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Preliminary Site Investigation and Limited Sampling, Launceston Airport

Preliminary Site Investigation and Limited Sampling, Launceston Airport

Client: Airservices Australia

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Quality Information

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**No changes have been made to the report text. The following figures were revised (02-Aug-2019) to show the extent of the south south-eastern airport boundary as confirmed by Australia Pacific Airports (Launceston) Pty Ltd (APAL) to Airservices (Email dated 9 Jul 2019)*

- *Figures 1 to 5 (Pages 64-68)*
- *Appendix E Figures D-1 to D-7 (Pages 135-141)*
- *Appendix F (which has the title Appendix E-1) (Page 143) which included amending the Figure label accordingly*

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Acronyms

Acronym	Description
6:2 FtS	6:2 Fluorotelomer Sulfonate
ACM	Asbestos Containing Material
ADF	Australian Defence Force
AECOM	AECOM Australia Pty Ltd
AFFF	Aqueous Film Forming Foam
AHD	Australian Height Datum
APEC	Area of Potential Environmental Concern
ARFF	Aviation Rescue and Fire Fighting
ASC	Australian Soil Classification
ASC NEPM	National Environment Protection (Assessment of Site Contamination) Measure
ASRIS	Australian Soil Resource Information System
AST	Above Ground Storage Tank
BFC	Bromochlorodifluoromethane
mBGL	Metres Below Ground Level
BOM	Bureau of Meteorology
BTEXN	Benzene, Ethylbenzene, Toluene, Xylene, Naphthalene
mBTOC	Metres Below Top of Casing
CASA	Civil Aviation Safety Authority
CPS	Coalescing Plate Separator
CSM	Conceptual Site Model
DFES	Department of Fire and Emergency Services
DSI	Detailed Site Investigation
ESA	Environmental Site Assessment
FESA	Fire and Emergency Services Authority
FFTG	Former Fire Training Ground
IBC	Intermediate Bulk Container
LOR	Limit of reporting
NA	Natural Attenuation
ODS	Ozone Depleting Substances
OIT	Oil Interception Trap
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PSCA	Preliminary Site Contamination Assessment
PFAS	Per- and Poly- fluoro alkyl substances
PFHxS	Perfluorohexane Sulfonate
PFOA	Perfluorooctanoic Acid
PFOS	Perfluoroctane Sulfonate
PSI	Preliminary Site Investigation
SAQP	Sampling Analysis and Quality Plan
SMF	Synthetic Mineral Fibre
TPH	Total Petroleum Hydrocarbons
TRH	Total Recoverable Hydrocarbons
UST	Underground Storage Tank
UV	Ultra Violet

Executive Summary

AECOM Australia Pty Ltd (AECOM) was engaged by Airservices Australia (Airservices) to undertake a Preliminary Site Investigation (PSI) with limited sampling to identify areas that have been potentially impacted by Aqueous Film Forming Foam (AFFF), which contains per- and poly- fluoro alkyl substances (PFAS). This scope of work is limited to AFFF affected areas and infrastructure; and was focussed on areas historically used for Aviation Rescue and Fire Fighting (ARFF) and for other firefighting activities at the Launceston Airport (the Site).

The objectives of this investigation were to:

- Confirm the site history with regards to AFFF activities and determine areas of potential environmental concern (APEC).
- Implement the Sampling, Analysis and Quality Plan (SAQP) (AECOM, 2017b) to address the following data gaps:
  - **Data Gap 1**: Presence/Absence of PFAS Impacts in Soil and/or Sediment.
  - **Data Gap 2**: Presence/Absence of PFAS Impacts in Shallow Groundwater.
  - **Data Gap 3**: Presence/Absence of Hydrocarbon Impacts in Soil and Groundwater.
- Confirm the presence or absence of PFAS or other identified contaminants of potential concern (COPC) impacts to soil or sediment (in surface drains), within shallow groundwater and at inferred APEC or at overall Site boundaries.
- Investigate the four (4) APEC with AFFF related sources of contamination and identify key receptors and potential contaminant transport pathways.
- Update the conceptual site model (CSM) and identify any outstanding data gaps to assist the evaluation of potential risks posed by identified PFAS compounds to Site users and/or the local environment.

The results of the desktop review identified that multiple locations have been or may have been impacted by historical AFFF use at the airport before and during the presence of Airservices on the Site since 1995 including:

- It is understood that firefighting foams containing PFAS were used at the site until 2010/2011, when the ARFF fire station transitioned to an alternative product.
- Fuels and AFFF were used at the FFTG in training exercises and intrusive investigations undertaken by GHD in 2008 confirmed the presence of TRH, PAHs, PFOS and PFOA in surface soils at the FFTG. The vertical and lateral extent of these impacts in soil and groundwater remains undefined.
- AFFF was understood to have been stored at the ARFF fire station, the FFTG and potentially at the Sharp Airlines hangar (ex-Qantas hangar) between approximately 1980 and 2010.
- Four APEC with AFFF related sources of contamination were detailed in the preliminary CSM presented in this PSI, with APEC 3 (Sharp Airlines Hangar) and APEC 6 (Mobil Fuel Farm) both excluded from the limited sampling. These exclusions reflect that insufficient information is available to confirm whether specific aircraft hangars or the airport fuel depot have ever incorporated the use or storage of AFFF and are not related with ARFF activities.
- Historically, ARFF training has occurred up to 3 times a week. Anecdotal evidence indicates AFFF foams may have been tested from the Walter and Mark 5 & 6 trucks on the concrete pad in front of the fire station, and wastewater potentially run off to nearby unpaved areas or discharged into reticulated wastewater or stormwater systems that is considered likely to have discharged to the former wastewater detention pond in the eastern part of the airport.
- PFAS contamination has been detected in the retained (and covered) soil stockpiles to the south of the southernmost hangars.

- PFAS contamination has been identified in soils generated during terminal apron paving upgrades, and in the area of the Cirrus Airlines hangar as reported in 2016.

Key outcomes of the PSI and preliminary CSM were the identification of several potential and unquantified contamination source exposure pathways, primarily associated with the following APECs:

- APEC 1: ARFF Fire Station and Vehicle Maintenance Areas
- APEC 2b: Southern Soil Stockpile
- APEC 4: Former Fire Training Ground and Soil Stockpile
- APEC 5: Former Wastewater Detention Pond

The results of the limited sampling indicated:

- PFAS impacts were reported at concentrations lower than the adopted human health assessment criteria in soil and sediment sampled analysed.
- PFOS concentrations in soil were reported greater than the adopted ecological assessment criteria at one location within APEC 1.
- PFAS concentrations were reported greater than the adopted screening criteria for human health protection at all monitoring well locations, including under drinking water and non-potable / recreational use scenarios. Three registered bores are located within 1.5 km of the site and the Tertiary sedimentary basin in the airport surrounds is considered a potential high yielding groundwater resource. It is noted that a reticulated water supply is provided to the Site and surrounding area by Taswater.
- PFAS impacts in groundwater were also reported above the adopted ecological assessment criteria at all APECs.
- Limited Petroleum hydrocarbon impacts to soil representative of aviation fuels are present less than screening criteria at APEC 1, APEC 2b and APEC 4.
- With one exception petroleum hydrocarbon impacts to groundwater reported were less than LOR. Petroleum hydrocarbon impacts representative of aviation fuels exceeded ecological screening criteria by up to a factor of three were reported at one location in APEC 4.

AECOM notes that the PFAS National Environmental Management Plan (NEMP) was released in February 2018. The SAQP defined the guideline values that have been compared against and were current at the time the limited sampling was conducted.

Based on the information obtained as part of the PSI and limited sampling, the following conclusions can be made:

- The data gaps determined in the SAQP (AECOM 2017b) have been assessed and closed:
  - **Data Gap 1**: Low concentrations of PFAS are present in soil and sediment at all soil/sediment investigation locations, with one location greater than the ecological screening criteria.
  - **Data Gap 2**: PFAS impacts exceeding screening criteria are present in groundwater in all areas investigated.
  - **Data Gap 3**: Limited hydrocarbon impact to soil is present at APEC 1, APEC 2b and APEC 4 and in groundwater exceeding ecological screening criteria at APEC 4.
- The updated CSM indicates that source, pathway and receptor linkages remain "*possible*" or "*likely*" based on the data collected during the limited sampling. Direct contact with impacted soils (ingestion, dermal contact and dust inhalation) for on-site workers (non-intrusive works) is considered unlikely.

1.0 Introduction

AECOM Australia Pty Ltd (AECOM) was engaged by Airservices Australia (Airservices) to undertake a Preliminary Site Investigation (PSI) and Limited Site Investigation at Launceston Airport, herein referred to as the Site (attached **Figure 1**). The PSI works were designed to identify areas that have been potentially impacted by Aqueous Film Forming Foams (AFFF) which contains per- and poly-fluoro alkyl substances (PFAS).

The scope of this investigation is therefore limited to AFFF affected areas and infrastructure and was necessarily focussed towards areas historically used for Aviation Rescue and Fire Fighting (ARFF) and for other firefighting related activities at Launceston Airport.

This investigation has adopted processes detailed in the National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended in 2013), referred to hereafter as the 'ASC NEPM'.

This report builds on preliminary work undertaken by AECOM in 2016, developing the initial PSI and preliminary CSM (AECOM, 2017a) for the Site, which focused on the identification of several potential and unquantified contamination exposure pathways, primarily associated with four Areas of Potential Environmental Concern (APEC) (attached **Figure 2**).

The PSI (AECOM, 2017a) and preliminary CSM (and data-gap assessment) provided the basis for designing a supplementary stage of limited intrusive site investigations and to guide the forward assessment of contaminant exposure risks. A Sampling Analysis and Quality Plan (SAQP) (AECOM, 2017b) was developed for the limited investigative works detailed within this report.

1.1 Background

Airservices operations at Launceston Airport are provided from eight sub-leased areas of the Launceston Airport Estate (Australia Pacific Airports – Launceston [APAL]) including the following facilities and land parcels:

- ARFF Fire Station and Vehicle Maintenance Areas
- Southern Soil Stockpile (not a sub-lease area)
- Former Fire Training Ground and Soil Stockpile
- Former Wastewater Detention Pond (not a sub-lease area)

These areas are identified in **Figure 2**.

AFFF has been used for fire-fighting purposes around Australia since the late 1970s. On airports, AFFF has been stored and/or used at fuel depots, hangers and for operational and fire training purposes at ARFF areas. Launceston Airport firefighting services are understood to have been established from approximately 1950s and have since been provided by various agencies as follows:

- Department of Aviation prior to 1986
- Department of Transport and Communication (successor to Department of Aviation) between 1986 and 1988
- Civil Aviation Authority (CAA) from 1988 to July 1995.
- Airservices from 1995 to present:
    - Fuels and AFFF were used at the Former Fire Training Ground (FFTG)
    - AFFF was variously stored at the ARFF Fire Station, the FFTG and potentially at the Sharp Airlines hangar (ex-Qantas hangar) between approximately 1980 and 2010.

The ARFF functions provided by the agencies listed above used AFFF for operational and training purposes from 1980 until 2010. It is understood that firefighting foams containing PFAS were used at the site until 2010/2011, when the ARFF fire station transitioned to an alternative product.

As a source of contamination, AFFF has been found to contain PFAS, which are considered to present potential risks to human health and the environment. Perfluoroctane Sulfonate (PFOS) and Perfluorooctanoic Acid (PFOA) are stable organic compounds that are resistant to break down in the natural environment. International studies have indicated that both are persistent chemicals, which can bio-accumulate within the natural environments into which they are allowed to enter.

1.2 Objectives

The objectives of this PSI and Limited Site Investigation were to:

- Confirm the site history with regards to AFFF activities and determine the relevant APEC.
- Implement the Sampling, Analysis and Quality Plan (SAQP) (AECOM, 2017b) to address the following data gaps:
  - **Data Gap 1**: Presence/Absence of PFAS Impacts in Soil and/or Sediment.
  - **Data Gap 2**: Presence/Absence of PFAS Impacts in Shallow Groundwater.
  - **Data Gap 3**: Presence/Absence of Hydrocarbon Impacts in Soil and Groundwater.
- Confirm the presence or absence of PFAS or other identified contaminants of potential concern (COPC) impacts to soil or sediment (in surface drains), within shallow groundwater and at inferred APEC or at overall Site boundaries.
- Investigate the four (4) APECs with AFFF related sources of contamination and identify key receptors and potential contaminant transport pathways:
  - APEC 1: ARFF Fire Station and Vehicle Maintenance Areas
  - APEC 2b: Southern Soil Stockpile
  - APEC 4: Former Fire Training Ground and Soil Stockpile
  - APEC 5: Former Wastewater Detention Pond
- Update the conceptual site model (CSM) and identify any outstanding data gaps to assist the evaluation of potential risks posed by identified PFAS compounds to Site users and/or the local environment.

The layout and extent of APECs and surface water drainage features are presented on **Figure 2**. It is noted that the APEC boundaries were broadly identified based on historical land use activities and are not directly correlated with the current Airservices lease areas.

1.3 Scope of Works

In order to address the objectives outlined above, the following works were undertaken as part of the investigation:

- Desktop review consistent with the 2013 ASC NEPM for PSIs and SAQP preparation:
  - Review of previous reports pertaining to the Launceston Airport to identify where AFFF may have historically been stored and/or used
  - Review of current and historical aerial imagery
  - Review of published geological, hydrogeological and hydrological information
  - A limited Site inspection and interviews with key airport representatives and ARFF personnel
  - Identification of where data gaps for soil and water quality characterisation may exist to provide the basis for development of a separate SAQP document (AECOM 2017b)
- Limited site investigation (August 2017) based on the preliminary findings of the PSI and SAQP:
  - Liaison with site stakeholders and site works preparation consistent with the SAQP (AECOM 2017b)

- Conduct a targeted PFAS and hydrocarbon contamination investigation at the identified four APECs:
    - Drilling and installation of three groundwater monitoring wells (MW01 to MW03) to a maximum depth of 8 metres below ground level (mBGL), including continuous logging and soil sampling at discrete intervals;
    - Drilling of seven soil bores (HA01 to HA07) using a hand auger to a maximum depth of 1.1 mBGL, including soil sampling at discrete intervals; and
    - Collection of seven surficial sediment samples (SS01 to SS07) to a depth of 0-0.1 mBGL.
- Groundwater gauging and monitoring of three new and four existing groundwater monitoring wells
- Survey of all new sample and groundwater monitoring well locations referenced to Australian Height Datum (AHD) by a qualified surveyor
- Preparation of a preliminary data summary report prior to finalisation of this preliminary and limited site investigation report

Works undertaken to specifically address **Data Gaps 1 to 3** are outlined by APEC in **Table 1-1** below:

Table 1-1 Completed Works and SAQP Deviation

APEC	Completed Works (August 2017)	Deviation from SAQP
APEC 1 – ARFF Fire Station and Surrounds	• Collection of three (3) shallow soil/sediment samples within drainage swale to east of ARFF Fire Station • Collection of soil samples at two (2) locations advanced by hand auger advanced to 1.1 m depth • Installation of one (1) groundwater monitoring well located in the drainage swale east of the ARFF Fire Station. Sampling of soils at discrete intervals and groundwater. Sampling of two nearby existing groundwater monitoring wells (GW18 [APAL] and MW04 [Mobil])	No deviation from SAQP for soil/sediment sampling. No standing surface water at time of investigation therefore no water samples collected
APEC 2b – Southern soil stockpile	• Collection of two (2) shallow soil/sediment samples within drainage swales on the airport boundary south and east of the APEC 2b • Collection of soil samples at two (2) locations advanced by hand auger advanced to 1.1 m depth • Installation of one (1) groundwater monitoring well located adjacent to perimeter access track east of the southern soil stockpile. Sampling of soils at discrete intervals and groundwater.	No deviation from SAQP for soil/sediment sampling. No standing surface water at time of investigation therefore no water samples collected
APEC 4 - Former Fire Training Ground (FFTG) and Soil Stockpile	• Collection of one (1) shallow soil/sediment sample in the vicinity of the Soil Stockpile north of the FFTG • Sampling of two (2) existing groundwater monitoring wells (GW10 and GB01 [APAL])	No deviation from SAQP
APEC 5 - Former wastewater detention ponds (located north of the grassed airstrip)	• Collection of two (2) shallow soil/sediment samples within drainage depressions on the airport boundary fence north of APEC 5 • Collection of soil samples at two (2) locations advanced by hand auger advanced to 1.1 m depth • Installation of one (1) groundwater monitoring well located within the former wastewater detention pond. Sampling of soils at discrete intervals and groundwater.	No deviation from SAQP for soil/sediment sampling. No standing surface water at time of investigation therefore no water samples collected

2.0 Site Identification

Launceston Airport is situated 15km south of Launceston City near the local towns of Perth and Evandale. The Airport details are summarised in **Table 2-1** below

Table 2-1 Airport Site Details

Item	Description
Airport Owner	Commonwealth of Australia
Airport Occupiers	• Australia Pacific Airports (Launceston) Pty. Ltd. • Other aviation related leaseholders and tenants
Airport Address	311 Evandale Road Western Junction 7212 TASMANIA
Legal Description (Lot and DP)	Block 1 128763
Local Government Authority	Northern Midlands
Current Zoning	Utility Services under the Launceston Master Plan 2009
Current Land Use	Operational Domestic Airport and related services
Proposed Land Use	No change
Site Elevation	Approximately 170 metres Australian Height Datum (m AHD)
Site Area	180 Hectares

2.1 Certificate of Title

Review of the Certificate of Title (**Appendix A**) indicates the Launceston Airport is situated on Lot 1 on Plan 128763, with the land owned by the Commonwealth of Australia.

- The Certificate of Title for the Airport does not record any historical or current potentially contaminating land uses.
- In terms of jurisdiction, Launceston Airport is subject to Commonwealth legislation, including legislation pertaining to the assessment and management of contamination.

The ARFF fire station areas (see **Section 1.1** above) have been sub-leased by the Airport Operator to Airservices since 1995.

2.2 Land Use

2.2.1 Current Land Use

The current layout of Launceston Airport is shown in **Figure 2**. The Airport serves as a domestic, regional and general aviation gateway to Northern Tasmania for commercial aircraft, airfreight and private operators, including the following primary airport facilities:

- Runways and taxiways;
- A grassed light aircraft airstrip
- Domestic terminal facilities, airport management buildings, communications and radar towers and an air traffic control tower
- Maintenance buildings and aircraft hangars (including separate hangars operated by Sharp Airlines, the Royal Flying Doctor Service and Cirrus)
- Cargo handling and storage areas
- Fuel depot and tank farm (operated by Mobil)
- ARFF fire station and former fire training ground
- Surrounding carparks and landscaped areas.

2.2.2 Surrounding Land Use

Surrounding land uses within Launceston Airport are summarised in **Table 2-2** and shown on **Figure 2**.

Table 2-2 Surrounding Land Use Summary

Direction	Description
North	Predominantly agricultural land. The Stornoway Quarry is located approximately 1km north east of the Airport.
East	Predominantly agricultural land across the Western Line Railway which runs along the eastern Airport boundary. Various creek lines and tributaries are located east and north-east of the eastern site boundary, contributing to Briarly Creek which is located east and north of the site.
South	Predominantly agricultural land use between the Airport and the South Esk River located approximately 1.8 m south east of the southern boundary of the site. The Western Line Railway passes south of the Airport and the town of Evandale lies approximately 2 kilometres south-east of the Airport.
West	An industrial estate, including warehouses and offices as well as a fuel station, is located immediately north-west of the Site. Immediately west and south-west is agricultural land use, followed further to the west by the rural residential properties of Devon Hills. The town of Perth is located approximately 3 kilometres south-west of the Airport.

3.0 Environmental Setting

3.1 Topography

The Launceston Airport is located north of the South Esk River and sits at approximately 170 mAHD with local topography (of the Airport) relatively flat. Regionally the topography generally falls to the east, falling more steeply to the east and north east beyond the Airport boundary. To the west of the Airport the land gently rises into the suburb of Devon Hills.

3.2 Climate

The Bureau of Meteorology (BOM) weather station 91311 has been located at Launceston Airport since September 2004. Records indicate the following climatic information:

- Average annual rainfall of approximately 610.5 mm, with April to November typically the wetter months (>50 mm per month);
- Average maximum monthly temperature from 2004 to 2016 ranged between 13.6°C and 33.8°C, with December to February being the warmest months; and
- Average minimum monthly temperature from 2004 to 2016 ranged between -3.6°C and 13.6°C, with June to August being the coldest months.

3.3 Geology

Launceston airport and its surrounds are located within the Tamar Trough, a north-south oriented depression centred on the Tamar River. The Tamar trough is partially infilled with sedimentary beds and interleaved basaltic flows (Sutherland et al, 2006).

The Mineral Resources Tasmania's 1:25 000 geological sheet (Forsyth and Calver, 2005) indicates that Launceston Airport is sited on Tertiary aged basalt (Tb) which is overlain by soil or Cainozoic deposits. The basalts extend over 1.5 km in an east west direction centred in the vicinity of the airport site. To the east and west the basalt is flanked by Tertiary aged sediments (Tsa) composed of cobbles and pebble sized dolerite and sandstone that form a moderately consolidated conglomerate, interbedded with lignite and carbonaceous beds. The Tertiary sediments are in turn flanked by Jurassic aged dolerite (Jd) that is deeply weathered and has been inferred to underlie the Tertiary sediments. Presumably the dolerite forms the edges of the north-south oriented Tamar Trough.

The 1:100,000 *Reconnaissance Soil Maps of Tasmania* – Sheet 47 (Longford) (Nicols 1958, amended 1999), classify soils underlying Launceston airport as Dermosol soils developed from tertiary basaltic remnants within the Launceston Basin, which form gently undulating to rolling land.

Review of bore logs extracted from the Tasmanian Department of Primary Industries indicates that the Tertiary sedimentary basin in the airport surrounds extends to depths in excess of 150 m, which could be considered a potential high yielding groundwater resource.

3.3.1 Acid Sulphate Soils

Due to the elevation of the Site, depth to groundwater and parent soil materials, acid sulphate soils (ASS) are unlikely to occur. Review of CSIRO's Australian Soil Resource Information System (ASRIS) Atlas of Australian Acid Sulphate Soils indicates the Site is regarded as having a low probability of ASS occurrence.

3.4 Hydrogeology

The properties of the main aquifers are summarised from Bacon and Latinovic, 2003. A summary of this information follows.

3.4.1 Regional Hydrogeology

Groundwater productivity beneath the Launceston Airport is described as high due to the presence of the deep sedimentary basin. Aquifers in the Tamar region are composed of fine to medium-grained sand, although occasional thin gravel zones occur. Water quality is described as usually poor in the Tamar Valley.

In Harrington et al, (2009) the hydrogeology of the Launceston area is described in the Longford Groundwater Assessment Area (Area 14), in the south Esk catchment. The Tertiary sediments form the main aquifers of the region followed by the Tertiary basalts.

3.4.1.1 Tertiary Sediments

The Tertiary Sediments are the most prospective aquifer in the Tamar Trough, containing the most groundwater. Groundwater is stored within fine to medium grained to coarse grained sand and gravel. Groundwater yields of up to 15 L/sec have been pumped from the Tertiary sediments. While higher maximum yields have been retrieved from the Tertiary basalts and Jurassic dolerites the average yields of the Tertiary sediments is higher. Water quality in the Tamar Trough is usually poor, based on bore records presented in **Appendix C**. The lack of any clayey horizons within the sediments makes the aquifer vulnerable to pollution. Recharge is via rainfall infiltration and rainfall runoff. Discharge is via springs higher in the catchment and leakage directly into the Tamar and Esk Rivers and/or leakage into the underlying basalt and dolerite.

3.4.1.2 Tertiary Basalts

The Tertiary basalts are a dual porosity aquifer consisting of primary vesicular porosity (caused by bubbles in the lava) and secondary fractures. This fracturing and high storage causes the bores to be high yielding; up to 25 L/sec. Recharge is via rainfall infiltration and rainfall runoff through rock fractures and leakage from dolerites where the dolerite outcrops in topographically higher locations. Discharge is via springs higher in the catchment and leakage into the Tamar and Esk Rivers and leakage into the underlying dolerite. Groundwater quality is variable but is generally sufficient for most purposes including domestic/stock/garden supply.

3.4.1.3 Jurassic Dolerites

The Jurassic dolerites are generally accepted to be a fractured rock aquifer although not as fractured as the Tertiary basalts. Within the Tamar Trough recharge is via rainfall infiltration and rainfall runoff through fractures. Discharge is via springs higher in the catchment and leakage into the Tamar and Esk Rivers. Groundwater quality is variable but is generally sufficient for most purposes including domestic/stock/garden supply. There are limited bores that intersect the dolerite but yields of up to 20L/sec have been obtained.

3.4.2 Local Hydrogeology

A review of water bores registered with the Tasmanian Department of Primary Industries indicates there are nine registered bores within a four kilometre radius of the Launceston Airport (refer to **Appendix C**). These bores range from 21 metres up to 152 metres in depth. Groundwater from three aquifers has been intersected including Tertiary sediments (4), basalt (2) and dolerite (3).

The absence of shallow licenced wells in the researched records may be due to shallow wells not being registered and/or the abundance of surface water. In the upper parts of the catchment springs flow at the interface of the Tertiary basalt and Tertiary sediments. Anecdotal information suggests that shallow groundwater may be extracted by digging shallow excavations at the geological interface which allows groundwater to flow naturally.

Tasmanian Department of Primary Industries, Parks, Water and Environment portal (http://wrt.tas.gov.au/groundwater-info/) reports two registered bores within a 500 metre radius of the Launceston Airport boundary, with both wells listed as capped. The nearest functional bore (No.3859 in the Breadalbane locality) is approximately 1.3km to the north-west of the Airport boundary, has a depth of 30.5 metres into the Tertiary Basalt geology, with a standing water level of 9.0m (below ground surface) with yields of about 5L/Sec (December 2000).

Groundwater levels measured in investigation wells at the Launceston airport are reported to vary between 2 mBGL and 12 mBGL (Launceston Airport, 2015) but the bores are not registered. Investigation reports prepared for the FFTG (AECOM 2016) indicate standing water levels of between 3.5 to 6.7 mBGL. Information from the groundwater monitoring wells at the Mobil fuel farm, located north of the ARFF Fire Station Area, was not provided during this study.

Given the reported ranges of groundwater depths, it is considered likely that multiple (at least two) groundwater units exist in the area, although some connectivity between colluvium and basalt hosted aquifers is expected. Groundwater flow is locally reported to be to the north-east (Launceston Airport, 2015) towards the North Esk River. This flow direction is consistent with the geomorphology and topographical relief of the Tamar Valley.

Bores No. 3813, No. 3849, No. 17943, No.17949 and No. 18420 are considered to be down-hydraulic gradient from Launceston Airport. Bores to the west (e.g. No. 31018, No. 31758 and No. 41004), north-west (e.g. No. 3858) and the south east (e.g. No. 3829) are considered to be in another groundwater catchment (e.g. South Esk) or are cross and/or up-hydraulic gradient from Launceston Airport (refer **Appendix C**).

3.5 Surface Water Hydrology

The Launceston Airport 2015 Masterplan indicates that the majority of stormwater exits the airport lands into Kelly's Creek and ultimately to the North Esk via Jingler's Creek. The Kelly's Creek outfall receives approximately 90% of the airport's stormwater runoff while Springvale Creek receives the balance via the southern runway outlet and a number of small drains exiting the property from the grass strips to the north-east of the main runway. Both receive runoff from the catchment area rising to Devon Hills to the west of the Airport.

The Tamar and Esk Rivers are deeply incised thus suggesting that those channels may interact with groundwater (Harrington, et al, 2009). It is unclear whether those rivers are 'losing streams' or 'gaining streams' and their hydrology likely varies seasonally. A gaining stream will receive groundwater discharge from the aquifer when the water table is higher than surface water, whereas a losing stream will allow surface water percolation into the underlying unconfined aquifer.

In the context of surface water drainage from the airport study area, direct runoff from paved areas is collected and discharged to the headwaters of Kelly's Creek but is also expected to directly infiltrate in grassed areas and in unlined swale channels. It is unclear whether the 'former wastewater detention pond' (refer **Figure 2 and Figure 5**) still receives surface water discharge from the wider Airport site. However a drainage channel that forms the head of Kelly's Creek flows from immediately beyond the airport boundary near this detention pond feature and drains in a north-east direction to converge with Briarly Creek further north of the Airport. Briarly Creek flows from the north-west, from the direction of the Stornoway Quarry which is located approximately 1 km north-east of the site.

Springvale Creek is located approximately 200 m south of the southern airport boundary at its closest point and lies beyond the Western Railway alignment. Springvale Creek receives some drainage from southern areas of Airport land, but is more generally inferred to be hydraulically up gradient of the Airport.

Springvale Creek flows to the east and north-east, before joining Rose Rivulet, approximately 1.5 km south (upstream) of the confluence between Kelly's Creek and Rose Rivulet. Approximately 6.5 km north of the Kelly's Creek / Rose Rivulet confluence, Rose Rivulet discharges into the North Esk River (at Scout Island), which is a tributary of the Tamar River.

4.0 Site History

4.1 Historical Land Use

Historical information in the Launceston Airport Master Plan 2015 revealed that the Airport was purchased by the Home Territories Department in 1929 and the first hangar was constructed for the Tasmanian Airways Service in 1934. The Site later became a RAAF base from 1934 to 1946 when the airport was upgraded to its current configuration. Specific historical land use is further described below.

4.1.1 Former RAAF Base

The former Launceston RAAF base was used by the No. 7 Elementary Flying School (RAAF Museum 2009). The school incorporated four hangar buildings and a concrete apron, as well as several residential quarters. All RAAF activities had ceased at Launceston by 1946. The RAAF base was then used as the civilian airport terminal and taxiway until 1964, when a new terminal was completed.

The original RAAF Base was modified a number of times. All that remains now from the initial RAAF Base period is Hangar 10 and the Ex "Holyman Hangar[1]" (Hangar 17) which now houses a small distillery operation. Both of these hangars are now heritage listed buildings (Launceston Airport Master Plan 2009). Two RAAF fire stations were also located on the Site but have since been removed (RAAF Museum 2009). Given the time period in which these fire stations existed, PFAS-based AFFF would not have been used during their operation.

The current Royal Flying Doctor / Rescue Hangar now exists immediately south of the former RAAF Base area and historical aerial photos dating back 1972 provided during the on-site interviews indicate that soil storage bins or soil stockpiles have been located south of this area.

4.1.2 Airport Terminal and Runway

Prior to 1964, the Airport terminal was located in the Ex Holyman Hangar within the former RAAF base (RAAF Museum 2009). In 1964 the terminal was relocated to its current location north of the ARFF Fire Station and airport Fuel Farm. In 2010 the Airport terminal building was extended and underwent significant upgrades. The runway, taxiway and terminal apron were extended during the 1960s to allow the airport to handle DC9 aircraft with subsequent upgrades in 1982 for B727 aircraft (Launceston Master Plan 2015).

4.1.3 Fire Station and Airport Maintenance Area

The current fire station and airport maintenance buildings (located behind fire station) were constructed in the early 1960s and became operational in 1964. A heritage assessment undertaken in 2010 by Lovell Chen for Airservices identified the Launceston fire station as a "significant" building. The fire station has not been substantially altered since its commissioning in 1964 with the exception of internal upgrades.

During the on-site interviews, it was noted that, in 2014 airport taxiways were resurfaced, including those in the vicinity of the Fire Station and in 2015 the concrete apron in front of the Fire Station was replaced. AFFF was reportedly used in fire truck testing activities from 1980 until 2010 in these areas.

4.1.4 Former Fire Training Ground (FFTG)

The FFTG was identified during the on-site interviews (refer **Table 5-1**) to be located beyond the main runway and light aircraft grass airstrip, on the eastern Airport boundary. The active portion of the FFTG was reportedly operated at this location since the 1950s and was understood to be approximately 400 m^2 in area. The lease area encompassing the FFTG appears to cover approximately 5,968 m^2.

[1] See: http://launcestondistillery.com.au/hangar-17/

Anecdotal information provided during the interview with ARFF representatives indicated the FFTG was modified a number of times over the last 60 years. An upgrade occurred around 1997/1998 to improve environmental protection and accommodate access for larger vehicles. This upgrade included the excavation and removal of the top 150 mm of soil; placement of an additional 200 m^2 of concrete; and installation of a sub-surface drainage system lined with geomembrane. A Large Mock-Up (LMU) aircraft was situated on a concrete pad at the FFTG and has since been removed and disposed off-site. A second LMU (a bus), was previously situated next to the pad on the gravel surface but has now also been removed.

A 2,000 L above ground storage tank (AST) containing kerosene was previously located to the north-east of the FFTG pad, without any constructed bund. In 1984 the AST was moved to its current bunded location.

Section 4.3 below provides additional observations regarding historical structures in the FFTG.

4.2 EPA Contaminated Sites Register Search

AECOM sent a property information request to the Tasmanian Environment Protection Authority (TAS EPA) contaminated sites unit on 20 May 2016. The response provided by TAS EPA is attached in **Appendix D** and is summarised as follows:

- A previous report entitled Rescue & Firefighting Services, Launceston Airport 1995; Environmental Audit prepared by SEMF Pty Ltd identified the FFTG as a potentially contaminated area within the Airport;
- The property information request records that in July 2012 Airservices Australia advised TAS EPA that they had identified seepage from the site, of water containing Perfluorochemicals [redacted] The property information request further notes the several actions undertaken to address the matter and that an update on those investigations was due by June 2016.
- Workplace Standards Tasmania (WST) records indicate that storage of dangerous goods has occurred at the airport;
    - Twelve underground Storage Tanks (USTs) were removed from the Airport in 2004 and residual hydrocarbon contamination was noted in two areas from which the USTs were removed;
    - Two further Underground Petroleum Storage Systems (UPSS) have been decommissioned by Mobil since 2010;
    - Records indicate that five UPSS with a total volume of 372,000 L are registered at the airport;
    - Records indicate a spill of approximately 20 L of 'AGRAL' an additive chemical for herbicides, fungicides and pesticides occurred in December 1996.
- A total of 267 m^3 of hydrocarbon and heavy metal contaminated soil has been removed from the airport between August 1999 and September 2014; removal was subject to approval from TAS EPA.
- In August 2015, Environmental Approval 9308 was granted for the removal treatment and disposal of ten tonnes of Perfluorochemicals-impacted soil. This Approval was later increased to accommodate a soil mass of 900 tonnes.

4.3 Historical Aerial Photographs

Historical Photos of the Launceston Airport from 1947 were reviewed to identify land use changes and potential areas where AFFF may have been used. Photos and observations are summarised **Table 4-1** below and are the historical aerial photographs are presented as Figures D-1 to D-7 in **Appendix E**.

