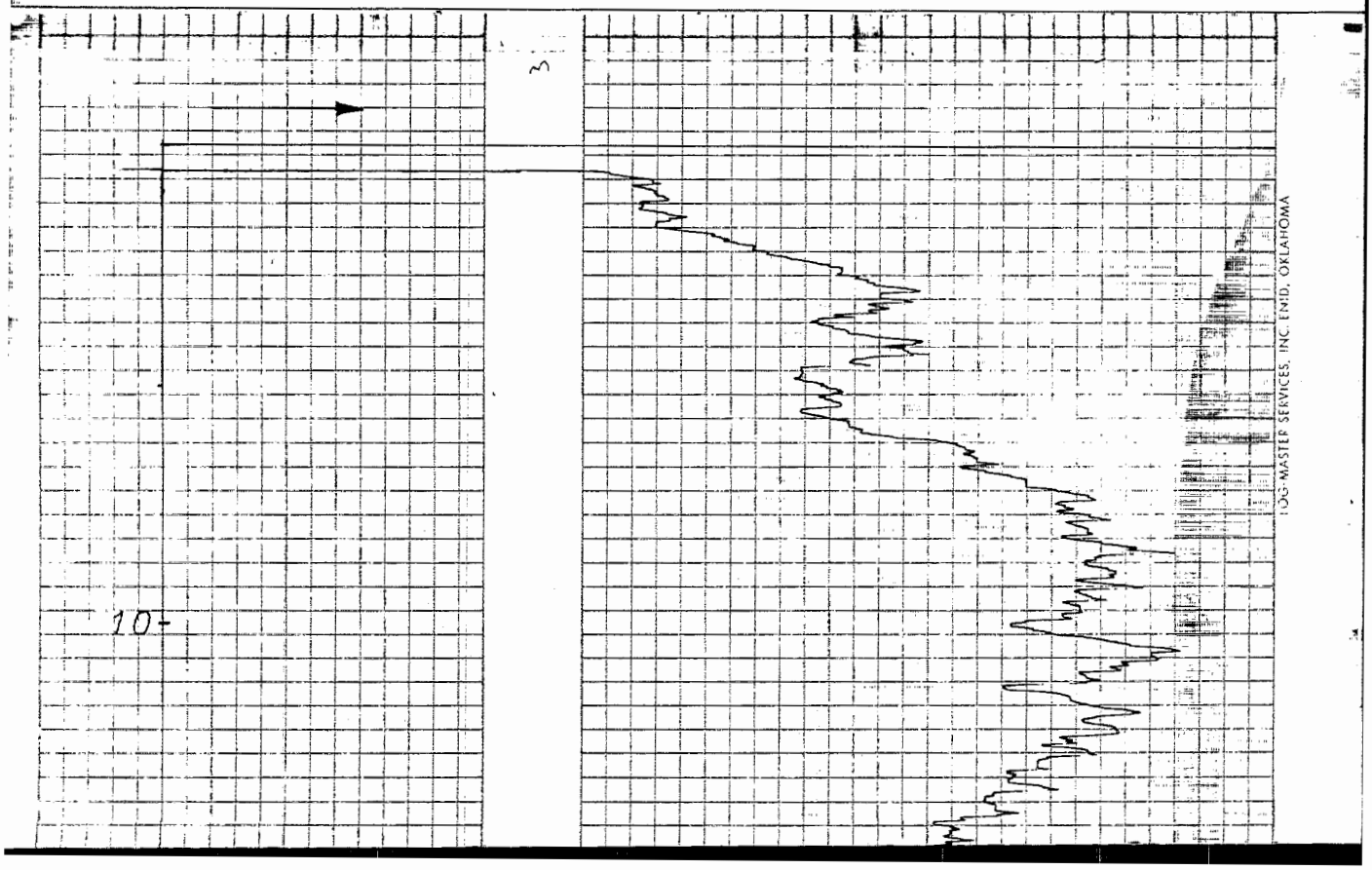
SENSITIVITY: RANGE: 4

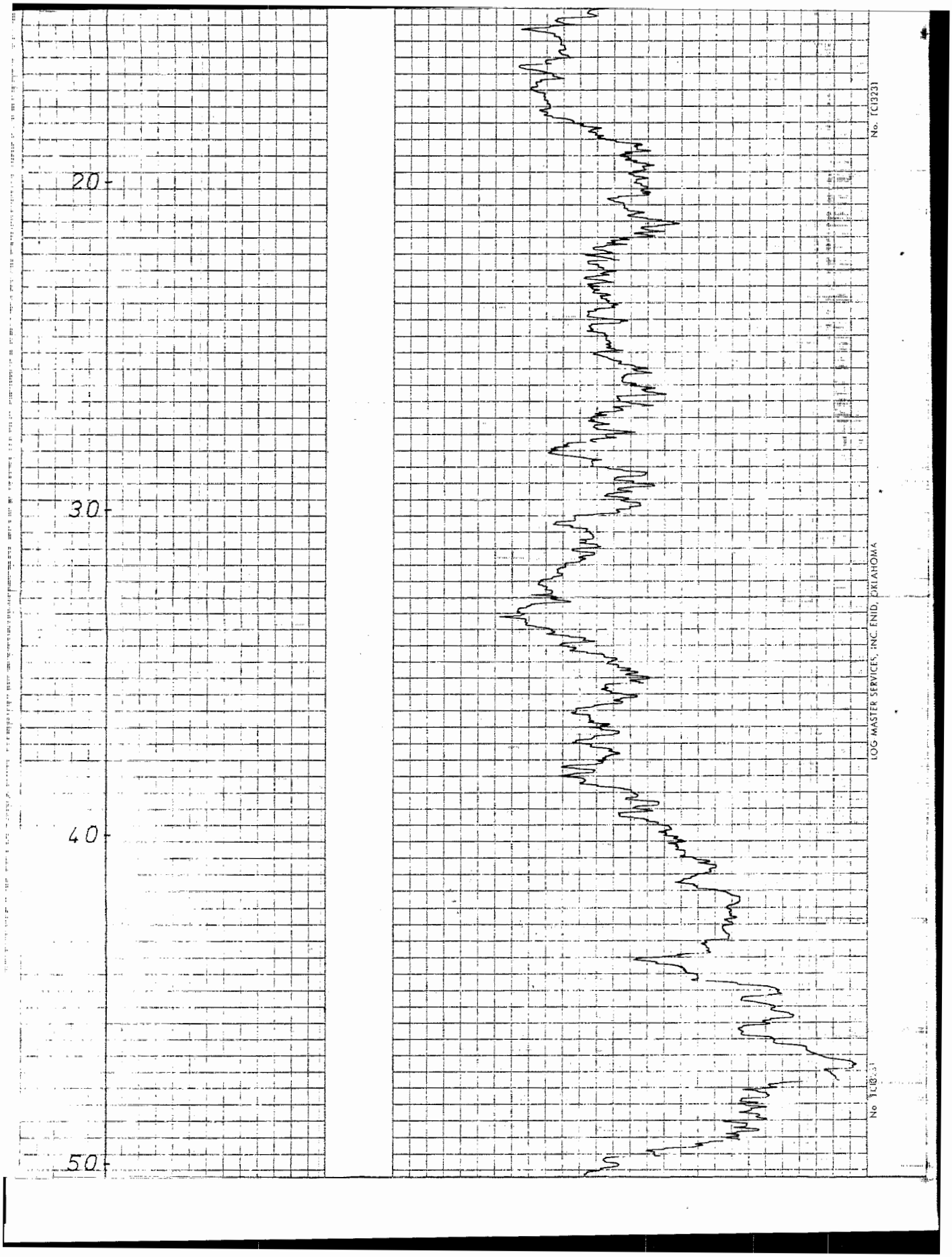
TIME CONSTANT: 4 SPEED: 13 M/ MIN:

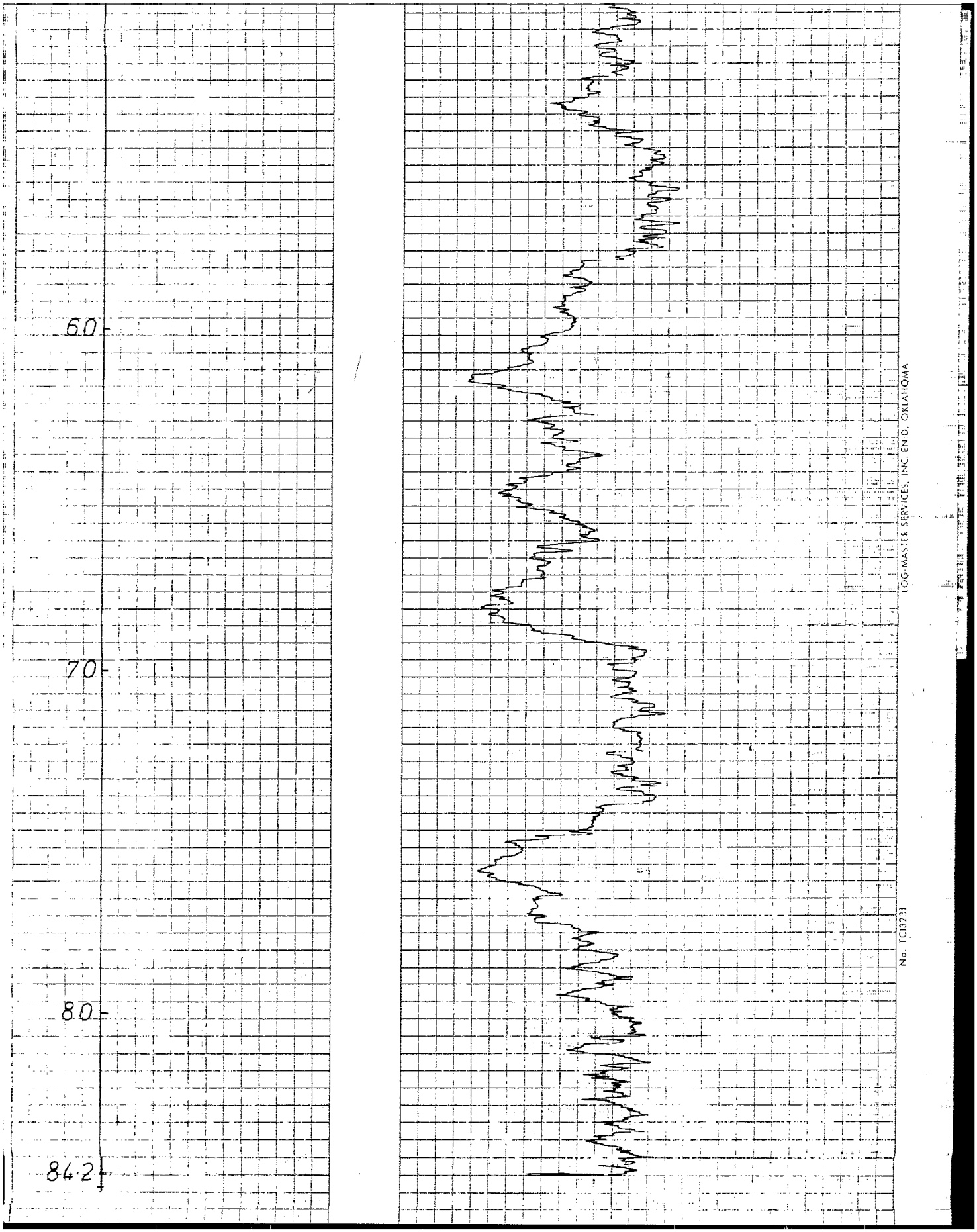
1st READING: 84·2 M INSTRUMENT: LM 444 B

LAST READING: 1·20 M OBSERVER: R.P.

INTERVAL: 83·1 M




20
30
40
50
No. TC13231
LOG MASTER SERVICES, INC. ENID, OKLAHOMA


60
70
80
84.2
LOG-MASTER SERVICES, INC. ENID, OKLAHOMA
No. TCI3231

Regulation 8

N.T.A. 181

THE NORTHERN TERRITORY OF AUSTRALIA

Control of Waters Ordinance

IN. 2/289

RN. 12081

FINAL STATEMENT OF BORE

From	To	Description of Strata
0·00	6·00	BROWN STONE.
6·00	12·00	BROWN + LIGHT BROWN STONE
12·00	18·00	LIGHT BROWN + SANDY STONE
18·00	33·00	LIGHT BROWN CLAY + STONE
33·00	43·00	BROWN STONE.
43·00	48·00	BROWN CLAY + STONE.
48·00	68·00	BROWN SANDY STONE
68·00	90·00	GREY + BROWN STONE & CLAY FALLING IN

Location of Bore (or supply sketch on back hereof) -

.....Miles

(a) N NE S SE E NW W SW of (b) ...(3 NNW.).....

(a) Circle appropriate direction.
(b) Use known point such as existing bore, homestead, outstation, etc.

Additional information of interest about the bore - TOP WATER CASED OFF TO 43·46m. Drill TO 43·00m WITH 7" BUTT BIT. From 43·00m TO 86·00 5½ BUTT BIT. From 86·00 TO 89·00m 5½ BLADE BIT

Map No: ANG 5047

Grid Reference: 990 N4

Samples of strata and water supplies
~~have been~~ *
will be *
left at the following trading place -

W.R.B. OFFICE A/S

R Bayley
Signature

* Strike out which does not apply.

For office use only -

Name of Bore - RN 12081 (3NNW)

Name of Property - AYERS Rock

Description of Property - N.P.

Name of Owner - N.T. P.B.

Name of Contractor - W.R.B

Name of Driller - R Bayley

Date of Commencement - 29/3/79

Date of Completion - 30/3/79

Total Depth - 88·99m

Particulars of Casing - 43·46 x 6" BLANK CASING

Particulars of Perforations or Screens - Nil

Water	1st Supply	2nd Supply	3rd Supply
Struck at	18m SEEPAGE	W/C 28·00m	43·00m
~~Standing~~ ~~Water level~~	68·00m 3,500 PPM 1 L/S	78·00m 3900 PPM 2 L/S	83·00m 3700 PPM 4 L/S
Pumping Supply: ~~G.P.M.~~ L/S		½ L/S	½ L/S
~~Duration of Pump Test~~	S.W.L	14-65m	
Water Level During Test			
Quality: Good, Fair, Bad		CONDUCT 3,500 PPM	CONDUCT 3,500 PPM

2/289

WATER ANALYSIS

Department of Transport & Works
Water Division, Darwin N.T.

WR 4/1A

Laboratory Register No.	Date received in Laboratory	
84/85/1759	3/5/85	
Bottle No.	**Time of sampling**	**Date of sampling**
PQ73	1630	17/4/85

LOCATION AND DETAILS
[redacted]RS ROCK 6" BORE RN 12081 DEPTH 28m DISCH 0.5LPS WRA6019

RSP1259

Proposed water use:- Domestic, Stock, Irrigation, other (specify)

ANALYSIS — PHYSICAL

☐	pH	7.7	☐ Colour (Hazen units)
☐	Specific conductance (microsiemens/cm at 25° C)	3710	☐ Turbidity (NTU's)
☒	Total dissolved solids (mg/L - by evaporation at 180° C)	2470	☐ Suspended solids (mg/L)

ANALYSIS — CHEMICAL (mg/L)

☐	Sodium, Na	492	☒ Chloride, Cl 690
☐	Potassium, K	57	☒ Sulphate, SO_4 672
☐	Calcium, Ca	166	☒ Nitrate, NO_3 55
☐	Magnesium, Mg	87	☐ Bicarbonate, HCO_3 243
☒	Total Hardness (as $CaCO_3$)	772	☐ Carbonate, CO_3
☐	Total Alkalinity (as $CaCO_3$)	199	☐ Fluoride, F 0.8
☐	Iron, (total) Fe	0.3	☐ Orthosphosphate, PO_4
☐	Silica, SiO_2	84	☒ NaCl (calc. from chloride) 1142

ANALYSIS — ADDITIONAL (mg/L)

☐ Copper, Cu	☐ Lead, Pb	☐ Arsenic, As
☐ Manganese, Mn	☐ Zinc, Zn	☐ Cadmium, Cd
☐	☐	☐

THE SAMPLE AS ANALYSED ~~COMPLIES~~/DOES NOT COMPLY WITH NORTHERN TERRITORY DRINKING WATER STANDARDS AS RECOMMENDED BY THE NORTHERN TERRITORY DEPARTMENT OF HEALTH.

This Laboratory is registered by the National Association of Testing Authorities, Australia. The test(s) reported herein have been performed in accordance with its terms of registration. This document shall not be reproduced except in full.

Analysed By: J. COOK Date 15 / 5 85

Boxes marked thus ☒ indicate levels considered undesirable for drinking water by the Northern Territory Department of Health.

4278.845 G. L. DUFFIELD, Government Printer of the Northern Territory

WATER ANALYSIS

2/289

Laboratory Register No. 79/0573

Date received in Laboratory 9.5.79

WR 4/1

Bottle No.	Time of sampling (hrs)	Date of sampling
YK 35	0915	31.3.79

LOCATION AND DETAILS
[redacted]s Rock - RN/12081 Depth: 93 m. Disch: 4.0 lps. Airlift RSP. 88

Sampler: Darby

ANALYSIS - PHYSICAL

pH	7.9	Colour (Hazen units)	
Specific conductance (microsiemens/cm at 25°C)	3770	Turbidty (A.P.H.A. units)	
Total dissolved solids (mg/l - by evaporation at 180°C)	2580	Suspended solids (mg/l)	

ANALYSIS - CHEMICAL (mg/l)

Total dissolved solids (by summation)	2558	Total alkalinity (as $CaCO_3$)	179
Sodium chloride (calc from chloride)	1195	Total hardness (as $CaCO_3$)	784
Chloride, Cl	725	Sodium, Na	480
Sulphate, SO_4	670	Patassium, K	75
Nitrate NO_3	62	Calcium, Ca	166
Bicarbonate, HCO_3	218	Magnesium, Mg	90
Carbonate, CO_3		Iron (total), Fe	1.2
Fluoride, F	1.5	Silica, SiO_2	70

ANALYLIS - ADDITIONAL (mg/l)

ANALYSED BY: Holger Henkel Date 30 / 5 / 79

REMARKS:

The sample as analysed is chemically unsuitable for human consumption according to 1971 W.H.O. International Standards for drinking water as the total dissolved solids exceed the maximum permissible level. suitable for stock.

"Information or discussion on the analysis shown above, can be obtained by contacting the Senior Engineer, Water Quality, Water Recources Branch, Darwin".

90999—5/78 C. J. THOMPSON, Commonwealth Government Printer, Darwin

WATER ANALYSIS

Department of Transport & Works
Water Division, Darwin NT
[redacted]

WR 4/1

Laboratory Register No: 80/0065
Date received in Laboratory: 10.1.80
Bottle No: ZN 88
Time of Sampling: 1515
Date of Sampling: 14.12.79

LOCATION AND DETAILS
Ayers Rock – RN 12081 – Disch: 1.2 lps Tap RSP. 88

2/289

Proposed water use:-Domestic, Stock, Irrigation, other (specify)

ANALYSIS – PHYSICAL

☐ pH	7.5	☐ Colour (Hazen units)	
☐ Specific conductance (microsiemens/cm at 25° C)	3760	☐ Turbidity (NTU's)	
☒ Total dissolved solids (mg/l - by evaporation at 180 ° C)	2520	☐ Suspended solids (mg /l)	

ANALYSIS – CHEMICAL (mg/l)

☐ Sodium, Na	477	☒ Chloride, Cl	711
☐ Potassium, K	79	☒ Sulphate, SO_4	665
☐ Calcium, Ca	188	☒ Nitrate, NO_3	59
☐ Magnesium, Mg	92	☐ Bicarbonate, HCO_3	238
☒ Total Hardness (as $CaCO_3$)	847	☐ Carbonate, CO_3	
☐ Total Alkalinity (as $CaCO_3$)	195	☐ Fluoride, F	1.5
☐ Iron, (total) Fe	0.3	☐ Orthophosphate, PO_4	
☐ Silica, SiO_2	84	☐ NaCl (calc. from chloride)	1172

ANALYSIS – ADDITIONAL (mg/1)

☐ Copper, Cu	☐ Lead, Pb	☐ Arsenic, As
☐ Maganese, Mn	☐ Zinc, Zn	☐ Cadmium, Cd

Analysed By: H. HENKEL Date 17/ 1 / 80

REMARKS

The sample as analysed is considered suitable for:–

Drinking water – ~~YES~~/NO
Irrigation – YES/NO
Stock watering – YES/NO
Other (specify) – YES/NO

Boxes marked thus ☒ indicate levels considered undesirable for drinking water by the Northern Territory Department of Health.

Note:– Advice and Water quality information can be obtained by contacting the Senior Engineer Water Quality, Darwin Phone 89 6072.

15303/79
A.B. CAUDELL, Government Printer of the Northern Territory.

WATER ANALYSIS

Laboratory Register No. 79/0589

Date received in Laboratory 24.4.79

WR 4/1

Bottle No.	Time of sampling (hrs)	Date of sampling
YZ 44	1340	16.4.79

LOCATION AND DETAILS

Yulara Village Depth: 63 m. Disch: 1.0 lps. Airlift RSP. 1259

RN/12163 Sampler: R. Darby

ANALYSIS - PHYSICAL

pH	8.3	Colour (Hazen units)	
Specific conductance (microsiemens/cm at 25°C)	4840	Turbidty (A.P.H.A. units)	
Total dissolved solids (mg/l - by evaporation at 180°C)	3160	Suspended solids (mg/l)	

ANALYSIS - CHEMICAL (mg/l)

Total dissolved solids (by summation)	3259	Total alkalinity (as $CaCO_3$)	180
Sodium chloride (calc from chloride)	1549	Total hardness (as $CaCO_3$)	1082
Chloride, Cl	940	Sodium, Na	632
Sulphate, SO_4	935	Patassium, K	81
Nitrate NO_3	42	Calcium, Ca	244
Bicarbonate, HCO_3	220	Magnesium, Mg	115
Carbonate, CO_3		Iron (total), Fe	not suitable for determination
Fluoride, F	2.0	Silica, SiO_2	48

ANALYLIS - ADDITIONAL (mg/l)

ANALYSED BY: Holger Henkel Date 31/5/79

REMARKS: The sample as analysed is chemically unsuitable for human consumption according to 1971 W.H.O. International standards for drinking water as the total dissolved solids exceed the maximum permissible level.

Suitable for stock.

"Information or discussion on the analysis shown above, can be obtained by contacting the Senior Engineer, Water Quality, Water Recources Branch, Darwin".

90999—5/78 C. J. THOMPSON, Commonwealth Government Printer, Darwin

WATER CONDUCTIVITY ANALYSIS

BORE:

REGISTERED NUMBER: 12163

LOCATION: AYERS ROCK

TESTED BY: R. BOEYEN

DATE TESTED: 10-5-79

BOTTLE NO.	DATE	TIME	DEPTH	DISCHARGE	SAMPLER		CONDUCTIVITY
ZN 97	23-4-79	1610	23 M	2.0 l/sec	R. DARBY		4,800
ZR 40	"	1645	33 M	2.0 "	"		4,300
[illegible]S 46	24-4-79	1245	48 M	1.0 "	"		4900
YZ 29	"	1340	63 M	1.0 "	"		4800

YULARA VILLAGE WATER RESOURCES 60.6D

RN 12163
IN 2/296
5047 Mt Olga

Depth (m)			Description
0	-	3	SAND. Dark reddish brown sand with silt.
3	-	12	SAND. Light brown silty sand.
12	-	38	SAND & CLAY. Reddish brown sand with clay.
38	-	63	SANDSTONE. Poorly sorted light grey sub angular sandstone, minor specks of mica, becoming coarser grained and more friable with depth.

SUMMARY

0	-	3	Sand	
3	-	12	Sand	Tertiary
12	-	38	Sand and clay	Tertiary
38	-	63	Sandstone	

MAJOR AQUIFERS

23m	2.0 ls^{-1}	Sand and clay	-	Tertiary
48m	1.0 ls^{-1}	Sandstone		

Geoff Knott

GEOFF KNOTT
HYDROGEOLOGIST

October 1979

NTA 1718

DATE 24/4/79 BORE No. RN 12163 (3N) Driller: DARBY

Time	Depth	Feet drilled	Mins lapsed	Drillers remark, casing details	BIT DATA No.	Size	Type	Worn cond'n	STRING DATA Item	O.D.	Length	Prog. tally	MUD DATA
..	33m												
1020	/	/		CONT DRILLING									
				ADD D/P					D/P	4½	4.58	30.06	
1045	39m	6m		BROWN clay + STONE									
				ADD D/P					D/P	4½	4.58	34.64	
				SANDY CHANGE TO 5½ BLD		5½	BLD	USED					
1220	43m	5m		GREY SAND FOAMING IN									
				ADD D/P & FOAM					D/P	4½	4.58	39.22	
1245	48m	5m		GREY SAND FOAMING IN ½" W/L	NB	14/8	4,600	RPM		26.68	75.46		
				ADD D/P					D/P	4½	4.58	43.80	
1310	53m	5m		GREY SAND & GREEN clay FOAMING IN									
				ADD D/P					D/P	4½	4.58	48.38	
1325	58m	5m		GREY SAND & BROWN clay FOAMING IN									
				ADD D/P					D/P	4½	4.58	52.96	53.86
1340	63m	5m		GREY SAND FOAMING IN [redacted]									
				PULL OUT & RUN 2" GWP FINAL SAMPLE						42.44 – 43.29			5000 PPM
										14/8			
				RUN 2" W/P TO 30.00m SAND									
				BLOW BACK TO BOTTOM CLEAN 6" CASING									
				SWL 16.20									

14702/69.... W. G. Murray, Government Printing Office, Canberra

NTA 1718

DATE 23/4/74 BORE No. RN 12163 (BN) Driller: DARBY

Time	Depth	Feet drilled	Mins lapsed	Drillers remark, casing details
1115	/	/		SETUP Rig + Drill TO 6m WITH
				Hammer Bit, Pull out + Ream
				To 3.60m WITH Roll bit
1125	6m	6m		RED SAND + LIGHT BROWN STONE
				COMP U/S
1520	/	/		mm D/C
1530	12m	6m		BROWN STONE
				mm D/C
1555	18m	6m		AS ABOVE W/C ¼ U/S
				mm D/P
1610	23m	5m		AS ABOVE INCREASE TO 2½ 4,500 RPM
				mm D/P
1625	28m	5m		BROWN SANDY STONE
				mm D/P
1645	33m	5m		BROWN clay
				PULL OUT + RIG DOWN TO RUN 6" CASE LAST SAMPLE BETWEEN CASING 29.24 - 28.40 3,500 RPM
				24/4/74
0700				LOAD + UNLOAD CASING BREAK HAMMER + CLEAN
				RUN CASING 6" = 2M
				6.70
				6.90
				5.85
				5.27
				6.65
				5.70 — 36.97 OUT ALL 3.00m TOTAL 33.97m

BIT DATA No.	Size	Type	Worn cond'n
	7"	BOIT	USED
	9⅞	ROLL	USED

STRING DATA Item	O.D.	Length	Prog. tally
HAMMER		2.5	5.03
			1.75
D/C	4½	5.73	
D/C	4½	6.01	[illegible]
D/P	4½	4.58	16.32
		ZN.97 - 72.01	
D/P	4½	4.58	20.90
D/P	4½	4.58	25.48

MUD DATA: 11.74

14702/69.... W. G. Murray, Government Printing Office, Canberra

Regulation 8

RN012163
N.T.A. 167

THE NORTHERN TERRITORY OF AUSTRALIA

Control of Waters Ordinance

IN 2/296
RN 12163

FINAL STATEMENT OF BORE

From	To	Description of Strata
0·00	6·00	RED SAND & LIGHT BROWN STONE
7·00	23·00	BROWN STONE
23·00	28·00	BROWN SANDY STONE
28·00	33·00	BROWN CLAY
33·00	38·00	BROWN CLAY & STONE.
38·00	43·00	GREY SAND & CAVING
43·00	48·00	AS ABOVE.
48·00	53·00	GREY SAND & GREEN CLAY
53·00	58·00	GREY SAND & BROWN CLAY
58·00	63·00	GREY SAND CAVING

Location of Bore (or supply sketch on back hereof) -

.....Miles

(a) N NE / S SE / E NW / W SW of (b) ...(3N)...

(a) Circle appropriate direction.
(b) Use known point such as existing bore, homestead, outstation, etc.

Additional information of interest about the bore - Drilled to 33.00 with 7" Hammer Bit. 33.00m to 63.00 5½ Blade Bit

Map No: 5047 AMG
Grid Reference: 000120.

Samples of strata and water supplies
• ~~have been~~ *
will be *
left at the following trading place -

..W..R.B...Office...A/S...

.....R. Darby...
Signature

* Strike out which does not apply.

For office use only -

Name of Bore - RN12163 (3N) Headquarters

Name of Property - Ayers Rock

Description of Property - N.P.

Name of Owner - NTRB

Name of Contractor - WRB

Name of Driller - R. Darby

Date of Commencement - 23/4/79

Date of Completion - 24/4/79

Total Depth - 63·00m

Particulars of Casing - CASING FROM TOP WATER 33·97m x 6" BLANK CASING TO 34·00m

Particulars of Perforations or Screens - BOTTOM LENGTH OF CASING 33·00m x 2" GVP

Water	1st Supply	2nd Supply	3rd Supply
Struck at	18·00	23·00	48·00m
Standing Water Level			14·20m
Pumping Supply: ~~G.P.H.~~ L/S	¼ L/S	2 L/S	1 L/S
Duration of Pump Test			
Water Level During Test			4,000 PPM
Quality: Good, Fair, Bad	4,500 PPM	4,500 PPM	5,000 PPM

WATER ANALYSIS

Laboratory Register No. 79/0574

Date received in Laboratory 9.5.79

WR 4/1

Bottle No.	Time of sampling (hrs)	Date of sampling
YP 92	1600	2.4.79

LOCATION AND DETAILS
Ayers Rock - RN/12082 Depth: 48 m. Disch: 3 lps. Airlift RSP. 88

Sampler: Darby

ANALYSIS - PHYSICAL

pH	7.7	Colour (Hazen units)	
Specific conductance (microsiemens/cm at 25°C)	4900	Turbidty (A.P.H.A. units)	
Total dissolved solids (mg/l - by evaporation at 180°C)	3340	Suspended solids (mg/l)	

ANALYSIS - CHEMICAL (mg/l)

Total dissolved solids (by summation)	3335	Total alkalinity (as $CaCO_3$)	178
Sodium chloride (calc from chloride)	1551	Total hardness (as $CaCO_3$)	1075
Chloride, Cl	941	Sodium, Na	650
Sulphate, SO_4	1000	Patassium, K	85
Nitrate NO_3	47	Calcium, Ca	248
Bicarbonate, HCO_3	217	Magnesium, Mg	111
Carbonate, CO_3		Iron (total), Fe	20
Fluoride, F	2.0	Silica, SiO_2	40

ANALYLIS - ADDITIONAL (mg/l)

ANALYSED BY: Holger Henkel Date 30 / 5 / 79

REMARKS: The sample as analysed is chemically unsuitable for human consumption according to 1971 W.H.O. International Standards for drinking water as the total dissolved solids exceed the maximum permissible level. Suitable for stock.

"Information or discussion on the analysis shown above, can be obtained by contacting the Senior Engineer, Water Quality, Water Recources Branch, Darwin".

90999—5/78 C. J. THOMPSON, Commonwealth Government Printer, Darwin

WATER CONDUCTIVITY ANALYSIS.

BORE: REGISTERED NUMBER: 12082

LOCATION: Ayers Rock

DATE TESTED: 3-5-79 TESTED BY: R Boeyen

BOTTLE No.	DATE	TIME	DEPTH	DISCHARGE	SAMPLER	CONDUCTIVITY
YX 16	2-4-79	0915	18M	1.0 l/sec	R Datey	4800
ZD 91	"	0950	28M	2.0 l/sec	"	4800
ZE 62	"	1010	33M	3.0 l/sec	"	4900
ZD 43	"	1600	48M	2.0 l/sec	"	5000

YULARA VILLAGE WATER RESOURCES 60.6D

RN 12082
IN 2/290
5047 Mt Olga

Depth (m)			Description
0	-	9	CALCRETE, CALCAREOUS SANDSTONE
9	-	12	SAND. Light brown silty sand.
12	-	38	CLAY & SAND. Brown clay with sand.
38	-	48	SANDSTONE. Light grey micaceous sandstone, minor clay.
48	-	53	SANDSTONE. White clean poorly sorted sub angular sandstone.

SUMMARY

0	-	9	Calcareous Sandstone	Tertiary
9	-	12	Sand	
12	-	38	Clay and Sand	
38	-	53	Sandstone	

MAJOR AQUIFER

18m	1.0 ls^{-1}	Clay and Sand (Tertiary)
28m	1.0 ls^{-1}	
48m	0.5 ls^{-1}	Sandstone

Geoff Knott

GEOFF KNOTT
HYDROGEOLOGIST

October 1979

NTA 1718

DATE 31/3/74 BORE No. RN 12082 (3M) Driller: DARBY

Time	Depth	Feet drilled	Mins lapsed	Drillers remark, casing details	BIT DATA No.	Size	Type	Worn cond'n	STRING DATA Item	O.D.	Length	Prog. tally	MUD DATA
1100	/	/		MOVE FROM 12081 TO 12082 BOGGED & SET UP DRILL TO 6M WITH 7 3/8 BLADE BIT. REAM OUT TO 5.80M WITH 9 7/8 ROLL BIT & RUN 8" SURF CASING.		7 3/8	BLD	USED	BLD BIT & SUB		5.90		
	6m	6m		HARD BROWN STONE.									
				(2/4/74 CREW & RIG OUT.									
3730	6m	/		COMM DRILLING P.D.D. D/C		7 7/8			HAMMER BIT & SUB		1.75		
0500									D/C	4½	5.73	7.48	
0615	12m	6m		LIGHT BROWN STONE ADD D/C					D/C	4½	6.01	13.49	
0915	18m	6m		AS ABOVE W/C 1 L/S 4,500 RPM ADD D/P					D/C D/P	4½	4.58	18.07	
0930	23m	5m		BROWN STONE ADD D/P					D/P	4½	4.58	22.65	
0950	28m	5m		WHITE & BROWN SANDY STONE INCREASE TO 2 L/S 4,200 ADD D/P					D/P	4½	4.58	27.23	
1010	33m	5m		BROWN clay & STONE Roll UP & PREPARE TO RUN 6" CASING LAST SAMPLE TAKEN BEFORE RUNNING 6" CASING									

14702/69.... W. G. Murray, Government Printing Office, Canberra

NTA 1718

DATE 2/4/74 BORE No. RN ~~[redacted]~~ 12082 (3N) Driller: DARCY

Time	Depth	Feet drilled	Mins lapsed	Drillers remark, casing details	BIT DATA No.	Size	Type	Worn cond'n	STRING DATA Item	O.D.	Length	Prog. tally	MUD DATA
1130	33	/		6" CASING									
				6·23 x SHOE									
				5·84									
				5·67									
				5·55									
				5·67									
				5·75 → 34·51 CUT OFF 1·00m	[redacted]								
1230	33m	/		RUN collars & Rods & CHANGE TO								26·11	
				5½ BLADE BIT		5½	BLD	USED	5½ BLADE BIT			LESS	
~~1250~~	/	/		~~[redacted]~~								·64	
1250	/	/		ADD D/P					D/P	4½	4·58	30·69	
1330	38m	5m		BROWN & GREY CLAY									
				PULL OUT & ADD 4·70m 6" CASING	TOTAL CASING IN HOLE 37·29m								
~~1400~~													
1400	/	/		CONT DRILLING ADD D/P					D/P	4½	4·58		
1500	43m	5m		GARBNISH & LIGHT BROWN CLAY									
				ADD D/P					D/P	4½	4·58	35·27	
1600	48m	5m		GREY SAND & GARBNISH CLAY W/L & L/S 3,400					PUMP			2D·43 - 4 P·92	
				ADD D/P					D/P	4½	4·58	39·85	
1645	53m	5m		LIGHT BROWN STONEY HARD, WHITE & BROWN CLAY									
				PULL UP									

14702/69....

W. G. Murray, Government Printing Office, Canberra

Bore Report RN012082

NTA 1718

DATE 3/4/79 BORE No. RN 12082 (3N) Driller: DAVE

Time	Depth	~~Feet~~ drilled	Mins lapsed	Drillers remark, casing details	BIT DATA No.	Size	Type	Worn cond'n	STRING DATA Item	O.D.	Length	Prog. tally	MUD DATA
4130	53	✓		GRADE Rig OUT.								39.85	
				RUN IN ROD'S.									
				BIT BLOCKED PULL OUT + CLEAN									
				BIT CAUGHT ON BOTTOM OF CASING									
				AND MADE CASING 4.73m									
				6.25 CUT OFF 3.60m TOTAL 46.19 DEPTH OF HOLE 50.44									
				BOTTOM OF CASING 4.00m ABOVE BOTTOM OF HOLE.									
				[redacted] 6" CASING STILL IN HOLE.									
				23.09 → BOTTOM OF CASING 4.00m FROM BOTTOM OF HOLE. TOP OF CASING 20.10m									
				7/4/79									
				PULL BACK OVER 12082 LEAVE UP + RUN IN RODS + KELLY TO FISH 6" CASING									

14702/69.... W. G. Murray, Government Printing Office, Canberra

Viewed at 15:08:57 on 25/08/2016

DEPARTMENT OF TRANSPORT & WORKS

WATER INVESTIGATION UNIT

GEOPHYSICAL BORE LOG

R N : 12082 AREA : AYERS ROCK STATUS : INVESTIGATION

MAP REFERENCE : A M G 5047 GRID CO ORDS : 000 120

ELEVATION :

S. W L :

CASING DETAILS : 23·09m x 6"

DRILLER : W. I.U.

DATE COMMENCED : 31·3·79

DEPTH DRILLED : 53·0m

DATE COMPLETED : 3·4·79

RADIOMETRIC LOG DATA

SERVICE : W. I. U.

LOG TYPE : GAMMA RAY

DATE : 7·6·79

RUN NO : 2

SCALE V : 1 = 200 H :

SENSITIVITY :

RANGE 10

TIME CONSTANT : 4 second

SPEED : 6·5 M/MIN

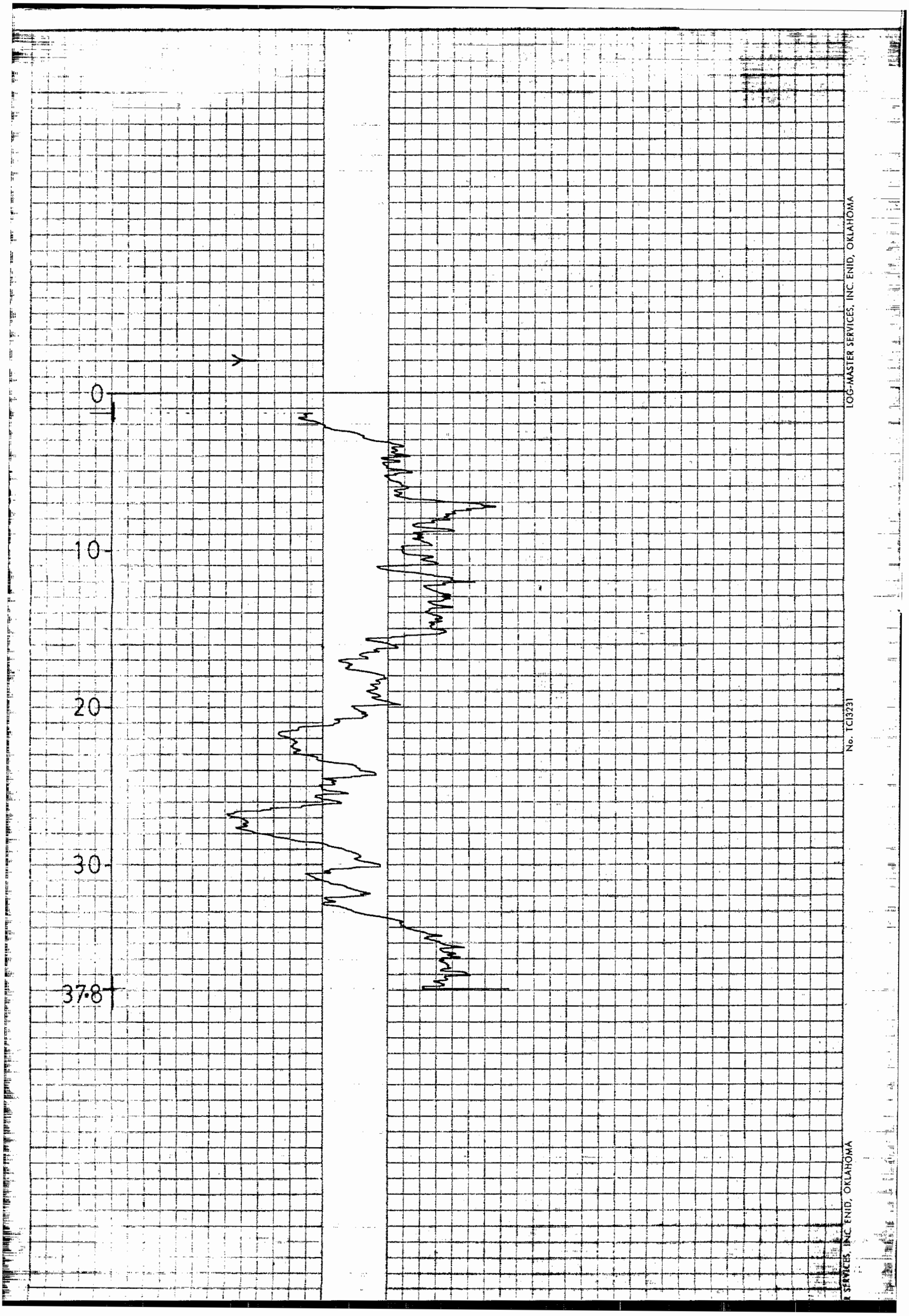
1st READING : 37·8 m

INSTRUMENT : LM 444 B LMG 15

LAST READING : 1·2 m

OBSERVER : R. P.

INTERVAL : 36·6 m


0
10
20
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37.8
LOG-MASTER SERVICES, INC. ENID, OKLAHOMA
No. TCI3231
LOG-MASTER SERVICES, INC. ENID, OKLAHOMA

EPARTMENT OF TRANSPORT & WORKS

WATER INVESTIGATION UNIT

GEOPHYSICAL BORE LOG

12082 AREA: GAMMA RAY STATUS: INVESTIGATION

REFERENCE A M G 5047 GRID CO ORDS: 000 120

ELEVATION S W L:

CASING DETAILS: 23·09 m x 6"

DRILLER W. I. U. DATE COMMENCED: 31·3·79

DEPTH DRILLED: 53·0 m DATE COMPLETED: 3·4·79

RADIOMETRIC LOG DATA

SERVICE: W. I. U. LOG TYPE: GAMMA RAY DATE: 7·6·79

RUN NO: 1 SCALE: V 1 = 200 H:

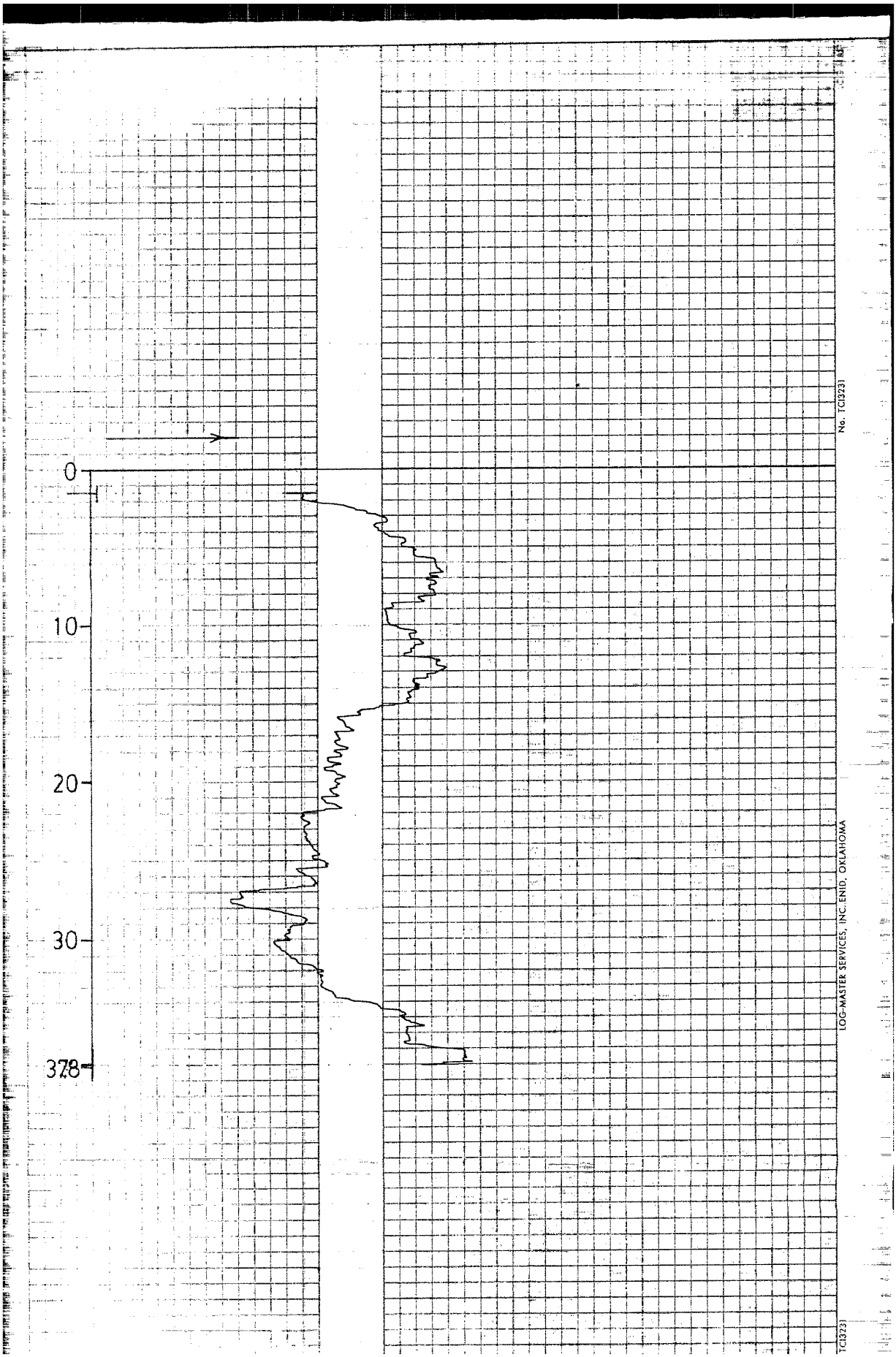
SENSITIVITY: RANGE: 10

TIME CONSTANT: 4 second SPEED: 8 M/MIN

1st READING: 37·8 m INSTRUMENT: LM444 B LMG 15

LAST READING: 1·2 m OBSERVER: R. P.

INTERVAL: 36·6 m


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378
No. TCI3231
LOG-MASTER SERVICES, INC. ENID, OKLAHOMA
TCI3231

DEPARTMENT OF TRANSPORT & WORKS

WATER INVESTIGATION UNIT

GEOPHYSICAL BORE LOG

RN 12082 AREA AYERS ROCK STATUS: INVESTIGATION

REFERENCE: A M G 5047 GRID CO ORDS: 000 120

ELEVATION: S.W.L.:

CASING DETAILS: 23·09m x 6" at bottom

DRILLER: W. I. U. DATE COMMENCED: 31·3·79

DEPTH DRILLED: 53·0m DATE COMPLETED: 3·4·79

RADIOMETRIC LOG DATA

SERVICE: W. I. U. LOG TYPE: GAMMA RAY DATE: 7·6·79

RUN NO: 4 SCALE V 1 = 100 H.

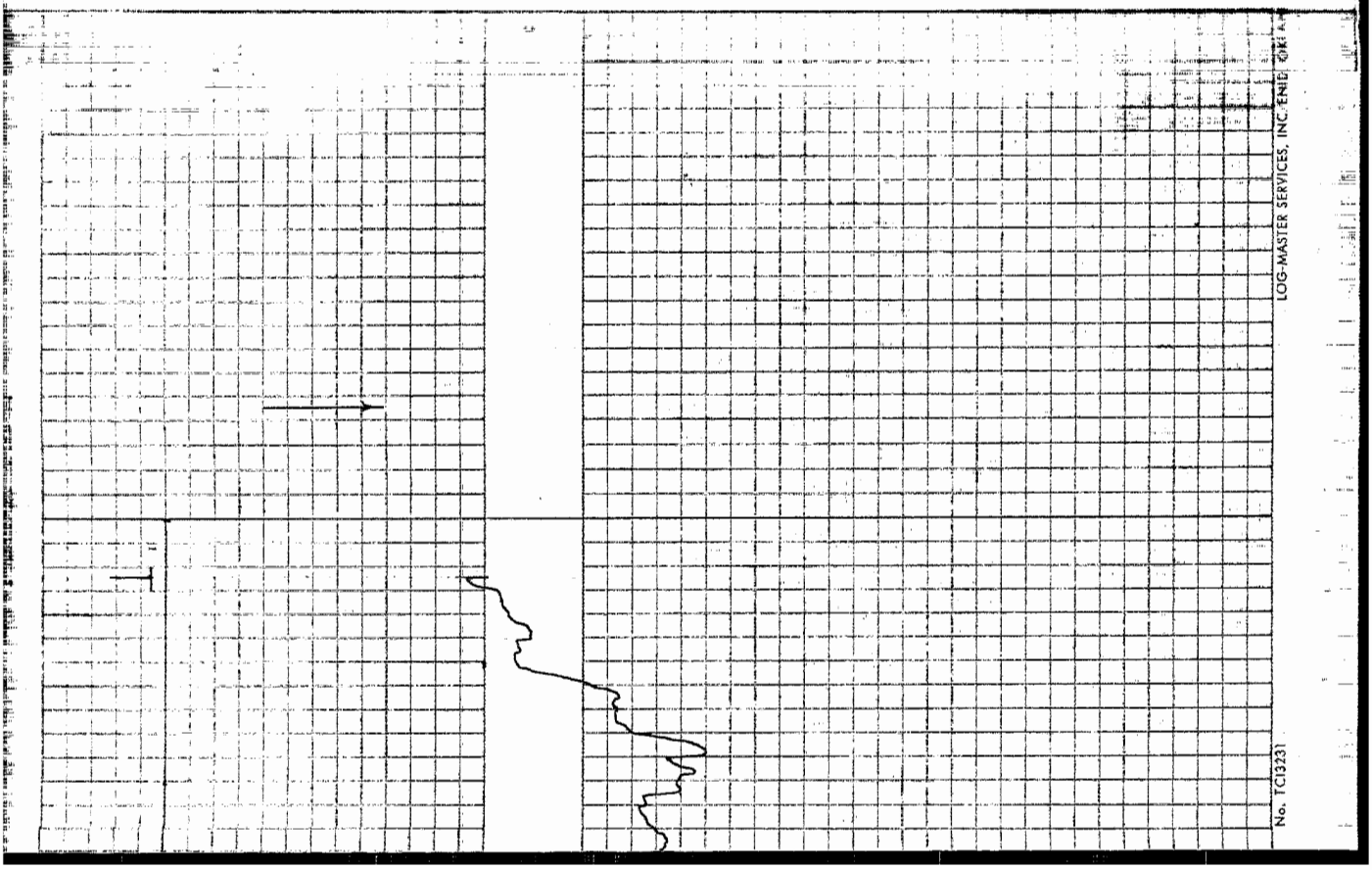
SENSITIVITY: RANGE: 10

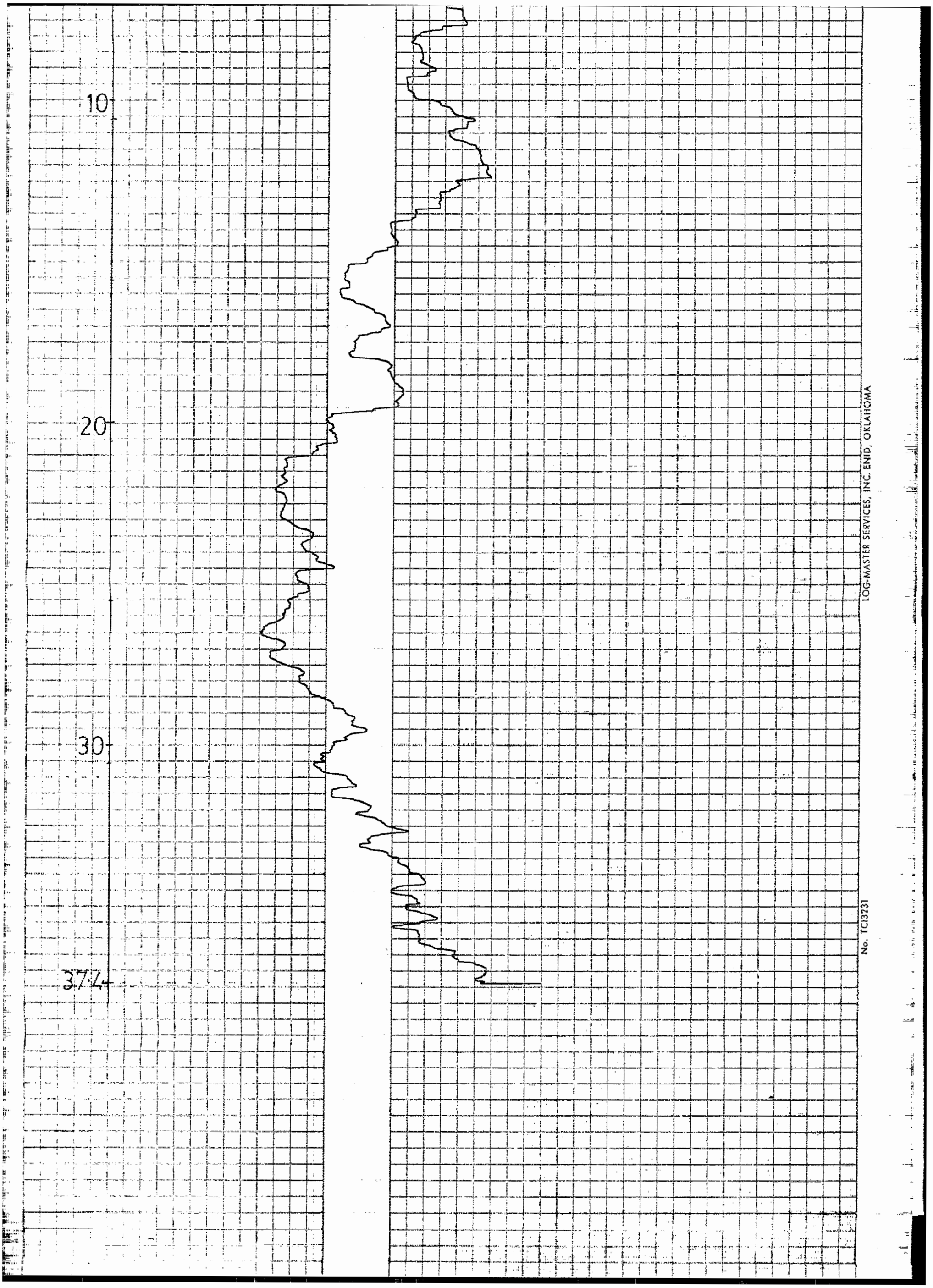
TIME CONSTANT: 4 second SPEED: 8 M/MIN.