Table 4-1 Aerial Photograph Review

Year	Observations
1947 **Run 5** **Longford** **Scale No Data**	**Airport Terminal, Former RAAF Base and ARFF Fire station** - The airport terminal area appears to be comprised of paddocks and the Royal Australia Air Force (RAAF) base is visible to the east within the current location of the Launceston Airport. - Three rectangular steel sheds were apparent that are thought to be maintenance building of aircraft hangars.
	FFTG - The FFTG location appeared to comprise predominantly paddocks either grassed or bare ground. - A separate allotment appears not to have been constructed
	Surrounds - There appeared to be properties (presumed residential) within immediate proximity to Castle Hill Road.
1971 **RUN: 1** **Scale 7,450** **Photo:T563 -118**	**Airport Terminal, Former RAAF Base and ARFF Fire station** - An asphalted runway and terminal area was apparent. The terminal appeared to be located within the area of the former RAAF base. - Four rectangular sheds were apparent along the Evandale side of the site. A carpark was also apparent to the north of the airport - Three ASTs were apparent to the north of the airport terminal buildings.
	FFTG - At the current FFTG location there appears to be a fire training area comprising bare or charred earth with three rectangular objects and an above ground storage tank (AST) in the immediate vicinity.
	Surrounds - There appears to be a storage shed to the south of the FFTG. - There are more residential houses visible to the south with no discernible difference to land use in the east from the 1947 aerial. - An Industrial yard with soil yard bins was apparent to the south west of the runway and several drums were observed to the north of this facility.
1986 **Run: 10** **Scale: 1:18000** **Photo 1053 -3**	**Airport Terminal, Former RAAF Base and ARFF Fire station** - An extension to the north of the runway was apparent as was three drainage ponds located to the north east of the site. The main terminal building was apparent and its surrounds were covered with a concrete aircraft pad. - Adjacent to the former RAAF base, what is considered to be fuel storage area was apparent where over seven above ground storage tanks ASTs were observed. A drainage channel was apparent along the grassed area to the left of the runway
	FFTG - There appears to be rectangular shaped objects (approximately the size of a shipping container), in the FFTG and a small structure to the north-east. The AST is still visible as in the 1971 aerial. The FFTG has had little change from 1971.
	Surrounds - There is increased development to the north-west of the airport and three dams have been constructed to the north of the airport Site. To the east there is no discernible difference to the 1971 aerial with the exception of a small dam on the neighbouring property to the south east.
1992 **Run: M148** **Scale 1:12200** **Photo:1186 -137**	**Airport Terminal, Former RAAF Base and ARFF Fire station** - The Apron in front of the terminal building appeared to have been resurfaced and enlarged
	FFTG - The area has been further developed with the construction of a concrete bunded area. The rectangular objects (approximately the size of a shipping container) were still present although they had changed colour through suspected fire charring. There is a storage building to the north of the FFTG and a dam to the south. There appears to be two Aboveground Storage Tanks (ASTs) in the vicinity of the FFTG.
	Surrounds - There is no discernible difference to the surrounding area from the 1971 aerial.
2003 **Run 10** **Scale 1:10,000**	**Airport Terminal, Former RAAF Base and ARFF Fire station** - There were no discernible differences from the 1992 aerial photograph.
	FFTG - The 1986 FFTG has been further redeveloped with the construction of a larger concrete bunded area and placement of an LMU (aircraft shell). Two small structures are visible on the western side of the concrete bund. The rectangular objects (approximately the size of a shipping container) and the AST from the 1992 aerial have been removed. In the north-east there is a new building/ storage shed and also a new AST contained in a concrete bund. Directly to the south of the FFTG there appeared to be another AST in an enclosure with high walls and the dam is still present with a white substance on the banks above the water line.
	Surrounds - There is no discernible difference in the surrounding area to the 1992 aerial.

Year	Observations
2012 **Run 1** **Scale 1:18000**	**Airport Terminal, Former RAAF Base and ARFF Fire station** - The area where the waste water drainage ponds were appeared to have been backfilled with the outline of the walls of the ponds apparent. The Terminal building had been extended.
	FFTG - The LMU aircraft and the building/storage shed were observed. There was a new square structure contained with fencing and an AST outside the fenced area. - The LMU aircraft has been moved to face the north-east and there is a new squarer structure and a possible hydrant on the boundary of the concrete bund. - To the west and south-west of the LMU aircraft there is three new ASTs and the ASTs contained behind high walls are still present with a new storage shed directly to the south. The dam is still present with the absence of the white substance seen in the 2003 aerial.
	Surrounds - There is the development of an industrial area to the north of the airport. The waste water drainage ponds were also apparent north of the airport site, and had been back filled since the 2003 aerial to the east boundary - A quarry located to the north-east of the airport boundary was apparent. The temporal extent of previous aerial photos did not show this feature. It is plausible this has been around for a considerable period of time.
2016 (Google Earth Pro)	**Airport Terminal, Former RAAF Base and ARFF Fire station** - The concrete apron to the left of the terminal building appeared to have been extended.
	FFTG - A roof cover structure, over fifteen rainwater tanks and the evaporation pond were apparent. No other discernible changes were apparent from the previous aerial photograph.
	Surrounds - No significant changes were apparent from the 2012 aerial photograph.

4.4 Previous Reports

AECOM is aware of the following previous reports relating to environmental investigations completed at the site:

- GHD (2008) Report for ARFF National Testing Program. Preliminary Site Contamination Assessment, Launceston ARFF Drill Ground, Launceston Airport. GHD Pty Ltd (GHD). September 2008.
- Sloane Geoscience - SGEO (2010) Launceston ARFFS Drill Ground - Groundwater and Surface Water Monitoring: August 2010;
- SGEO (2013) Launceston ARFFS Drill Ground - Groundwater and Surface Water Monitoring: August 2013;
- SGEO (2014a) Launceston ARFFS Drill Ground - Groundwater and Surface Water Monitoring: April 2014;
- SGEO (2014b) Launceston ARFFS Drill Ground - Groundwater and Surface Water Monitoring: August 2014;
- ELA (2010) Growling Grass Frog Assessment. Eco logical Australia (ELA), May 2010;
- ELA (2011) Growling Grass Frog Assessment. Eco logical Australia (ELA), May 2011;
- Sloane Geoscience Pty Ltd (SGEO) (2014) Airport, Western Junction. Groundwater and Surface water monitoring event April 2014;
- SEMF (2013) Stockpile Sampling for Northern Flexible Pavement Repair- Launceston Airport, Western Junction 29 July 2013;
- Asset Environmental (2016) Letter Report for Cirrus Australia 2 March 2016;
- AECOM (2016) Presentation of Findings SAQP Implementation Speculative Off-Site Sampling Program, ARFF FFTG, Launceston Airport, Launceston, TAS 9 June 2016;

A summary of the findings of these reports is provided below with **Figure E-1** in **Appendix F** presenting the location of previous sampling events and identifying sample locations historically recording PFAS detection.

4.4.1 GHD Preliminary Site Contamination Assessment, 2008

GHD undertook a Preliminary Site Contamination Assessment (PSCA) at the ARFF "*drill ground*" (FFTG), reported as a 0.5 Ha site on the eastern boundary of the Airport. At the time investigation the site was used as a firefighting training facility including a mock up plane, which was lit with kerosene and extinguished with AFFF foams during training exercises. The objective of the GHD study was to investigate potential contamination at the FFTG and determine if soil or groundwater contamination was present in nearby runoff detention/evaporative pond feature. The conclusions from the PSCA were:

- Intrusive investigations examined TPH, BTEX, PAH, PFOS and PFOA only in targeted areas of the site. Further targeted investigations would be required to confirm the existence of contamination in wider FFTG areas, which were also considered to hold potential for contamination.
- PFOS was detected above the level of reporting (LOR) in the three soil samples analysed, with concentrations ranging between 4.8 mg/kg and 47 mg/kg. The PFOS concentration detected in sample SB02-0.1 (47 mg/kg) exceeded the Minnesota Department of Health (MDH) (2005) – Industrial Soil Screen Criteria for PFOS of 14 mg/kg.
- PFOA was also detected above LOR in the three soil samples analysed, with concentrations ranging between 0.003 mg/kg and 1.0 mg/kg. No PFOA concentrations exceeded MDH industrial soil criteria.
- The full vertical and horizontal extent of PFOS/PFOA soil contamination was not delineated.

- Groundwater was impacted by PFOS and PFOA with concentrations ranging from 460-490 µg/L and 130-160 µg/L respectively. Detected concentrations exceeded MDH (2007) Drinking Water Health Based Value of 0.3 µg/L for PFOS and 0.5 µg/L for PFOA.
- Local groundwater was also impacted by TRH, as a result of the use of kerosene and petrol fuels. The full extent of hydrocarbon impact to groundwater was not possible to define. However, TPH and PAH were not detected in soil bore soil samples.
- The report identified potential risks to human health and the environment due to PFOS and PFOA contamination in groundwater, soil and sediment, based on the limited number of samples analysed and the criteria used.

Recommendations of the GHD PSCA were to:

- Conduct additional targeted site investigation works in the FFTG;
- Install, survey and sample three groundwater monitoring wells around the drill ground area (FFTG) and evaporative retention pond, to further evaluate groundwater contamination;
- Upgrade training protocols to reduce potential for further contamination to the surrounding environment; and
- Determine site-specific human health and ecological risks associated with PFOS and PFOA in soil and groundwater, via a site specific risk assessment and including management actions, if required.

4.4.2 SGEO, 2010-2014 Groundwater and Surface Water Monitoring

SGEO undertook four groundwater and surface water monitoring events in the 2010 – 2014 period, utilising the two monitoring wells MB1 and MB2 and sampling standing water in the 'LA-Dam' feature at the FFTG area (elsewhere referred to herein as the 'evaporative retention pond').

In the 2010 study the detected concentrations of PFOS and PFOA in groundwater were between 7 and 10 times the concentrations initially reported in the 2008 assessment by GHD. In the August 2014 sampling round, PFOS and PFOA concentrations were noted to decrease. Conclusions of the August 2014 report noted that groundwater elevations were higher (by up to one-metre) above those elevations recorded in April 2014, indicative of the high degree of recent recharge from rainfall events. However, inference was also made that the reducing PFOS and PFOA concentrations might be attributable to the discontinued use of the FFTG.

4.4.3 ELA, 2010 & 2011 Growling Grass Frog Assessment

ELA was engaged by Airservices to complete a species and habitat survey of the threatened Growling Grass Frog (*Litoria raniformis*) at Launceston Airport and surrounding properties including the FFTG. The survey was aimed at obtaining the current status of the species (i.e. population numbers and locality). The survey involved a background literature review, desktop mapping and field survey including diurnal and timed nocturnal surveys. The following results were reported:

- The Growling Grass Frog was encountered in the FFTG evaporative pond;
- Adults, sub-adults and tadpoles were observed within the FFTG evaporative pond, as well as other areas of the airport; and
- It was considered likely that the frogs would migrate between surface water bodies at the Airport and downgradient in surrounding off-airport land.

ELA reported that a separate management plan for the frogs was not required.

4.4.4 SEMF, 2013

In 2013 SEMF Pty Ltd sampled the stockpiles recovered from the Northern flexible pavement repair to assess the suitability of the soil for reuse onsite or disposal in accordance with the Airports (Environmental Protection) Regulations 1997; EPA Guidelines, Information Bulletin 105 (rev Nov 2010) and the ASC NEPM (NEPM, 1999). Four (4) stockpiles were sampled and analysed for Heavy Metals, Petroleum Hydrocarbons and PAH, PFOS and PFAS.

The findings were:

- PFOS concentrations ranging from 0.02 to 0.06 mg/kg were reported in stockpiles S1, S2 and S3 and as a result the soil could not be reused onsite; and
- All stockpile results were within the Airport Regulation guidelines. High manganese, chromium and nickel results classified Stockpile S4 as Level 2. The exceedance in manganese, chromium and nickel are indicative of high natural background levels of these metals and therefore the material was suitable for reuse on site.

These conclusions correlate with the TAS EPA contaminated sites register search (**Section 4.2** & **Appendix D**), which indicate that a total of 267 m^3 of hydrocarbon and heavy metal contaminated soil was removed from the airport between August 1999 and September 2014. It is considered possible that remnants of these soil stockpiles are located south of the current Freight Terminal area, where the disposed stockpile material was previously stored.

4.4.5 Asset Environmental Limited Soil Assessment, 2016

Asset Environmental undertook a soil sampling event for Heavy Metals, BTEXN, TRH, PFOS and PFAS within the proposed hangar area located beside the existing Royal Flying Doctor Service (RFDS) Hangar. The soil assessment was a targeted investigation and as such was not considered an environmental assessment to ASC NEPM standards. The findings were:

- PFOS in was detected in one of the four samples collected, SB02-0.3 (0.3 m depth) at a concentration of 0.0010 mg/kg; and
- All other PFOS/PFOA results were less that the analytical limit of reporting (<0.0005 mg/kg).

4.4.6 AECOM Limited Off-Airport Environmental Sampling, 2016

AECOM undertook a PFAS related preliminary investigation for Airservices [redacted] The investigation involved the analysis of soil, sediment, flora, surface water and ground water samples, [redacted] The resultant investigation report has been submitted to the Tasmanian Environment Protection Authority (TAS EPA) for review. With agreement from Airservices, the CSM provided in **Section 12.0** of this PSI was developed in recognition of the off-site investigations undertaken.

4.5 Historical AFFF Use

Historical AFFF use at the site is summarised from the site history and anecdotal information in the sections below. **Figure 2** provides locations of historical use.

4.5.1 Former RAAF Base

PFOS was detected in soil stockpiles located south of this area (SEMF 2013). The TAS EPA contaminated sites register search indicates that hydrocarbon and heavy metal contaminated soil was removed from the airport between August 1999 and September 2014, and it is possible that remnants of these soil stockpiles, potentially containing PFAS, are located south of the current Freight Terminal area.

Limited soil sampling within the proposed hangar area located beside the existing RFDS Hangar indicates potential for PFAS contamination (Asset Environmental, 2016).

4.5.2 Airport Terminal and Runway

AFFF is known to have been applied in two emergency aircraft incidents that have occurred at or near the Airport; one at the terminal apron in 2006 and a second approximately 2 km to the south of the airport buildings in 2009.

4.5.3 Fire Station and Airport Maintenance Area

AFFF was reportedly used in fire truck testing activities from approximately 1980 until 2010 in these areas. During the Airport visit in June 2016 it was reported that various types of firefighting foams had been used at the ARFF fire station during fire truck maintenance, with some of the testing conducted on the grass area and concrete apron in front of the fire station. During the 1970s protein foams (non AFFF) were employed. In 1983, 3M Lightwater™ was used and sometime between 2001 and 2003 Ansulite AFFF (3% and 6% for training and 6% operationally) was employed until 2010/2011, when the ARFF fire station transitioned to Solberg Re-healing (RF6) fluorine-free foam.

4.5.4 Former Fire Training Ground

The FFTG site was used for ARFF training exercises, including the use of water and AFFF, for firefighting purposes until approximately 2010/2011. GHD (2008) identified that AFFF had been used within the FFTG on the eastern Airport boundary, with PFAS detected in limited soil and groundwater investigations in this area. SGEO (2010-2014) also reported PFAS detections in seven of the nine groundwater monitoring events conducted between 2008 and 2014 (noting that groundwater monitoring events undertaken in 2008 and 2009 did not include PFAS as a targeted analyte).

It is understood that firefighting foams containing PFAS were used at the site until 2010/2011, when the ARFF fire station transitioned to an alternative product.

4.5.5 Fire Suppression Activities

Firefighting incidents at and off- the Site to which the ARFF services have responded are summarised in **Table 4-2**. The incident logs were provided by Airservices to AECOM. A copy of the incidents reports are provided in **Appendix G**.

Table 4-2 Airservices Incident Reporting Summary

Airservices Incident #	Incident Location	Airport Area	Incident Details	Date	Approx. Volume of AFFF concentrate Applied (L)
318	RNWY 32 @ 150 meter mark	Airport runway	An electrical problem in aircraft	27/12/2006	3
444	1.2 K south of airport boundary	Off- Airport	A single seat aircraft crashed south of airport.	19/04/2009	6

4.5.6 Summary of AFFF Training Uses

Table 4-3 summarises anecdotal information provided by an ARFF Representative during the site visit. It is noted that Ansulite and 3M Lightwater were in use approximately during the period between 1980 and 2010, and that Airservices and its ARFF service came into existence in 1995. It is understood that firefighting foams containing PFAS were used at the site until 2010/2011, when the ARFF fire station transitioned to an alternative product.

Table 4-3 AFFF Usage

Activity	Frequency of Activity	Approximate volume of diluted AFFF and Water discharged
Walter Truck ARFF Training (200 L per truck)	3 times a week	600 L / event
Mark 5 & 6 Truck ARFF Training (150 L per truck)	3 times a week	450 L / event
ARFF Incident 2006	One off aircraft fire	53 L
ARFF Incident 2009	One off aircraft fire	106 L
Washing of truck water tanks	Unknown	Unknown

5.0 Site Inspection and Stakeholder Engagement

A questionnaire was sent to both the Airport and ARFF representatives prior to a Site visit undertaken in June 2016 to identify the potential Site uses and activities that could have led to AFFF releases and contamination concerns.

On 6 June 2016 [redacted], of Airservices, and [redacted], from AECOM, met with the following Launceston Airport representatives:

- [redacted], Manger Environment;
- [redacted], General Manager;
- [redacted], Building and Grounds Manager; and
- [redacted] engineering services with 32 years' experience at the airport.

Interviews were also undertaken with the following staff of the Launceston ARFF service:

- [redacted] ARFF Launceston Manager; and
- [redacted] who has been a fire fighter at the ARFF since 1978.

Key AFFF related areas and Airport facilities of interest were also visited and inspected during the site visit, with observations made during those inspections also summarised below. It is noted that the information presented below is based on anecdotal information provided by the interviewees and has not been further verified.

AECOM were also supplied with copies of incident reports where AFFF was used in response to emergency events.

5.1 Observations, Interviews and Anecdotal Information

Observations made during the Launceston Airport Site inspection are summarised in **Table 5-1** below. A photo log of the inspection is provided in **Appendix B**. The information provided in the discussions and during the Site inspections was largely anecdotal and in most cases has not been verified and should not be relied upon without substantiating further.

Table 5-1 Summary of Observations and Anecdotal Information

Observed Anecdotal information		
#	**Airport Estate Area**	**Detail**
1	ARFF fire station	The concrete pad in front of the fire station had been replaced in 2014
2		Vehicle maintenance areas and carport storage was observed in buildings behind the current fire station
3		A store of Solberg^{TM} firefighting foam was observed to the north of the fire station
4		The Mobil fuel farm is located to the north of the fire station
5	Former RAAF base	Approximately 20 m^3 of stockpiled soil was observed to the south of the former RAAF base area. To the west of this stockpile is a smaller stockpile of soil and concrete fragments/cores
6		The Royal Flying Doctor Service hangar is located to the south of Hangar 10 and the Ex Holyman Hangar (former RAAF hangars)
	Airport Terminal and Runway	A hangar (formerly occupied by Qantas and now occupied by Sharp Airlines) is located north of the main domestic terminal building
7		Storm water drainage systems were observed throughout all hardstand areas, as well as swale-drain features in unpaved /grassed areas adjacent to taxiways
8		Stormwater or wastewater discharge / detention / soakage feature was observed to the north of the grassed airstrip and opposite (across the main runway) from the domestic airport Terminal
9	FFTG	The FFTG and associated detention/evaporative pond were observed at the eastern airport boundary. A low profile metal roof cover was installed over the FFTG pad and several ASTs (steel and HDPE) were located in the area (reportedly containing wastewater from decommissioning works at the FFTG and associated detention pond)
10		Soil stockpiles were observed approximately 200 m north of the FFTG smoke hut

Launceston airport representatives Comments		
#	**Airport Estate Area**	**Detail**
1	ARFF fire station	The concrete pad in front of the fire station had been replaced in 2014
2		A hydrocarbon spill had occurred (dates not provided) in the area of the Mobil fuel farm and that approximately eight groundwater monitoring bores were installed to monitor associated groundwater impacts in the area. No active hydrocarbon remediation was known to have been undertaken.
3		An airport register documents areas of known PFAS contamination. These include Site 55 (soil stockpile area) and the CIRRUS Hangar area (both located to the south of the RFDS hangar).
4		PFAS contamination was found in stockpiled soils and asphalt samples collected in the vicinity of the Royal Flying Doctor (RFDS) Hangar, within the current freight terminal area to the south west of the Airport. The stockpiles were reportedly generated from the southern extent of excavations associated with the upgrade of the main terminal apron in 2014. Soil stockpiles were wrapped in a “black poly liner” and then covered with a 30 cm thick layer of clay to cap the material.
5	Runway and main aircraft apron	In 2000 an aircraft incident occurred on the main apron, where AFFF was used to suppress a potential fire risk situation.
6		In 2006 a light aircraft crash landed on Runway 32 due to the failure of its nose-wheel 53 litres of Ansulite foam mixed with water was used during the incident.
7	Southern apron Area	Anecdotal information suggesting PFAS contamination was found in stockpiled soils and asphalt samples collected in the vicinity of the Royal Flying Doctor (RFDS) Hangar, within the current freight terminal area to the south west of the Airport. Those stockpiles were reportedly generated from southern extent of excavations associated with the upgrade of the main terminal apron in 2014 It was indicated that the soil stockpiles were wrapped in a “black poly liner” and then covered with a 30 cm thick layer of clay to cap the material
8		Anecdotal information suggesting that no hangars at the Airport contained fire suppression systems
9		The airport shared the locations of known PFAS contamination for which a register is maintained. Site 55 (soil stockpile area) and the CIRRUS Hangar area (both located to the south of the RFDS hangar), were recorded as being impacted with PFAS contamination, confirmed via laboratory analysis
10	Former wastewater detention pond	Anecdotal information suggesting wastewater detention basin feature located to the north of the grassed airstrip was previously used for wastewater discharge. Approximately 15 years ago the wastewater system was upgraded to divert Trade waste to an offsite waste water treatment plant
11		Drainage maps of the airport were reviewed and drainage patterns indicated that stormwater from Evandale Road, the runways, hangar and terminal areas discharges via drains under the runway and into the head of Kelly Creek Onsite and offsite sampling / testing of surface drainage has been undertaken by the airport previously but has not included assessment for PFAS.
12	Mobil fuel Farm	Anecdotal information suggests a hydrocarbon spill had occurred (dates not provided) in the area of the Mobil fuel farm and that approximately eight groundwater monitoring bores were installed to monitor associated groundwater impacts in the area. It was also indicated that no active hydrocarbon remediation had been undertaken
13	General	No hangars at the Airport contained fire suppression systems
14		A review of drainage maps of the airport indicated drainage patterns inferring stormwater from Evandale Road, the runways, hangar and terminal areas discharges via drains under the runway and into the head of Kelly Creek.
15		Onsite and offsite sampling / testing of surface drainage has been undertaken by the airport previously but has not included assessment for PFAS

ARFF Station Representatives Comments		
#	**Airport Estate Area**	**Detail**
1	ARFF fire station	Two fire stations were formerly located within the areas of the former RAAF base prior to 1964. Protein foams would have been used for any firefighting training during this period.
2		3M Lightwater™ and Ansulite were kept in 200L drums located within a non-bunded storeroom adjacent to the fire station garages
3		Testing of the Walter and Mark 5/6 fire trucks occurred three times per week, during which AFFF may have been discharged onto the front apron of the fire station and from the 1980s to 2010.
4		A 'drop tank' (a collection container) was used to collect spills when AFFF and water were mixed. This tank was then decanted into firetrucks.
5		Every 2 years from 1980 – 2006, a combined emergency training event was held although there was no recollection of AFFF being discharged during these events.
6		3M Lightwater™ was used at the FFTG and the fire station from 1983 to 2003 and then Ansulite from 2003 to 2010. In the earlier period AFFF training occurred three to five times per week and in later years only occurred monthly.
7		Ten years ago soil of unknown origin was placed to form the mound north of the FFTG.
8		A drum-based venturi AFFF fire suppression system was used in the Sharp Airlines (formerly Qantas) and the RFDS hangars and these are believed to have been removed. Some testing of these systems may have taken place but it was uncertain if AFFF had been discharged;
9		In 2006 a light aircraft crash landed on Runway 32 due to the failure of its nose-wheel. 53 litres of Ansulite foam mixed with water was used during the incident.
10		Alternative (non-AFFF) fire suppression systems are installed in terminal buildings
11		In the early 1990s an incident involving the crash of a 'Dove' aircraft occurred to the south east of the runway, but no AFFF foam was discharged.
12		No AFFF had been used at the Smoke Hut located near the FFTG
13	General	AFFF fire extinguishers were deployed throughout the Airport, although it was considered that these would have been discharged onsite occasionally but not used to treat fires
14		
15		No AFFF has been used to treat grass fires at the airport
16	South of Airport (off site)	In 2009 106 litres of Ansulite foam mixed with water was used to treat an aircraft incident 1.2km to the south of the airport.
17	3 km south west (off site)	Approximately five years ago a tyre fire occurred at Perth (township) where AFFF was applied.

5.2 Water Management

A review of the Launceston Airport Master Plan 2015 and anecdotal information collected during the site interviews in June 2016 provides the following information relating to water management at the Site.

5.2.1 Airport Terminal, Former RAAF Base and ARFF Fire station

All water used at the Site is sourced from the TasWater mains water supply.

All waste water generated during maintenance and day to day operations at the airport is collected into triple interceptors and/or grit/sediment traps before discharge to the municipal council sewer system for treatment. Additionally, a triple interceptor treats greases and surfactants from the vehicle wash-down area of the maintenance area, prior to discharge to sewer. The current wastewater systems were upgraded to their current configuration fifteen years ago (circa. 2000-2001). Prior to that, it is presumed that wastewater went through similar primary treatment (traps and interceptors) before being discharged to the detention ponds located at the north-east of the airport.

The Launceston Airport Master Plan 2015 (Section11), states that the airport has installed a litter trap for stormwater at the main drain that flows into the Site near the terminal entrance area. Stormwater collected from hardstands around the airport is diverted into underground drainage systems that pass under the runway to the north-east and discharges into the headwaters of Kelly's Creek.

Additionally, it was stated during site interviews that, up to approximately 10 years ago, water generated from the fire station during training exercises and from vehicle wash down and maintenance activities was discharged onto local grassed areas.

5.2.2 Former Fire Training Ground

Prior to upgrade of the FFTG in 1998, wastewater generated in training exercises drained into three consecutive chambers/sumps, before flowing into the FFTG evaporative retention pond. The FFTG evaporative retention pond has an approximate capacity of 750,000 L and is not synthetically lined (earthen only).

In the 1998 upgrade, a diversion was installed such that wastewater from training events drained into a 23,000 L concrete underground holding tank. Discharge from that tank (via a float controlled valve) then entered a coalescing plate separator (CPS) before discharging into the FFTG evaporative retention pond.

In its current care-and-maintenance state, a number of short and medium term actions have been implemented to mitigate leaching of residual PFAS within the concrete pad and to prevent failure of the wastewater evaporative pond and therefore prevent seepage of PFAS impacted surface water onto the neighbouring pastoral land:

- The LMU infrastructure has been removed from the FFTG and disposed off-site;
- Wastewater generated during the cleaning of the FFTG pad in 2012 is currently stored in three large metal tanks with approximate holding capacities of 15 000 L each.
- A low profile roofed structure has been constructed above the FFTG's concrete pad;
- Water captured by the roofed structure during rainfall events is diverted directly to an airport storm water drainage channel or to the FFTG evaporative pond as required;
- An interception trench has been installed between the pond and the airport boundary that runs perpendicular to the anticipated direction of pond seepage flow. Any captured seepage is redirected into the pond or above ground holding tanks as required; and
- Water treatability trials using MYCELX (https://www.mycelx.com, a filtration based approach) have been conducted and evaluated to be a feasible option to treat PFAS impacted water stored and potentially generated at the former FFTG.

Circa 1995, the FFTG was used three times per week during dry weather. In relation to the effectiveness of wastewater controls at the FFTG facility, it is understood that foam and hydrocarbons were observed on the surface of the evaporative retention pond on a number of occasions (during/following training exercises). It was also suggested that interception/treatment sumps were ineffective and on one occasion, excess hydrocarbon floating in the evaporative-retention pond was ignited and burnt off.

The management and potential remediation of the earthen wastewater evaporative pond is inherently complicated because:

- Its construction is not designed to current engineering standards, it appears to be a rudimental design that has been formed by grading a wall from excavated materials on the down gradient side and it contains no engineered lining;
- In 2013/2014 the down-gradient wall of the evaporative pond was evaluated by an engineer as potentially unstable if subjected to high water levels (i.e. incapable of long-term retention of water). Therefore, there is a potential for seepage of pond water directly onto the neighbouring property.
- The evaporative retention pond has been designated an environmentally significant area under the Launceston Airport Master Plan 2015, because it is a breeding site/habitat for the Growling Grass Frog (*Litoria raniformis*) and Southern Brown Tree Frog (*Litoria ewingii*).

6.0 Data Quality Objectives

The Data Quality Objectives (DQOs) process is used to define the type, quantity and quality of data needed to support decisions relating to the environmental condition of a site. DQOs were developed in accordance with the ASC NEPM (Schedule B2). The process consists of seven distinct steps, as shown below:

- State the problem;
- Identify the decision;
- Identify inputs to the decision;
- Define the study boundaries;
- Develop a decision rule;
- Specify limits on decision errors; and
- Optimise the design for obtaining data.

A summary of the DQO definition process for the APECs that require investigation is provided in **Table** 6-1 below.

Table 6-1 Summary of Data Quality Objectives

	Data Gap 1: Presence/Absence of PFAS Impacts in Soil or Sediment	Data Gap 2: Presence/Absence of PFAS Impacts in Shallow Groundwater	Data Gap 3: Presence/Absence of Hydrocarbon Impacts in Soil or Groundwater
Step 1 **Problem Statement**	**Problem Statement:** Confirmation of the presence or absence of PFAS impacts to soil or sediment is necessary in all APEC except for APEC 1 (ARFF station). Where PFAS has been confirmed in soils, further delineation is typically required. **Decision Makers/Stakeholders:** AECOM, Airservices and Launceston Airport **Resources:** Intrusive site investigation resources. Surface and shallow depth soil samples may be collected by hand-auger or small drill rig.	**Problem Statement:** Confirmation of the presence or absence of potential PFAS impacts within shallow groundwater. **Decision Makers/Stakeholders:** AECOM, Airservices and Launceston Airport **Resources:** Intrusive site investigation resources. Installation of shallow groundwater monitoring wells will require a small drilling rig.	**Problem Statement:** Extent of hydrocarbon impacts in soil and groundwater at the FFTG are not delineated. Presence of hydrocarbon impacts in the vicinity of the ARFF Fire Station (specifically former Diesel UST facility) is unconfirmed. **Decision Makers/Stakeholders:** AECOM, Airservices and Launceston Airport **Resources:** Site investigation resources required for the collection of surface water, sediment and groundwater samples.
Step 2 **Decision Identification**	***Are PFAS impacts present within surficial soils and/or shallow soil horizons within all APEC or can some of these areas be ruled out as potential Source Zones?***	***Have PFAS impacts migrated to groundwater within those APEC where PFAS in soil has previously been detected (or inferred by analyses of excavated soils)?***	***Do hydrocarbon impacts exist in soils or groundwater in the vicinity of the ARFF Fire Station and what residual hydrocarbon concentrations exist at the FFTG?***
Step 3 **Decision Inputs**	Conduct surface soil and shallow soil sampling program: APEC 1: ARFF Fires Station and surrounds Three shallow soil bores to be advanced using hand-auger to depth of 1.0m, targeting unpaved areas at edges of hardstand that have likely received runoff APEC 2b: Southern soil stockpile Two shallow soil bore to be advanced using hand-auger to depth of 1.0m, in the vicinity of the soil stockpile area south of the Cirrus Hanger. APEC 4: Former Fire Training Ground (FFTG) and Soil Stockpile One shallow soil bore to be advanced using hand-auger to depth of 1.0m, in the vicinity of the soil stockpile north of the FFTG. APEC 5: Former wastewater detention ponds (located north of the grassed airstrip) Three shallow soil bores to be advanced using hand-auger to depth of 1.0m, targeting the detention pond footprint that has potentially received airport-wide drainage. Non-APEC Investigations: Other Drainage Features Further sediment samples or shallow soil bores (advanced using hand-auger) may be collected to evaluate any other obvious drainage features that may have received AFFF impacted discharge water from the wider site catchments. Where surface water is present at each proposed sediment or shallow bore location (as located within identified drainage features), a correspondent surface water sample will be collected.	Conduct monitoring well (MW) installation and site wide groundwater sampling event: APEC 1: ARFF Fires Station and surrounds Installation and sampling of one MW located in the eastern portion of the ARFF station, positioned at inferred hydraulic down-gradient location. Groundwater sampling event using two existing groundwater monitoring wells (MW04 and GW18) APEC 2b: Southern soil stockpile Installation and sampling of one MW located in the south eastern (i.e. downgradient) corner of the southern Apron area. APEC 5: Former wastewater detention ponds (located north of the grassed airstrip) Installation and sampling of one MW located in the eastern (i.e. inferred downgradient) corner of the former wastewater detention area APEC 4: FFTG Conduct groundwater sampling event using the existing (two) groundwater monitoring wells (MB01 and GW10). Note additional existing groundwater monitoring well MB02 not located.	Select and analyse a sub-set of soil and groundwater samples collected in the sampling programs detailed for Data Gaps 1 and 2 for hydrocarbon compound analyses. Use of available off-site data.
Step 4 **Study Boundaries**	**Spatial**: Within Airport boundaries only and specifically at potential (unconfirmed) source areas APEC 1, 2b, 4 and 5 and drainage features as shown in **Figure 5**. **Temporal:** Timely consultation with Airport and Airservices to allow access to proposed locations. **Constraints:** Approvals from Airport and Airservices. Potential conflicts between investigation locations and critical services.	**Spatial**: Within Airport boundaries only and specifically at potential (unconfirmed) source areas APEC 1, 2b, 4 and 5 and drainage features as shown in **Figure 5**. **Temporal:** Timely consultation with Airport and Airservices to allow access to proposed locations. **Constraints:** The number of proposed monitoring well locations are intentionally limited at this stage. Approvals from Airport and Airservices. Potential conflicts between investigation locations and critical airport services may exist.	**Spatial**: Within Airport boundaries only and specifically at potential (unconfirmed) source areas APEC 1, 2b, 4 and 5. **Temporal:** Timely consultation with Airport and Airservices to allow access to proposed locations. **Constraints:** Approvals from Airport and Airservices. . Potential conflicts between investigation locations and critical airport services.
Step 5 **Decision Rules**	Soil analytical data will be assessed against Soil Acceptance Criteria (refer **Section 10.2.1** below). However, initial soil quality studies proposed by this SAQP are designed to confirm presence or absence of PFAS only.	Groundwater analytical data will be assessed against Groundwater Acceptance Criteria (refer **Section 10.2.2** below). However, the initial groundwater quality studies proposed by this SAQP are designed to confirm presence or absence of PFAS only.	Analytical data will be assessed against the Groundwater Acceptance Criteria (refer **Section 10.2.2** below).

	Data Gap 1: Presence/Absence of PFAS Impacts in Soil or Sediment	Data Gap 2: Presence/Absence of PFAS Impacts in Shallow Groundwater	Data Gap 3: Presence/Absence of Hydrocarbon Impacts in Soil or Groundwater
Step 6 **Decision Error Limitation**	The potential for significant decision errors will be minimised via a robust QA/QC program in accordance with NEPM guideline requirements. Standard operating procedures will be followed in the field to ensure accurate and representative data acquisition. Data quality indicators (DQIs) will be applied to assess the usability of data based on precision, accuracy, representativeness, comparability and completeness. The acceptable limit on decision error is 100% compliance with the applied DQIs. If any of the DQIs are not met, further assessment will be necessary to evaluate the significance of any non-conformance and to identify any corrective actions.		
Step 7 **Design Optimisation**	Soil and sediment sampling locations have been selected on the basis of accessibility (unpaved areas) and proximity to potential or suspected PFAS impacted areas.	Proposed groundwater monitoring well locations have been selected to confirm the presence or absence of PFAS impacts. Existing monitoring wells within the airport should be utilised in the GME(s).	Sampling locations will be refined based on site observations and the ability to Safely access sampling locations.

7.0 Areas of Environmental Concern

As a result of the combined information searches, site inspections and site interviews detailed in the PSI, six key Areas of Potential Environmental Concern (APEC) have been identified (within the Airport site boundary) as summarised in **Table 7-1**.