1st READING 37·4 m INSTRUMENT: LM 444 B LMG 15

LAST READING: 1·2m OBSERVER: R. P.

INTERVAL: 36·2m




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37.4
LOG-MASTER SERVICES, INC. ENID, OKLAHOMA
No. TCI3231

DEPARTMENT OF TRANSPORT & WORKS

WATER INVESTIGATION UNIT

GEOPHYSICAL BORE LOG

R.N. 12082 AREA: AYERS ROCK STATUS: INVESTIGATION

MAP REFERENCE: A M G 5047 GRID CO ORDS: 000 120

ELEVATION: S. W. L.:

CASING DETAILS: 23·09m x 6" at bottom

DRILLER: W. I. U. DATE COMMENCED: 31·3·79

DEPTH DRILLED: 53·0 m DATE COMPLETED: 3·4·79

RADIOMETRIC LOG DATA

SERVICE: W. I. U. LOG TYPE: GAMMA RAY DATE: 7·6·79

RUN NO: 3 SCALE V: 1 = 200 H:

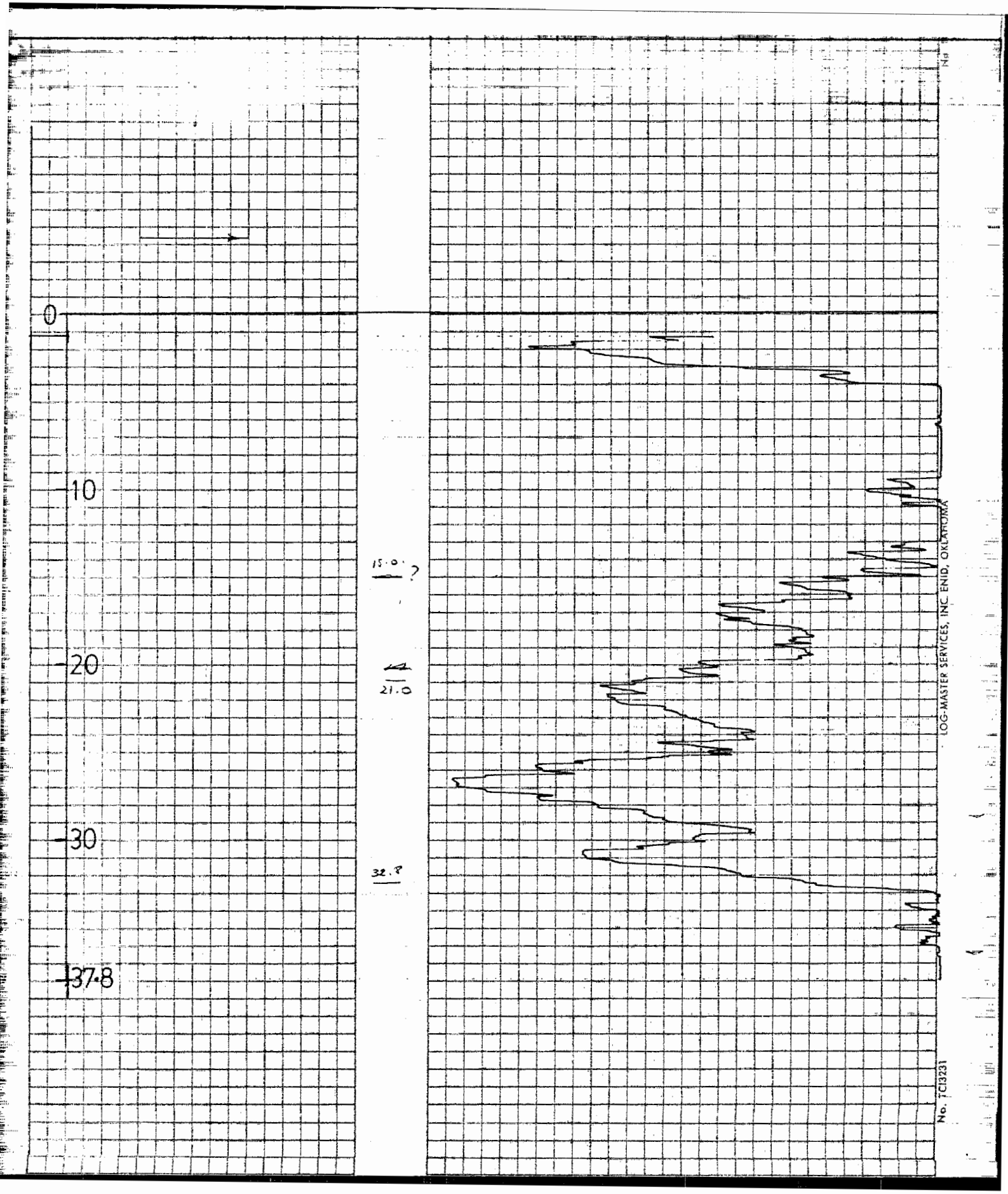
SENSITIVITY: RANGE: 4

TIME CONSTANT: 4 second SPEED: 8 M/MIN.

1st READING: 37·8 m INSTRUMENT: LM 444 B LMG 15

LAST READING: 1·2m OBSERVER: R. P.

INTERVAL: 36·6m


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37.8
15.0 ?
21.0
32.8
LOG-MASTER SERVICES, INC. ENID, OKLAHOMA
No. 7CI3231

Regulation 8

THE NORTHERN TERRITORY OF AUSTRALIA

Control of Waters Ordinance

FINAL STATEMENT OF BORE

RN012082

IN 2/290

RN 12082

From	To	Description of Strata
0.00	6.00	HARD BROWN STONE.
6.00	18.00	LIGHT BROWN STONE.
18.00	23.00	BROWN STONE
23.00	25.00	WHITE & BROWN SANDY STONE
25.00	37.00	BROWN CLAY & STONE.
37.00	38.00	BROWN & GREY CLAY
38.00	43.00	CARBONISH & LIGHT BROWN CLAY
43.00	48.00	GREY SAND & CARBONISH CLAY
48.00	53.00	LIGHT BROWN STONE & WHITE & BROWN CLAY

Location of Bore (or supply sketch on back hereof) -

..... Miles

(a) N NE / S SE / E NW / W SW of (b) (T.N.)

(a) Circle appropriate direction.
(b) Use known point such as existing bore, homestead, outstation, etc.

Additional information of interest about the bore - Drilled to 33.00m with 7" Hammer then Drill on to 53.00m

Map No: AMG 5047

Grid Reference: 000120

Samples of strata and water supplies
have been *
~~will~~ be *
left at the following trading place -

W.R.B. Office A/S

R Bark
Signature

* Strike out which does not apply.

For office use only -

Name of Bore - RN12082 (TN)

Name of Property - Ayers Rock

Description of Property - NP

Name of Owner - NTRB

Name of Contractor - W.R.B.

Name of Driller - R. Darby

Date of Commencement - 31/3/79

Date of Completion - 3/4/79

Total Depth - 53.00m

Particulars of Casing - 23.09 x 6" CASING STILLIN HOLE AT BOTTOM.

Particulars of Perforations or Screens - Nil

Water	1st Supply	2nd Supply	3rd Supply
Struck at	18.00m	28.00m	48.00m
Standing Water Level			
Pumping Supply: ~~G.F.H.~~ U/S	1 L/S	2 L/S	½ U/S
Duration of Pump Test			
Water Level During Test			
Quality: Good, Fair, Bad	4,500 PPM	4,200 PPM	3,900 PPM

WATER ANALYSIS

27290

Laboratory Register No.	Date received in Laboratory
79/0574	9.5.79

WR 4/1

Bottle No.	Time of sampling (hrs)	Date of sampling
YP 92	1600	2.4.79

LOCATION AND DETAILS
Ayers Rock – RN/12082 Depth: 48 m. Disch: 3 lps. Airlift RSP. 88

Sampler: Darby

ANALYSIS - PHYSICAL

pH	7.7	Colour (Hazen units)	
Specific conductance (microsiemens/cm at 25°C)	4900	Turbidty (A.P.H.A. units)	
Total dissolved solids (mg/l - by evaporation at 180°C)	3340	Suspended solids (mg/l)	

ANALYSIS - CHEMICAL (mg/l)

Total dissolved solids (by summation)	3335	Total alkalinity (as $CaCO_3$)	178
Sodium chloride (calc from chloride)	1551	Total hardness (as $CaCO_3$)	1075
Chloride, Cl	941	Sodium, Na	650
Sulphate, SO_4	1000	Patassium, K	85
Nitrate NO_3	47	Calcium, Ca	248
Bicarbonate, HCO_3	217	Magnesium, Mg	111
Carbonate, CO_3		Iron (total), Fe	20
Fluoride, F	2.0	Silica, SiO_2	40

ANALYLIS - ADDITIONAL (mg/l)

ANALYSED BY: Holger Henkel Date 30 / 5 / 79

REMARKS: The sample as analysed is chemically unsuitable for human consumption according to 1971 W.H.O. International Standards for drinking water as the total dissolved solids exceed the maximum permissible level. Suitable for stock.

"Information or discussion on the analysis shown above, can be obtained by contacting the Senior Engineer, Water Quality, Water Recources Branch, Darwin".

90999—5/78 C. J. THOMPSON, Commonwealth Government Printer, Darwin

Regulation 8 N.T.A. 161

THE NORTHERN TERRITORY OF AUSTRALIA

Control of Waters Ordinance IN 2/284

FINAL STATEMENT OF BORE RN 12076

From	To	Description of Strata
0·00	6·00	[illegible] & BROWN STONE
6·00	12·00	RED & LIGHT BROWN & BROWN STONE
12·00	18·00	BROWN STONE & LIGHT BROWN CLAY
18·00	24·00	BROWN STONE & CLAY
24·00	30·00	BROWN & WHITEISH STONE
30·00	36·00	LIGHT GREY STONE

Location of Bore (or supply sketch on back hereof) -

.....Miles

(a) N NE S SE E NW W SW of (b) ..(4 NW).....

.....

(a) Circle appropriate direction.
(b) Use known point such as existing bore, homestead, outstation, etc.

Additional information of interest about the bore - DRILLED ALWAYS WITH 7" HAMMER BIT
SURFACE CASING PULLED
HOLE BACK FILLED 1-5-79.

Map No: 5047

Grid Reference: AMG 983932

Samples of strata and water supplies
~~have been~~ *
will be *
left at the following trading place -

...W.F.B. OFFICE...A/S.....

.....R. Boast.....
Signature

* Strike out which does not apply.

For office use only -

Name of Bore - RN12076 (4 NW)

Name of Property - AYERS Rock

Description of Property - N.P.

Name of Owner - N.T.A.B.

Name of Contractor - W.F.B.

Name of Driller - R. DADDY

Date of Commencement - 24/3/79

Date of Completion - 24/3/79

Total Depth - 37.69

Particulars of Casing - 4·80 x 8" SURF CASING

Particulars of Perforations or Screens - Nil

Water	1st Supply	2nd Supply	3rd Supply
Struck at	SEEPAGE 18·00	W/C 28·00	
Standing Water Level		12·6 am	
Pumping Supply: ~~C.P.H.~~ L/S		3 L/S	
Duration of Pump Test			
Water Level During Test			
Quality: Good, Fair, Bad		CONDUCT 3,600 @ 20°	

WATER ANALYSIS

Laboratory Register No. 79/0570

Date received in Laboratory 9.5.79

WR 4/1	Bottle No.	Time of sampling (hrs)	Date of sampling
	ZQ 64	1050	24.3.79

LOCATION AND DETAILS
Ayers Rock RN/12076 Depth: 36m Disch: 3.0 lps Airlift

RSP. 88

ANALYSIS - PHYSICAL

pH	7.9	Colour (Hazen units)	
Specific conductance (microsiemens/cm at 25°C)	3240	Turbidty (A.P.H.A. units)	
Total dissolved solids (mg/l - by evaporation at 180°C)	2110	Suspended solids (mg/l)	

ANALYSIS - CHEMICAL (mg/l)

Total dissolved solids (by summation)	2249	Total alkalinity (as $CaCO_3$)	176
Sodium chloride (calc from chloride)	986	Total hardness (as $CaCO_3$)	698
Chloride, Cl	598	Sodium, Na	410
Sulphate, SO_4	580	Patassium, K	68
Nitrate NO_3	75	Calcium, Ca	148
Bicarbonate, HCO_3	214	Magnesium, Mg	80
Carbonate, CO_3		Iron (total), Fe	18.6
Fluoride, F	1.5	Silica, SiO_2	74

ANALYLIS - ADDITIONAL (mg/l)

ANALYSED BY: G.JOHNSTON Date 21 / 5 / 79

REMARKS:

WATER INVESTIGATION UNIT
ALICE SPRINGS
30 AUG 1979
DEPT. OF TRANSPORT & WORKS

"Information or discussion on the analysis shown above, can be obtained by contacting the Senior Engineer, Water Quality, Water Recources Branch, Darwin".

90999—5/78 C. J. THOMPSON, Commonwealth Government Printer, Darwin

WATER CONDUCTIVITY ANALYSIS.

BORE: REGISTERED NUMBER: 12076

LOCATION: Ayers Rock

DATE TESTED: 3-5-79 TESTED BY: R. Boeyen

BOTTLE No.	DATE	TIME	DEPTH	DISCHARGE	SAMPLER		CONDUCTIVITY
CQ 89	24-3-79	1030	30 M	3.0 l/sec	R. Daby		3400
ZQ 65	"	1050	36 M	3.0 l/sec	"		3400

YULARA VILLAGE WATER RESOURCES 60.6D

RN 12076
IN 2/284
5047 Mt Olga

Depth (m)			Description
0	-	3	SAND. Reddish brown.
3	-	6	CALCRETE.
6	-	18	SAND. Light brown poorly sorted rounded sand, with much silt.
18	-	27	CLAY & SAND. Reddish brown clay with sand.
27	-	30	SANDSTONE. Silicified purple brown sandstone with minor white siltstone.
30	-	36	SILTSTONE. White calcareous siltstone with sand.

SUMMARY

0	-	6	Sand, calcrete	Tertiary
6	-	18	Sand	
18	-	~~27~~ 26.7	Clay and sand	
26.7*	~~27~~	- 30	Sandstone	
30	-	36	Siltstone	

MAJOR AQUIFER

28m 3.0 ls^{-1} Base of Tertiary Clay.

Geoff Knott

GEOFF KNOTT
HYDROGEOLOGIST

October 1979

NTA 1718

DATE 24/3/79 BORE No. RN12076 (4 NW) Driller: DARBY

Time	Depth	Feet drilled	Mins lapsed	Drillers remark, casing details
0730				MOVE OVER SITE + SET UP, DRILL TO
				6-00 WITH 7" HAMMER BIT, PULL OUT
				+ CHANGE TO 9 7/8 ROLLER BIT + RIMER
				OUT TO 4-30 M FOR 8" BULK CASING
0900	6m	6m		RED & LIGHT BROWN STONE
				ADD D/C
0945	12m	6m		LIGHT BROWN + BROWN STONE (DAMP)
				ADD D/C
1000	18m	6m		BROWN STONE + LIGHT BROWN CLAY
				ADD D/P
1015	24m	6m		BROWN STONE + CLAY
				ADD D/P
1030	30m	6m		BROWN + WHITE SILT STONE W/C 28m 34/5
				ADD D/P ZQ·28 - ZQ·89
1050	36m	6m		LIGHT GREY STONE
				ZQ·64 - ZQ·65
				NO WATER FLOW JUST 8"
				SCAR CASING
				SWL 12·60m

BIT DATA No.	Size	Type	Worn cond'n
13648	9 7/8	Roll	USED
39645	7"	Button	USED

STRING DATA Item	O.D.	Length	Prog. tally
HAMMER BIT + SUB			1·75
D/C	6 1/2	5·73	7·48
D/C	6 1/2	6·01	13·49
D/P	6 1/2	6·00	19·49
D/P	6 1/2	6·00	25·49
CONDUCT 3,500 PPM			
D/P	6 1/2	6·00	31·49
CONDUCT 3,600			

MUD DATA

14702/69.... W. G. Murray, Government Printing Office, Canberra

DEPARTMENT OF TRANSPORT & WORKS
WATER INVESTIGATION UNIT
GEOPHYSICAL BORE LOG

R N. 12076 AREA: AYERS ROCK

STATUS : INVESTIGATION

MAP REFERENCE: 5047

GRID CO ORDS : 483 132

ELEVATION :

S. W. L. : 12·6m

CASING DETAILS : 4·8m x 8"

DRILLER : W. I. U.

DATE COMMENCED : 24·3·79

DEPTH DRILLED : 37·49m

DATE COMPLETED : 24·3·79

RADIOMETRIC LOG DATA

SERVICE : W. I.U.

LOG TYPE : GAMMA RAY

DATE : 2·4·79

RUN NO. : 1

SCALE : V : 1 = 100

H :

SENSITIVITY :

RANGE : 4

TIME CONSTANT : 4sec

SPEED : 13 M/ MIN :

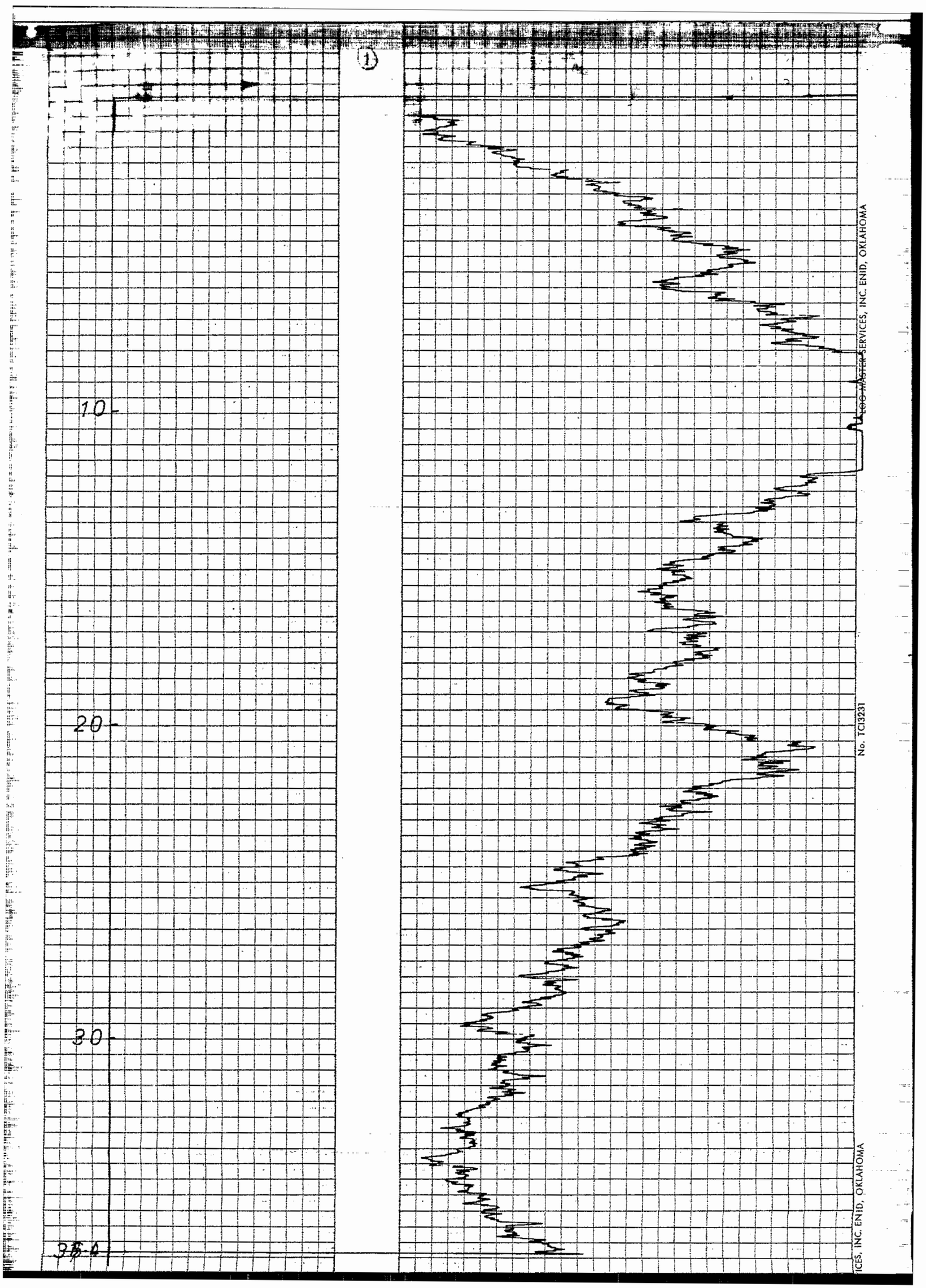
1st READING : 1·1m

INSTRUMENT : LM 444 B LMG 15

LAST READING : 37·0m

OBSERVER : R. P.

INTERVAL : 35·9m


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35.4
LOG-MASTER SERVICES, INC. ENID, OKLAHOMA
No. TCI3231
ICES, INC. ENID, OKLAHOMA

DEPARTMENT OF TRANSPORT & WORKS
WATER INVESTIGATION UNIT
GEOPHYSICAL BORE LOG

R N 12076 AREA: AYERS ROCK

STATUS : INVESTIGATION

MAP REFERENCE : 5047

GRID CO ORDS : 483 132

ELEVATION :

S. W. L. : 12·6m

CASING DETAILS : 4·8m x 8"

DRILLER : W. I. U.

DATE COMMENCED : 24·3·79

DEPTH DRILLED : 37·49m

DATE COMPLETED : 24·3·79

RADIOMETRIC LOG DATA

SERVICE : W. I. U.

LOG TYPE : GAMMA RAY

DATE : 2·4·79

RUN NO. : 2

SCALE : V : 1 = 100 H :

SENSITIVITY :

RANGE : 4

TIME CONSTANT : 4 sec

SPEED : 16 M/ MIN :

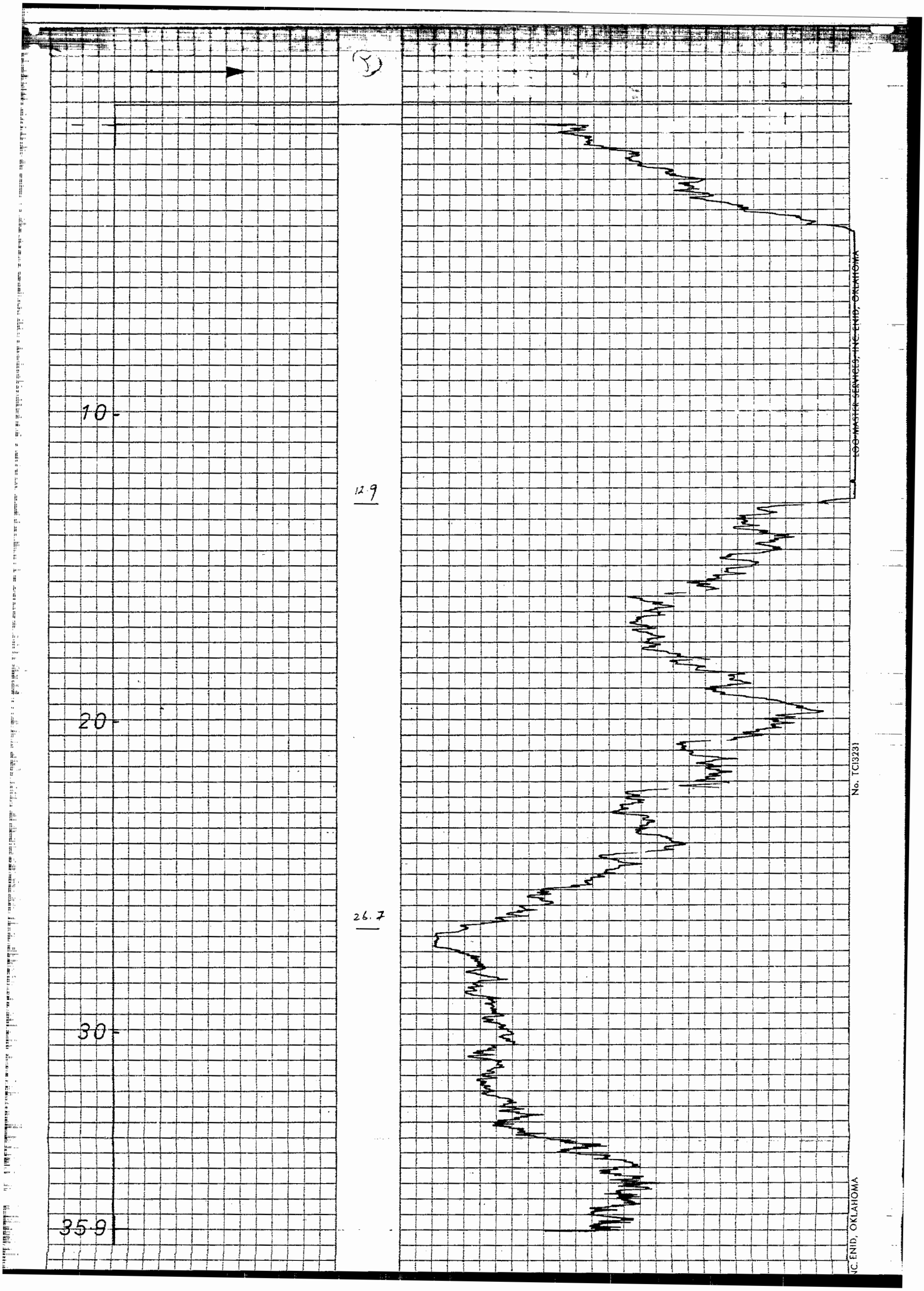
1st READING : 36·5m

INSTRUMENT : LM444B LMG 15

LAST READING : 1·1m

OBSERVER : R. P

INTERVAL : 35·4 m


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35.9
12.9
26.7
No. TCI3231
LOG-MASTER SERVICES, INC. ENID, OKLAHOMA

DEPARTMENT OF TRANSPORT & WORKS
WATER INVESTIGATION UNIT
GEOPHYSICAL BORE LOG

R N : 12076 AREA: AYERS ROCK

STATUS : INVESTIGATION

MAP REFERENCE: 5047

GRID CO ORDS : 483 132

ELEVATION :

S. W. L. : 12·6m

CASING DETAILS : 4·8m x 8"

DRILLER : W. I. U.

DATE COMMENCED : 24·3·79

DEPTH DRILLED : 37·49 m

DATE COMPLETED : 24·3·79

RADIOMETRIC LOG DATA

SERVICE : W. I. U.

LOG TYPE : GAMMA RAY

DATE : 2·4·79

RUN NO. : 3

SCALE : V : 1 = 100 H :

SENSITIVITY :

RANGE : 10

TIME CONSTANT : 4 sec

SPEED : 18 M/ MIN :

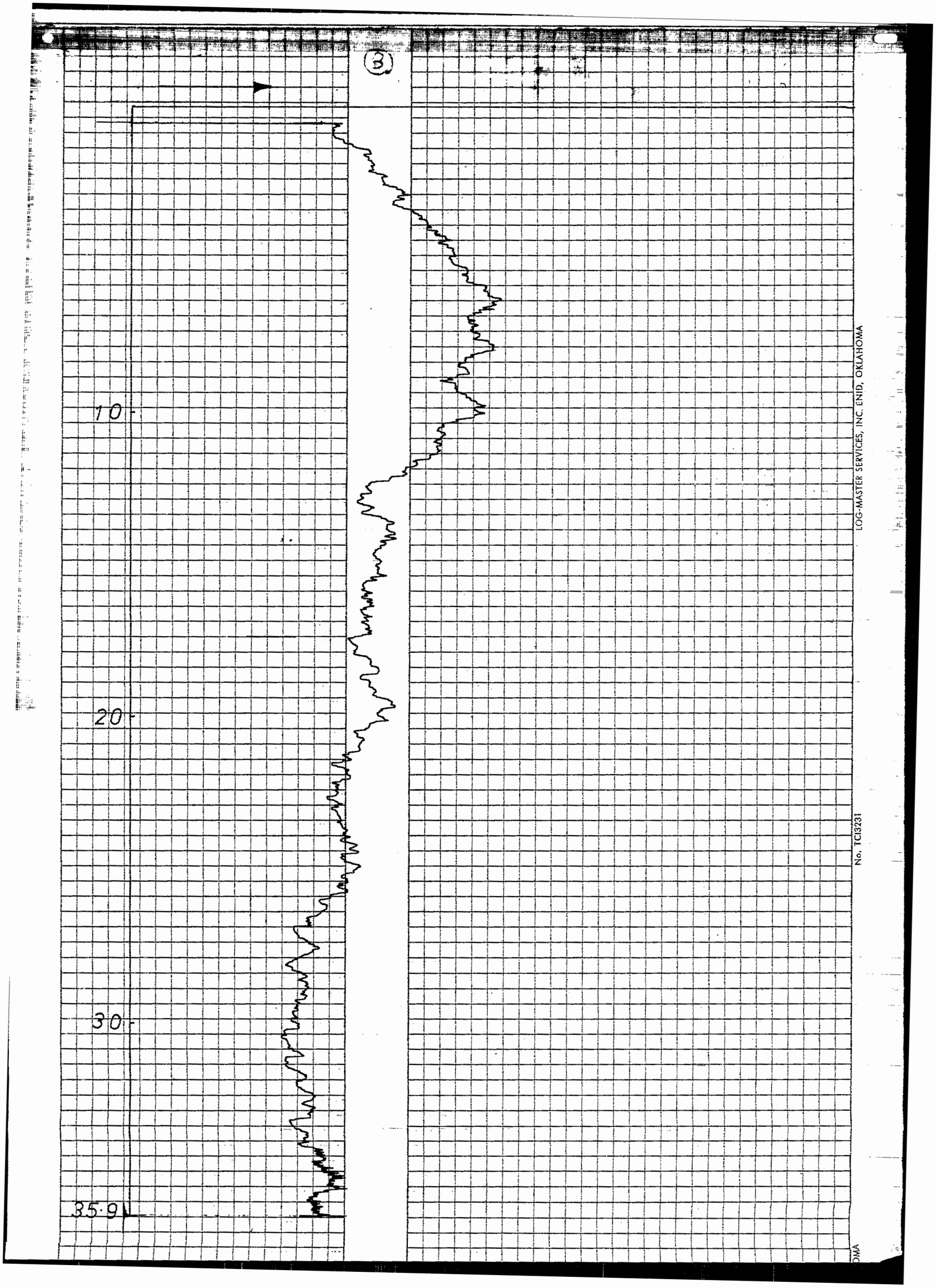
1st READING : 36·6m

INSTRUMENT : LM 444B LMG 15

LAST READING : 1·1m

OBSERVER : R. P.

INTERVAL : 35·5m


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35·9
LOG-MASTER SERVICES, INC. ENID, OKLAHOMA
No. TCI3231

Regulation 8

RN012076

THE NORTHERN TERRITORY OF AUSTRALIA

Control of Waters Ordinance

IN 2/284

FINAL STATEMENT OF BORE

RN 12076

From	To	Description of Strata
0.00	6.00	~~[illegible]~~ & BROWN STONE
6.00	12.00	LIGHT BROWN & BROWN STONE
12.00	18.00	BROWN STONE & LIGHT BROWN CLAY
18.00	24.00	BROWN STONE & CLAY
24.00	30.00	BROWN & WHITE SILL STONE
30.00	36.00	LIGHT GREY STONE

Location of Bore (or supply sketch on back hereof) -

.....Miles

(a) N NE S SE E NW W SW of (b) (4.NW)

(a) Circle appropriate direction.
(b) Use known point such as existing bore, homestead, outstation, etc.

Additional information of interest about the bore - Daiken all way with 7" Hammer Bit

Map No: 5047

Grid Reference: AM6 983 132

Samples of strata and water supplies
~~have been~~ *
will be *
left at the following trading place -

...W.T.B. Office...A/S.....

.....R. Boof.....
Signature

* Strike out which does not apply.

For office use only -

Name of Bore - RN 12076 (4 NW)

Name of Property - Ayers Rock

Description of Property - N.P.

Name of Owner - N.T.B.

Name of Contractor - W.T.B.

Name of Driller - R. Daddy

Date of Commencement - 24/3/79

Date of Completion - 24/3/79

Total Depth - 37.49

Particulars of Casing - 4.80 x 8" SURF CASING

Particulars of Perforations or Screens - Nil

Water	1st Supply	2nd Supply	3rd Supply
Struck at	SEEPAGE 15 cms	W/C 28-00	
Standing Water Level		12.60 m	
Pumping Supply: ~~G.W.~~ S.W.		3 L/S	
Duration of Pump Test			
Water Level During Test			
Quality: Good, Fair, Bad		CONDUCT 3,600 @ 25°	

WATER ANALYSIS

2/284

Laboratory Register No. 79/0570

Date received in Laboratory 9.5.79

WR 4/1

Bottle No.	Time of sampling (hrs)	Date of sampling
ZQ 64	1050	24.3.79

LOCATION AND DETAILS

Ayers Rock, RN/12076 Depth 36 mm Disch: 3.0 lps. AIRLIFT RSP. 86

Sampler: R. Darby

ANALYSIS - PHYSICAL

pH	7.9	Colour (Hazen units)	
Specific conductance (microsiemens/cm at 25°C)	3240	Turbidty (A.P.H.A. units)	
Total dissolved solids (mg/l - by evaporation at 180°C)	2110	Suspended solids (mg/l)	

ANALYSIS - CHEMICAL (mg/l)

Total dissolved solids (by summation)	2249	Total alkalinity (as $CaCO_3$)	176
Sodium chloride (calc from chloride)	986	Total hardness (as $CaCO_3$)	698
Chloride, Cl	598	Sodium, Na	410
Sulphate, SO_4	580	Patassium, K	68
Nitrate NO_3	75	Calcium, Ca	148
Bicarbonate, HCO_3	214	Magnesium, Mg	80
Carbonate, CO_3		Iron (total), Fe	18.6
Fluoride, F	1.5	Silica, SiO_2	74

ANALYLIS - ADDITIONAL (mg/l)

ANALYSED BY: Holger Henkel Date 21 / 5 / 79

REMARKS: The sample as analysed is chemically unsuitable for human consumption according to 1971 W.H.O. International Standards for drinking water and the Total Dissolved Solids exceed the maximum permissible level. Suitable for stock.

"Information or discussion on the analysis shown above, can be obtained by contacting the Senior Engineer, Water Quality, Water Recources Branch, Darwin".

90999—5/78 C. J. THOMPSON, Commonwealth Government Printer, Darwin

APPENDIX D - GROUNDWATER QUALITY FORMS

TETRA TECH COFFEY

Groundwater Sampling Form - Hydrasleeve

PROJECT NAME:	Ayers Rock Airport	PROJECT NUMBER:	754-PEREN233360
FIELD PERSONNEL:	John Hardless and Sarah Richards	DATE:	28/06/2023
PROJECT MANAGER:	Sarah Richards, Adam Xanthis	PAGE	1 of 1

Method: __Hydrasleeve sampling_____

FIELD EQUIPMENT IDENTITIES

IP Serial number: _____ _348889_____

WQM Serial Number: __19E100244_____

PID Serial number: _____N/A_____

FIELD EQUIPMENT INSTALLATION DETAILS

Depth to Water - Before Installation: _____N/A_____ m below TOC

Hydrasleeve Depth: Base of well casing

After Installation: _____N/A____ m below TOC

Equipment Volume: _____1 L_____

ORP Ref Electrode: (circle) SHE / Calomel Saturated KCl / Ag/AgCl 1M KCl / Ag/AgCl 4M KCl / Ag/AgCl Saturated KCl

WELL HEADSPACE PID READING

PID READING

PPM: _____N/A_____

TIME OF DAY	Sample ID	Date sampled	DEPTH TO WATER (m) note 2	DISSOLVED OXYGEN (mg/l)		ELECTRICAL CONDUCTIVITY (mS or µS/cm)		pH (pH units)		REDOX POTENTIAL (mV)		TEMPERATURE (°C)		CLARITY – tick one					COMMENTS
				READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE	Clear	Slightly Cloudy	Cloudy	Very Cloudy	Turbid	ODOUR, COLOUR, SEDIMENTS, PSH COLLECTED, etc
13:10	**GW01**	28/6/23		**5.94**		**2782**		**7.35**		**265**		**23.2**		**x**					**2 X 125ml PFAS**
13:51	RN12082	28/6/23		7.18		4809		7.17		282.7		23.0					x		Rusty floculant
14:10	RN12081	28/6/23		3.19		2939		8.45		-10		23.9		x					Slight H_2S odour
15:15	RN12065	28/6/23		2.50		2576		8.38		72.5		24.3		x					Black precipitate at the bottom
15:40	GW03	28/6/23		-		1565		7.53		123.8		241.4			x				Red-brown tinge
15:50	GW02	28/6/23		4.9		3030		7.37		140		25.6			x				-
16:05	GW05	28/6/23		5.95		2445		7.4		141		23.9		x					-
16:20	GW04	28/6/23		5.35		4436		7.2		146		24.8		x					-
16:35	GW06	28/6/23		6.62		826		7.68		121.1		24.8		x					No observable odour

TETRA TECH COFFEY

Groundwater Gauging and Water Quality Parameters - 2022

Airservices Australia Ayers Rock Airport (AYQ) – Environmental Site Investigation

PFAS Characterisation Program

Well ID	Easting	Northing	RL TOC (mAHD)	Date Measured	Time Measured	Depth to Water (mBTOC)	SWL (mAHD)	Total Well Depth (mBTOC)	Date Hydrosleeve Deployed	Dissovled Oxygen (mg/L)	Electrical Conductivity (µS/cm)	TDS* (mg/L)	pH (pH units)	Redox Potential (mV)	Temperature (°C)	Comments
GW01	698,962.23	7,212,359.25	492.62	27/06/2022	4:46 PM	9.690	482.930	15.00	28/06/2022	5.94	2782	1808	7.35	265.0	23.2	Clear
GW02	698,824.01	7,212,592.63	491.91	28/06/2022	9:27 AM	9.065	482.730	14.00	28/06/2022	4.90	3030	1970	7.37	140.0	25.6	Slightly cloudy
GW03	698,717.86	7,212,828.81	492.17	27/06/2022	4:10 PM	9.610	482.500	14.00	28/06/2022	-	1565	1017	7.53	123.8	21.4	Slightly cloudy
GW04	698,812.00	7,213,197.00	492.49	28/06/2022	8:59 AM	10.940	482.435	15.00	28/06/2022	5.35	4436	2883	7.20	146.0	24.8	Clear
GW05	698,638.00	7,213,090.00	492.99	28/06/2022	9:13 AM	11.435	482.340	15.00	28/06/2022	5.95	2445	1589	7.40	141.0	23.9	Clear
GW06	698,913.33	7,212,865.66	491.47	28/06/2022	1:24 PM	8.810	482.585	15.00	28/06/2022	6.62	826	537	7.68	121.1	24.8	Clear
RN12065	698,865.43	7,213,077.70	492.64	-	-	-	482.542	-	28/06/2022	2.50	2576	1674	8.38	72.5	24.3	Clear
RN12081	698,936.46	7,211,120.69	496.19	27/06/2022	10:13 AM	13.080	483.166	90.00	28/06/2022	3.19	2939	1910	8.45	-10.0	23.9	Clear. Slight rotten egg odour
RN12082	699,627.00	7,211,398.00	-	27/06/2022	9:38 AM	12.880	-	-	28/06/2022	7.18	4809	3126	7.17	282.7	23.0	Very cloudy
RN12163	699,627.38	7,211,397.86	495.30	27/06/2022	9:09 AM	13.090	483.056	14.06 (blocked)	-	-	-	-	-	-	-	

Australian height datum (AHD)

* = TDS gained by multiplying electrical conductivity by 0.65

TETRA TECH COFFEY

Groundwater Gauging and Water Quality Parameters - 2023

Airservices Australia Ayers Rock Airport (AYQ) – Environmental Site Investigation

PFAS Characterisation Program

Well ID	Easting	Northing	RL TOC (mAHD)	Date Measured	Time Measured	Depth to Water (mBTOC)	SWL (mAHD)	Total Well Depth (mBTOC)	Date Hydrasleeve Deployed	Dissovled Oxygen (mg/L)	Electrical Conductivity (µS/cm)	TDS* (mg/L)	pH (pH units)	Redox Potential (mV)	Temperature (°C)	Comments
GW01	698962.228	7212359.252	492.62	04/02/2023	12:15	9.692	482.928	15	04/02/2023	3.16	2466	1603	7.48	126.0	30.4	Clear, no observable turbidity
GW02	698824.009	7212592.625	491.91	04/02/2023	13:00	9.067	482.843	14	04/02/2023	1.03	2706	1759	7.31	119.7	29.2	Clear, no observable turbidity
GW03	698717.856	7212828.808	492.17	04/02/2023	13:40	9.659	482.511	14	04/02/2023	4.87	1521	989	7.66	121.0	29.7	Clear, no observable turbidity
GW04	698812.153	7213196.930	492.49	05/02/2023	9:00	11.210	481.280	15	05/02/2023	3.27	4614	2999	7.30	111.1	29.5	Clear, no observable turbidity
GW05	698637.731	7213089.898	492.99	05/02/2023	8:10	11.655	481.335	15	05/02/2023	1.43	2318	1507	7.37	115.0	28.4	Clear, no observable turbidity
GW06	698913.329	7212865.655	491.47	05/02/2023	7:30	8.896	482.574	15	05/02/2023	2.07	1015	660	7.58	100.2	29.3	Clear, no observable turbidity
GW07	699116.243	7212188.066	494.33	05/02/2023	12:00	11.504	482.826	15	05/02/2023	1.38	2520	1638	7.38	102.4	26.1	Clear, no observable turbidity
GW08	698966.861	7212489.676	492.51	05/02/2023	12:30	9.665	482.845	15	05/02/2023	1.85	2662	1730	7.19	110.3	25.8	Slightly cloudy, pale yellow, low turbidity
GW09	699130.608	7212922.144	491.40	05/02/2023	9:30	8.874	482.526	15	05/02/2023	1.89	831	540	7.75	92.8	30.5	Slightly cloudy, pale yellow, low turbidity
GW10	698117.293	7213048.706	493.75	05/02/2023	10:10	12.150	481.600	15	05/02/2023	1.97	3647	2371	7.08	129.1	28.4	Clear, no observable turbidity
GW11	698163.310	7213766.856	490.25	05/02/2023	10:30	9.150	481.100	14	05/02/2023	0.63	861	560	7.68	91.9	27.3	Clear, no observable turbidity
RN012065	698865.434	7213077.704	492.64	7/02/2023	10:00	10.240	482.400	35	7/02/2023	0.26	2368	1539	8.62	51.1	24.3	Clear, no observable turbidity

Australian height datum (AHD)

* = TDS gained by multiplying electrical conductivity by 0.65

TETRA TECH COFFEY

Groundwater Sampling Form - Hydrasleeve

PROJECT NAME:	Ayers Rock Airport	PROJECT NUMBER:	754-PEREN233360
FIELD PERSONNEL:	Sanjana Audit	DATE:	5/2/23
PROJECT MANAGER:	Matthew Jessop-Hunt	PAGE	1 of 1

WELL ID: __Hydrasleeve sampling_____

FIELD EQUIPMENT IDENTITIES

IP Serial number: _____

WQM Serial Number: __19L102400_____

PID Serial number: _____N/A_____

FIELD EQUIPMENT INSTALLATION DETAILS

Depth to Water - Before Installation: _____N/A_____ m below TOC

Hydrasleeve Depth: Base of Well casing

After Installation: _____N/A____ m below TOC

Equipment Volume: _____l L _____

ORP Ref Electrode: (circle) SHE / Calomel Saturated KCl / Ag/AgCl 1M KCl / Ag/AgCl 4M KCl / Ag/AgCl Saturated KCl

WELL HEADSPACE PID READING

PID READING

PPM: _____N/A_____

TIME OF DAY	Sample ID	Date sampled	DEPTH TO WATER (m) note 2	DISSOLVED OXYGEN (mg/l)		ELECTRICAL CONDUCTIVITY (mS or µS/cm)		pH (pH units)		REDOX POTENTIAL (mV)		TEMPERATURE (°C)		CLARITY – tick one					COMMENTS
				READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE	Clear	Slightly Cloudy	Cloudy	Very Cloudy	Turbid	ODOUR, COLOUR, SEDIMENTS, PSH COLLECTED, etc
12.30	**GW02**	**5/2/23**	**9.206**	**1.03**		**2706**		**7.31**		**119.7**		**29.2**		**X**					**Clear, no observable turbidity**
13:00	GW03	5/2/23	9.667	4.87		1521		7.66		121		29.7		X					**Clear, no observable turbidity**
13:40	GW01	5/2/23	9.689	3.16		2466		7.48		126		30.4		X					**Clear, no observable turbidity**
8:00	GW07	6/2/23	11.525	1.38		2520		7.38		102.4		26.1		X					**Clear, no observable turbidity**
8:30	GW08	6/2/23	9.689	1.85		2662		7.19		110.3		25.8			X				Pale yellow, low turbidity
10:00	GW10	6/2/23	12.456	1.97		3647		7.08		129.1		28.4		X					**Clear, no observable turbidity**
10:30	GW11	6/2/23	9.251	0.63		861		7.68		91.9		27.3		X					**Clear, no observable turbidity**
11:00	GW04	6/2/23	11.325	3.27		4614		7.30		111.1		29.5		X					**Clear, no observable turbidity**
11:30	GW09	6/2/23	8.905	1.89		831		7.75		92.8		30.5			X				Pale yellow, low turbidity
12:00	GW05	6/2/23	11.672	1.43		2318		7.37		115		28.4		X					**Clear, no observable turbidity**
12:30	GW06	6/2/23	8.963	2.07		1015		7.58		100.2		29.3		X					**Clear, no observable turbidity**
7:00	RN012065	8/2/23	0.26	0.91		2368		8.62		51.1		24.3		X					**Clear, no observable turbidity**

Groundwater Gauging and Water Quality Parameters - 2023

Airservices Australia Ayers Rock Airport (AYQ) – Environmental Site Investigation

PFAS Characterisation Program

Well ID	Easting	Northing	RL TOC (mAHD)	Date Measured	Time Measured	Depth to Water (mBTOC)	SWL (mAHD)	Total Well Depth (mBTOC)	Date Hydrasleeve Deployed	Dissovled Oxygen (mg/L)	Electrical Conductivity (µS/cm)	TDS* (mg/L)	pH (pH units)	Redox Potential (mV)	Temperature (°C)	Comments
GW01	698962.228	7212359.252	492.62	04/02/2023	12:15	9.692	482.928	15	04/02/2023	3.16	2466	1603	7.48	126.0	30.4	Clear, no observable turbidity
GW02	698824.009	7212592.625	491.91	04/02/2023	13:00	9.067	482.843	14	04/02/2023	1.03	2706	1759	7.31	119.7	29.2	Clear, no observable turbidity
GW03	698717.856	7212828.808	492.17	04/02/2023	13:40	9.659	482.511	14	04/02/2023	4.87	1521	989	7.66	121.0	29.7	Clear, no observable turbidity
GW04	698812.153	7213196.930	492.49	05/02/2023	09:00	11.210	481.280	15	05/02/2023	3.27	4614	2999	7.30	111.1	29.5	Clear, no observable turbidity
GW05	698637.731	7213089.898	492.99	05/02/2023	08:10	11.655	481.335	15	05/02/2023	1.43	2318	1507	7.37	115.0	28.4	Clear, no observable turbidity
GW06	698913.329	7212865.655	491.47	05/02/2023	07:30	8.896	482.574	15	05/02/2023	2.07	1015	660	7.58	100.2	29.3	Clear, no observable turbidity
GW07	699116.243	7212188.066	494.33	05/02/2023	12:00	11.504	482.826	15	05/02/2023	1.38	2520	1638	7.38	102.4	26.1	Clear, no observable turbidity
GW08	698966.861	7212489.676	492.51	05/02/2023	12:30	9.665	482.845	15	05/02/2023	1.85	2662	1730	7.19	110.3	25.8	Slightly cloudy, pale yellow, low turbidity
GW09	699130.608	7212922.144	491.40	05/02/2023	09:30	8.874	482.526	15	05/02/2023	1.89	831	540	7.75	92.8	30.5	Slightly cloudy, pale yellow, low turbidity
GW10	698117.293	7213048.706	493.75	05/02/2023	10:10	12.150	481.600	15	05/02/2023	1.97	3647	2371	7.08	129.1	28.4	Clear, no observable turbidity
GW11	698163.310	7213766.856	490.25	05/02/2023	10:30	9.150	481.100	14	05/02/2023	0.63	861	560	7.68	91.9	27.3	Clear, no observable turbidity
RN012065	698865.434	7213077.704	492.64	07/02/2023	10:00	10.240	482.400	35	07/02/2023	0.26	2368	1539	8.62	51.1	24.3	Clear, no observable turbidity

Australian height datum (AHD)

* = TDS gained by multiplying electrical conductivity by 0.65

APPENDIX E - CALIBRATION CERTIFICATES

Oil / Water Interface Meter

airmet

Air-Met Scientific Pty Ltd
1300 137 067

Instrument Interface Meter (100M)
Serial No. 348889

Item	Test	Pass	Comments
Battery	Compartment	✓	
	Capacity	✓	
	above 7.9V		
Probe	Cleaned/Decon.	✓	
	Operation	✓	
Connectors	Condition	✓	
		✓	
Tape Check	Cleaned	✓	
Connectors	Checked for cuts	✓	
Instrument Test	At surface level	✓	

Certificate of Calibration

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

Tested by: Sam Stevens

Test date: 16/06/2022

Next Test due: 13/12/2022

Multi Parameter Water Meter

Instrument **YSI Quatro Pro Plus**
Serial No. **19E100244**

airmet
Air-Met Scientific Pty Ltd
1300 137 067

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

Certificate of Calibration

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

Sensor	Serial no	Standard Solutions	Certified	Solution Bottle Number	Instrument Reading
1. D.O		0 ppm		1911294839	0 ppm
2. Conductivity		2760uS		377099	2760uS
3. pH7		pH 7.00		381241	pH 7.00
4. pH4		pH 4.00		380327	pH 4.00
5. ORP mV		228.72		381475 / 374426	228.72
6. Temp °C		22.4		163377	22.4

Calibrated by: **Harrison Meers**

Calibration date: **16-Jun-22**

Next calibration due: **13-Dec-22**

PID Calibration Certificate

Instrument **PhoCheck Tiger**
Serial No. **T-106574 PPB**

Air-Met Scientific Pty Ltd
1300 137 067

Item	Test	Pass	Comments
Battery	Charge Condition	✓	
	Fuses	✓	
	Capacity	✓	
	Recharge OK?	✓	
Switch/keypad	Operation	✓	
Display	Intensity	✓	
	Operation (segments)	✓	
Grill Filter	Condition	✓	
	Seal	✓	
Pump	Operation	✓	
	Filter	✓	
	Flow	✓	
	Valves, Diaphragm	✓	
PCB	Condition	✓	
Connectors	Condition	✓	
Sensor	PID	✓	10.6 ev
Alarms	Beeper	✓	Low: 50ppm; High: 100ppm; TWA: ; STEL:
	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:

Diffusion mode Aspirated mode

Sensor	Serial no	Calibration gas and concentration	Certified	Gas bottle No		Instrument Reading
PID Lamp		95ppm Isobutylene	NIST	ME846		95ppm Isobutylene

Calibrated by: **Natalya Cheng**

Calibration date: **14/06/2022**

Next calibration due: **11/12/2022**

GK Environmental EQUIPMENT

Calibration Report

Multi-Parameter Water Quality Instrument

Customer:
Contact:

Manufacturer: YSI
Instrument: Professional Plus with Quatro cable
Serial #: 19L102400
Cable length: 1m 19H100045

Item	Test	Pass	Comments
Battery	2 x Alkaline C-cells	✓	Voltage reading above 2.9V
	Battery Saver	✓	Automatically turns off after 30 minutes if not used
Connections	Condition	✓	Good, clean
Cable	Condition	✓	Clean, no tears
Display	Operation	✓	
Firmware	Version	✓	4.0.0
Keypad	Operational	✓	
Display	Screen	✓	
Unit	Condition, seals and O-rings	✓	
Monitor housing	Condition	✓	
pH			
Condition		✓	Good, clean
pH millivolts for pH7 calibration range 0 mV ± 50 mV		✓	
pH 4 mV range + 165 to + 180 from 7 buffer mV value		✓	175.80 mV
pH slope		✓	55 to 60 mV/pH, ideal 59mV 58.73
Response time < 90 seconds		✓	
Calibrated and conforms to manufacturer's specifications		✓	
ORP			
Condition		✓	Good, clean
Response time < 90 seconds		✓	
within ± 80mv of reference Zobell Reading		✓	
Calibrated and conforms to manufacturer's specifications		✓	variance range ± 20mV -2 mV
Conductivity			
Condition		✓	Good, clean
Temperature		✓	°C
Conductivity cell constant 5.0 ± 1.0 in GLP file		✓	
Clean sensor reads less than 3 uS/cm in dry air		✓	
Calibrated and conforms to manufacturer's specifications		✓	µs/cm
Dissolved Oxygen			
Condition		✓	Good, clean
DO sensor in use		✓	Galvanic
1.25 mil PE membrane (yellow membrane):		✓	
DO Sensor Value		✓	(min 4.31 uA - max 8.00 uA) Avg 6.15 uA
Calibrated and conforms to manufacturer's specifications		✓	ppm

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

Parameter	Standards	Reference	Calibration Point	Span	Units	Instrument Readings Before	After	Units
Temperature (21A100491)	Check Temp NATA	Room Temp	24.1	-0.2	°C	NA	23.9	°C
pH (22F)	pH 7.00	375757	7.01	-5.30	mV	7.03	7.01	pH
pH (22F)	pH 4.00	378281	4.00	170.50	mV	4.01	4.00	pH
Conductivity (21A100491)	2764 µs/cm at 25°C	21/1012	2764	GLP	5.06	2733	2764	µs/cm
ORP (200124SEN605102)	Zobell A & B	22/0309	231	231	mV	234.6	233.4	mV
Zero DO (21K100090)	NaSO3 in distilled water	10175	0.0	NA	NA	-0.3	0.0	%
100% DO (21K100090)	100% Air Saturation	Air	100.0	7.06	%	98.2	100.0	%

Calibrated by: Gaurav Kanwar

Calibration Date: 24-Jan-23
Next Due: 23-Jul-23

APPENDIX F - SURVEY REPORTS

GW4
E:698812.153
N:7213196.930
RL:492.49
GROUND LEVEL

CON_2
E:698862.314
N:7213147.232
RL:492.12
GROUND LEVEL

GW5
E:698637.731
N:7213089.898
RL:492.99
GROUND LEVEL

12065
E:698865.434
N:7213077.704
RL:492.64
TOP

CON_1
E:698712.945
N:7212940.886
RL:492.16
GROUND LEVEL

GW6
E:698913.329
N:7212865.655
RL:491.47
GROUND LEVEL

GW3
E:698717.856
N:7212828.808
RL:492.17
GROUND LEVEL

GW2
E:698824.009
N:7212592.625
RL:491.91
GROUND LEVEL

GW1
E:698962.2281
N:7212359.252
RL:492.62
EST TOP CASING

12163
E:699627.375
N:7211397.855
RL:495.30
GROUND LEVEL

12081
E:698936.467
N:7211120.686
RL:496.19
TOP CASING

Level 2, 255 Pulteney Street
Adelaide SA 5000
08 8100 5700
adelaide@veris.com.au
veris.com.au
ABN 53 615 735 727

NO	DATE	DRN	CHKD	DESCRIPTION
0	24/06/22	Chun	WWW	FIRST ISSUE

This plan is not intended for attachment to sale contract documents

NOTES.
UNDERGROUND UTILITIES HAVE NOT BEEN SURVEYED AND REQUIRE VERIFICATION ON SITE BEFORE CONSTRUCTION.