Notes:

- Blue shaded rows are APEC known to contain AFFF impacts and APEC identified on the basis of historical or anecdotal information.
- Grey shaded rows are APEC not considered in the limited sampling activities based on insufficient information presently available to confirm AFFF use or storage and are not related with ARFF activities.

Table 7-1 Areas of Potential Environmental Concern

APEC	APEC Description	Potential Issues (collated from site interviews and background data)	COPC
1	ARFF Fire Station & Vehicle Maintenance areas	• ARFF operational area and surrounds, including soil impacts caused by washing of hoses and previous weekly testing of firefighting trucks. • Former onsite diesel UST.	TRH, BTEXN, PAH, PFAS
2a	Southern Freight Apron, RFDS Hangar, Cirrus Hangar areas (Former RAAF Base)	• Anecdotal information suggesting PFAS impacts in soils in vicinity of proposed CIRRUS hangar area.	PFAS
2b	Southern soil stockpile	• Anecdotal information suggesting PFAS impacts in southern soil stockpiles.	PFAS
3	Sharp Airlines Hangar	• Soils excavated during concrete apron upgrade contained PFAS, suggesting further impacts may exist in this area • AFFF fire suppression system (venturi-system) was also reportedly installed in the Sharp Airlines hangar (ex-Qantas Hangar).	PFAS
4	Former Fire Training Ground and stockpile	• PFAS contamination in groundwater and surface soils • Hydrocarbon impacts in soils and FFTG surrounds • Observation of a stockpile approximately 200m north of the FFTG; • Origin and chemical status of stockpile unknown	TRH, BTEXN, PAH, PFAS
5	Former wastewater detention ponds located north of the grassed airstrip	• Stormwater and wastewater previously directed to this area prior to upgrades in 2000/2001.	PFAS
6	Mobil Fuel Farm	• Previous TRH spill & plume as reported during site visit (not related to ARFF activities).	TRH, BTEXN, PAH

8.0 Limited Intrusive Investigations Methodology

Field activities were conducted at the site in accordance with the following standards and guidelines. Western Australian guidelines have been adopted in Tasmania in the absence of specific local guidance:

- Australian Standard 4482.0, Guide to Sampling and Investigation of Potentially Contaminated Soil.
- Australian Standard 5667.11, Water Quality - Sampling - Guidance on Sampling of Groundwaters.
- DER, 2014. Contaminated Sites Guidelines: Assessment and Management of Contaminated Sites, Issued: December 2014.
- DER, 2017. Contaminated Sites Guidelines: Interim Guideline on the Assessment and Management of Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS), Version 2.1; Issued: January 2017.
- AECOM, 2017c. PFAS Sampling Guidance (AECOM Internal Use Only)

A summary of works consistent with the scope detailed in Section 1.3 is provided in **Table 8-1** below:

Table 8-1 Field Work Activity Summary

Dates	Activities	Contractors / AECOM Personnel
27 June and 3 July 2017	Preliminary site visits to establish site contacts, permit requirements and familiarise with site conditions	[redacted] (AECOM)
13 July 2017	Location mark-out and services / utilities clearance was undertaken at all new groundwater monitoring well locations using GPR (ground penetrating radar) and CAT (cable avoidance tool) methods.	[redacted] AECOM)
9 to 11 August 2017	Confirmation of service location and clearance of investigation location by APAL engineering and maintenance staff. Supervision of the advancement of 7 soil bores to a maximum depth of 1.1 mBGL, installation of 3 groundwater monitoring wells to a maximum depth of 8 mBGL and collection of seven surficial sediment samples Drilling methods applied were hollow stem auger and pneumatic hammer	[redacted] (AECOM)
16 to 17 August 2017	Groundwater gauging and monitoring of all three new and four existing groundwater monitoring wells. Survey of all new investigation locations	[redacted] (AECOM)

8.1 Health and Safety Planning

Prior to commencement of site works, a site-specific Health, Safety and Environment Plan (HSEP) was developed in accordance with AECOM and Airservices Australia policy. All site works undertaken by AECOM, and AECOM preferred subcontractors ([redacted] – subsurface clearance, [redacted] – surveying, [redacted] – non-destructive digging (NDD), drilling and hand auger) was conducted in accordance with the AECOM HSEP titled: *Health, Safety and Environment Plan Launceston Airport Environmental Assessment Works* Reference 60543717 dated 6 July 2017.

All AECOM subcontractors and AECOM field personnel undertaking the works at Launceston Airport completed the Airservices Australia Contractor General Induction Course, Launceston Fire Station Induction, Launceston Airport general contractor inductions and undertook the Drug and Alcohol Testing according to the Airservices Requirements and to the following Standards:

- AS 4760:2006 Procedures for specimen collection and the detection and quantitation of drugs in oral fluid.
- AS 4308:2008 Recommended practices for the collection, detection and quantitation of drugs of abuse in urine.

APAL permits were required for all investigation areas.

A copy of the HSEP was available at the work site at all times during the fieldworks.

8.2 Underground Services Identification (Subsurface Clearance)

Prior to any intrusive works being conducted on Site, AECOM supervised the completion of underground service clearance for all proposed soil bore and monitoring well locations on site.

Dial before you dig (DBYD) utility plans were obtained by AECOM from utility providers and as built plans were obtained from Australia Pacific Airports - Launceston (APAL).

The service identification and clearance was informed by current Dial Before you Dig (DBYD) plans, site as built plans and site utility information provided by discussions on site with Airport and Fire Station personnel.

[redacted] were engaged to identify and mark out underground services and clear proposed investigation locations prior to the commencement the intrusive works. All subsurface clearance works were undertaken under the supervision of AECOM personnel. Subsurface clearance techniques included Ground Penetrating Radar (GPR) and Cable Avoidance Tools (CAT).

AECOM Service identification and Clearance Procedure (S4AN-783-PR1) was followed and Permit to Work and Concealed Services Authority clearances were obtained from APAL. Refer to **Appendix H** for the Subsurface Utility Clearance Reports.

8.3 Non-Destructive Digging

All drill locations were cleared by non-destructive digging (NDD) methods by [redacted] using high pressure water and vacuum extraction to remove soil. Non-destructive clearance was advanced to a minimum of 1.5 mBGL at each location. Each location was cleared to a minimum of 30% greater than the diameter of the proposed drill stem to ensure that the area has been safely cleared of services before drilling commences. NDD was undertaken in order to prevent damage to any unrecorded/undetected underground services encountered. A drill rig was then used to progress the holes to depth.

8.4 Drilling Methodology

The advancement of soil bores and the conversion of select bores to monitoring wells was undertaken by AECOM's preferred supplier [redacted].

8.4.1 Advancement of Soil Bores

Following underground service location and where ground conditions were are suitable, soil bores were advanced with a hand-auger to intended investigation depth of 1.1 mBGL.

8.4.2 Groundwater Monitoring Well Installation

Groundwater monitoring well locations were cleared to 1.5 mBGL using NDD and then advanced to the intended investigation depth utilising hollow stem auger and pneumatic hammer drilling methods. Monitoring wells were 50 mm in diameter and constructed using Class 18 uPVC. Monitoring wells were constructed with screening across the water bearing zone with solid casing to the surface. Screened sections were backfilled with a gravel filter pack and isolated with a bentonite seal. The remaining void to the ground surface was backfilled with bentonite cement grout. Each well was fitted with a lockable well cap and a trafficable flush-mounted gatic cover secured into position with concrete.

Groundwater monitoring wells were developed to remove any material disturbed during drilling and installation prior to sampling. All water generated was contained within 205L sealed drums and disposed off-site by a licensed waste disposal contractor.

The monitoring wells were left to reach equilibrium for a minimum of one week prior to groundwater sampling.

Well construction details are shown in the logs in **Appendix J**.

8.4.3 Decontamination and Waste Management

Hand auger, drilling equipment and any tools in contact with sampling media used between locations were decontaminated between sampling locations, by removing any adhered soils and by scrubbing with brushes and Liquinox detergent (suitable for PFAS decontamination), followed by rinsing with potable water. Waste soil and water was contained within 205L sealed drums prior to disposal off-site by a licensed waste disposal contractor.

8.5 Soil Bore Logging and Sampling Methodology

The handling, collection and preservation of all soil samples submitted for laboratory analysis complied with the practices detailed in Australian Standards AS 4482.1 2005, with additional requirements in relation to using PTFE-free materials in all aspects of the fieldworks.

Soil samples were collected at regular intervals down the profile and at points of change in geology. The exact depth of soil sampling was determined in the field during drilling activities.

Soil and sediment samples were collected using hand tools including a hand-auger to advance shallow soil bores and stainless steel spatula/trowel.

Representative soil samples were recovered and placed into laboratory prepared glass (TRH/ BTEXN) or plastic (PFOS) sample jars. Sealed jars were placed into an ice-filled esky immediately following collection for subsequent delivery via courier to the nominated National Association of Testing Authorities (NATA) accredited laboratory.

To provide an indication of potential volatile organic contaminants within soil, sub-samples were obtained at regular depth intervals, placed in a zip-lock plastic bag and screened for volatile organic compounds (VOCs) using a photo-ionisation detector (PID) with a 10.6 volt bulb. Samples for hydrocarbon analysis were selected based the likelihood of contamination being present and on visual/olfactory observations, PID readings, and depth.

To support subsequent data interpretation, soil bores were logged in general accordance with the Unified Soil Classification System (USCS) and graphically transcribed into soil-logging software.

All field equipment was calibrated prior to use on-site and calibration records are provided in **Appendix I**. The specific depths for the soil samples collected are detailed on the soil bore logs in **Appendix J**.

8.6 Groundwater Sampling

Gauging of static water level (SWL) was completed on 16 and 17 August 2017 prior to the commencement of the GME sampling program.

All groundwater monitoring wells were purged using low-flow techniques[2], consistent with standard AECOM practices and in general accordance with *AS/NZS 5667.11:1998 "Water Quality – Sampling, Part 11: Guidance on Sampling of Groundwaters" (AS/NZS 5667.11:1998*). An air bladder displacement pump was used to recover groundwater samples, with the pump inlet positioned within the well screen.

[2] As described in US EPA Standard Operating Procedure GW0001 Low Stress (low flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells.

Groundwater samples (representative of formation water) were collected following observed stabilisation of field indicator parameters including dissolved oxygen, oxidation-reduction potential (redox), electrical conductivity, temperature and pH.

The key procedures undertaken during the Groundwater Monitoring Event (GME) were:

- Measurement of the depth to water prior to sampling;
- Identification of any non-aqueous phase liquid, if present, and measurement of thickness;
- Measurement of the depth to the base of the well following sampling;
- Groundwater purging of each well using a low flow pump, including dedicated tubing for each groundwater monitoring well;
- Recording of groundwater quality parameters during purging using a multi-parameter meter fitted with a flow-through-cell;
- All field equipment was calibrated prior to use on-site and calibration records are provided in **Appendix I**.
- Collection of groundwater samples directly into laboratory supplied and appropriately preserved bottles;
- Collection of groundwater samples and field QA/QC samples for laboratory analysis;
- Purged water was contained within 205L sealed drums prior to disposal off-site by a licensed waste disposal contractor
- Decontamination of all non-dedicated sampling equipment between sample locations.

8.7 Groundwater Monitoring Well Elevation Surveying

All new groundwater monitoring well and investigation locations were surveyed on 17 August 2017 by [redacted], a licenced surveying company for horizontal location and elevation to metres Australian Height Datum (m AHD) to enable interpretation of groundwater gradients. Horizontal Datum was provided in Map Grid Australia (MGA94), Zone 50 to an accuracy of 50 mm in the x, y plane and to +/- 2 mm vertically, relative to AHD. A copy of the survey data are provided in **Appendix H**.

8.8 General Field Practices

8.8.1 Fieldwork Documentation

Field data and observations were recorded on field sheets and included but not be limited to:

- Project name and number
- Date, time, weather conditions
- Personnel present
- Site diary detailing activities undertaken during the day
- Health and safety observations
- All aspects of sample collection (including sample type, location, time of collection, sampling method, visual description and primary/duplicate sample names)
- Field measurements
- Equipment calibration documentation

8.8.2 Field Equipment Calibration

Equipment used to perform testing or data recording (PID, water quality meter and water level meter) was calibrated prior to use. Calibration checks and adjustments were performed before equipment the equipment as used in field operations. Calibration records are provided in **Appendix I**.

8.8.3 Sample Labelling

Each sample container was clearly labelled and marked with waterproof ink in the field. Sample labels included at least the following information:

- Project number
- Sampling date
- Unique sample number
- Sample point number/designation

8.8.4 Sample Storage and Transport

As each sample was collected, it was placed into a chilled Esky. Samples were kept secure and chilled during the field program and during subsequent transportation to the laboratory. Samples were stored and transported by courier under chain of custody documentation, completed during the field program.

8.9 Laboratory Analysis

8.9.1 Laboratory Selection

AECOM utilised the services of Australian Laboratory Group (ALS) based in Melbourne as the primary laboratory and Eurofins as the secondary laboratory to conduct the analysis of soil, sediment and groundwater. The two laboratories were selected as they were:

- Accredited by the National Association of Testing Authorities (NATA);
- Certified by NATA to conduct the specific tests required, unless NATA does not certify a particular analysis or method specified; and
- Able to demonstrate that it can achieve the required analytical limits of reporting (typically an order of magnitude below the respective assessment criteria for the matrix and parameter).

8.9.2 Soil and Groundwater Analytical Suites

A summary of the laboratory analysis suite, methods and LOR is presented in **Table 8-2** (below) Based on the chemicals of potential concern (COPCs) for the Site, the proposed analytes were chosen based on the CSM and to meet the DQOs. The detailed analytical suite is presented in **Table 8-3** (below).

Table 8-2 Analysis Suites and Methods

Sample Type	Parameter	Analytical Method Reference	LOR
Soil / Sediment (Solid)	PFAS	LC/MS-MS	0.0002 - 0.001 mg/kg
	BTEXN and TRH C_6 – C_{40} fractions	P&T/HC-GC/MS	0.2 – 100 mg/kg
Water	PFAS	LC/MS-MS	0.02- 50 µg/L
	BTEXN and TRH C_6 – C_{40} fractions	P&T/HC-GC/MS	1 – 100 µg/L

Table 8-3 Detailed Analyte suite (COPC)

PFAS Group	Compound	CAS No.
Perfluoroalkyl Sulfonic Acids	Perfluorobutane sulfonic acid (PFBS)	375-73-5
	Perfluoropentane sulfonic acid (PFPeS)	2706-91-4
	Perfluorohexane sulfonic acid (PFHxS)	355-46-4
	Perfluoroheptane sulfonic acid (PFHpS)	375-92-8
	Perfluorooctane sulfonic acid (PFOS)	1763-23-1
	Perfluorodecane sulfonic acid (PFDS)	335-77-3
Perfluoroalkyl Carboxylic Acids	Perfluorobutanoic acid (PFBA)	375-22-4
	Perfluoropentanoic acid (PFPeA)	2706-90-3
	Perfluorohexanoic acid (PFHxA)	307-24-4
	Perfluoroheptanoic acid (PFHpA)	375-85-9
	Perfluorooctanoic acid (PFOA)	335-67-1
	Perfluorononanoic acid (PFNA)	375-95-1
	Perfluorodecanoic acid (PFDA)	335-76-2
	Perfluoroundecanoic acid (PFUnDA)	2058-94-8
	Perfluorododecanoic acid (PFDoDA)	307-55-1
	Perfluorotridecanoic acid (PFTrDA)	72629-94-8
	Perfluorotetradecanoic acid (PFTeDA)	376-06-7
Perfluoroalkyl Sulfonamides	Perfluorooctane sulphonamide (FOSA)	754-91-6
	N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8
	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2
	N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7
	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2
	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9
	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6
(n:2) Fluorotelomer Sulfonic Acids	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4
	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2
	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4
	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0
Petroleum Hydrocarbons		
Total Recoverable Hydrocarbons C_6 – C_{40} Fractions	TRH (C_6 – C_{40})	
Benzene, Toluene, Ethylbenzene, Xylene, Naphthalene	BTEXN	

9.0 Quality Assurance / Quality Control

Quality Assurance protocols applicable to the field and analytical program allow the assessment and verification of the accuracy, repeatability and reliability of the generated analytical data set.

9.1 QA/QC Samples

The quality control procedures are outlined in SAQP (AECOM, 2017a) and any deviation to the quality control procedures is outlined in the Data Validation Summaries in **Sections 9.5** and **9.6** Field Quality Control Data are provided in **Appendix L**.

The following Quality Control (QC) samples were collected during the field program:

- Duplicate samples to allow for intra-laboratory analysis
- Triplicate samples to allow for inter-laboratory analysis
- Trip Blank samples to examine the potential for sample cross contamination (during sample storage and transit and only for volatile contaminants)
- Field Blank samples were collected in order to monitor the introduction of sample contamination from background field conditions
- Rinsate samples to check the precision and accuracy of sampling equipment decontamination procedures

All QA/QC samples collected during the project (for all types of samples collected) had the naming convention of **[QC](number)_YYMMDD**, where:

- QC (number) is a QA/QC sample with a specific number
- YYMMDD provides date information i.e. year / month /date

9.2 Laboratory Analysis Plan

The selected laboratories employed the following methods to ensure quality, accuracy, precision and completeness of the analytical data generated as part of this investigation.

All primary and duplicate samples were submitted to the primary laboratory (ALS). Triplicate samples were submitted to a secondary laboratory (Eurofins). Both analytical laboratories were NATA accredited and perform all laboratory testing to the appropriate standards required for environmental assessment.

The performance of the laboratory QA/QC measures were assessed in accordance with the PARCC parameters (precision, accuracy, representativeness, comparability and completeness). Independent assessment of the laboratory QA/QC measures was undertaken during the preparation of site investigation reports and assessed the following:

- Method Blanks
- Laboratory control samples
- Matrix Spike and Matrix Spike Duplicates
- Laboratory Duplicates
- Surrogates

9.3 Analytical Data Validation

Analytical data validation is the process of assessing if data are in compliance with method requirements and project specifications as outlined in the ASC NEPM. The primary objectives of this process are to ensure that data of known quality are reported, and to identify if the data can be used to fulfil the overall project objectives.

Specific elements of data validation that will be checked and assessed for this project are:

- preservation and storage of samples upon collection and during transport to the laboratory
- sample holding times
- required limits of reporting
- frequency of conducting quality control measurements
- laboratory blanks
- rinsate blanks
- trip blanks
- field duplicates
- laboratory duplicates
- inter-laboratory duplicates
- laboratory control samples
- matrix spike/matrix spike duplicates
- surrogates
- the occurrence of apparently unusual or anomalous results, e.g. laboratory results that appear to be inconsistent with field observations or measurements.

9.4 Corrective Actions

Analytical data that fail to meet the predetermined data quality indicators were managed using the following corrective actions on a case-by-case basis:

- reanalyse suspect samples, provided sample or extract is within holding time
- evaluate and amend sampling and/or analytical procedures
- resampling and reanalysis
- accept the data as an estimate with an acknowledged level of bias and imprecision

In the event that data of questionable reliability are used, restrictions and limitations associated with the use of such data are clearly identified and discussed.

A summary of the data validation undertaken as part of the soil sampling program is provided below. All relevant laboratory reports (including the laboratory QA/QC reports) are included in **Appendix M**. Field Quality Assurance / Quality Control (QA/QC) data are included in **Appendix L**.

9.5 Soil and Sediment Data Validation

Validation of the soil data is discussed below:

- Soil samples were collected in laboratory supplied sample containers.
- Two field blanks were collected and analysed. All concentrations were reported below the LOR for all analytes tested. It is noted that three field blanks were required in the three field days. Given the majority of the DQIs were met it is not considered a significant oversight that would make the data unusable.
- Two trips blanks (1 per esky) were collected and concentrations were not reported above the LOR for all volatile analytes tested.
- Primary and duplicate soil samples were received correctly preserved with ice. ALS laboratory received the samples at a temperature of 1.7 °C in primary batch EM1710771, less than the recommended temperature of 4 ºC ± 2 ºC. The triplicate soil sample was received correctly preserved at the Eurofins laboratory (batch 558872) with ice at a temperature of 10.1 °C. The sample receipt temperature is not considered to affect the integrity of the PFAS soil samples, which was the primary COPC for this investigation.

- A total of 3 field duplicates and 1 field triplicate (inter-laboratory duplicates) were analysed. The duplicates met the frequency of one in twenty primary samples, whereas the triplicate sample did not. Field relative percentage differences (RPDs) for some compounds exceeded the relative DQIs including:
  - PFHpS
  - PFPeS
  - PFHxS
  - PFOA
  - PFOS
  - FOSA
  - PFBS
  - PFDS
  - PFHxA
  - PFUnA
- Field triplicate RPDs were reported within control limits, with the exception of the following sample analysis (the sample with the higher reported concentrations is in bold):
  - SS05 and **QC18** for Sum of PFAS - WA DER List (100%)
  - SS05 and **QC18** for TPH C_{10}-C36 fraction (101%)
  - SS05 and **QC18** for TRH >C_{16}-C_{34} fraction (33%)
  - SS05 and **QC18** for PFOS (108%)
- Method blanks were within control limits.
- Laboratory duplicates were within control limits.
- Laboratory control outliers were not reported.
- No surrogate outliers were reported.

No apparent anomalies between field observations and resultant data occurred other than no hydrocarbon odours being noted in MW02 during drilling, whereas TPH/TRH concentrations were reported above LOR.

Refer to **Appendix M** for the laboratory documentation and **Appendix L** for the Field QAQC tables.

9.6 Groundwater Data Validation

Validation of the groundwater data is discussed below. No surface water samples were collected during the limited investigation.

- Groundwater samples were collected in laboratory supplied sample containers
- Field blank (QC03 and QC05) and rinsate samples (QC04 and QC06) were collected at a minimum frequency of one each per day of sampling. Field blank concentrations were below the LOR for all analytes with the exception of PFOS in QC04 (0.04 µg/L). Rinsate blank concentrations were below the LOR for all analytes.
- Trip blank samples were collected at a frequency of one per esky and reported concentrations below the LOR all analytes.
- Method blanks were within control limits.
- Laboratory duplicates were within control limits.
- Laboratory control outliers were not reported.

No apparent anomalies between field observations and resultant data occurred.

Refer to **Appendix M** for the laboratory documentation and **Appendix L** for the Field QAQC tables.

10.0 Adopted Assessment Criteria

10.1 Overview

Identifying and selecting appropriate scientifically robust assessment criteria for a site can be a detailed process. Selection and use of assessment criteria were considered in the context of the CSM to ensure appropriate evaluation of potential human health and ecosystem risks.

The adopted PFAS assessment criteria are intended to be conservative, for the initial assessment of human health and ecological risk (i.e. Tier 1).

It is noted that overall risks to human health or the environment from PFAS cannot be evaluated simply by comparison of reported PFAS concentrations with the criteria discussed below, because PFAS has the potential to bioaccumulate within the food chain and the criteria do not take into consideration the potential for bioaccumulation via all potential pathways.

Adopted assessment criteria and reference documents are summarised below and in **Table 10-1**.

10.2 Human Health

10.2.1 Soil and Sediment

- DER (2017) Interim Guideline on the Assessment and Management of PFAS – Health Based Screening Level (Commercial and Industrial land use).
- Airservices (GHD, 2017) Derivation of PFAS Soil and Water Criteria (HBSC) – Commercial / Industrial land use – Based on FSANZ TDI 2017.
- Airservices (GHD, 2015) Derivation of PFAS Soil and Water Criteria – Human Health Screening Levels (HILs) – Industrial land use (direct contact only).

10.2.2 Groundwater

- DER (2017) Non-potable and Recreational Use Guideline.
- DER (2017) Drinking Water Guideline.
- DoH (2017) Drinking Water Guideline – Based on FSANZ (2017) Health Based Guidance Values for PFAS.

10.3 Ecological

10.3.1 Soil and Sediment

- Airservices (GHD, 2015) Derivation of PFAS Soil and Water Criteria – Ecological Screening Levels (EILs) –Commercial and Industrial land use at 60% protection, low reliability.

10.3.2 Groundwater

- DER (2017) Freshwater Guideline for Highly Disturbed Systems – 80% and 90% species protection.
- Airservices (GHD, 2015) Derivation of PFAS Soil and Water Criteria – Ecological Interim Screening Levels (EISLs) – toxicity effects on aquatic organisms.

Table 10-1 Adopted Assessment Criteria Summary[3]

Receptor	Media	PFOS+PFHxS	PFHxS	PFOA	PFOS	8:2 FTS	6:2 FTS	Reference
Human Health	Soil & Sediment (mg/kg)	--	100	--	--	--	--	WA DER (2017) Health Based Screening Level (Commercial and Industrial land use).
		--	--	680	--	--	--	Airservices (GHD, 2017) Commercial / Industrial land use – Based on FSANZ TDI 2017.
		--	--	240	90	240	900	Airservices (GHD, 2015) Human Health Screening Levels (HILs) – Industrial land use (direct contact only).
	Groundwater (µg/L)	5	5	50	5	--	--	DER (2017) Non-potable and Recreational Use Guideline.
		0.5	--	5	--	--	--	DER (2017) Drinking Water Guideline.
		0.07	--	0.56	--	--	--	DoH (2017) Drinking Water Guideline – Based on FSANZ (2017)
Ecological	Soil & Sediment (mg/kg)	--	--	3.73	4.71	3.73		Airservices (GHD, 2015) EILs – Commercial and Industrial land use at 60% protection, low reliability.
	Groundwater (µg/L)	2	2	632	2	--	--	DER (2017) Freshwater Guideline for Highly Disturbed Systems – 90% species protection.
		31	31	1824	31	--	--	DER (2017) Freshwater Guideline for Highly Disturbed Systems – 80% species protection.
		--	--	2900	6.66	2900	--	Airservices (GHD, 2015) EISLs – toxicity effects on aquatic organisms.

[3] AECOM notes that the PFAS National Environmental Management Plan (NEMP) was released in February 2018. The SAQP defined the guideline values that have been compared against and were current at the time the limited sampling was conducted.

11.0 Results

11.1 Field Observations

11.1.1 Lithology

Table 11-1 below provides a summary of the subsurface conditions encountered at each APEC during the August 2017 limited investigation. Refer to **Appendix J** detailed bore logs. No visual and/or olfactory observations of potential contamination were reported any of the soil bores.

Table 11-1 Summary of Lithology – August 2017

Depth intervals (mBGL)	Lithology
APEC 1	
0 – 0.9-1.2	Sandy CLAY, brown to red brown, low to moderate plasticity clay, dolerite gravel to cobble and boulders (20-200 mm) through soil profile
0.9-1.2 – 1.6	As above, becoming firmer and paler with depth
1.6 – 2.6	Grading to Gravelly CLAY – likely extremely weathered upper margin of Dolerite
2.6 – 4.0	Weathered Dolerite bedrock, weathering decreasing with depth
End of Investigation (mBGL) – 6.0 m(MW01), 1.1 m (HA01, HA02)	
APEC 2b	
0 – 0.6	Sandy CLAY, brown to red brown, low to moderate plasticity clay, dolerite gravel to cobble (20-60 mm) through soil profile
0.6 – 4.3	As above, orange brown, becoming firmer and paler with depth
4.3 – 8.0	Weathered Dolerite bedrock, weathering decreasing with depth
End of Investigation (mBGL) – 8.0 m(MW02), 1.1 m (HA03), 0.9 m (HA04)	
APEC 4	
0 – 0.8	Sandy CLAY, dark brown, moderate plasticity clay, dolerite gravel to cobble (20-60 mm) through soil profile
0.8 – 1.1	As above, grey brown, becoming firmer and paler with depth
End of Investigation (mBGL) – 1.1 m (HA05)	
APEC 5	
0 – 0.7-0.8	Sandy Silty CLAY, black brown to dark grey, low to moderate plasticity clay, dolerite gravel to cobble (20-50 mm) through soil profile, >>plastic limit
0.7-0.8 – 3.4	As above, dark grey, >>plastic limit, slight natural organic odour
3.4 – 4.0	Clayey GRAVEL, well sorted, saturated
End of Investigation (mBGL) – 4.0 m (MW03), 1.1 m (HA06, HA07)	

11.1.2 Groundwater

Table 11-2 below provides a summary of groundwater elevation and field groundwater chemistry observed during the GME. Refer to **Appendix K** for the field groundwater purging data, **Table 1** and **Table 2** for groundwater elevation and field chemistry data. Because survey information for existing monitoring wells were not made available to AECOM at the time of completing this report, meaningful inferred groundwater potentiometric surface contours are not able to be drawn.

Table 11-2 Groundwater Field observations

Field Observation	August 2017 GME	
Groundwater Elevation (m AHD)	Groundwater beneath the Site (16-17 August 2017) was encountered at a depth of approximately 4.06 to 6.93 m below top of casing (mBTOC), with corresponding groundwater elevation of approximately 161.49 to 163.88 m AHD. Groundwater was encountered at 0.0 mBTOC (160.80 mAHD) at MW03 within the former waste water detention basin which may represent a perched water bearing zone. However, there is insufficient groundwater monitoring infrastructure present at the site to infer the presence of a single continuous or multiple aquifers/water bearing zones beneath the site. The permeability aquifer(s) is inferred to be moderate to high based on the observed subsurface conditions and groundwater recharge during sampling. General topography is noted to fall to the south and east towards the Springvale / Kelly's Creek catchments therefore it is anticipated that localised groundwater flow direction is likely to be similar to the direction of topographic fall.	
Dissolved Oxygen (DO) (mg/L)	APEC 1[#]	3.06 (MW04 – Mobil) – 7.19 (MW01)
	APEC 2b	4.38 (MW02)
	APEC 4[#]	0.32 (GW10 – APAL) – 1.85 (MB01 – APAL)
	APEC 5	0.08 (MW03)
pH (unit less)	pH was similar across all APECs ranging from 6.52 (MW04 – Mobil) to 7.61 (MW03).	
Electrical Conductivity (EC) (µS/cm)	APEC 1	452 (MW01) – 3740 (GW18 – APAL)
	APEC 2b	651 (MW02)
	APEC 4	777 (MB01 – APAL) – 1696 (GW10 – APAL)
	APEC 5	1980 (MW03)
Total Dissolved Solids (TDS)* (mg/L)	APEC 1	294 (MW01) – 2431 (GW18 – APAL)
	APEC 2b	423 (MW02)
	APEC 4	505 (MB01 – APAL) – 1102 (GW10 – APAL)
	APEC 5	1287 (MW03)
Redox Potential (mV)	APEC 1	139 (MW01) – 175 (MW04 – Mobil)
	APEC 2b	173 (MW02)
	APEC 4	103 (GW10 – APAL) – 106 (MB01 – APAL)
	APEC 5	113 (MW03)
Temperature (ºC)	Temperature was similar across all APECs ranging from 12.3 (GW10 and MW03) to 14.8 (MW04)	
General Comments and evidence of impact	Purged water was noted to be generally of low turbidity, colourless to light brown and odourless. Two locations (MW03 and GW18) were noted to be turbid and brown. A slight hydrocarbon odour was noted at GW10 and a slight natural organic odour noted at MW03. No visual and/or olfactory observations of potential contamination were reported any of the other groundwater monitoring wells.	

* TDS calculated from EC readings: EC x 0.65
[#] Bore logs for existing groundwater monitoring wells were not reviewed at the time of preparing this report. Monitoring wells were installed at different times by different consultants and may represent different water bearing zones demonstrated by variable electrical conductivity, dissolved oxygen and redox potential

11.2 Analytical Results

11.2.1 Soil and Sediment

Sample location and analytical results for soil and sediment samples are presented in the following attached Tables and Figures.

- **Table 3** Laboratory Analytical Results – PFAS Concentrations Detected in Soil and Sediment
- **Table 5** Laboratory Analytical Results – Hydrocarbon Concentrations Detected in Soil and Sediment
- **Figure 2** Monitoring Well, Surface Sample and Hand Auger Locations
- **Figure 3** Soil and Sediment Sample Analytical Results

PFAS impacts were identified greater than LOR and generally less than screening criteria at all soil investigation locations (APEC 1, APEC 2b, APEC 4, APEC 5).

PFOS concentrations in soil were reported greater than the adopted commercial / industrial land use screening criteria for ecological protection (60% protection of species) (GHD, 2015b) at one surface soil location in the vicinity of the ARFF Fire Station – APEC 1 (HA02).

PFAS impacts were not identified greater than the adopted screening criteria for human health protection in any soil or sediment sample.

Minor heavy fraction (TRH >C_{10}-C_{40}) petroleum hydrocarbon impacts were identified in soils but did not exceed the adopted human health or ecological screening criteria.

11.2.2 Groundwater

Sample location and analytical results for groundwater samples are presented in the following attached Tables and Figures.

- **Table 4** Laboratory Analytical Results – PFAS Concentrations Detected in Groundwater
- **Table 6** Hydrocarbon Concentrations Detected in Groundwater
- **Figure 2** Monitoring Well, Surface Sample and Hand Auger Locations
- **Figure 4** Groundwater Sample Analytical Results
- **Figure 5** Site Hydrology – Stormwater Drainage Network

PFAS impacts in groundwater were observed at all sampled monitoring well locations (APEC 1, APEC 2b, APEC 4, APEC 5) greater than the adopted screening criteria.

PFAS concentrations were reported greater than the adopted screening criteria for human health protection at all monitoring well locations, including under drinking water and non-potable / recreational use scenarios. Whilst potable use of groundwater down-hydraulic gradient of the site is considered unlikely given the availability of reticulated water supply in the area, drinking water screening criteria have been adopted in the current assessment to screen against all potential receptor pathways.

PFAS impacts in groundwater were also reported greater than the adopted screening criteria for ecological protection at all areas sampled (APEC 1, APEC 2b, APEC 4, APEC 5), including highly disturbed freshwater ecosystems and in consideration of toxicological effects on aquatic organisms.

With one exception petroleum hydrocarbon impacts to groundwater reported were less than LOR. Petroleum hydrocarbon impacts from one groundwater location (GW10) located at the former fire training ground (APEC 4) exceeded the Airport (Environment Protection) Regulations 1997 ecological screening criteria for fresh water by up to a factor of three.

11.2.3 Non-Potable / Recreational Criteria

- PFHxS concentrations were above the criteria for non-potable groundwater use (5 µg/L - DER, 2017) at five of the seven monitoring wells, with concentrations ranging from 2.45 µg/L to 411 µg/L.
- PFOS + PFHxS (sum) concentrations were above the criteria for non-potable groundwater use (5 µg/L – DER, 2017) at all monitoring wells, with concentrations ranging from 8.19 µg/L to 1,650 µg/L.
- PFOS concentrations were above the criteria for non-potable groundwater use (5 µg/L – DER, 2017) in five of the seven monitoring wells, with concentrations ranging up to 1,240 µg/L.
- PFOA concentrations were less than the criteria for non-potable groundwater use (50 µg/L – DER, 2017) with a maximum concentration of 46.9 µg/L.

11.2.4 Drinking Water Criteria

- PFOS + PFHxS (sum) concentrations were above the DoH/FSANZ criteria for potable groundwater use (0.07 µg/L – DoH, 2017) at all monitoring wells.
- PFOS + PFHxS (sum) concentrations were above the WA DER criteria for potable groundwater use (0.5 µg/L – WA DER, 2017)) at all monitoring wells.
- PFOA concentrations were above the DoH/FSANZ criteria for potable groundwater use (0.56 µg/L – DoH, 2017) at four of seven monitoring wells.
- PFOA concentrations were above the WA DER criteria for potable groundwater use (5 µg/L – WA DER, (2017) at four of seven monitoring wells.