0 50 100 150 200 250
SCALE METRES

OUR REF: 304578.DWG		
CONTOUR INTERVAL: -		
DATUM: -GDA 94 ZONE 52		
SCALE: 1:2500	ORIGINAL SHEET SIZE: A1	
DATE OF SURVEY: 21/06/2022		
DRAWING No:	REV 0	SHEET No: 1 OF 1

TETRA TECH

YULARA AIRPORT MONITORING WELL
YULARA

GW11
E: 698163.310
N: 7213766.856
RL: 490.25
TOP CAP

GW4
E: 698812.153
N: 7213196.930
RL: 492.49
GROUND LEVEL

CON 2
E: 698862.314
N: 7213147.232
RL: 492.12
GROUND LEVEL

GW5
E: 698637.731
N: 7213089.898
RL: 492.99
GROUND LEVEL

12065
E: 698865.434
N: 7213077.704
RL: 492.64
TOP

GW10
E: 698117.293
N: 7213048.706
RL: 493.75
TOP CAP

CON 1
E: 698712.945
N: 7212940.886
RL: 492.16
GROUND LEVEL

GW09
E: 699130.608
N: 7212922.144
RL: 491.40
TOP CAP

GW6
E: 698913.329
N: 7212865.655
RL: 491.47
GROUND LEVEL

GW3
E: 698717.856
N: 7212828.808
RL: 492.17
GROUND LEVEL

GW2
E: 698824.009
N: 7212592.625
RL: 491.91
GROUND LEVEL

GW08
E: 698966.861
N: 7212489.676
RL: 492.51
TOP CAP

GW1
E: 698962.2281
N: 7212359.252
RL: 492.62
EST TOP CASING

GW07
E: 699116.243
N: 7212188.066
RL: 494.33
TOP CAP

12163
E: 699627.375
N: 7211397.855
RL: 495.30
GROUND LEVEL

12081
E: 698936.467
N: 7211120.686
RL: 496.19
TOP CASING

veris
Level 2, 255 Pulteney Street
Adelaide SA 5000
08 8100 5700
adelaide@veris.com.au
veris.com.au
ABN 53 615 735 727

NO	DATE	DRN	CHKD	DESCRIPTION
1	09/02/23	SA	KS	ADDED GW07-GW11
0	24/06/22	CS	SA	FIRST ISSUE

This plan is not intended for attachment to sale contract documents

0 80 160 240 320 400
SCALE METRES

OUR REF: 304578.DWG		
CONTOUR INTERVAL: -		
DATUM: GDA 94 ZONE 52 and AHD		
SCALE: 1:2500	ORIGINAL SHEET SIZE: A1	
DATE OF SURVEY: 21/06/2022		
DRAWING No:	REV 0	SHEET No: 1 OF 1

TETRA TECH

YULARA AIRPORT MONITORING WELL
YULARA

APPENDIX G - LABORATORY CERTIFICATES AND COCS

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **ES2305042**

Client	: **TETRA TECH COFFEY PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MATTHEW JESSOP-HUNT	Contact	: Khaleda Ataei
Address	: LEVEL 19, TOWER B- CITADEL TOWER 799 PACIFIC HIGHWAY CHATSWOOD NSW, AUSTRALIA 2067	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: Matthew.Hunt@tetratech.com	E-mail	: khaleda.ataei@alsglobal.com
Telephone	: ----	Telephone	: + 61 2 8784 8555
Facsimile	: ----	Facsimile	: +61-2-8784 8500
Project	: 754-PEREN233360	Page	: 1 of 5
Order number	: ----	Quote number	: ES2018COFENV0007 (EN/222)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	:		
Sampler	: Sanjana Audit		

Dates

Date Samples Received	: 15-Feb-2023 08:00	Issue Date	: 17-Feb-2023
Client Requested Due Date	: 24-Feb-2023	Scheduled Reporting Date	: **23-Feb-2023**

Delivery Details

Mode of Delivery	: Undefined	Security Seal	: Not Available
No. of coolers/boxes	: 9	Temperature	: 27.1'C - Ice present
Receipt Detail	: ICE MELTED	No. of samples received / analysed	: 91 / 17

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **This work order is a split from ES2305043.**
- **Sample ID QC2, QC4 QC14, QC16, QC17 & QC20 will be forwarded Eurofins.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

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

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Sampling date / time	Sample ID	(On Hold) SOIL No analysis requested	SOIL - EA055-103 Moisture Content	SOIL - EP231X (solids) PFAS - Full Suite (28 analytes)
ES2305042-001	31-Jan-2023 00:00	QC1	✓		
ES2305042-002	31-Jan-2023 00:00	QC3	✓		
ES2305042-005	31-Jan-2023 00:00	GW07_0-0.2	✓		
ES2305042-006	31-Jan-2023 00:00	GW07_0.4-0.5	✓		
ES2305042-007	31-Jan-2023 00:00	GW07_0.6-0.75	✓		
ES2305042-008	31-Jan-2023 00:00	GW07_0.9-1.0	✓		
ES2305042-009	31-Jan-2023 00:00	GW07_1.4-1.5	✓		
ES2305042-010	31-Jan-2023 00:00	GW07_1.9-2.0	✓		
ES2305042-011	31-Jan-2023 00:00	GW07_3.9-4.0	✓		
ES2305042-012	31-Jan-2023 00:00	GW07_5.9-6.0	✓		
ES2305042-013	31-Jan-2023 00:00	GW07_7.9-8.0	✓		
ES2305042-014	31-Jan-2023 00:00	GW07_9.9-10.0	✓		
ES2305042-015	31-Jan-2023 00:00	GW07_11.9-12.0	✓		
ES2305042-016	31-Jan-2023 00:00	GW07_13.9-14.0	✓		
ES2305042-017	31-Jan-2023 00:00	GW07_14.9-15.0	✓		
ES2305042-018	31-Jan-2023 00:00	GW10_0-0.2	✓		
ES2305042-019	31-Jan-2023 00:00	GW10_0.4-0.5	✓		
ES2305042-020	31-Jan-2023 00:00	GW10_0.6-0.75	✓		
ES2305042-021	31-Jan-2023 00:00	GW10_0.9-1.0	✓		
ES2305042-022	31-Jan-2023 00:00	GW10_1.4-1.5	✓		
ES2305042-023	31-Jan-2023 00:00	GW10_1.9-2.0	✓		
ES2305042-024	31-Jan-2023 00:00	GW10_3.9-4.0	✓		
ES2305042-025	01-Feb-2023 00:00	GW10_5.9-6.0	✓		
ES2305042-026	01-Feb-2023 00:00	GW10_7.9-8.0	✓		
ES2305042-027	01-Feb-2023 00:00	GW10_9.9-10.0	✓		
ES2305042-028	01-Feb-2023 00:00	GW10_11.9-12.0	✓		
ES2305042-029	01-Feb-2023 00:00	GW10_13.9-14.0	✓		
ES2305042-030	01-Feb-2023 00:00	GW10_14.9-15.0	✓		
ES2305042-031	01-Feb-2023 00:00	GW11_0-0.2	✓		
ES2305042-032	01-Feb-2023 00:00	GW11_0.4-0.5	✓		
ES2305042-033	01-Feb-2023 00:00	GW11_0.6-0.75	✓		
ES2305042-034	01-Feb-2023 00:00	GW11_0.9-1.0	✓		
ES2305042-035	01-Feb-2023 00:00	GW11_1.4-1.5	✓		
ES2305042-036	01-Feb-2023 00:00	GW11_1.9-2.0	✓		
ES2305042-037	01-Feb-2023 00:00	GW11_3.9-4.0	✓		

			(On Hold) SOIL No analysis requested	SOIL - EA055-103 Moisture Content	SOIL - EP231X (solids) PFAS - Full Suite (28 analytes)
ES2305042-038	01-Feb-2023 00:00	GW11_5.9-6.0	✓		
ES2305042-039	01-Feb-2023 00:00	GW11_7.9-8.0	✓		
ES2305042-040	01-Feb-2023 00:00	GW11_9.9-10.0	✓		
ES2305042-041	01-Feb-2023 00:00	GW11_11.9-12.0	✓		
ES2305042-042	01-Feb-2023 00:00	GW11_13.9-14.0	✓		
ES2305042-047	02-Feb-2023 00:00	GW09_0-0.2	✓		
ES2305042-048	02-Feb-2023 00:00	GW09_0.4-0.5	✓		
ES2305042-049	02-Feb-2023 00:00	GW09_0.6-0.75	✓		
ES2305042-050	02-Feb-2023 00:00	GW09_0.9-1.0	✓		
ES2305042-051	02-Feb-2023 00:00	GW09_1.4-1.5	✓		
ES2305042-052	02-Feb-2023 00:00	GW09_1.9-2.0	✓		
ES2305042-053	02-Feb-2023 00:00	GW09_3.9-4.0	✓		
ES2305042-054	02-Feb-2023 00:00	GW09_5.9-6.0	✓		
ES2305042-055	02-Feb-2023 00:00	GW09_7.9-8.0	✓		
ES2305042-056	02-Feb-2023 00:00	GW09_9.9-10.0	✓		
ES2305042-057	02-Feb-2023 00:00	GW09_11.9-12.0	✓		
ES2305042-058	02-Feb-2023 00:00	GW09_13.9-14.0	✓		
ES2305042-059	02-Feb-2023 00:00	GW09_14.9-15.0	✓		
ES2305042-060	02-Feb-2023 00:00	GW08_0-0.2	✓		
ES2305042-061	02-Feb-2023 00:00	GW08_0.4-0.5	✓		
ES2305042-062	02-Feb-2023 00:00	GW08_0.6-0.75	✓		
ES2305042-063	02-Feb-2023 00:00	GW08_0.9-1.0	✓		
ES2305042-064	02-Feb-2023 00:00	GW08_1.4-1.5	✓		
ES2305042-065	02-Feb-2023 00:00	GW08_1.9-2.0	✓		
ES2305042-066	02-Feb-2023 00:00	GW08_3.9-4.0	✓		
ES2305042-067	02-Feb-2023 00:00	GW08_5.9-6.0	✓		
ES2305042-068	02-Feb-2023 00:00	GW08_7.9-8.0	✓		
ES2305042-069	02-Feb-2023 00:00	GW08_9.9-10.0	✓		
ES2305042-070	02-Feb-2023 00:00	GW08_11.9-12.0	✓		
ES2305042-071	02-Feb-2023 00:00	GW08_13.9-14.0	✓		
ES2305042-072	02-Feb-2023 00:00	GW08_14.9-15.0	✓		
ES2305042-075	03-Feb-2023 00:00	QC13	✓		
ES2305042-076	03-Feb-2023 00:00	QC15		✓	✓
ES2305042-077	03-Feb-2023 00:00	QC17		✓	✓
ES2305042-078	03-Feb-2023 00:00	QC19		✓	✓
ES2305042-079	03-Feb-2023 00:00	SB45_0-0.2		✓	✓
ES2305042-080	03-Feb-2023 00:00	SB45_0.4-0.5		✓	✓
ES2305042-081	03-Feb-2023 00:00	SB45_0.6-0.75	✓		
ES2305042-082	03-Feb-2023 00:00	SB45_0.9-1.0		✓	✓
ES2305042-083	03-Feb-2023 00:00	SB45_1.4-1.5	✓		
ES2305042-084	03-Feb-2023 00:00	SB45_1.9-2.0	✓		

			(On Hold) SOIL No analysis requested	SOIL - EA055-103 Moisture Content	SOIL - EP231X (solids) PFAS - Full Suite (28 analytes)
ES2305042-085	03-Feb-2023 00:00	SB46_0-0.2	✓		
ES2305042-086	03-Feb-2023 00:00	SB46_0.4-0.5		✓	✓
ES2305042-087	03-Feb-2023 00:00	SB46_0.6-0.75	✓		
ES2305042-088	03-Feb-2023 00:00	SB46_0.9-1.0		✓	✓
ES2305042-089	03-Feb-2023 00:00	SB46_1.4-1.5	✓		
ES2305042-090	03-Feb-2023 00:00	SB46_1.9-2.0	✓		

Matrix: **WATER**

Laboratory sample ID	*Sampling date / time*	*Sample ID*	WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - EP231X-SUT PFAS - Super Ultra Trace Waters Long Suite (29
ES2305042-003	31-Jan-2023 00:00	QC5		✓
ES2305042-004	31-Jan-2023 00:00	QC6		✓
ES2305042-043	01-Feb-2023 00:00	QC7		✓
ES2305042-044	01-Feb-2023 00:00	QC8		✓
ES2305042-045	02-Feb-2023 00:00	QC9		✓
ES2305042-046	02-Feb-2023 00:00	QC10		✓
ES2305042-073	03-Feb-2023 00:00	QC11		✓
ES2305042-074	03-Feb-2023 00:00	QC12		✓
ES2305042-091	08-Feb-2023 00:00	TB	✓	

Proactive Holding Time Report

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

Requested Deliverables

ACCOUNTS PERTH		
- A4 - AU Tax Invoice (INV)	Email	accounts.perth@tetratech.com
Admin Invoice		
- A4 - AU Tax Invoice (INV)	Email	COF.GeneralAdmin@tetratech.com
ESDAT REPORTS		
- *AU Certificate of Analysis - NATA (COA)	Email	esdat_labreports@coffey.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	esdat_labreports@coffey.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	esdat_labreports@coffey.com
- EDI Format - ESDAT (ESDAT)	Email	esdat_labreports@coffey.com
INVOICES CHAT GENERAL ADMIN		
- A4 - AU Tax Invoice (INV)	Email	CHAT-GeneralAdmin@coffey.com
MATTHEW JESSOP-HUNT		
- *AU Certificate of Analysis - NATA (COA)	Email	Matthew.Hunt@tetratech.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	Matthew.Hunt@tetratech.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	Matthew.Hunt@tetratech.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	Matthew.Hunt@tetratech.com
- A4 - AU Tax Invoice (INV)	Email	Matthew.Hunt@tetratech.com
- Chain of Custody (CoC) (COC)	Email	Matthew.Hunt@tetratech.com
- EDI Format - ENMRG (ENMRG)	Email	Matthew.Hunt@tetratech.com
- EDI Format - ESDAT (ESDAT)	Email	Matthew.Hunt@tetratech.com
SANJANA AUDIT		
- *AU Certificate of Analysis - NATA (COA)	Email	sanjana.audit@tetratech.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	sanjana.audit@tetratech.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	sanjana.audit@tetratech.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	sanjana.audit@tetratech.com
- Chain of Custody (CoC) (COC)	Email	sanjana.audit@tetratech.com
- EDI Format - ENMRG (ENMRG)	Email	sanjana.audit@tetratech.com
- EDI Format - ESDAT (ESDAT)	Email	sanjana.audit@tetratech.com

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

TETRA TECH COFFEY

Consigning Office: Tetra Tech Coffey - Perth

Report Results to: Matthew Jessop-Hunt and Sanjana Audit — Mobile: 466896542 — Email: matthew.jessop-hunt@tetratech.com and sanjana.audit@tetratech.com

Invoices to: accounts.perth@tetratech.com — Phone: — Email: @tetratech.com

Project No: 754-PEREN233360 — Task No:

Project Name: Ayers Rock Airport — Laboratory: ALS

Sampler's Name: Sanjana Audit — Project Manager: Matthew Jessop-Hunt

Quote number (if different to current quoted prices):

Special Instructions:

Tetra Tech

Lab Batch Ref	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)	PFAS in soil - 28 analytes	Super Ultra Trace PFAS (28 analytes)	Std LOR PFAS (28 analytes)	Other- Refer to Notes	On Hold	NOTES
1	QC1	31-Jan		Soil	1J	Std					X	
2	QC3	31-Jan		Soil	1J	Std					X	
3	QC5	31-Jan		Water	2x PFAS	Std		X				
4	QC6	31-Jan		Water	2x PFAS	Std		X				
5	GW07_0-0.2	31-Jan		soil	1J	Std					X	
6	GW07_0.4-0.5	31-Jan		soil	1J	Std					X	
7	GW07_0.6-0.75	31-Jan		soil	1J	Std					X	
8	GW07_0.9-1.0	31-Jan		soil	1J	Std					X	
9	GW07_1.4-1.5	31-Jan		soil	1J	Std					X	
10	GW07_1.9-2.0	31-Jan		soil	1J	Std					X	
11	GW07_3.9-4.0	31-Jan		soil	1J	Std					X	
12	GW07_5.9-6.0	31-Jan		soil	1J	Std					X	
13	GW07_7.9-8.0	31-Jan		soil	1J	Std					X	
14	GW07_9.9-10.0	31-Jan		soil	1J	Std					X	
15	GW07_11.9-12.0	31-Jan		soil	1J	Std					X	
16	GW07_13.9-14.0	31-Jan		soil	1J	Std					X	

Analysis Request Section

Subcon / Forwarded: ES2305043 Sub WO

Lab / Analysis: 92, 94, 914, 916, 917, 920

Organised By: [illegible] 24/07/23

Relinquished By: [illegible] Date:

Connote / Consignment: ES2305043

WO No: ES2305043

Attached: [illegible] Sheet

RELINQUISHED BY			RECEIVED BY		
Name: Sanjana Audit - 8/2/23	Date:	→	Name: JGC4	17/07/23	
Coffey	Time:		Company: AU	11Gm	
Name:	Date:	→	Name:		
Company:	Time:		Company:		

Sample Receipt Advice: (Lab Use Only)

- All Samples Recieved in Good Condition ☐
- All Documentation is in Proper Order ☐
- Samples Received Properly Chilled ☐
- Lab. Ref/Batch No.

Container Type & Preservation Codes: P - Plastic, G- Glass Bottle, J - Glass Jar, V- Vial, Z - Ziplock bag, N - Nitric Acid Preserved, C - Hyd Preserved, I - Ice, ST - Sodium Thiosulfate, NP - No Preservative

Environmental Division Sydney
Work Order Reference
ES2305042

Telephone : + 61-2-8784 8555

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

TETRA TECH COFFEY

Consigning Office:	Tetra Tech Coffey - Perth				
Report Results to:	Matthew Jessop-Hunt and Sanjana Audit	Mobile:	466896542	Email:	matthew.jessop-hunt@tetratech.com and sanjana.audit@tetratech.com
Invoices to:	accounts.perth@tetratech.com	Phone:		Email:	@tetratech.com

Project No:	754-PEREN233360	Task No:	
Project Name:	Ayers Rock Airport	Laboratory:	ALS
Sampler's Name:	Sanjana Audit	Project Manager:	Matthew Jessop-Hunt
Quote number (if different to current quoted prices):			
Special Instructions:			
	Tetra Tech		

Lab Batch Ref	Sample ID	Sample Date	Time	Matrix (Soil..etc)	Container Type & Preservative*	T-A-T (specify)	PFAS in soil - 28 analytes	Super Ultra Trace PFAS (28 analytes)	Std LOR PFAS (28 analytes)	Other - Refer to Notes	On Hold	NOTES
17	GW07_14.9-15.0	31-Jan		Soil	1J	Std					X	
18	GW10_0-0.2	31-Jan		Soil	1J	Std					X	
19	GW10_0.4-0.5	31-Jan		Soil	1J	Std					X	
20	GW10_0.6-0.75	31-Jan		Soil	1J	Std					X	
21	GW10_0.9-1.0	31-Jan		Soil	1J	Std					X	
22	GW10_1.4-1.5	31-Jan		Soil	1J	Std					X	
23	GW10_1.9-2.0	31-Jan		Soil	1J	Std					X	
24	GW10_3.9-4.0	31-Jan		Soil	1J	Std					X	
—	QC2	31-Jan		Soil	1J	Std				X		Please send to ARL/Eurofins for analysis
—	QC4	31-Jan		Soil	1J	Std				X		Please send to ARL/Eurofins for analysis
25	GW10_5.9-6.0	1-Feb		Soil	1J	Std					X	
26	GW10_7.9-8.0	1-Feb		Soil	1J	Std					X	
27	GW10_9.9-10.0	1-Feb		Soil	1J	Std					X	
28	GW10_11.9-12.0	1-Feb		Soil	1J	Std					X	
29	GW10_13.9-14.0	1-Feb		Soil	1J	Std					X	
30	GW10_14.9-15.0	1-Feb		Soil	1J	Std					X	

RELINQUISHED BY		RECEIVED BY		Sample Receipt Advice: (Lab Use Only)	
Name:	Sanjana Audit - 8/2/23	Name:	Jack	All Samples Recieved in Good Condition	☐
Coffey	Date: / Time:	Company:	AU	All Documentation is in Proper Order	☐
Name:	Date:	Name:	Date:	Samples Received Properly Chilled	☐
Company:	Time:	Company:	Time:	Lab. Ref/Batch No.	

*Container Type & Preservation Codes: P - Plastic, G- Glass Bottle, J - Glass Jar, V- Vial, Z - Ziplock bag, N - Nitric Acid Preserved, C - Hydrochloric Acid Preserved, S - Sulphuric Acid Preserved, I - Ice, ST - Sodium Thiosulfate, NP - No Preservative

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

TETRA TECH COFFEY

Consigning Office: Tetra Tech Coffey - Perth

Report Results to: Matthew Jessop-Hunt and Sanjana Audit — Mobile: 466896542 — Email: matthew.jessop-hunt@tetratech.com and sanjana.audit@tetratech.com

Invoices to: accounts.perth@tetratech.com — Phone: — Email: @tetratech.com

Project No: 754-PEREN233360 — Task No:

Project Name: Ayers Rock Airport — Laboratory: ALS

Sampler's Name: Sanjana Audit — Project Manager: Matthew Jessop-Hunt

Quote number (if different to current quoted prices):

Special Instructions:

Tetra Tech

Lab Batch Ref	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)	PFAS in soil - 28 analytes	Super Ultra Trace PFAS (28 analytes)	Std LOR PFAS (28 analytes)	Other- Refer to Notes	On Hold	NOTES
31	GW11_0-0.2	1-Feb		Soil	1J	Std					X	
32	GW11_0.4-0.5	1-Feb		Soil	1J	Std					X	
33	GW11_0.6-0.75	1-Feb		Soil	1J	Std					X	
34	GW11_0.9-1.0	1-Feb		Soil	1J	Std					X	
35	GW11_1.4-1.5	1-Feb		Soil	1J	Std					X	
36	GW11_1.9-2.0	1-Feb		Soil	1J	Std					X	
37	GW11_3.9-4.0	1-Feb		Soil	1J	Std					X	
38	GW11_5.9-6.0	1-Feb		Soil	1J	Std					X	
39	GW11_7.9-8.0	1-Feb		Soil	1J	Std					X	
40	GW11_9.9-10.0	1-Feb		Soil	1J	Std					X	
41	GW11_11.9-12.0	1-Feb		Soil	1J	Std					X	
42	GW11_13.9-14.0	1-Feb		Soil	1J	Std					X	
43	QC7	1-Feb		Water	2x PFAS	Std		X				
44	QC8	1-Feb		Water	2x PFAS	Std		X				
45	QC9	2-Feb		Water	2x PFAS	Std		X				
46	QC10	2-Feb		Water	2x PFAS	Std		X				

Analysis Request Section

RELINQUISHED BY

Name: Sanjana Audit - 8/2/23 — Date: →

Coffey — Time:

Name: — Date: →

Company: — Time:

RECEIVED BY

Name: Jack — Date: 7/08/23

Company: ALS — Time: 11am

Name: — Date:

Company: — Time:

Sample Receipt Advice: (Lab Use Only)

All Samples Recieved in Good Condition ☐

All Documentation is in Proper Order ☐

Samples Received Properly Chilled ☐

Lab. Ref/Batch No.

***Container Type & Preservation Codes:** **P** - Plastic, **G**- Glass Bottle, **J** - Glass Jar, **V**- Vial, **Z** - Ziplock bag, **N** - Nitric Acid Preserved, **C** - Hydrochloric Acid Preserved, **S** - Sulphuric Acid Preserved, **I** - Ice, **ST** - Sodium Thiosulfate, **NP** - No Preservative

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

TETRA TECH COFFEY

Consigning Office:	Tetra Tech Coffey - Perth				
Report Results to:	Matthew Jessop-Hunt and Sanjana Audit	Mobile:	466896542	Email:	matthew.jessop-hunt@tetratech.com and sanjana.audit@tetratech.com
Invoices to:	accounts.perth@tetratech.com	Phone:		Email:	@tetratech.com

Project No:	754-PEREN233360	Task No:	
Project Name:	Ayers Rock Airport	Laboratory:	ALS
Sampler's Name:	Sanjana Audit	Project Manager:	Matthew Jessop-Hunt
Quote number (if different to current quoted prices):			
Special Instructions:			

Tetra Tech

Lab Batch Ref	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)	PFAS in soil - 28 analytes	Super Ultra Trace PFAS (28 analytes)	Std LOR PFAS (28 analytes)	Other- Refer to Notes	On Hold	NOTES
47	GW09_0-0.2	2-Feb		Soil	1J	Std					X	
48	GW09_0.4-0.5	2-Feb		Soil	1J	Std					X	
49	GW09_0.6-0.75	2-Feb		Soil	1J	Std					X	
50	GW09_0.9-1.0	2-Feb		Soil	1J	Std					X	
51	GW09_1.4-1.5	2-Feb		Soil	1J	Std					X	
52	GW09_1.9-2.0	2-Feb		Soil	1J	Std					X	
53	GW09_3.9-4.0	2-Feb		Soil	1J	Std					X	
54	GW09_5.9-6.0	2-Feb		Soil	1J	Std					X	
55	GW09_7.9-8.0	2-Feb		Soil	1J	Std					X	
56	GW09_9.9-10.0	2-Feb		Soil	1J	Std					X	
57	GW09_11.9-12.0	2-Feb		Soil	1J	Std					X	
58	GW09_13.9-14.0	2-Feb		Soil	1J	Std					X	
59	GW09_14.9-15.0	2-Feb		Soil	1J	Std					X	
60	GW08_0-0.2	2-Feb		Soil	1J	Std					X	
61	GW08_0.4-0.5	2-Feb		Soil	1J	Std					X	
62	GW08_0.6-0.75	2-Feb		Soil	1J	Std					X	

Analysis Request Section

RELINQUISHED BY			RECEIVED BY		
Name:	Sanjana Audit - 8/2/23	Date: →	Name:	Jack	Date: 7/08/23
Coffey		Time:	Company:	ALS	Time: 11am
Name:		Date: →	Name:		Date:
Company:		Time:	Company:		Time:

Sample Receipt Advice: (Lab Use Only)

- All Samples Recieved in Good Condition ☐
- All Documentation is in Proper Order ☐
- Samples Received Properly Chilled ☐
- Lab. Ref/Batch No.

***Container Type & Preservation Codes: P** - Plastic, **G**- Glass Bottle, **J** - Glass Jar, **V**- Vial, **Z** - Ziplock bag, **N** - Nitric Acid Preserved, **C**- Hydrochloric Acid Preserved, **S** - Sulphuric Acid Preserved, **I** - Ice, **ST** - Sodium Thiosulfate, **NP** - No Preservative

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

TETRA TECH COFFEY

Consigning Office: Tetra Tech Coffey - Perth

Report Results to: Matthew Jessop-Hunt and Sanjana Audit — Mobile: 466896542 — Email: matthew.jessop-hunt@tetratech.com and sanjana.audit@tetratech.com

Invoices to: accounts.perth@tetratech.com — Phone: — Email: @tetratech.com

Project No: 754-PEREN233360 — Task No:

Project Name: Ayers Rock Airport — Laboratory: ALS

Sampler's Name: Sanjana Audit — Project Manager: Matthew Jessop-Hunt

Quote number (if different to current quoted prices):

Special Instructions:

Tetra Tech

Lab Batch Ref	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)	PFAS in soil - 28 analytes	Super Ultra Trace PFAS (28 analytes)	Std LOR PFAS (28 analytes)	Other - Refer to Notes	On Hold	NOTES
63	GW08_0.9-1.0	2-Feb		Soil	1J	Std					X	
64	GW08_1.4-1.5	2-Feb		Soil	1J	Std					X	
65	GW08_1.9-2.0	2-Feb		Soil	1J	Std					X	
66	GW08_3.9-4.0	2-Feb		Soil	1J	Std					X	
67	GW08_5.9-6.0	2-Feb		Soil	1J	Std					X	
68	GW08_7.9-8.0	2-Feb		Soil	1J	Std					X	
69	GW08_9.9-10.0	2-Feb		Soil	1J	Std					X	
70	GW08_11.9-12.0	2-Feb		Soil	1J	Std					X	
71	GW08_13.9-14.0	2-Feb		Soil	1J	Std					X	
72	GW08_14.9-15.0	2-Feb		Soil	1J	Std					X	
73	QC11	3-Feb		Water	2x PFAS	Std		X				
74	QC12	3-Feb		Water	2x PFAS	Std		X				
75	QC13	3-Feb		Soil	1J	Std					X	
—	QC14	3-Feb		Soil	1J	Std				X		Please send to ARL/Eurofins for analysis
76	QC15	3-Feb		Soil	1J	Std	X					
—	QC16	3-Feb		Soil	1J	Std				X		Please send to ARL/Eurofins for analysis

RELINQUISHED BY

Name: Sanjana Audit - 8/2/23 — Date: →

Coffey — Time:

Name: — Date: →

Company: — Time:

RECEIVED BY

Name: Jash — Date: 7/11/23

Company: ARL — Time: 11am

Name: — Date:

Company: — Time:

Sample Receipt Advice: (Lab Use Only)

All Samples Recieved in Good Condition ☐

All Documentation is in Proper Order ☐

Samples Received Properly Chilled ☐

Lab. Ref/Batch No.

Container Type & Preservation Codes: P - Plastic, **G**- Glass Bottle, **J** - Glass Jar, **V**- Vial, **Z** - Ziplock bag, **N** - Nitric Acid Preserved, **C** - Hydrochloric Acid Preserved, **S** - Sulphuric Acid Preserved, **I** - Ice, **ST** - Sodium Thiosulfate, **NP** - No Preservative

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

TETRA TECH COFFEY

Consigning Office:	Tetra Tech Coffey - Perth				
Report Results to:	Matthew Jessop-Hunt and Sanjana Audit	Mobile:	466896542	Email:	matthew.jessop-hunt@tetratech.com and sanjana.audit@tetratech.com
Invoices to:	accounts.perth@tetratech.com	Phone:		Email:	@tetratech.com

Project No:	754-PEREN233360	Task No:	
Project Name:	Ayers Rock Airport	Laboratory:	ALS
Sampler's Name:	Sanjana Audit	Project Manager:	Matthew Jessop-Hunt
Quote number (if different to current quoted prices):			
Special Instructions:	Tetra Tech		

Lab Batch Ref	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)	PFAS in soil - 28 analytes	Super Ultra Trace PFAS (28 analytes)	Std LOR PFAS (28 analytes)	Other - Refer to Notes	On Hold	NOTES
77	QC17	3-Feb		Soil	1J	Std	x					
	QC18	3-Feb		Soil	1J	Std				x		Please send to ARL/Eurofins for analysis
78	QC19	3-Feb		Soil	1J	Std	x					
	QC20	3-Feb		Soil	1J	Std				x		Please send to ARL/Eurofins for analysis
79	SB45_0-0.2	3-Feb		Soil	1J	Std					x	
80	SB45_0.4-0.5	3-Feb		Soil	1J	Std	x					
81	SB45_0.6-0.75	3-Feb		Soil	1J	Std					x	
82	SB45_0.9-1.0	3-Feb		Soil	1J	Std	x					
83	SB45_1.4-1.5	3-Feb		Soil	1J	Std					x	
84	SB45_1.9-2.0	3-Feb		Soil	1J	Std					x	
85	SB46_0-0.2	3-Feb		Soil	1J	Std					x	
86	SB46_0.4-0.5	3-Feb		Soil	1J	Std	x					
87	SB46_0.6-0.75	3-Feb		Soil	1J	Std					x	
88	SB46_0.9-1.0	3-Feb		Soil	1J	Std	x					
89	SB46_1.4-1.5	3-Feb		Soil	1J	Std					x	
90	SB46_1.9-2.0	3-Feb		Soil	1J	Std					x	

RELINQUISHED BY		RECEIVED BY		Sample Receipt Advice: (Lab Use Only)	
Name: Sanjana Audit - 8/2/23	Date: →	Name: Jack	Date: 17/8/23	All Samples Recieved in Good Condition	☐
Coffey	Time:	Company: ALS	Time: 11am	All Documentation is in Proper Order	☐
Name:	Date: →	Name:	Date:	Samples Received Properly Chilled	☐
Company:	Time:	Company:	Time:	Lab. Ref/Batch No.	

*Container Type & Preservation Codes: **P** - Plastic, **G**- Glass Bottle, **J** - Glass Jar, **V**- Vial, **Z** - Ziplock bag, **N** - Nitric Acid Preserved, **C** - Hydrochloric Acid Preserved, **S** - Sulphuric Acid Preserved, **I** - Ice, **ST** - Sodium Thiosulfate, **NP** - No Preservative

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES2305042**	Page	: 1 of 13
Client	: **TETRA TECH COFFEY PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MATTHEW JESSOP-HUNT	Contact	: Khaleda Ataei
Address	: LEVEL 19, TOWER B- CITADEL TOWER 799 PACIFIC HIGHWAY CHATSWOOD NSW, AUSTRALIA 2067	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: + 61 2 8784 8555
Project	: 754-PEREN233360	Date Samples Received	: 15-Feb-2023 08:00
Order number	: ----	Date Analysis Commenced	: 20-Feb-2023
C-O-C number	: ----	Issue Date	: 23-Feb-2023 13:15
Sampler	: Sanjana Audit		
Site	:		
Quote number	: EN/222		
No. of samples received	: 91		
No. of samples analysed	: 17		

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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

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

Signatories

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

Signatories	*Position*	*Accreditation Category*
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Franco Lentini	LCMS Coordinator	Sydney Inorganics, Smithfield, NSW
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

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

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

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

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

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

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

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

- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	QC15	QC17	QC19	SB45_0-0.2	SB45_0.4-0.5
			Sampling date / time	03-Feb-2023 00:00	03-Feb-2023 00:00	03-Feb-2023 00:00	03-Feb-2023 00:00	03-Feb-2023 00:00
Compound	CAS Number	LOR	Unit	ES2305042-076	ES2305042-077	ES2305042-078	ES2305042-079	ES2305042-080
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	**2.9**	**3.5**	**3.9**	**0.8**	**3.5**
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	**0.0009**	<0.0002	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	**0.0010**	<0.0002	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	**0.0033**	**0.0002**	<0.0002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	**0.0006**	**0.0003**	<0.0002
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	**0.0018**	<0.0002	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	**0.0093**	<0.0002	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	**0.0002**	**0.0048**	<0.0002	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	**0.0014**	**0.0029**	<0.0002
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	QC15	QC17	QC19	SB45_0-0.2	SB45_0.4-0.5
				Sampling date / time	03-Feb-2023 00:00	03-Feb-2023 00:00	03-Feb-2023 00:00	03-Feb-2023 00:00	03-Feb-2023 00:00
Compound	CAS Number	LOR	Unit		ES2305042-076	ES2305042-077	ES2305042-078	ES2305042-079	ES2305042-080
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		<0.0002	**0.0002**	**0.0231**	**0.0034**	<0.0002
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		<0.0002	<0.0002	**0.0039**	**0.0005**	<0.0002
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		<0.0002	**0.0002**	**0.0221**	**0.0034**	<0.0002
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**100**	**106**	**97.2**	**102**	**102**
13C8-PFOA	----	0.0002	%		**111**	**118**	**99.6**	**118**	**100**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	SB45_0.9-1.0	SB46_0.4-0.5	SB46_0.9-1.0	----	----
				Sampling date / time	03-Feb-2023 00:00	03-Feb-2023 00:00	03-Feb-2023 00:00	----	----
Compound	CAS Number	LOR	Unit		ES2305042-082	ES2305042-086	ES2305042-088	--------	--------
					Result	Result	Result	----	----
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	0.1	%		**2.7**	**3.5**	**3.4**	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg		<0.001	<0.001	<0.001	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg		<0.0002	**0.0002**	<0.0002	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	SB45_0.9-1.0	SB46_0.4-0.5	SB46_0.9-1.0	----	----
				Sampling date / time	03-Feb-2023 00:00	03-Feb-2023 00:00	03-Feb-2023 00:00	----	----
Compound	CAS Number	LOR	Unit		ES2305042-082	ES2305042-086	ES2305042-088	--------	--------
					Result	Result	Result	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		<0.0002	**0.0002**	<0.0002	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	----	----
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		<0.0002	**0.0002**	<0.0002	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**103**	**95.5**	**96.6**	----	----
13C8-PFOA	----	0.0002	%		**114**	**112**	**112**	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC5	QC6	QC7	QC8	QC9
				Sampling date / time	31-Jan-2023 00:00	31-Jan-2023 00:00	01-Feb-2023 00:00	01-Feb-2023 00:00	02-Feb-2023 00:00
Compound	CAS Number	LOR	Unit		ES2305042-003	ES2305042-004	ES2305042-043	ES2305042-044	ES2305042-045
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L		<0.001	<0.001	<0.001	<0.001	<0.001
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L		<0.001	<0.001	<0.001	<0.001	<0.001

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC5	QC6	QC7	QC8	QC9
				Sampling date / time	31-Jan-2023 00:00	31-Jan-2023 00:00	01-Feb-2023 00:00	01-Feb-2023 00:00	02-Feb-2023 00:00
Compound	CAS Number	LOR	Unit		ES2305042-003	ES2305042-004	ES2305042-043	ES2305042-044	ES2305042-045
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L		<0.001	<0.001	<0.001	<0.001	<0.001
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L		<0.001	<0.001	<0.001	<0.001	<0.001
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L		<0.001	<0.001	<0.001	<0.001	<0.001
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L		<0.001	<0.001	<0.001	<0.001	<0.001
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L		<0.001	<0.001	<0.001	<0.001	<0.001
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	µg/L		<0.001	<0.001	<0.001	<0.001	<0.001
EP231P: PFAS Sums									
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
^ Sum of PFAS	----	0.0002	µg/L		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%		**97.1**	**97.2**	**96.9**	**94.1**	**95.5**
13C8-PFOA	----	0.0005	%		**101**	**103**	**98.1**	**96.5**	**99.4**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC10	QC11	QC12	TB	----
				Sampling date / time	02-Feb-2023 00:00	03-Feb-2023 00:00	03-Feb-2023 00:00	08-Feb-2023 00:00	----
Compound	CAS Number	LOR	Unit		ES2305042-046	ES2305042-073	ES2305042-074	ES2305042-091	--------
					Result	Result	Result	Result	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L		<0.0005	<0.0005	<0.0005	----	----
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		----	----	----	<0.02	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L		<0.0005	<0.0005	<0.0005	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		----	----	----	<0.02	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L		<0.0005	<0.0005	<0.0005	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L		----	----	----	<0.01	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L		<0.0005	<0.0005	<0.0005	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		----	----	----	<0.02	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L		<0.0002	<0.0002	<0.0002	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L		<0.0005	<0.0005	<0.0005	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		----	----	----	<0.01	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		----	----	----	<0.02	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		----	----	----	<0.1	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		----	----	----	<0.02	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		----	----	----	<0.02	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		----	----	----	<0.02	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		----	----	----	<0.01	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		----	----	----	<0.02	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		----	----	----	<0.02	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		----	----	----	<0.02	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		----	----	----	<0.02	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC10	QC11	QC12	TB	----
				Sampling date / time	02-Feb-2023 00:00	03-Feb-2023 00:00	03-Feb-2023 00:00	08-Feb-2023 00:00	----
Compound	CAS Number	LOR	Unit		ES2305042-046	ES2305042-073	ES2305042-074	ES2305042-091	--------
					Result	Result	Result	Result	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		----	----	----	<0.02	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		----	----	----	<0.05	----
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L		<0.0020	<0.0020	<0.0020	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L		<0.0005	<0.0005	<0.0005	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L		<0.0005	<0.0005	<0.0005	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L		<0.0005	<0.0005	<0.0005	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L		<0.0005	<0.0005	<0.0005	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L		<0.0005	<0.0005	<0.0005	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L		<0.0005	<0.0005	<0.0005	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L		<0.0005	<0.0005	<0.0005	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L		<0.0005	<0.0005	<0.0005	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L		<0.0005	<0.0005	<0.0005	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L		<0.0005	<0.0005	<0.0005	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		----	----	----	<0.02	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		----	----	----	<0.05	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		----	----	----	<0.05	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		----	----	----	<0.05	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		----	----	----	<0.05	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		----	----	----	<0.02	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		----	----	----	<0.02	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC10	QC11	QC12	TB	----
				Sampling date / time	02-Feb-2023 00:00	03-Feb-2023 00:00	03-Feb-2023 00:00	08-Feb-2023 00:00	----
Compound	CAS Number	LOR	Unit		ES2305042-046	ES2305042-073	ES2305042-074	ES2305042-091	--------
					Result	Result	Result	Result	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L		<0.0005	<0.0005	<0.0005	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L		<0.001	<0.001	<0.001	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L		<0.001	<0.001	<0.001	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L		<0.001	<0.001	<0.001	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L		<0.001	<0.001	<0.001	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L		<0.0005	<0.0005	<0.0005	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L		<0.0005	<0.0005	<0.0005	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		----	----	----	<0.05	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		----	----	----	<0.05	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		----	----	----	<0.05	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		----	----	----	<0.05	----
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L		<0.001	<0.001	<0.001	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L		<0.001	<0.001	<0.001	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L		<0.001	<0.001	<0.001	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	µg/L		<0.001	<0.001	<0.001	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		----	----	----	<0.01	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC10	QC11	QC12	TB	----
				Sampling date / time	02-Feb-2023 00:00	03-Feb-2023 00:00	03-Feb-2023 00:00	08-Feb-2023 00:00	----
Compound	CAS Number	LOR	Unit		ES2305042-046	ES2305042-073	ES2305042-074	ES2305042-091	--------
					Result	Result	Result	Result	----
EP231P: PFAS Sums - Continued									
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		----	----	----	<0.01	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		----	----	----	<0.01	----
^ **Sum of PFHxS and PFOS**	355-46-4/1763-23-1	0.0002	µg/L		<0.0002	<0.0002	<0.0002	----	----
^ **Sum of PFAS (WA DER List)**	----	0.0002	µg/L		<0.0002	<0.0002	<0.0002	----	----
^ **Sum of PFAS**	----	0.0002	µg/L		<0.0002	<0.0002	<0.0002	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		----	----	----	**95.0**	----
13C8-PFOA	----	0.02	%		----	----	----	**102**	----
13C4-PFOS	----	0.0005	%		**96.6**	**98.6**	**96.6**	----	----
13C8-PFOA	----	0.0005	%		**102**	**103**	**100**	----	----

Surrogate Control Limits

Sub-Matrix: SOIL		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **ES2305042**	Page	: 1 of 17
Client	: **TETRA TECH COFFEY PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MATTHEW JESSOP-HUNT	Contact	: Khaleda Ataei
Address	: LEVEL 19, TOWER B- CITADEL TOWER 799 PACIFIC HIGHWAY CHATSWOOD NSW, AUSTRALIA 2067	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: + 61 2 8784 8555
Project	: 754-PEREN233360	Date Samples Received	: 15-Feb-2023
Order number	: ----	Date Analysis Commenced	: 20-Feb-2023
C-O-C number	: ----	Issue Date	: 23-Feb-2023
Sampler	: Sanjana Audit		
Site	:		
Quote number	: EN/222		
No. of samples received	: 91		
No. of samples analysed	: 17		

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

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

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

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

Signatories	*Position*	*Accreditation Category*
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Franco Lentini	LCMS Coordinator	Sydney Inorganics, Smithfield, NSW
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

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

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

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
= Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 4882703)									
ES2305042-077	QC17	EA055: Moisture Content	----	0.1	%	3.5	3.6	0.0	0% - 20%
ES2305172-001	Anonymous	EA055: Moisture Content	----	0.1	%	8.6	8.0	6.2	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4883963)									
ES2304781-003	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
ES2304781-032	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4883964)									
ES2304885-013	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
ES2305157-003	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	0.0004	0.0003	28.2	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4883964) - continued									
ES2305157-003	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	0.0005	0.0005	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0026	0.0026	0.0	0% - 50%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4883963)									
ES2304781-003	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
ES2304781-032	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4883964)									
ES2304885-013	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
ES2305157-003	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	0.0005	0.0005	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4883964) - continued									
ES2305157-003	Anonymous	EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	0.0022	0.0019	16.2	0% - 50%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4883963)									
ES2304781-003	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
ES2304781-032	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4883964)									
ES2304885-013	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4883964) - continued									
ES2304885-013	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
ES2305157-003	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4883963)									
ES2304781-003	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
ES2304781-032	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4883964)									

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4883964) - continued									
ES2304885-013	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
ES2305157-003	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4881431)									
ES2305043-078	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	0.14	0.13	10.1	0% - 50%
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.02	0.02	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.04	0.04	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.03	0.03	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
ES2305043-085	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	0.04	0.04	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.02	0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4881855)									
EM2302547-001	Anonymous	EP231X-SUT: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	<0.0002	0.0	No Limit
		EP231X-SUT: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4881855) - continued									
EM2302547-001	Anonymous	EP231X-SUT: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4881431)									
ES2305043-078	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.38	0.36	5.5	0% - 20%
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.48	0.47	3.2	0% - 20%
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.57	0.55	3.0	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.61	0.59	2.7	0% - 20%
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	0.03	0.03	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	0.4	0.3	0.0	No Limit
ES2305043-085	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4881855)									
EM2302547-001	Anonymous	EP231X-SUT: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	0.0023	0.0023	0.0	No Limit
		EP231X-SUT: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	0.0020	0.0020	0.0	No Limit
		EP231X-SUT: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	0.0007	0.0007	0.0	No Limit
		EP231X-SUT: Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	0.0026	0.0030	11.9	No Limit
		EP231X-SUT: Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4881855) - continued									
EM2302547-001	Anonymous	EP231X-SUT: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: Perfluorobutanoic acid (PFBA)	375-22-4	0.002	µg/L	0.0030	0.0027	11.1	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4881431)									
ES2305043-078	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
ES2305043-085	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4881855)									
EM2302547-001	Anonymous	EP231X-SUT: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	<0.001	<0.001	0.0	No Limit
		EP231X-SUT: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<0.001	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4881855) - continued									
EM2302547-001	Anonymous	EP231X-SUT: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	<0.001	0.0	No Limit
		EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	<0.001	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4881431)									
ES2305043-078	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
ES2305043-085	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4881855)									
EM2302547-001	Anonymous	EP231X-SUT: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<0.001	0.0	No Limit
		EP231X-SUT: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	0.010	0.010	0.0	0% - 50%
		EP231X-SUT: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	0.0	No Limit
		EP231X-SUT: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	µg/L	<0.001	<0.001	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 4881431)									
ES2305043-078	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	2.70	2.52	6.9	0% - 20%
ES2305043-085	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	0.06	0.06	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 4881855)									
EM2302547-001	Anonymous	EP231X-SUT: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	<0.0002	<0.0002	0.0	No Limit
		EP231X-SUT: Sum of PFAS (WA DER List)	----	0.0002	µg/L	0.0206	0.0207	0.5	0% - 20%
		EP231X-SUT: Sum of PFAS	----	0.0002	µg/L	0.0206	0.0207	0.5	0% - 20%

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4883963)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	80.8	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	94.3	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	94.7	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	107	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	107	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	109	59.0	134
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4883964)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	96.8	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	113	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	98.6	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	101	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	98.3	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	103	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4883963)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	81.6	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	97.1	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	102	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	118	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	122	69.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	93.2	72.0	129
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	112	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	116	64.0	136
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	76.6	69.0	135
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	118	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	106	69.0	133
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4883964)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	93.8	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	117	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	111	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	115	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	121	69.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	84.6	72.0	129
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	102	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	115	64.0	136

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4883964) - continued								
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	120	69.0	135
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	134	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	92.9	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4883963)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	108	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	109	71.6	129
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	120	69.8	131
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	100	68.7	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	121	65.1	134
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	124	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	124	61.0	139
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4883964)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	123	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	117	71.6	129
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	123	69.8	131
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	105	68.7	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	108	65.1	134
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	123	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	122	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4883963)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	89.4	62.0	145
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	118	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	100	65.0	137
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	99.6	69.2	143
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4883964)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	104	62.0	145
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	118	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	120	65.0	137
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	121	69.2	143

Sub-Matrix: **WATER**

	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report		
		Spike	Spike Recovery (%)	Acceptable Limits (%)

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4881431)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	89.0	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	102	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	115	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	109	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	84.4	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	99.2	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4881855)								
EP231X-SUT: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	0.004 µg/L	109	72.0	130
EP231X-SUT: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	0.004 µg/L	105	71.0	127
EP231X-SUT: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	0.004 µg/L	95.6	68.0	131
EP231X-SUT: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	0.004 µg/L	114	69.0	134
EP231X-SUT: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	0.004 µg/L	105	65.0	140
EP231X-SUT: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	0.004 µg/L	89.2	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4881431)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	76.8	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	95.4	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	92.8	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	88.2	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	89.8	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	84.4	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	96.8	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	79.8	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	113	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	94.4	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	91.0	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4881855)								
EP231X-SUT: Perfluorobutanoic acid (PFBA)	375-22-4	0.002	µg/L	<0.0020	0.02 µg/L	113	73.0	129
EP231X-SUT: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	0.004 µg/L	118	72.0	129
EP231X-SUT: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	0.004 µg/L	120	72.0	129
EP231X-SUT: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	0.004 µg/L	115	72.0	130
EP231X-SUT: Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	0.004 µg/L	116	71.0	133
EP231X-SUT: Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	0.004 µg/L	104	69.0	130
EP231X-SUT: Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	0.004 µg/L	118	71.0	129
EP231X-SUT: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	0.004 µg/L	98.4	69.0	133
EP231X-SUT: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	<0.0005	0.004 µg/L	126	72.0	134
EP231X-SUT: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	0.004 µg/L	86.8	65.0	144
EP231X-SUT: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	<0.0005	0.01 µg/L	103	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4881431)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4881431) - continued								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	91.6	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	94.6	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	83.0	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	102	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	94.9	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	89.8	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	80.6	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4881855)								
EP231X-SUT: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	0.004 µg/L	113	67.0	137
EP231X-SUT: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	<0.001	0.01 µg/L	113	68.0	141
EP231X-SUT: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	0.01 µg/L	85.8	56.6	136
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	0.01 µg/L	108	61.9	129
EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	0.01 µg/L	109	52.8	135
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	0.004 µg/L	116	65.0	136
EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	0.004 µg/L	96.0	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4881431)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	90.8	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	86.8	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	112	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	98.0	71.4	144
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4881855)								
EP231X-SUT: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	0.004 µg/L	94.4	63.0	143
EP231X-SUT: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	0.004 µg/L	115	64.0	140
EP231X-SUT: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	0.004 µg/L	123	67.0	138
EP231X-SUT: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	µg/L	<0.001	0.004 µg/L	83.6	60.9	136
EP231P: PFAS Sums (QCLot: 4881855)								
EP231X-SUT: Sum of PFHxS and PFOS	355-46-4/17 63-23-1	0.0002	µg/L	<0.0002	----	----	----	----
EP231X-SUT: Sum of PFAS (WA DER List)	----	0.0002	µg/L	<0.0002	----	----	----	----

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231P: PFAS Sums (QCLot: 4881855) - continued								
EP231X-SUT: Sum of PFAS	----	0.0002	µg/L	<0.0002	----	----	----	----

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4883963)							
ES2304781-003	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	88.1	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	105	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	99.8	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	119	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	116	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	119	59.0	134
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4883964)							
ES2304885-013	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	104	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	108	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	99.7	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	111	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	102	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	107	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4883963)							
ES2304781-003	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	98.4	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	100	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	114	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	123	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	127	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	108	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	119	69.0	133
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	118	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	76.1	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	116	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	117	69.0	133
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4883964)							
ES2304885-013	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	114	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	131	69.0	132

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4883964) - continued							
ES2304885-013	Anonymous	EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	109	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	121	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	124	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	98.4	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	114	69.0	133
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	120	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	117	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	119	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	112	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4883963)							
ES2304781-003	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	97.2	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	117	71.6	129
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	125	69.8	131
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	124	68.7	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	106	65.1	134
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	123	63.0	144
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	124	61.0	139
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4883964)							
ES2304885-013	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	121	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	120	71.6	129
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	126	69.8	131
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	104	68.7	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	124	65.1	134
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	124	63.0	144
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	114	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4883963)							
ES2304781-003	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	99.9	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	125	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	120	65.0	137

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4883963) - continued							
ES2304781-003	Anonymous	EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	123	69.2	143
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4883964)							
ES2304885-013	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	112	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	122	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	116	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	112	69.2	143

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4881431)							
ES2305043-079	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	81.2	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	99.2	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	93.6	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	106	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	89.0	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	82.8	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4881431)							
ES2305043-079	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	98.3	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	93.6	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	90.0	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	103	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	119	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	87.4	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	93.6	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	84.6	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	99.0	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	83.8	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	108	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4881431)							
ES2305043-079	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	96.8	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	110	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	109	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	104	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	106	57.6	145

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4881431) - continued							
ES2305043-079	Anonymous	EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	97.8	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	92.4	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4881431)							
ES2305043-079	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	89.8	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	97.2	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	102	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	81.4	71.4	144

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES2305042**	Page	: 1 of 6
Client	: **TETRA TECH COFFEY PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MATTHEW JESSOP-HUNT	Telephone	: + 61 2 8784 8555
Project	: 754-PEREN233360	Date Samples Received	: 15-Feb-2023
Site	:	Issue Date	: 23-Feb-2023
Sampler	: Sanjana Audit	No. of samples received	: 91
Order number	: ----	No. of samples analysed	: 17

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Analysis Holding Time Compliance

Matrix: **SOIL**

Method / Container / Client Sample ID(s)		Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA055: Moisture Content (Dried @ 105-110°C)							
HDPE Soil Jar							
QC15,	QC17,	----	----	----	20-Feb-2023	17-Feb-2023	**3**
QC19,	SB45_0-0.2,						
SB45_0.4-0.5,	SB45_0.9-1.0,						
SB46_0.4-0.5,	SB46_0.9-1.0						

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	1	11	9.09	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	11	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content (Dried @ 105-110°C)								
HDPE Soil Jar (EA055)								
QC15,	QC17,	**03-Feb-2023**	**----**	----	----	**20-Feb-2023**	17-Feb-2023	✗
QC19,	SB45_0-0.2,							
SB45_0.4-0.5,	SB45_0.9-1.0,							
SB46_0.4-0.5,	SB46_0.9-1.0							
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE Soil Jar (EP231X)								
QC15,	QC17,	**03-Feb-2023**	**21-Feb-2023**	02-Aug-2023	✓	**22-Feb-2023**	02-Apr-2023	✓
QC19,	SB45_0-0.2,							
SB45_0.4-0.5,	SB45_0.9-1.0,							
SB46_0.4-0.5,	SB46_0.9-1.0							

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE Soil Jar (EP231X)								
QC15,	QC17,	**03-Feb-2023**	**21-Feb-2023**	02-Aug-2023	✓	**22-Feb-2023**	02-Apr-2023	✓
QC19,	SB45_0-0.2,							
SB45_0.4-0.5,	SB45_0.9-1.0,							
SB46_0.4-0.5,	SB46_0.9-1.0							
EP231C: Perfluoroalkyl Sulfonamides								
HDPE Soil Jar (EP231X)								
QC15,	QC17,	**03-Feb-2023**	**21-Feb-2023**	02-Aug-2023	✓	**22-Feb-2023**	02-Apr-2023	✓
QC19,	SB45_0-0.2,							
SB45_0.4-0.5,	SB45_0.9-1.0,							
SB46_0.4-0.5,	SB46_0.9-1.0							
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE Soil Jar (EP231X)								
QC15,	QC17,	**03-Feb-2023**	**21-Feb-2023**	02-Aug-2023	✓	**22-Feb-2023**	02-Apr-2023	✓
QC19,	SB45_0-0.2,							
SB45_0.4-0.5,	SB45_0.9-1.0,							
SB46_0.4-0.5,	SB46_0.9-1.0							
EP231P: PFAS Sums								
HDPE Soil Jar (EP231X)								
QC15,	QC17,	**03-Feb-2023**	**21-Feb-2023**	02-Aug-2023	✓	**22-Feb-2023**	02-Apr-2023	✓
QC19,	SB45_0-0.2,							
SB45_0.4-0.5,	SB45_0.9-1.0,							
SB46_0.4-0.5,	SB46_0.9-1.0							

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE (no PTFE) (EP231X-SUT)								
QC7,	QC8	**01-Feb-2023**	**20-Feb-2023**	31-Jul-2023	✓	**22-Feb-2023**	31-Jul-2023	✓
HDPE (no PTFE) (EP231X-SUT)								
QC9,	QC10	**02-Feb-2023**	**20-Feb-2023**	01-Aug-2023	✓	**22-Feb-2023**	01-Aug-2023	✓
HDPE (no PTFE) (EP231X-SUT)								
QC11,	QC12	**03-Feb-2023**	**20-Feb-2023**	02-Aug-2023	✓	**22-Feb-2023**	02-Aug-2023	✓
HDPE (no PTFE) (EP231X)								
TB		**08-Feb-2023**	**20-Feb-2023**	07-Aug-2023	✓	**21-Feb-2023**	07-Aug-2023	✓
HDPE (no PTFE) (EP231X-SUT)								
QC5,	QC6	**31-Jan-2023**	**20-Feb-2023**	30-Jul-2023	✓	**22-Feb-2023**	30-Jul-2023	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X-SUT) QC7, QC8	**01-Feb-2023**	**20-Feb-2023**	31-Jul-2023	✓	**22-Feb-2023**	31-Jul-2023	✓
HDPE (no PTFE) (EP231X-SUT) QC9, QC10	**02-Feb-2023**	**20-Feb-2023**	01-Aug-2023	✓	**22-Feb-2023**	01-Aug-2023	✓
HDPE (no PTFE) (EP231X-SUT) QC11, QC12	**03-Feb-2023**	**20-Feb-2023**	02-Aug-2023	✓	**22-Feb-2023**	02-Aug-2023	✓
HDPE (no PTFE) (EP231X) TB	**08-Feb-2023**	**20-Feb-2023**	07-Aug-2023	✓	**21-Feb-2023**	07-Aug-2023	✓
HDPE (no PTFE) (EP231X-SUT) QC5, QC6	**31-Jan-2023**	**20-Feb-2023**	30-Jul-2023	✓	**22-Feb-2023**	30-Jul-2023	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X-SUT) QC7, QC8	**01-Feb-2023**	**20-Feb-2023**	31-Jul-2023	✓	**22-Feb-2023**	31-Jul-2023	✓
HDPE (no PTFE) (EP231X-SUT) QC9, QC10	**02-Feb-2023**	**20-Feb-2023**	01-Aug-2023	✓	**22-Feb-2023**	01-Aug-2023	✓
HDPE (no PTFE) (EP231X-SUT) QC11, QC12	**03-Feb-2023**	**20-Feb-2023**	02-Aug-2023	✓	**22-Feb-2023**	02-Aug-2023	✓
HDPE (no PTFE) (EP231X) TB	**08-Feb-2023**	**20-Feb-2023**	07-Aug-2023	✓	**21-Feb-2023**	07-Aug-2023	✓
HDPE (no PTFE) (EP231X-SUT) QC5, QC6	**31-Jan-2023**	**20-Feb-2023**	30-Jul-2023	✓	**22-Feb-2023**	30-Jul-2023	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X-SUT) QC7, QC8	**01-Feb-2023**	**20-Feb-2023**	31-Jul-2023	✓	**22-Feb-2023**	31-Jul-2023	✓
HDPE (no PTFE) (EP231X-SUT) QC9, QC10	**02-Feb-2023**	**20-Feb-2023**	01-Aug-2023	✓	**22-Feb-2023**	01-Aug-2023	✓
HDPE (no PTFE) (EP231X-SUT) QC11, QC12	**03-Feb-2023**	**20-Feb-2023**	02-Aug-2023	✓	**22-Feb-2023**	02-Aug-2023	✓
HDPE (no PTFE) (EP231X) TB	**08-Feb-2023**	**20-Feb-2023**	07-Aug-2023	✓	**21-Feb-2023**	07-Aug-2023	✓
HDPE (no PTFE) (EP231X-SUT) QC5, QC6	**31-Jan-2023**	**20-Feb-2023**	30-Jul-2023	✓	**22-Feb-2023**	30-Jul-2023	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X-SUT) QC7, QC8	**01-Feb-2023**	**20-Feb-2023**	31-Jul-2023	✓	**22-Feb-2023**	31-Jul-2023	✓
HDPE (no PTFE) (EP231X-SUT) QC9, QC10	**02-Feb-2023**	**20-Feb-2023**	01-Aug-2023	✓	**22-Feb-2023**	01-Aug-2023	✓
HDPE (no PTFE) (EP231X-SUT) QC11, QC12	**03-Feb-2023**	**20-Feb-2023**	02-Aug-2023	✓	**22-Feb-2023**	02-Aug-2023	✓
HDPE (no PTFE) (EP231X) TB	**08-Feb-2023**	**20-Feb-2023**	07-Aug-2023	✓	**21-Feb-2023**	07-Aug-2023	✓
HDPE (no PTFE) (EP231X-SUT) QC5, QC6	**31-Jan-2023**	**20-Feb-2023**	30-Jul-2023	✓	**22-Feb-2023**	30-Jul-2023	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Moisture Content	EA055	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	12	16.67	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	1	11	9.09	10.00	×	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	12	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	12	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	12	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	0	11	0.00	5.00	×	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	SOIL	In-house: Analysis of soils by solvent extraction followed by LC-Electrospray-MS-MS, Negative Mode using MRM using internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to a portion of soil which is then extracted with MTBE and an ion pairing reagent. A portion of extract is exchanged into the analytical solvent mixture, combined with an equal volume reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is concentrated, combined with an equal volume of reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
QuECheRS Extraction of Solids	ORG71	SOIL	In house: Sequential extractions with Acetonitrile/Methanol by shaking. Extraction efficiency aided by the addition of salts under acidic conditions. Where relevant, interferences from co-extracted organics are removed with dispersive clean-up media (dSPE). The extract is either diluted or concentrated and exchanged into the analytical solvent.
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **ES2305043**

Client	: **TETRA TECH COFFEY PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: Matthew Jessop-Hunt	Contact	: Khaleda Ataei
Address	: LEVEL 19, TOWER B- CITADEL TOWER 799 PACIFIC HIGHWAY CHATSWOOD NSW, AUSTRALIA 2067	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: Matthew.JessopHunt@tetratech.com	E-mail	: khaleda.ataei@alsglobal.com
Telephone	: ----	Telephone	: + 61 2 8784 8555
Facsimile	: ----	Facsimile	: +61-2-8784 8500
Project	: 754-PEREN233360 Ayers Rock Airport	Page	: 1 of 5
Order number	: ----	Quote number	: ES2018COFENV0007 (EN/222)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	:		
Sampler	: SANJANA AUDIT		

Dates

Date Samples Received	: 17-Feb-2023 08:00	Issue Date	: 17-Feb-2023
Client Requested Due Date	: 24-Feb-2023	Scheduled Reporting Date	: **24-Feb-2023**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 9	Temperature	: 27.1'C - Ice present
Receipt Detail	: Ice Melted	No. of samples received / analysed	: 97 / 50

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Workorder split from ES2305042.**
- **Samples 'QC24', 'QC26', 'QC30' & 'QC32' have been forwarded to Eurofins for analysis.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

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

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Sampling date / time	Sample ID	(On Hold) SOIL No analysis requested	SOIL - EA055-103 Moisture Content	SOIL - EP231X (solids) PFAS - Full Suite (28 analytes)
ES2305043-001	03-Feb-2023 00:00	SB47_0-0.2	✓		
ES2305043-002	03-Feb-2023 00:00	SB47_0.4-0.5		✓	✓
ES2305043-003	03-Feb-2023 00:00	SB47_0.6-0.75	✓		
ES2305043-004	03-Feb-2023 00:00	SB47_0.9-1.0		✓	✓
ES2305043-005	03-Feb-2023 00:00	SB47_1.4-1.5	✓		
ES2305043-006	03-Feb-2023 00:00	SB47_1.9-2.0	✓		
ES2305043-007	03-Feb-2023 00:00	SB35_0-0.2		✓	✓
ES2305043-008	03-Feb-2023 00:00	SB35_0.4-0.5		✓	✓
ES2305043-009	03-Feb-2023 00:00	SB35_0.6-0.75	✓		
ES2305043-010	03-Feb-2023 00:00	SB35_0.9-1.0	✓		
ES2305043-011	03-Feb-2023 00:00	SB35_1.4-1.5	✓		
ES2305043-012	03-Feb-2023 00:00	SB35_1.9-2.0	✓		
ES2305043-013	03-Feb-2023 00:00	SB36_0-0.2		✓	✓
ES2305043-014	03-Feb-2023 00:00	SB36_0.4-0.5		✓	✓
ES2305043-015	03-Feb-2023 00:00	SB36_0.6-0.75	✓		
ES2305043-016	03-Feb-2023 00:00	SB36_0.9-1.0	✓		
ES2305043-017	03-Feb-2023 00:00	SB36_1.4-1.5	✓		
ES2305043-018	03-Feb-2023 00:00	SB36_1.9-2.0	✓		
ES2305043-019	03-Feb-2023 00:00	SB37_0-0.2	✓		
ES2305043-020	03-Feb-2023 00:00	SB37_0.4-0.5		✓	✓
ES2305043-021	03-Feb-2023 00:00	SB37_0.6-0.75	✓		
ES2305043-022	03-Feb-2023 00:00	SB37_0.9-1.0		✓	✓
ES2305043-023	03-Feb-2023 00:00	SB37_1.4-1.5	✓		
ES2305043-024	03-Feb-2023 00:00	SB37_1.9-2.0	✓		
ES2305043-025	03-Feb-2023 00:00	SB38_0-0.2		✓	✓
ES2305043-026	03-Feb-2023 00:00	SB38_0.4-0.5		✓	✓
ES2305043-027	03-Feb-2023 00:00	SB38_0.6-0.75	✓		
ES2305043-028	03-Feb-2023 00:00	SB38_0.9-1.0	✓		
ES2305043-029	03-Feb-2023 00:00	SB38_1.4-1.5	✓		
ES2305043-030	03-Feb-2023 00:00	SB38_1.9-2.0	✓		
ES2305043-031	03-Feb-2023 00:00	SB41_0-0.2		✓	✓
ES2305043-032	03-Feb-2023 00:00	SB41_0.4-0.5		✓	✓
ES2305043-033	03-Feb-2023 00:00	SB41_0.6-0.75	✓		
ES2305043-034	03-Feb-2023 00:00	SB41_0.9-1.0	✓		
ES2305043-035	03-Feb-2023 00:00	SB41_1.4-1.5	✓		

			(On Hold) SOIL No analysis requested	SOIL - EA055-103 Moisture Content	SOIL - EP231X (solids) PFAS - Full Suite (28 analytes)
ES2305043-036	03-Feb-2023 00:00	SB41_1.9-2.0	✓		
ES2305043-037	03-Feb-2023 00:00	SB40_0-0.2		✓	✓
ES2305043-038	03-Feb-2023 00:00	SB40_0.4-0.5		✓	✓
ES2305043-039	03-Feb-2023 00:00	SB40_0.6-0.75	✓		
ES2305043-040	03-Feb-2023 00:00	SB40_0.9-1.0	✓		
ES2305043-041	03-Feb-2023 00:00	SB40_1.4-1.5	✓		
ES2305043-042	03-Feb-2023 00:00	SB40_1.9-2.0	✓		
ES2305043-043	04-Feb-2023 00:00	SB39_0-0.2	✓		
ES2305043-044	04-Feb-2023 00:00	SB39_0.4-0.5		✓	✓
ES2305043-045	04-Feb-2023 00:00	SB39_0.6-0.75	✓		
ES2305043-046	04-Feb-2023 00:00	SB39_0.9-1.0		✓	✓
ES2305043-047	04-Feb-2023 00:00	SB39_1.4-1.5	✓		
ES2305043-048	04-Feb-2023 00:00	SB39_1.9-2.0	✓		
ES2305043-049	04-Feb-2023 00:00	SB43_0-0.2	✓		
ES2305043-050	04-Feb-2023 00:00	SB43_0.4-0.5		✓	✓
ES2305043-051	04-Feb-2023 00:00	SB43_0.6-0.75	✓		
ES2305043-052	04-Feb-2023 00:00	SB43_0.9-1.0		✓	✓
ES2305043-053	04-Feb-2023 00:00	SB43_1.4-1.5	✓		
ES2305043-054	04-Feb-2023 00:00	SB43_1.9-2.0	✓		
ES2305043-055	04-Feb-2023 00:00	SB43_2.4-2.5	✓		
ES2305043-056	04-Feb-2023 00:00	SB43_2.9-3.0	✓		
ES2305043-057	04-Feb-2023 00:00	SB42_0-0.2	✓		
ES2305043-058	04-Feb-2023 00:00	SB42_0.4-0.5		✓	✓
ES2305043-059	04-Feb-2023 00:00	SB42_0.6-0.75	✓		
ES2305043-060	04-Feb-2023 00:00	SB42_0.9-1.0		✓	✓
ES2305043-061	04-Feb-2023 00:00	SB42_1.4-1.5	✓		
ES2305043-062	04-Feb-2023 00:00	SB42_1.9-2.0	✓		
ES2305043-063	04-Feb-2023 00:00	SB42_2.4-2.5	✓		
ES2305043-064	04-Feb-2023 00:00	SB44_0-0.2	✓		
ES2305043-065	04-Feb-2023 00:00	SB44_0.4-0.5		✓	✓
ES2305043-066	04-Feb-2023 00:00	SB44_0.6-0.75	✓		
ES2305043-067	04-Feb-2023 00:00	SB44_0.9-1.0		✓	✓
ES2305043-070	04-Feb-2023 00:00	QC23		✓	✓
ES2305043-071	04-Feb-2023 00:00	QC25		✓	✓
ES2305043-072	02-Feb-2023 00:00	GW09_2.9-3.0	✓		
ES2305043-073	02-Feb-2023 00:00	GW08_2.9-3.0	✓		
ES2305043-094	06-Feb-2023 00:00	QC36		✓	✓

Matrix: **WATER**

Laboratory sample ID	*Sampling date / time*	*Sample ID*	WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - EP231X-SUT PFAS - Super Ultra Trace Waters Long Suite (29
ES2305043-068	04-Feb-2023 00:00	QC21		✓
ES2305043-069	04-Feb-2023 00:00	QC22		✓
ES2305043-074	05-Feb-2023 00:00	QC27		✓
ES2305043-075	05-Feb-2023 00:00	QC28		✓
ES2305043-076	05-Feb-2023 00:00	QC29		✓
ES2305043-077	05-Feb-2023 00:00	GW02		✓
ES2305043-078	05-Feb-2023 00:00	QC31	✓	
ES2305043-079	05-Feb-2023 00:00	GW03	✓	
ES2305043-080	05-Feb-2023 00:00	GW01	✓	
ES2305043-081	06-Feb-2023 00:00	QC33		✓
ES2305043-082	06-Feb-2023 00:00	QC34		✓
ES2305043-083	06-Feb-2023 00:00	GW04		✓
ES2305043-084	06-Feb-2023 00:00	GW05	✓	
ES2305043-085	06-Feb-2023 00:00	GW06	✓	
ES2305043-086	06-Feb-2023 00:00	GW07		✓
ES2305043-087	06-Feb-2023 00:00	GW08		✓
ES2305043-088	06-Feb-2023 00:00	GW09		✓
ES2305043-089	06-Feb-2023 00:00	GW10		✓
ES2305043-090	06-Feb-2023 00:00	GW11		✓
ES2305043-091	06-Feb-2023 00:00	IN01		✓
ES2305043-092	06-Feb-2023 00:00	EF01		✓
ES2305043-093	06-Feb-2023 00:00	QC35		✓
ES2305043-095	08-Feb-2023 00:00	RN012065		✓
ES2305043-096	08-Feb-2023 00:00	QC37		✓
ES2305043-097	08-Feb-2023 00:00	QC38		✓

Proactive Holding Time Report

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

Requested Deliverables

ACCOUNTS PERTH		
- A4 - AU Tax Invoice (INV)	Email	accounts.perth@tetratech.com
Admin Invoice		
- A4 - AU Tax Invoice (INV)	Email	COF.GeneralAdmin@tetratech.com
ESDAT REPORTS		
- *AU Certificate of Analysis - NATA (COA)	Email	esdat_labreports@coffey.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	esdat_labreports@coffey.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	esdat_labreports@coffey.com
- EDI Format - ESDAT (ESDAT)	Email	esdat_labreports@coffey.com
INVOICES CHAT GENERAL ADMIN		
- A4 - AU Tax Invoice (INV)	Email	CHAT-GeneralAdmin@coffey.com
MATTHEW JESSOP-HUNT		
- *AU Certificate of Analysis - NATA (COA)	Email	Matthew.Hunt@tetratech.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	Matthew.Hunt@tetratech.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	Matthew.Hunt@tetratech.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	Matthew.Hunt@tetratech.com
- A4 - AU Tax Invoice (INV)	Email	Matthew.Hunt@tetratech.com
- Chain of Custody (CoC) (COC)	Email	Matthew.Hunt@tetratech.com
- EDI Format - ENMRG (ENMRG)	Email	Matthew.Hunt@tetratech.com
- EDI Format - ESDAT (ESDAT)	Email	Matthew.Hunt@tetratech.com

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

TETRA TECH COFFEY

Consigning Office: Tetra Tech Coffey - Perth

Report Results to: Matthew Jessop-Hunt and Sanjana Audit — Mobile: 466896542 — Email: matthew.jessop-hunt@tetratech.com and sanjana.audit@tetratech.com

Invoices to: accounts.perth@tetratech.com — Phone: — Email: @tetratech.com

Project No: 754-PEREN233360 — Task No:

Project Name: Ayers Rock Airport — Laboratory: ALS

Sampler's Name: Sanjana Audit — Project Manager: Matthew Jessop-Hunt

Quote number (if different to current quoted prices):

Special Instructions:

Tetra Tech

Lab Batch Ref	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)	PFAS in soil - 28 analytes	Super Ultra Trace PFAS (28 analytes)	Std LOR PFAS (28 analytes)	Other- Refer to Notes	On Hold	NOTES
1	SB47_0-0.2	3-Feb		Soil	1J	Std					x	
2	SB47_0.4-0.5	3-Feb		Soil	1J	Std	x					
3	SB47_0.6-0.75	3-Feb		Soil	1J	Std					x	
4	SB47_0.9-1.0	3-Feb		Soil	1J	Std	x					
5	SB47_1.4-1.5	3-Feb		Soil	1J	Std					x	
6	SB47_1.9-2.0	3-Feb		Soil	1J	Std					x	
7	SB35_0-0.2	3-Feb		Soil	1J	Std	x					
8	SB35_0.4-0.5	3-Feb		Soil	1J	Std	x					
9	SB35_0.6-0.75	3-Feb		Soil	1J	Std					x	
10	SB35_0.9-1.0	3-Feb		Soil	1J	Std					x	
11	SB35_1.4-1.5	3-Feb		Soil	1J	Std					x	
12	SB35_1.9-2.0	3-Feb		Soil	1J	Std					x	
13	SB36_0-0.2	3-Feb		Soil	1J	Std	x					
14	SB36_0.4-0.5	3-Feb		Soil	1J	Std	x					
15	SB36_0.6-0.75	3-Feb		Soil	1J	Std					x	
16	SB36_0.9-1.0	3-Feb		Soil	1J	Std					x	

Analysis Request Section

Subcon / Forward Lab / Split WO: ES2305042

Lab / Analysis:

Organised By / Date:

Relinquished By / Date:

Connote / Courier:

WO No:

Attached By PO / Internal Sheet:

RELINQUISHED BY			RECEIVED BY		
Name: Sanjana Audit - 8/2/23	Date:	→	Name: Jack	Date: 7/02/25	
Coffey	Time:		Company: ALS	Time: 11am	
Name:	Date:	→	Name:	Date:	
Company:	Time:		Company:	Time:	

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Lab. Ref/Bat

*Container Type & Preservation Codes: **P** - Plastic, **G**- Glass Bottle, **J** - Glass Jar, **V**- Vial, **Z** - Ziplock bag, **N** - Nitric Acid Preserved, **C** - Hydrochloric Acid Preserved, **S** - Sulphuric Acid Preserved, **I** - Ice, **ST** - Sodium Thiosulfate, **NP** - No Preservative

Environmental Division Sydney
Work Order Reference
ES2305043

Telephone : + 61-2-8784 8555

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

TETRA TECH COFFEY

Consigning Office:	Tetra Tech Coffey - Perth				
Report Results to:	Matthew Jessop-Hunt and Sanjana Audit	Mobile:	466896542	Email:	matthew.jessop-hunt@tetratech.com and sanjana.audit@tetratech.com
Invoices to:	accounts.perth@tetratech.com	Phone:		Email:	@tetratech.com

Project No:	754-PEREN233360	Task No:	
Project Name:	Ayers Rock Airport	Laboratory:	ALS
Sampler's Name:	Sanjana Audit	Project Manager:	Matthew Jessop-Hunt
Quote number (if different to current quoted prices):			
Special Instructions:			

Tetra Tech

Lab Batch Ref	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)	Analysis Request Section: PFAS in soil - 28 analytes	Super Ultra Trace PFAS (28 analytes)	Std LOR PFAS (28 analytes)	Other- Refer to Notes	On Hold	NOTES
17	SB36_1.4-1.5	3-Feb		Soil	1J	Std					X	
18	SB36_1.9-2.0	3-Feb		Soil	1J	Std					X	
19	SB37_0-0.2	3-Feb		Soil	1J	Std					X	
20	SB37_0.4-0.5	3-Feb		Soil	1J	Std	X					
21	SB37_0.6-0.75	3-Feb		Soil	1J	Std					X	
22	SB37_0.9-1.0	3-Feb		Soil	1J	Std	X					
23	SB37_1.4-1.5	3-Feb		Soil	1J	Std					X	
24	SB37_1.9-2.0	3-Feb		Soil	1J	Std					X	
25	SB38_0-0.2	3-Feb		Soil	1J	Std	X					
26	SB38_0.4-0.5	3-Feb		Soil	1J	Std	X					
27	SB38_0.6-0.75	3-Feb		Soil	1J	Std					X	
28	SB38_0.9-1.0	3-Feb		Soil	1J	Std					X	
29	SB38_1.4-1.5	3-Feb		Soil	1J	Std					X	
30	SB38_1.9-2.0	3-Feb		Soil	1J	Std					X	
31	SB41_0-0.2	3-Feb		Soil	1J	Std	X					
32	SB41_0.4-0.5	3-Feb		Soil	1J	Std	X					

RELINQUISHED BY			RECEIVED BY			Sample Receipt Advice: (Lab Use Only)	
Name:	Sanjana Audit - 8/2/23	Date: →	Name: Jack	Date: 7/02/23		All Samples Recieved in Good Condition	☐
Coffey		Time:	Company: AD	Time: 11am		All Documentation is in Proper Order	☐
Name:		Date: →	Name:	Date:		Samples Received Properly Chilled	☐
Company:		Time:	Company:	Time:		Lab. Ref/Batch No.	

*Container Type & Preservation Codes: P - Plastic, G- Glass Bottle, J - Glass Jar, V- Vial, Z - Ziplock bag, N - Nitric Acid Preserved, C - Hydrochloric Acid Preserved, S - Sulphuric Acid Preserved, I - Ice, ST - Sodium Thiosulfate, NP - No Preservative

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

TETRA TECH COFFEY

Consigning Office:	Tetra Tech Coffey - Perth				
Report Results to:	Matthew Jessop-Hunt and Sanjana Audit	Mobile:	466896542	Email:	matthew.jessop-hunt@tetratech.com and sanjana.audit@tetratech.com
Invoices to:	accounts.perth@tetratech.com	Phone:		Email:	@tetratech.com

Project No:	754-PEREN233360	Task No:	
Project Name:	Ayers Rock Airport	Laboratory:	ALS
Sampler's Name:	Sanjana Audit	Project Manager:	Matthew Jessop-Hunt

Quote number (if different to current quoted prices):

Special Instructions:

Tetra Tech

Lab Batch Ref	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)	Analysis Request Section: PFAS in 1 - 28 analytes	Super Ultra Trace PFAS (28 analytes)	Std LOR PFAS (28 analytes)	Other - Refer to Notes	On Hold	NOTES
33	SB41_0.6-0.75	3-Feb		Soil	1J	Std					X	
34	SB41_0.9-1.0	3-Feb		Soil	1J	Std					X	
35	SB41_1.4-1.5	3-Feb		Soil	1J	Std					X	
36	SB41_1.9-2.0	3-Feb		Soil	1J	Std					X	
37	SB40_0-0.2	3-Feb		Soil	1J	Std	X					
38	SB40_0.4-0.5	3-Feb		Soil	1J	Std	X					
39	SB40_0.6-0.75	3-Feb		Soil	1J	Std					X	
40	SB40_0.9-1.0	3-Feb		Soil	1J	Std					X	
41	SB40_1.4-1.5	3-Feb		Soil	1J	Std					X	
42	SB40_1.9-2.0	3-Feb		Soil	1J	Std					X	
43	SB39_0-0.2	4-Feb		Soil	1J	Std					X	
44	SB39_0.4-0.5	4-Feb		Soil	1J	Std	X					
45	SB39_0.6-0.75	4-Feb		Soil	1J	Std					X	
46	SB39_0.9-1.0	4-Feb		Soil	1J	Std	X					
47	SB39_1.4-1.5	4-Feb		Soil	1J	Std					X	
48	SB39_1.9-2.0	4-Feb		Soil	1J	Std					X	

RELINQUISHED BY		RECEIVED BY		Sample Receipt Advice: (Lab Use Only)	
Name: Sanjana Audit - 8/2/23	Date: →	Name: Jack	Date: 17/8/23	All Samples Recieved in Good Condition	☐
Coffey	Time:	Company: ALS	Time: 11am	All Documentation is in Proper Order	☐
Name:	Date: →	Name:	Date:	Samples Received Properly Chilled	☐
Company:	Time:	Company:	Time:	Lab. Ref/Batch No.	

***Container Type & Preservation Codes: P** - Plastic, **G** - Glass Bottle, **J** - Glass Jar, **V** - Vial, **Z** - Ziplock bag, **N** - Nitric Acid Preserved, **C** - Hydrochloric Acid Preserved, **S** - Sulphuric Acid Preserved, **I** - Ice, **ST** - Sodium Thiosulfate, **NP** - No Preservative

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

TETRA TECH COFFEY

Consigning Office:	Tetra Tech Coffey - Perth				
Report Results to:	Matthew Jessop-Hunt and Sanjana Audit	Mobile:	466896542	Email:	matthew.jessop-hunt@tetratech.com and sanjana.audit@tetratech.com
Invoices to:	accounts.perth@tetratech.com	Phone:		Email:	@tetratech.com

Project No:	754-PEREN233360	Task No:	
Project Name:	Ayers Rock Airport	Laboratory:	ALS
Sampler's Name:	Sanjana Audit	Project Manager:	Matthew Jessop-Hunt
Quote number (if different to current quoted prices):			
Special Instructions:	Tetra Tech		

Lab Batch Ref	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)	PFAS in soil - 28 analytes	Super Ultra Trace PFAS (28 analytes)	Std LOR PFAS (28 analytes)	Other - Refer to Notes	On Hold	NOTES
49	SB43_0-0.2	4-Feb		Soil	1J	Std					X	
50	SB43_0.4-0.5	4-Feb		Soil	1J	Std	X					
51	SB43_0.6-0.75	4-Feb		Soil	1J	Std					X	
52	SB43_0.9-1.0	4-Feb		Soil	1J	Std	X					
53	SB43_1.4-1.5	4-Feb		Soil	1J	Std					X	
54	SB43_1.9-2.0	4-Feb		Soil	1J	Std					X	
55	SB43_2.4-2.5	4-Feb		Soil	1J	Std					X	
56	SB43_2.9-3.0	4-Feb		Soil	1J	Std					X	
57	SB42_0-0.2	4-Feb		Soil	1J	Std					X	
58	SB42_0.4-0.5	4-Feb		Soil	1J	Std	X					
59	SB42_0.6-0.75	4-Feb		Soil	1J	Std					X	
60	SB42_0.9-1.0	4-Feb		Soil	1J	Std	X					
61	SB42_1.4-1.5	4-Feb		Soil	1J	Std					X	
62	SB42_1.9-2.0	4-Feb		Soil	1J	Std					X	
63	SB42_2.4-2.5	4-Feb		Soil	1J	Std					X	
64	SB44_0-0.2	4-Feb		Soil	1J	Std					X	

RELINQUISHED BY			RECEIVED BY		
Name:	Sanjana Audit - 8/2/23	Date: →	Name:	Jack	Date: 1/10/23
Coffey		Time:	Company:	ALS	Time: 11am
Name:		Date: →	Name:		Date:
Company:		Time:	Company:		Time:

Sample Receipt Advice: (Lab Use Only)

- All Samples Recieved in Good Condition ☐
- All Documentation is in Proper Order ☐
- Samples Received Properly Chilled ☐
- Lab. Ref/Batch No.

***Container Type & Preservation Codes:** **P** - Plastic, **G**- Glass Bottle, **J** - Glass Jar, **V**- Vial, **Z** - Ziplock bag, **N** - Nitric Acid Preserved, **C** - Hydrochloric Acid Preserved, **S** - Sulphuric Acid Preserved, **I** - Ice, **ST** - Sodium Thiosulfate, **NP** - No Preservative

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

TETRA TECH COFFEY

Consigning Office:	Tetra Tech Coffey - Perth				
Report Results to:	Matthew Jessop-Hunt and Sanjana Audit	Mobile:	466896542	Email:	matthew.jessop-hunt@tetratech.com and sanjana.audit@tetratech.com
Invoices to:	accounts.perth@tetratech.com	Phone:		Email:	@tetratech.com

Project No:	754-PEREN233360	Task No:	
Project Name:	Ayers Rock Airport	Laboratory:	ALS
Sampler's Name:	Sanjana Audit	Project Manager:	Matthew Jessop-Hunt
Quote number (if different to current quoted prices):			
Special Instructions:			

Tetra Tech

Lab Batch Ref	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)	Analysis Request Section: PFAS in soil - 28 analytes	Super Ultra Trace PFAS (28 analytes)	Std LOR PFAS (28 analytes)	Other- Refer to Notes	On Hold	NOTES
65	SB44_0.4-0.5	4-Feb		Soil	1J	Std	X					
66	SB44_0.6-0.75	4-Feb		Soil	1J	Std					X	
67	SB44_0.9-1.0	4-Feb		Soil	1J	Std	X					
68	QC21	4-Feb		Water	2x PFAS	Std		X				
69	QC22	4-Feb		Water	2x PFAS	Std		X				
70	QC23	4-Feb		Soil	1J	Std	X					
—	QC24	4-Feb		Soil	1J	Std				X		Please send to ARL/Eurofins for analysis
71	QC25	4-Feb		Soil	1J	Std	X					
—	QC26	4-Feb		Soil	1J	Std				X		Please send to ARL/Eurofins for analysis
72	GW09_2.9-3.0	2-Feb		Soil	1J	Std					X	
73	GW08_2.9-3.0	2-Feb		Soil	1J	Std					X	
74	QC27	5-Feb		Water	2xPFAS	Std		X				
75	QC28	5-Feb		Water	2xPFAS	Std		X				
76	QC29	5-Feb		Water	2xPFAS	Std		X				
—	QC30	5-Feb		Water	2xPFAS	Std				X		Please send to ARL/Eurofins for analysis
77	GW02	5-Feb		Water	2xPFAS	Std		X				

RELINQUISHED BY			RECEIVED BY		
Name:	Sanjana Audit - 8/2/23	Date: →	Name: Jack	Date: 17/04/23	
Coffey		Time:	Company: ALS	Time: 11am	
Name:		Date: →	Name:	Date:	
Company:		Time:	Company:	Time:	

Sample Receipt Advice: (Lab Use Only)

- All Samples Recieved in Good Condition ☐
- All Documentation is in Proper Order ☐
- Samples Received Properly Chilled ☐
- Lab. Ref/Batch No.

***Container Type & Preservation Codes:** P - Plastic, G- Glass Bottle, J - Glass Jar, V- Vial, Z - Ziplock bag, N - Nitric Acid Preserved, C - Hydrochloric Acid Preserved, S - Sulphuric Acid Preserved, I - Ice, ST - Sodium Thiosulfate, NP - No Preservative

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

TETRA TECH COFFEY

Consigning Office:	Tetra Tech Coffey - Perth				
Report Results to:	Matthew Jessop-Hunt and Sanjana Audit	Mobile:	466896542	Email:	matthew.jessop-hunt@tetratech.com and sanjana.audit@tetratech.com
Invoices to:	accounts.perth@tetratech.com	Phone:		Email:	@tetratech.com

Project No:	754-PEREN233360	Task No:	
Project Name:	Ayers Rock Airport	Laboratory:	ALS
Sampler's Name:	Sanjana Audit	Project Manager:	Matthew Jessop-Hunt
Quote number (if different to current quoted prices):			
Special Instructions:			

Tetra Tech

Lab Batch Ref	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)	PFAS in soil - 28 analytes	Super Ultra Trace PFAS (28 analytes)	Std LOR PFAS (28 analytes)	Other - Refer to Notes	On Hold	NOTES
78	QC31	5-Feb		Water	2xPFAS	Std			X			
—	QC32	5-Feb		Water	2xPFAS	Std				X		Please send to ARL/Eurofins for analysis
79	GW03	5-Feb		Water	2xPFAS	Std			X			
80	GW01	5-Feb		Water	2xPFAS	Std			X			
81	QC33	6-Feb		Water	2xPFAS	Std		X				
82	QC34	6-Feb		Water	2xPFAS	Std		X				
83	GW04	6-Feb		Water	2xPFAS	Std		X				
84	GW05	6-Feb		Water	2xPFAS	Std			X			
85	GW06	6-Feb		Water	2xPFAS	Std			X			
86	GW07	6-Feb		Water	2xPFAS	Std		X				
87	GW08	6-Feb		Water	2xPFAS	Std		X				
88	GW09	6-Feb		Water	2xPFAS	Std		X				
89	GW10	6-Feb		Water	2xPFAS	Std		X				
90	GW11	6-Feb		Water	2xPFAS	Std		X				
91	IN01	6-Feb		Water	2xPFAS	Std		X				CAUTION: Sewage treatment plant influent and effluent samples
92	EF01	6-Feb		Water	2xPFAS	Std		X				

Analysis Request Section

RELINQUISHED BY			RECEIVED BY			Sample Receipt Advice: (Lab Use Only)	
Name:	Sanjana Audit - 8/2/23	Date: →	Name:	Jack	Date: 17/08/23	All Samples Recieved in Good Condition	☐
Coffey		Time:	Company:	AU	Time: 11am	All Documentation is in Proper Order	☐
Name:		Date: →	Name:		Date:	Samples Received Properly Chilled	☐
Company:		Time:	Company:		Time:	Lab. Ref/Batch No.	

*Container Type & Preservation Codes: P - Plastic, G- Glass Bottle, J - Glass Jar, V- Vial, Z - Ziplock bag, N - Nitric Acid Preserved, C - Hydrochloric Acid Preserved, S - Sulphuric Acid Preserved, I - Ice, ST - Sodium Thiosulfate, NP - No Preservative

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

TETRA TECH COFFEY

Consigning Office:	Tetra Tech Coffey - Perth				
Report Results to:	Matthew Jessop-Hunt and Sanjana Audit	Mobile:	466896542	Email:	matthew.jessop-hunt@tetratech.com and sanjana.audit@tetratech.com
Invoices to:	accounts.perth@tetratech.com	Phone:		Email:	@tetratech.com

Project No:	754-PEREN233360	Task No:	
Project Name:	Ayers Rock Airport	Laboratory:	ALS
Sampler's Name:	Sanjana Audit	Project Manager:	Matthew Jessop-Hunt
Quote number (if different to current quoted prices):			
Special Instructions:	Tetra Tech		

Lab Batch Ref	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)	PFAS in soil - 28 analytes	Super Ultra Trace PFAS (28 analytes)	Std LOR PFAS (28 analytes)	Other- Refer to Notes	On Hold	NOTES
93	QC35	6-Feb		Water	2xPFAS	Std		X				
94	QC36	6-Feb		Soil	2xPFAS	Std	X					
95	RN012065	8-Feb		Water	2xPFAS	Std		X				
96	QC37	8-Feb		Water	2xPFAS	Std		X				
97	QC38	8-Feb		Water	2xPFAS	Std		X				

Analysis Request Section

RELINQUISHED BY				RECEIVED BY			
Name:	Sanjana Audit - 8/2/23	Date:	→	Name:	Josh	Date:	7/08/23
Coffey		Time:		Company:	ALS	Time:	11am
Name:		Date:	→	Name:		Date:	
Company:		Time:		Company:		Time:	

Sample Receipt Advice: (Lab Use Only)

- All Samples Recieved in Good Condition ☐
- All Documentation is in Proper Order ☐
- Samples Received Properly Chilled ☐
- Lab. Ref/Batch No.