11.2.5 Ecological Guidelines

PFAS concentrations in groundwater were also reported above the adopted assessment criteria for ecological protection as follows:

- PFHxS concentrations were above the criteria for highly disturbed freshwater ecosystems (90% species protection) (2 µg/L – WA DER, 2017) at all monitoring wells.
- PFOS + PFHxS (sum) concentrations were above the criteria for highly disturbed freshwater ecosystems (90% and 80% species protection) (2 µg/L – WA DER, 2017) at all monitoring wells.
- PFOS concentrations were above the criteria for highly disturbed freshwater ecosystems (90% species protection) (2 µg/L – WA DER, 2017) at all monitoring wells. Concentrations were greater than the 80% species protection at four of seven monitoring wells.
- PFOS concentrations were above the criteria for ecological protection derived by GHD (2015) (6.66 µg/L) in consideration of toxicological effects on aquatic organisms at five of seven monitoring wells.
- PFOA concentrations were less than all criteria.

12.0 Updated Conceptual Site Model (CSM)

A preliminary CSM was developed as part of the PSI (AECOM, 2017a).The outcomes of the PSI identified several data gaps for each APEC. The Limited Site Investigation undertaken by AECOM in August 2017 in general accordance with the SAQP (AECOM, 2017b) addressed the following data gaps:

- Confirmation of the presence and extent of PFAS contamination in soil
- Confirmation of the presence and extent of PFAS contamination in ground and surface water
- Confirmation of the presence of Hydrocarbon contamination in Soil and Groundwater.

Best-practice risk-based contaminated site management involves the development of a conceptual site model (CSM) to examine the source, nature and extent of contamination and to evaluate the potential effects of contamination on human health and the environment. Land is considered to be 'contaminated' where there is a risk of harm, or potential harm, to human health, the environment or environmental values from a substance present at or above background concentrations.

The assessment of whether a site is 'contaminated' is founded on this risk-based approach; and the iterative development of the CSM. Development of the CSM is therefore a standard preliminary step in the process of human health and ecological risk assessment. For a particular contaminant to pose a risk to receptors, three components must exist:

- **Source** – A potentially hazardous substance that has been released into the environment;
- **Pathway** – the mechanism by which receptors may be exposed to the source or derivatives of the source;
- **Receptors** – The human or ecological component potentially at risk of experiencing an adverse response from exposure to the source, or derivatives of the source. Identified receptors for the site are detailed in **Table 12-1**.

If one of these three components is missing from an exposure scenario, then there can be no risk.

The fundamental aim of the risk evaluation process is to identify any complete source-pathway-receptor (SPR) linkages that may present an unacceptable level of risk to a receptor; and to formulate an appropriate management strategy to mitigate identified risks to acceptable levels.

Based on the findings of desktop and intrusive investigations, site inspections and site interviews conducted at the Launceston Airport Estate, a tabulated updated CSM is presented in **Table 12-2** (below).

12.1 Potential Sources of Contamination

The current scope of works pertains to the historical use of AFFF by ARFF and other stakeholders operating at the airport. As such, the preliminary CSM focuses primarily on AFFF sources of contamination. However, as requested by Airservices, the CSM also identifies other contaminants of potential concern (COPC) related to ARFF activities.

Four APEC are listed and detailed in the preliminary CSM presented in **Table 12-2** below, with APEC 3 and APEC 6 from both excluded from the limited sampling. These exclusions reflect that insufficient information is available to confirm whether specific aircraft hangars or the airport fuel depot have ever incorporated the use or storage of AFFF and are not related with ARFF activities.

AFFF related sources of contamination are therefore further examined **Table 12-1** as:

- ARFF Fire Station & Vehicle Maintenance areas
- Southern soil stockpile
- Former Fire Training Ground and Soil Stockpile
- Former wastewater detention ponds (located north of the grassed airstrip).

12.2 Potential Receptors

Potential receptors to AFFF related contamination at the Launceston Airport Estate are summarised in **Table 12-1.**

Table 12-1 Potential Receptors

Receptor(s)	Description
On-site workers / operators	Persons routinely working at the airport. The site is an operational airport and commercial and business precincts are present within the site boundary.
On-site intrusive maintenance workers	There is a potential for maintenance worker exposure, particularly where works require ground-breaking or excavation activities within APECs.
Down-gradient users of non-potable groundwater or surface water	Users of groundwater or surface water may be exposed to AFFF related contaminants in the neighbouring agricultural catchments. Numerous irrigation dams are located within neighbouring farmland properties, with two such features located directly east-north-east of the FFTG and within the Springvale Creek catchment.
Down-gradient users of potable groundwater	Potable use of groundwater down-hydraulic gradient of the site. Human consumption is unlikely given the reticulated water supply in the area, but exposure to bore water via extraction for other domestic use (e.g. irrigation / recreational) is possible.
Down-gradient agricultural produce streams	Agricultural crops or cattle/stock exposure to potential off-site migration of contaminants within downgradient catchments.
Ecological receptors within the former retention pond, Kelly's Creek and Springvale Creek catchments	Kelly's Creek receives direct stormwater discharge from a significant proportion of the reticulated airport catchment (and previously received treated wastewater discharge from the airport). Springvale Creek (to the south) is expected to receive stormwater runoff from southern areas of the airport.

12.3 Potential Transport Mechanisms and Exposure Pathways

Potential mechanisms of contamination transport through soil, groundwater, vapour media and the environment include:

- Direct releases and/or spillages into the ground;
- Leaching of contaminants from impacted soils to groundwater;
- Lateral migration of contaminants in groundwater, in the direction of groundwater flow;
- Surface water run-off into drainage systems and the migration of contaminants within surface water catchments, either in soluble and/or soil/sediment adsorbed forms;
- Dispersion through the air via wind drift; and
- Ecological uptake in vegetation and/or fauna.

Potential exposure pathways between the key AFFF contaminant sources identified in **Section 12.1** and relevant receptors identified in **Section 12.2** include:

- Direct contact with impacted soils (including oral ingestion, dermal contact and dust inhalation);
- Direct contact with groundwater (encountered or abstracted);
- Direct contact with surface water (encountered);
- Crop uptake or cattle/stock/biota intake of surface water or abstracted groundwater affected by contaminants;
- Direct discharge or migration of contaminants into surface waters.

12.4 Source Pathway and Receptor Linkages

A tabulated representation of the preliminary CSM describing potential SPR linkages and based on the findings of the Limited Investigation is provided in **Table 12-2**, which includes an assessment of the status of each identified SPR linkage for on-site and off-site receptors and an associated evaluation of any residual data gaps relevant to each SPR linkage of concern.

The preliminary CSM identifies linkages as either *probable* or *possible*, based on the likelihood of occurrence and the availability of data. Probable indicates that the SPR linkage is more likely, whereas possible suggests that the SPR linkage may occur, although, there is insufficient information to determine if the linkage is credible.

Table 12-2 Updated Conceptual Model

APEC 1 – ARFF Fire Station & Vehicle Maintenance areas							
Source	**Transport Mechanisms**	**Exposure Pathway**	**Receptors**	**SPR Status**	**Data Gap**	**Discussion**	**Data Gaps Status**
On-site soils potentially impacted by hydrocarbons, heavy metals and/or PFAS resulting from fire-appliance testing and maintenance activities and the storage of AFFF in the area. Former Diesel UST located at Fire Station	Direct spills or releases of contaminants into soil profiles. Vertical infiltration of contaminants or leaching of contaminants into groundwater and lateral migration of soluble contaminants in the direction of groundwater flow. Contaminants in storm water run-off or in wash water via discharge to drainage systems and further migration within receiving catchments – in dissolved form and/or adsorbed to soil/sediment. Ecological uptake into vegetation and/or fauna, and potential bioaccumulation.	Direct contact with impacted soils (ingestion, dermal contact and dust inhalation)	On-site Airport workers / operators	**Unlikely**	<u>The presence/absence of PFAS impacts in soil and/or sediment.</u>	• PFAS impacts were previously confirmed in soils excavated from the area during replacement of concrete apron. • A single PFOS concentration was reported greater than the adopted commercial / industrial land use screening criteria for ecological protection (60% protection of species) (GHD, 2015b). • PFAS impacts were not identified greater than the adopted screening criteria for human health protection in any soil or sediment sample. • Minor heavy fraction (TRH >C10-C40) petroleum hydrocarbon impacts were identified in soils but did not exceed the adopted human health or ecological screening criteria.	<u>Data gap considered closed based on the presence of PFAS in soil and/or sediment samples in APEC 1.</u> <u>It is noted that the SPR linkages remain possible based on the data collected during the Limited Investigation.</u>
		Direct contact with impacted soils (ingestion, dermal contact, dust inhalation, vapour inhalation)	On-site intrusive maintenance workers	**Possible**			
		Direct contact with impacted groundwater during excavation or similar works		**Possible**	<u>The presence/absence of PFAS impacts in groundwater and surface water.</u>	• PFAS was reported at concentration greater than the LOR in all groundwater and surface water samples • PFAS concentrations reported above one or more of the adopted assessment criteria in all samples. Stormwater system figures **Figure 5** suggest surface water for the airport is directed towards the Springvale / Kelly's Creek catchments, however no surface water was present to confirm presence of COPC within drainage swales or the stormwater drainage system.	<u>Data gap considered closed based on the presence of PFAS in groundwater and/or surface water samples in and adjacent to APEC 1</u> <u>It is noted that the SPR linkages remain possible based on the data collected during the Limited Investigation</u>.
		Direct contact with impacted surface water or wastewater during maintenance or similar works		**Possible**			
		Direct contact (ingestion or dermal contact) with abstracted groundwater or surface water	Down-gradient users of non-potable groundwater or surface water	**Possible**			
		Ingestion via harvest of irrigated crops or watered stock		**Possible**			
		Natural uptake/intake of impacted groundwater or surface water	Down-gradient agricultural produce streams	**Possible**			
		Crop uptake of irrigation water sourced from impacted groundwater or surface water		**Possible**			
		Stock ingestion of impacted surface water or abstracted impacted groundwater		**Possible**			
		Entry of contaminated surface water drainage and/or sediment into surface water bodies.	Ecological receptors within the Kelly's Creek and Springvale Creek catchments	**Possible**	<u>The presence/absence of PFAS impacts in sediment and surface water.</u>	As above for soil and sediment	<u>Data gap considered closed based on the presence of PFAS in soil and/or sediment samples in APEC 1.</u> <u>It is noted that the SPR linkages remain possible based on the data collected during the Limited Investigation.</u>
		Entry of contaminated groundwater into surface water bodies ('gaining stream' scenario).		**Likely**	<u>The presence/absence of PFAS impacts in groundwater and surface water.</u>	As above for groundwater	<u>Data gap considered closed based on the presence of PFAS in groundwater and/or surface water samples in and adjacent to APEC 1</u> <u>It is noted that the SPR linkages remain possible based on the data collected during the Limited Investigation</u>.

APEC 2b – Southern soil stockpile							
Source	**Transport Mechanisms**	**Exposure Pathway**	**Receptors**	**SPR Status**	**Data Gap**	**Discussion**	**Data Gaps Status**
Soil stockpiles located south of hangars potentially impacted by PFAS.	Direct spills or releases of contaminants into soil profiles. Vertical infiltration of contaminants or leaching of contaminants into groundwater and lateral migration of soluble contaminants in the direction of groundwater flow. Contaminants in storm water run-off or in wash water via discharge to drainage systems and further migration within receiving catchments – in dissolved form and/or adsorbed to soil/sediment. Ecological uptake into vegetation and/or fauna, and potential bioaccumulation.	Direct contact with impacted soils (ingestion, dermal contact and dust inhalation)	On-site Airport workers / operators	**Unlikely**	The presence/absence of PFAS impacts in soil and/or sediment.	• PFAS and heavy metal impacts were previously confirmed in stockpiled soils to the south of RFDS & Cirrus Hangars. • PFAS impacts were confirmed in soils greater than LOR and less than screening criteria at all soil investigation locations • PFAS impacts were not identified greater than the adopted screening criteria for human health protection in any soil or sediment sample.	Data gap considered closed based on the presence of PFAS in soil and/or sediment samples in APEC 2b. It is noted that the SPR linkages remain possible based on the data collected during the Limited Investigation.
		Direct contact with impacted soils (ingestion, dermal contact, dust inhalation, vapour inhalation)	On-site intrusive maintenance workers	**Possible**			
		Direct contact with impacted groundwater during excavation or similar works		**Possible**	The presence/absence of PFAS impacts in groundwater and surface water.	• PFAS impacts in groundwater were observed at the single sampled monitoring well greater than the adopted screening criteria. • Stormwater system figures (**Figure 5**) suggest surface water for the airport is directed towards the Springvale / Kelly's Creek catchments, however no surface water was present to confirm presence of COPC within surface drainage swales.	Data gap considered closed based on the presence of PFAS in groundwater and/or surface water samples in and adjacent to APEC 2b. It is noted that the SPR linkages remain possible based on the data collected during the Limited Investigation.
		Direct contact with impacted surface water or wastewater during maintenance or similar works		**Possible**			
		Direct contact (ingestion or dermal contact) with abstracted groundwater or surface water	Down-gradient users of non-potable groundwater or surface water	**Possible**			
		Ingestion via harvest of irrigated crops or watered stock		**Possible**			
		Natural uptake/intake of impacted groundwater or surface water	Down-gradient agricultural produce streams	**Possible**			
		Crop uptake of irrigation water sourced from impacted groundwater or surface water		**Possible**			
		Stock ingestion of impacted surface water or abstracted impacted groundwater		**Possible**			
		Entry of contaminated surface water drainage and/or sediment into surface water bodies.	Ecological receptors within the Kelly's Creek and Springvale Creek catchments	**Possible**	The presence/absence of PFAS impacts in sediment and surface water.	As above for soil and sediment	Data gap considered closed based on the presence of PFAS in soil and/or sediment samples in APEC 2b. It is noted that the SPR linkages remain possible based on the data collected during the Limited Investigation.
		Entry of contaminated groundwater into surface water bodies ('gaining stream' scenario).		**Likely**	The presence/absence of PFAS impacts in groundwater and surface water.	As above for groundwater	Data gap considered closed based on the presence of PFAS in groundwater and/or surface water samples in and adjacent to APEC 2b. It is noted that the SPR linkages remain possible based on the data collected during the Limited Investigation.

APEC 4 – Former Fire Training Ground and Soil stockpile							
Source	**Transport Mechanisms**	**Exposure Pathway**	**Receptors**	**SPR Status**	**Data Gap**	**Discussion**	**Data Gaps Status**
Storage and controlled releases of Jet Fuel and Kerosene for training fire purposes. Storage and controlled releases of AFFF for training fire purposes. Treatment and discharge of waste burnt fuels and AFFF to the evaporative-detention pond.	Historical release and potential spillage of fuels and AFFF products directly into soil profiles of the FFTG and surrounds. Vertical infiltration of contaminants into groundwater and lateral migration of soluble contaminants in the direction of groundwater flow. Further migration within receiving catchments – in dissolved form and/or adsorbed to soil/sediment. Ecological uptake into vegetation and/or fauna, and bioaccumulation.	Direct contact with impacted soils (ingestion, dermal contact and dust inhalation)	On-site Airport workers / operators	**Unlikely**	The presence/absence of PFAS impacts in soil and/or sediment.	• PFAS and hydrocarbon impacts are confirmed in soil and groundwater at the FFTG and have been routinely monitored in groundwater since 2008. The FFTG facilities are now in a care & maintenance state. • PFAS impacts were confirmed in soils greater than LOR and less than screening criteria at all soil investigation locations.	Data gap considered closed based on the presence of PFAS in soil and/or sediment samples in APEC 4. It is noted that the SPR linkages remain possible based on the data collected during the Limited Investigation.
		Direct contact with impacted soils (ingestion, dermal contact, dust inhalation, vapour inhalation)	On-site intrusive maintenance workers	**Possible**			
		Direct contact with impacted groundwater during excavation or similar works		**Possible**	The presence/absence of PFAS impacts in groundwater and surface water.	• PFAS impacts in groundwater were observed at the two sampled monitoring wells greater than the adopted screening criteria. • Exposure of on-site workers to soil and groundwater impacts at the FFTG is considered unlikely due to its remoteness for the majority of Airport workers and activities. • Contact risks exist for ARFF workers who use/maintain the area or to other intrusive maintenance workers. • The FFTG is located on the hydraulically lowest Airport boundary (the eastern boundary), and it is possible that PFAS (and to a lesser extent hydrocarbon) impacts have migrated eastwards beyond the Airport boundary. • No surface water was present to confirm presence of COPC in natural drainage features or constructed drainage swales	Data gap considered closed based on the presence of PFAS in groundwater and/or surface water samples in and adjacent to APEC 4. It is noted that the SPR linkages remain possible based on the data collected during the Limited Investigation.
		Direct contact with impacted surface water or wastewater during maintenance or similar works		**Possible**			
		Direct contact, ingestion and uptake of contaminated surface waters and sediments.	On-site ecological receptors	**Possible**			
		Direct contact (ingestion or dermal contact) with abstracted groundwater or surface water	Down-gradient users of non-potable groundwater or surface water	**Likely**			
		Ingestion via harvest of irrigated crops or watered stock		**Likely**			
		Natural uptake/intake of impacted groundwater or surface water	Down-gradient agricultural produce streams	**Possible**			
		Crop uptake of irrigation water sourced from impacted groundwater or surface water.		**Likely**			
		Stock ingestion of impacted surface water or abstracted impacted groundwater		**Likely**			
		Entry of contaminated surface water drainage and/or sediment into surface water bodies.	Ecological receptors within the Kelly's Creek and Springvale Creek catchments	**Possible**	The presence/absence of PFAS impacts in sediment and surface water.	As above for soil and sediment	Data gap considered closed based on the presence of PFAS in soil and/or sediment samples in APEC 4. It is noted that the SPR linkages remain possible based on the data collected during the Limited Investigation.
		Entry of contaminated groundwater into surface water bodies ('gaining stream' scenario).		**Likely**	The presence/absence of PFAS impacts in groundwater and surface water.	As above for groundwater	Data gap considered closed based on the presence of PFAS in groundwater and/or surface water samples in and adjacent to APEC 4. It is noted that the SPR linkages remain possible based on the data collected during the Limited Investigation.

APEC 5 – Former wastewater detention ponds (located north of the grassed airstrip)							
Source	**Transport Mechanisms**	**Exposure Pathway**	**Receptors**	**SPR Status**	**Data Gap**	**Discussion**	**Data Gaps Status**
Airport wastewater and likely some component of stormwater, was discharged to this area prior to trade-waste and sewer connections being established in Airport upgrades (circa. 2000-2001).	Drainage of contaminants borne in surface water run-off into reticulated drainage systems (pre-2001) and discharge to soil profiles at the former detention ponds. Vertical infiltration of contaminants into groundwater and lateral migration of soluble contaminants in the direction of groundwater flow. Overflow discharge of contaminated surface water to nearby channels and potentially the off-site headwaters of Kelly's Creek (immediately north of wastewater detention pond) Migration of contaminated sediment and surface water in drainage channels and into natural Creek lines.	Direct contact with impacted soils (ingestion, dermal contact and dust inhalation)	On-site Airport workers / operators	**Unlikely**	The presence/absence of PFAS impacts in soil and/or sediment.	• PFAS impacts were confirmed in soils greater than LOR and less than screening criteria at all soil investigation locations.	Data gap considered closed based on the presence of PFAS in soil and/or sediment samples in APEC 5. It is noted that the SPR linkages remain possible based on the data collected during the Limited Investigation.
		Direct contact with impacted soils (ingestion, dermal contact, dust inhalation, vapour inhalation)	On-site intrusive maintenance workers	**Possible**			
		Direct contact with impacted groundwater during excavation or similar works		**Possible**	The presence/absence of PFAS impacts in groundwater and surface water.	• PFAS impacts in groundwater were observed at the single sampled monitoring well greater than the adopted screening criteria. • Stormwater system figures (**Figure 5**) suggest surface water and stormwater systems for the airport are directed towards the former detention pond located at the top of Kelly's Creek catchment, however no surface water was present to confirm presence of COPC within drainage swales or the stormwater drainage system • Although referenced as a 'detention' pond, the former wastewater treatment system may have acted as a constructed wetland discharge system. It is thus considered likely that ground infiltration and direct runoff may have occurred, as well as evaporation.	Data gap considered closed based on the presence of PFAS in groundwater and/or surface water samples in and adjacent to APEC 5. It is noted that the SPR linkages remain possible based on the data collected during the Limited Investigation.
		Direct contact with impacted surface water or wastewater during maintenance or similar works		**Possible**			
		Direct contact, ingestion and uptake of contaminated surface waters and sediments.	On-site ecological receptors	**Possible**			
		Direct contact (ingestion or dermal contact) with abstracted groundwater or surface water	Down-gradient users of non-potable groundwater or surface water	**Likely**			
		Ingestion via harvest of irrigated crops or watered stock		**Likely**			
		Natural uptake/intake of impacted groundwater or surface water	Down-gradient agricultural produce streams	**Possible**			
		Crop uptake of irrigation water sourced from impacted groundwater or surface water.		**Likely**			
		Stock ingestion of impacted surface water or abstracted impacted groundwater		**Likely**			
		Entry of contaminated surface water drainage and/or sediment into surface water bodies.	Ecological receptors within the Kelly's Creek and catchment.	**Likely**	The presence/absence of PFAS impacts in sediment and surface water.	As above for soil and sediment	Data gap considered closed based on the presence of PFAS in soil and/or sediment samples in APEC 5. It is noted that the SPR linkages remain possible based on the data collected during the Limited Investigation.
		Entry of contaminated groundwater into surface water bodies ('gaining stream' scenario).		**Likely**	The presence/absence of PFAS impacts in groundwater and surface water.	As above for groundwater	Data gap considered closed based on the presence of PFAS in groundwater and/or surface water samples in and adjacent to APEC 5. It is noted that the SPR linkages remain possible based on the data collected during the Limited Investigation.

13.0 Summary and Conclusions

13.1 Summary of Findings

This PSI of the Launceston Airport has assessed the available information and has documented that areas have been impacted by historical AFFF use at the airport before and during the presence of Airservices on the Site since 1995 including:

- It is understood that firefighting foams containing PFAS were used at the site until 2010/2011, when the ARFF fire station transitioned to an alternative product.
- Fuels and AFFF were used at the FFTG in training exercises and intrusive investigations undertaken by GHD in 2008 confirmed the presence of TRH, PAHs, PFOS and PFOA in surface soils at the FFTG. The vertical and lateral extent of these impacts in soil and groundwater remains undefined.
- AFFF was variously stored at the ARFF fire station, the FFTG and potentially at the Sharp Airlines hangar (ex-Qantas hangar) between approximately 1980 and 2010.
- Historically, ARFF training has occurred up to 3 times a week. Anecdotal evidence indicates AFFF foams may have been tested from the Walter and Mark 5 & 6 trucks on the concrete pad in front of the fire station, and wastewater potentially run off to nearby unpaved areas or discharged into reticulated wastewater or stormwater systems that is considered likely to have discharged to the former wastewater detention pond in the eastern part of the airport.
- PFAS contamination has been detected in the retained (and covered) soil stockpiles to the south of the southernmost hangars.
- PFAS contamination has been identified in soils generated during terminal apron paving upgrades, and in the area of the Cirrus Airlines hangar.

The results of the limited sampling indicated:

- PFAS impacts were not reported at concentrations greater than the adopted human health assessment criteria in the soil or sediment samples analysed.
- PFOS concentrations in soil were reported greater than the adopted ecological assessment criteria at one location within APEC 1.
- PFAS concentrations were reported greater than the adopted screening criteria for human health protection at all monitoring well locations, including under drinking water and non-potable / recreational use scenarios. Three registered bores are located within 1.5 km of the site and the Tertiary sedimentary basin in the airport surrounds is considered a potential high yielding groundwater resource. It is noted that a reticulated supply is available.
- PFAS impacts in groundwater were also reported above the adopted ecological assessment criteria at all APECs.
- Limited petroleum hydrocarbon impacts to soil representative of aviation fuels are present less than screening criteria at APEC 1, APEC 2b and APEC 4.
- With one exception petroleum hydrocarbon impacts to groundwater reported were less than LOR. Petroleum hydrocarbon impacts representative of aviation fuels exceeded ecological screening criteria by up to a factor of three were reported at one location in APEC 4.

13.2 Conclusions

Based on the information obtained as part of the PSI and limited sampling, the following conclusions can be made:

- The data gaps determined in the SAQP (AECOM 2017b) have been assessed and closed:
  - **Data Gap 1**: Low concentrations of PFAS are present in soil and sediment at all soil/sediment investigation locations, with one location greater than the ecological screening criteria.
  - **Data Gap 2**: PFAS impacts exceeding screening criteria are present in groundwater in all areas investigated.
  - **Data Gap 3**: Limited hydrocarbon impact to soil is present at APEC 1, APEC 2b and APEC 4 and in groundwater exceeding ecological screening criteria at APEC 4.
- The updated CSM indicates that SPR linkages remain "*possible*" or "likely" based on the data collected during the Limited Site Investigation. Direct contact with impacted soils (ingestion, dermal contact and dust inhalation) for on-site workers (non-intrusive works) is considered unlikely.

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15.0 Standard Limitations

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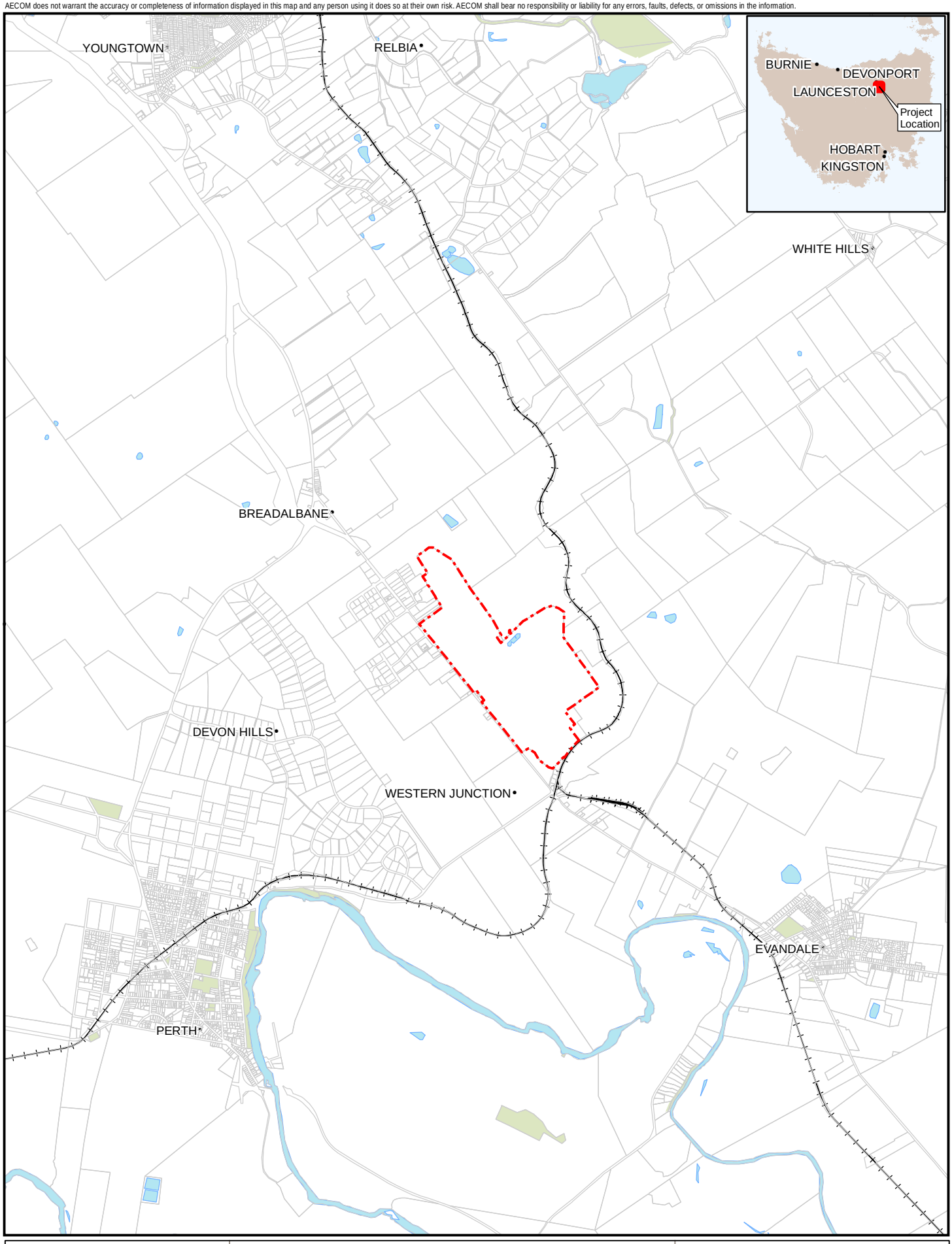
Figures



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APPROVED BY BEismen
LAST MODIFIED 23 JUL 2019

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N

DATUM GDA 1994, PROJECTION MGA ZONE 55

0 200 400 600 800
metres

1:50,000 when printed at A4

LEGEND

- Cadastral Boundary
- Parks
- Lakes
- Airport Estate Boundary
- Highway
- Major Road
- Minor Road
- Track
- Railways

Data sources:

Base Data: (c) Based on information provided by and with the permission of the Geosciences Australia

Site Location

AIRSERVICES AUSTRALIA

PRELIMINARY SITE INVESTIGATION AND LIMITED SAMPLING, LAUNCESTON AIRPORT

Figure

1

Map Document: \\172.20.192.11\Projects\605X\60509115\4. Tech Work Area\4.99 GIS\02_MXDs\Launceston\PSI_LS_Dec2017\G60543717_Fig 1_SiteLocation_v2_A4P.mxd [redacted]

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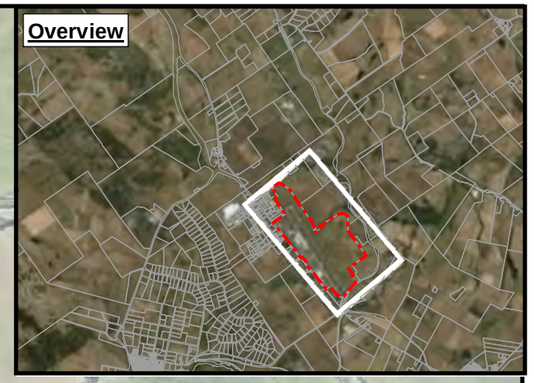

HA05
SOIL STOCKPILE AREA
APEC 4
MB1
GW10
FIRE TRAINING GROUND
FORMER WASTEWATER DETENTION POND
APEC 5
SS07
MW03
HA06
HA07
SS06
SS05
SS03
SS02
SS01
MW01
GW18
HA01
HA02
MW04
ARFF FIRE STATION
FUEL FARM TPH SPILL
APEC 1
POTENTIAL AFFF STOCKPILE
APEC 2b
SS04
MW02
HA03
HA04

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DATUM GDA 1994, PROJECTION MGA ZONE 55

0 100 200 300 400

metres

1:7,000 (when printed at A3)

LEGEND

- Monitoring Well Location
- Monitoring Well - Not Surveyed
- Hand Auger Location
- Surface Sample Location
- Airport Estate Boundary
- Cadastral Boundary
- Area of Potential Environmental Concern (APEC)

Data sources:
Nearmap Imagery

Base Data: (c) Based on information provided by and with the permission of Geoscience Australia

Monitoring Well, Surface Sample and Hand Auger Locations

AIRSERVICES AUSTRALIA

PRELIMINARY SITE INVESTIGATION AND LIMITED SAMPLING, LAUNCESTON AIRPORT

Figure

2

Map Document: \\172.20.192.11\Projects\605X\60509115\4. Tech Work Area\4.99 GIS\02_MXDs\Launceston\PSI_LS_Dec2017\G60543717_Fig 2_SamplingLocations_v3_A3L.mxd [redacted]

A3 size

Overview

	MW03_0.0-0.1	MW03_1.0-1.1
PFOS	**0.0393**	**0.419**
PFOS+PFHxS	**0.0634**	**0.449**
PFOA	**0.0005**	**0.0028**
F1	<10	<10
F2	<50	<50
BTEX	<0.2	<0.2
N	<1	<1

	SS07
PFOS	**0.359**
PFOS+PFHxS	**0.538**
PFOA	**0.0101**
F1	<10
F2	<50
BTEX	<0.2
N	<1

	HA06_0-0.1	HA06_1.0-1.1
PFOS	**0.0641**	**0.482**
PFOS+PFHxS	**0.102**	**0.507**
PFOA	**0.0022**	**0.0016**
F1	<10	<10
F2	<50	<50
BTEX	<0.2	<0.2
N	<1	<1

	HA07_0-0.1	HA07_1.0-1.1
PFOS	**0.145**	**0.223**
PFOS+PFHxS	**0.167**	**0.23**
PFOA	**0.0013**	**0.0003**
F1	<10	<10
F2	<50	<50
BTEX	<0.2	<0.2
N	<1	<1

	SS06
PFOS	**0.0124**
PFOS+PFHxS	**0.0138**
PFOA	<0.0002
F1	<10
F2	<50
BTEX	<0.2
N	<1

	HA01_0-0.1	HA01_1.0-1.1
PFOS	**0.428**	**2.24**
PFOS+PFHxS	**0.454**	**2.27**
PFOA	**0.0007**	**0.002**
F1	<10	<10
F2	<50	<50
BTEX	<0.2	<0.2
N	<1	<1

	MW01_0-0.1	MW01_1.0-1.1
PFOS	**0.24**	**0.32**
PFOS+PFHxS	**0.262**	**0.329**
PFOA	**0.0004**	**0.001***
F1	<10	<10
F2	<50	<50
BTEX	<0.2	<0.2
N	<1	<1

	SS03
PFOS	**0.0714**
PFOS+PFHxS	**0.0918**
PFOA	**0.0014**
F1	<10
F2	<50
BTEX	<0.2
N	<1

	SS02
PFOS	**0.0598**
PFOS+PFHxS	**0.0838**
PFOA	**0.0021**
F1	<10
F2	<50
BTEX	<0.2
N	<1

	SS01
PFOS	**0.0536**
PFOS+PFHxS	**0.109**
PFOA	**0.001**
F1	<10
F2	<50
BTEX	<0.2
N	<1

	HA02_0-0.1	HA02_1.0-1.1
PFOS	**10.4**	**3.88**
PFOS+PFHxS	**10.6**	**3.93**
PFOA	**0.0114**	**0.0021**
F1	<10	<10
F2	<50	<50
BTEX	<0.2	<0.2
N	<1	<1

	HA05_0-0.1	HA05_1.0-1.1
PFOS	**0.0201**	**0.0232***
PFOS+PFHxS	**0.0221**	**0.0261***
PFOA	**<0.0002**	**0.0002***
F1	<10	<10
F2	<50	<50
BTEX	<0.2	<0.2
N	<1	<1

	HA03_0-0.1	HA03_1.0-1.1
PFOS	**0.016**	**0.0055**
PFOS+PFHxS	**0.0172**	**0.0075**
PFOA	<0.0002	<0.0002
F1	<10	<10
F2	<50	<50
BTEX	<0.2	<0.2
N	<1	<1

	HA04_0.8-0.9	HA04_0-0.1
PFOS	**0.0243**	**0.016**
PFOS+PFHxS	**0.0617**	**0.0167**
PFOA	**0.0059**	<0.0002
F1	<10	<10
F2	<50	<50
BTEX	<0.2	<0.2
N	<1	<1

	MW02_0-0.1	MW02_1.0-1.1
PFOS	**0.0092**	<0.0002
PFOS+PFHxS	**0.0107**	<0.0002
PFOA	<0.0002	<0.0002
F1	<10	<10
F2	<50	<50
BTEX	<0.2	<0.2
N	<1	<1

	SS05
PFOS	**0.032****
PFOS+PFHxS	**0.032****
PFOA	<0.0002
F1	<10
F2	<50
BTEX	<0.2
N	<1

	SS04
PFOS	**0.0247**
PFOS+PFHxS	**0.0273**
PFOA	<0.0002
F1	<10
F2	**90**
BTEX	<0.2
N	<1

HA05
SOIL STOCKPILE AREA
APEC 4
GW10
MB1
FIRE TRAINING GROUND
FORMER WASTEWATER DETENTION POND
APEC 5
MW03
SS07
HA06
HA07
SS06
SS03
SS02
SS01
ARFF FIRE STATION
MW01
GW18
HA01
MW04
HA02
FUEL FARM TPH SPILL
APEC 1
POTENTIAL AFFF STOCKPILE
APEC 2b
MW02
HA03
HA04
SS04
SS05

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0 100 200 300 400
metres
1:7,000 (when printed at A3)

LEGEND
- Monitoring Well Location
- Monitoring Well - Not Surveyed
- Hand Auger Location
- Surface Sample Location
- Airport Estate Boundary
- Cadastral Boundary
- Area of Potential Environmental Concern (APEC)

PFOS = Perfluorooctane sulfonic acid
PFOS + PFHxS =Sum of Perfluorooctane sulfonic acid and Perfluorohexane sulfonic acid
PFOA = Perfluorooctanoic acid
F1 = C6-C10 fraction (minus BTEX)(F1)
F2 = >C10-C16 (minus Naphthalene)(F2)
BTEX = Total BTEX
N = Naphthalene
# Duplicate value adopted
LOR = Limit of Reporting
all units are in mg/kg
- = not analysed
#1 Quantification of linear and branched isomers has been conducted as a single total response using the relative response factor for the corresponding linear/branched standard.