*Container Type & Preservation Codes: P - Plastic, G- Glass Bottle, J - Glass Jar, V- Vial, Z - Ziplock bag, N - Nitric Acid Preserved, C - Hydrochloric Acid Preserved, S - Sulphuric Acid Preserved, I - Ice, ST - Sodium Thiosulfate, NP - No Preservative

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES2305043**	Page	: 1 of 31
Client	: **TETRA TECH COFFEY PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: Matthew Jessop-Hunt	Contact	: Khaleda Ataei
Address	: LEVEL 19, TOWER B- CITADEL TOWER 799 PACIFIC HIGHWAY CHATSWOOD NSW, AUSTRALIA 2067	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: + 61 2 8784 8555
Project	: 754-PEREN233360 Ayers Rock Airport	Date Samples Received	: 17-Feb-2023 08:00
Order number	: ----	Date Analysis Commenced	: 17-Feb-2023
C-O-C number	: ----	Issue Date	: 23-Feb-2023 14:51
Sampler	: SANJANA AUDIT		
Site	:		
Quote number	: EN/222		
No. of samples received	: 97		
No. of samples analysed	: 56		

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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

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

Signatories

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

Signatories	*Position*	*Accreditation Category*
Alex Rossi	Organic Chemist	Sydney Organics, Smithfield, NSW
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Franco Lentini	LCMS Coordinator	Sydney Inorganics, Smithfield, NSW
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

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

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

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

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

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

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

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

- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- EP231X: PFAS results for sample #085 confirmed by instrument QC duplicate.
- EP231X-SUT: Samples ES2305043-087 & ES2305043-091 required dilution due to sample matrix . LOR values have been adjusted accordingly.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	SB47_0.4-0.5	SB47_0.9-1.0	SB35_0-0.2	SB35_0.4-0.5	SB35_0.9-1.0
				Sampling date / time	03-Feb-2023 00:00	03-Feb-2023 00:00	03-Feb-2023 00:00	03-Feb-2023 00:00	03-Feb-2023 00:00
Compound	CAS Number	LOR	Unit		ES2305043-002	ES2305043-004	ES2305043-007	ES2305043-008	ES2305043-010
					Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	0.1	%		**4.7**	**3.2**	**0.3**	**2.0**	**3.3**
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg		<0.0002	<0.0002	**0.0003**	<0.0002	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg		**0.0003**	<0.0002	**0.0003**	<0.0002	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg		**0.0008**	**0.0006**	**0.0016**	<0.0002	<0.0002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg		**0.0005**	**0.0002**	**0.0123**	**0.0003**	<0.0002
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg		<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg		**0.0002**	<0.0002	<0.0002	**0.0003**	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg		**0.0014**	**0.0006**	**0.0002**	**0.0002**	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg		**0.0002**	<0.0002	<0.0002	**0.0006**	**0.0002**
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg		**0.0003**	<0.0002	**0.0003**	**0.0008**	**0.0002**
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg		<0.0002	<0.0002	**0.0003**	**0.0005**	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg		<0.0002	<0.0002	**0.0002**	<0.0002	<0.0002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	SB47_0.4-0.5	SB47_0.9-1.0	SB35_0-0.2	SB35_0.4-0.5	SB35_0.9-1.0
				Sampling date / time	03-Feb-2023 00:00	03-Feb-2023 00:00	03-Feb-2023 00:00	03-Feb-2023 00:00	03-Feb-2023 00:00
Compound	CAS Number	LOR	Unit		ES2305043-002	ES2305043-004	ES2305043-007	ES2305043-008	ES2305043-010
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		**0.0037**	**0.0014**	**0.0155**	**0.0027**	**0.0004**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		**0.0013**	**0.0008**	**0.0139**	**0.0003**	<0.0002
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		**0.0034**	**0.0014**	**0.0147**	**0.0022**	**0.0004**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**97.0**	**97.5**	**100**	**78.5**	**110**
13C8-PFOA	----	0.0002	%		**107**	**104**	**105**	**106**	**105**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	SB36_0-0.2	SB36_0.4-0.5	SB36_0.9-1.0	SB37_0-0.2	SB37_0.4-0.5
				Sampling date / time	03-Feb-2023 00:00	03-Feb-2023 00:00	03-Feb-2023 00:00	03-Feb-2023 00:00	03-Feb-2023 00:00
Compound	CAS Number	LOR	Unit		ES2305043-013	ES2305043-014	ES2305043-016	ES2305043-019	ES2305043-020
					Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	0.1	%		**2.6**	**5.0**	**5.2**	**3.1**	**3.7**
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	**0.0003**
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg		<0.0002	**0.0013**	**0.0011**	**0.0247**	**0.0114**
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	**0.0158**	**0.0003**
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg		**0.0046**	**0.0005**	**0.0005**	**0.0411**	**0.0010**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg		<0.001	<0.001	<0.001	<0.001	**0.001**
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg		<0.0002	<0.0002	**0.0002**	**0.0003**	**0.0016**
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg		<0.0002	**0.0004**	**0.0006**	**0.0007**	**0.0028**
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg		<0.0002	**0.0009**	**0.0005**	**0.0025**	**0.0021**
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg		**0.0002**	**0.0017**	**0.0007**	**0.161**	**0.0056**
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg		**0.0005**	<0.0002	<0.0002	**0.0189**	**0.0003**
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg		**0.0032**	<0.0002	<0.0002	**0.0008**	<0.0002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		**0.0008**	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		**0.0005**	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	SB36_0-0.2	SB36_0.4-0.5	SB36_0.9-1.0	SB37_0-0.2	SB37_0.4-0.5
				Sampling date / time	03-Feb-2023 00:00	03-Feb-2023 00:00	03-Feb-2023 00:00	03-Feb-2023 00:00	03-Feb-2023 00:00
Compound	CAS Number	LOR	Unit		ES2305043-013	ES2305043-014	ES2305043-016	ES2305043-019	ES2305043-020
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	**0.0020**	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		**0.0009**	<0.0005	<0.0005	**0.0020**	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		**0.0107**	**0.0048**	**0.0036**	**0.270**	**0.0264**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		**0.0046**	**0.0018**	**0.0016**	**0.0658**	**0.0124**
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		**0.0057**	**0.0048**	**0.0036**	**0.234**	**0.0255**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**95.0**	**110**	**95.5**	**91.5**	**85.5**
13C8-PFOA	----	0.0002	%		**109**	**114**	**104**	**99.0**	**104**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	SB37_0.9-1.0	SB38_0-0.2	SB38_0.4-0.5	SB38_0.9-1.0	SB41_0-0.2
			Sampling date / time	03-Feb-2023 00:00	03-Feb-2023 00:00	03-Feb-2023 00:00	03-Feb-2023 00:00	03-Feb-2023 00:00
Compound	CAS Number	LOR	Unit	ES2305043-022	ES2305043-025	ES2305043-026	ES2305043-028	ES2305043-031
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	**3.3**	**3.3**	**3.7**	**3.9**	**0.4**
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	**0.0055**	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	**0.0150**	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	**0.0642**	**0.0005**	**0.0003**	<0.0002	**0.0009**
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	**0.0004**	<0.0002	<0.0002	<0.0002	**0.0008**
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	**0.0062**	**0.0040**	<0.0002	<0.0002	**0.152**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	**0.0002**
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	**0.002**	<0.001	<0.001	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	**0.0031**	<0.0002	**0.0005**	**0.0009**	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	**0.0270**	<0.0002	**0.0044**	**0.0010**	**0.0002**
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	**0.0095**	**0.0007**	**0.0105**	**0.0006**	**0.0004**
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	**0.0032**	**0.0308**	**0.0010**	**0.0007**	**0.0148**
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	**0.0006**	**0.0118**	<0.0002	<0.0002	**0.0368**
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	**0.0006**	<0.0002	<0.0002	**0.0206**
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	**0.0055**
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	**0.0054**
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	**0.0011**
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	**0.0013**
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	SB37_0.9-1.0	SB38_0-0.2	SB38_0.4-0.5	SB38_0.9-1.0	SB41_0-0.2
				Sampling date / time	03-Feb-2023 00:00	03-Feb-2023 00:00	03-Feb-2023 00:00	03-Feb-2023 00:00	03-Feb-2023 00:00
Compound	CAS Number	LOR	Unit		ES2305043-022	ES2305043-025	ES2305043-026	ES2305043-028	ES2305043-031
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	**0.0007**	<0.0005	<0.0005	**0.0413**
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	**0.0014**
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		**0.137**	**0.0491**	**0.0167**	**0.0032**	**0.283**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		**0.0704**	**0.0045**	**0.0003**	<0.0002	**0.153**
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		**0.121**	**0.0367**	**0.0167**	**0.0032**	**0.210**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**93.0**	**101**	**87.0**	**93.0**	**102**
13C8-PFOA	----	0.0002	%		**108**	**104**	**106**	**104**	**102**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	SB41_0.4-0.5	SB41_0.9-1.0	SB40_0-0.2	SB40_0.4-0.5	SB40_0.9-1.0
			Sampling date / time	03-Feb-2023 00:00	03-Feb-2023 00:00	03-Feb-2023 00:00	03-Feb-2023 00:00	03-Feb-2023 00:00
Compound	CAS Number	LOR	Unit	ES2305043-032	ES2305043-034	ES2305043-037	ES2305043-038	ES2305043-040
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	**2.4**	**2.8**	**1.3**	**3.8**	**4.3**
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	**0.0002**	<0.0002	**0.0010**	**0.0018**
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	**0.0010**	**0.0010**
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	**0.0032**	**0.0029**	**0.0048**	**0.0029**	**0.0044**
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	**0.0006**	<0.0002	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	**0.0104**	**0.0025**	**0.0314**	**0.0005**	**0.0006**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	<0.001	<0.001	**0.001**
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	**0.0002**	**0.0008**	<0.0002	**0.0015**	**0.0027**
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	**0.0009**	**0.0013**	<0.0002	**0.0092**	**0.0104**
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	**0.0034**	**0.0009**	**0.0008**	**0.0052**	**0.0043**
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	**0.0033**	**0.0008**	**0.0234**	**0.0013**	**0.0036**
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	**0.0005**	<0.0002	**0.0066**	<0.0002	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	**0.0050**	<0.0002	<0.0002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	**0.0015**	<0.0002	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	**0.0026**	<0.0002	<0.0002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	**0.0011**	<0.0002	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	**0.0021**	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	SB41_0.4-0.5	SB41_0.9-1.0	SB40_0-0.2	SB40_0.4-0.5	SB40_0.9-1.0
				Sampling date / time	03-Feb-2023 00:00	03-Feb-2023 00:00	03-Feb-2023 00:00	03-Feb-2023 00:00	03-Feb-2023 00:00
Compound	CAS Number	LOR	Unit		ES2305043-032	ES2305043-034	ES2305043-037	ES2305043-038	ES2305043-040
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	<0.0005	**0.0010**	<0.0005	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	<0.0005	**0.0080**	<0.0005	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		**0.0219**	**0.0094**	**0.0889**	**0.0226**	**0.0298**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		**0.0136**	**0.0054**	**0.0362**	**0.0034**	**0.0050**
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		**0.0214**	**0.0094**	**0.0694**	**0.0216**	**0.0288**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**88.0**	**98.5**	**84.0**	**94.0**	**95.5**
13C8-PFOA	----	0.0002	%		**107**	**110**	**110**	**104**	**104**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	SB39_0.4-0.5	SB39_0.9-1.0	SB43_0.4-0.5	SB43_0.9-1.0	SB42_0.4-0.5
				Sampling date / time	04-Feb-2023 00:00	04-Feb-2023 00:00	04-Feb-2023 00:00	04-Feb-2023 00:00	04-Feb-2023 00:00
Compound	CAS Number	LOR	Unit		ES2305043-044	ES2305043-046	ES2305043-050	ES2305043-052	ES2305043-058
					Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	0.1	%		**1.8**	**2.2**	**7.2**	**7.8**	**2.8**
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg		**0.0003**	**0.0005**	<0.0002	<0.0002	**0.0016**
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg		**0.0004**	<0.0002	<0.0002	<0.0002	**0.0009**
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg		**0.0026**	**0.0004**	**0.0005**	**0.0005**	**0.0017**
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg		**0.0006**	**0.0007**	**0.0008**	**0.0033**	<0.0002
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg		<0.001	<0.001	**0.001**	**0.002**	**0.002**
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg		**0.0003**	**0.0002**	**0.0029**	**0.0040**	**0.0041**
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg		**0.0021**	**0.0006**	**0.0027**	**0.0020**	**0.0084**
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg		**0.0003**	**0.0004**	**0.0078**	**0.0044**	**0.0036**
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg		**0.0002**	**0.0004**	**0.0037**	**0.0098**	**0.0018**
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg		<0.0002	<0.0002	**0.0013**	**0.0062**	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg		<0.0002	<0.0002	**0.0011**	**0.0065**	<0.0002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		<0.0002	<0.0002	**0.0004**	**0.0028**	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		<0.0002	<0.0002	**0.0005**	**0.0033**	<0.0002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	**0.0010**	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	**0.0013**	<0.0005
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	SB39_0.4-0.5	SB39_0.9-1.0	SB43_0.4-0.5	SB43_0.9-1.0	SB42_0.4-0.5
				Sampling date / time	04-Feb-2023 00:00	04-Feb-2023 00:00	04-Feb-2023 00:00	04-Feb-2023 00:00	04-Feb-2023 00:00
Compound	CAS Number	LOR	Unit		ES2305043-044	ES2305043-046	ES2305043-050	ES2305043-052	ES2305043-058
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	<0.0005	**0.0049**	**0.0300**	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	**0.0009**	<0.0005
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		**0.0068**	**0.0032**	**0.0276**	**0.0780**	**0.0241**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		**0.0032**	**0.0011**	**0.0013**	**0.0038**	**0.0017**
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		**0.0064**	**0.0032**	**0.0243**	**0.0560**	**0.0232**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**93.0**	**91.0**	**98.5**	**96.5**	**104**
13C8-PFOA	----	0.0002	%		**108**	**110**	**106**	**106**	**112**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	SB42_0.9-1.0	SB44_0.4-0.5	SB44_0.9-1.0	QC23	QC25
			Sampling date / time	04-Feb-2023 00:00	04-Feb-2023 00:00	04-Feb-2023 00:00	04-Feb-2023 00:00	04-Feb-2023 00:00
Compound	CAS Number	LOR	Unit	ES2305043-060	ES2305043-065	ES2305043-067	ES2305043-070	ES2305043-071
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	**2.9**	**9.6**	**15.5**	**7.2**	**2.6**
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	**0.0007**	<0.0002	<0.0002	<0.0002	**0.0012**
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	**0.0004**	<0.0002	<0.0002	<0.0002	**0.0009**
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	**0.0009**	<0.0002	<0.0002	**0.0006**	**0.0017**
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	**0.0004**	**0.0046**	**0.0020**	**0.0009**	<0.0002
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	<0.001	**0.002**	**0.002**
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	**0.0014**	<0.0002	<0.0002	**0.0042**	**0.0045**
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	**0.0031**	<0.0002	<0.0002	**0.0032**	**0.0073**
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	**0.0032**	<0.0002	<0.0002	**0.0080**	**0.0026**
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	**0.0025**	<0.0002	<0.0002	**0.0050**	**0.0015**
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	**0.0003**	**0.0005**	**0.0012**	**0.0011**	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	**0.0002**	**0.0062**	**0.0019**	**0.0012**	<0.0002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	**0.0007**	<0.0002	**0.0005**	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	**0.0006**	<0.0002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	SB42_0.9-1.0	SB44_0.4-0.5	SB44_0.9-1.0	QC23	QC25
				Sampling date / time	04-Feb-2023 00:00	04-Feb-2023 00:00	04-Feb-2023 00:00	04-Feb-2023 00:00	04-Feb-2023 00:00
Compound	CAS Number	LOR	Unit		ES2305043-060	ES2305043-065	ES2305043-067	ES2305043-070	ES2305043-071
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		**0.0010**	**0.0066**	**0.0037**	**0.0049**	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		**0.0141**	**0.0186**	**0.0088**	**0.0322**	**0.0217**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		**0.0013**	**0.0046**	**0.0020**	**0.0015**	**0.0017**
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		**0.0132**	**0.0112**	**0.0057**	**0.0288**	**0.0208**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**100**	**107**	**93.7**	**98.4**	**93.4**
13C8-PFOA	----	0.0002	%		**108**	**119**	**109**	**114**	**105**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	QC36	----	----	----	----
				Sampling date / time	06-Feb-2023 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		ES2305043-094	--------	--------	--------	--------
					Result	----	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	0.1	%		**0.6**	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg		<0.0002	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg		<0.001	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg		<0.0005	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg		<0.0002	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0005	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	QC36	----	----	----	----
			Sampling date / time	06-Feb-2023 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	ES2305043-094	--------	--------	--------	--------
				Result	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	----	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	----	----	----	----
EP231P: PFAS Sums								
Sum of PFAS	----	0.0002	mg/kg	<0.0002	----	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	<0.0002	----	----	----	----
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	<0.0002	----	----	----	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	**104**	----	----	----	----
13C8-PFOA	----	0.0002	%	**115**	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC21	QC22	QC27	QC28	QC29
				Sampling date / time	04-Feb-2023 00:00	04-Feb-2023 00:00	05-Feb-2023 00:00	05-Feb-2023 00:00	05-Feb-2023 00:00
Compound	CAS Number	LOR	Unit		ES2305043-068	ES2305043-069	ES2305043-074	ES2305043-075	ES2305043-076
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L		<0.0005	<0.0005	<0.0005	<0.0005	**0.0007**
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L		<0.0020	<0.0020	<0.0020	<0.0020	**0.0023**
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L		<0.0005	<0.0005	<0.0005	<0.0005	**0.0005**
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L		<0.001	<0.001	<0.001	<0.001	<0.001
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L		<0.001	<0.001	<0.001	<0.001	<0.001

Analytical Results

Sub-Matrix: **WATER**
(Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	QC21	QC22	QC27	QC28	QC29
				Sampling date / time	04-Feb-2023 00:00	04-Feb-2023 00:00	05-Feb-2023 00:00	05-Feb-2023 00:00	05-Feb-2023 00:00
					ES2305043-068	ES2305043-069	ES2305043-074	ES2305043-075	ES2305043-076
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L		<0.001	<0.001	<0.001	<0.001	<0.001
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L		<0.001	<0.001	<0.001	<0.001	<0.001
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L		<0.001	<0.001	<0.001	<0.001	<0.001
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L		<0.001	<0.001	<0.001	<0.001	<0.001
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L		<0.001	<0.001	<0.001	<0.001	<0.001
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	µg/L		<0.001	<0.001	<0.001	<0.001	<0.001
EP231P: PFAS Sums									
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L		<0.0002	<0.0002	<0.0002	<0.0002	**0.0007**
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L		<0.0002	<0.0002	<0.0002	<0.0002	**0.0035**
^ Sum of PFAS	----	0.0002	µg/L		<0.0002	<0.0002	<0.0002	<0.0002	**0.0035**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%		**103**	**104**	**102**	**107**	**92.9**
13C8-PFOA	----	0.0005	%		**81.8**	**82.1**	**79.9**	**80.4**	**116**

Analytical Results

Sub-Matrix: **WATER**
(Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	GW02	QC31	GW03	GW01	QC33
				Sampling date / time	05-Feb-2023 00:00	05-Feb-2023 00:00	05-Feb-2023 00:00	05-Feb-2023 00:00	06-Feb-2023 00:00
					ES2305043-077	ES2305043-078	ES2305043-079	ES2305043-080	ES2305043-081
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L		<0.0005	----	----	----	<0.0005
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		----	**0.04**	**0.04**	**0.81**	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L		<0.0005	----	----	----	<0.0005
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		----	**0.03**	**0.02**	**0.69**	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L		**0.0006**	----	----	----	<0.0005
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L		----	**0.14**	**0.13**	**1.92**	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L		<0.0005	----	----	----	<0.0005
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		----	<0.02	<0.02	**0.02**	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L		<0.0002	----	----	----	<0.0002
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L		<0.0005	----	----	----	<0.0005
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		----	**0.02**	**0.02**	**0.07**	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		----	<0.02	<0.02	<0.02	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		----	**0.4**	**0.4**	**2.2**	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		----	**0.48**	**0.62**	**2.86**	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		----	**0.57**	**0.74**	**2.31**	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		----	**0.61**	**0.78**	**1.23**	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		----	**0.38**	**0.46**	**0.82**	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		----	**0.03**	**0.04**	<0.02	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		----	<0.02	<0.02	<0.02	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		----	<0.02	<0.02	<0.02	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		----	<0.02	<0.02	<0.02	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	GW02	QC31	GW03	GW01	QC33
				Sampling date / time	05-Feb-2023 00:00	05-Feb-2023 00:00	05-Feb-2023 00:00	05-Feb-2023 00:00	06-Feb-2023 00:00
Compound	CAS Number	LOR	Unit		ES2305043-077	ES2305043-078	ES2305043-079	ES2305043-080	ES2305043-081
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		----	<0.02	<0.02	<0.02	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		----	<0.05	<0.05	<0.05	----
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L		<0.0020	----	----	----	<0.0020
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L		<0.0005	----	----	----	<0.0005
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L		<0.0005	----	----	----	<0.0005
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L		**0.0006**	----	----	----	<0.0005
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L		<0.0005	----	----	----	<0.0005
Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L		<0.0005	----	----	----	<0.0005
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L		<0.0005	----	----	----	<0.0005
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L		<0.0005	----	----	----	<0.0005
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L		<0.0005	----	----	----	<0.0005
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L		<0.0005	----	----	----	<0.0005
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L		<0.0005	----	----	----	<0.0005
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		----	<0.02	<0.02	<0.02	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		----	<0.05	<0.05	<0.05	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		----	<0.05	<0.05	<0.05	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		----	<0.05	<0.05	<0.05	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		----	<0.05	<0.05	<0.05	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		----	<0.02	<0.02	<0.02	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		----	<0.02	<0.02	<0.02	----

Analytical Results

Sub-Matrix: **WATER**
(Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	GW02	QC31	GW03	GW01	QC33
				Sampling date / time	05-Feb-2023 00:00	05-Feb-2023 00:00	05-Feb-2023 00:00	05-Feb-2023 00:00	06-Feb-2023 00:00
					ES2305043-077	ES2305043-078	ES2305043-079	ES2305043-080	ES2305043-081
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L		<0.0005	----	----	----	<0.0005
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L		<0.001	----	----	----	<0.001
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L		<0.001	----	----	----	<0.001
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L		<0.001	----	----	----	<0.001
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L		<0.001	----	----	----	<0.001
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L		<0.0005	----	----	----	<0.0005
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L		<0.0005	----	----	----	<0.0005
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		----	<0.05	<0.05	<0.05	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		----	<0.05	<0.05	<0.05	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		----	<0.05	<0.05	<0.05	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		----	<0.05	<0.05	<0.05	----
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L		<0.001	----	----	----	<0.001
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L		<0.001	----	----	----	<0.001
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L		<0.001	----	----	----	<0.001
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	µg/L		<0.001	----	----	----	<0.001
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		----	**2.70**	**3.25**	**12.9**	----

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	GW02	QC31	GW03	GW01	QC33
				Sampling date / time	05-Feb-2023 00:00	05-Feb-2023 00:00	05-Feb-2023 00:00	05-Feb-2023 00:00	06-Feb-2023 00:00
					ES2305043-077	ES2305043-078	ES2305043-079	ES2305043-080	ES2305043-081
					Result	Result	Result	Result	Result
EP231P: PFAS Sums - Continued									
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**----**	**0.16**	**0.15**	**1.99**	**----**
Sum of PFAS (WA DER List)	----	0.01	µg/L		**----**	**2.64**	**3.19**	**12.2**	**----**
^ **Sum of PFHxS and PFOS**	355-46-4/1763-23-1	0.0002	µg/L		**0.0006**	**----**	**----**	**----**	<0.0002
^ **Sum of PFAS (WA DER List)**	----	0.0002	µg/L		**0.0012**	**----**	**----**	**----**	<0.0002
^ **Sum of PFAS**	----	0.0002	µg/L		**0.0012**	**----**	**----**	**----**	<0.0002
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**----**	**95.1**	**97.7**	**95.1**	**----**
13C8-PFOA	----	0.02	%		**----**	**103**	**103**	**102**	**----**
13C4-PFOS	----	0.0005	%		**91.9**	**----**	**----**	**----**	**94.2**
13C8-PFOA	----	0.0005	%		**117**	**----**	**----**	**----**	**83.3**

Analytical Results

Sub-Matrix: **WATER**
(Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	QC34	GW04	GW05	GW06	GW07
				Sampling date / time	06-Feb-2023 00:00	06-Feb-2023 00:00	06-Feb-2023 00:00	06-Feb-2023 00:00	06-Feb-2023 00:00
					ES2305043-082	ES2305043-083	ES2305043-084	ES2305043-085	ES2305043-086
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L		<0.0005	**0.0032**	----	----	**0.0058**
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		----	----	<0.02	**0.02**	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L		<0.0005	<0.0005	----	----	**0.0038**
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		----	----	<0.02	<0.02	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L		<0.0005	<0.0005	----	----	**0.0096**
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L		----	----	**0.04**	**0.04**	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L		<0.0005	<0.0005	----	----	<0.0005
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		----	----	<0.02	<0.02	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L		<0.0002	<0.0002	----	----	**0.0029**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L		<0.0005	<0.0005	----	----	<0.0005
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		----	----	**0.10**	<0.01	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		----	----	<0.02	<0.02	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		----	----	<0.1	<0.1	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		----	----	**0.07**	<0.02	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		----	----	**0.07**	<0.02	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		----	----	**0.15**	<0.02	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		----	----	**0.23**	<0.01	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		----	----	**0.08**	<0.02	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		----	----	<0.02	<0.02	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		----	----	<0.02	<0.02	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		----	----	<0.02	<0.02	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC34	GW04	GW05	GW06	GW07
				Sampling date / time	06-Feb-2023 00:00	06-Feb-2023 00:00	06-Feb-2023 00:00	06-Feb-2023 00:00	06-Feb-2023 00:00
Compound	CAS Number	LOR	Unit		ES2305043-082	ES2305043-083	ES2305043-084	ES2305043-085	ES2305043-086
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		----	----	<0.02	<0.02	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		----	----	<0.05	<0.05	----
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L		<0.0020	<0.0020	----	----	**0.0029**
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L		<0.0005	**0.0010**	----	----	**0.0106**
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L		<0.0005	<0.0005	----	----	<0.0005
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L		<0.0005	<0.0005	----	----	**0.0010**
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L		<0.0005	<0.0005	----	----	**0.0007**
Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L		<0.0005	<0.0005	----	----	<0.0005
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L		<0.0005	<0.0005	----	----	<0.0005
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L		<0.0005	<0.0005	----	----	<0.0005
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L		<0.0005	<0.0005	----	----	<0.0005
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L		<0.0005	<0.0005	----	----	<0.0005
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L		<0.0005	<0.0005	----	----	<0.0005
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		----	----	<0.02	<0.02	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		----	----	<0.05	<0.05	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		----	----	<0.05	<0.05	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		----	----	<0.05	<0.05	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		----	----	<0.05	<0.05	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		----	----	<0.02	<0.02	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		----	----	<0.02	<0.02	----

Analytical Results

Sub-Matrix: **WATER**
(Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	QC34	GW04	GW05	GW06	GW07
				Sampling date / time	06-Feb-2023 00:00	06-Feb-2023 00:00	06-Feb-2023 00:00	06-Feb-2023 00:00	06-Feb-2023 00:00
					ES2305043-082	ES2305043-083	ES2305043-084	ES2305043-085	ES2305043-086
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L		<0.0005	<0.0005	----	----	<0.0005
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L		<0.001	<0.001	----	----	<0.001
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L		<0.001	<0.001	----	----	<0.001
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L		<0.001	<0.001	----	----	<0.001
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L		<0.001	<0.001	----	----	<0.001
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L		<0.0005	<0.0005	----	----	<0.0005
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L		<0.0005	<0.0005	----	----	<0.0005
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		----	----	<0.05	<0.05	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		----	----	<0.05	<0.05	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		----	----	<0.05	<0.05	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		----	----	<0.05	<0.05	----
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L		<0.001	<0.001	----	----	<0.001
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L		<0.001	<0.001	----	----	<0.001
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L		<0.001	<0.001	----	----	<0.001
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	µg/L		<0.001	<0.001	----	----	<0.001
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		----	----	**0.74**	**0.06**	----

Analytical Results

Sub-Matrix: **WATER**
(Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	QC34	GW04	GW05	GW06	GW07
				Sampling date / time	06-Feb-2023 00:00	06-Feb-2023 00:00	06-Feb-2023 00:00	06-Feb-2023 00:00	06-Feb-2023 00:00
					ES2305043-082	ES2305043-083	ES2305043-084	ES2305043-085	ES2305043-086
					Result	Result	Result	Result	Result
EP231P: PFAS Sums - Continued									
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**----**	**----**	**0.14**	**0.04**	**----**
Sum of PFAS (WA DER List)	----	0.01	µg/L		**----**	**----**	**0.66**	**0.06**	**----**
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L		<0.0002	<0.0002	**----**	**----**	**0.0125**
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L		<0.0002	**0.0042**	**----**	**----**	**0.0335**
^ Sum of PFAS	----	0.0002	µg/L		<0.0002	**0.0042**	**----**	**----**	**0.0373**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**----**	**----**	**94.4**	**93.1**	**----**
13C8-PFOA	----	0.02	%		**----**	**----**	**103**	**99.3**	**----**
13C4-PFOS	----	0.0005	%		**102**	**84.6**	**----**	**----**	**87.0**
13C8-PFOA	----	0.0005	%		**80.7**	**109**	**----**	**----**	**117**

Analytical Results

Sub-Matrix: **WATER**
(Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	GW08	GW09	GW10	GW11	IN01
				Sampling date / time	06-Feb-2023 00:00	06-Feb-2023 00:00	06-Feb-2023 00:00	06-Feb-2023 00:00	06-Feb-2023 00:00
					ES2305043-087	ES2305043-088	ES2305043-089	ES2305043-090	ES2305043-091
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L		**0.233**	**0.0082**	<0.0005	**0.0499**	<0.0016
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L		**0.137**	**0.0073**	<0.0005	**0.0562**	<0.0016
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L		**0.498**	**0.0428**	**0.0017**	**0.481**	<0.0016
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L		**0.0157**	<0.0005	<0.0005	**0.0180**	<0.0016
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L		**0.412**	**0.0041**	**0.0091**	**0.776**	<0.0016
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L		<0.0016	<0.0005	<0.0005	<0.0005	<0.0016
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L		**0.858**	**0.0543**	**0.0026**	**0.0374**	<0.0080
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L		**0.882**	**0.0510**	<0.0005	**0.0533**	<0.0016
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L		**0.443**	**0.0151**	<0.0005	**0.0199**	**0.0217**
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L		**0.592**	**0.0207**	**0.0007**	**0.120**	**0.0280**
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L		**0.145**	**0.0113**	**0.0028**	**0.0414**	**0.0365**
Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L		<0.0016	<0.0005	**0.0006**	<0.0005	**0.0217**
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L		<0.0016	<0.0005	**0.0008**	<0.0005	**0.0212**
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L		<0.0016	<0.0005	<0.0005	<0.0005	**0.0076**
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L		<0.0016	<0.0005	<0.0005	<0.0005	**0.0018**
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L		<0.0016	<0.0005	<0.0005	<0.0005	<0.0016
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L		<0.0040	<0.0005	<0.0005	<0.0005	<0.0040
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L		<0.0016	<0.0005	<0.0005	<0.0005	<0.0016
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L		<0.004	<0.001	<0.001	<0.001	<0.004
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L		<0.004	<0.001	<0.001	<0.001	<0.004

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	GW08	GW09	GW10	GW11	IN01
				Sampling date / time	06-Feb-2023 00:00	06-Feb-2023 00:00	06-Feb-2023 00:00	06-Feb-2023 00:00	06-Feb-2023 00:00
Compound	CAS Number	LOR	Unit		ES2305043-087	ES2305043-088	ES2305043-089	ES2305043-090	ES2305043-091
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L		<0.004	<0.001	<0.001	<0.001	<0.004
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L		<0.004	<0.001	<0.001	<0.001	<0.004
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L		<0.0016	<0.0005	<0.0005	<0.0005	<0.0016
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L		<0.0016	<0.0005	<0.0005	<0.0005	<0.0016
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L		<0.002	<0.001	<0.001	<0.001	<0.002
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L		<0.002	<0.001	<0.001	<0.001	<0.002
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L		<0.002	<0.001	<0.001	<0.001	**0.055**
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	µg/L		<0.002	<0.001	<0.001	<0.001	<0.002
EP231P: PFAS Sums									
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L		**0.910**	**0.0469**	**0.0108**	**1.26**	<0.0016
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L		**4.06**	**0.208**	**0.0169**	**1.58**	**0.141**
^ Sum of PFAS	----	0.0002	µg/L		**4.22**	**0.215**	**0.0183**	**1.65**	**0.194**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%		**110**	**86.3**	**87.4**	**91.4**	**101**
13C8-PFOA	----	0.0005	%		**112**	**117**	**108**	**115**	**86.7**

Analytical Results

Sub-Matrix: **WATER**
(Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	EF01	QC35	RN012065	QC37	QC38
				Sampling date / time	06-Feb-2023 00:00	06-Feb-2023 00:00	08-Feb-2023 00:00	08-Feb-2023 00:00	08-Feb-2023 00:00
					ES2305043-092	ES2305043-093	ES2305043-095	ES2305043-096	ES2305043-097
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L		**0.0102**	<0.0005	**0.0167**	<0.0005	<0.0005
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L		**0.0032**	<0.0005	**0.0074**	<0.0005	<0.0005
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L		**0.0295**	<0.0005	**0.0225**	<0.0005	<0.0005
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L		**0.0045**	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L		**0.154**	<0.0002	**0.0389**	<0.0002	<0.0002
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L		**0.841**	<0.0020	<0.0020	<0.0020	<0.0020
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L		**0.363**	<0.0005	**0.0438**	<0.0005	<0.0005
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L		**0.404**	<0.0005	**0.0023**	<0.0005	<0.0005
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L		**0.388**	<0.0005	**0.0800**	<0.0005	<0.0005
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L		**0.698**	<0.0005	**0.0013**	<0.0005	<0.0005
Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L		**0.210**	<0.0005	**0.0009**	<0.0005	<0.0005
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L		**0.110**	<0.0005	**0.0006**	<0.0005	<0.0005
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L		**0.0372**	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L		**0.0103**	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L		<0.0005	<0.0005	**0.0006**	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L		<0.001	<0.001	<0.001	<0.001	<0.001
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L		<0.001	<0.001	<0.001	<0.001	<0.001

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	EF01	QC35	RN012065	QC37	QC38
				Sampling date / time	06-Feb-2023 00:00	06-Feb-2023 00:00	08-Feb-2023 00:00	08-Feb-2023 00:00	08-Feb-2023 00:00
					ES2305043-092	ES2305043-093	ES2305043-095	ES2305043-096	ES2305043-097
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L		<0.001	<0.001	<0.001	<0.001	<0.001
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L		<0.001	<0.001	<0.001	<0.001	<0.001
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L		<0.001	<0.001	<0.001	<0.001	<0.001
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L		**0.041**	<0.001	**0.006**	<0.001	<0.001
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L		**0.300**	<0.001	<0.001	<0.001	<0.001
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	µg/L		<0.001	<0.001	<0.001	<0.001	<0.001
EP231P: PFAS Sums									
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L		**0.184**	<0.0002	**0.0614**	<0.0002	<0.0002
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L		**3.23**	<0.0002	**0.212**	<0.0002	<0.0002
^ Sum of PFAS	----	0.0002	µg/L		**3.60**	<0.0002	**0.221**	<0.0002	<0.0002
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%		**94.9**	**95.8**	**92.8**	**94.7**	**93.5**
13C8-PFOA	----	0.0005	%		**111**	**80.7**	**79.2**	**100**	**100**

Surrogate Control Limits

Sub-Matrix: **SOIL**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Sub-Matrix: **WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **ES2305043**	Page	: 1 of 23
Client	: **TETRA TECH COFFEY PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: Matthew Jessop-Hunt	Contact	: Khaleda Ataei
Address	: LEVEL 19, TOWER B- CITADEL TOWER 799 PACIFIC HIGHWAY CHATSWOOD NSW, AUSTRALIA 2067	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: + 61 2 8784 8555
Project	: 754-PEREN233360 Ayers Rock Airport	Date Samples Received	: 17-Feb-2023
Order number	: ----	Date Analysis Commenced	: 17-Feb-2023
C-O-C number	: ----	Issue Date	: 23-Feb-2023
Sampler	: SANJANA AUDIT		
Site	:		
Quote number	: EN/222		
No. of samples received	: 97		
No. of samples analysed	: 56		

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

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

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

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

Signatories	*Position*	*Accreditation Category*
Alex Rossi	Organic Chemist	Sydney Organics, Smithfield, NSW
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Franco Lentini	LCMS Coordinator	Sydney Inorganics, Smithfield, NSW
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

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

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

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
= Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 4880252)									
ES2304883-006	Anonymous	EA055: Moisture Content	----	0.1	%	8.0	8.7	8.4	No Limit
ES2305043-026	SB38_0.4-0.5	EA055: Moisture Content	----	0.1	%	3.7	3.7	0.0	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 4880253)									
ES2305043-058	SB42_0.4-0.5	EA055: Moisture Content	----	0.1	%	2.8	2.9	4.3	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 4882703)									
ES2305042-077	Anonymous	EA055: Moisture Content	----	0.1	%	3.5	3.6	0.0	0% - 20%
ES2305172-001	Anonymous	EA055: Moisture Content	----	0.1	%	8.6	8.0	6.2	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 4888139)									
ES2305043-019	SB37_0-0.2	EA055: Moisture Content	----	0.1	%	3.1	3.2	0.0	0% - 20%
ES2305277-008	Anonymous	EA055: Moisture Content	----	0.1	%	19.6	19.5	0.8	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4883654)									
ES2305043-002	SB47_0.4-0.5	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	0.0003	0.0003	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	0.0008	0.0008	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0005	0.0006	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
ES2305043-031	SB41_0-0.2	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	0.0009	0.0009	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	0.0008	0.0007	16.4	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.152	0.153	0.8	0% - 20%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	0.0002	0.0003	0.0	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4883963)									
ES2304781-003	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
ES2304781-032	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4888377)									
ES2305043-010	SB35_0.9-1.0	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
ES2305709-005	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4883654)									
ES2305043-002	SB47_0.4-0.5	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	0.0002	0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	0.0014	0.0014	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	0.0002	0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	0.0003	0.0003	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
ES2305043-031	SB41_0-0.2	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	0.0004	0.0004	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4883654) - continued									
ES2305043-031	SB41_0-0.2	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	0.0148	0.0129	13.1	0% - 20%
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	0.0368	0.0374	1.8	0% - 20%
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	0.0206	0.0189	8.6	0% - 20%
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	0.0055	0.0050	9.6	0% - 20%
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	0.0054	0.0049	9.5	0% - 20%
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	0.0011	0.0010	11.5	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	0.0013	0.0012	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4883963)									
ES2304781-003	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
ES2304781-032	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4888377)									
ES2305043-010	SB35_0.9-1.0	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	0.0002	0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	0.0002	0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4888377) - continued									
ES2305043-010	SB35_0.9-1.0	EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
ES2305709-005	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4883654)									
ES2305043-002	SB47_0.4-0.5	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
ES2305043-031	SB41_0-0.2	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4883963)									
ES2304781-003	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
ES2304781-032	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4888377)									
ES2305043-010	SB35_0.9-1.0	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
ES2305709-005	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4888377) - continued									
ES2305709-005	Anonymous	EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4883654)									
ES2305043-002	SB47_0.4-0.5	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
ES2305043-031	SB41_0-0.2	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	0.0413	0.0432	4.3	0% - 20%
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	0.0014	0.0017	21.1	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4883963)									
ES2304781-003	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
ES2304781-032	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4883963) - continued									
ES2304781-032	Anonymous	EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4888377)									
ES2305043-010	SB35_0.9-1.0	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
ES2305709-005	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4881431)									
ES2305043-078	QC31	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	0.14	0.13	10.1	0% - 50%
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.02	0.02	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.04	0.04	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.03	0.03	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
ES2305043-085	GW06	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	0.04	0.04	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.02	0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4881855)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4881855) - continued									
EM2302547-001	Anonymous	EP231X-SUT: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	<0.0002	0.0	No Limit
		EP231X-SUT: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4881431)									
ES2305043-078	QC31	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.38	0.36	5.5	0% - 20%
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.48	0.47	3.2	0% - 20%
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.57	0.55	3.0	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.61	0.59	2.7	0% - 20%
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	0.03	0.03	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	0.4	0.3	0.0	No Limit
ES2305043-085	GW06	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4881855)									
EM2302547-001	Anonymous	EP231X-SUT: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	0.0023	0.0023	0.0	No Limit
		EP231X-SUT: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	0.0020	0.0020	0.0	No Limit
		EP231X-SUT: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	0.0007	0.0007	0.0	No Limit
		EP231X-SUT: Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	0.0026	0.0030	11.9	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4881855) - continued									
EM2302547-001	Anonymous	EP231X-SUT: Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: Perfluorobutanoic acid (PFBA)	375-22-4	0.002	µg/L	0.0030	0.0027	11.1	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4881431)									
ES2305043-078	QC31	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
ES2305043-085	GW06	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4881855)									
EM2302547-001	Anonymous	EP231X-SUT: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4881855) - continued									
EM2302547-001	Anonymous	EP231X-SUT: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	<0.0005	0.0	No Limit
		EP231X-SUT: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	<0.001	<0.001	0.0	No Limit
		EP231X-SUT: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<0.001	0.0	No Limit
		EP231X-SUT: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	<0.001	0.0	No Limit
		EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	<0.001	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4881431)									
ES2305043-078	QC31	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
ES2305043-085	GW06	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4881855)									
EM2302547-001	Anonymous	EP231X-SUT: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<0.001	0.0	No Limit
		EP231X-SUT: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	0.010	0.010	0.0	0% - 50%
		EP231X-SUT: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	0.0	No Limit
		EP231X-SUT: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	µg/L	<0.001	<0.001	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 4881431)									
ES2305043-078	QC31	EP231X: Sum of PFAS	----	0.01	µg/L	2.70	2.52	6.9	0% - 20%
ES2305043-085	GW06	EP231X: Sum of PFAS	----	0.01	µg/L	0.06	0.06	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231P: PFAS Sums (QC Lot: 4881855)									
EM2302547-001	Anonymous	EP231X-SUT: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	<0.0002	<0.0002	0.0	No Limit
		EP231X-SUT: Sum of PFAS (WA DER List)	----	0.0002	µg/L	0.0206	0.0207	0.5	0% - 20%
		EP231X-SUT: Sum of PFAS	----	0.0002	µg/L	0.0206	0.0207	0.5	0% - 20%

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4883654)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	124	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	120	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	104	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	105	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	110	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	134	59.0	134
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4883963)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	80.8	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	94.3	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	94.7	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	107	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	107	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	109	59.0	134
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4888377)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	107	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	114	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	108	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	114	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	120	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	112	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4883654)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	120	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	116	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	123	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	130	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	133	69.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	125	72.0	129
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	128	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	128	64.0	136
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	123	69.0	135
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	136	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	127	69.0	133
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4883963)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	81.6	71.0	135

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4883963) - continued								
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	97.1	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	102	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	118	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	122	69.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	93.2	72.0	129
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	112	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	116	64.0	136
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	76.6	69.0	135
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	118	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	106	69.0	133
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4888377)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	110	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	123	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	116	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	120	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	118	69.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	120	72.0	129
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	120	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	115	64.0	136
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	124	69.0	135
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	125	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	128	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4883654)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	108	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	120	71.6	129
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	126	69.8	131
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	127	68.7	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	123	65.1	134
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	132	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	120	61.0	139
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4883963)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	108	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	109	71.6	129
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	120	69.8	131

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4883963) - continued								
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	100	68.7	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	121	65.1	134
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	124	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	124	61.0	139
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4888377)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	121	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	120	71.6	129
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	117	69.8	131
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	116	68.7	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	127	65.1	134
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	115	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	115	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4883654)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	132	62.0	145
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	118	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	136	65.0	137
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	135	69.2	143
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4883963)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	89.4	62.0	145
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	118	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	100	65.0	137
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	99.6	69.2	143
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4888377)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	92.8	62.0	145
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	119	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	118	65.0	137
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	108	69.2	143

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4881431)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	89.0	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	102	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	115	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	109	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	84.4	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	99.2	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4881432)								
EP231X-SUT: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	0.004 µg/L	76.4	72.0	130
EP231X-SUT: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	0.004 µg/L	92.0	71.0	127
EP231X-SUT: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	0.004 µg/L	76.7	68.0	131
EP231X-SUT: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	0.004 µg/L	112	69.0	134
EP231X-SUT: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	0.004 µg/L	105	65.0	140
EP231X-SUT: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	0.004 µg/L	82.0	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4881855)								
EP231X-SUT: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	0.004 µg/L	109	72.0	130
EP231X-SUT: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	0.004 µg/L	105	71.0	127
EP231X-SUT: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	0.004 µg/L	95.6	68.0	131
EP231X-SUT: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	0.004 µg/L	114	69.0	134
EP231X-SUT: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	0.004 µg/L	105	65.0	140
EP231X-SUT: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	0.004 µg/L	89.2	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4881431)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	76.8	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	95.4	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	92.8	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	88.2	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	89.8	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	84.4	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	96.8	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	79.8	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	113	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	94.4	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	91.0	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4881432)								
EP231X-SUT: Perfluorobutanoic acid (PFBA)	375-22-4	0.002	µg/L	<0.0020	0.02 µg/L	124	73.0	129
EP231X-SUT: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	0.004 µg/L	89.2	72.0	129
EP231X-SUT: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	0.004 µg/L	93.4	72.0	129
EP231X-SUT: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	0.004 µg/L	115	72.0	130
EP231X-SUT: Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	0.004 µg/L	113	71.0	133

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4881432) - continued								
EP231X-SUT: Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	0.004 µg/L	79.3	69.0	130
EP231X-SUT: Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	0.004 µg/L	105	71.0	129
EP231X-SUT: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	0.004 µg/L	108	69.0	133
EP231X-SUT: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	<0.0005	0.004 µg/L	81.8	72.0	134
EP231X-SUT: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	0.004 µg/L	75.6	65.0	144
EP231X-SUT: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	<0.0005	0.01 µg/L	94.1	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4881855)								
EP231X-SUT: Perfluorobutanoic acid (PFBA)	375-22-4	0.002	µg/L	<0.0020	0.02 µg/L	113	73.0	129
EP231X-SUT: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	0.004 µg/L	118	72.0	129
EP231X-SUT: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	0.004 µg/L	120	72.0	129
EP231X-SUT: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	0.004 µg/L	115	72.0	130
EP231X-SUT: Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	0.004 µg/L	116	71.0	133
EP231X-SUT: Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	0.004 µg/L	104	69.0	130
EP231X-SUT: Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	0.004 µg/L	118	71.0	129
EP231X-SUT: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	0.004 µg/L	98.4	69.0	133
EP231X-SUT: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	<0.0005	0.004 µg/L	126	72.0	134
EP231X-SUT: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	0.004 µg/L	86.8	65.0	144
EP231X-SUT: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	<0.0005	0.01 µg/L	103	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4881431)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	91.6	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	94.6	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	83.0	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	102	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	94.9	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	89.8	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	80.6	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4881432)								
EP231X-SUT: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	0.004 µg/L	84.0	67.0	137
EP231X-SUT: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	<0.001	0.01 µg/L	83.0	68.0	141
EP231X-SUT: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	0.01 µg/L	98.1	56.6	136
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	0.01 µg/L	94.9	61.9	129

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4881432) - continued								
EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	0.01 µg/L	104	52.8	135
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	0.004 µg/L	119	65.0	136
EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	0.004 µg/L	106	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4881855)								
EP231X-SUT: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	0.004 µg/L	113	67.0	137
EP231X-SUT: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	<0.001	0.01 µg/L	113	68.0	141
EP231X-SUT: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	0.01 µg/L	85.8	56.6	136
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	0.01 µg/L	108	61.9	129
EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	0.01 µg/L	109	52.8	135
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	0.004 µg/L	116	65.0	136
EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	0.004 µg/L	96.0	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4881431)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	90.8	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	86.8	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	112	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	98.0	71.4	144
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4881432)								
EP231X-SUT: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	0.004 µg/L	85.1	63.0	143
EP231X-SUT: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	0.004 µg/L	108	64.0	140
EP231X-SUT: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	0.004 µg/L	108	67.0	138
EP231X-SUT: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	µg/L	<0.001	0.004 µg/L	77.8	60.9	136
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4881855)								
EP231X-SUT: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	0.004 µg/L	94.4	63.0	143
EP231X-SUT: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	0.004 µg/L	115	64.0	140
EP231X-SUT: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	0.004 µg/L	123	67.0	138
EP231X-SUT: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	µg/L	<0.001	0.004 µg/L	83.6	60.9	136
EP231P: PFAS Sums (QCLot: 4881432)								
EP231X-SUT: Sum of PFHxS and PFOS	355-46-4/17 63-23-1	0.0002	µg/L	<0.0002	----	----	----	----
EP231X-SUT: Sum of PFAS (WA DER List)	----	0.0002	µg/L	<0.0002	----	----	----	----

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231P: PFAS Sums (QCLot: 4881432) - continued								
EP231X-SUT: Sum of PFAS	----	0.0002	µg/L	<0.0002	----	----	----	----
EP231P: PFAS Sums (QCLot: 4881855)								
EP231X-SUT: Sum of PFHxS and PFOS	355-46-4/17 63-23-1	0.0002	µg/L	<0.0002	----	----	----	----
EP231X-SUT: Sum of PFAS (WA DER List)	----	0.0002	µg/L	<0.0002	----	----	----	----
EP231X-SUT: Sum of PFAS	----	0.0002	µg/L	<0.0002	----	----	----	----

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4883654)							
ES2305043-002	SB47_0.4-0.5	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	124	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	118	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	110	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	108	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	125	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	124	59.0	134
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4883963)							
ES2304781-003	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	88.1	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	105	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	99.8	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	119	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	116	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	119	59.0	134
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4888377)							
ES2305043-010	SB35_0.9-1.0	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	108	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	115	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	111	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	114	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	111	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	118	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4883654)							
ES2305043-002	SB47_0.4-0.5	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	122	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	120	69.0	132

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4883654) - continued							
ES2305043-002	SB47_0.4-0.5	EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	128	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	131	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	126	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	120	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	128	69.0	133
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	134	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	129	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	139	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	130	69.0	133
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4883963)							
ES2304781-003	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	98.4	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	100	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	114	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	123	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	127	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	108	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	119	69.0	133
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	118	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	76.1	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	116	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	117	69.0	133
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4888377)							
ES2305043-010	SB35_0.9-1.0	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	112	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	122	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	114	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	113	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	132	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	114	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	118	69.0	133
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	127	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	122	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	121	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	126	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4883654)							
ES2305043-002	SB47_0.4-0.5	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	119	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	124	71.6	129
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	124	69.8	131

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4883654) - continued							
ES2305043-002	SB47_0.4-0.5	EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	120	68.7	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	131	65.1	134
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	136	63.0	144
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	116	61.0	139
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4883963)							
ES2304781-003	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	97.2	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	117	71.6	129
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	125	69.8	131
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	124	68.7	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	106	65.1	134
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	123	63.0	144
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	124	61.0	139
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4888377)							
ES2305043-010	SB35_0.9-1.0	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	118	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	126	71.6	129
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	111	69.8	131
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	124	68.7	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	126	65.1	134
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	121	63.0	144
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	112	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4883654)							
ES2305043-002	SB47_0.4-0.5	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	138	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	116	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	122	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	111	69.2	143

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4883963)							
ES2304781-003	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	99.9	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	125	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	120	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	123	69.2	143
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4888377)							
ES2305043-010	SB35_0.9-1.0	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	86.0	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	118	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	117	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	103	69.2	143

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4881431)							
ES2305043-079	GW03	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	81.2	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	99.2	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	93.6	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	106	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	89.0	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	82.8	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4881431)							
ES2305043-079	GW03	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	98.3	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	93.6	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	90.0	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	103	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	119	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	87.4	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	93.6	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	84.6	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	99.0	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	83.8	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	108	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4881431)							
ES2305043-079	GW03	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	96.8	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	110	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	109	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	104	66.0	145

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4881431) - continued							
ES2305043-079	GW03	EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	106	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	97.8	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	92.4	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4881431)							
ES2305043-079	GW03	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	89.8	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	97.2	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	102	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	81.4	71.4	144

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES2305043**	Page	: 1 of 10
Client	: **TETRA TECH COFFEY PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: Matthew Jessop-Hunt	Telephone	: + 61 2 8784 8555
Project	: 754-PEREN233360 Ayers Rock Airport	Date Samples Received	: 17-Feb-2023
Site	:	Issue Date	: 23-Feb-2023
Sampler	: SANJANA AUDIT	No. of samples received	: 97
Order number	: ----	No. of samples analysed	: 56

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Analysis Holding Time Compliance

Matrix: **SOIL**

Method / Container / Client Sample ID(s)		Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA055: Moisture Content (Dried @ 105-110°C)							
HDPE Soil Jar							
SB35_0.9-1.0,	SB36_0.9-1.0,	----	----	----	22-Feb-2023	17-Feb-2023	**5**
SB37_0-0.2,	SB38_0.9-1.0,						
SB41_0.9-1.0,	SB40_0.9-1.0						

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	1	29	3.45	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	29	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content (Dried @ 105-110°C)								
HDPE Soil Jar (EA055)								
SB47_0.4-0.5,	SB47_0.9-1.0,	**03-Feb-2023**	**----**	----	----	**17-Feb-2023**	17-Feb-2023	✓
SB35_0-0.2,	SB35_0.4-0.5,							
SB36_0-0.2,	SB36_0.4-0.5,							
SB37_0.4-0.5,	SB37_0.9-1.0,							
SB38_0-0.2,	SB38_0.4-0.5,							
SB41_0-0.2								
HDPE Soil Jar (EA055)								
SB35_0.9-1.0,	SB36_0.9-1.0	**03-Feb-2023**	**----**	----	----	**22-Feb-2023**	17-Feb-2023	×
HDPE Soil Jar (EA055)								
SB41_0.4-0.5,	SB40_0-0.2,	**03-Feb-2023**	**----**	----	----	**17-Feb-2023**	17-Feb-2023	✓
SB40_0.4-0.5								
HDPE Soil Jar (EA055)								

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content (Dried @ 105-110°C) - Continued							
SB37_0-0.2, SB38_0.9-1.0, SB41_0.9-1.0, SB40_0.9-1.0	**03-Feb-2023**	**----**	----	----	**22-Feb-2023**	17-Feb-2023	×
HDPE Soil Jar (EA055) SB39_0.4-0.5, SB39_0.9-1.0, SB43_0.4-0.5, SB43_0.9-1.0, SB42_0.4-0.5, SB42_0.9-1.0, SB44_0.4-0.5, SB44_0.9-1.0, QC23, QC25	**04-Feb-2023**	**----**	----	----	**17-Feb-2023**	18-Feb-2023	✓
HDPE Soil Jar (EA055) QC36	**06-Feb-2023**	**----**	----	----	**20-Feb-2023**	20-Feb-2023	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE Soil Jar (EP231X) SB47_0.4-0.5, SB47_0.9-1.0, SB35_0-0.2, SB35_0.4-0.5, SB36_0-0.2, SB36_0.4-0.5, SB37_0.4-0.5, SB37_0.9-1.0, SB38_0-0.2, SB38_0.4-0.5, SB41_0-0.2, SB41_0.4-0.5, SB40_0-0.2, SB40_0.4-0.5	**03-Feb-2023**	**20-Feb-2023**	02-Aug-2023	✓	**22-Feb-2023**	01-Apr-2023	✓
HDPE Soil Jar (EP231X) SB35_0.9-1.0, SB36_0.9-1.0, SB37_0-0.2, SB38_0.9-1.0, SB41_0.9-1.0, SB40_0.9-1.0	**03-Feb-2023**	**22-Feb-2023**	02-Aug-2023	✓	**23-Feb-2023**	03-Apr-2023	✓
HDPE Soil Jar (EP231X) SB39_0.4-0.5, SB39_0.9-1.0, SB43_0.4-0.5, SB43_0.9-1.0, SB42_0.4-0.5, SB42_0.9-1.0	**04-Feb-2023**	**20-Feb-2023**	03-Aug-2023	✓	**22-Feb-2023**	01-Apr-2023	✓
HDPE Soil Jar (EP231X) SB44_0.4-0.5, SB44_0.9-1.0, QC23, QC25	**04-Feb-2023**	**21-Feb-2023**	03-Aug-2023	✓	**22-Feb-2023**	02-Apr-2023	✓
HDPE Soil Jar (EP231X) QC36	**06-Feb-2023**	**21-Feb-2023**	05-Aug-2023	✓	**22-Feb-2023**	02-Apr-2023	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE Soil Jar (EP231X)							
SB47_0.4-0.5, SB47_0.9-1.0, SB35_0-0.2, SB35_0.4-0.5, SB36_0-0.2, SB36_0.4-0.5, SB37_0.4-0.5, SB37_0.9-1.0, SB38_0-0.2, SB38_0.4-0.5, SB41_0-0.2, SB41_0.4-0.5, SB40_0-0.2, SB40_0.4-0.5	**03-Feb-2023**	**20-Feb-2023**	02-Aug-2023	✓	**22-Feb-2023**	01-Apr-2023	✓
HDPE Soil Jar (EP231X)							
SB35_0.9-1.0, SB36_0.9-1.0, SB37_0-0.2, SB38_0.9-1.0, SB41_0.9-1.0, SB40_0.9-1.0	**03-Feb-2023**	**22-Feb-2023**	02-Aug-2023	✓	**23-Feb-2023**	03-Apr-2023	✓
HDPE Soil Jar (EP231X)							
SB39_0.4-0.5, SB39_0.9-1.0, SB43_0.4-0.5, SB43_0.9-1.0, SB42_0.4-0.5, SB42_0.9-1.0	**04-Feb-2023**	**20-Feb-2023**	03-Aug-2023	✓	**22-Feb-2023**	01-Apr-2023	✓
HDPE Soil Jar (EP231X)							
SB44_0.4-0.5, SB44_0.9-1.0, QC23, QC25	**04-Feb-2023**	**21-Feb-2023**	03-Aug-2023	✓	**22-Feb-2023**	02-Apr-2023	✓
HDPE Soil Jar (EP231X)							
QC36	**06-Feb-2023**	**21-Feb-2023**	05-Aug-2023	✓	**22-Feb-2023**	02-Apr-2023	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE Soil Jar (EP231X)							
SB47_0.4-0.5, SB47_0.9-1.0, SB35_0-0.2, SB35_0.4-0.5, SB36_0-0.2, SB36_0.4-0.5, SB37_0.4-0.5, SB37_0.9-1.0, SB38_0-0.2, SB38_0.4-0.5, SB41_0-0.2, SB41_0.4-0.5, SB40_0-0.2, SB40_0.4-0.5	**03-Feb-2023**	**20-Feb-2023**	02-Aug-2023	✓	**22-Feb-2023**	01-Apr-2023	✓
HDPE Soil Jar (EP231X)							
SB35_0.9-1.0, SB36_0.9-1.0, SB37_0-0.2, SB38_0.9-1.0, SB41_0.9-1.0, SB40_0.9-1.0	**03-Feb-2023**	**22-Feb-2023**	02-Aug-2023	✓	**23-Feb-2023**	03-Apr-2023	✓
HDPE Soil Jar (EP231X)							
SB39_0.4-0.5, SB39_0.9-1.0, SB43_0.4-0.5, SB43_0.9-1.0, SB42_0.4-0.5, SB42_0.9-1.0	**04-Feb-2023**	**20-Feb-2023**	03-Aug-2023	✓	**22-Feb-2023**	01-Apr-2023	✓
HDPE Soil Jar (EP231X)							
SB44_0.4-0.5, SB44_0.9-1.0, QC23, QC25	**04-Feb-2023**	**21-Feb-2023**	03-Aug-2023	✓	**22-Feb-2023**	02-Apr-2023	✓
HDPE Soil Jar (EP231X)							
QC36	**06-Feb-2023**	**21-Feb-2023**	05-Aug-2023	✓	**22-Feb-2023**	02-Apr-2023	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE Soil Jar (EP231X)							
SB47_0.4-0.5, SB47_0.9-1.0, SB35_0-0.2, SB35_0.4-0.5, SB36_0-0.2, SB36_0.4-0.5, SB37_0.4-0.5, SB37_0.9-1.0, SB38_0-0.2, SB38_0.4-0.5, SB41_0-0.2, SB41_0.4-0.5, SB40_0-0.2, SB40_0.4-0.5	**03-Feb-2023**	**20-Feb-2023**	02-Aug-2023	✓	**22-Feb-2023**	01-Apr-2023	✓
HDPE Soil Jar (EP231X)							
SB35_0.9-1.0, SB36_0.9-1.0, SB37_0-0.2, SB38_0.9-1.0, SB41_0.9-1.0, SB40_0.9-1.0	**03-Feb-2023**	**22-Feb-2023**	02-Aug-2023	✓	**23-Feb-2023**	03-Apr-2023	✓
HDPE Soil Jar (EP231X)							
SB39_0.4-0.5, SB39_0.9-1.0, SB43_0.4-0.5, SB43_0.9-1.0, SB42_0.4-0.5, SB42_0.9-1.0	**04-Feb-2023**	**20-Feb-2023**	03-Aug-2023	✓	**22-Feb-2023**	01-Apr-2023	✓
HDPE Soil Jar (EP231X)							
SB44_0.4-0.5, SB44_0.9-1.0, QC23, QC25	**04-Feb-2023**	**21-Feb-2023**	03-Aug-2023	✓	**22-Feb-2023**	02-Apr-2023	✓
HDPE Soil Jar (EP231X)							
QC36	**06-Feb-2023**	**21-Feb-2023**	05-Aug-2023	✓	**22-Feb-2023**	02-Apr-2023	✓
EP231P: PFAS Sums							
HDPE Soil Jar (EP231X)							
SB47_0.4-0.5, SB47_0.9-1.0, SB35_0-0.2, SB35_0.4-0.5, SB36_0-0.2, SB36_0.4-0.5, SB37_0.4-0.5, SB37_0.9-1.0, SB38_0-0.2, SB38_0.4-0.5, SB41_0-0.2, SB41_0.4-0.5, SB40_0-0.2, SB40_0.4-0.5	**03-Feb-2023**	**20-Feb-2023**	02-Aug-2023	✓	**22-Feb-2023**	01-Apr-2023	✓
HDPE Soil Jar (EP231X)							
SB35_0.9-1.0, SB36_0.9-1.0, SB37_0-0.2, SB38_0.9-1.0, SB41_0.9-1.0, SB40_0.9-1.0	**03-Feb-2023**	**22-Feb-2023**	02-Aug-2023	✓	**23-Feb-2023**	03-Apr-2023	✓
HDPE Soil Jar (EP231X)							
SB39_0.4-0.5, SB39_0.9-1.0, SB43_0.4-0.5, SB43_0.9-1.0, SB42_0.4-0.5, SB42_0.9-1.0	**04-Feb-2023**	**20-Feb-2023**	03-Aug-2023	✓	**22-Feb-2023**	01-Apr-2023	✓
HDPE Soil Jar (EP231X)							
SB44_0.4-0.5, SB44_0.9-1.0, QC23, QC25	**04-Feb-2023**	**21-Feb-2023**	03-Aug-2023	✓	**22-Feb-2023**	02-Apr-2023	✓
HDPE Soil Jar (EP231X)							
QC36	**06-Feb-2023**	**21-Feb-2023**	05-Aug-2023	✓	**22-Feb-2023**	02-Apr-2023	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X-SUT) QC21, QC22	**04-Feb-2023**	**20-Feb-2023**	03-Aug-2023	✓	**22-Feb-2023**	03-Aug-2023	✓
HDPE (no PTFE) (EP231X) QC31, GW03, GW01	**05-Feb-2023**	**20-Feb-2023**	04-Aug-2023	✓	**21-Feb-2023**	04-Aug-2023	✓
HDPE (no PTFE) (EP231X-SUT) QC27, QC28, QC29, GW02	**05-Feb-2023**	**20-Feb-2023**	04-Aug-2023	✓	**22-Feb-2023**	04-Aug-2023	✓
HDPE (no PTFE) (EP231X-SUT) GW05, GW06, GW08, IN01	**06-Feb-2023**	**20-Feb-2023**	05-Aug-2023	✓	**21-Feb-2023**	05-Aug-2023	✓
HDPE (no PTFE) (EP231X-SUT) QC33, QC34, GW04, GW07, GW09, GW10, GW11, EF01, QC35	**06-Feb-2023**	**20-Feb-2023**	05-Aug-2023	✓	**22-Feb-2023**	05-Aug-2023	✓
HDPE (no PTFE) (EP231X-SUT) RN012065, QC37, QC38	**08-Feb-2023**	**20-Feb-2023**	07-Aug-2023	✓	**22-Feb-2023**	07-Aug-2023	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X-SUT) QC21, QC22	**04-Feb-2023**	**20-Feb-2023**	03-Aug-2023	✓	**22-Feb-2023**	03-Aug-2023	✓
HDPE (no PTFE) (EP231X) QC31, GW03, GW01	**05-Feb-2023**	**20-Feb-2023**	04-Aug-2023	✓	**21-Feb-2023**	04-Aug-2023	✓
HDPE (no PTFE) (EP231X-SUT) QC27, QC28, QC29, GW02	**05-Feb-2023**	**20-Feb-2023**	04-Aug-2023	✓	**22-Feb-2023**	04-Aug-2023	✓
HDPE (no PTFE) (EP231X-SUT) GW05, GW06, GW08, IN01	**06-Feb-2023**	**20-Feb-2023**	05-Aug-2023	✓	**21-Feb-2023**	05-Aug-2023	✓
HDPE (no PTFE) (EP231X-SUT) QC33, QC34, GW04, GW07, GW09, GW10, GW11, EF01, QC35	**06-Feb-2023**	**20-Feb-2023**	05-Aug-2023	✓	**22-Feb-2023**	05-Aug-2023	✓
HDPE (no PTFE) (EP231X-SUT) RN012065, QC37, QC38	**08-Feb-2023**	**20-Feb-2023**	07-Aug-2023	✓	**22-Feb-2023**	07-Aug-2023	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X-SUT) QC21, QC22	**04-Feb-2023**	**20-Feb-2023**	03-Aug-2023	✓	**22-Feb-2023**	03-Aug-2023	✓
HDPE (no PTFE) (EP231X) QC31, GW03, GW01	**05-Feb-2023**	**20-Feb-2023**	04-Aug-2023	✓	**21-Feb-2023**	04-Aug-2023	✓
HDPE (no PTFE) (EP231X-SUT) QC27, QC28, QC29, GW02	**05-Feb-2023**	**20-Feb-2023**	04-Aug-2023	✓	**22-Feb-2023**	04-Aug-2023	✓
HDPE (no PTFE) (EP231X-SUT) GW05, GW06, GW08, IN01	**06-Feb-2023**	**20-Feb-2023**	05-Aug-2023	✓	**21-Feb-2023**	05-Aug-2023	✓
HDPE (no PTFE) (EP231X-SUT) QC33, QC34, GW04, GW07, GW09, GW10, GW11, EF01, QC35	**06-Feb-2023**	**20-Feb-2023**	05-Aug-2023	✓	**22-Feb-2023**	05-Aug-2023	✓
HDPE (no PTFE) (EP231X-SUT) RN012065, QC37, QC38	**08-Feb-2023**	**20-Feb-2023**	07-Aug-2023	✓	**22-Feb-2023**	07-Aug-2023	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X-SUT) QC21, QC22	**04-Feb-2023**	**20-Feb-2023**	03-Aug-2023	✓	**22-Feb-2023**	03-Aug-2023	✓
HDPE (no PTFE) (EP231X) QC31, GW03, GW01	**05-Feb-2023**	**20-Feb-2023**	04-Aug-2023	✓	**21-Feb-2023**	04-Aug-2023	✓
HDPE (no PTFE) (EP231X-SUT) QC27, QC28, QC29, GW02	**05-Feb-2023**	**20-Feb-2023**	04-Aug-2023	✓	**22-Feb-2023**	04-Aug-2023	✓
HDPE (no PTFE) (EP231X-SUT) GW05, GW06, GW08, IN01	**06-Feb-2023**	**20-Feb-2023**	05-Aug-2023	✓	**21-Feb-2023**	05-Aug-2023	✓
HDPE (no PTFE) (EP231X-SUT) QC33, QC34, GW04, GW07, GW09, GW10, GW11, EF01, QC35	**06-Feb-2023**	**20-Feb-2023**	05-Aug-2023	✓	**22-Feb-2023**	05-Aug-2023	✓
HDPE (no PTFE) (EP231X-SUT) RN012065, QC37, QC38	**08-Feb-2023**	**20-Feb-2023**	07-Aug-2023	✓	**22-Feb-2023**	07-Aug-2023	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X-SUT) QC21, QC22	**04-Feb-2023**	**20-Feb-2023**	03-Aug-2023	✓	**22-Feb-2023**	03-Aug-2023	✓
HDPE (no PTFE) (EP231X) QC31, GW03, GW01	**05-Feb-2023**	**20-Feb-2023**	04-Aug-2023	✓	**21-Feb-2023**	04-Aug-2023	✓
HDPE (no PTFE) (EP231X-SUT) QC27, QC28, QC29, GW02	**05-Feb-2023**	**20-Feb-2023**	04-Aug-2023	✓	**22-Feb-2023**	04-Aug-2023	✓
HDPE (no PTFE) (EP231X-SUT) GW05, GW06, GW08, IN01	**06-Feb-2023**	**20-Feb-2023**	05-Aug-2023	✓	**21-Feb-2023**	05-Aug-2023	✓
HDPE (no PTFE) (EP231X-SUT) QC33, QC34, GW04, GW07, GW09, GW10, GW11, EF01, QC35	**06-Feb-2023**	**20-Feb-2023**	05-Aug-2023	✓	**22-Feb-2023**	05-Aug-2023	✓
HDPE (no PTFE) (EP231X-SUT) RN012065, QC37, QC38	**08-Feb-2023**	**20-Feb-2023**	07-Aug-2023	✓	**22-Feb-2023**	07-Aug-2023	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Moisture Content	EA055	7	69	**10.14**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	6	54	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	3	54	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	3	54	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	3	54	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	12	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	1	29	**3.45**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	2	29	**6.90**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	2	29	**6.90**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	0	29	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	SOIL	In-house: Analysis of soils by solvent extraction followed by LC-Electrospray-MS-MS, Negative Mode using MRM using internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to a portion of soil which is then extracted with MTBE and an ion pairing reagent. A portion of extract is exchanged into the analytical solvent mixture, combined with an equal volume reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is concentrated, combined with an equal volume of reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
QuECheRS Extraction of Solids	ORG71	SOIL	In house: Sequential extractions with Acetonitrile/Methanol by shaking. Extraction efficiency aided by the addition of salts under acidic conditions. Where relevant, interferences from co-extracted organics are removed with dispersive clean-up media (dSPE). The extract is either diluted or concentrated and exchanged into the analytical solvent.
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **ES2307216**

Client	: **TETRA TECH COFFEY PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: Matthew Jessop-Hunt	Contact	: Khaleda Ataei
Address	: LEVEL 19, TOWER B- CITADEL TOWER 799 PACIFIC HIGHWAY CHATSWOOD NSW, AUSTRALIA 2067	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: Matthew.JessopHunt@tetratech.com	E-mail	: khaleda.ataei@alsglobal.com
Telephone	: ----	Telephone	: + 61 2 8784 8555
Facsimile	: ----	Facsimile	: +61-2-8784 8500
Project	: 754-PEREN233360 Ayers Rock Airport	Page	: 1 of 3
Order number	: ----	Quote number	: ES2018COFENV0007 (EN/222)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	:		
Sampler	: SANJANA AUDIT		

Dates

Date Samples Received	: 03-Mar-2023 16:20	Issue Date	: 03-Mar-2023
Client Requested Due Date	: 10-Mar-2023	Scheduled Reporting Date	: **10-Mar-2023**

Delivery Details

Mode of Delivery	: Undefined	Security Seal	: Not Available
No. of coolers/boxes	: ----	Temperature	: ----
Receipt Detail	:	No. of samples received / analysed	: 11 / 11

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **REBATCH OF ES2305042 and ES2305043**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

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

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Sampling date / time	Sample ID	SOIL - EA055-103 Moisture Content	SOIL - EP231X (solids) PFAS - Full Suite (28 analytes)
ES2307216-001	02-Feb-2023 00:00	GW08_1.9-2.0	✓	✓
ES2307216-002	02-Feb-2023 00:00	GW08_9.9-10.0	✓	✓
ES2307216-003	02-Feb-2023 00:00	GW11_1.9-2.0	✓	✓
ES2307216-004	02-Feb-2023 00:00	GW11_7.9-8.0	✓	✓
ES2307216-005	02-Feb-2023 00:00	GW07_9.9-10.0	✓	✓
ES2307216-006	02-Feb-2023 00:00	GW09_7.9-8.0	✓	✓
ES2307216-007	02-Feb-2023 00:00	GW10_9.9-10.0	✓	✓
ES2307216-008	03-Feb-2023 00:00	SB42_1.9-2.0	✓	✓
ES2307216-009	03-Feb-2023 00:00	SB42_2.4-2.5	✓	✓
ES2307216-010	03-Feb-2023 00:00	SB43_1.9-2.0	✓	✓
ES2307216-011	03-Feb-2023 00:00	SB43_2.9-3.0	✓	✓

Proactive Holding Time Report

The following table summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory.

Matrix: **SOIL** Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Client Sample ID(s)	Container	Due for extraction	Due for analysis	Samples Received Date	Samples Received Evaluation	Instructions Received Date	Instructions Received Evaluation
EA055: Moisture Content							
GW07_9.9-10.0	HDPE Soil Jar	----	16-Feb-2023	03-Mar-2023	×	----	----
GW08_1.9-2.0	HDPE Soil Jar	----	16-Feb-2023	03-Mar-2023	×	----	----
GW08_9.9-10.0	HDPE Soil Jar	----	16-Feb-2023	03-Mar-2023	×	----	----
GW09_7.9-8.0	HDPE Soil Jar	----	16-Feb-2023	03-Mar-2023	×	----	----
GW10_9.9-10.0	HDPE Soil Jar	----	16-Feb-2023	03-Mar-2023	×	----	----
GW11_1.9-2.0	HDPE Soil Jar	----	16-Feb-2023	03-Mar-2023	×	----	----
GW11_7.9-8.0	HDPE Soil Jar	----	16-Feb-2023	03-Mar-2023	×	----	----
SB42_1.9-2.0	HDPE Soil Jar	----	17-Feb-2023	03-Mar-2023	×	----	----
SB42_2.4-2.5	HDPE Soil Jar	----	17-Feb-2023	03-Mar-2023	×	----	----
SB43_1.9-2.0	HDPE Soil Jar	----	17-Feb-2023	03-Mar-2023	×	----	----
SB43_2.9-3.0	HDPE Soil Jar	----	17-Feb-2023	03-Mar-2023	×	----	----

Requested Deliverables

ACCOUNTS PERTH		
- A4 - AU Tax Invoice (INV)	Email	accounts.perth@tetratech.com
Admin Invoice		
- A4 - AU Tax Invoice (INV)	Email	COF.GeneralAdmin@tetratech.com
ESDAT REPORTS		
- *AU Certificate of Analysis - NATA (COA)	Email	esdat_labreports@coffey.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	esdat_labreports@coffey.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	esdat_labreports@coffey.com
- EDI Format - ESDAT (ESDAT)	Email	esdat_labreports@coffey.com
INVOICES CHAT GENERAL ADMIN		
- A4 - AU Tax Invoice (INV)	Email	CHAT-GeneralAdmin@coffey.com
Matthew Jessop-Hunt		
- *AU Certificate of Analysis - NATA (COA)	Email	Matthew.JessopHunt@tetratech.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	Matthew.JessopHunt@tetratech.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	Matthew.JessopHunt@tetratech.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	Matthew.JessopHunt@tetratech.com
- A4 - AU Tax Invoice (INV)	Email	Matthew.JessopHunt@tetratech.com
- Chain of Custody (CoC) (COC)	Email	Matthew.JessopHunt@tetratech.com
- EDI Format - ENMRG (ENMRG)	Email	Matthew.JessopHunt@tetratech.com
- EDI Format - ESDAT (ESDAT)	Email	Matthew.JessopHunt@tetratech.com

Rec: Jack 03/03/23 1620

From: Khaleda Ataei
Sent: Friday, 3 March 2023 4:21 PM
To: rebatches.sydney; Samples Sydney
Subject: Re-batch Coffey Additional analysis - Ayers Rock Airport

Hi Team,

Could you please organise a re-batch as per below?

Kind regards,

Khaleda Ataei
Project Manager, Environmental
Sydney, NSW

●: +61 2 8784 8555
D: +61 2 8784 8603
Khaleda.Ataei@alsglobal.com
277-289 Woodpark Road
Smithfield NSW 2164 AUSTRALIA

alsglobal.com

Environmental Division
Sydney
Work Order Reference
ES2307216

Telephone : + 61-2-8784 8555

From: Audit, Sanjana <SANJANA.AUDIT@tetratech.com>
Sent: Friday, 3 March 2023 3:52 PM
To: Khaleda Ataei <khaleda.ataei@ALSGlobal.com>; ALSEnviro Sydney <ALSEnviro.Sydney@ALSGlobal.com>
Cc: Lyons, Brigitte <Brigitte.Lyons@tetratech.com>; Janiak, Monika <MONIKA.JANIAK@tetratech.com>; Price, Robyn <ROBYN.PRICE@tetratech.com>
Subject: [EXTERNAL] - Additional analysis - Ayers Rock Airport

CAUTION: This email originated from outside of ALS. Do not click links or open attachments unless you recognize the sender and are sure content is relevant to you.

Hi Khaleda,

Can you please action the following additional analysis for PFAS in soil (28 analytes) on ES2305042 and ES2305043:

1. GW08_1.9-2.0
2. GW08_9.9-10.0
3. GW11_1.9-2.0
4. GW11_7.9-8.0
5. GW07_9.9-10.0
6. GW09_7.9-8.0
7. GW10 9.9-10.0
8. SB42_1.9-2.0
9. SB42_2.4-2.5
10. SB43_1.9-2.0
11. SB43-2.9-3.0

ES2305042 - S1148 - S1154
#65, 69, 36, 39, 14, 55, 27

ES2305043
#62, 63, 54, 56
S1154 - S1159

Kin regards,
Sanjana

Sanjana Audit | Environmental Scientist
Business **+61 8 6218 2077** | Mobile **+61 466 896 542** | Sanjana.audit@coffey.com

Tetra Tech Coffey | *Leading with Science®*
Level 1, 235 Saint Georges Terrace, Perth WA 6000 | tetratech.com | tetratechcoffey.com



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Please consider the environment before printing. Read more

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES2307216**	Page	: 1 of 9
Client	: **TETRA TECH COFFEY PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: Matthew Jessop-Hunt	Contact	: Khaleda Ataei
Address	: LEVEL 19, TOWER B- CITADEL TOWER 799 PACIFIC HIGHWAY CHATSWOOD NSW, AUSTRALIA 2067	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: + 61 2 8784 8555
Project	: 754-PEREN233360 Ayers Rock Airport	Date Samples Received	: 03-Mar-2023 16:20
Order number	: ----	Date Analysis Commenced	: 03-Mar-2023
C-O-C number	: ----	Issue Date	: 10-Mar-2023 15:33
Sampler	: SANJANA AUDIT		
Site	:		
Quote number	: EN/222		
No. of samples received	: 11		
No. of samples analysed	: 11		

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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

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

Signatories

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

Signatories	*Position*	*Accreditation Category*
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Franco Lentini	LCMS Coordinator	Sydney Inorganics, Smithfield, NSW
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

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

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

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

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

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

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

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

- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	GW08_1.9-2.0	GW08_9.9-10.0	GW11_1.9-2.0	GW11_7.9-8.0	GW07_9.9-10.0
			Sampling date / time	02-Feb-2023 00:00	02-Feb-2023 00:00	02-Feb-2023 00:00	02-Feb-2023 00:00	02-Feb-2023 00:00
Compound	CAS Number	LOR	Unit	ES2307216-001	ES2307216-002	ES2307216-003	ES2307216-004	ES2307216-005
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	**4.0**	**10.3**	**5.0**	**12.9**	**7.5**
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	**0.0002**	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	GW08_1.9-2.0	GW08_9.9-10.0	GW11_1.9-2.0	GW11_7.9-8.0	GW07_9.9-10.0
				Sampling date / time	02-Feb-2023 00:00	02-Feb-2023 00:00	02-Feb-2023 00:00	02-Feb-2023 00:00	02-Feb-2023 00:00
Compound	CAS Number	LOR	Unit		ES2307216-001	ES2307216-002	ES2307216-003	ES2307216-004	ES2307216-005
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		**0.0002**	<0.0002	<0.0002	<0.0002	<0.0002
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		**0.0002**	<0.0002	<0.0002	<0.0002	<0.0002
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		**0.0002**	<0.0002	<0.0002	<0.0002	<0.0002
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**104**	**96.5**	**91.5**	**99.5**	**96.0**
13C8-PFOA	----	0.0002	%		**94.0**	**92.0**	**96.0**	**100**	**97.0**

Analytical Results

Sub-Matrix: **SOIL**
(Matrix: **SOIL**)

Compound	CAS Number	LOR	Unit	Sample ID	GW09_7.9-8.0	GW10_9.9-10.0	SB42_1.9-2.0	SB42_2.4-2.5	SB43_1.9-2.0
				Sampling date / time	02-Feb-2023 00:00	02-Feb-2023 00:00	03-Feb-2023 00:00	03-Feb-2023 00:00	03-Feb-2023 00:00
					ES2307216-006	ES2307216-007	ES2307216-008	ES2307216-009	ES2307216-010
					Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	0.1	%		**6.2**	**11.7**	**8.0**	**5.8**	**8.3**
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	**0.0003**
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	**0.0003**
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	**0.0006**
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	**0.0009**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg		<0.001	<0.001	<0.001	<0.001	**0.006**
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	**0.0079**
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg		<0.0002	<0.0002	**0.0004**	**0.0003**	**0.0051**
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg		<0.0002	<0.0002	**0.0003**	**0.0003**	**0.0043**
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg		<0.0002	<0.0002	**0.0002**	**0.0002**	**0.0039**
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	**0.0009**
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	**0.0006**
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	**0.0004**
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	**0.0002**
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	GW09_7.9-8.0	GW10_9.9-10.0	SB42_1.9-2.0	SB42_2.4-2.5	SB43_1.9-2.0
			Sampling date / time	02-Feb-2023 00:00	02-Feb-2023 00:00	03-Feb-2023 00:00	03-Feb-2023 00:00	03-Feb-2023 00:00
Compound	CAS Number	LOR	Unit	ES2307216-006	ES2307216-007	ES2307216-008	ES2307216-009	ES2307216-010
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	**0.0024**
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231P: PFAS Sums								
Sum of PFAS	----	0.0002	mg/kg	<0.0002	<0.0002	**0.0009**	**0.0008**	**0.0338**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	**0.0015**
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	<0.0002	<0.0002	**0.0009**	**0.0008**	**0.0314**
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	**95.0**	**93.5**	**102**	**94.0**	**99.5**
13C8-PFOA	----	0.0002	%	**94.5**	**95.0**	**97.5**	**95.5**	**96.5**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	SB43_2.9-3.0	----	----	----	----
			Sampling date / time	03-Feb-2023 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	ES2307216-011	--------	--------	--------	--------
				Result	----	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	**8.5**	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	**0.0004**	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	**0.0003**	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	**0.0007**	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	**0.0014**	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	**0.008**	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	**0.0123**	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	**0.0060**	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	**0.0043**	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	**0.0045**	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	**0.0012**	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	**0.0009**	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	**0.0005**	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	**0.0003**	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	SB43_2.9-3.0	----	----	----	----
				Sampling date / time	03-Feb-2023 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		ES2307216-011	--------	--------	--------	--------
					Result	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	----	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg		<0.0005	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		**0.0035**	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	----	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		**0.0443**	----	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		**0.0021**	----	----	----	----
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		**0.0411**	----	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**96.0**	----	----	----	----
13C8-PFOA	----	0.0002	%		**92.5**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **SOIL**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **ES2307216**	Page	: 1 of 7
Client	: **TETRA TECH COFFEY PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: Matthew Jessop-Hunt	Contact	: Khaleda Ataei
Address	: LEVEL 19, TOWER B- CITADEL TOWER 799 PACIFIC HIGHWAY CHATSWOOD NSW, AUSTRALIA 2067	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: + 61 2 8784 8555
Project	: 754-PEREN233360 Ayers Rock Airport	Date Samples Received	: 03-Mar-2023
Order number	: ----	Date Analysis Commenced	: 03-Mar-2023
C-O-C number	: ----	Issue Date	: 10-Mar-2023
Sampler	: SANJANA AUDIT		
Site	:		
Quote number	: EN/222		
No. of samples received	: 11		
No. of samples analysed	: 11		

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

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

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

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

Signatories	*Position*	*Accreditation Category*
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Franco Lentini	LCMS Coordinator	Sydney Inorganics, Smithfield, NSW
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

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

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

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
= Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 4916813)									
ES2307134-002	Anonymous	EA055: Moisture Content	----	0.1	%	4.5	4.6	2.4	No Limit
ES2307216-004	GW11_7.9-8.0	EA055: Moisture Content	----	0.1	%	12.9	13.3	3.1	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 4916814)									
EW2301003-004	Anonymous	EA055: Moisture Content	----	0.1	%	16.8	17.5	4.1	0% - 50%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4909240)									
ES2306929-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0010	0.0010	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
ES2307216-002	GW08_9.9-10.0	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4909240)									
ES2306929-001	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4909240) - continued									
ES2306929-001	Anonymous	EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
ES2307216-002	GW08_9.9-10.0	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4909240)									
ES2306929-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
ES2307216-002	GW08_9.9-10.0	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4909240) - continued									
ES2307216-002	GW08_9.9-10.0	EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4909240)									
ES2306929-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
ES2307216-002	GW08_9.9-10.0	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4909240)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	82.0	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	107	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	76.8	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	109	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	103	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	112	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4909240)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	125	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	105	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	117	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	108	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	117	69.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	114	72.0	129
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	101	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	105	64.0	136
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	91.2	69.0	135
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	122	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	105	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4909240)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	84.0	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	105	71.6	129
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	110	69.8	131
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	116	68.7	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	97.6	65.1	134
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	99.2	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	109	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4909240)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	82.4	62.0	145
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	113	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	116	65.0	137

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4909240) - continued								
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	89.2	69.2	143

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4909240)							
ES2306929-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	88.4	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	100	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	80.0	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	114	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	128	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	122	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4909240)							
ES2306929-001	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	125	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	105	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	116	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	109	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	119	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	107	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	108	69.0	133
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	109	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	88.0	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	114	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	106	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4909240)							
ES2306929-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	75.2	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	103	71.6	129
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	113	69.8	131
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	106	68.7	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	102	65.1	134
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	120	63.0	144

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4909240) - continued							
ES2306929-001	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	120	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4909240)							
ES2306929-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	80.4	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	118	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	122	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	81.6	69.2	143

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES2307216**	Page	: 1 of 5
Client	: **TETRA TECH COFFEY PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: Matthew Jessop-Hunt	Telephone	: + 61 2 8784 8555
Project	: 754-PEREN233360 Ayers Rock Airport	Date Samples Received	: 03-Mar-2023
Site	:	Issue Date	: 10-Mar-2023
Sampler	: SANJANA AUDIT	No. of samples received	: 11
Order number	: ----	No. of samples analysed	: 11

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Outliers : Analysis Holding Time Compliance

Matrix: **SOIL**

Method / Container / Client Sample ID(s)		Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA055: Moisture Content (Dried @ 105-110°C)							
HDPE Soil Jar							
GW08_1.9-2.0,	GW08_9.9-10.0,	----	----	----	08-Mar-2023	16-Feb-2023	**20**
GW11_1.9-2.0,	GW11_7.9-8.0,						
GW07_9.9-10.0,	GW09_7.9-8.0,						
GW10_9.9-10.0							
HDPE Soil Jar							
SB42_1.9-2.0,	SB42_2.4-2.5,	----	----	----	08-Mar-2023	17-Feb-2023	**19**
SB43_1.9-2.0,	SB43_2.9-3.0						

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content (Dried @ 105-110°C)								
HDPE Soil Jar (EA055)								
GW08_1.9-2.0,	GW08_9.9-10.0,	**02-Feb-2023**	**----**	----	----	**08-Mar-2023**	16-Feb-2023	×
GW11_1.9-2.0,	GW11_7.9-8.0,							
GW07_9.9-10.0,	GW09_7.9-8.0,							
GW10_9.9-10.0								
HDPE Soil Jar (EA055)								
SB42_1.9-2.0,	SB42_2.4-2.5,	**03-Feb-2023**	**----**	----	----	**08-Mar-2023**	17-Feb-2023	×
SB43_1.9-2.0,	SB43_2.9-3.0							
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE Soil Jar (EP231X)								
GW08_1.9-2.0,	GW08_9.9-10.0,	**02-Feb-2023**	**03-Mar-2023**	01-Aug-2023	✓	**07-Mar-2023**	12-Apr-2023	✓
GW11_1.9-2.0,	GW11_7.9-8.0,							
GW07_9.9-10.0,	GW09_7.9-8.0,							
GW10_9.9-10.0								
HDPE Soil Jar (EP231X)								
SB42_1.9-2.0,	SB42_2.4-2.5,	**03-Feb-2023**	**03-Mar-2023**	02-Aug-2023	✓	**07-Mar-2023**	12-Apr-2023	✓
SB43_1.9-2.0,	SB43_2.9-3.0							

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE Soil Jar (EP231X)							
GW08_1.9-2.0, GW08_9.9-10.0, GW11_1.9-2.0, GW11_7.9-8.0, GW07_9.9-10.0, GW09_7.9-8.0, GW10_9.9-10.0	**02-Feb-2023**	**03-Mar-2023**	01-Aug-2023	✓	**07-Mar-2023**	12-Apr-2023	✓
HDPE Soil Jar (EP231X)							
SB42_1.9-2.0, SB42_2.4-2.5, SB43_1.9-2.0, SB43_2.9-3.0	**03-Feb-2023**	**03-Mar-2023**	02-Aug-2023	✓	**07-Mar-2023**	12-Apr-2023	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE Soil Jar (EP231X)							
GW08_1.9-2.0, GW08_9.9-10.0, GW11_1.9-2.0, GW11_7.9-8.0, GW07_9.9-10.0, GW09_7.9-8.0, GW10_9.9-10.0	**02-Feb-2023**	**03-Mar-2023**	01-Aug-2023	✓	**07-Mar-2023**	12-Apr-2023	✓
HDPE Soil Jar (EP231X)							
SB42_1.9-2.0, SB42_2.4-2.5, SB43_1.9-2.0, SB43_2.9-3.0	**03-Feb-2023**	**03-Mar-2023**	02-Aug-2023	✓	**07-Mar-2023**	12-Apr-2023	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE Soil Jar (EP231X)							
GW08_1.9-2.0, GW08_9.9-10.0, GW11_1.9-2.0, GW11_7.9-8.0, GW07_9.9-10.0, GW09_7.9-8.0, GW10_9.9-10.0	**02-Feb-2023**	**03-Mar-2023**	01-Aug-2023	✓	**07-Mar-2023**	12-Apr-2023	✓
HDPE Soil Jar (EP231X)							
SB42_1.9-2.0, SB42_2.4-2.5, SB43_1.9-2.0, SB43_2.9-3.0	**03-Feb-2023**	**03-Mar-2023**	02-Aug-2023	✓	**07-Mar-2023**	12-Apr-2023	✓
EP231P: PFAS Sums							
HDPE Soil Jar (EP231X)							
GW08_1.9-2.0, GW08_9.9-10.0, GW11_1.9-2.0, GW11_7.9-8.0, GW07_9.9-10.0, GW09_7.9-8.0, GW10_9.9-10.0	**02-Feb-2023**	**03-Mar-2023**	01-Aug-2023	✓	**07-Mar-2023**	12-Apr-2023	✓
HDPE Soil Jar (EP231X)							
SB42_1.9-2.0, SB42_2.4-2.5, SB43_1.9-2.0, SB43_2.9-3.0	**03-Feb-2023**	**03-Mar-2023**	02-Aug-2023	✓	**07-Mar-2023**	12-Apr-2023	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Moisture Content	EA055	3	24	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	SOIL	In-house: Analysis of soils by solvent extraction followed by LC-Electrospray-MS-MS, Negative Mode using MRM using internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to a portion of soil which is then extracted with MTBE and an ion pairing reagent. A portion of extract is exchanged into the analytical solvent mixture, combined with an equal volume reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
QuECheRS Extraction of Solids	ORG71	SOIL	In house: Sequential extractions with Acetonitrile/Methanol by shaking. Extraction efficiency aided by the addition of salts under acidic conditions. Where relevant, interferences from co-extracted organics are removed with dispersive clean-up media (dSPE). The extract is either diluted or concentrated and exchanged into the analytical solvent.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **ES2309421**

Client	: **TETRA TECH COFFEY PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: Matthew Jessop-Hunt	Contact	: Khaleda Ataei
Address	: LEVEL 19, TOWER B- CITADEL TOWER 799 PACIFIC HIGHWAY CHATSWOOD NSW, AUSTRALIA 2067	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: Matthew.JessopHunt@tetratech.com	E-mail	: khaleda.ataei@alsglobal.com
Telephone	: ----	Telephone	: + 61 2 8784 8555
Facsimile	: ----	Facsimile	: +61-2-8784 8500
Project	: 754-PEREN233360 Ayers Rock Airport	Page	: 1 of 2
Order number	: ----	Quote number	: ES2018COFENV0007 (EN/222)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	:		
Sampler	: SANJANA AUDIT		

Dates

Date Samples Received	: 22-Mar-2023 12:15	Issue Date	: 23-Mar-2023
Client Requested Due Date	: 29-Mar-2023	Scheduled Reporting Date	: **29-Mar-2023**

Delivery Details

Mode of Delivery	: Undefined	Security Seal	: Not Available
No. of coolers/boxes	: ----	Temperature	: 4.1'C
Receipt Detail	:	No. of samples received / analysed	: 5 / 5

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **REBATCH OF ES2305042 and ES2305043**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

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

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Sampling date / time	Sample ID	SOIL - EN60a-P ASLP Leachate Procedure - Plastic Leaching	SOIL - EP231X PFAS - Full Suite (28 analytes)
ES2309421-001	03-Feb-2023 00:00	SB45_0-0.2	✓	✓
ES2309421-002	04-Feb-2023 00:00	SB44_0.4-0.5	✓	✓
ES2309421-003	04-Feb-2023 00:00	SB44_0.9-1.0	✓	✓
ES2309421-004	03-Feb-2023 00:00	SB47_0.4-0.5	✓	✓
ES2309421-005	03-Feb-2023 00:00	SB47_0.9-1.0	✓	✓

Proactive Holding Time Report

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

Requested Deliverables

ACCOUNTS PERTH		
- A4 - AU Tax Invoice (INV)	Email	accounts.perth@tetratech.com
Admin Invoice		
- A4 - AU Tax Invoice (INV)	Email	COF.GeneralAdmin@tetratech.com
ESDAT REPORTS		
- *AU Certificate of Analysis - NATA (COA)	Email	esdat_labreports@coffey.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	esdat_labreports@coffey.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	esdat_labreports@coffey.com
- EDI Format - ESDAT (ESDAT)	Email	esdat_labreports@coffey.com
INVOICES CHAT GENERAL ADMIN		
- A4 - AU Tax Invoice (INV)	Email	CHAT-GeneralAdmin@coffey.com
MATTHEW HUNT		
- *AU Certificate of Analysis - NATA (COA)	Email	matthew.hunt@tetratech.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	matthew.hunt@tetratech.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	matthew.hunt@tetratech.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	matthew.hunt@tetratech.com
- A4 - AU Tax Invoice (INV)	Email	matthew.hunt@tetratech.com
- Chain of Custody (CoC) (COC)	Email	matthew.hunt@tetratech.com
- EDI Format - ENMRG (ENMRG)	Email	matthew.hunt@tetratech.com
- EDI Format - ESDAT (ESDAT)	Email	matthew.hunt@tetratech.com
Matthew Jessop-Hunt		
- *AU Certificate of Analysis - NATA (COA)	Email	Matthew.JessopHunt@tetratech.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	Matthew.JessopHunt@tetratech.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	Matthew.JessopHunt@tetratech.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	Matthew.JessopHunt@tetratech.com
- A4 - AU Tax Invoice (INV)	Email	Matthew.JessopHunt@tetratech.com
- Chain of Custody (CoC) (COC)	Email	Matthew.JessopHunt@tetratech.com
- EDI Format - ENMRG (ENMRG)	Email	Matthew.JessopHunt@tetratech.com
- EDI Format - ESDAT (ESDAT)	Email	Matthew.JessopHunt@tetratech.com

Fadi Soro

FM: 22/3/23 12:19

From: Khaleda Ataei
Sent: Wednesday, 22 March 2023 12:34 PM
To: Fadi Soro; rebatches.sydney
Subject: RE: [EXTERNAL] - Additional analysis - Ayers Rock Airport

Hi Fadi,

Please see below:

S1148-1154
#79

Lab order ES2305042 – SB45_0.0-0.2 1

S1154-1159
#65, 67, 2, 4

Lab order ES2305043 – SB44_0.4-0.5 2
SB44_0.9-1.0 3
SB47_0.4-0.5 4
SB47_0.9-1.0 5

Kind regards,

Khaleda Ataei
Project Manager, Environmental
Sydney, NSW

O: +61 2 8784 8555
D: +61 2 8784 8603
Khaleda.Ataei@alsglobal.com
277-289 Woodpark Road
Smithfield NSW 2164 AUSTRALIA

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Environmental Division
Sydney
Work Order Reference
ES2309421
Telephone : +61-2-8784 8555

From: Fadi Soro <fadi.soro@alsglobal.com>
Sent: Wednesday, 22 March 2023 12:16 PM
To: Khaleda Ataei <khaleda.ataei@ALSGlobal.com>; rebatches.sydney <rebatches.sydney@ALSGlobal.com>
Subject: RE: [EXTERNAL] - Additional analysis - Ayers Rock Airport

Hey Khalea,

Samples SB47_0.4-0.5 & SB47_0.9-1.0 aren't is WO ES2305042 they're in WO ES2305043.

Can you confirm the IDs with the client?

Regards

Fadi

From: Khaleda Ataei <khaleda.ataei@ALSGlobal.com>
Sent: Wednesday, 22 March 2023 12:03 PM
To: rebatches.sydney <rebatches.sydney@ALSGlobal.com>; Samples Sydney <Samples.Sydney@alsglobal.com>
Subject: RE: [EXTERNAL] - Additional analysis - Ayers Rock Airport

Hi Team,

For workorder ES2305043, The sample was repeated. Please see below updated sample ID's:

Lab order ES2305042 – SB45_0.0-0.2
SB47_0.4-0.5
SB47_0.9-1.0

Lab order ES2305043 – SB44_0.4-0.5
SB44_0.9-1.0

Kind regards,

Khaleda Ataei
Project Manager, Environmental
Sydney, NSW

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D: +61 2 8784 8603
Khaleda.Ataei@alsglobal.com
277-289 Woodpark Road
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From: Khaleda Ataei
Sent: Wednesday, 22 March 2023 11:49 AM
To: rebatches.sydney <rebatches.sydney@ALSGlobal.com>; Samples Sydney <Samples.Sydney@alsglobal.com>
Subject: FW: [EXTERNAL] - Additional analysis - Ayers Rock Airport

Hi Team,

Could you please organise a re-batch for the following:

Lab order ES2305042 – SB45_0.0-0.2
SB47_0.4-0.5
SB47_0.9-1.0

Lab order ES2305043 – SB44_0.4-0.5
SB44_0.4-0.5

ASLP leachate (pH 7) - PFAS EP231X

Kind regards,

Khaleda Ataei
Project Manager, Environmental
Sydney, NSW

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D: +61 2 8784 8603
Khaleda.Ataei@alsglobal.com
277-289 Woodpark Road
Smithfield NSW 2164 AUSTRALIA

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From: Lyons, Brigitte <Brigitte.Lyons@tetratech.com>
Sent: Wednesday, 22 March 2023 11:39 AM
To: Khaleda Ataei <khaleda.ataei@ALSGlobal.com>
Subject: RE: [EXTERNAL] - Additional analysis - Ayers Rock Airport

Hi Khaleda,

Sorry I should have said for PFAS full suite (28 analytes).

Thank you,

Brigitte Lyons | Senior Environmental Scientist
Direct **+61 3 5215 4615** | Business **+61 3 5215 4600** | Mobile **+61 421 177 077** | brigitte.lyons@tetratech.com
Hours: Tuesday, Wednesday and Thursday

Tetra Tech Coffey | *Leading with Science®*
Wauthorong Country
Level 1, 23 West Fyans Street | Newtown VIC 3220 | tetratech.com | tetratechcoffey.com

TETRA TECH COFFEY

From: Khaleda Ataei <khaleda.ataei@ALSGlobal.com>
Sent: 22 March 2023 11:35
To: Lyons, Brigitte <Brigitte.Lyons@tetratech.com>
Subject: RE: [EXTERNAL] - Additional analysis - Ayers Rock Airport

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Hi Brigitte,

We should still have these samples. What would you like us to report on the ASLP Leachate?

Kind regards,

right solutions. right partner.

Khaleda Ataei
Project Manager, Environmental
Sydney, NSW

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D: +61 2 8784 8603
Khaleda.Ataei@alsglobal.com
277-289 Woodpark Road
Smithfield NSW 2164 AUSTRALIA

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From: Lyons, Brigitte <Brigitte.Lyons@tetratech.com>
Sent: Wednesday, 22 March 2023 9:59 AM
To: Khaleda Ataei <khaleda.ataei@ALSGlobal.com>
Cc: Karen Coveny <karen.coveny@ALSGlobal.com>
Subject: RE: [EXTERNAL] - Additional analysis - Ayers Rock Airport

Hi Khaleda,

I wanted to see if it's still possible to do additional analysis [ASLP leachate (pH 7)] analysis on a few soil samples. See below.

Lab order ES2305042 – SB45_0.0-0.2
SB47_0.4-0.5
SB47_0.9-1.0

Lab order ES2305043 – SB44_0.4-0.5
SB44_0.4-0.5

I'm not sure of the soil samples are still available and holding times for analysis.

Thanks for your help,

Brigitte Lyons | Senior Environmental Scientist
Direct **+61 3 5215 4615** | Business **+61 3 5215 4600** | Mobile **+61 421 177 077** | brigitte.lyons@tetratech.com
Hours: Tuesday, Wednesday and Thursday

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TETRA TECH COFFEY

From: Khaleda Ataei <khaleda.ataei@ALSGlobal.com>
Sent: 09 March 2023 10:37
To: Lyons, Brigitte <Brigitte.Lyons@tetratech.com>
Cc: Karen Coveny <karen.coveny@ALSGlobal.com>
Subject: RE: [EXTERNAL] - Additional analysis - Ayers Rock Airport

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Hi Brigitte,

It's been my pleasure.

I have sent you the reports for the first workorder ES2305043.

The re-batch workorder ES2307216 will be reported to you tomorrow. I have re-sent the SRN just now.

Let me know if there is any issues 😊

Kind regards,

Khaleda Ataei
Project Manager, Environmental
Sydney, NSW

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D: +61 2 8784 8603
Khaleda.Ataei@alsglobal.com
277-289 Woodpark Road
Smithfield NSW 2164 AUSTRALIA

alsglobal.com

From: Lyons, Brigitte <Brigitte.Lyons@tetratech.com>
Sent: Thursday, 9 March 2023 10:26 AM
To: Khaleda Ataei <khaleda.ataei@ALSGlobal.com>
Cc: Karen Coveny <karen.coveny@ALSGlobal.com>
Subject: RE: [EXTERNAL] - Additional analysis - Ayers Rock Airport

Hi Khaleda,

Thanks for your help with this project.

Can you please forward me the latest SRNs/ Lab reports if they have already been updated with additional analysis for the Ayers Rock Airport project.

Thanks so much,

Brigitte Lyons | Senior Environmental Scientist
Direct **+61 3 5215 4615** | Business **+61 3 5215 4600** | Mobile **+61 421 177 077** | brigitte.lyons@tetratech.com
Hours: Tuesday, Wednesday and Thursday

Tetra Tech Coffey | *Leading with Science®*
Wauthorong Country
Level 1, 23 West Fyans Street | Newtown VIC 3220 | tetratech.com | tetratechcoffey.com



From: Audit, Sanjana <SANJANA.AUDIT@tetratech.com>
Sent: 07 March 2023 12:21
To: Khaleda Ataei <khaleda.ataei@ALSGlobal.com>
Cc: Lyons, Brigitte <Brigitte.Lyons@tetratech.com>; Janiak, Monika <MONIKA.JANIAK@tetratech.com>; Price, Robyn <ROBYN.PRICE@tetratech.com>
Subject: RE: [EXTERNAL] - Additional analysis - Ayers Rock Airport

Thanks Khaleda,

Could you please provide a SRN for the additional analysis?

Kind regards,
Sanjana

Sanjana Audit | Environmental Scientist
Business **+61 8 6218 2077** | Mobile **+61 466 896 542** | Sanjana.audit@coffey.com

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From: Khaleda Ataei <khaleda.ataei@ALSGlobal.com>
Sent: Friday, 3 March 2023 1:20 PM
To: Audit, Sanjana <SANJANA.AUDIT@tetratech.com>
Cc: Lyons, Brigitte <Brigitte.Lyons@tetratech.com>; Janiak, Monika <MONIKA.JANIAK@tetratech.com>; Price, Robyn <ROBYN.PRICE@tetratech.com>
Subject: RE: [EXTERNAL] - Additional analysis - Ayers Rock Airport

⚠ **CAUTION:** This email originated from an external sender. Verify the source before opening links or attachments. ⚠

Hi Sanjana,

No worries, I will get these samples re-batched for you.

Kind regards,

Khaleda Ataei
Project Manager, Environmental
Sydney, NSW

O: +61 2 8784 8555
D: +61 2 8784 8603
Khaleda.Ataei@alsglobal.com
277-289 Woodpark Road
Smithfield NSW 2164 AUSTRALIA

alsglobal.com

From: Audit, Sanjana <SANJANA.AUDIT@tetratech.com>
Sent: Friday, 3 March 2023 3:52 PM
To: Khaleda Ataei <khaleda.ataei@ALSGlobal.com>; ALSEnviro Sydney <ALSEnviro.Sydney@ALSGlobal.com>
Cc: Lyons, Brigitte <Brigitte.Lyons@tetratech.com>; Janiak, Monika <MONIKA.JANIAK@tetratech.com>; Price, Robyn <ROBYN.PRICE@tetratech.com>
Subject: [EXTERNAL] - Additional analysis - Ayers Rock Airport

CAUTION: This email originated from outside of ALS. Do not click links or open attachments unless you recognize the sender and are sure content is relevant to you.

Hi Khaleda,

Can you please action the following additional analysis for PFAS in soil (28 analytes) on ES2305042 and ES2305043:

- GW08_1.9-2.0
- GW08_9.9-10.0
- GW11_1.9-2.0
- GW11_7.9-8.0

- GW07_9.9-10.0
- GW09_7.9-8.0
- GW10_9.9-10.0
- SB42_1.9-2.0
- SB42_2.4-2.5
- SB43_1.9-2.0
- SB43-2.9-3.0

Kin regards,
Sanjana

Sanjana Audit | Environmental Scientist
Business **+61 8 6218 2077** | Mobile **+61 466 896 542** | Sanjana.audit@coffey.com

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ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES2309421**	Page	: 1 of 6
Client	: **TETRA TECH COFFEY PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: Matthew Jessop-Hunt	Contact	: Khaleda Ataei
Address	: LEVEL 19, TOWER B- CITADEL TOWER 799 PACIFIC HIGHWAY CHATSWOOD NSW, AUSTRALIA 2067	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: + 61 2 8784 8555
Project	: 754-PEREN233360 Ayers Rock Airport	Date Samples Received	: 22-Mar-2023 12:15
Order number	: ----	Date Analysis Commenced	: 23-Mar-2023
C-O-C number	: ----	Issue Date	: 28-Mar-2023 17:14
Sampler	: SANJANA AUDIT		
Site	:		
Quote number	: EN/222		
No. of samples received	: 5		
No. of samples analysed	: 5		

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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

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

Signatories

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

Signatories	*Position*	*Accreditation Category*
Alex Rossi	Organic Chemist	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW

General Comments

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

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

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

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

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

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

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

- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.
- EN60: Where leachable PFAS analysis is requested, centrifugation rather than pressure filtration is used as the default approach for removal of particulates, in line with AS 4439.3.