WA DER (2017) Interim Guideline on the Assessment and Management of PFAS. Health Based Screening Level - Commercial and Industrial Landuse
Airservices (GHD) (2017) Derivation of PFAS Soil and Water Criteria - Health Based Screening Criteria (HBSC) - Commercial / Industrial Landuse
Airservices (GHD) (2015) Derivation of PFAS Soil and Water Criteria - Human Health Interim Screening levels (HILs)- industrial (direct contact only)
Airservices (GHD) (2015) Derivation of PFAS Soil and Water Criteria - Ecological Interim Screening levels (EISLs)- Commercial and industrial at 60% protection, low reliability

Data sources: Nearmap Imagery
Base Data: (c) Based on information provided by and with the permission of Geoscience Australia

Soil and Sediment Sample Analytical Results

AIRSERVICES AUSTRALIA

PRELIMINARY SITE INVESTIGATION AND LIMITED SAMPLING, LAUNCESTON AIRPORT

Figure 3

Map Document: \\172.20.192.11\Projects\605X\60509115\4. Tech Work Area\4.99 GIS\02_MXDs\Launceston\PSI_LS_Dec2017\G60543717_Fig3_SoilSampling_v3_A3L.mxd [redacted]

A3 size

Overview

GW10	
PFOS	1,240
PFOS+PFHxS	1,650
PFOA	46.9
F1	70
F2	1,430
BTEX	<1
N	8

MB1	
PFOS	582
PFOS+PFHxS	840
PFOA	21.9
F1	<20
F2	<100
BTEX	<1
N	<5

MW03	
PFOS	43.7
PFOS+PFHxS	77.9
PFOA	3.22
F1	<20
F2	<100
BTEX	<1
N	<5

MW01	
PFOS	270**
PFOS+PFHxS	450**
PFOA	15**
F1	<20
F2	<100
BTEX	<1
N	<5

MW04	
PFOS	3.22
PFOS+PFHxS	9.05
PFOA	0.37
F1	<20
F2	<100
BTEX	<1
N	<5

GW18	
PFOS	10.7
PFOS+PFHxS	13.2
PFOA	0.21
F1	<20
F2	<100
BTEX	<1
N	<5

MW02	
PFOS	4.81
PFOS+PFHxS	8.19
PFOA	0.16
F1	<20
F2	<100
BTEX	<1
N	<5

HA05
SOIL STOCKPILE AREA
APEC 4
GW10
MB1
FIRE TRAINING GROUND
FORMER WASTEWATER DETENTION POND
APEC 5
SS07
MW03
HA06
HA07
SS06
SS05
SS03
SS02
SS01
MW01
GW18
HA01
HA02
MW04
ARFF FIRE STATION
FUEL FARM TPH SPILL
APEC 1
POTENTIAL AFFF STOCKPILE
APEC 2b
MW02
HA03
HA04
SS04

PROJECT ID 60543717
CREATED BY [redacted]
APPROVED BY BEismen
LAST MODIFIED 29 JUL 2019

AECOM
www.aecom.com

DATUM GDA 1994, PROJECTION MGA ZONE 55
0 100 200 300 400
metres
1:7,000 (when printed at A3)

LEGEND
- Monitoring Well Location
- Monitoring Well - Not Surveyed
- Hand Auger Location
- Surface Sample Location
- Airport Estate Boundary
- Cadastral Boundary
- Area of Potential Environmental Concern (APEC)

PFOS = Perfluroctane sulfuric acid
PFOS + PFHxS = Sum of Perfluroctane sulfuric acid and Perflurohexane sulforic acid
PFOA = Perfluorooctanoic acid
F1 = C6-C10 fraction (minus BTEX)(F1)
F2 = >C10-C16 (minus napthalene)(F2)
BTEX = Total BTEX
N = Napthalene
All units in µg/L
NA = not analysed
* = duplicate sample value adopted for conservatism
** = triplicate sample value adopted for conservatism
It is noted that the APEC boundaries were broadly identified based on historical land use activities and are not directly correlated with the current Airservices lease areas.

Legend

DoH (2017) Australian Drinking Water Guideline - Based on FSANZ (2017) Health Based Guidance Values for PFAS
WA DER (2017) Drinking Water
WA DER (2017) Non-potable and recreational
WA DER (2017) Highly disturbed systems - 90% species protection
WA DER (2017) Highly disturbed systems - 80% species protection
Airservices (GHD) (2015) Derivation of PFAS Soil and Water Criteria - Ecological Interim Levels (EISLs) (toxicity effects on aquatic organisms

Data sources: Nearmap Imagery
Base Data: (c) Based on information provided by and with the permission of Geoscience Australia

Groundwater Sample Analytical Results

AIRSERVICES AUSTRALIA

PRELIMINARY SITE INVESTIGATION AND LIMITED SAMPLING, LAUNCESTON AIRPORT

Figure 4

Map Document: \\172.20.192.11\Projects\605X\60509115\4. Tech Work Area\4.99 GIS\02_MXDs\Launceston\PSI_LS_Dec2017\G60543717_Fig4_GWSampling_v3_A3L.mxd [redacted]

A3 size

HA05
SOIL STOCKPILE AREA
APEC 4
GW10
MB1
FIRE TRAINING GROUND
FORMER WASTEWATER DETENTION POND
APEC 5
SS07
MW03
HA06
HA07
SS06
SS05
SS03
SS02
SS01
MW01
GW18
HA01
HA02
MW04
ARFF FIRE STATION
FUEL FARM TPH SPILL
APEC 1
POTENTIAL AFFF STOCKPILE
APEC 2b
SS04
MW02
HA03
HA04

PROJECT ID	60543717
CREATED BY	
APPROVED BY	TS
LAST MODIFIED	29 JUL 2019

AECOM
www.aecom.com

DATUM GDA 1994, PROJECTION MGA ZONE 55

0 100 200 300 400

metres (when printed at A3)

1:7,000

LEGEND

- Monitoring Well Location
- Monitoring Well - Not Surveyed
- Hand Auger Location
- Surface Sample Location
- Site Hydrology – Stormwater Drainage Network
- Airport Estate Boundary
- Cadastral Boundary
- Area of Potential Environmental Concern (APEC)

Data sources:
Nearmap Imagery

Base Data: (c) Based on information provided by and with the permission of Geoscience Australia

Site Hydrology – Stormwater Drainage Network

AIRSERVICES AUSTRALIA

PRELIMINARY AND LIMITED SITE INVESTIGATION OF ARFF SERVICES, LAUNCESTON AIRPORT

Figure

5

Map Document: \\172.20.192.11\Projects\605X\60509115\4. Tech Work Area\4.99 GIS\02_MXDs\Launceston\PSI_LS_Dec2017\G60543717_Fig5_SiteHydrology_v3_A3L.mxd

A3 size

Tables

Table 1: MW Register and Gauging Data

	Monitoring Well	Date	Top of Casing Elevation (mAHD)	Well Depth (m)	Depth to Water (mbtoc)	Groundwater Elevation (mAHD)	Easting	Northing	Ground Level (mAHD)
APEC 1 ARFF Fire Station and Vehicle Maintenance Areas	MW01	16/08/2017	167.94	5.90	4.06	163.88	517447.141	5400649.003	168.07
	MW04	16/08/2017	-	6.03	5.36	-	-	-	-
	GW18	16/08/2017	-	10.38	4.18	-	-	-	-
APEC 2b Southern Soil Stockpile	MW02	16/08/2017	166.66	7.78	5.17	161.49	5400649.003	5399982.638	166.72
APEC 4 Former Fire Training Ground and Associated Soil Stockpile	GW10	16/08/2017	-	10.86	6.93	-	-	-	-
	MB01	17/08/2017	-	6.04	4.19	-	-	-	-
APEC 5 Former Wastewater Detention Pond	MW03	17/08/2017	160.80	4.00	0.00	160.80	517642.702	5401120.639	160.86

Legend
mAHD = meters Australian Height Datum
m = metres
mbtoc = metres below top of casing
Monitoring Well Survey Completed on 11 August 2017
- = not measured / recorded

Table 2: Groundwater Field Chemistry

Location	Sample Date	Purge Volume	Dissolved Oxygen	pH	Electrical conductivity	Total Dissolved Solids*	Redox Potential (Field)	Temperature
		L	mg/L	pH Units	µS/cm	mg/L	mV	°C
MW01	16/08/2017	3	7.19	6.67	452	294	139	12.5
MW04	16/08/2017	15	3.06	6.52	1,498	974	175	14.8
GW18	16/08/2017	11	3.07	6.93	3,740	2,431	156	14.5
MW02	16/08/2017	6	4.38	6.87	651	423	173	13.2
GW10	16/08/2017	10	0.32	7.23	1,696	1,102	103	12.3
MB01	17/08/2017	10	1.85	7.24	777	505	106	14.0
MW03	17/08/2017	12	0.08	7.61	1,980	1,287	113	12.3

Table 3: Laboratory Analytical Results - PFAS Concentrations Detected in Soil and Sediment

								APEC 1 - ARFF Fire Station and Vehicle Maintenance Areas							APEC 2b - Southern Soil Stockpile						APEC 4 - Soil Stockpile Area		
							Location	HA01		HA02		MW01			HA03		HA04		MW02		HA05		
							Sample ID	HA01_0-0.1	HA01_1.0-1.1	HA02_0-0.1	HA02_1.0-1.1	MW01_0-0.1	MW01_1.0-1.1	QC01	HA03_0-0.1	HA03_1.0-1.1	HA04_0.8-0.9	HA04_0-0.1	MW02_0-0.1	MW02_1.0-1.1	HA05_0-0.1	HA05_1.0-1.1	QC03
							Sample Depth	0-0.1	1-1.1	0-0.1	1-1.1	0-0.1	1-1.1	1-1.1	0-0.1	1-1.1	0.8-0.9	0-0.1	0-0.1	1-1.1	0-0.1	1-1.1	1-1.1
							Sample Date	9/08/2017	9/08/2017	9/08/2017	9/08/2017	9/08/2017	9/08/2017	9/08/2017	9/08/2017	9/08/2017	9/08/2017	9/08/2017	10/08/2017	10/08/2017	10/08/2017	10/08/2017	10/08/2017
							Sample Type	Primary	Primary	Primary	Primary	Primary	Primary	Intralaboratory Duplicate	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Intralaboratory Duplicate
							Lab Report No.	EM1710771	EM1710771	EM1710771	EM1710771	EM1710771	EM1710771	EM1710771	EM1710771	EM1710771	EM1710771	EM1710771	EM1710771	EM1710771	EM1710771	EM1710771	EM1710771
	Analyte	Units	LOR	ASA (GHD) 2015. EISLs - Comm / Ind 60% species protection level	ASA (GHD) 2015. HSLs Industrial (Direct Contact)	ASA (GHD) 2017. HBSC Comm/Ind (after FSANZ TDI)	WA DER - 2017. Health Based Screening Levels Comm / Ind																
Per- and Polyfluoroalkyl	Sum of PFAS	mg/kg	**0.0002**					**0.507**	**2.29**	**10.9**	**3.95**	**0.275**	**0.336**	**0.244**	**0.0187**	**0.0085**	**0.0785**	**0.0179**	**0.0107**	<0.0002	**0.0225**	<0.0002	**0.0273**
	Sum of PFAS (WA DER List)	mg/kg	**0.0002**					**0.474**	**2.28**	**10.6**	**3.94**	**0.264**	**0.332**	**0.219**	**0.0184**	**0.0079**	**0.0708**	**0.0167**	**0.0107**	<0.0002	**0.0225**	<0.0002	**0.027**
	Sum of PFHxS and PFOS	mg/kg	**0.0002**			81	100	**0.454**	**2.27**	**10.6**	**3.93**	**0.262**	**0.329**	**0.216**	**0.0172**	**0.0075**	**0.0617**	**0.0167**	**0.0107**	<0.0002	**0.0221**	<0.0002	**0.0261**
	10:2 FTS	mg/kg	**0.0005**					<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
	MeFOSAA	mg/kg	**0.0002**					<0.0002	<0.0002	**0.0024**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	PFPeS	mg/kg	**0.0002**					**0.0028**	**0.0029**	**0.0083**	**0.0022**	**0.0009**	**0.0004**	**0.0005**	<0.0002	<0.0002	**0.0014**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	PFHpS	mg/kg	**0.0002**					**0.0019**	**0.0025**	**0.0158**	**0.0029**	**0.0012**	**0.0004**	**0.0009**	<0.0002	**0.0006**	**0.006**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	**0.0003**
	PFHxS	mg/kg	**0.0002**				100	**0.0265**	**0.0342**	**0.187**	**0.0478**	**0.0219**	**0.0086**	**0.0148**	**0.0012**	**0.002**	**0.0374**	**0.0007**	**0.0015**	<0.0002	**0.002**	<0.0002	**0.0029**
	Et FOSAA	mg/kg	**0.0002**					<0.0002	<0.0002	**0.0047**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Surfactants	6:2 FTS	mg/kg	**0.0005**	NA	900			<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
	PFOA	mg/kg	**0.0002**	4	240	680	1,000	**0.0007**	**0.002**	**0.0114**	**0.0021**	**0.0004**	**0.0005**	**0.001**	<0.0002	<0.0002	**0.0059**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	**0.0002**
	PFOS	mg/kg	**0.0002**	5	90			**0.428**	**2.24**	**10.4**	**3.88**	**0.24**	**0.32**	**0.201**	**0.016**	**0.0055**	**0.0243**	**0.016**	**0.0092**	<0.0002	**0.0201**	<0.0002	**0.0232**
Organic	4:2 FTS	mg/kg	**0.0005**					<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
	PFBA	mg/kg	**0.001**					**0.008**	<0.001	**0.002**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	PFPeA	mg/kg	**0.0002**					**0.0048**	**0.0022**	**0.0068**	**0.0017**	**0.0006**	**0.0005**	**0.0004**	**0.0005**	<0.0002	**0.0006**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorinated Compounds (PFCs)	8:2 FTS	mg/kg	**0.0005**	4	240			<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
	N-Me-FOSA	mg/kg	**0.0005**					<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
	N-Me-FOSE	mg/kg	**0.0005**					<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
	FOSA	mg/kg	**0.0002**					**0.0043**	**0.0007**	**0.186**	**0.003**	**0.002**	**0.0016**	**0.0055**	<0.0002	<0.0002	<0.0002	**0.0003**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	PFBS	mg/kg	**0.0002**					**0.0019**	**0.0018**	**0.0023**	**0.0008**	**0.0004**	**0.0007**	**0.0006**	**0.0002**	<0.0002	**0.0007**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	PFDS	mg/kg	**0.0002**					**0.0221**	**0.0014**	**0.0354**	**0.0026**	**0.006**	**0.0013**	**0.0171**	**0.0003**	<0.0002	**0.0003**	**0.0009**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	PFTeDA	mg/kg	**0.0005**					<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
	PFTrDA	mg/kg	**0.0002**					<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	N-Et-FOSA	mg/kg	**0.0005**					<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
	PFDcA	mg/kg	**0.0002**					**0.0003**	<0.0002	**0.0034**	**0.0005**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	PFHpA	mg/kg	**0.0002**					**0.0003**	**0.0006**	**0.0038**	**0.0009**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	**0.0002**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	PFHxA	mg/kg	**0.0002**					**0.0034**	**0.0049**	**0.0321**	**0.009**	**0.001**	**0.0016**	**0.001**	**0.0005**	**0.0004**	**0.0017**	<0.0002	<0.0002	<0.0002	**0.0004**	<0.0002	**0.0007**
	N-Et-FOSE	mg/kg	**0.0005**					<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
	PFDoA	mg/kg	**0.0002**					**0.0013**	<0.0002	**0.0049**	<0.0002	**0.0006**	<0.0002	**0.0005**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	PFNA	mg/kg	**0.0002**					**0.0007**	**0.0003**	**0.0044**	**0.0007**	**0.0002**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	PFUnA	mg/kg	**0.0002**					**0.0002**	<0.0002	**0.0011**	<0.0002	<0.0002	<0.0002	**0.0003**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	Moisture Content	%	1					**28.6**	**26.2**	**34.2**	**33.2**	**22.4**	**16.1**	**21.7**	**27.6**	**25.7**	**16.4**	**10.3**	**18.9**	**30**	**33.2**	**32.9**	**40.9**

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

Legend
WA DER (2017) Interim Guideline on the Assessment and Management of PFAS. Health Based Screening Level - Commercial and Industrial
Airservices (GHD) (2017) Derivation of PFAS Soil and Water Criteria - Health Based Screening Criteria (HBSC) - Commercial / Industrial
Airservices (GHD) (2015) Derivation of PFAS Soil and Water Criteria - Human Health Interim Screening levels (HILs)- industrial (direct
Airservices (GHD) (2015) Derivation of PFAS Soil and Water Criteria - Ecological Interim Screening levels (EISLs)- Commercial and
LOR = Limit of Reporting
Above LOR results in **bold**
- = not analysed
mg/kg = milligrams per kilogram
It is noted that the APEC boundaries were broadly identified based on historical land use activities and are not directly correlated with the current Airservices lease areas.

Table 3: Laboratory Analytical Results - PFAS Concentrations Detected in Soil and Sediment

								APEC 5 - Former Wastewater Detention Pond						Sediment Samples								
	Location							HA06		HA07		MW03		SS01	SS02	SS03	SS04	SS05			SS06	SS07
	Sample ID							HA06_0-0.1	HA06_1.0-1.1	HA07_0-0.1	HA07_1.0-1.1	MW03_0.0-0.1	MW03_1.0-1.1	SS01	SS02	SS03	SS04	SS05	QC17	QC18	SS06	SS07
	Sample Depth							0-0.1	1-1.1	0-0.1	1-1.1	0-0.1	1-1.1	0-0.1	0-0.1	0-0.1	0-0.1	0-0.1	0-0.1	0-0.1	0-0.1	0-0.1
	Sample Date							10/08/2017	10/08/2017	10/08/2017	10/08/2017	10/08/2017	10/08/2017	11/08/2017	11/08/2017	11/08/2017	11/08/2017	11/08/2017	11/08/2017	11/08/2017	11/08/2017	11/08/2017
	Sample Type							Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Intralaboratory Duplicate	Interlaboratory Duplicate	Primary	Primary
	Lab Report No.							EM1710771	EM1710771	EM1710771	EM1710771	EM1710771	EM1710771	EM1710771	EM1710771	EM1710771	EM1710771	EM1710771	EM1710771	558872	EM1710771	EM1710771
				ASA (GHD) 2015. EISLs - Comm / Ind 60% species protection level	ASA (GHD) 2015. HSLs Industrial (Direct Contact)	ASA (GHD) 2017. HBSC Comm/Ind (after FSANZ TDI)	WA DER - 2017. Health Based Screening Levels Comm / Ind							APEC 1			APEC 2b				APEC 5	
	Analyte	Units	LOR																			
Per- and Polyfluoroalkyl	Sum of PFAS	mg/kg	0.0002					0.121	0.524	0.176	0.237	0.0749	0.47	0.128	0.0957	0.103	0.0288	0.0107	0.0114	<0.05	0.0138	0.586
	Sum of PFAS (WA DER List)	mg/kg	0.0002					0.112	0.515	0.172	0.231	0.0679	0.461	0.124	0.092	0.0974	0.0281	0.0107	0.0114	0.032	0.0138	0.567
	Sum of PFHxS and PFOS	mg/kg	0.0002			81	100	0.102	0.507	0.167	0.23	0.0634	0.449	0.109	0.0838	0.0918	0.0273	0.0107	0.0114	0.032	0.0138	0.538
	10:2 FTS	mg/kg	0.0005					<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.005	<0.0005	<0.0005
	MeFOSAA	mg/kg	0.0002					<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.01	<0.0002	<0.0002
	PFPeS	mg/kg	0.0002					0.0041	0.0026	0.0015	0.0004	0.0026	0.0029	0.0017	0.0011	0.0008	0.0004	<0.0002	<0.0002	<0.005	<0.0002	0.008
	PFHpS	mg/kg	0.0002					0.0049	0.0051	0.0021	0.0009	0.0044	0.0058	0.0004	0.0007	0.0005	<0.0002	<0.0002	<0.0002	<0.005	<0.0002	0.0113
	PFHxS	mg/kg	0.0002				100	0.0384	0.0254	0.0221	0.0066	0.0241	0.0301	0.0551	0.024	0.0204	0.0026	0.0012	0.0007	<0.005	0.0014	0.179
	Et FOSAA	mg/kg	0.0002					<0.0002	0.0005	<0.0002	0.003	<0.0002	<0.0002	<0.0002	<0.0002	0.0002	<0.0002	<0.0002	<0.0002	<0.01	<0.0002	<0.0002
Surfactants	6:2 FTS	mg/kg	0.0005	NA	900			<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.01	<0.0005	<0.0005
	PFOA	mg/kg	0.0002	4	240	680	1,000	0.0022	0.0016	0.0013	0.0003	0.0005	0.0028	0.001	0.0021	0.0014	<0.0002	<0.0002	<0.0002	<0.005	<0.0002	0.0101
	PFOS	mg/kg	0.0002	5	90			0.0641	0.482	0.145	0.223	0.0393	0.419	0.0536	0.0598	0.0714	0.0247	0.0095	0.0107	0.032	0.0124	0.359
Organic	4:2 FTS	mg/kg	0.0005					<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.005	<0.0005	<0.0005
	PFBA	mg/kg	0.001					<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.005	<0.001	<0.001
	PFPeA	mg/kg	0.0002					0.0006	0.0006	0.0008	<0.0002	0.0005	0.0009	0.0026	0.002	0.0008	<0.0002	<0.0002	<0.0002	<0.005	<0.0002	0.0012
Perfluorinated Compounds (PFCs)	8:2 FTS	mg/kg	0.0005	4	240			<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.005	<0.0005	<0.0005
	N-Me-FOSA	mg/kg	0.0005					<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.005	<0.0005	<0.0005
	N-Me-FOSE	mg/kg	0.0005					<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.005	<0.0005	<0.0005
	FOSA	mg/kg	0.0002					<0.0002	<0.0002	0.0003	0.0008	<0.0002	<0.0002	0.0011	0.0009	0.0023	<0.0002	<0.0002	<0.0002	<0.005	<0.0002	<0.0002
	PFBS	mg/kg	0.0002					0.0015	0.0016	0.0004	<0.0002	0.0011	0.0012	0.0032	0.0012	0.0008	0.0006	<0.0002	<0.0002	<0.005	<0.0002	0.0061
	PFDS	mg/kg	0.0002					<0.0002	<0.0002	0.0004	0.0012	<0.0002	<0.0002	0.0004	0.0006	0.0009	0.0003	<0.0002	<0.0002	<0.005	<0.0002	<0.0002
	PFTeDA	mg/kg	0.0005					<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.005	<0.0005	<0.0005
	PFTrDA	mg/kg	0.0002					<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.005	<0.0002	<0.0002
	N-Et-FOSA	mg/kg	0.0005					<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.005	<0.0005	<0.0005
	PFDcA	mg/kg	0.0002					<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0003	<0.0002	<0.0002	<0.0002	<0.005	<0.0002	<0.0002
	PFHpA	mg/kg	0.0002					0.0009	0.0007	0.0005	<0.0002	0.0003	0.0013	<0.0002	0.0005	0.0004	<0.0002	<0.0002	<0.0002	<0.005	<0.0002	0.0024
	PFHxA	mg/kg	0.0002					0.0042	0.0035	0.0019	0.0008	0.0021	0.0059	0.0061	0.0024	0.0022	0.0002	<0.0002	<0.0002	<0.005	<0.0002	0.009
	N-Et-FOSE	mg/kg	0.0005					<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.005	<0.0005	<0.0005
	PFDoA	mg/kg	0.0002					<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0003	<0.0002	0.0002	<0.0002	<0.0002	<0.0002	<0.005	<0.0002	<0.0002
	PFNA	mg/kg	0.0002					<0.0002	<0.0002	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0004	0.0003	<0.0002	<0.0002	<0.0002	<0.005	<0.0002	<0.0002
	PFUnA	mg/kg	0.0002					<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0002	<0.0002	0.0002	<0.0002	<0.0002	<0.0002	<0.005	<0.0002	<0.0002
	Moisture Content	%	1					42.9	38.5	38.8	42.1	32.8	41	38	37.1	35.1	41.2	49.7	40.2	40	41.2	49.5

Data Comments

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

Legend

WA DER (2017) Interim Guideline on the Assessment and Management of PFAS. Health Based Screening Level - Commercial and Industrial
Airservices (GHD) (2017) Derivation of PFAS Soil and Water Criteria - Health Based Screening Criteria (HBSC) - Commercial / Industrial
Airservices (GHD) (2015) Derivation of PFAS Soil and Water Criteria - Human Health Interim Screening levels (HILs)- industrial (direct
Airservices (GHD) (2015) Derivation of PFAS Soil and Water Criteria - Ecological Interim Screening levels (EISLs)- Commercial and

LOR = Limit of Reporting
Above LOR results in **bold**
- = not analysed
mg/kg = milligrams per kilogram
It is noted that the APEC boundaries were broadly identified based on historical land use activities and are not directly correlated with the current Airservices

Table 4: Laboratory Analytical Results - PFAS Concentrations Detected in Groundwater

									APEC 1 - ARFF Fire Station and Vehicle Maintenance Areas					APEC 2b - Southern Soil Stockpile	APEC 5 - Former Wastewater Detention Pond	APEC 4 - Former Fire Training Ground and Associated Soil Stockpile	
								Location	MW01			GW18	MW04	MW02	MW03	GW10	MB01
								Sample Type	Primary	Intralaboratory Duplicate	Interlaboratory Duplicate	Primary	Primary	Primary	Primary	Primary	Primary
								Sample ID	MW01	QC01	QC02	GW18	MW04	MW02	MW03	GW10	MB01
								Sample Date	16/08/2017	16/08/2017	16/08/2017	16/08/2017	16/08/2017	16/08/2017	17/08/2017	16/08/2017	17/08/2017
								Lab Report No.	EM1711072	EM1711072	559840	EM1711072	EM1711072	EM1711072	EM1711072	EM1711072	EM1711072
	Analyte	Units	LOR	DoH (2017) Drinking water	WA DER (2017) Drinking Water	WA DER (2017) Non-Potable Use and Recreational	WA DER (2017) Highly disturbed systems - FW 90%	WA DER (2017) Highly disturbed systems - FW 80%	Airservices (GHD) (2015) EISLs									
Per- and Polyfluoroalkyl Surfactants	Sum of PFAS	µg/L	0.01							**358**	**330**	**568.6**	**15.3**	**13**	**10**	**110**	**2,070**	**1,070**
	Sum of PFAS (WA DER List)	µg/L	0.01							**330**	**297**	**529.6**	**14.7**	**11.8**	**9.42**	**97.2**	**1,950**	**1,010**
	Sum of PFHxS and PFOS	µg/L	0.01	**0.07**		**5**	**2**	**31**		**276**	**245**	**450#**	**13.2**	**9.05**	**8.19**	**77.9**	**1,650**	**840**
	10:2 FTS	µg/L	0.01							<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
	MeFOSAA	µg/L	0.02							<0.02	<0.02	<0.05	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	PFPeS	µg/L	0.01							**14.9**	**14.3**	**19**	**0.39**	**0.98**	**0.38**	**7.95**	**72.8**	**37.9**
	PFHpS	µg/L	0.01							**12**	**19.1**	**20**	**0.27**	**0.23**	**0.25**	**4.43**	**40.2**	**16.3**
	PFHxS	µg/L	0.01			**5**	**2**	**31**		**130**	**115**	**180**	**2.45**	**5.83**	**3.38**	**34**	**411**	**258**
	EtFOSAA	µg/L	0.02							<0.02	<0.02	<0.05	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	6:2 FTS	µg/L	0.05						**NA**	**0.05**	**0.06**	<0.05	<0.05	<0.05	**0.08**	<0.05	**4.4**	**2.54**
	PFOA	µg/L	0.01	**0.56**	**5**	**50**	**632**	**1,824**	**2900**	**13.1**	**13**	**15**	**0.21**	**0.37**	**0.16**	**3.22**	**46.9**	**21.9**
	PFOS	µg/L	0.01			**5**	**2**	**31**	**6.66**	**146**	**130**	**270**	**10.7**	**3.22**	**4.81**	**43.7**	**1240**	**582**
Organic	4:2 FTS	ug/L	0.01							<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
	PFBA	ug/L	0.05							**3.5**	**3.2**	**3.3**	<0.1	<0.1	<0.1	<0.1	**29.8**	**17.2**
	PFPeA	ug/L	0.01							**5.57**	**5.13**	**6.8**	**0.16**	**0.39**	**0.14**	**1.58**	**39.6**	**24.8**
Perfluorinated Compounds (PFCs)	8:2 FTS	µg/L	0.01						**2900**	<0.05	<0.05	<0.01	**0.07**	<0.05	<0.05	<0.05	**8**	**3.33**
	N-Me-FOSA	µg/L	0.05							<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
	N-Me-FOSE	µg/L	0.05							<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
	FOSA	µg/L	0.02							<0.02	<0.02	<0.05	<0.02	<0.02	<0.02	<0.02	**0.52**	**0.25**
	PFBS	µg/L	0.01							**11**	**10.1**	**21**	**0.35**	**0.8**	**0.35**	**5.7**	**51.6**	**29.3**
	PFDS	µg/L	0.01							<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	**0.16**	**0.04**
	PFTeDA	µg/L	0.01							<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
	PFTrDA	µg/L	0.01							<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	N-Et-FOSA	µg/L	0.05							<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
	PFDcA	µg/L	0.01							**0.02**	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	**1.93**	**0.33**
	PFHpA	µg/L	0.01							**4.13**	**3.48**	**4.5**	**0.09**	**0.19**	**0.1**	**1.24**	**19**	**10.7**
	PFHxA	µg/L	0.01							**17.2**	**17**	**29**	**0.63**	**1.01**	**0.4**	**7.53**	**99.6**	**60.3**
	N-Et-FOSE	µg/L	0.05							<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
	PFDoA	µg/L	0.01							<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	PFNA	µg/L	0.01							**0.13**	**0.13**	<0.01	**0.02**	<0.02	<0.02	**0.02**	**9.38**	**4.54**
	PFUnA	µg/L	0.01							<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	**0.1**	**0.06**

Legend

DoH (2017) Australian Drinking Water Guideline - Based on FSANZ (2017) Health Based Guidance Values for PFAS
WA DER (2017) Drinking Water
WA DER (2017) Non-potable and recreational
WA DER (2017) Highly disturbed systems - 90% species protection
WA DER (2017) Highly disturbed systems - 80% species protection
Airservices (GHD) (2015) Derivation of PFAS Soil and Water Criteria - Ecological Interim Levels (EISLs) (toxicity effects on aquatic organisms)

LOR = Limit of Reporting
Above LOR results in **bold**
- = not analysed
µg/L = micrograms per litre
NL = Not Limiting
It is noted that the APEC boundaries were broadly identified based on historical land use activities and are not directly correlated with the current Airservices lease areas.

Table 5 - Laboratory Analytical Results - Hydrocarbon Concentrations Detected in Soils and Sediment

							APEC 1 - ARFF Fire Station and Vehicle Maintenance Areas							APEC 2b - Southern Soil Stockpile						APEC 4 - Soil Stockpile Area		
						Location	HA01		HA02		MW01			HA03		HA04		MW02		HA05		
						Sample ID	HA01_0-0.1	HA01_1.0-1.1	HA02_0-0.1	HA02_1.0-1.1	MW01_0-0.1	MW01_1.0-1.1	QC01	HA03_0-0.1	HA03_1.0-1.1	HA04_0.8-0.9	HA04_0-0.1	MW02_0-0.1	MW02_1.0-1.1	HA05_0-0.1	HA05_1.0-1.1	QC03
						Sample Depth	0-0.1	1-1.1	0-0.1	1-1.1	0-0.1	1-1.1	1-1.1	0-0.1	1-1.1	0.8-0.9	0-0.1	0-0.1	1-1.1	0-0.1	1-1.1	1-1.1
						Sample Date	9/08/2017	9/08/2017	9/08/2017	9/08/2017	9/08/2017	9/08/2017	9/08/2017	9/08/2017	9/08/2017	9/08/2017	9/08/2017	10/08/2017	10/08/2017	10/08/2017	10/08/2017	10/08/2017
						Sample Type	Primary	Primary	Primary	Primary	Primary	Primary	Intralaboratory Duplicate	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Intralaboratory Duplicate
						Lab Report No.	EM1710771	EM1710771	EM1710771	EM1710771	EM1710771	EM1710771	EM1710771	EM1710771	EM1710771	EM1710771	EM1710771	EM1710771	EM1710771	EM1710771	EM1710771	EM1710771
				NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand		CRC Care 2011 Table B4 Comm/Ind D Soil HSL Direct Contact	CRC Care 2011 Table B4 Soil HSL Direct Contact (Int. Main. Worker)	Airport (environment protection) Regulations 1997 - Soil pollution - General Areas															
	Analyte	Units	LOR	0-1m	1-2m																	
TPH	C6-C9 fraction	mg/kg	10					800	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	C10-C14 fraction	mg/kg	20					5,000	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
	C15-C28 fraction	mg/kg	50					5,000	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	**510**	<100	<100	<100
	C29-C36 fraction	mg/kg	50					5,000	<100	<100	**140**	<100	<100	<100	<100	**110**	<100	<100	<100	<100	**1,200**	<100	<100	<100
	C10-C36 fraction (sum)	mg/kg	50					5,000	<50	<50	**140**	<50	<50	<50	<50	**110**	<50	<50	<50	<50	**1,710**	<50	<50	<50
TRH	C6-C10 fraction	mg/kg	10					800	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	C6-C10 fraction (minus BTEX)(F1)	mg/kg	10	260	370	26000	82000	800	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	>C10-C16 fraction	mg/kg	50					5,000	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
	>C10-C16 (minus Naphthalene)(F2)	mg/kg	50	NL	NL	20000	62000	5,000	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
	>C16-C34 fraction	mg/kg	100			27000	85000	5,000	<100	<100	**160**	<100	<100	<100	<100	**110**	<100	<100	<100	<100	**1,340**	<100	<100	**110**
	>C34-C40 fraction	mg/kg	100			38000	120000	5,000	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	**920**	<100	<100	<100
	>C10-C40 fraction (sum)	mg/kg	50					5,000	<50	<50	**160**	<50	<50	<50	<50	**110**	<50	<50	<50	<50	**2,260**	<50	<50	**110**
BTEXN	Benzene	mg/kg	0.1	3	3	430	1100	1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
	Toluene	mg/kg	0.1	NL	NL	99000	120000	130	<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
	Ethylbenzene	mg/kg	0.1	NL	NL	27000	85000	50	<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
	m&p-Xylene	mg/kg	0.2					25	<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
	o-Xylene	mg/kg	0.1					25	<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
	Total Xylenes	mg/kg	0.3	230	NL	81000	130000	25	<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
	Total BTEX	mg/kg	0.2						<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
	Naphthalene (VOC)	mg/kg	1	NL	NL	11000	29000		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1

Legend

Airport (Environment Protection) Regulations 1997 - Soil pollution - General Areas
CRC Care 2011 Table B4 Soil HSL Direct Contact (Int. Main. Worker)
CRC Care 2011 Table B4 Comm/Ind D Soil HSL Direct Contact
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand

LOR = Limit of Reporting
Above LOR results in **bold**

- = not analysed
mg/kg = milligrams per kilogram
NL = Not Limiting
It is noted that the APEC boundaries were broadly identified based on historical land use activities and are not directly correlated with the current Airservices lease areas.

NL (Csat in mg/kg) - The soil saturation concentration (Csat) is defined as the soil concentration at which the porewater phase cannot dissolve any more of an individual chemical. The soil vapour that is in equilibrium with the porewater will be at its maximum. If the derived soil HSL exceeds Csat, a soil vapour source concentration for a petroleum mixture could not exceed a level that would result in the maximum allowable vapour risk for the given scenario. For these scenarios, no HSL is presented for these chemicals and the HSL is shown as NL (NEPM, 2013).

Table 5 - Laboratory Analytical Results - Hydrocarbon Concentrations Detected in Soils and Sediment

								APEC 5 - Former Wastewater Detention Pond						Sediment Samples								
	Location							HA06		HA07		MW03		SS01	SS02	SS03	SS04	SS05			SS06	SS07
	Sample ID							HA06_0-0.1	HA06_1.0-1.1	HA07_0-0.1	HA07_1.0-1.1	MW03_0.0-0.1	MW03_1.0-1.1	SS01	SS02	SS03	SS04	SS05	QC17	QC18	SS06	SS07
	Sample Depth							0-0.1	1-1.1	0-0.1	1-1.1	0-0.1	1-1.1	0-0.1	0-0.1	0-0.1	0-0.1	0-0.1	0-0.1	0-0.1	0-0.1	0-0.1
	Sample Date							10/08/2017	10/08/2017	10/08/2017	10/08/2017	10/08/2017	10/08/2017	11/08/2017	11/08/2017	11/08/2017	11/08/2017	11/08/2017	11/08/2017	11/08/2017	11/08/2017	11/08/2017
	Sample Type							Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Intralaboratory Duplicate	Interlaboratory Duplicate	Primary	Primary
	Lab Report No.							EM1710771	EM1710771	EM1710771	EM1710771	EM1710771	EM1710771	EM1710771	EM1710771	EM1710771	EM1710771	EM1710771	EM1710771	558872	EM1710771	EM1710771
				NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand		CRC Care 2011 Table B4 Comm/Ind D Soil HSL Direct Contact	CRC Care 2011 Table B4 Soil HSL Direct Contact (Int. Main. Worker)	Airport (environment protection) Regulations 1997 - Soil pollution - General Areas						APEC 1			APEC 2b				APEC 5	
	Analyte	Units	LOR	0-1m	1-2m																	
TPH	C6-C9 fraction	mg/kg	10					800	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<20	<10	<10
	C10-C14 fraction	mg/kg	20					5,000	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<20	<50	<50
	C15-C28 fraction	mg/kg	50					5,000	<100	<100	<100	<100	<100	<100	<100	<100	<100	**1,200**	<100	<100	**66**	<100	<100
	C29-C36 fraction	mg/kg	50					5,000	<100	<100	<100	<100	<100	<100	<100	<100	<100	**430**	<100	<100	**86**	<100	<100
	C10-C36 fraction (sum)	mg/kg	50					5,000	<50	<50	<50	<50	<50	<50	<50	<50	<50	**1,630**	<50	<50	**152**	<50	<50
TRH	C6-C10 fraction	mg/kg	10					800	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<20	<10	<10
	C6-C10 fraction (minus BTEX)(F1)	mg/kg	10	260	370	26000	82000	800	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<20	<10	<10
	>C10-C16 fraction	mg/kg	50					5,000	<50	<50	<50	<50	<50	<50	<50	<50	<50	**90**	<50	<50	<50	<50	<50
	>C10-C16 (minus Naphthalene)(F2)	mg/kg	50	NL	NL	20000	62000	5,000	<50	<50	<50	<50	<50	<50	<50	<50	<50	**90**	<50	<50	<50	<50	<50
	>C16-C34 fraction	mg/kg	100			27000	85000	5,000	<100	<100	<100	<100	<100	<100	<100	<100	<100	**1,450**	<100	<100	**140**	**110**	<100
	>C34-C40 fraction	mg/kg	100			38000	120000	5,000	<100	<100	<100	<100	<100	<100	<100	<100	<100	**160**	<100	<100	<100	<100	<100
	>C10-C40 fraction (sum)	mg/kg	50					5,000	<50	<50	<50	<50	<50	<50	<50	<50	<50	**1,700**	<50	<50	**140**	**110**	<50
BTEXN	Benzene	mg/kg	0.1	3	3	430	1100	1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.1	<0.2	<0.2
	Toluene	mg/kg	0.1	NL	NL	99000	120000	130	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.1	<0.5	<0.5
	Ethylbenzene	mg/kg	0.1	NL	NL	27000	85000	50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.1	<0.5	<0.5
	m&p-Xylene	mg/kg	0.2					25	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5
	o-Xylene	mg/kg	0.1					25	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.1	<0.5	<0.5
	Total Xylenes	mg/kg	0.3	230	NL	81000	130000	25	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.3	<0.5	<0.5
	Total BTEX	mg/kg	0.2						<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.6	<0.2	<0.2
	Naphthalene (VOC)	mg/kg	1	NL	NL	11000	29000		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1

Legend

Airport (Environment Protection) Regulations 1997 - Soil pollution - General Areas
CRC Care 2011 Table B4 Soil HSL Direct Contact (Int. Main. Worker)
CRC Care 2011 Table B4 Comm/Ind D Soil HSL Direct Contact
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand

LOR = Limit of Reporting
Above LOR results in **bold**

- = not analysed
mg/kg = milligrams per kilogram
NL = Not Limiting
It is noted that the APEC boundaries were broadly identified based on historical land use activities and are not directly correlated with the current Airservices lease areas.

NL (Csat in mg/kg) - The soil saturation concentration (Csat) is defined as the soil concentration at which the porewater phase cannot dissolve any more of an individual chemical. The soil vapour that is in equilibrium with the porewater will be at its maximum. If the derived soil HSL exceeds Csat, a soil vapour source concentration for a petroleum mixture could not exceed a level that would result in the maximum allowable vapour risk for the given scenario. For these scenarios, no HSL is presented for these chemicals and the HSL is shown as NL (NEPM, 2013).

Table 6: Laboratory Analytical Results - Hydrocarbon Concentrations Detected in Groundwater

Client Name: Airservices Australia
Project Name: PSI and Limited Sampling, Launceston Airport
Project No: 60543717

					APEC 1 - ARFF Fire Station and Vehicle Maintenance Areas					APEC 2b - Southern Soil Stockpile	APEC 5 - Former Wastewater Detention Pond	APEC 4 - Former Fire Training Ground and Associated Soil Stockpile	
	Location				MW01			GW18	MW04	MW02	MW03	GW10	MB01
	Sample Type				Primary	Intralaboratory Duplicate	Interlaboratory Duplicate	Primary	Primary	Primary	Primary	Primary	Primary
	Sample ID				MW01	QC01	QC02	GW18	MW04	MW02	MW03	GW10	MB01
	Sample Date				16/08/2017	16/08/2017	16/08/2017	16/08/2017	16/08/2017	16/08/2017	17/08/2017	16/08/2017	17/08/2017
	Lab Report No.				EM1711072	EM1711072	559840	EM1711072	EM1711072	EM1711072	EM1711072	EM1711072	EM1711072
	Analyte	**Units**	LOR	**Airport (EP) Regulations 1997 - Fresh Water**									
TPH	C6-C9 fraction	µg/L	20	150	<20	<20	<20	<20	<20	<20	<20	**40**	<20
TPH	C10-C14 fraction	µg/L	50	600	<50	<50	<50	<50	<50	<50	<50	**1,300**	<50
TPH	C15-C28 fraction	µg/L	100	600		<100	<100	<100	<100	<100	<100	**520**	<100
TPH	C29-C36 fraction	µg/L	50	600	<50	<50	<100	<50	<50	<50	<50	**100**	<50
TPH	C10-C36 fraction (sum)	µg/L	50	600	<50	<50	<100	<50	<50	<50	<50	**1,920**	<50
TRH	C6-C10 fraction	µg/L	20	150	<20	<20	<20	<20	<20	<20	<20	**70**	<20
TRH	C6-C10 fraction (minus BTEX)(F1)	µg/L	20	150	<20	<20	<20	<20	<20	<20	<20	**70**	<20
TRH	>C10-C16 fraction	µg/L	50	600	<100	<100	<50	<100	<100	<100	<100	**1,440**	<100
TRH	>C10-C16 (minus Naphthalene)(F2)	µg/L	50	600	<100	<100	<50	<100	<100	<100	<100	**1,430**	<100
TRH	>C16-C34 fraction	µg/L	100	600	<100	<100	<100	<100	<100	<100	<100	**370**	<100
TRH	>C34-C40 fraction	µg/L	100	600	<100	<100	<100	<100	<100	<100	<100	<100	<100
TRH	>C10-C40 fraction (sum)	µg/L	100	600	<100	<100	<250	<100	<100	<100	<100	**1,810**	<100
BTEXN	Benzene	µg/L	1	300	<1	<1	<1	<1	<1	<1	<1	<1	<1
BTEXN	Toluene	µg/L	1	300	<2	<2	<1	<2	<2	<2	<2	<2	<2
BTEXN	Ethylbenzene	µg/L	1	140	<2	<2	<1	<2	<2	<2	<2	<2	<2
BTEXN	m&p-Xylene	µg/L	2		<2	<2	<2	<2	<2	<2	<2	<2	<2
BTEXN	o-Xylene	µg/L	1		<2	<2	<1	<2	<2	<2	<2	<2	<2
BTEXN	Total Xylenes	µg/L	2		<2	<2	<3	<2	<2	<2	<2	<2	<2
BTEXN	Total BTEX	µg/L	1		<1	<1	<6	<1	<1	<1	<1	<1	<1
BTEXN	Naphthalene (VOC)	µg/L	5		<5	<5	<10	<5	<5	<5	<5	**8**	<5

Legend

Airport (Environment Protection) Regulations 1997 - Fresh Water

LOR = Limit of reporting

Above LOR results in **bold**

- = not analysed

µg/L = micrograms per litre

NL = Not Limiting

It is noted that the APEC boundaries were broadly identified based on historical land use activities and are not directly correlated with the current Airservices lease areas.

Appendix A

Certificates of Title

the LIST. DEPARTMENT of PRIMARY INDUSTRIES and WATER Land Information Services

Tasmania

RESULT OF SEARCH

RECORDER OF TITLES, TASMANIA
Issued pursuant to the Land Titles Act 1980

SEARCH OF TORRENS TITLE

VOLUME	FOLIO
31731	1
EDITION	DATE OF ISSUE
3	05-Oct-1998

SEARCH DATE : 16-Feb-2010
SEARCH TIME : 11.57 am

DESCRIPTION OF LAND

Parish of BREADALBANE, Land District of CORNWALL
Lot 1 on Diagram 31731
Derivation : Part of 582A-3R-0Ps. Gtd. to J. Sinclair
Prior CT 4608/71

SCHEDULE 1

C124556 THE COMMONWEALTH OF AUSTRALIA - Registered 05-Oct-1998 at 12:00 pm (MF:2536o/1213)

SCHEDULE 2

Reservations and conditions in the Crown Grant, if any
B306349 FENCING PROVISION in Transfer
C150314 CAVEAT by National Australia Bank Limited - Registered 22-Mar-1999 at 12:00 pm (MF:2550o/786)

UNREGISTERED DEALINGS AND NOTATIONS

No unregistered dealings or other notations

END OF SEARCH.

Warning: The information appearing under Unregistered Dealings and Notations has not been formally recorded in the Register.

Putting it all together.

Owner:
Hugh Colbran Cameron

Title Reference: *C.T. 1286-2*

Grantee:
Part of 382a 3r 0p Gtd to John Sinclair

PLAN OF SURVEY

by Surveyor *P.O. Richmond*
of land situated in the

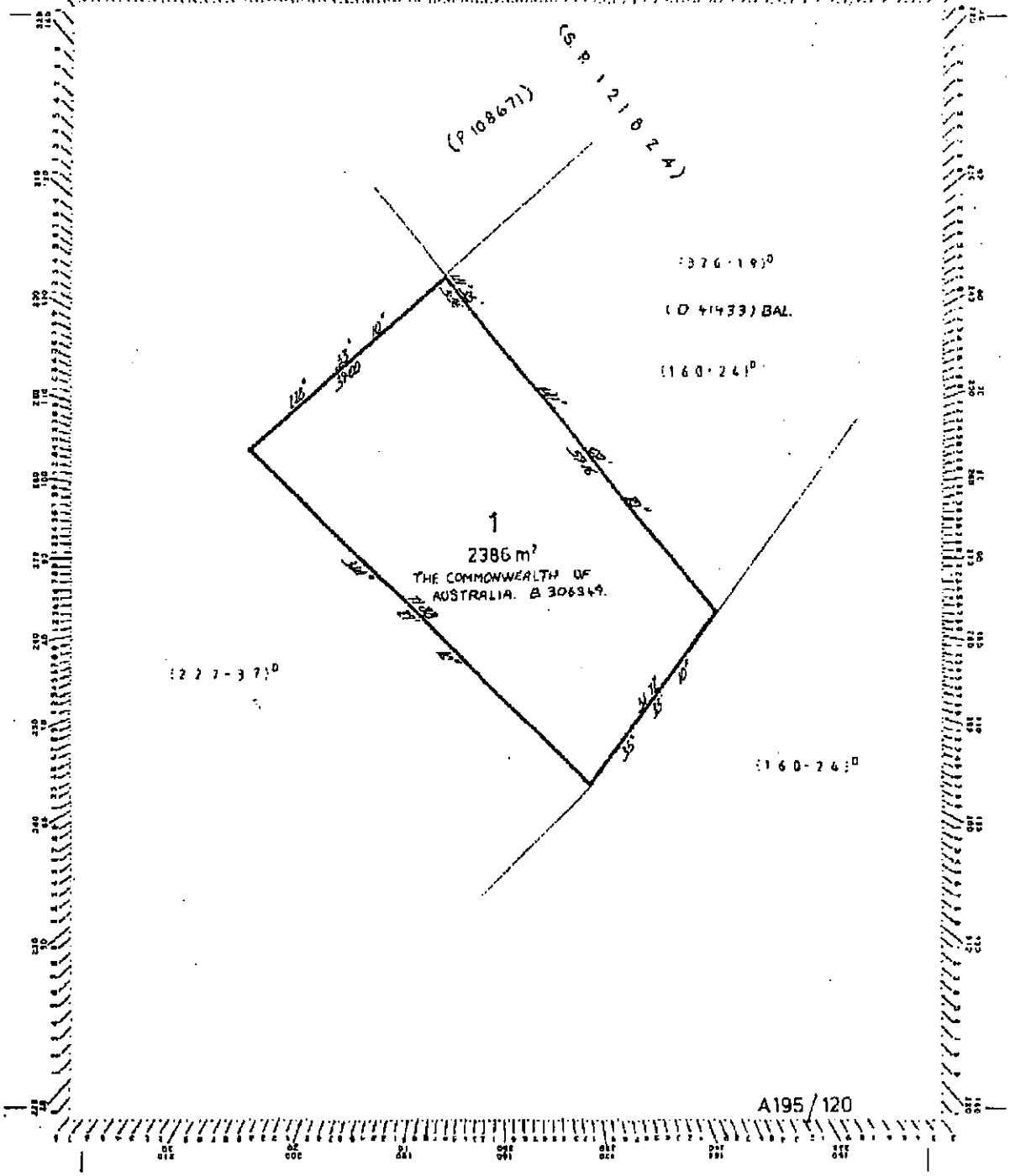
LAND DISTRICT OF CORNWALL
PARISH OF BREADALBANE.

SCALE 1:600 MEASUREMENTS IN METRES

Registered Number
D31731

Approved
Effective from

Recorder of Titles



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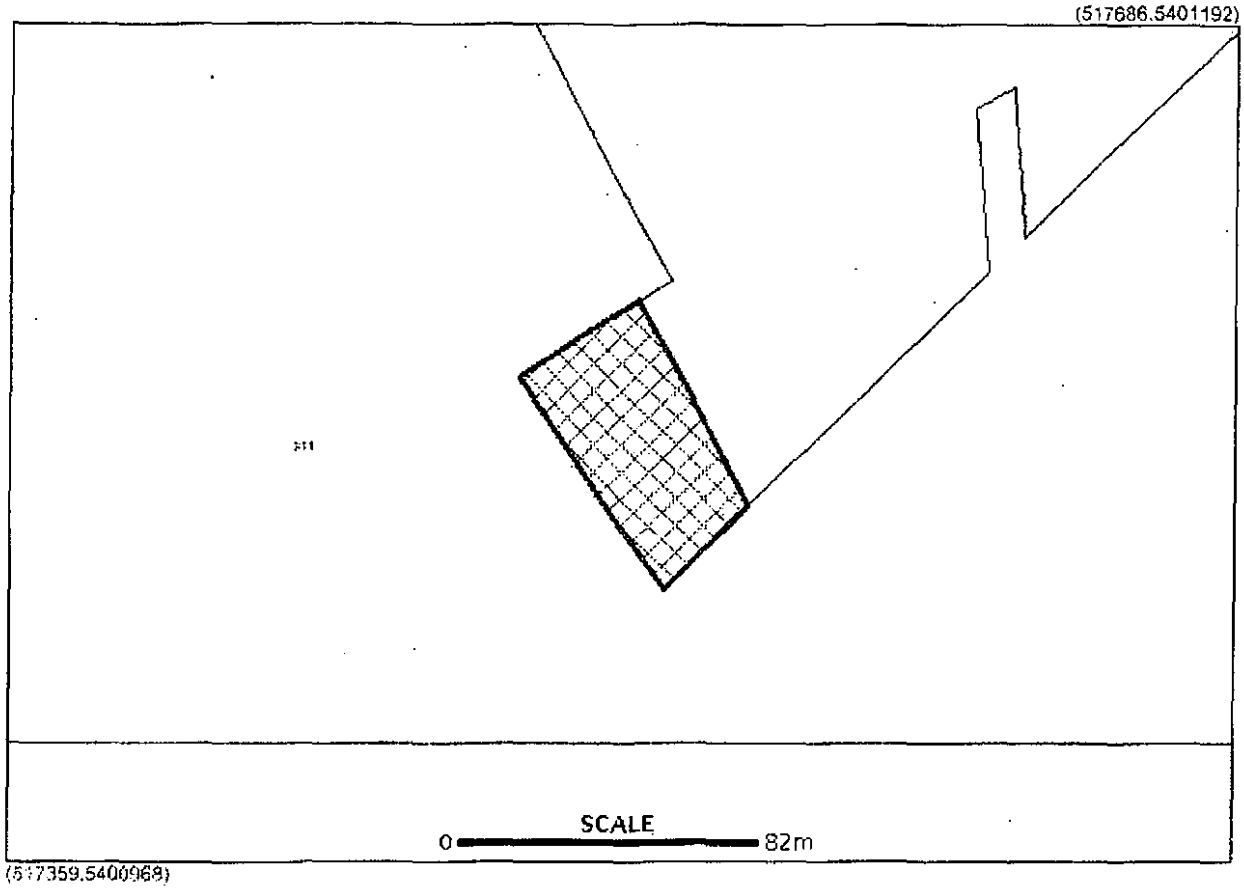

(517359.5400968)

Identify Results - Cadastral Parcels

Property ID	7607593
Title Reference	31731/1
Owners	The Commonwealth Of Australia
Address	"LAUNCESTON AIRPORT", 311 EVANDALE ROAD, WESTERN JUNCTION TAS 7212
Authority	Commonwealth of Australia
LPI	FET89

Localities and Postcodes
Local Government Boundaries
Road Centreline Names
Cadastral Parcels

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DEPARTMENT of PRIMARY INDUSTRIES and WATER
Land Information Services

Tasmania

RESULT OF SEARCH

RECORDER OF TITLES, TASMANIA
Issued pursuant to the Land Titles Act 1980

SEARCH OF TORRENS TITLE

VOLUME	FOLIO
128763	1
EDITION	DATE OF ISSUE
7	05-Oct-1998

SEARCH DATE : 16-Feb-2010
SEARCH TIME : 11.58 am

DESCRIPTION OF LAND

Parish of BREADALBANE, Land District of CORNWALL
Lot 1 on Plan 128763
Derivation : Parts of 806A-0R-0Ps. & 800 ac.Gtd. to J. Kirkby., Part of 324 ac. Gtd. to T. Gee Part of 582A-3R-0Ps. Gtd. to J. Sinclair.
Prior CTs 198334/1 and 198335/1

SCHEDULE 1

C124556 THE COMMONWEALTH OF AUSTRALIA - Registered 05-Oct-1998 at 12:00 pm (MF:2536o/1213)

SCHEDULE 2

Reservations and conditions in the Crown Grant, if any
BENEFITING EASEMENT: the right for the Commonwealth its successors and assigns and the owners and occupiers for the time being of the land marked C.D.E.F.G.H.J.K. on Plan No. 198334 to go pass and repass at all times with or without horses cattle carts or other vehicles through over or along the strip of land marked "Right of Way 9.14 wide" on Plan No. 128763 and with the right to erect use and maintain overhead power transmission lines through over and along the strip of land and to lay use and maintain underground cables through under and along the said strip of land and the strip of land marked "Easement 1.52m wide" on Plan No. 128763 and with the right for its workmen servants and others to enter into and upon the said two strips of land for the purpose of erecting laying amending or repairing and such overhead power transmission lines or underground cables.
BENEFITING EASEMENT: the full free right and liberty for the Commonwealth its successors and assigns and the owners andoccupiers for the time being of the lands marked G.H.L.M.N.O.P., N.Q.R.S.t.U.V.W.X.Y.Z.A. and A1., B1., C1.,D1., E1., F1., G1., H1., J1. and A1 on Plan No. 128763 and as appurtenant thereto for the free and uninterrupted passage of stormwater or other surface water through over under and along the strips of land marked "Drainage Easement 3.02 m wide" on Plan No. 128763 and with the right to enter upon the said strips of land by their officers servants workmen contractors and agents with or without horses carts and other vehicles for the purpose of constructing laying using and maintaining open drains or covered pipe drains or any part or parts thereof and of

removing therefrom any obstruction and for the purposes aforesaid or any of them and as often as may be necessary to bring and place upon the said strips of land and to remove therefrom all goods materials machinery tools implements appliances and articles and to do and perform all other such incidental acts and things as may be reasonably necessary or required doing as little damage as possible to the said strips of land and forthwith making good all damage that may be done thereto in exercise of the rights and authorities hereby reserved.

BENEFITING EASEMENT: the right for the Commonwealth its successors and assigns and the owners and occupiers for the time being of that portion of the said land within described containing 52.24ha and shown on Plan No. 128763 to pass discharge and conductall such surface percolating and other drainage waters sewage and soil from such portion of land by means of open or covered drains or such line or lines of pipes as it or they may consider desirable or expedient through under along and upon the three strips of land marked "Drain Reserve" on Plan No. 128763 and with the right to enter into or upon the said three strips of land by its or their workmen servants and others for the purpose of excavating constructing laying cleansing amending or repairing any such open or covered drains or line or lines of pipes without doing any unnecessary damage to the adjoining land of William Stuart Hogarth.

BENEFITING EASEMENT: (appurtenant to the land marked D1.,E1.,F1.,G1.,H1.,J1.,D1., on Plan No. 128763 a right of drainage (including the right of construction of drains) for the Commonwealth or the owner or owners for the time being of the said land for the purpose of carrying away stormwater and other surplus water from the said land over and under the strip of land marked "Drainage Easement 291/8D" through all sewers and drains which may hereafter be made or passing under through and along the said strip of land and with the right of the Commonwealth and owner or owners and its his or their surveyors and workmen from time to time and at all times hereafter if it he or they should think fit to enter into and upon the said strip of land and to inspect repair cleanse and amend any such sewer or drain without doing unnecessary damage to the said strip of land.

BENEFITING EASEMENT: the right for the Commonwealth its successors and assigns and the owners and occupiers for the time being of the lands marked G.H.L.M.N.O.P.G. and D1.,E1.,F1.,G1.,H1.,J1.,D1., on Plan No. 128763 and as appurtenant thereto to erect lay use and maintain an approach lighting system and to lay gravel tracks through under over and along the lands marked "Easement For Approach Lighting System 6.04 ms. wide" on Plan No. 128763 and with the right to enter into and upon the said lands by its workmen servants and others with or without horses and other animals carts and other vehicles for the purpose of excavating erecting laying amending or repairing such approach lighting system or tracks with the right to install gates in any fences adjoining or crossing the said lands and with the right to go pass and repass with or without horses and other animals carts and other vehicles through over and along lands marked "Access Easement" and "Access Easement 376/20D" on Plan No. 128763.

BENEFITING EASEMENT: a right of carriage way over the land marked "Access Easement 454/18D" on Plan No. 128763.

C108262 BURDENING EASEMENT: A right of carriageway (appurtenant to Lot 2 on SP 121824) over the land marked RIGHT OF WAY `P'

and RIGHT OF WAY `R' on P.128763 - Registered 07-Aug-1998 at 12:02 pm (MF:2531o/777)

C108259 BURDENING EASEMENT: A right of carriageway (appurtenant to Lot 1 on P.128762) over the land marked RIGHT OF WAY `B' on P.128763 - Registered 07-Aug-1998 at 12:04 pm (MF:2531o/779)

C70476 FENCING PROVISION in Transfer (MF:2512o/105)

B954891 LEASE to AIRSERVICES AUSTRALIA of a leasehold estate for the term of 39 years less 5 days from 6-Jul-1995 in such part of the within land shown on the plan thereon. - Registered 25-Jun-1996 at 12:05 pm (MF:2418o/216)

B954892 LEASE to AIRSERVICES AUSTRALIA of a leasehold estate for the term of 39 years less 5 days from 6-Jul-1995 in such part of the within land shown on the plan thereon. - Registered 25-Jun-1996 at 12:06 pm (MF:2418o/217)

B954893 LEASE to AIRSERVICES AUSTRALIA of a leasehold estate for the term of 39 years less 5 days from 6-Jul-1995 in such part of the within land shown on the plan thereon - Registered 25-Jun-1996 at 12:07 pm (MF:2418o/218)

B954894 LEASE to AIRSERVICES AUSTRALIA of a leasehold estate for the term of 39 years less 5 days from 6-Jul-1995 in such part of the within land shown on the plan thereon. - Registered 25-Jun-1996 at 12:08 pm (MF:2418o/219)

C42907 ADHESION ORDER under Section 110 of the Local Government (Building and Miscellaneous Provisions) Act 1993 - Registered 18-Dec-1997 at 12:02 pm (MF:2511o/1385)

C108890 LEASE to AIRSERVICES AUSTRALIA of a leasehold estate of portion of the said land within described as shown by a diagram on the said lease for the term of 39 years less 5 days commencing from the 6th-July-1995 - Registered 16-Jul-1998 at 12:00 pm (MF:2529o/1)

C150314 CAVEAT by National Australia Bank Limited - Registered 22-Mar-1999 at 12:00 pm (MF:2550o/786)

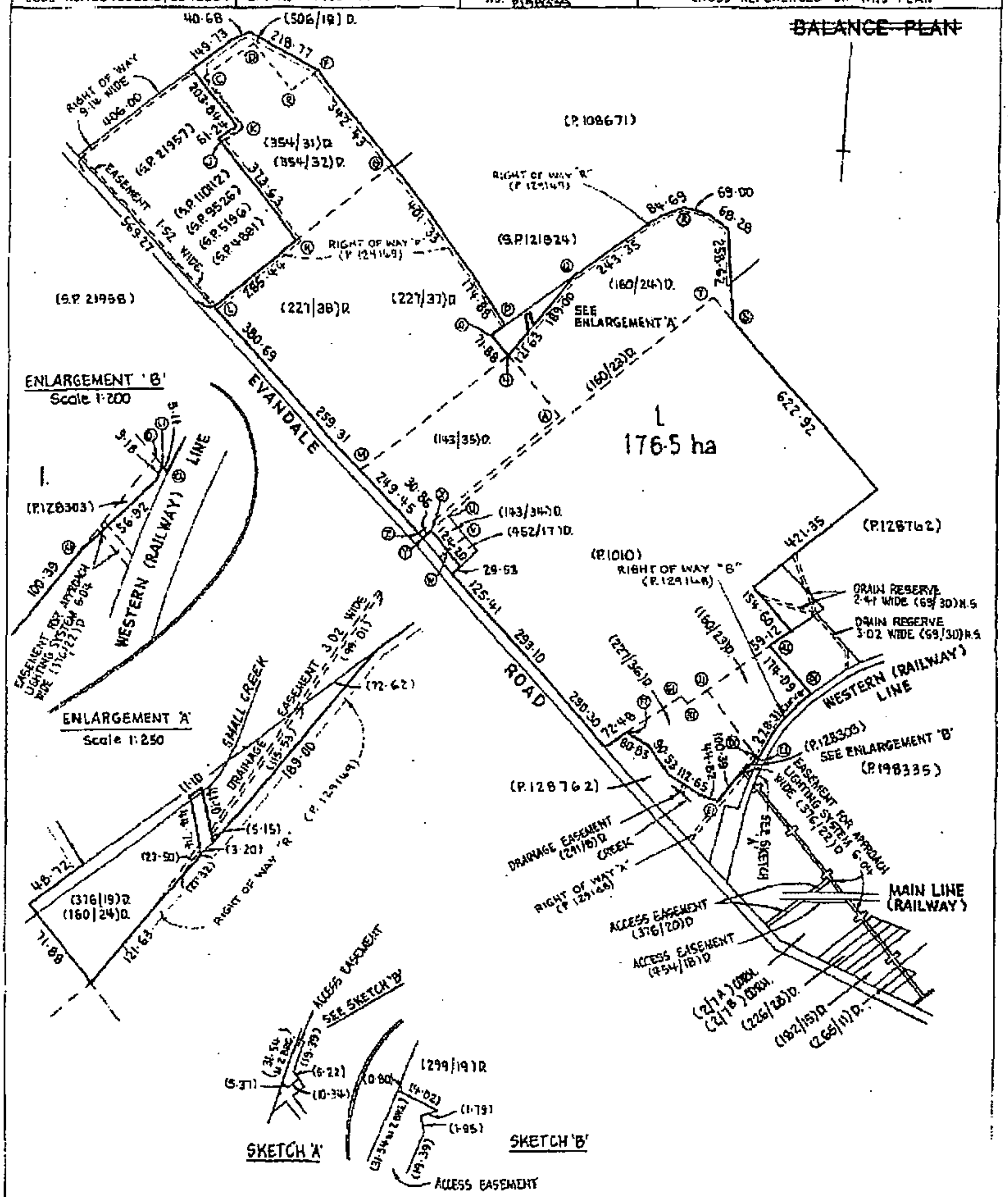
C403607 CAVEAT by Southern Australia Airlines Pty Limited against portion of the above land as desribed therein - Registered 10-Sep-2002 at 12:01 pm

UNREGISTERED DEALINGS AND NOTATIONS

153637 PLAN Lodged by DEPT OF INF, EN & RE on 22-Jan-2008 BP: 153637

END OF SEARCH.