Analytical Results

Sub-Matrix: **ASLP LEACHATE** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	SB45_0-0.2	SB44_0.4-0.5	SB44_0.9-1.0	SB47_0.4-0.5	SB47_0.9-1.0
				Sampling date / time	03-Feb-2023 00:00	04-Feb-2023 00:00	04-Feb-2023 00:00	03-Feb-2023 00:00	03-Feb-2023 00:00
					ES2309421-001	ES2309421-002	ES2309421-003	ES2309421-004	ES2309421-005
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L		**0.01**	<0.01	<0.01	**0.04**	**0.02**
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**0.01**	**0.13**	**0.08**	**0.02**	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	**0.08**	**0.02**
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		**0.10**	<0.01	<0.01	**0.01**	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	**0.05**	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	**0.13**	**0.05**	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: **ASLP LEACHATE** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	SB45_0-0.2	SB44_0.4-0.5	SB44_0.9-1.0	SB47_0.4-0.5	SB47_0.9-1.0
				Sampling date / time	03-Feb-2023 00:00	04-Feb-2023 00:00	04-Feb-2023 00:00	03-Feb-2023 00:00	03-Feb-2023 00:00
					ES2309421-001	ES2309421-002	ES2309421-003	ES2309421-004	ES2309421-005
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	**0.20**	**0.13**	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**0.12**	**0.46**	**0.31**	**0.15**	**0.04**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.02**	**0.13**	**0.08**	**0.06**	**0.02**
Sum of PFAS (WA DER List)	----	0.01	µg/L		**0.12**	**0.33**	**0.21**	**0.15**	**0.04**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**94.7**	**95.9**	**101**	**91.7**	**93.8**
13C8-PFOA	----	0.02	%		**108**	**107**	**107**	**106**	**104**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	SB45_0-0.2	SB44_0.4-0.5	SB44_0.9-1.0	SB47_0.4-0.5	SB47_0.9-1.0
			Sampling date / time	03-Feb-2023 00:00	04-Feb-2023 00:00	04-Feb-2023 00:00	03-Feb-2023 00:00	03-Feb-2023 00:00
Compound	CAS Number	LOR	Unit	ES2309421-001	ES2309421-002	ES2309421-003	ES2309421-004	ES2309421-005
				Result	Result	Result	Result	Result
EN60: ASLP Leaching Procedure - Inorganics/PFAS (Plastic Vessel)								
Final pH	----	0.1	pH Unit	**6.5**	**8.2**	**9.0**	**7.6**	**7.0**

Surrogate Control Limits

Sub-Matrix: **ASLP LEACHATE**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **ES2309421**	Page	: 1 of 4
Client	: **TETRA TECH COFFEY PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: Matthew Jessop-Hunt	Contact	: Khaleda Ataei
Address	: LEVEL 19, TOWER B- CITADEL TOWER 799 PACIFIC HIGHWAY CHATSWOOD NSW, AUSTRALIA 2067	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: + 61 2 8784 8555
Project	: 754-PEREN233360 Ayers Rock Airport	Date Samples Received	: 22-Mar-2023
Order number	: ----	Date Analysis Commenced	: 23-Mar-2023
C-O-C number	: ----	Issue Date	: 28-Mar-2023
Sampler	: SANJANA AUDIT		
Site	:		
Quote number	: EN/222		
No. of samples received	: 5		
No. of samples analysed	: 5		

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

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

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

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

Signatories	*Position*	*Accreditation Category*
Alex Rossi	Organic Chemist	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW

General Comments

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

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

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
= Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

- **No Laboratory Duplicate (DUP) Results are required to be reported.**

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4953588)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	101	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	83.7	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	89.1	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	94.9	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	84.8	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	84.1	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4953588)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	91.2	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	116	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	99.5	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	83.3	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	87.1	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	84.6	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	74.5	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	86.4	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	102	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	78.2	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	73.0	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4953588)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	129	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	100.0	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	75.5	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	115	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	90.2	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	96.4	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	95.5	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4953588)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	103	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	86.7	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	94.8	67.0	138

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4953588) - continued								
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	88.2	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

- **No Matrix Spike (MS) or Matrix Spike Duplicate (MSD) Results are required to be reported.**

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES2309421**	Page	: 1 of 5
Client	: **TETRA TECH COFFEY PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: Matthew Jessop-Hunt	Telephone	: + 61 2 8784 8555
Project	: 754-PEREN233360 Ayers Rock Airport	Date Samples Received	: 22-Mar-2023
Site	:	Issue Date	: 28-Mar-2023
Sampler	: SANJANA AUDIT	No. of samples received	: 5
Order number	: ----	No. of samples analysed	: 5

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count QC	Count Regular	Rate (%) Actual	Rate (%) Expected	Quality Control Specification
Laboratory Duplicates (DUP)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	15	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	15	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Evaluation	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Evaluation
EN60: ASLP Leaching Procedure - Inorganics/PFAS (Plastic Vessel)							
Non-Volatile Leach: 180 day HT (e.g. PFAS, metals ex.Hg) (EN60a-P)							
SB45_0-0.2, SB47_0.4-0.5, SB47_0.9-1.0	**03-Feb-2023**	**23-Mar-2023**	02-Aug-2023	✓	**----**	----	----
Non-Volatile Leach: 180 day HT (e.g. PFAS, metals ex.Hg) (EN60a-P)							
SB44_0.4-0.5, SB44_0.9-1.0	**04-Feb-2023**	**23-Mar-2023**	03-Aug-2023	✓	**----**	----	----

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Evaluation	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Evaluation
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
SB45_0-0.2, SB44_0.4-0.5, SB44_0.9-1.0, SB47_0.4-0.5, SB47_0.9-1.0	**23-Mar-2023**	**27-Mar-2023**	19-Sep-2023	✓	**28-Mar-2023**	19-Sep-2023	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
SB45_0-0.2, SB44_0.4-0.5, SB44_0.9-1.0, SB47_0.4-0.5, SB47_0.9-1.0	**23-Mar-2023**	**27-Mar-2023**	19-Sep-2023	✓	**28-Mar-2023**	19-Sep-2023	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
SB45_0-0.2, SB44_0.4-0.5, SB44_0.9-1.0, SB47_0.4-0.5, SB47_0.9-1.0	**23-Mar-2023**	**27-Mar-2023**	19-Sep-2023	✓	**28-Mar-2023**	19-Sep-2023	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
SB45_0-0.2, SB44_0.4-0.5, SB44_0.9-1.0, SB47_0.4-0.5, SB47_0.9-1.0	**23-Mar-2023**	**27-Mar-2023**	19-Sep-2023	✓	**28-Mar-2023**	19-Sep-2023	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
SB45_0-0.2, SB44_0.4-0.5, SB44_0.9-1.0, SB47_0.4-0.5, SB47_0.9-1.0	**23-Mar-2023**	**27-Mar-2023**	19-Sep-2023	✓	**28-Mar-2023**	19-Sep-2023	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	0	15	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	0	15	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	SOIL	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
ASLP for Non & Semivolatile Analytes - Plastic Leaching Vessel	EN60a-P	SOIL	In house QWI-EN/60 referenced to AS4439.3 Preparation of Leachates.
Solid Phase Extraction (SPE) for PFAS in water	ORG72	SOIL	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

TETRA TECH

Consigning Office: Tetra Tech Coffey - Perth

Report Results to: Matthew Jessop-Hunt and Sanjana Audit — Mobile: 466896542 — Email: matthew.jessop-hunt@tetratech.com and sanjana.audit@tetratech.com

Invoices to: accounts.perth@tetratech.com — Phone: — Email: @tetratech.com

Project No: 754-PEREN233360 — Task No:

Project Name: Ayers Rock Airport — Laboratory: Eurofins/ARL

Sampler's Name: Sanjana Audit — Project Manager: Matthew Jessop-Hunt

Quote number (if different to current quoted prices):

Special Instructions:

Tetra Tech

Analysis Request Section

Lab Batch Ref	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)	PFAS in soil - 28 analytes	Super Ultra Trace PFAS (28 analytes)	Std LOR PFAS (28 analytes)		On Hold								NOTES
	QC2	31-Jan		Soil	1J	Std					x								
	QC4	31-Jan		Soil	1J	Std					x								
	QC14	3-Feb		Soil	1J	Std					x								
	QC16	3-Feb		Soil	1J	Std	x												
	QC18	3-Feb		Soil	1J	Std	x												
	QC20	3-Feb		Soil	1J	Std	x												
	QC24	4-Feb		Soil	1J	Std	x												
	QC26	4-Feb		Soil	1J	Std	x												
	QC30	5-Feb		Water	2xPFAS	Std		x											99% species protection level PFOS
	QC32	5-Feb		Water	2xPFAS	Std			x										standard limit of reporting

RELINQUISHED BY

Name: Sanjana Audit - 8/2/23 — Date:

Coffey — Time:

Name: — Date: →

Company: — Time:

RECEIVED BY

Name: [illegible] — Date: 20/2

Company: [illegible] — Time: 2:07

Name: — Date:

Company: — Time:

Sample Receipt Advice: (Lab Use Only)

All Samples Recieved in Good Condition ☑

All Documentation is in Proper Order ☑

Samples Received Properly Chilled 6.0 ☑

Lab. Ref/Batch No. 966290

***Container Type & Preservation Codes:** **P** - Plastic, **G**- Glass Bottle, **J** - Glass Jar, **V**- Vial, **Z** - Ziplock bag, **N** - Nitric Acid Preserved, **C** - Hydrochloric Acid Preserved, **S** - Sulphuric Acid Preserved, **I** - Ice, **ST** - Sodium Thiosulfate, **NP** - No Preservative

eurofins | Environment Testing

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IANZ# 1290

Sample Receipt Advice

Company name:	Tetra Tech Coffey Environment Pty Ltd NSW
Contact name:	Matthew Jessop-Hunt
Project name:	AYERS ROCK AIRPORT
Project ID:	754-PEREN233360
Turnaround time:	5 Day
Date/Time received	Feb 20, 2023 2:47 PM
Eurofins reference	966290

Sample Information

✓	A detailed list of analytes logged into our LIMS, is included in the attached summary table.
✓	Sample Temperature of chilled sample on the batch as recorded by Eurofins Sample Receipt : 6 degrees Celsius.
✓	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.
X	Split sample sent to requested external lab.
X	Some samples have been subcontracted.
N/A	Custody Seals intact (if used).

Notes

Contact

If you have any questions with respect to these samples, please contact your Analytical Services Manager:

Asim Khan on phone : or by email: AsimKhan@eurofins.com

Results will be delivered electronically via email to Matthew Jessop-Hunt - Matthew.Jessop-Hunt@tetratech.com.

Note: A copy of these results will also be delivered to the general Tetra Tech Coffey Environment Pty Ltd NSW email address.

eurofins

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

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ABN: 50 005 085 521

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Rolleston,
Christchurch 7675
Tel: 0800 856 450
IANZ# 1290

Company Name: Tetra Tech Coffey Environment Pty Ltd NSW
Address: Level 20, Tower B, Citadel Tower 799 Pacific Highway
Chatswood
NSW 2067

Project Name: AYERS ROCK AIRPORT
Project ID: 754-PEREN233360

Order No.:
Report #: 966290
Phone: +61 2 9406 1000
Fax: +61 2 9406 1004

Received: Feb 20, 2023 2:47 PM
Due: Feb 27, 2023
Priority: 5 Day
Contact Name: Matthew Jessop-Hunt

Eurofins Analytical Services Manager : Asim Khan

Sample Detail						Moisture Set	Per- and Polyfluoroalkyl Substances (PFASs)	Per- and Polyfluoroalkyl Substances (PFASs) - Ultra Trace
Melbourne Laboratory - NATA # 1261 Site # 1254							X	X
Sydney Laboratory - NATA # 1261 Site # 18217						X	X	X
Brisbane Laboratory - NATA # 1261 Site # 20794							X	X
External Laboratory								
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**			
1	QC2	Jan 31, 2023		Soil	S23-Fe0054157	X	X	
2	QC4	Jan 31, 2023		Soil	S23-Fe0054158	X	X	
3	QC14	Feb 03, 2023		Soil	S23-Fe0054159	X	X	
4	QC16	Feb 03, 2023		Soil	S23-Fe0054160	X	X	
5	QC18	Feb 03, 2023		Soil	S23-Fe0054161	X	X	
6	QC20	Feb 03, 2023		Soil	S23-Fe0054162	X	X	
7	QC24	Feb 04, 2023		Soil	S23-Fe0054163	X	X	
8	QC26	Feb 04, 2023		Soil	S23-Fe0054164	X	X	
9	QC30	Feb 05, 2023		Water	S23-Fe0054165			X
10	QC32	Feb 05, 2023		Water	S23-Fe0054166		X	
Test Counts						8	9	1

Tetra Tech Coffey Environment Pty Ltd NSW
Level 20, Tower B, Citadel Tower 799 Pacific Highway
Chatswood
NSW 2067

NATA Accredited
Accreditation Number 1261
Site Number 18217

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

Attention: **Matthew Jessop-Hunt**

Report **966290-S**
Project name AYERS ROCK AIRPORT
Project ID 754-PEREN233360
Received Date Feb 20, 2023

Client Sample ID			**QC16**	**QC18**	**QC20**	**QC24**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**S23-Fe0054160**	**S23-Fe0054161**	**S23-Fe0054162**	**S23-Fe0054163**
Date Sampled			**Feb 03, 2023**	**Feb 03, 2023**	**Feb 03, 2023**	**Feb 04, 2023**
Test/Reference	LOR	Unit				
Sample Properties						
% Moisture	1	%	1.6	2.6	3.0	6.5
Perfluoroalkyl carboxylic acids (PFCAs)						
Perfluorobutanoic acid (PFBA)[N11]	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoropentanoic acid (PFPeA)[N11]	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorohexanoic acid (PFHxA)[N11]	5	ug/kg	< 5	< 5	6.6	< 5
Perfluoroheptanoic acid (PFHpA)[N11]	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorooctanoic acid (PFOA)[N11]	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorononanoic acid (PFNA)[N11]	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorodecanoic acid (PFDA)[N11]	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoroundecanoic acid (PFUnDA)[N11]	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorododecanoic acid (PFDoDA)[N11]	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorotridecanoic acid (PFTrDA)[N15]	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorotetradecanoic acid (PFTeDA)[N11]	5	ug/kg	< 5	< 5	< 5	< 5
13C4-PFBA (surr.)	1	%	103	105	106	107
13C5-PFPeA (surr.)	1	%	108	103	117	107
13C5-PFHxA (surr.)	1	%	107	114	106	117
13C4-PFHpA (surr.)	1	%	101	99	107	101
13C8-PFOA (surr.)	1	%	93	101	96	98
13C5-PFNA (surr.)	1	%	101	106	106	98
13C6-PFDA (surr.)	1	%	113	117	125	122
13C2-PFUnDA (surr.)	1	%	116	113	128	127
13C2-PFDoDA (surr.)	1	%	110	104	116	105
13C2-PFTeDA (surr.)	1	%	98	95	106	101
Perfluoroalkyl sulfonamido substances						
Perfluorooctane sulfonamide (FOSA)[N11]	5	ug/kg	< 5	< 5	< 5	< 5
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)[N11]	5	ug/kg	< 5	< 5	< 5	< 5
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)[N11]	5	ug/kg	< 5	< 5	< 5	< 5
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)[N11]	5	ug/kg	< 5	< 5	< 5	< 5
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)[N11]	5	ug/kg	< 5	< 5	< 5	< 5
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)[N11]	10	ug/kg	< 10	< 10	< 10	< 10
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)[N11]	10	ug/kg	< 10	< 10	< 10	< 10
13C8-FOSA (surr.)	1	%	104	96	94	90

Client Sample ID			QC16	QC18	QC20	QC24
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S23-Fe0054160	S23-Fe0054161	S23-Fe0054162	S23-Fe0054163
Date Sampled			Feb 03, 2023	Feb 03, 2023	Feb 03, 2023	Feb 04, 2023
Test/Reference	LOR	Unit				
Perfluoroalkyl sulfonamido substances						
D3-N-MeFOSA (surr.)	1	%	127	130	128	120
D5-N-EtFOSA (surr.)	1	%	147	140	133	144
D7-N-MeFOSE (surr.)	1	%	103	101	105	107
D9-N-EtFOSE (surr.)	1	%	108	105	114	107
D5-N-EtFOSAA (surr.)	1	%	120	124	127	142
D3-N-MeFOSAA (surr.)	1	%	150	139	152	151
Perfluoroalkyl sulfonic acids (PFSAs)						
Perfluorobutanesulfonic acid (PFBS)[N11]	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorononanesulfonic acid (PFNS)[N15]	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoropropanesulfonic acid (PFPrS)[N15]	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoropentanesulfonic acid (PFPeS)[N15]	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorohexanesulfonic acid (PFHxS)[N11]	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoroheptanesulfonic acid (PFHpS)[N15]	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorooctanesulfonic acid (PFOS)[N11]	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorodecanesulfonic acid (PFDS)[N15]	5	ug/kg	< 5	< 5	< 5	< 5
13C3-PFBS (surr.)	1	%	102	104	109	104
18O2-PFHxS (surr.)	1	%	101	100	95	97
13C8-PFOS (surr.)	1	%	93	95	96	94
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)						
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)[N11]	5	ug/kg	< 5	< 5	< 5	< 5
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)[N11]	10	ug/kg	< 10	< 10	< 10	< 10
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)[N11]	5	ug/kg	< 5	< 5	< 5	< 5
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)[N11]	5	ug/kg	< 5	< 5	< 5	< 5
13C2-4:2 FTSA (surr.)	1	%	90	100	88	88
13C2-6:2 FTSA (surr.)	1	%	82	83	87	80
13C2-8:2 FTSA (surr.)	1	%	179	175	182	192
13C2-10:2 FTSA (surr.)	1	%	161	166	168	150
PFASs Summations						
Sum (PFHxS + PFOS)*	5	ug/kg	< 5	< 5	< 5	< 5
Sum of US EPA PFAS (PFOS + PFOA)*	5	ug/kg	< 5	< 5	< 5	< 5
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	5	ug/kg	< 5	< 5	< 5	< 5
Sum of WA DWER PFAS (n=10)*	10	ug/kg	< 10	< 10	< 10	< 10
Sum of PFASs (n=30)*	50	ug/kg	< 50	< 50	< 50	< 50

Client Sample ID			QC26
Sample Matrix			Soil
Eurofins Sample No.			S23-Fe0054164
Date Sampled			Feb 04, 2023
Test/Reference	LOR	Unit	
Sample Properties			
% Moisture	1	%	2.2

Client Sample ID			QC26
Sample Matrix			Soil
Eurofins Sample No.			S23-Fe0054164
Date Sampled			Feb 04, 2023
Test/Reference	LOR	Unit	
Perfluoroalkyl carboxylic acids (PFCAs)			
Perfluorobutanoic acid (PFBA)[N11]	5	ug/kg	< 5
Perfluoropentanoic acid (PFPeA)[N11]	5	ug/kg	< 5
Perfluorohexanoic acid (PFHxA)[N11]	5	ug/kg	7.9
Perfluoroheptanoic acid (PFHpA)[N11]	5	ug/kg	< 5
Perfluorooctanoic acid (PFOA)[N11]	5	ug/kg	< 5
Perfluorononanoic acid (PFNA)[N11]	5	ug/kg	< 5
Perfluorodecanoic acid (PFDA)[N11]	5	ug/kg	< 5
Perfluoroundecanoic acid (PFUnDA)[N11]	5	ug/kg	< 5
Perfluorododecanoic acid (PFDoDA)[N11]	5	ug/kg	< 5
Perfluorotridecanoic acid (PFTrDA)[N15]	5	ug/kg	< 5
Perfluorotetradecanoic acid (PFTeDA)[N11]	5	ug/kg	< 5
13C4-PFBA (surr.)	1	%	108
13C5-PFPeA (surr.)	1	%	107
13C5-PFHxA (surr.)	1	%	110
13C4-PFHpA (surr.)	1	%	105
13C8-PFOA (surr.)	1	%	98
13C5-PFNA (surr.)	1	%	110
13C6-PFDA (surr.)	1	%	113
13C2-PFUnDA (surr.)	1	%	116
13C2-PFDoDA (surr.)	1	%	107
13C2-PFTeDA (surr.)	1	%	104
Perfluoroalkyl sulfonamido substances			
Perfluorooctane sulfonamide (FOSA)[N11]	5	ug/kg	< 5
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)[N11]	5	ug/kg	< 5
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)[N11]	5	ug/kg	< 5
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)[N11]	5	ug/kg	< 5
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)[N11]	5	ug/kg	< 5
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)[N11]	10	ug/kg	< 10
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)[N11]	10	ug/kg	< 10
13C8-FOSA (surr.)	1	%	95
D3-N-MeFOSA (surr.)	1	%	129
D5-N-EtFOSA (surr.)	1	%	148
D7-N-MeFOSE (surr.)	1	%	113
D9-N-EtFOSE (surr.)	1	%	110
D5-N-EtFOSAA (surr.)	1	%	107
D3-N-MeFOSAA (surr.)	1	%	118
Perfluoroalkyl sulfonic acids (PFSAs)			
Perfluorobutanesulfonic acid (PFBS)[N11]	5	ug/kg	< 5
Perfluorononanesulfonic acid (PFNS)[N15]	5	ug/kg	< 5
Perfluoropropanesulfonic acid (PFPrS)[N15]	5	ug/kg	< 5
Perfluoropentanesulfonic acid (PFPeS)[N15]	5	ug/kg	< 5
Perfluorohexanesulfonic acid (PFHxS)[N11]	5	ug/kg	< 5
Perfluoroheptanesulfonic acid (PFHpS)[N15]	5	ug/kg	< 5
Perfluorooctanesulfonic acid (PFOS)[N11]	5	ug/kg	< 5
Perfluorodecanesulfonic acid (PFDS)[N15]	5	ug/kg	< 5
13C3-PFBS (surr.)	1	%	102

Client Sample ID			QC26
Sample Matrix			**Soil**
Eurofins Sample No.			**S23-Fe0054164**
Date Sampled			**Feb 04, 2023**
Test/Reference	LOR	Unit	
Perfluoroalkyl sulfonic acids (PFSAs)			
18O2-PFHxS (surr.)	1	%	98
13C8-PFOS (surr.)	1	%	92
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)[N11]	5	ug/kg	< 5
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)[N11]	10	ug/kg	< 10
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)[N11]	5	ug/kg	< 5
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)[N11]	5	ug/kg	< 5
13C2-4:2 FTSA (surr.)	1	%	97
13C2-6:2 FTSA (surr.)	1	%	79
13C2-8:2 FTSA (surr.)	1	%	193
13C2-10:2 FTSA (surr.)	1	%	167
PFASs Summations			
Sum (PFHxS + PFOS)*	5	ug/kg	< 5
Sum of US EPA PFAS (PFOS + PFOA)*	5	ug/kg	< 5
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	5	ug/kg	< 5
Sum of WA DWER PFAS (n=10)*	10	ug/kg	< 10
Sum of PFASs (n=30)*	50	ug/kg	< 50

Sample History

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

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

Description	Testing Site	Extracted	Holding Time
% Moisture	Sydney	Feb 23, 2023	14 Days
- Method: LTM-GEN-7080 Moisture			
Per- and Polyfluoroalkyl Substances (PFASs)			
Perfluoroalkyl carboxylic acids (PFCAs)	Sydney	Feb 27, 2023	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonamido substances	Sydney	Feb 27, 2023	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonic acids (PFSAs)	Sydney	Feb 27, 2023	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)	Sydney	Feb 27, 2023	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
PFASs Summations	Sydney	Feb 23, 2023	
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			

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Project Name: AYERS ROCK AIRPORT
Project ID: 754-PEREN233360

Order No.:
Report #: 966290
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Received: Feb 20, 2023 2:47 PM
Due: Feb 27, 2023
Priority: 5 Day
Contact Name: Matthew Jessop-Hunt

Eurofins Analytical Services Manager : Asim Khan

Sample Detail						Moisture Set	Per- and Polyfluoroalkyl Substances (PFASs)	Per- and Polyfluoroalkyl Substances (PFASs) - Ultra Trace
Melbourne Laboratory - NATA # 1261 Site # 1254							X	X
Sydney Laboratory - NATA # 1261 Site # 18217						X	X	X
Brisbane Laboratory - NATA # 1261 Site # 20794							X	X
External Laboratory								
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**			
1	QC2	Jan 31, 2023		Soil	S23-Fe0054157	X	X	
2	QC4	Jan 31, 2023		Soil	S23-Fe0054158	X	X	
3	QC14	Feb 03, 2023		Soil	S23-Fe0054159	X	X	
4	QC16	Feb 03, 2023		Soil	S23-Fe0054160	X	X	
5	QC18	Feb 03, 2023		Soil	S23-Fe0054161	X	X	
6	QC20	Feb 03, 2023		Soil	S23-Fe0054162	X	X	
7	QC24	Feb 04, 2023		Soil	S23-Fe0054163	X	X	
8	QC26	Feb 04, 2023		Soil	S23-Fe0054164	X	X	
9	QC30	Feb 05, 2023		Water	S23-Fe0054165			X
10	QC32	Feb 05, 2023		Water	S23-Fe0054166		X	
Test Counts						8	9	1

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Internal Quality Control Review and Glossary

General

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

Holding Times

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

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

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

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

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

Units

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

Terms

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

QC - Acceptance Criteria

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

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

Results <10 times the LOR: No Limit

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

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

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

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

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

QC Data General Comments

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

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	ug/kg	< 5			5	Pass	
Perfluoropentanoic acid (PFPeA)	ug/kg	< 5			5	Pass	
Perfluorohexanoic acid (PFHxA)	ug/kg	< 5			5	Pass	
Perfluoroheptanoic acid (PFHpA)	ug/kg	< 5			5	Pass	
Perfluorooctanoic acid (PFOA)	ug/kg	< 5			5	Pass	
Perfluorononanoic acid (PFNA)	ug/kg	< 5			5	Pass	
Perfluorodecanoic acid (PFDA)	ug/kg	< 5			5	Pass	
Perfluoroundecanoic acid (PFUnDA)	ug/kg	< 5			5	Pass	
Perfluorododecanoic acid (PFDoDA)	ug/kg	< 5			5	Pass	
Perfluorotridecanoic acid (PFTrDA)	ug/kg	< 5			5	Pass	
Perfluorotetradecanoic acid (PFTeDA)	ug/kg	< 5			5	Pass	
Method Blank							
Perfluoroalkyl sulfonamido substances							
Perfluorooctane sulfonamide (FOSA)	ug/kg	< 5			5	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	ug/kg	< 5			5	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	ug/kg	< 5			5	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	ug/kg	< 5			5	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	ug/kg	< 5			5	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	ug/kg	< 10			10	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	ug/kg	< 10			10	Pass	
Method Blank							
Perfluoroalkyl sulfonic acids (PFSAs)							
Perfluorobutanesulfonic acid (PFBS)	ug/kg	< 5			5	Pass	
Perfluorononanesulfonic acid (PFNS)	ug/kg	< 5			5	Pass	
Perfluoropropanesulfonic acid (PFPrS)	ug/kg	< 5			5	Pass	
Perfluoropentanesulfonic acid (PFPeS)	ug/kg	< 5			5	Pass	
Perfluorohexanesulfonic acid (PFHxS)	ug/kg	< 5			5	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	ug/kg	< 5			5	Pass	
Perfluorooctanesulfonic acid (PFOS)	ug/kg	< 5			5	Pass	
Perfluorodecanesulfonic acid (PFDS)	ug/kg	< 5			5	Pass	
Method Blank							
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	ug/kg	< 5			5	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	ug/kg	< 10			10	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	ug/kg	< 5			5	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	ug/kg	< 5			5	Pass	
LCS - % Recovery							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	%	99			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	101			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	101			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	95			50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	109			50-150	Pass	
Perfluorononanoic acid (PFNA)	%	119			50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	101			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	%	104			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	%	106			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	%	104			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	103			50-150	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
LCS - % Recovery							
Perfluoroalkyl sulfonamido substances							
Perfluorooctane sulfonamide (FOSA)	%	95			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	%	99			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	%	102			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	%	122			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	%	93			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	%	101			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	%	109			50-150	Pass	
LCS - % Recovery							
Perfluoroalkyl sulfonic acids (PFSAs)							
Perfluorobutanesulfonic acid (PFBS)	%	101			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	%	107			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	%	89			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	%	83			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	%	98			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	%	99			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	%	100			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	%	104			50-150	Pass	
LCS - % Recovery							
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	%	92			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	%	91			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	%	111			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	%	105			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Perfluoroalkyl sulfonamido substances				Result 1					
Perfluorooctane sulfonamide (FOSA)	S23-Fe0054158	CP	%	107			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	S23-Fe0054158	CP	%	101			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	S23-Fe0054158	CP	%	113			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	S23-Fe0054158	CP	%	109			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	S23-Fe0054158	CP	%	107			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	S23-Fe0054158	CP	%	104			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	S23-Fe0054158	CP	%	110			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1					
Perfluorobutanesulfonic acid (PFBS)	S23-Fe0054158	CP	%	106			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	S23-Fe0054158	CP	%	113			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	S23-Fe0054158	CP	%	94			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	S23-Fe0054158	CP	%	93			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	S23-Fe0054158	CP	%	104			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	S23-Fe0054158	CP	%	121			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				Result 1					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	S23-Fe0054158	CP	%	105			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	S23-Fe0054158	CP	%	110			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	S23-Fe0054158	CP	%	102			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	S23-Fe0054158	CP	%	116			50-150	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Sample Properties				Result 1	Result 2	RPD			
% Moisture	S23-Fe0054162	CP	%	3.0	3.3	8.8	30%	Pass	

Comments

Sample Integrity

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

Qualifier Codes/Comments

Code	Description
N11	Isotope dilution is used for calibration of each native compound for which an exact labelled analogue is available (Isotope Dilution Quantitation). The isotopically labelled analogues allow identification and recovery correction of the concentration of the associated native PFAS compounds.
N15	Where the native PFAS compound does not have labelled analogue then the quantification is made using the Extracted Internal Standard Analyte with the closest retention time to the analyte and no recovery correction has been made (Internal Standard Quantitation).

Authorised by:

Bonnie Pu Analytical Services Manager

Glenn Jackson
General Manager

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

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

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

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NATA Accredited
Accreditation Number 1261
Site Number 20794

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

Attention: **Matthew Jessop-Hunt**

Report **966290-W**
Project name AYERS ROCK AIRPORT
Project ID 754-PEREN233360
Received Date Feb 20, 2023

Client Sample ID			**QC30**	**QC32**
Sample Matrix			**Water**	**Water**
Eurofins Sample No.			**S23-Fe0054165**	**S23-Fe0054166**
Date Sampled			**Feb 05, 2023**	**Feb 05, 2023**
Test/Reference	LOR	Unit		
Perfluoroalkyl carboxylic acids (PFCAs) - Ultra Trace				
Perfluorobutanoic acid (PFBA)[N11]	0.05	ug/L	< 0.05	-
Perfluoropentanoic acid (PFPeA)[N11]	0.01	ug/L	< 0.01	-
Perfluorohexanoic acid (PFHxA)[N11]	0.01	ug/L	< 0.01	-
Perfluoroheptanoic acid (PFHpA)[N11]	0.01	ug/L	< 0.01	-
Perfluorooctanoic acid (PFOA)[N11]	0.01	ug/L	< 0.01	-
Perfluorononanoic acid (PFNA)[N11]	0.01	ug/L	< 0.01	-
Perfluorodecanoic acid (PFDA)[N11]	0.01	ug/L	< 0.01	-
Perfluoroundecanoic acid (PFUnDA)[N11]	0.01	ug/L	< 0.01	-
Perfluorododecanoic acid (PFDoDA)[N11]	0.01	ug/L	< 0.01	-
Perfluorotridecanoic acid (PFTrDA)[N15]	0.01	ug/L	< 0.01	-
Perfluorotetradecanoic acid (PFTeDA)[N11]	0.01	ug/L	< 0.01	-
13C4-PFBA (surr.)	1	%	87	-
13C5-PFPeA (surr.)	1	%	93	-
13C5-PFHxA (surr.)	1	%	72	-
13C4-PFHpA (surr.)	1	%	51	-
13C8-PFOA (surr.)	1	%	52	-
13C5-PFNA (surr.)	1	%	128	-
13C6-PFDA (surr.)	1	%	165	-
13C2-PFUnDA (surr.)	1	%	157	-
13C2-PFDoDA (surr.)	1	%	71	-
13C2-PFTeDA (surr.)	1	%	80	-
Perfluoroalkyl sulfonic acids (PFSAs)- Ultra Trace				
Perfluorobutanesulfonic acid (PFBS)[N11]	0.001	ug/L	< 0.001	-
Perfluorononanesulfonic acid (PFNS)[N15]	0.001	ug/L	< 0.001	-
Perfluoropropanesulfonic acid (PFPrS)[N15]	0.001	ug/L	< 0.001	-
Perfluoropentanesulfonic acid (PFPeS)[N15]	0.001	ug/L	< 0.001	-
Perfluorohexanesulfonic acid (PFHxS)[N11]	0.001	ug/L	< 0.001	-
Perfluoroheptanesulfonic acid (PFHpS)[N15]	0.001	ug/L	< 0.001	-
Perfluorooctanesulfonic acid (PFOS)[N11]	0.0001	ug/L	0.0003	-
Perfluorodecanesulfonic acid (PFDS)[N15]	0.001	ug/L	< 0.001	-
13C3-PFBS (surr.)	1	%	64	-
18O2-PFHxS (surr.)	1	%	69	-
13C8-PFOS (surr.)	1	%	69	-

Client Sample ID			QC30	QC32
Sample Matrix			Water	Water
Eurofins Sample No.			S23-Fe0054165	S23-Fe0054166
Date Sampled			Feb 05, 2023	Feb 05, 2023
Test/Reference	LOR	Unit		
Perfluoroalkyl sulfonamido substances- Ultra Trace				
Perfluorooctane sulfonamide (FOSA)[N11]	0.05	ug/L	< 0.05	-
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)[N11]	0.05	ug/L	< 0.05	-
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)[N11]	0.05	ug/L	< 0.05	-
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)[N11]	0.05	ug/L	< 0.05	-
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)[N11]	0.05	ug/L	< 0.05	-
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)[N11]	0.05	ug/L	< 0.05	-
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)[N11]	0.05	ug/L	< 0.05	-
13C8-FOSA (surr.)	1	%	65	-
D3-N-MeFOSA (surr.)	1	%	97	-
D5-N-EtFOSA (surr.)	1	%	73	-
D7-N-MeFOSE (surr.)	1	%	62	-
D9-N-EtFOSE (surr.)	1	%	65	-
D5-N-EtFOSAA (surr.)	1	%	64	-
D3-N-MeFOSAA (surr.)	1	%	121	-
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)- Ultra Trace				
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)[N11]	0.001	ug/L	< 0.001	-
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)[N11]	0.005	ug/L	< 0.005	-
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)[N11]	0.001	ug/L	< 0.001	-
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)[N11]	0.001	ug/L	< 0.001	-
13C2-4:2 FTSA (surr.)	1	%	50	-
13C2-6:2 FTSA (surr.)	1	%	157	-
13C2-8:2 FTSA (surr.)	1	%	75	-
13C2-10:2 FTSA (surr.)	1	%	91	-
PFASs Summations				
Sum (PFHxS + PFOS)*	0.001	ug/L	< 0.001	-
Sum of US EPA PFAS (PFOS + PFOA)*	0.001	ug/L	< 0.001	-
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.001	ug/L	< 0.001	-
Sum of WA DWER PFAS (n=10)*	0.005	ug/L	< 0.005	-
Sum of PFASs (n=30)*	0.005	ug/L	< 0.005	-
Perfluoroalkyl carboxylic acids (PFCAs)				
Perfluorobutanoic acid (PFBA)[N11]	0.05	ug/L	-	0.45
Perfluoropentanoic acid (PFPeA)[N11]	0.01	ug/L	-	[N09]0.60
Perfluorohexanoic acid (PFHxA)[N11]	0.01	ug/L	-	[N09]0.62
Perfluoroheptanoic acid (PFHpA)[N11]	0.01	ug/L	-	[N09]0.79
Perfluorooctanoic acid (PFOA)[N11]	0.01	ug/L	-	[N09]0.47
Perfluorononanoic acid (PFNA)[N11]	0.01	ug/L	-	0.05
Perfluorodecanoic acid (PFDA)[N11]	0.01	ug/L	-	< 0.01
Perfluoroundecanoic acid (PFUnDA)[N11]	0.01	ug/L	-	< 0.01
Perfluorododecanoic acid (PFDoDA)[N11]	0.01	ug/L	-	< 0.01
Perfluorotridecanoic acid (PFTrDA)[N15]	0.01	ug/L	-	< 0.01
Perfluorotetradecanoic acid (PFTeDA)[N11]	0.01	ug/L	-	< 0.01
13C4-PFBA (surr.)	1	%	-	85
13C5-PFPeA (surr.)	1	%	-	96

Client Sample ID			QC30	QC32
Sample Matrix			Water	Water
Eurofins Sample No.			S23-Fe0054165	S23-Fe0054166
Date Sampled			Feb 05, 2023	Feb 05, 2023
Test/Reference	LOR	Unit		
Perfluoroalkyl carboxylic acids (PFCAs)				
13C5-PFHxA (surr.)	1	%	-	105
13C4-PFHpA (surr.)	1	%	-	92
13C8-PFOA (surr.)	1	%	-	111
13C5-PFNA (surr.)	1	%	-	101
13C6-PFDA (surr.)	1	%	-	134
13C2-PFUnDA (surr.)	1	%	-	111
13C2-PFDoDA (surr.)	1	%	-	109
13C2-PFTeDA (surr.)	1	%	-	108
Perfluoroalkyl sulfonamido substances				
Perfluorooctane sulfonamide (FOSA)[N11]	0.05	ug/L	-	< 0.05
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)[N11]	0.05	ug/L	-	< 0.05
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)[N11]	0.05	ug/L	-	< 0.05
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)[N11]	0.05	ug/L	-	< 0.05
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)[N11]	0.05	ug/L	-	< 0.05
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)[N11]	0.05	ug/L	-	< 0.05
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)[N11]	0.05	ug/L	-	< 0.05
13C8-FOSA (surr.)	1	%	-	99
D3-N-MeFOSA (surr.)	1	%	-	77
D5-N-EtFOSA (surr.)	1	%	-	105
D7-N-MeFOSE (surr.)	1	%	-	64
D9-N-EtFOSE (surr.)	1	%	-	82
D5-N-EtFOSAA (surr.)	1	%	-	109
D3-N-MeFOSAA (surr.)	1	%	-	94
Perfluoroalkyl sulfonic acids (PFSAs)				
Perfluorobutanesulfonic acid (PFBS)[N11]	0.01	ug/L	-	0.04
Perfluorononanesulfonic acid (PFNS)[N15]	0.01	ug/L	-	< 0.01
Perfluoropropanesulfonic acid (PFPrS)[N15]	0.01	ug/L	-	0.03
Perfluoropentanesulfonic acid (PFPeS)[N15]	0.01	ug/L	-	[N09]0.02
Perfluorohexanesulfonic acid (PFHxS)[N11]	0.01	ug/L	-	< 0.01
Perfluoroheptanesulfonic acid (PFHpS)[N15]	0.01	ug/L	-	< 0.01
Perfluorooctanesulfonic acid (PFOS)[N11]	0.01	ug/L	-	[N09]0.02
Perfluorodecanesulfonic acid (PFDS)[N15]	0.01	ug/L	-	< 0.01
13C3-PFBS (surr.)	1	%	-	101
18O2-PFHxS (surr.)	1	%	-	103
13C8-PFOS (surr.)	1	%	-	101
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)[N11]	0.01	ug/L	-	< 0.01
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)[N11]	0.05	ug/L	-	< 0.05
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)[N11]	0.01	ug/L	-	< 0.01
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)[N11]	0.01	ug/L	-	< 0.01
13C2-4:2 FTSA (surr.)	1	%	-	95
13C2-6:2 FTSA (surr.)	1	%	-	103
13C2-8:2 FTSA (surr.)	1	%	-	104
13C2-10:2 FTSA (surr.)	1	%	-	101

Client Sample ID			QC30	QC32
Sample Matrix			Water	Water
Eurofins Sample No.			S23-Fe0054165	S23-Fe0054166
Date Sampled			Feb 05, 2023	Feb 05, 2023
Test/Reference	LOR	Unit		
PFASs Summations				
Sum (PFHxS + PFOS)*	0.01	ug/L	-	0.02
Sum of US EPA PFAS (PFOS + PFOA)*	0.01	ug/L	-	0.49
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.01	ug/L	-	0.49
Sum of WA DWER PFAS (n=10)*	0.05	ug/L	-	2.99
Sum of PFASs (n=30)*	0.1	ug/L	-	3.09

Sample History

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

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

Description	Testing Site	Extracted	Holding Time
Per- and Polyfluoroalkyl Substances (PFASs) - Ultra Trace			
Perfluoroalkyl carboxylic acids (PFCAs) - Ultra Trace	Brisbane	Feb 27, 2023	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS) - ultra trace			
Perfluoroalkyl sulfonic acids (PFSAs)- Ultra Trace	Brisbane	Feb 27, 2023	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS) - ultra trace			
Perfluoroalkyl sulfonamido substances- Ultra Trace	Brisbane	Feb 27, 2023	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS) Ultra trace			
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)- Ultra Trace	Brisbane	Feb 27, 2023	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS) - ultra trace			
PFASs Summations	Brisbane	Feb 27, 2023	
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS) - low level			
Per- and Polyfluoroalkyl Substances (PFASs)			
Perfluoroalkyl carboxylic acids (PFCAs)	Sydney	Feb 23, 2023	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonamido substances	Sydney	Feb 23, 2023	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonic acids (PFSAs)	Sydney	Feb 23, 2023	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)	Sydney	Feb 23, 2023	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
PFASs Summations	Sydney	Feb 23, 2023	
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			

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Project Name: AYERS ROCK AIRPORT
Project ID: 754-PEREN233360

Order No.:
Report #: 966290
Phone: +61 2 9406 1000
Fax: +61 2 9406 1004

Received: Feb 20, 2023 2:47 PM
Due: Feb 27, 2023
Priority: 5 Day
Contact Name: Matthew Jessop-Hunt

Eurofins Analytical Services Manager : Asim Khan

Sample Detail						Moisture Set	Per- and Polyfluoroalkyl Substances (PFASs)	Per- and Polyfluoroalkyl Substances (PFASs) - Ultra Trace
Melbourne Laboratory - NATA # 1261 Site # 1254							X	X
Sydney Laboratory - NATA # 1261 Site # 18217						X	X	X
Brisbane Laboratory - NATA # 1261 Site # 20794							X	X
External Laboratory								
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**			
1	QC2	Jan 31, 2023		Soil	S23-Fe0054157	X	X	
2	QC4	Jan 31, 2023		Soil	S23-Fe0054158	X	X	
3	QC14	Feb 03, 2023		Soil	S23-Fe0054159	X	X	
4	QC16	Feb 03, 2023		Soil	S23-Fe0054160	X	X	
5	QC18	Feb 03, 2023		Soil	S23-Fe0054161	X	X	
6	QC20	Feb 03, 2023		Soil	S23-Fe0054162	X	X	
7	QC24	Feb 04, 2023		Soil	S23-Fe0054163	X	X	
8	QC26	Feb 04, 2023		Soil	S23-Fe0054164	X	X	
9	QC30	Feb 05, 2023		Water	S23-Fe0054165			X
10	QC32	Feb 05, 2023		Water	S23-Fe0054166		X	
Test Counts						8	9	1

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Internal Quality Control Review and Glossary

General

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

Holding Times

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

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

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

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

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

Units

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

Terms

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

QC - Acceptance Criteria

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

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

Results <10 times the LOR: No Limit

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

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

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

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

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

QC Data General Comments

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

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Perfluoroalkyl carboxylic acids (PFCAs) - Ultra Trace							
Perfluorobutanoic acid (PFBA)	ug/L	< 0.05			0.05	Pass	
Perfluoropentanoic acid (PFPeA)	ug/L	< 0.01			0.01	Pass	
Perfluorohexanoic acid (PFHxA)	ug/L	< 0.01			0.01	Pass	
Perfluoroheptanoic acid (PFHpA)	ug/L	< 0.01			0.01	Pass	
Perfluorooctanoic acid (PFOA)	ug/L	< 0.01			0.01	Pass	
Perfluorononanoic acid (PFNA)	ug/L	< 0.01			0.01	Pass	
Perfluorodecanoic acid (PFDA)	ug/L	< 0.01			0.01	Pass	
Perfluoroundecanoic acid (PFUnDA)	ug/L	< 0.01			0.01	Pass	
Perfluorododecanoic acid (PFDoDA)	ug/L	< 0.01			0.01	Pass	
Perfluorotridecanoic acid (PFTrDA)	ug/L	< 0.01			0.01	Pass	
Perfluorotetradecanoic acid (PFTeDA)	ug/L	< 0.01			0.01	Pass	
Method Blank							
Perfluoroalkyl sulfonic acids (PFSAs)- Ultra Trace							
Perfluorobutanesulfonic acid (PFBS)	ug/L	< 0.001			0.001	Pass	
Perfluorononanesulfonic acid (PFNS)	ug/L	< 0.001			0.001	Pass	
Perfluoropropanesulfonic acid (PFPrS)	ug/L	< 0.001			0.001	Pass	
Perfluoropentanesulfonic acid (PFPeS)	ug/L	< 0.001			0.001	Pass	
Perfluorohexanesulfonic acid (PFHxS)	ug/L	< 0.001			0.001	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	ug/L	< 0.001			0.001	Pass	
Perfluorooctanesulfonic acid (PFOS)	ug/L	< 0.0001			0.0001	Pass	
Perfluorodecanesulfonic acid (PFDS)	ug/L	< 0.001			0.001	Pass	
Method Blank							
Perfluoroalkyl sulfonamido substances- Ultra Trace							
Perfluorooctane sulfonamide (FOSA)	ug/L	< 0.05			0.05	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	ug/L	< 0.05			0.05	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	ug/L	< 0.05			0.05	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	ug/L	< 0.05			0.05	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	ug/L	< 0.05			0.05	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	ug/L	< 0.05			0.05	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	ug/L	< 0.05			0.05	Pass	
Method Blank							
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)- Ultra Trace							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	ug/L	< 0.001			0.001	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	ug/L	< 0.005			0.005	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	ug/L	< 0.001			0.001	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	ug/L	< 0.001			0.001	Pass	
Method Blank							
Perfluoroalkyl sulfonic acids (PFSAs)							
Perfluorobutanesulfonic acid (PFBS)	ug/L	< 0.01			0.01	Pass	
Perfluorononanesulfonic acid (PFNS)	ug/L	< 0.01			0.01	Pass	
Perfluoropropanesulfonic acid (PFPrS)	ug/L	< 0.01			0.01	Pass	
Perfluoropentanesulfonic acid (PFPeS)	ug/L	< 0.01			0.01	Pass	
Perfluorohexanesulfonic acid (PFHxS)	ug/L	< 0.01			0.01	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	ug/L	< 0.01			0.01	Pass	
Perfluorooctanesulfonic acid (PFOS)	ug/L	< 0.01			0.01	Pass	
Perfluorodecanesulfonic acid (PFDS)	ug/L	< 0.01			0.01	Pass	
Method Blank							
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	ug/L	< 0.01			0.01	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	ug/L	< 0.05			0.05	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	ug/L	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	ug/L	< 0.01			0.01	Pass	
LCS - % Recovery							
Perfluoroalkyl carboxylic acids (PFCAs) - Ultra Trace							
Perfluorobutanoic acid (PFBA)	%	93			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	94			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	108			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	95			50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	98			50-150	Pass	
Perfluorononanoic acid (PFNA)	%	99			50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	100			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	%	94			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	%	100			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	%	137			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	95			50-150	Pass	
LCS - % Recovery							
Perfluoroalkyl sulfonic acids (PFSAs)- Ultra Trace							
Perfluorobutanesulfonic acid (PFBS)	%	91			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	%	111			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	%	128			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	%	56			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	%	112			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	%	103			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	%	91			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	%	60			50-150	Pass	
LCS - % Recovery							
Perfluoroalkyl sulfonamido substances- Ultra Trace							
Perfluorooctane sulfonamide (FOSA)	%	96			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	%	108			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	%	100			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	%	88			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	%	105			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	%	86			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	%	93			50-150	Pass	
LCS - % Recovery							
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)- Ultra Trace							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	%	124			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	%	117			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	%	85			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	%	136			50-150	Pass	
LCS - % Recovery							
Perfluoroalkyl sulfonic acids (PFSAs)							
Perfluorobutanesulfonic acid (PFBS)	%	93			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	%	99			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	%	92			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	%	84			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	%	82			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	%	98			50-150	Pass	
LCS - % Recovery							
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	%	94			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	%	97			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	%	96			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Perfluoroalkyl carboxylic acids (PFCAs) - Ultra Trace				Result 1					
Perfluorobutanoic acid (PFBA)	S23-Fe0052932	NCP	%	98			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	S23-Fe0052932	NCP	%	93			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	S23-Fe0052932	NCP	%	98			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	S23-Fe0052932	NCP	%	94			50-150	Pass	
Perfluorooctanoic acid (PFOA)	S23-Fe0052932	NCP	%	106			50-150	Pass	
Perfluorononanoic acid (PFNA)	S23-Fe0052932	NCP	%	106			50-150	Pass	
Perfluorodecanoic acid (PFDA)	S23-Fe0052932	NCP	%	106			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	S23-Fe0052932	NCP	%	100			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	S23-Fe0052932	NCP	%	99			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	S23-Fe0052637	NCP	%	145			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	S23-Fe0052932	NCP	%	105			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonamido substances- Ultra Trace				Result 1					
Perfluorooctane sulfonamide (FOSA)	S23-Fe0052932	NCP	%	92			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	S23-Fe0052932	NCP	%	104			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	S23-Fe0052932	NCP	%	99			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	S23-Fe0052932	NCP	%	101			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	S23-Fe0052932	NCP	%	102			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	S23-Fe0052932	NCP	%	85			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	S23-Fe0052932	NCP	%	97			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1					
Perfluorobutanesulfonic acid (PFBS)	S23-Fe0052932	NCP	%	101			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	S23-Fe0052932	NCP	%	106			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	S23-Fe0052932	NCP	%	94			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	S23-Fe0052932	NCP	%	92			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	S23-Fe0052637	NCP	%	100			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	S23-Fe0052932	NCP	%	91			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	S23-Fe0052637	NCP	%	100			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	S23-Fe0052637	NCP	%	124			50-150	Pass	
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				Result 1					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	S23-Fe0052932	NCP	%	107			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	S23-Fe0052932	NCP	%	100			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	S23-Fe0052932	NCP	%	102			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	S23-Fe0052932	NCP	%	104			50-150	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Perfluoroalkyl sulfonic acids (PFSAs)- Ultra Trace				Result 1	Result 2	RPD			
Perfluorobutanesulfonic acid (PFBS)	B23-Fe0054721	NCP	ug/L	0.028	0.029	3.2	30%	Pass	
Perfluorononanesulfonic acid (PFNS)	B23-Fe0054721	NCP	ug/L	< 0.001	< 0.001	<1	30%	Pass	
Perfluoropropanesulfonic acid (PFPrS)	B23-Fe0054721	NCP	ug/L	0.029	0.031	6.4	30%	Pass	
Perfluoropentanesulfonic acid (PFPeS)	B23-Fe0054721	NCP	ug/L	0.008	0.008	3.7	30%	Pass	
Perfluorohexanesulfonic acid (PFHxS)	B23-Fe0054721	NCP	ug/L	0.086	0.079	8.4	30%	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	B23-Fe0054721	NCP	ug/L	< 0.001	< 0.001	<1	30%	Pass	
Perfluorooctanesulfonic acid (PFOS)	B23-Fe0054721	NCP	ug/L	0.0049	0.0050	4.9	30%	Pass	
Perfluorodecanesulfonic acid (PFDS)	B23-Fe0054721	NCP	ug/L	< 0.001	< 0.001	<1	30%	Pass	
Duplicate									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)- Ultra Trace				Result 1	Result 2	RPD			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	B23-Fe0057824	NCP	ug/L	< 0.001	< 0.001	<1	30%	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	B23-Fe0054721	NCP	ug/L	0.028	0.024	17	30%	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	B23-Fe0054721	NCP	ug/L	< 0.001	< 0.001	<1	30%	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	B23-Fe0054721	NCP	ug/L	< 0.001	< 0.001	<1	30%	Pass	
Duplicate									
Perfluoroalkyl carboxylic acids (PFCAs) - Ultra Trace				Result 1	Result 2	RPD			
Perfluorobutanoic acid (PFBA)	S23-Fe0046230	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	S23-Fe0046230	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorohexanoic acid (PFHxA)	S23-Fe0046230	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	S23-Fe0046230	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	S23-Fe0046230	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorononanoic acid (PFNA)	S23-Fe0046230	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorodecanoic acid (PFDA)	S23-Fe0046230	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnDA)	S23-Fe0046230	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorododecanoic acid (PFDoDA)	S23-Fe0046230	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotridecanoic acid (PFTrDA)	S23-Fe0046230	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	S23-Fe0046230	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	

Duplicate									
Perfluoroalkyl sulfonamido substances- Ultra Trace				Result 1	Result 2	RPD			
Perfluorooctane sulfonamide (FOSA)	S23-Fe0046230	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	S23-Fe0046230	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	S23-Fe0046230	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	S23-Fe0046230	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	S23-Fe0046230	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	S23-Fe0046230	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	S23-Fe0046230	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
Duplicate									
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1	Result 2	RPD			
Perfluorobutanesulfonic acid (PFBS)	S23-Fe0046230	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorononanesulfonic acid (PFNS)	S23-Fe0046230	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoropropanesulfonic acid (PFPrS)	S23-Fe0046230	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoropentanesulfonic acid (PFPeS)	S23-Fe0046230	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	S23-Fe0046230	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorooctanesulfonic acid (PFOS)	S23-Fe0046230	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorodecanesulfonic acid (PFDS)	S23-Fe0046230	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Duplicate									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				Result 1	Result 2	RPD			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	S23-Fe0046230	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	S23-Fe0046230	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	S23-Fe0046230	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	S23-Fe0046230	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	

Comments

Sample Integrity

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

Qualifier Codes/Comments

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

Authorised by:

Bonnie Pu	Analytical Services Manager
Jonathon Angell	Senior Analyst-PFAS



Glenn Jackson
General Manager

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

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

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

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APPENDIX H - DATA QUALITY REPORT

Introduction

This data validation appendix summarises the data quality objectives (DQOs), established for the data to support the environmental site investigation (SI) and then assesses the reliability of the field work procedures and laboratory analytical results using the data quality indicators (DQIs).

The QAQC assessment for the PFAS Characterisation Program at Ayers Rock Airport (AYQ) is presented herein.

Note: This includes a combined QAQC assessment for both the 2023 sampling program, and the 2022 QAQC data which was reported separately. The 2022 QAQC data was included in the AYQ Environmental Site Investigation Report (754-PEREN23360_R26_AYQ), however has been duplicated within this QAQC report for ease of reading.

Data Quality Objectives

The National Environment Protection Measure (NEPM, Schedule B2 Guideline on Site Characterisation - 2013) states that the nature and quality of the data collected for a particular assessment will be determined by the DQOs. The NEPM reference the US EPA *Guidance on Systematic Planning Using the Data Quality Objectives Process* (US EPA, 2006) which defines the DQO process. The US EPA defines the process as *'a strategic planning approach based on the Scientific Methods that is used to prepare for a data collection activity. It provides a systematic procedure for defining the criteria that a data collection design should satisfy, including when to collect samples, where to collect samples, the tolerable level of decision errors for the study, and how many samples to collect'.*

To define the purpose, type, quantity, and quality of data required for the investigation, the seven step DQOs approach, as described in the NEPM 2013, was adopted.

The seven steps of the DQO process for the current investigation are summarised below.

Table 1: Data Quality Objectives

Steps	Data Quality Objective
Step 1: State the problem	Soil, surface sediment, groundwater and infrastructure water require investigation completed as part of the broader PFAS Characterisation Program which investigates PFAS contamination resulting from Airservices Australia current and historical operations.
Step 2: Identify the decision/ goal of the study	The scope of this SI is targeted to source zone areas associated with current and historical operations.
Step 3: Identify the decision inputs	Confirmation that data generated by sampling and analysis are of a suitable quality to allow reliable comparison to assessment criteria as per the assessment of the DQIs.
Step 4: Define the boundaries of the study	The study area is targeted to source zone areas including the fire training ground (FTG), sewage treatment plant (STP) and the associated waste management and operational area at AYQ.
Step 5: Develop the analytical approach	Soil, surface sediment, groundwater and infrastructure water analytical results will be compared against assessment criteria outlined in the report.
Step 6: Specify performance or acceptance criteria	The potential for significant decision errors was minimised by completing a Quality Assurance/ Quality Control (QA/QC) program in accordance with ASC NEPM guidelines.
Step 7: Develop the plan for obtaining data	The sampling design was reviewed and adjusted if necessary, during fieldworks implementation to ensure that the relevant DQOs were met to adequately address the requirements of the program.

Data Quality Indicators

An assessment of the reliability of field procedures and laboratory analytical results outlined through the DQOs has been undertaken using the DQIs of precision, accuracy, representativeness, completeness, and comparability. A brief outline of the DQIs is presented below.

Precision – All Tetra Tech Coffey field staff to implement Tetra Tech Coffey standard operating procedures (SOPs) appropriate for the task being undertaken. All laboratories used to undertake analysis are NATA accredited for the analytes being tested for. An appropriate number of intra-laboratory and inter-laboratory replicate samples were collected and analysed and are within the acceptable limits of 1 in 20.

Accuracy – All Tetra Tech Coffey field staff to follow the appropriate SOPs for the tasks being undertaken. Trip blanks and equipment rinsate blank samples collected, and results of which are to be satisfactory. All laboratories used are to be NATA accredited and the use of NATA endorsed methods, including appropriate method blanks, laboratory control samples, laboratory spikes and duplicates, and the results of which satisfy the defined criteria of acceptability.