OWNER FOLIO REFERENCE F/R - 198334/1 - 198335/1 GRANTEE	PLAN OF TITLE LOCATION CORNWALL - BREADALBANE FIRST SURVEY PLAN No. COMPILED BY L.T.O. SCALE 1:10000 LENGTHS IN METRES	REGISTERED NUMBER P.128763 APPROVED 10 DEC 1997 Recorder of Titles
MAPSHEET MUNICIPAL CODE No. 123 (502916, 504055) LAST UPI No. FBN50 4700041	LAST PLAN No. P.198334 P.198335	ALL EXISTING SURVEY NUMBERS TO BE CROSS REFERENCED ON THIS PLAN



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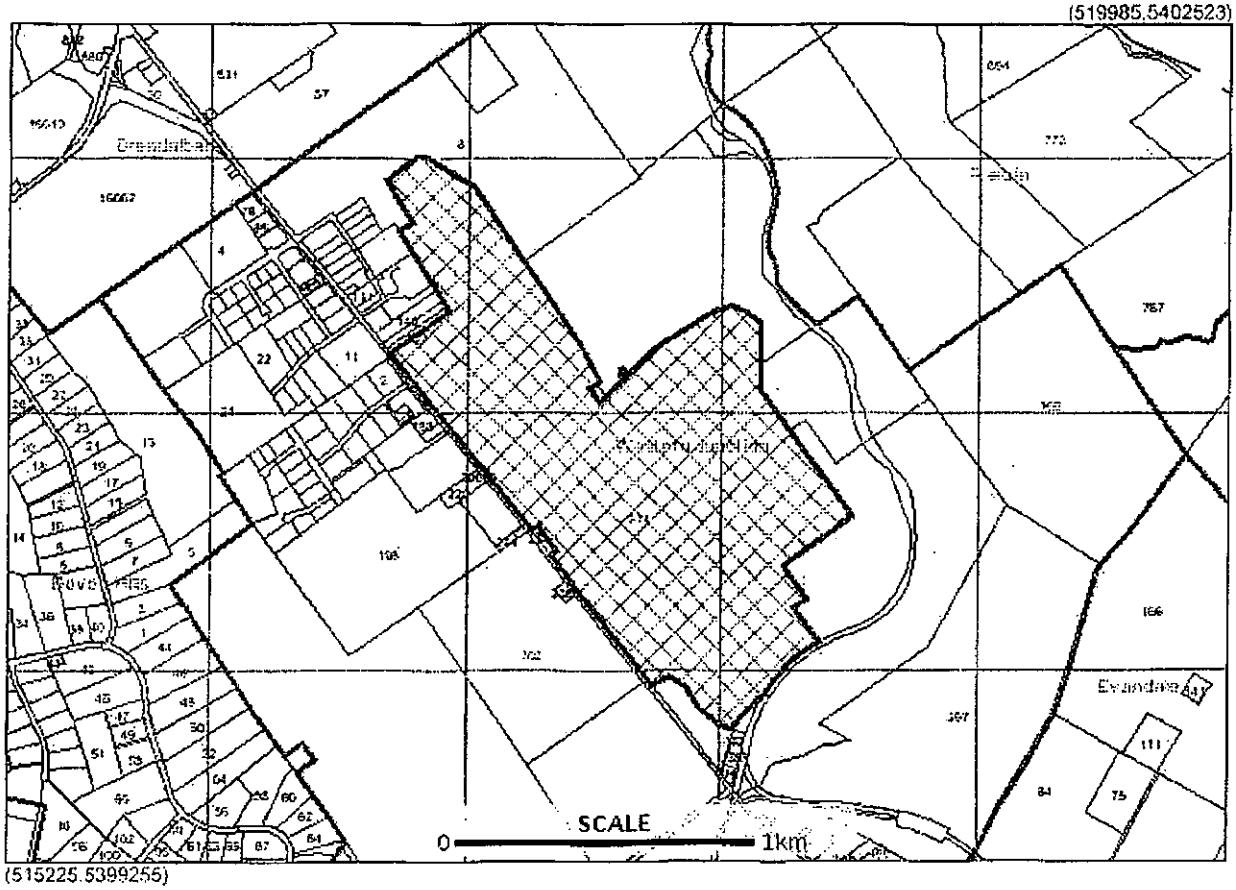

(515225.5399255)

Identify Results - Cadastral Parcels

Property ID	7607593
Title Reference	128763/1
Owners	The Commonwealth Of Australia
Address	"LAUNCESTON AIRPORT", 311 EVANDALE ROAD, WESTERN JUNCTION TAS 7212
Authority	Commonwealth of Australia
LPI	FPY07

Localities and Postcodes
Local Government Boundaries
Cadastral Parcels

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Tasmania

RESULT OF SEARCH

RECORDER OF TITLES, TASMANIA

Issued pursuant to the Land Titles Act 1980

SEARCH OF TORRENS TITLE

VOLUME	FOLIO
80983	1
EDITION	DATE OF ISSUE
3	05-Oct-1998

SEARCH DATE : 16-Feb-2010
SEARCH TIME : 12.00 pm

DESCRIPTION OF LAND

Parish of BREADALBANE, Land District of CORNWALL
Lot 1 on Diagram 80983 (formerly being 554-12D)
Derivation : Parts of 806 Acres Gtd. to J. Kirby
Prior CT 2388/25

SCHEDULE 1

C124557 THE COMMONWEALTH OF AUSTRALIA - Registered 05-Oct-1998 at 12:00 pm (MF:2536o/1212)

SCHEDULE 2

Reservations and conditions in the Crown Grant, if any
C150314 CAVEAT by National Australia Bank Limited - Registered 22-Mar-1999 at 12:00 pm (MF:2550o/786)

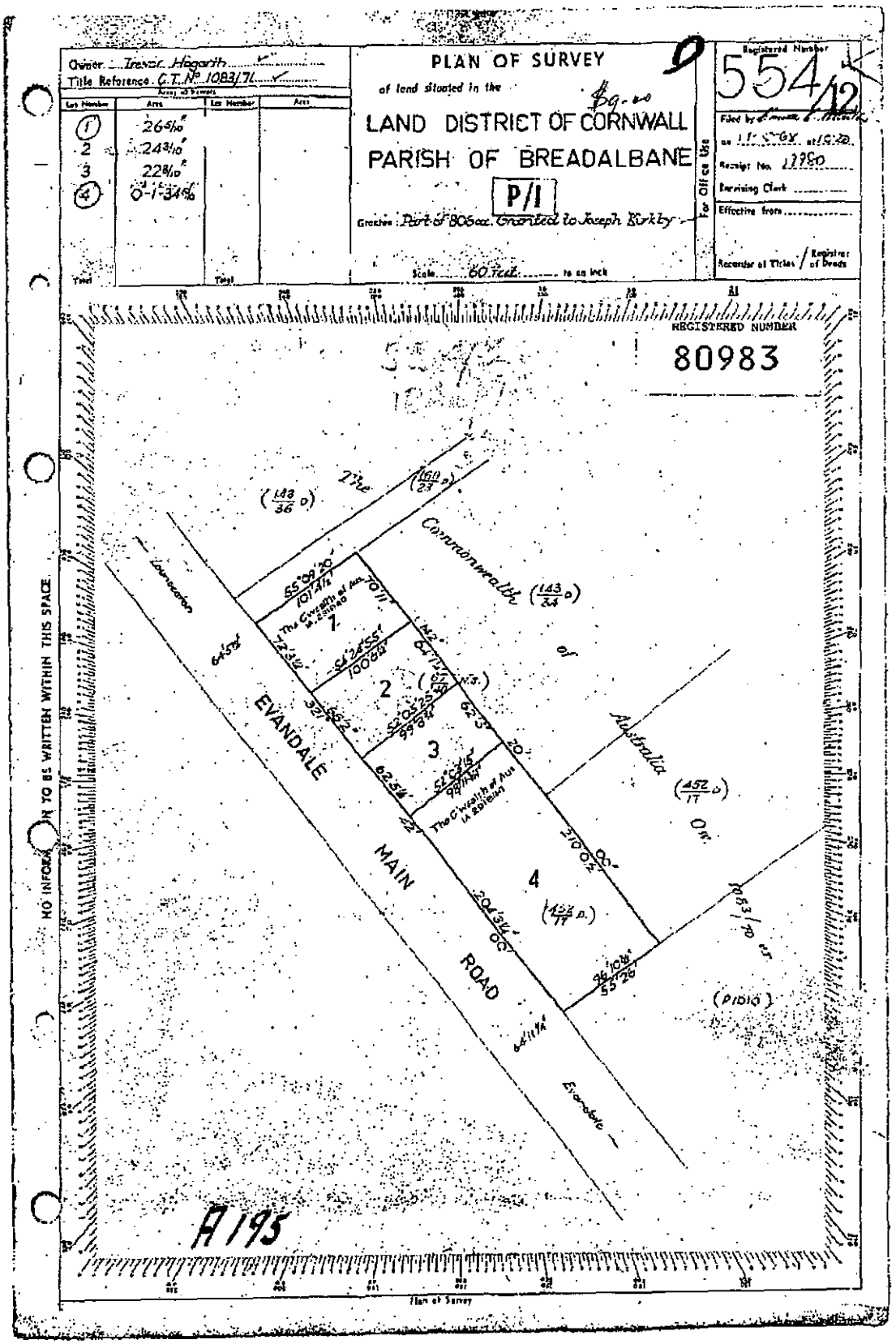
UNREGISTERED DEALINGS AND NOTATIONS

No unregistered dealings or other notations

END OF SEARCH.

Warning: The information appearing under Unregistered Dealings and Notations has not been formally recorded in the Register.

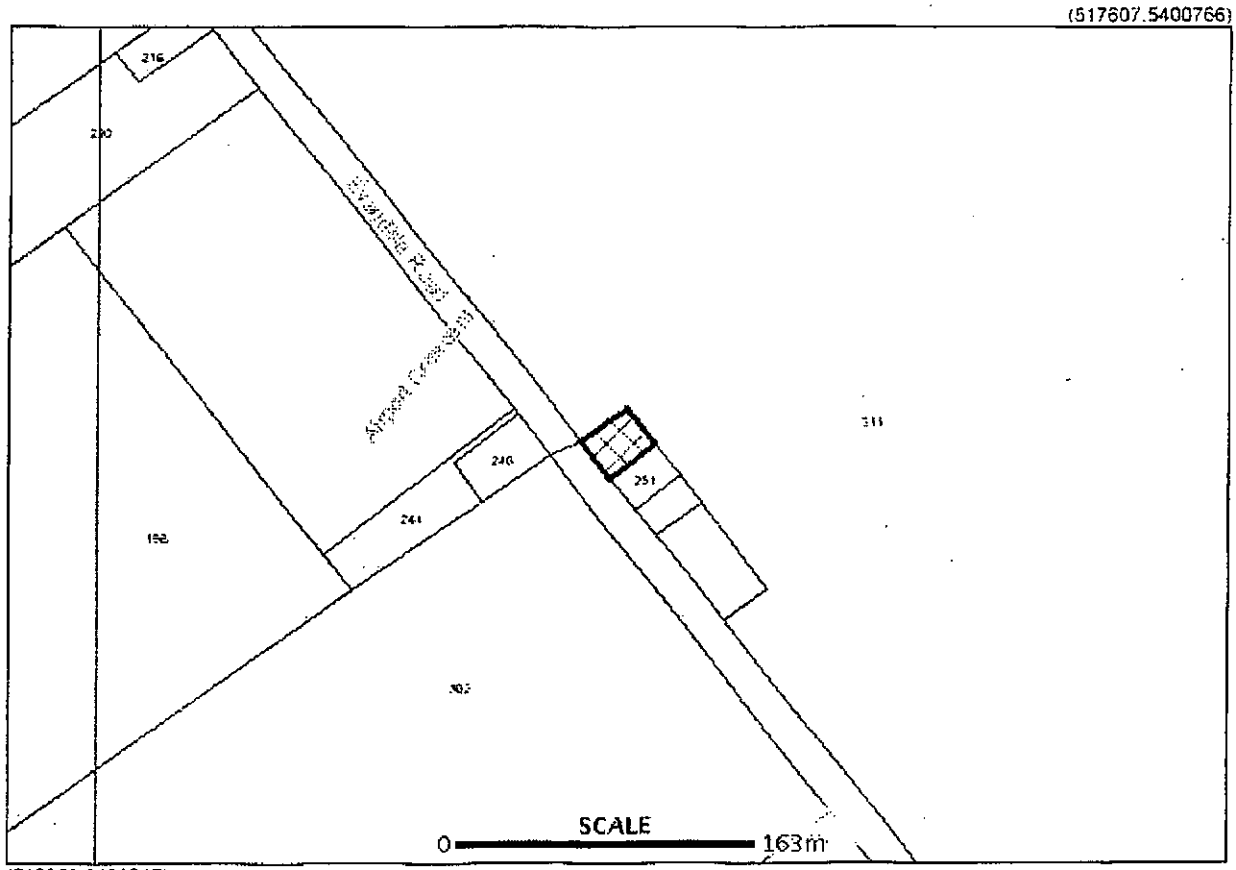
Putting it all together.


PLAN OF SURVEY
of land situated in the
LAND DISTRICT OF CORNWALL
PARISH OF BREADALBANE
P/1
Owner Trevor Hegarth
Title Reference C.T. No 1083/71
Lot Number
Area
Registered Number
554/12
REGISTERED NUMBER
80983
Commonwealth of Australia
EVANDALE MAIN ROAD
Plan of Survey
A195

LISTmap

Generated at: 12:01 on 16-February-2010 EST User: dobson Charge Details: 1901106 (margaret)

(517607,5400766)



(516953,5400317)

Identify Results - Cadastral Parcels

Property ID	7607593
Title Reference	80983/1
Owners	The Commonwealth Of Australia
Address	"LAUNCESTON AIRPORT", 311 EVANDALE ROAD, WESTERN JUNCTION TAS 7212
Authority	Commonwealth of Australia
LPI	4700512

Localities and Postcodes
Local Government Boundaries
Road Centreline Names
Cadastral Parcels

Tasmania

RESULT OF SEARCH

RECORDER OF TITLES, TASMANIA
Issued pursuant to the Land Titles Act 1980

SEARCH OF TORRENS TITLE

VOLUME	FOLIO
80983	4
EDITION	DATE OF ISSUE
3	05-Oct-1998

SEARCH DATE : 16-Feb-2010
SEARCH TIME : 12.03 pm

DESCRIPTION OF LAND

Parish of BREADALBANE, Land District of CORNWALL
Lot 4 on Diagram 80983 (formerly being 554-12D)
Derivation : Parts of 806 Acres Gtd. to J. Kirkby
Prior CT 2388/26

SCHEDULE 1

C124557 THE COMMONWEALTH OF AUSTRALIA - Registered 05-Oct-1998 at 12:00 pm (MF:2536o/1212)

SCHEDULE 2

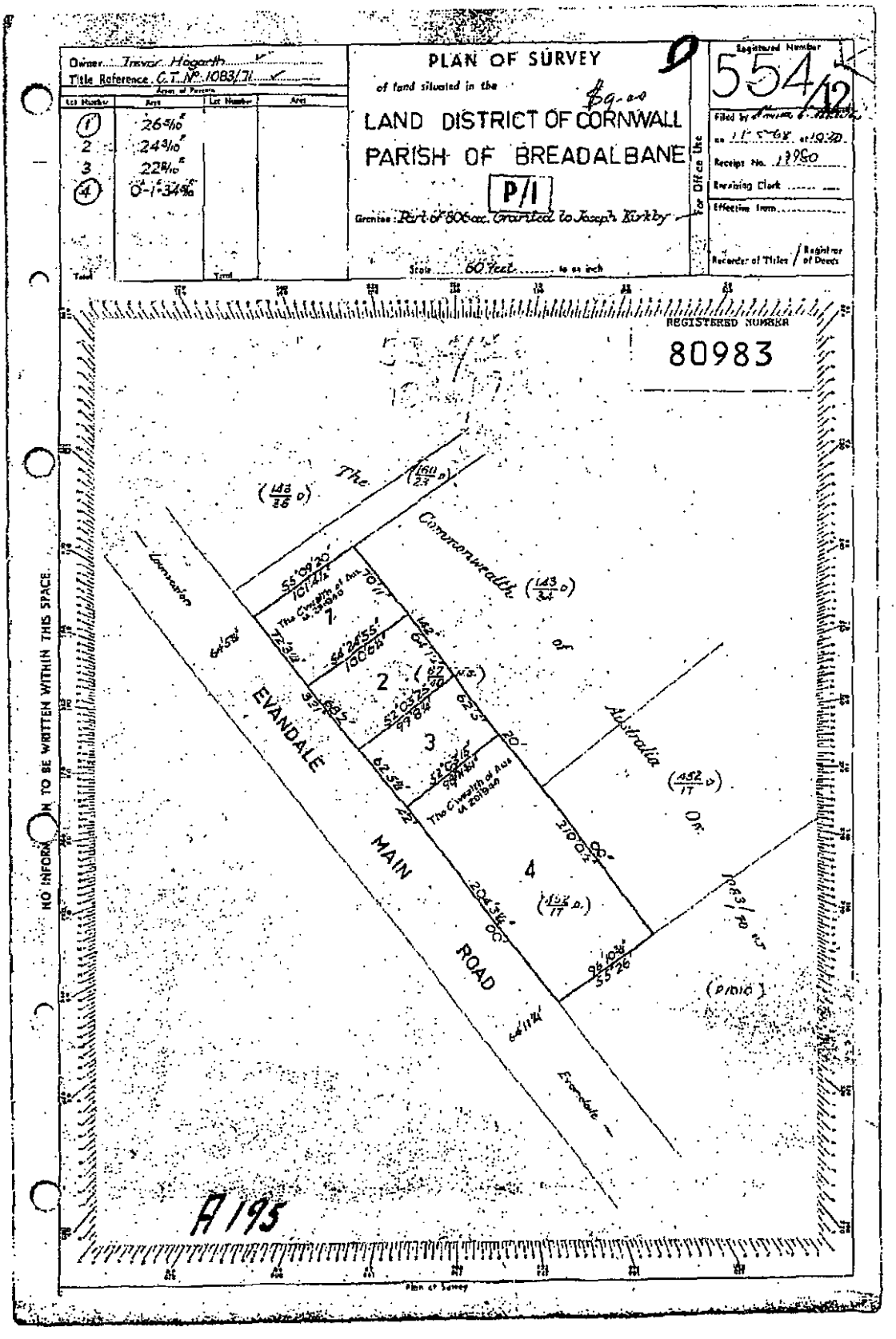
Reservations and conditions in the Crown Grant, if any
C150314 CAVEAT by National Australia Bank Limited - Registered 22-Mar-1999 at 12:00 pm (MF:2550o/786)

UNREGISTERED DEALINGS AND NOTATIONS

No unregistered dealings or other notations

END OF SEARCH.

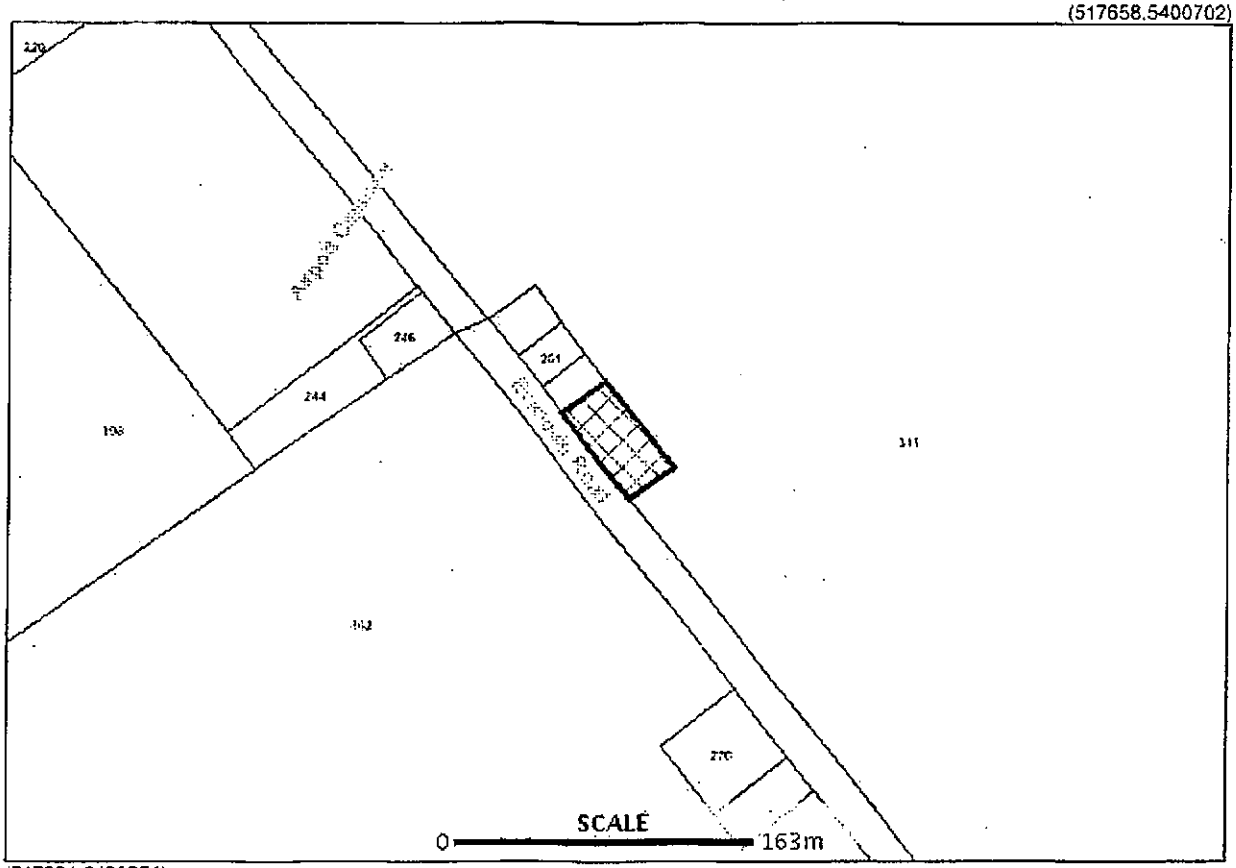
Warning: The information appearing under Unregistered Dealings and Notations has not been formally recorded in the Register.


PLAN OF SURVEY
of land situated in the
LAND DISTRICT OF CORNWALL
PARISH OF BREADALBANE
P/1
Owner Trevor Hogarth
Title Reference C.T. No. 1083/71
Registered Number
55412
REGISTERED NUMBER
80983
NO INFORMATION TO BE WRITTEN WITHIN THIS SPACE.
EVANDALE
MAIN ROAD
Commonwealth of Australia
The Commonwealth of Aus.
A195

LISTmap

Generated at: 12:04 on 16-February-2010 EST User: dobson Charge Details: 1901106 (margaret)

(517658,5400702)



(517004,5400254)

Identify Results - Cadastral Parcels

Property ID	7607593
Title Reference	80983/4
Owners	The Commonwealth Of Australia
Address	"LAUNCESTON AIRPORT", 311 EVANDALE ROAD, WESTERN JUNCTION TAS 7212
Authority	Commonwealth of Australia
LPI	4700515

Localities and Postcodes
Local Government Boundaries
Road Centreline Names
Cadastral Parcels

Tasmania
Explore the possibilities

GDA

the LIST. DEPARTMENT of PRIMARY INDUSTRIES and WATER Land Information Services

Tasmania

RESULT OF SEARCH

RECORDER OF TITLES, TASMANIA
Issued pursuant to the Land Titles Act 1980

SEARCH OF TORRENS TITLE

VOLUME	FOLIO
80983	3
EDITION	DATE OF ISSUE
3	05-Oct-1998

SEARCH DATE : 16-Feb-2010
SEARCH TIME : 12.04 pm

DESCRIPTION OF LAND

Parish of BREADALBANE, Land District of CORNWALL
Lot 3 on Diagram 80983 (formerly being 554-12D)
Derivation : Parts of 806 Acres Gtd. to J. Kirby
Prior CT 2388/28

SCHEDULE 1

C124557 THE COMMONWEALTH OF AUSTRALIA - Registered 05-Oct-1998 at 12:00 pm (MF:2536o/1212)

SCHEDULE 2

Reservations and conditions in the Crown Grant, if any
C150314 CAVEAT by National Australia Bank Limited - Registered 22-Mar-1999 at 12:00 pm (MF:2550o/786)

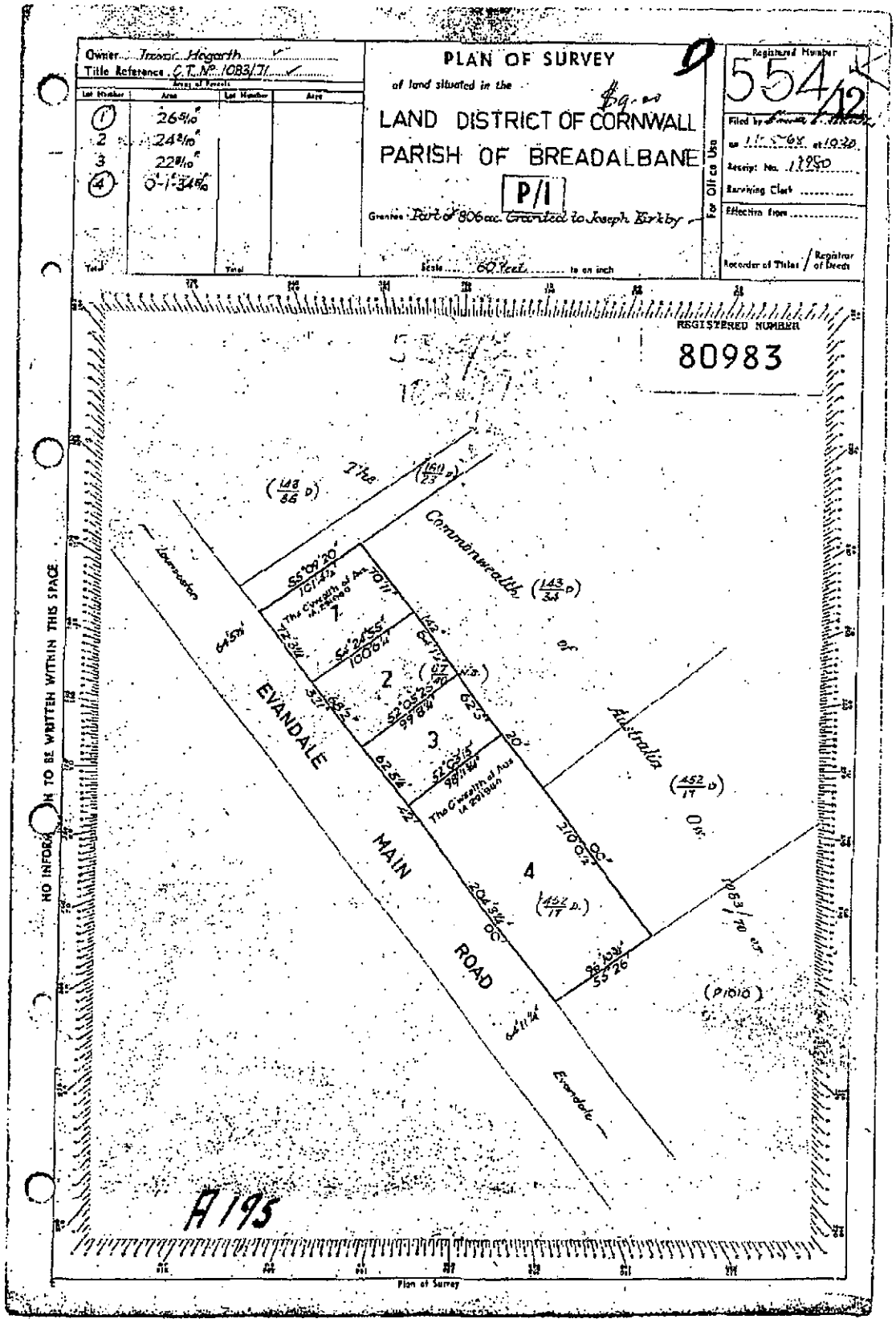
UNREGISTERED DEALINGS AND NOTATIONS

No unregistered dealings or other notations

END OF SEARCH.

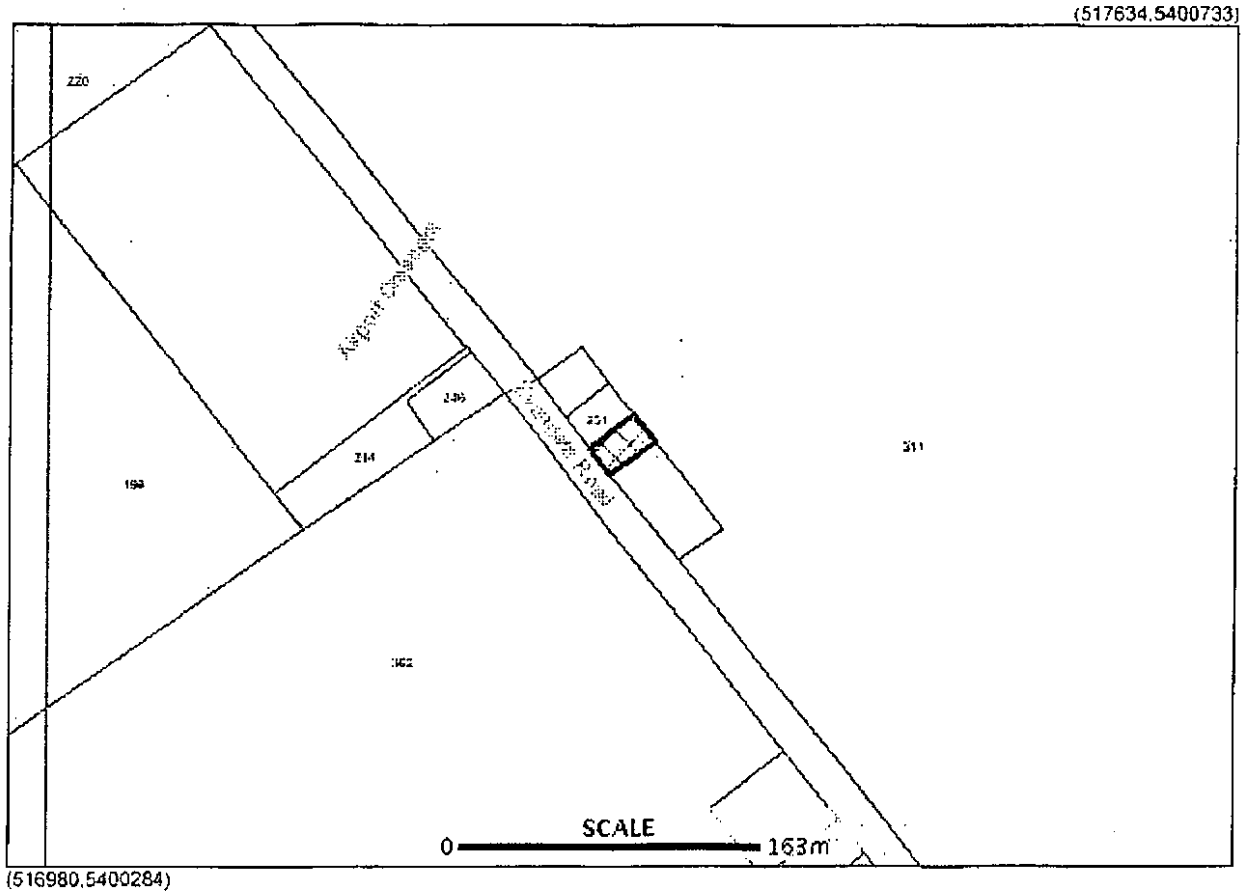
Warning: The information appearing under Unregistered Dealings and Notations has not been formally recorded in the Register.

Putting it all together.


PLAN OF SURVEY
of land situated in the
LAND DISTRICT OF CORNWALL
PARISH OF BREADALBANE
P/1
Grantee: Part of 806ac. Granted to Joseph Kirkby
Scale: 60 Feet to an inch
Registered Number
554/12
For Office Use
REGISTERED NUMBER
80983
Owner: Isaac Hogarth
Title Reference: C.T. No. 1083/71
Lot Number
Area
1 26¾0
2 24¾0
3 22¾0
4 0-1-34¾0
Total
Title
Commonwealth
Australia
EVANDALE
MAIN
ROAD
Evandale
Plan of Survey
A195

LISTmap

Generated at: 12:05 on 16-February-2010 EST User: dobson Charge Details: 1901106 (margaret)



Identify Results - Cadastral Parcels

Property ID	7607593
Title Reference	80983/3
Owners	The Commonwealth Of Australia
Address	"LAUNCESTON AIRPORT", 311 EVANDALE ROAD, WESTERN JUNCTION TAS 7212
Authority	Commonwealth of Australia
LPI	4700514

Localities and Postcodes
Local Government Boundaries
Road Centrelines Names
Cadastral Parcels

Tasmania
Explore the possibilities

GDA

the LIST. DEPARTMENT of PRIMARY INDUSTRIES and WATER Land Information Services

Tasmania

RESULT OF SEARCH

RECORDER OF TITLES, TASMANIA
Issued pursuant to the Land Titles Act 1980

SEARCH OF TORRENS TITLE

VOLUME	FOLIO
225834	1
EDITION	DATE OF ISSUE
3	05-Oct-1998

SEARCH DATE : 16-Feb-2010
SEARCH TIME : 12.06 pm

DESCRIPTION OF LAND

Parish of BREADALBANE, Land District of CORNWALL
Lot 1 on Plan 225834
Derivation : Part of 582A-3R-0P Gtd to J Sinclair
Prior CT 2873/40

SCHEDULE 1

C124557 THE COMMONWEALTH OF AUSTRALIA - Registered 05-Oct-1998 at 12:00 pm (MF:2536o/1212)

SCHEDULE 2

Reservations and conditions in the Crown Grant, if any
C150314 CAVEAT by National Australia Bank Limited - Registered 22-Mar-1999 at 12:00 pm (MF:2550o/786)

UNREGISTERED DEALINGS AND NOTATIONS

No unregistered dealings or other notations

END OF SEARCH.

Warning: The information appearing under Unregistered Dealings and Notations has not been formally recorded in the Register.

Putting it all together.

VOL. 2873 FOL. 40

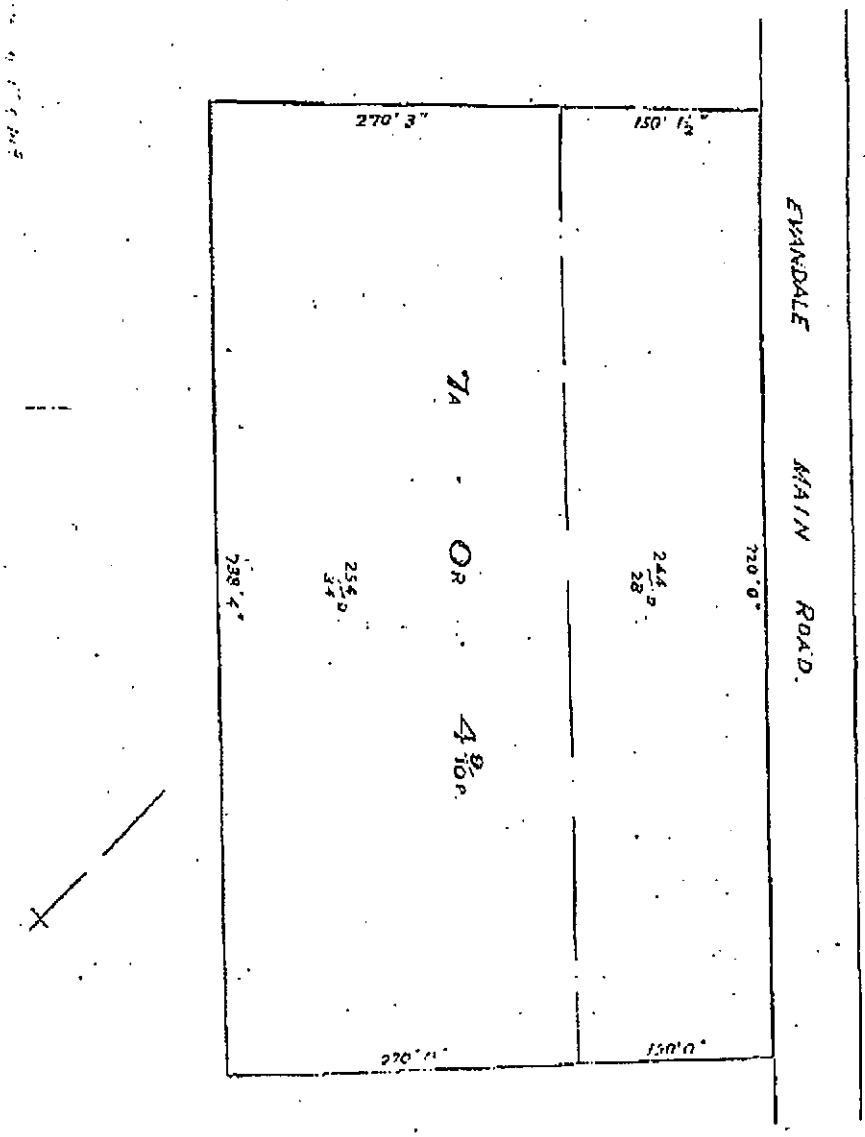
ANNEXURE TO CERTIFICATE OF TITLE

Recorder of Titles

REGISTERED NUMBER

225834

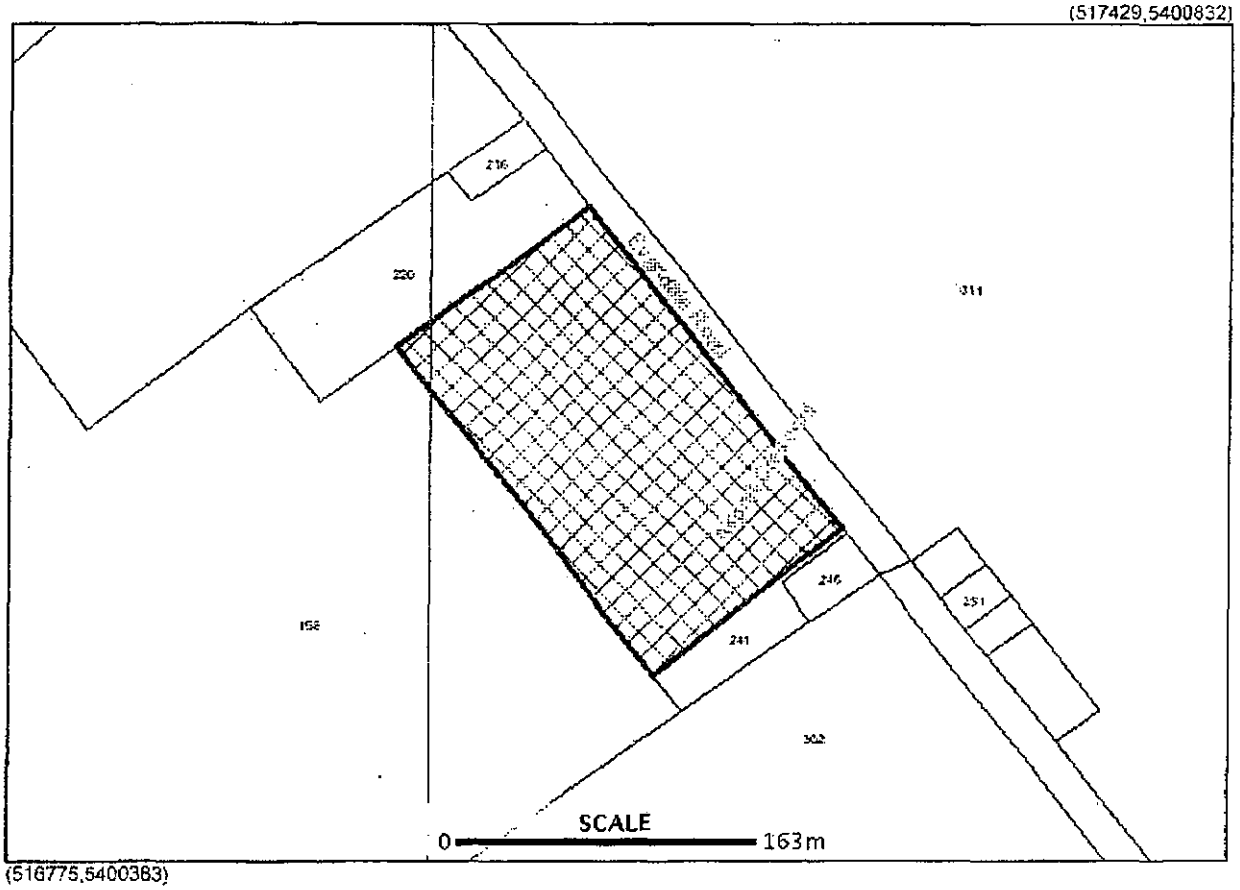
Lot 1 of this plan consists of all the land comprised in the above-mentioned cancelled folio of the Register.