Representativeness – A sufficient number of samples are to be collected and analysed from each media to adequately achieve the overall SI objectives.

Completeness – All Tetra Tech Coffey field staff to follow Tetra Tech Coffey SOPs appropriate to the task being performed, along with the appropriate documentation. All identified areas of environmental concern to be assessed with chemical analysis for relevant chemicals of potential concern from targeted and systematic sampling locations. All samples to be under proper custody between the field and laboratory. The data obtained from the laboratory is considered relevant and usable.

Comparability – All Tetra Tech Coffey field staff to follow the appropriate SOPs for the task being undertaken and complete all sampling documentation. All analyte holding times to be complied with and samples properly and adequately preserved. All laboratory analysis to use the correct methods, along with appropriate limits of reporting (LORs).

The nominated acceptance targets are presented in Table 2 and Table 3.

Table 2: Field Works Quality Control Criteria

Item	Comments
Intra-laboratory duplicates Inter-laboratory duplicates (triplicates)	Intra-laboratory field duplicates were collected at a minimum frequency of one sample per twenty samples collected (5%). The analytical results of the primary sample and duplicate/ triplicate samples will be compared to assess the precision of the sampling protocol and to provide an indication of variation in the sample source. Repeatability will be assessed by calculating the relative percentage difference (RPD) between the primary and duplicate results. Where the RPD is greater than 30%, the potential causes of variability have been reviewed.
Trip blanks	Trip blanks are a check on sample contamination originating from containers, sample transport, shipping, and site conditions. The trip blank will be prepared in a clean environment (office or warehouse) and remain with the sample containers during sampling and during the return trip to the laboratory. At no time during these procedures will the blanks be opened. Upon return to the laboratory the blank will be analysed, if needed, as any other field sample. Detectable concentrations of a contaminants of potential concern (COPC) in a trip blank sample will trigger review of sample container types, transport procedures and UHP water quality. The concentration and compound detected will be considered in reviewing the potential impact of transport related cross-contamination of the assessment data quality.

Rinsate blanks	Rinsate blank samples will be prepared in the field using empty bottles and the distilled water/ potable water used for the cleaning of non-disposable sampling equipment. These samples will be a check of field decontamination procedures. A rinsate sample will be collected and analysed for each day of field work, where non-disposable sampling equipment has been used. Detectable concentrations of a COPC in a rinsate blank sample will trigger review of decontamination procedures, equipment materials, sample container types and UHP water quality. The concentration and compound detected will be considered in reviewing the potential impact of transport related cross-contamination of the assessment data quality.

Table 3: Laboratory Quality Control Criteria

Data Type	Comments and Acceptable Control Limits
Sample Analysis	All sample analyses to be conducted using NATA certified laboratories which will implement a quality control plan in accordance with NEPM (1999).
Holding times	Maximum acceptable sample holding times: Groundwater/surface water: 14 days for organic analyses (including PFAS) and 6 months for inorganic analyses (28 days for mercury).
Laboratory detection limits	All laboratory detection limits to be less than the site investigation criteria.
Laboratory Blanks	Laboratory blanks to be analysed at a rate of 1 in 20, with a minimum of one analysed per batch. Concentration of analytes to be less than the laboratory detection limits.
Laboratory Duplicates	Laboratory duplicates to be analysed at a rate of 1 in 20, with a minimum of one analysed per batch. RPDs to be less than 30%.
Laboratory Control Samples (LCS)	LCSs to be analysed at a rate of 1 in 20, with a minimum of one analysed per analytical batch.
Control limits	50 to 150 % acceptable recovery
Matrix spikes	Matrix spike duplicate prepared by dividing a field sample into two aliquots, then spiking each with identical concentrations of the analytes at a rate of 1 in 20.
Matrix spike control limits	50 to 150 % acceptable recovery. Lower recoveries may be acceptable for OCPs, OPPs, PCBs and phenols and will be assessed according to USEPA protocols.
Matrix spike duplicates	RPDs <50%

Field Quality Assurance Procedures

Field quality assurance involves all the planned actions, procedures, checks and decisions which have been made and undertaken through quality control measures to ensure the representativeness and integrity of collected samples is that of the true conditions.

Sample Collection

All Tetra Tech Coffey environmental scientists /engineers were suitably qualified, trained and experienced for the sample collection undertaken. Sampling of each matrix was undertaken with reference to the Tetra Tech Coffey SOPs.

Sampling Methodology

All samples were collected using a new disposable nitrile glove. Each sample was collected in a laboratory supplied container appropriate to the analysis required.

All groundwater samples were collected using disposable hydrasleeves.

Each sample was labelled using a unique sample identifier, project reference and date of sample collection.

Sample Transport and Preservation

To maintain sample integrity, all samples were placed into laboratory prepared containers suitable for PFAS and other non-PFAS analysis. Samples were immediately placed into an insulated ice chest containing ice, for storage and transportation to the Australian Laboratory Services (ALS) and Eurofins Environment Testing Australia (Eurofins). All samples were placed into zip-lock bags according to analysis, separating samples requiring PFAS analysis and samples requiring non-PFAS analysis.

All samples were sent to the laboratories under a chain of custody (CoC) documentation.

Field Equipment Calibration

All equipment was calibrated before being used to collect data. All equipment was calibrated in accordance with the manufacturers' specifications and provided in Appendix E.

Field Quality Control (QA/ QC) Samples

2022	Soil, Sediment, Leachate, Water
Primary Samples – Analysed	103 (total)
Days of sampling: **20th – 28th June (Soil)** **20th – 24th June (Sediment)** **28th June (Groundwater)**	8 (total)
Inter-laboratory Field Duplicates Analysed (at least 1 in 20 samples)	19
Intra-laboratory Field Duplicates Analysed (at least 1 in 20 samples)	17
Field Blanks (1 per sampling day)	2
Trip Blanks (at least 1 per sampling event)	12
Equipment Rinsate (at least 1/day/matrix/equipment)	11

2023	Soil and Sediment	Water
Primary Samples - Analysed	44	14
Days of sampling - 2nd to 6th February and 8th February	6	
Inter-laboratory Field Duplicates Analysed (at least 1 in 20 samples)	5	2
Intra-laboratory Field Duplicates Analysed (at least 1 in 20 samples)	5	2
Field Blanks (1 per sampling day)	8	
Trip Blanks (at least 1 per sampling event)	2	
Equipment Rinsate (at least 1/day/matrix/equipment)	8	

Samples Analysed

In **2022,** one hundred and three samples were collected and sent to the primary laboratory Australian Laboratory Services (ALS) over eight days of sampling. Nineteen duplicate samples were collected and

submitted for laboratory analysis to the primary laboratory ALS. Seventeen triplicate samples were collected and submitted for laboratory analysis to the secondary Eurofins Environmental Consulting.

In **2023**, a total of 58 soil and water samples were collected and sent for analysis to the primary laboratory Australian Laboratory Services (ALS) over six days of sampling. Seven duplicate samples (including soil and water) were collected and submitted for laboratory analysis to the primary laboratory ALS. Seven triplicate samples (including soil and water) were collected and submitted for laboratory analysis to the secondary Eurofins Environmental Consulting.

Inter-Laboratory and Intra-Laboratory Duplicates

ITEM	QUESTION	YES	NO - Comment below)
1	Were an Adequate Number of inter-laboratory and inter-laboratory duplicates analysed?	☒ - 2022 ☒ - 2023	☐ - 2023 ☐ - 2023
2	Were RPDs within Control Limits? < 30% for concentrations	☐ - 2022 ☐ - 2023	☒ - 2022 ☒ - 2023

Comments

Where RPDs were outside the acceptable range, sampling procedures, laboratory analytical methods and laboratory results were investigated.

For **2022**, there were seven duplicate soil pair analyses for metal compounds and 86% were reported within the acceptance target of less than 30% RPD. There were three triplicate soil pair analyses for metal compounds and 67% were reported within the acceptance target of less than 30%. There were thirteen duplicate pair analyses for PFAS compounds and 70% were reported within the acceptance target of less than 30% RPD. There were fifteen triplicate pair analyses for PFAS compounds and 54% were reported within the acceptance target of less than 30% RPD.

One duplicate leachate pair analysed for PFAS compounds reported concentrations outside of the RPD acceptance.

There were two duplicate groundwater pair analyses for PFAS compounds, and all were within the acceptance target of less than 30% RPD. There were two triplicate groundwater pair analyses for PFAS compounds and 50% were reported within the acceptance target of less than 30% RPD.

For **2023**, there were five duplicate and five triplicate soil pair analyses for PFAS compounds, and greater than 95% of the analytical results were reported within the acceptance target of less than 30% RPD.

There were two duplicate and two triplicate groundwater pair analyses for PFAS compounds, and greater than 95% of the analytical results were reported within the acceptance target of less than 30% RPD.

The duplicate and triplicate results and calculated RPDs for soil, leachate and water are provided in **Table 6, Table 7,** and **Table 8**, respectively. It is noted that where the highest result recorded has been reported in the results tables (Appendix B).

Table 6: Soil RPDs outside Acceptance Range

Primary Sample ID	Duplicate / Triplicate Sample ID	Primary Sample Lab	Duplicate/Triplicate Sample Lab	Analyte	RPD %	See Comment
2022						
SB17_0.0_260622	QC37	ALS	Eurofins	Chromium (III+VI)	62	2
SB33_0.3-0.5	QC05_240622	ALS	ALS	Perfluorohexane sulfonic acid (PFHxS)	82	2
				Perfluoroheptanoic acid (PFHpA)	61	2
				Perfluorooctanoic acid (PFOA)	95	2
				Perfluorononanoic acid (PFNA)	111	2
SB33_0.3-0.5	QC06_240622	ALS	Eurofins	Perfluoroheptanoic acid (PFHpA)	67	2
				Perfluorooctanoic acid (PFOA)	37	1
SS02_220622	QC16_220622	ALS	Eurofins	Perfluorododecanoic acid (PFDoDA)	47	3
				Perfluorotridecanoic acid (PFTrDA)	57	3
				Perfluoroundecanoic acid (PFUnDA)	53	3
SB22_0.0_230622	QC27	ALS	ALS	Perfluorohexane sulfonic acid (PFHxS)	67	3
				Perfluorooctane sulfonic acid (PFOS)	145	3
				Perfluorooctanoic acid (PFOA)	37	3
				Perfluorodecanoic acid (PFDA)	156	1
				Perfluorododecanoic acid (PFDoDA)	127	1
				Perfluorononanoic acid (PFNA)	159	3
				Perfluoroundecanoic acid (PFUnDA)	111	1
				8:2 Fluorotelomer sulfonic acid (8:2 FTS)	156	3
SB22_0.0_230622	QC28	ALS	Eurofins	Perfluorooctanoic acid (PFOA)	64	3
SB12_0.0_240622	QC25	ALS	ALS	Perfluorohexane sulfonic acid (PFHxS)	72	3
				Perfluorooctane sulfonic acid (PFOS)	45	3
				Perfluoropentanoic acid (PFPeA)	69	2
				Perfluorohexanoic acid (PFHxA)	47	2
				Perfluorooctanoic acid (PFOA)	114	3
				Perfluorodecanoic acid (PFDA)	64	3

Primary Sample ID	Duplicate / Triplicate Sample ID	Primary Sample Lab	Duplicate/Triplicate Sample Lab	Analyte	RPD %	See Comment
				Perfluorononanoic acid (PFNA)	59	3
				6:2 Fluorotelomer sulfonic acid (6:2 FTS)	112	3
				8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39	3
SB12_0.0_240622	QC26	ALS	Eurofins	Perfluorohexane sulfonic acid (PFHxS)	84	3
				Perfluorooctane sulfonic acid (PFOS)	42	2
				Perfluoroheptanoic acid (PFHpA)	73	3
				Perfluorooctanoic acid (PFOA)	114	3
				8:2 Fluorotelomer sulfonic acid (8:2 FTS)	46	2
YAP2_0.0_240622	QC21	ALS	ALS	Perfluorooctane sulfonic acid (PFOS)	58	3
				Perfluorooctanoic acid (PFOA)	36	3
				Perfluorononanoic acid (PFNA)	51	3
YAP2_0.0_240622	QC22	ALS	Eurofins	Perfluorobutanoic acid (PFBA)	57	3
				Perfluoropentanoic acid (PFPeA)	55	3
				Perfluorohexanoic acid (PFHxA)	62	3
				Perfluoroheptanoic acid (PFHpA)	67	3
				Perfluorooctanoic acid (PFOA)	65	3
SS08_250622	QC09_250622	ALS	ALS	Perfluorotetradecanoic acid (PFTeDA)	39	2
SS08_250622	QC10_250622	ALS	Eurofins	Perfluorooctane sulfonic acid (PFOS)	31	2
				Perfluorononanoic acid (PFNA)	35	3
CC01_Top_260622 (concrete)	QC41	ALS	Eurofins	Perfluorobutanoic acid (PFBA)	127	3
				Perfluoropentanoic acid (PFPeA)	162	3
				Perfluorohexanoic acid (PFHxA)	129	3
				Perfluoroheptanoic acid (PFHpA)	68	3
				Perfluorooctanoic acid (PFOA)	35	3
				Perfluorononanoic acid (PFNA)	33	3
				8:2 Fluorotelomer sulfonic acid (8:2 FTS)	44	3
2023						
SB40_0.4-0.5	QC20	ALS	Eurofins	Perfluorohexanoic acid (PFHxA)	33	3,5
SB42_0.4-0.5	QC25	ALS	ALS	Perfluoroheptanoic acid (PFHpA)	32	3,5

Primary Sample ID	Duplicate / Triplicate Sample ID	Primary Sample Lab	Duplicate/Triplicate Sample Lab	Analyte	RPD %	See Comment
SB43_0.4-0.5	QC23	ALS	ALS	Perfluorobutanoic acid (PFBA)	67	2,5
	QC23	ALS	ALS	Perfluoropentanoic acid (PFPeA)	37	2,5
SB43_0.4-0.5	QC24	ALS	Eurofins	Perfluoroheptanoic acid (PFHpA)	44	1,5

Table 7: Leachate RPDs outside Acceptance Range

Primary Sample ID	Duplicate / Triplicate Sample ID	Primary Sample Lab	Duplicate/Triplicate Sample Lab	Analyte	RPD %	See Comment
2022						
CC01_Top_260622 **(ASLP leachate)**	QC41	ALS	Eurofins	Perfluorobutane sulfonic acid (PFBS)	133	3
				Perfluoropentane sulfonic acid (PFPeS)	86	3
				Perfluoroheptane sulfonic acid (PFHpS)	60	2
				Perfluorooctane sulfonic acid (PFOS)	59	3
				Perfluorobutanoic acid (PFBA)	130	3
				Perfluoropentanoic acid (PFPeA)	150	3
				Perfluorohexanoic acid (PFHxA)	142	3
				Perfluoroheptanoic acid (PFHpA)	65	3
				Perfluorooctanoic acid (PFOA)	34	3
				Perfluorononanoic acid (PFNA)	53	2
				8:2 Fluorotelomer sulfonic acid (8:2 FTS)	79	1

Table 8: Groundwater RPDs outside Acceptance Range

Primary Sample ID	Duplicate / Triplicate Sample ID	Primary Sample Lab	Duplicate/Triplicate Sample Lab	Analyte	RPD %	See Comment
2022						
GW03	QC45	ALS	Eurofins	Perfluoroheptanoic acid (PFHpA)	53	3
				Perfluorooctanoic acid (PFOA)	36	3
2023						

Primary Sample ID	Duplicate / Triplicate Sample ID	Primary Sample Lab	Duplicate/Triplicate Sample Lab	Analyte	RPD %	See Comment
GW02	QC29	ALS	ALS	Sum of PFAS (WA DER List)	98	2,4
				Sum of PFAS	98	2,4
	QC30	ALS	Eurofins	Perfluorooctane sulfonic acid (PFOS)	40	2,4
GW03	QC31	ALS	ALS	Perfluoropentane sulfonic acid (PFPeS)	40	2,4
	QC32	ALS	Eurofins	Perfluorohexane sulfonic acid (PFHxS)	171	3
		ALS	Eurofins	Sum of PFHxS and PFOS	153	3

Table Comments

1. RPDs outside the target range are attributed to the primary or duplicate/triplicate analysis result <LOR, and therefore RPD is exaggerated.
2. RPDs reported outside the target range are where the primary result is lower than the duplicate/triplicate reported result. For completeness, both the primary and duplicates results have been reported in the tables provided.
3. RPDs reported outside the target range are where the primary result is higher than the duplicate/triplicate reported result.
4. Low analyte concentrations have exaggerated the percentage differences with respect to small total concentration differences. The calculated RPD values are not considered to affect the integrity of the results as both results remain well below adopted criteria (where available).
5. Low analyte concentrations have exaggerated the percentage differences with respect to small total concentration differences. The calculated RPD values are not considered to affect the integrity of the results as both results exceed the adopted criteria and/or indicate a potential risk. Where RPD exceedance from the primary are above the assessment criteria, the highest reported concentration is utilised for assessment purposes.

For **2022,** many elevated soil RPDs are due to heterogeneity of soil, and do not show a bias between laboratories for PFOS. Some high soil primary and duplicate calculated RPDs for PFAS were associated with concentrations close to the LOR. Although the precision of these analyses may be low, the data is considered to be suitable in that it identifies the presence of impact, and in combination with interpretation of the surrounding sample data, is sufficient to identify is soils exceed nominated criteria.

The soil calculated RPDs for PFAS discrepancies were between the primary and secondary laboratory indicated that the secondary laboratory was reporting lower concentrations of PFOA than the primary laboratory, suggesting a slight bias. This bias adds a level of conservatism to the results and despite the discrepancies observed, it identifies the presence of impact, if present.

The RPD discrepancies observed in groundwater GW03 and its inter- and intra-duplicate pair, reported results above LOR and despite the discrepancies observed it identifies the presence of significant impact. The RPD exceedances are not considered to affect the interpretation of the data.

For **2023**, overall, there were five primary and secondary soil pairs analysed, with 98.4% of calculated RPDs within the acceptance limits. Many elevated soil RPDs are due to heterogeneity of soil, and do not show a bias between laboratories for analytes. Some high soil primary and duplicate calculated RPDs for PFAS were associated with concentrations close to the LOR.

Although the precision of these analyses may be low, the data is considered to be suitable in that it identifies the presence of impact, and in combination with interpretation of the surrounding sample data, is sufficient to identify if soil samples exceed the nominated criteria.

Overall, there were two primary and secondary water pairs analysed, with 95.8% of calculated RPDs within the acceptance limits. None of the results where the secondary results are higher than the duplicate or triplicate result alter the interpretation of the primary data with respect to the nominated criteria, and indicate that the primary sample data set is sufficient to identify if water samples exceed the nominated criteria.

Trip Blanks

ITEM	QUESTION	YES	NO (Comment below)
1	Was a trip blank collected for each batch of samples?	☒ - 2022 ☒ - 2023	☐ - 2022 ☐ - 2023
2	Were the trip blanks free of contaminants?	☒ - 2022 ☒ - 2023	☐ - 2022 ☐ - 2023

Comments

For 2022, seven soil trip blanks and five water trip blanks, and for 2023, one soil trip blank and two water trip blanks, were analysed through the sampling program and included in each esky batch with concentrations for all analytes were below the laboratory LOR for all trip blanks and indicated that cross contamination was unlikely to have occurred during sample storage and transport.

Rinsate Blanks and Field Blanks

ITEM	QUESTION	YES	NO (Comment below)
1	Were Equipment Rinsates and Field Blanks collected and analysed every day?	☐ - 2022 ☒ - 2023	☒ - 2022 ☐ - 2023
2	Were the Equipment Rinsates and Field Blanks free of contaminants?	☐ - 2022 ☒ - 2023	☒ - 2022 ☐ - 2023

Comments

For **2022** nine rinsate blanks were analysed through the sampling program and collected from the field equipment after decontamination. Equipment rinsate samples were collected by pouring laboratory prepared deionised water over the equipment and collecting the 'rinse' into sample containers.

Concentrations for all analytes were below the laboratory LOR for all rinsate blanks; with the exception rinsate blank (sample QC13_200622) which reported concentration PFAS compounds above limit of detection. This sample was collected off a used and washed glove. The concentrations and scenario present a low potential risk for cross contamination to the program, as new gloves were used for sample collection rather than re-used gloves, and the concentration in water reported, would have a very low impact on transfer to soil samples (which were relevant that day).

Only two field blanks were collected in 2022 when there was more than two field sampling days (eight sampling days). Concentrations of COPCs in rinsate blanks, mentioned in the section above, were reported below the LOR for all sampling days (with the exception of QC13_200622) which suggests that field conditions were acceptable for sampling, even in the absence of dedicated field blank samples.

For **2023,** eight rinsate blanks were analysed during the sampling program and collected from the field equipment after decontamination. Equipment rinsate samples were collected by pouring laboratory prepared deionised water over the equipment and collecting the 'rinse' into sample containers.

Eight field blanks were collected during the field program by pouring laboratory prepared deionised water into sample containers and leaving open during sampling.

Concentrations for all analytes were below the laboratory LOR for all rinsate blanks and field blanks.

The rinsate results indicated that the decontamination procedures were acceptable, and the field QC results are considered acceptable for the purposes of this investigation.

Field QA/ QC:		
	☐	Satisfactory
	☒	Partially Satisfactory
	☐	Unsatisfactory

Laboratory Quality Assurance Quality Control

Laboratories

ITEM	QUESTION	YES	NO (Comment below)
1	Was a NATA registered laboratory used?	☒ - 2022/2023	☐ - 2022/2023
2	Did the laboratory perform the requested tests?	☒ - 2022/2023	☐ - 2022/2023
3	Were the laboratory methods adopted NATA endorsed?	☒ - 2022/2023	☐ - 2022/2023
4	Were the appropriate test procedures followed?	☒ - 2022/2023	☐ - 2022/2023
5	Were the reporting limits satisfactory?	☒ - 2022/2023	☐ - 2022/2023
6	Was the NATA Seal on the reports?	☒ - 2022/2023	☐ - 2022/2023
7	Were the reports signed by an authorised person?	☒ - 2022/2023	☐ - 2022/2023

Comments

Australian Laboratory Services (ALS) has been adopted as the primary laboratory for analysis of soil and water samples. ALS is a NATA accredited laboratory (NATA accreditation number 825) for all the analytes requiring analysis.

Eurofins Environment Testing Australia (Eurofins) has been adopted as the secondary laboratory for analysis of all matrices. Eurofins is a NATA accredited laboratory (NATA accreditation number 1261) for all the analytes requiring analysis.

Precision/ Accuracy of the Laboratory Reports		
	☒	Satisfactory
	☐	Partially Satisfactory
	☐	Unsatisfactory

Sample Handling

ITEM	QUESTION	YES	NO (Comment below)
1	Were the sample **holding times** met?	☐ - 2022/2023	☒ - 2022/2023
2	Were the samples in **proper custody** between the field and reaching the laboratory?	☒ - 2022/2023	☐ - 2022/2023
3	Were the samples **properly and adequately** preserved? *This includes keeping the samples chilled, where applicable.*	☒ - 2022/2023	☐ - 2022/2023
4	Were the samples received by the laboratory in good condition?	☒ - 2022/2023	☐ - 2022/2023

Comments

For **2022**, holding times were exceeded for several analytes, due to the transport time from the site, or addition of subsequent analytical requests. Impacted analytes were TPH and MAH, pesticides, MBAS, BOD, volatile halogenated compounds, and moisture content. Moisture content is not expected to affect assessment data quality, as similar losses would be accounted for by analytes being reported in dry weight. Other analytes may be under reported based on the delay in extraction and analysis, however these analytes are not considered to be sensitive COPCs for the site; additionally based on no odours or staining observed during the field observations and no visual / olfactory signs of COPC and were not reported at concentrations where a moderate increase would change the interpretation against criteria.

For **2023,** holding times for moisture content were exceeded for several soil samples due to the request of subsequent additional analysis. Moisture content is not expected to affect assessment data quality, as similar losses would be accounted for by analytes being reported in dry weight.

Sample Handling:		
	☐	Satisfactory
	☒	Partially Satisfactory
	☐	Unsatisfactory

Internal Laboratory Quality Control

ITEM	QUESTION	YES	NO (Comment below)
1	Were the laboratory blanks/reagents blanks free of contamination?	☒ - 2022/2023	☐ - 2022/2023
2	Were the spike recoveries within control limits?	☒ - 2022/2023	☐ - 2022/2023
3	Were the RPDs of the laboratory duplicates within control limits?	☒ - 2022/2023	☐ - 2022/2023
4	Were the surrogate recoveries within control limits?	☐ - 2022 ☒ - 2023	☒ - 2022 ☐ - 2023

Laboratory Blanks

For **2022 and 2023**, all Eurofins and ALS laboratory method blank results reported concentrations of contaminants below the laboratory reporting limits.

Laboratory Duplicates

For **2022 and 2023,** all internal laboratory duplicates analysed by Eurofins and ALS were within acceptable limits (<30% RPD). The rate of laboratory duplicates was lower than the target of 1 in 10 for PFAS.

Laboratory Control Samples

For **2022 and 2023,** all laboratory control sample analyses performed by Eurofins and ALS were within the acceptable range (>50%).

Matrix Spikes

For **2022**, all matrix spike analyses were performed by Eurofins and ALS were within the adopted 70% – 130% acceptability criteria adopted. The rate of matrix spike analysis was lower than the target of 1:20 for PFAS, and several spikes were not able to be quantified, due to the background concentration being higher than the spiked concentration

For **2023,** all matrix spike analyses that were performed by Eurofins and ALS were within the adopted 70% – 130% acceptability criteria adopted.

Surrogate Recoveries

For **2022**, the collated laboratory data for surrogate recoveries reported 5 surrogates (out of a total of 1,110 surrogate analyses undertaken) below the lower recovery limit of 50%. A total of 6 surrogate recoveries were above the adopted upper recovery limit of 150% for PFAS compounds (ranging up to 170%). These discrepancies were for several non-regulated PFAS compounds. As these discrepancies relate to the secondary laboratory, and represent a small percentage of the analyses, it is not anticipated to affect overall data reliability.

For **2023**, the collated laboratory data for surrogate recoveries reported no outliers.

Frequency of Quality Control Samples

The number of quality control samples performed for matrix spikes and laboratory duplicates for PFAS compounds were below the acceptable limit for two of the laboratory work orders.

Laboratory internal QA/ QC:	☐	Satisfactory
	☒	Partially Satisfactory
	☐	Unsatisfactory

The review of the laboratory internal quality control testing indicated overall completeness and therefore the data is considered of an acceptable quality to use in the assessment.

Summary of Data Quality Review

In general, the data quality of the soil, groundwater and sediment assessed during this investigation was considered to be acceptable.

APPENDIX I - PHOTOGRAPHY LOG

Photography Log



Photograph 1 – Looking towards the south at the large mock up and concrete pad at the Fire Training Ground.



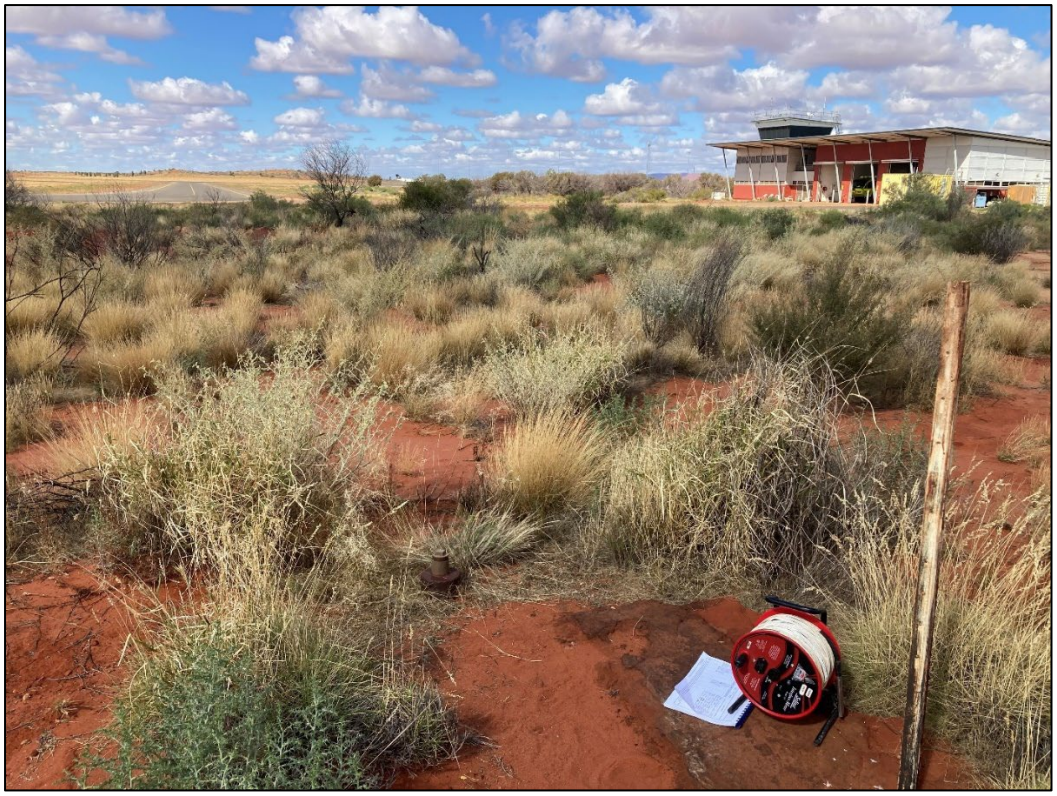
Photograph 2 – Looking towards the north-west at the Seepage Field and helicopter pads.



Photograph 3 – Looking towards the south-east at the front of the ARFFS Fire Station and concrete pad. The office is located on the left, the garage is in the centre and the mechanical workshop is located on the right.



Photograph 4 – Looking towards the north at the Former Interim ARFFS Fire Station.



Photograph 5 – Looking towards the south-east at the existing monitoring well RN12065 in the foreground and the ARFFS Fire Station in the background.



Photograph 6 – Looking towards the southern boundary of the Airport Estate at monitoring well GW01 (stake location).



Photograph 7 – Looking towards the south-east at monitoring well GW02 in the foreground and the Aviation refuelling facilities in the background.



Photograph 8 – Looking towards the south-east at monitoring well GW03 (stake location) in the foreground and the large mock up at the FTG in the background.



Photograph 9 – Looking towards the north at monitoring well GW04 (stake location) in the foreground and the Airport runway in the background.



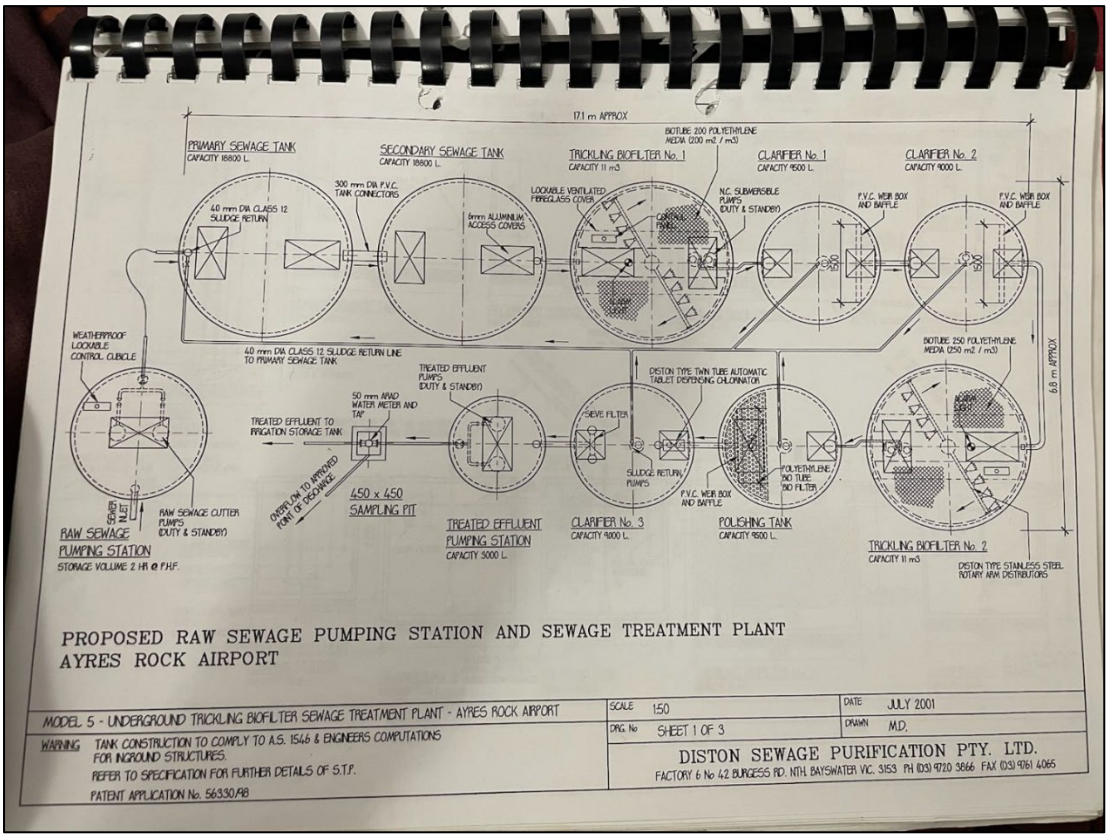
Photograph 10 – Looking towards the north-west at monitoring well GW06 (stake location) in the foreground and the ARFFS Fire Station in the background.



Photograph 11 – Looking towards the south at the Sewage Treatment Plant.



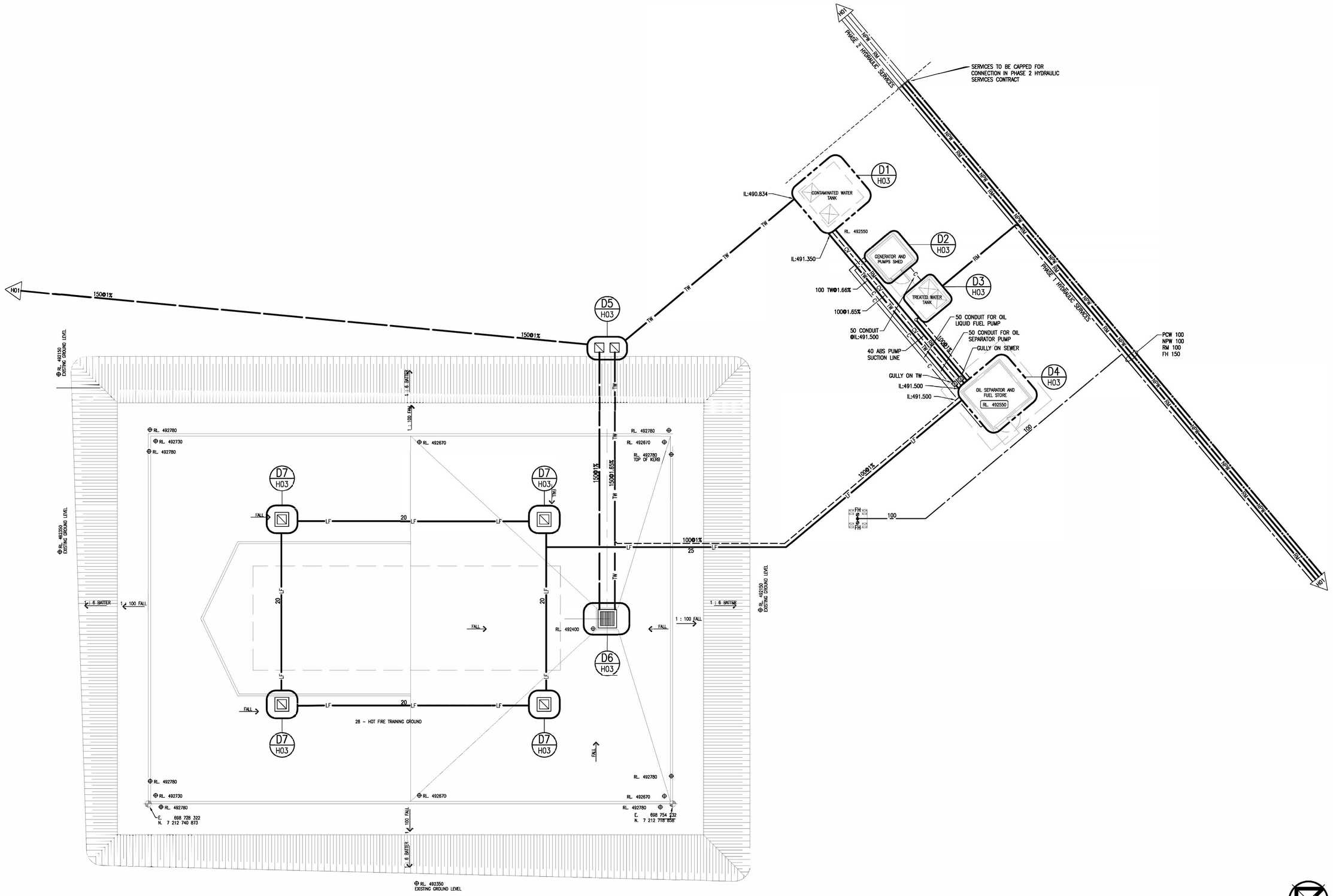
Photograph 12 – The sampling point for the effluent sample; taken from the purple hose which is located in the sewage treatment plant area.



Photograph 13 – Infrastructure layout system for the Sewage Treatment Plant.

APPENDIX J - HYDRAULIC SERVICES DESIGN DRAWINGS

B1



Revision	Amendment	Date	Initial	Reference Coordination Drawings			
P1	PRELIMINARY ISSUE	12.02.04	DH	Discipline	Dwg. No.	Date	Revisions
A	PHASE 1 TENDER ISSUE	01.03.04	DH	ARCHITECTURAL	A-FP-01	EMAIL:27.02.04	
				STRUCTURAL			
				MECHANICAL			
				ELECTRICAL			

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Notes

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Project

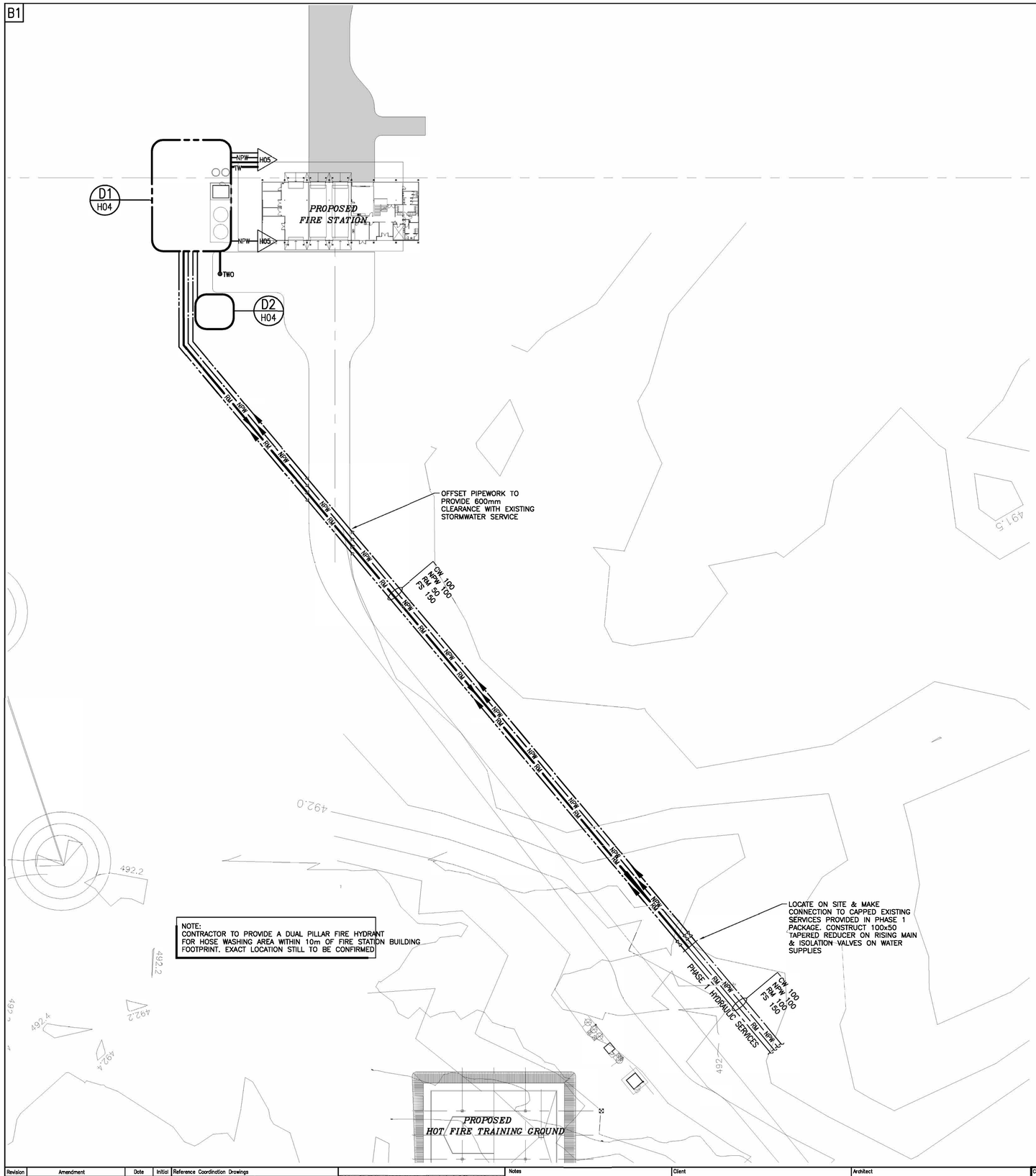
AYRES ROCK AIRPORT
FIRE STATION

Drawing

HYDRAULIC SERVICES
FIRE TRAINING GROUND

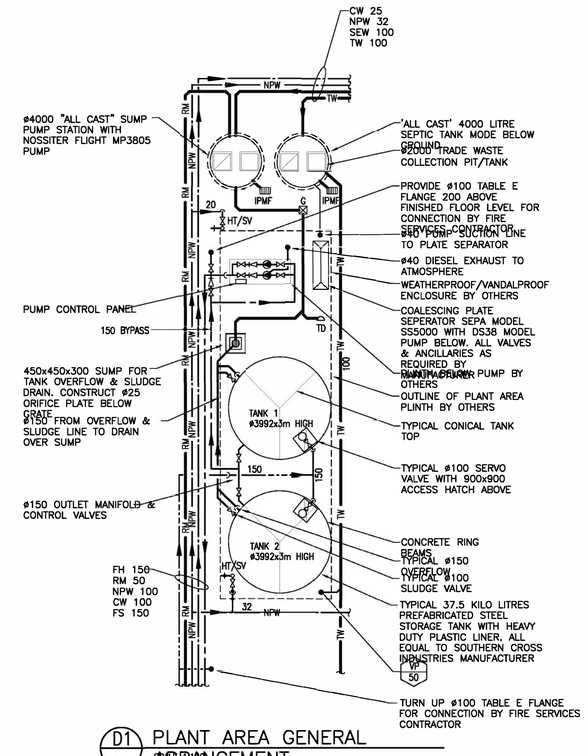
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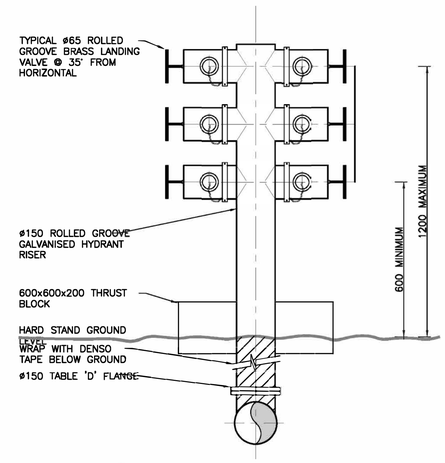


LEGEND

	STORMWATER DRAINAGE
RM	RISING MAIN
TW	TRADE WASTE DRAINAGE
	COLD WATER
NPW	NON-POTABLE COLD WA
	FIRE SERVICE
CV	CHAMBER VENT
C	CONDUIT
LF	LIQUID FUEL
	STOP VALVE
	NON RETURN VALVE
	FLOOR WASTE
	OVERFLOW GULLY
	FIRE HYDRANT
FW	FLOOR WASTE
IL	INVERT LEVEL
LF	LIQUID FUEL
OFG	NON-POTABLE WATER
NPW	OVERFLOW GULLY
RL	REDUCED LEVEL
RM	RISING MAIN
SW	STORMWATER
TW	TRADE WASTE



D1 – PLANT AREA GENERAL ARRANGEMENT



D2 – SIX POINT PILLAR HYDRANT OUTLET

Revision	Amendment	Date	Initial
P1	TENDER REVIEW	12.05.04	DH
A	TENDER ISSUE	31.05.04	DH

Reference Coordination Drawings

Discipline	Dwg. No.	Date	Revisions
ARCHITECTURAL	SK-xRe	SMN.27.02.04	-
STRUCTURAL			
MECHANICAL			
ELECTRICAL			

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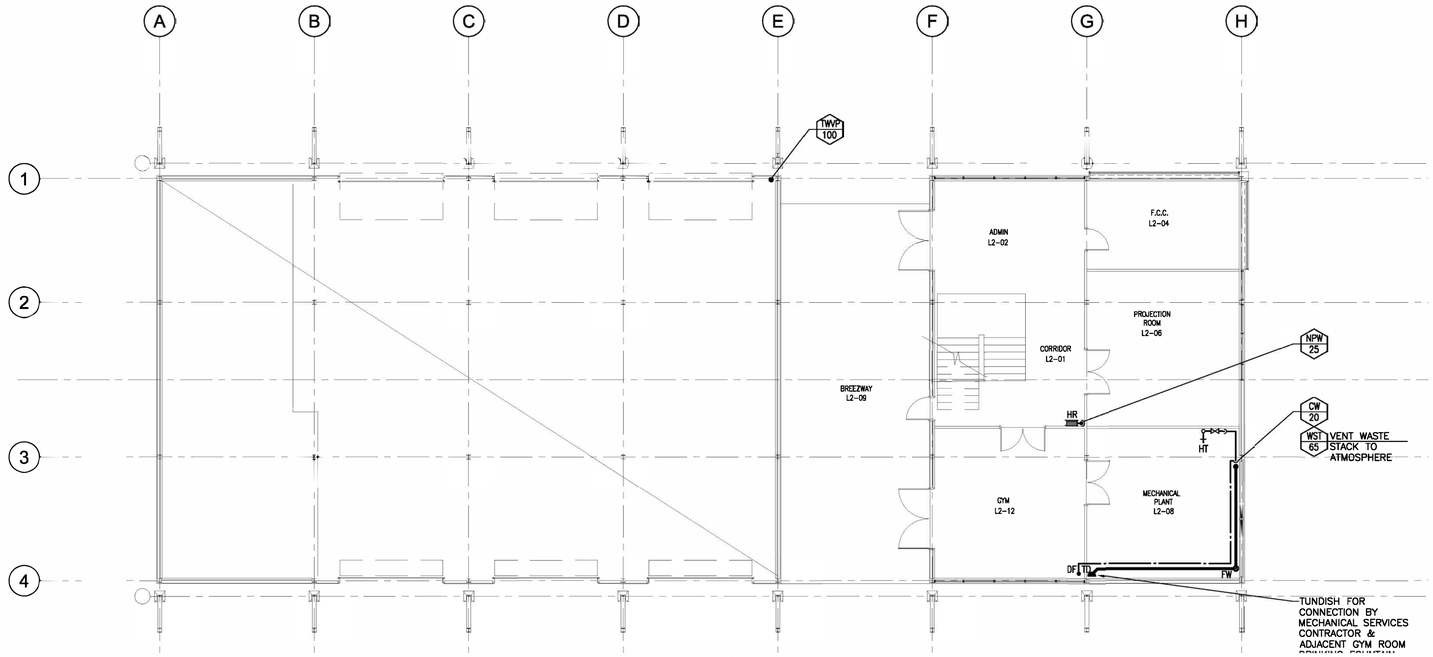
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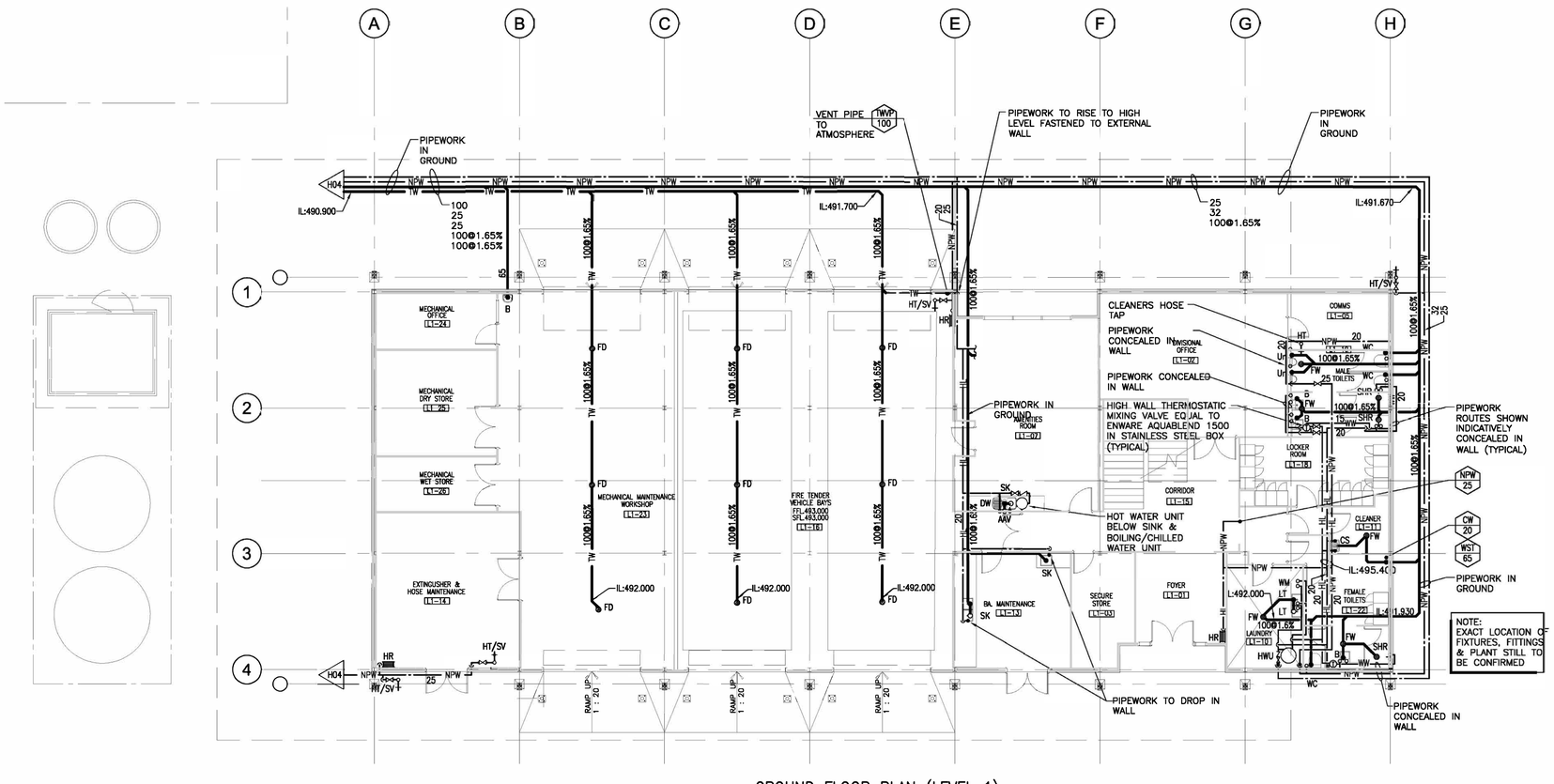
Drawing
HYDRAULIC SERVICES
PHASE 2
SITE PLAN

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Date 06.05.04	Design Validated
Sheet 4 OF 5	QA Approved
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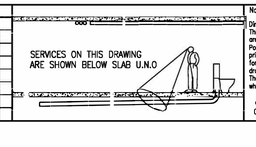


FIRST FLOOR PLAN (LEVEL 2)



GROUND FLOOR PLAN (LEVEL 1)

Revision	Amendment	Date	Initial	Reference Coordination Drawings				
P1	TENDER REVIEW	12.05.04	DH	Discipline	Dwg.No.	Datate	Reisions	
A	TENDER ISSUE	31.05.04	DH	ARCHITECTURAL	A-DR-01 A-2007	Date 28.05.04 01.06.04	C	
				STRUCTURAL				
				MECHANICAL				
				ELECTRICAL				



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Project
AYRES ROCK AIRPORT FIRE STATION

Drawing
HYDRAULIC SERVICES
PHASE 2
GROUND FLOOR PLAN (LEVEL 1) & FIRST FLOOR PLAN (LEVEL 2)

Design	DH	Scale	1:100
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0	Andrew Lau	Andrew Lau	Andrew Lau		27/02/2025

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