LISTmap

Generated at: 12:06 on 16-February-2010 EST User: dobson Charge Details: 1901106 (margaret)

(517429,5400832)



(516775,5400383)

Identify Results - Cadastral Parcels

Property ID	7781743
Title Reference	225834/1
Owners	The Commonwealth Of Australia
Address	EVANDALE ROAD, WESTERN JUNCTION TAS 7212
Authority	Commonwealth of Australia
LPI	FET93

Localities and Postcodes
Local Government Boundaries
Road Centreline Names
Cadastral Parcels

Tasmania
Explore the possibilities

GDA

Appendix B

Site Inspection Photo Log

PHOTOGRAPHIC LOG

Site Name:	Site Location:	Project No:
Canberra Airport ARFF	Launceston Airport Fire Station	60504929

Plate No.	Date:
1	06/06/2016

Direction Photo Taken:

South west

Description:

1964 – Present Fire Station showing the observation tower and the original AFFF store to the left.

Plate No.	Date:
2	06/06/2016

Direction Photo Taken:

South West

Description:

Fire Station looking to the current solberg foam storage on right of building

PHOTOGRAPHIC LOG

Site Name:	Site Location:	Project No:
Canberra Airport ARFF	Launceston Airport Fire Station	60504929

Plate No.	Date:
3	01/06/2016

Direction Photo Taken:

South East

Description:

Fire Station Pad and grassed area showing location of hose washing area and hydrant.

Plate No.	Date:
4	06/06/2016

Direction Photo Taken:

Looking North west

Description:

Mobil Fuel Farm located to the right of the fire station

PHOTOGRAPHIC LOG

Site Name:	Site Location:	Project No:
Canberra Airport ARFF	Canberra Airport Fire Station	60504929

Plate No.	Date:
5	01/06/2016

Direction Photo Taken:

North East

Description:

Looking to runway showing surface drainage infrastructure on the Fire Station pad.

Plate No.	Date:
6	06/06/2016

Direction Photo Taken:

South West

Description:

Soil stockpiles to south of former RAAF Base. These stockpiles were reported to contain PFAs were excavated from the right of the Terminal Apron.

PHOTOGRAPHIC LOG

Site Name:	Site Location:	Project No:
Launceston Airport	Launceston Freight Terminal	60504929

Plate No.	Date:
7	06/06/2016

Direction Photo Taken:

North west

Description:

Hangar 17 Historical (Former RAAF Base)

Plate No.	Date:
8	06/06/2016

Direction Photo Taken:

North west

Description:

Looking toward the Terminal building and to the right the Sharp Airlines Hangar.

PHOTOGRAPHIC LOG

Site Name:	Site Location:	Project No:
Launceston Airport	Launceston Airport Sharp Airlines Hangar	60504929

Plate No.	Date:
9	06/06/2016

Direction Photo Taken:

North west

Description:

Sharp Airlines Hangar reportedly had AFFF fire suppression system.

Plate No.	Date:
10	06/06/2016

Direction Photo Taken:

North West

Description:

Airport Maintenance Area including Mechanics workshops

PHOTOGRAPHIC LOG

Site Name: Launceston Airport	**Site Location:** Launceston Airport Maintenance Area	**Project No:** 60504929

Plate No.	**Date:**
11	06/06/2016

Direction Photo Taken:

North west

Description:

Vehicle Maintenance sheds

Plate No.	**Date:**
12	01/06/2016

Direction Photo Taken:

South West

Description:

Airport Maintenance area

PHOTOGRAPHIC LOG

Site Name:	Site Location:	Project No:
Launceston Airport	Launceston Airport Control Tower	60504929

Plate No.	Date:
13	01/06/2016

Direction Photo Taken:

South west

Description:

Maintenance area and Air port Control Tower

Plate No.	Date:
14	06/06/2016

Direction Photo Taken:

SouthWest

Description:

Airport Freight Terminal, former RAAF Base and Royal Flying Doctor Hangar.

PHOTOGRAPHIC LOG

Site Name:	Site Location:	Project No:
Launceston Airport	Launceston Former FTG	60504929

Plate No.	Date:
15	06/06/2016

Direction Photo Taken:

North east

Description:

Fire training ground showing the steel cover over pad.

Plate No.	Date:
16	06/06/2016

Direction Photo Taken:

North East

Description:

FTG Smoke Hut

PHOTOGRAPHIC LOG

Site Name: Launceston Airport	**Site Location:** North East Stockpile	**Project No:** 60504929

Plate No.	**Date:**
17	06/06/2016

Direction Photo Taken:

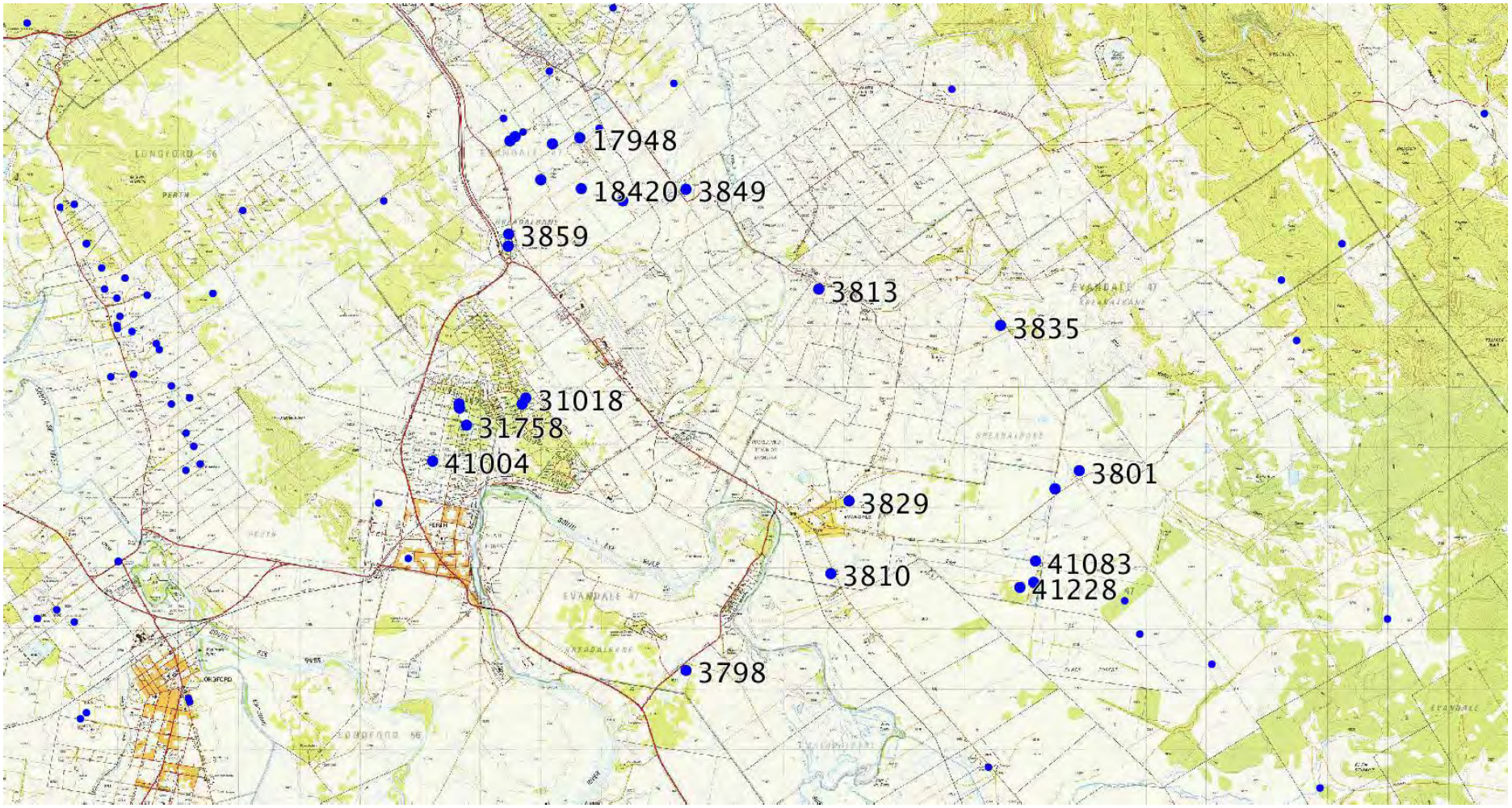
North east

Description:

Soil Stockpile

Appendix C

Bore Information



Identification

Feature id: 3813 **Feature type:** Bore

Location

Locality: Evandale
Easting: 520713 **Datum:** GDA94
Northing: 5401783 **Accuracy:** 200
Ground level (m ASL): 70.00

Construction

Date drilled: 21/09/1970
Drilling company: [redacted]
Depth (metres): 152.40
Initial yield (L/sec): 1.80
Initial EC (µS/cm):

Bore diameters

From (m)	To (m)	Diameter (mm)	Drilling technique
0.0	152.4	180.00	Rotary

Casings

From (m)	To (m)	Inside diameter (mm)	Outside diameter (mm)	Material
0.0	106.7		152.00	unknown

Screens

From (m)	To (m)	Inlet type
76.2	106.7	slotted casing

Seals

From (m)	To (m)	Material type
NA		

Geological / Hydrogeological Information

Lithological Log

From (m)	To (m)	Lithological description
0.0	1.5	soil and brown clay
1.5	7.6	light brown clay
7.6	15.2	light grey/brown sandy clay
15.2	152.4	wood, clay, rocks and sand

Depth to water struck

Date	From (m)	To (m)	Cumulative yield
21/09/1970	76.2		

Main aquifer geology: Tertiary Sediments
Final TDS (mg/L): 1760

Standing Water Levels

Standing water levels

Date	SWL (metres)
21/09/1970	0.00

Current status

Last recorded statuses

Type	Value	Date recorded
function	abandoned	21/09/1970

Identification

Feature id: 3829 **Feature type:** Bore

Location

Locality: Evandale
Easting: 521213 **Datum:** GDA94
Northing: 5398283 **Accuracy:** 200
Ground level (m ASL):

Construction

Date drilled: 23/10/1969
Drilling company: [redacted]
Depth (metres): 33.50
Initial yield (L/sec): 0.88
Initial EC (µS/cm):

Bore diameters

From (m)	To (m)	Diameter (mm)	Drilling technique
0.0	33.5	114.00	Air Percussion (Rotary air - R)

Casings

From (m)	To (m)	Inside diameter (mm)	Outside diameter (mm)	Material
0.0	16.8		127.00	unknown

Screens

From (m)	To (m)	Inlet type
NA		

Seals

From (m)	To (m)	Material type
NA		

Geological / Hydrogeological Information

Lithological Log

From (m)	To (m)	Lithological description
0.0	19.8	clay
19.8	24.4	coal
24.4	25.0	mudstone
25.0	25.9	soft mudstone
25.9	26.2	quartz
26.2	33.5	mudstone

Depth to water struck

Date	From (m)	To (m)	Cumulative yield
23/10/1969	17.1		

Main aquifer geology: Tertiary Sediments
Final TDS (mg/L):

Geological / Hydrogeological Information

Lithological Log

From (m)	To (m)	Lithological description
0.0	1.5	brown sand
1.5	12.2	dolerite fragments from boulder beds
12.2	21.3	light brown clay
21.3	24.4	brown clay with dolerite fragments (contaminated ?)
24.4	42.7	dark brown-grey clay and sandy clay
42.7	59.4	dark brown sandy clay with wood fragments
59.4	91.4	light grey clay, some wood fragments, very little sand
91.4	96.0	grey clayey sand, a little wood
96.0	99.1	grey sand
99.1	109.7	sandy clay, some wood fragments
109.7	131.1	grey sandy clay
131.1	140.2	grey sand
140.2	142.0	light grey brown sandy mudstone, some grit
142.0	143.0	mottled stone

Depth to water struck

Date	From (m)	To (m)	Cumulative yield
20/08/1970	88.4	106.7	4.42

Main aquifer geology: Tertiary Sediments
Final TDS (mg/L): 1950

Standing Water Levels

Standing water levels

Date	SWL (metres)
20/08/1970	18.90

Current status

Last recorded statuses

Type	Value	Date recorded
function	abandoned	20/08/1970

Identification

Feature id: 3849 **Feature type:** Bore

Location

Locality: Relbia

Easting: 518513 **Datum:** GDA94

Northing: 5403433 **Accuracy:** 2000

Ground level (m ASL):

Construction

Date drilled: 18/11/1983

Drilling company: [redacted]

Depth (metres): 56.40

Initial yield (L/sec): 0.15

Initial EC (µS/cm):

Bore diameters

From (m)	To (m)	Diameter (mm)	Drilling technique
0.0	56.4	152.00	Rotary

Casings

From (m)	To (m)	Inside diameter (mm)	Outside diameter (mm)	Material
NA				

Screens

From (m)	To (m)	Inlet type
NA		

Seals

From (m)	To (m)	Material type
NA		

Geological / Hydrogeological Information

Lithological Log

From (m)	To (m)	Lithological description
0.0	56.4	clay

Depth to water struck

Date	From (m)	To (m)	Cumulative yield
18/11/1983	39.6		0.15

Main aquifer geology: Tertiary Sediments

Final TDS (mg/L):

Standing Water Levels

Standing water levels

Date	SWL (metres)
18/11/1983	7.60

Current status

Last recorded statuses

Type	Value	Date recorded
function	Unknown	18/11/1983

Identification

Feature id: 3859 **Feature type:** Bore

Location

Locality: Breadalbane
Easting: 515594 **Datum:** GDA94
Northing: 5402693 **Accuracy:** 10
Ground level (m ASL):

Construction

Date drilled: 01/08/1985
Drilling company: [redacted]
Depth (metres): 30.50
Initial yield (L/sec): 5.05
Initial EC (µS/cm):

Bore diameters

From (m)	To (m)	Diameter (mm)	Drilling technique
12.2	30.5	152.00	Air Percussion (Rotary air - R)
0.0	12.2	203.00	Air Percussion (Rotary air - R)

Casings

From (m)	To (m)	Inside diameter (mm)	Outside diameter (mm)	Material
0.0	12.2		152.00	unplasticised polyvinylchloride uPVC

Screens

From (m)	To (m)	Inlet type
NA		

Seals

From (m)	To (m)	Material type
NA		

Geological / Hydrogeological Information

Lithological Log

From (m)	To (m)	Lithological description
0.0	0.3	top soil
0.3	9.2	brown clay
9.2	16.8	decomposed basalt
16.8	30.5	honeycomb basalt

Depth to water struck

Date	From (m)	To (m)	Cumulative yield
01/08/1985	25.9		
01/08/1985	27.5		5.05

Main aquifer geology: Tertiary Basalt
Final TDS (mg/L):

Current status

Last recorded statuses

Type	Value	Date recorded
function	abandoned	20/11/1991

Identification

Feature id: 17948 **Feature type:** Bore

Location

Locality: Relbia

Easting: 516763 **Datum:** GDA94

Northing: 5404283 **Accuracy:** 200

Ground level (m ASL):

Construction

Date drilled: 25/03/1999

Drilling company: [redacted]

Depth (metres): 52.00

Initial yield (L/sec):

Initial EC (µS/cm):

Bore diameters

From (m)	To (m)	Diameter (mm)	Drilling technique
0.0	52.0	200.00	Air Percussion (Rotary air - R)

Casings

From (m)	To (m)	Inside diameter (mm)	Outside diameter (mm)	Material
NA				

Screens

From (m)	To (m)	Inlet type
NA		

Seals

From (m)	To (m)	Material type
NA		

Geological / Hydrogeological Information

Lithological Log

From (m)	To (m)	Lithological description
0.0	52.0	basalt ??

Depth to water struck

Date	From (m)	To (m)	Cumulative yield
NA			

Main aquifer geology: Tertiary Sediments

Final TDS (mg/L):

Standing Water Levels

Standing water levels

Date	SWL (metres)
NA	

Current status

Last recorded statuses

Type	Value	Date recorded
function	Unknown	25/03/1999

Identification

Feature id: 18420 **Feature type:** Bore

Location

Locality: Breadalbane
Easting: 516788 **Datum:** GDA94
Northing: 5403443 **Accuracy:** 25
Ground level (m ASL):

Construction

Date drilled:
Drilling company: [redacted]
Depth (metres):
Initial yield (L/sec):
Initial EC (µS/cm):

Bore diameters

From (m)	To (m)	Diameter (mm)	Drilling technique
			Unknown

Casings

From (m)	To (m)	Inside diameter (mm)	Outside diameter (mm)	Material
NA				

Screens

From (m)	To (m)	Inlet type
NA		

Seals

From (m)	To (m)	Material type
NA		

Geological / Hydrogeological Information

Lithological Log

From (m)	To (m)	Lithological description
NA		

Depth to water struck

Date	From (m)	To (m)	Cumulative yield
NA			

Main aquifer geology: Tertiary Basalt
Final TDS (mg/L):

Standing Water Levels

Standing water levels

Date	SWL (metres)
NA	

Current status

Last recorded statuses

Type	Value	Date recorded
function	abandoned	01/12/2000

Identification

Feature id: 31018 **Feature type:** Bore

Location

Locality: Devon Hills
Easting: 515873 **Datum:** GDA94
Northing: 5399983 **Accuracy:** 50
Ground level (m ASL):

Construction

Date drilled: 06/05/2003
Drilling company: [redacted]
Depth (metres): 57.30
Initial yield (L/sec): 0.56
Initial EC (µS/cm):

Bore diameters

From (m)	To (m)	Diameter (mm)	Drilling technique
0.0	57.3	150.00	Downhole Hammer (Rotary Hammer)

Casings

From (m)	To (m)	Inside diameter (mm)	Outside diameter (mm)	Material
0.0	57.3	100.00	100.00	unplasticised polyvinylchloride uPVC

Screens

From (m)	To (m)	Inlet type
NA		

Seals

From (m)	To (m)	Material type
NA		

Geological / Hydrogeological Information

Lithological Log

From (m)	To (m)	Lithological description
0.0	0.1	topsoil
0.1	0.5	broken sandstone
0.5	57.3	dolerite

Depth to water struck

Date	From (m)	To (m)	Cumulative yield
06/05/2003	42.0		0.56

Main aquifer geology: Jurassic Dolerite
Final TDS (mg/L): 1337

Standing Water Levels

Standing water levels

Date	SWL (metres)
06/05/2003	39.00

Current status

Last recorded statuses

Type	Value	Date recorded
function	functioning	06/05/2003
purpose	irrigated agriculture	06/05/2003

Identification

Feature id: 31758 **Feature type:** Bore

Location

Locality: Perth
Easting: 514898 **Datum:** GDA94
Northing: 5399533 **Accuracy:** 200
Ground level (m ASL):

Construction

Date drilled: 19/01/2003
Drilling company: [redacted]
Depth (metres): 21.00
Initial yield (L/sec): 0.57
Initial EC (µS/cm):

Bore diameters

From (m)	To (m)	Diameter (mm)	Drilling technique
0.0	21.0	148.00	Unknown

Casings

From (m)	To (m)	Inside diameter (mm)	Outside diameter (mm)	Material
0.0	21.0	100.00	100.00	"unplasticised polyvinylchloride uPVC, Class 9"

Screens

From (m)	To (m)	Inlet type
NA		

Seals

From (m)	To (m)	Material type
NA		

Geological / Hydrogeological Information

Lithological Log

From (m)	To (m)	Lithological description
0.0	1.2	Brown clay
1.2	1.8	Decomposed dolerite
1.8	21.0	Dolerite occasional fractures

Depth to water struck

Date	From (m)	To (m)	Cumulative yield
19/01/2003	6.0		0.37
19/01/2003	12.0		0.57

Main aquifer geology: Jurassic Dolerite
Final TDS (mg/L):

Standing Water Levels

Standing water levels

Date	SWL (metres)
NA	

Current status

Last recorded statuses

Type	Value	Date recorded
function	functioning	19/01/2003
purpose	Unknown	19/01/2003

Identification

Feature id: 41004 **Feature type:** Bore

Location

Locality: Perth
Easting: 514340 **Datum:** GDA94
Northing: 5398941 **Accuracy:** 100
Ground level (m ASL):

Construction

Date drilled: 17/12/2007
Drilling company: [redacted]
Depth (metres): 63.00
Initial yield (L/sec): 0.19
Initial EC (µS/cm):

Bore diameters

From (m)	To (m)	Diameter (mm)	Drilling technique
0.0	63.0	150.00	Downhole Hammer (Rotary Hammer)

Casings

From (m)	To (m)	Inside diameter (mm)	Outside diameter (mm)	Material
0.0	60.0	100.00	105.00	unplasticised polyvinylchloride uPVC

Screens

From (m)	To (m)	Inlet type
36.0	42.0	slotted casing

Seals

From (m)	To (m)	Material type
NA		

Geological / Hydrogeological Information

Lithological Log

From (m)	To (m)	Lithological description
0.0	63.0	Dolerite

Depth to water struck

Date	From (m)	To (m)	Cumulative yield
17/12/2007	45.7	45.7	0.19

Main aquifer geology: Jurassic Dolerite
Final TDS (mg/L): 525

Standing Water Levels

Standing water levels

Date	SWL (metres)
17/12/2007	22.00

Current status

Last recorded statuses

Type	Value	Date recorded
function	capped	17/12/2007

Feature id	Feature type	Locality name	Easting	Northing	Datum	Coordinate accuracy (m)	Drilled date	[redacted]	Depth	Initial yield	SWL list	Last SWL date	Final TDS	Main aquifer geology	Last operating status	Last operating status date
3813	Bore	Evandale	520713	5401783	GDA94	200	21/09/1970		152.40	1.80	0	21/09/1970	1760	Tertiary Sediments	abandoned	21/09/1970
3829	Bore	Evandale	521213	5398283	GDA94	200	23/10/1969		33.50	0.88	9.1	23/10/1969		Tertiary Sediments	Unknown	23/10/1969
3835	Bore	Evandale	523713	5401183	GDA94	200	20/08/1970		143.00	4.42	18.9	20/08/1970	1950	Tertiary Sediments	abandoned	20/08/1970
3849	Bore	Relbia	518513	5403433	GDA94	2000	18/11/1983		56.40	0.15	7.6	18/11/1983		Tertiary Sediments	Unknown	18/11/1983
3859	Bore	Breadalbane	515594	5402693	GDA94	10	01/08/1985		30.50	5.05	9.1;9	01/12/2000		Tertiary Basalt	functioning	01/12/2000
3864	Bore	Devon Hills	515813	5399883	GDA94	2000	05/01/1989		23.20	0.00				Jurassic Dolerite	abandoned	05/01/1989
17943	Bore	Breadalbane	515583	5402493	GDA94	10	27/11/1998		36.00	0.13	7.5	27/11/1998		Tertiary Sediments	capped	27/11/1998
17949	Bore	Relbia	517473	5403243	GDA94	25	25/03/1999		30.00					Tertiary Sediments	Unknown	25/03/1999
18420	Bore	Breadalbane	516788	5403443	GDA94	25								Tertiary Basalt	abandoned	01/12/2000
31018	Bore	Devon Hills	515873	5399983	GDA94	50	06/05/2003		57.30	0.56	39	06/05/2003	1337	Jurassic Dolerite	functioning	06/05/2003
31758	Bore	Perth	514898	5399533	GDA94	200	19/01/2003		21.00	0.57				Jurassic Dolerite	functioning	19/01/2003
41166	Bore	Breadalbane	516121	5403591	GDA94	200	24/11/2003		7.00					Tertiary Basalt	abandoned	24/11/2003

Appendix D

Contaminated Sites Information

Level 7, 134 Macquarie Street, Hobart TAS
GPO Box 1550, Hobart, TAS 7001 Australia

Enquiries: Contaminated Sites Unit
Ph: (03) 6165 4594 Fax: (03) 61730254
Email: contaminatedsites@environment.tas.gov.au
Web: www.epa.tas.gov.au
Our Ref: (EN-EM-AV-100706_36: H547227) sma

ENVIRONMENT PROTECTION AUTHORITY

3 June 2016

[redacted]
AECOM
Level 2
60 Marcus Clarke Street
CANBERRA CITY ACT 2601

Dear Mr Brownsdon

Property Information Request
Launceston Airport, 311 Evandale Road, Western Junction
CT 128763/1

On 20 May 2016, the Contaminated Sites Unit received your Property Information Request relating to the land referred to above ('the Site'). A search of relevant databases and records has been undertaken.

A report entitled *Rescue & Fire Fighting Services, Launceston Airport 1995; Environmental Audit,* prepared by SEMF Pty Ltd, noted that there were numerous potentially contaminated areas on the site. These areas included: fire training areas, underground storage tanks (USTs), the chemical storage area, the vehicle workshop area, the vehicle wash-down area and the bunded areas around some of the USTs where empty drums were being temporarily stored and fire extinguishers refilled.

In July 2012, Air Services Australia (ASA), advised the EPA that water containing Perfluorochemicals was seeping [redacted] and that they have undertaken a number of actions to address the seepage such as:

- [redacted]
- Managing the source area to limit further discharge.
- Commissioning a report from Sloane Geoscience - Launceston ARFFS Dam Seepage Groundwater, Surface Water & Soil Monitoring Event: June 2012. Launceston Airport, Western Junction.
- Preparing further sampling and investigations.

The Director, EPA has requested ASA provide an update on the investigations by June 2016.

The then Environment Division and the EPA Division have given approval for the offsite disposal of contaminated soil from the Site:

- 4 Aug 1999: Approximately 35m^3 of hydrocarbon was approved for disposal at the Dulverton Regional Landfill site.
- 3 Oct 2002: Approximately 40m^3 of hydrocarbon was approved for disposal at the Remount Road Waste Depot site.
- 11 Sept 2013: Approximately 190m^3 of manganese, chromium, nickel and benzo (a) pyrene level 2 waste was approved for disposal at the Remount Road Waste Depot site.

- 12 Sept 2014: Approximately $2m^3$ of TPH and Metal contaminated pit waste was approved for disposal at the Remount Road Waste Depot site.
- Aug 2015 Environmental Approval 9308 under Regulation 12 of EMPCA was given for the removal, treatment and disposal of initially 10 Tonnes of PFC contaminated soil at Launceston City Council facility; this was later increased to accommodate 900 Tonnes of material.

A Workplace Standards [WST] record indicates that dangerous goods have historically been stored at the site in UST's. This record refers to file number 2017 (1982-1992).

Records indicate that 12 USTs were removed from the site in 2004. Residual hydrocarbon contamination was noted in two areas from which the USTs were removed.

A record indicates that two UPSS have been decommissioned at the site by Mobil since 2010.

A record indicates that four underground petroleum storage systems [UPSS} with a total volume of 330,000 L, plus another UPSS of 42,000 L, are registered at the site.

A record indicates that a spill of approximately 20 L of the chemical AGRAL (used as an additive to herbicides, fungicides, and pesticides) occurred at the site on 10 December 1996.

Records located relating to adjacent properties were:

- 139 Evandale Road: two UPSS were decommissioned and removed in March 2011; another tank [9500 L for waste oil] remains on the property
- 190 Evandale Road: one active UPSS is registered at the site; in addition, WST file number B667 refers to a UST.
- 246 Evandale Road: two active UPSS totalling 20000L are registered.
- 17 Richard Street: two UPSS were decommissioned and removed in Feb 2014.
- 4 Richard Street: three UPSS totalling 13500 L are registered.

No other records relating to contamination or potentially contaminating activities at the Site or adjacent properties were found.

The search of records is restricted to those held by the EPA Division and includes records relating to: the *Environmental Management and Pollution Control (Underground Petroleum Storage Systems) Regulations 2010;* Industrial Sites (which are or have been regulated by the EPA Division); historic landfills; and contamination issues reported to the Division. In addition, the Incidents and Complaints database and records relating to the historical storage of dangerous goods (as detailed below) are searched.

If dangerous goods have or may have been stored on the Site or an adjacent property, Workplace Standards Tasmania (1300 366 322) may have issued dangerous goods licences and/or may hold records of requested licences for the Site. As the storage of dangerous goods/fuels is regarded as an environmentally relevant activity, you may wish to contact them for further information.

The dangerous goods licensing records held by the EPA Division are only for sites which ceased holding a Dangerous Goods Licence prior to 1993. After this date Workplace Standards Tasmania holds the records for the Licenses.

The EPA Division does not hold records on all sites that are, or may be, contaminated. It is recommended that the history of the Sites and adjacent properties be investigated in order to determine the likelihood of contamination. If contamination is considered likely on the Sites or an adjacent property then further site assessment by a competent environmental assessment practitioner is recommended. Site assessment should be performed in accordance with the *National Environment Protection (Assessment of Site Contamination) Measure 1999*, National Environment Protection Council or as varied. Additionally, you should note the Director's

requirements, from 1 July 2015, regarding the mandatory use of certified practitioners for the preparation of site reports that will be assessed by the EPA. Further details, including an Information Sheet, are available at:
http://epa.tas.gov.au/regulation/engaging-a-contaminated-land-consultant

As local councils are able to issue Environment Protection Notices, Environmental Infringement Notices and record complaints, you may wish to contact them for additional information that may be relevant to the site. Further, if the Site has historically been subject to a permit under the *Land Use Planning and Approvals Act 1993*, the Council would have issued the permit.

Under the *Right to Information Act 2009* (RTI Act) you are entitled to apply for any records mentioned within this letter such as reports, letters, or other relevant documents. For further information on how the RTI process works and how to request information under the RTI Act please visit the Department of Primary Industries, Parks, Water and Environment website.

If you are purchasing a property, you should consider Part 5A of the *Environmental Management and Pollution Control Act 1994* (EMPCA) which defines and specifies requirements for managing contaminated sites. If there is reason to believe the site is, or is likely to be, contaminated there are certain requirements that you must meet (e.g. notification of a likely contaminated site to the Director, EPA as outlined in section 74B of the EMPCA).

Although all due care has been taken in the preparation of this letter, the Crown gives no warranty, express or implied, as to the accuracy or completeness of the information provided. The Crown and its servants or agents accept no responsibility for any loss or damage which may arise from reliance upon this letter, and any person relying on the letter does so at their own risk absolutely.

As you are aware, property searches incur a charge of $226.50. An invoice is enclosed.

If you have any queries in relation to the matters above, please contact the Contaminated Sites Unit using the details at the head of this correspondence or refer to the EPA website at www.epa.tas.gov.au and click on 'Regulation and Assessment' to locate information on Underground Fuel Tanks and Contaminated Sites.

Yours sincerely

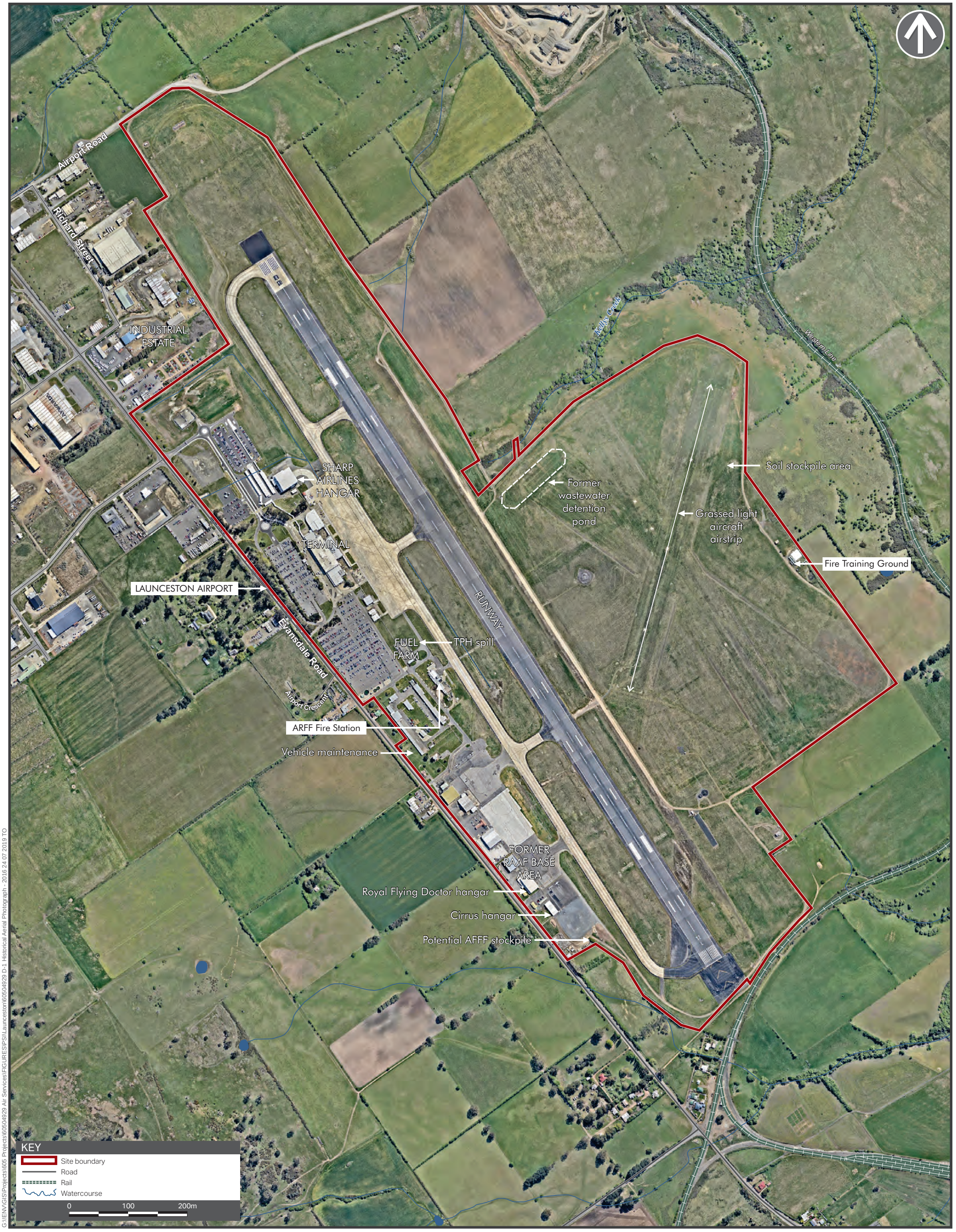
[redacted]

Email: [redacted]

Attachment: Invoice

Appendix E

Aerial Photographs



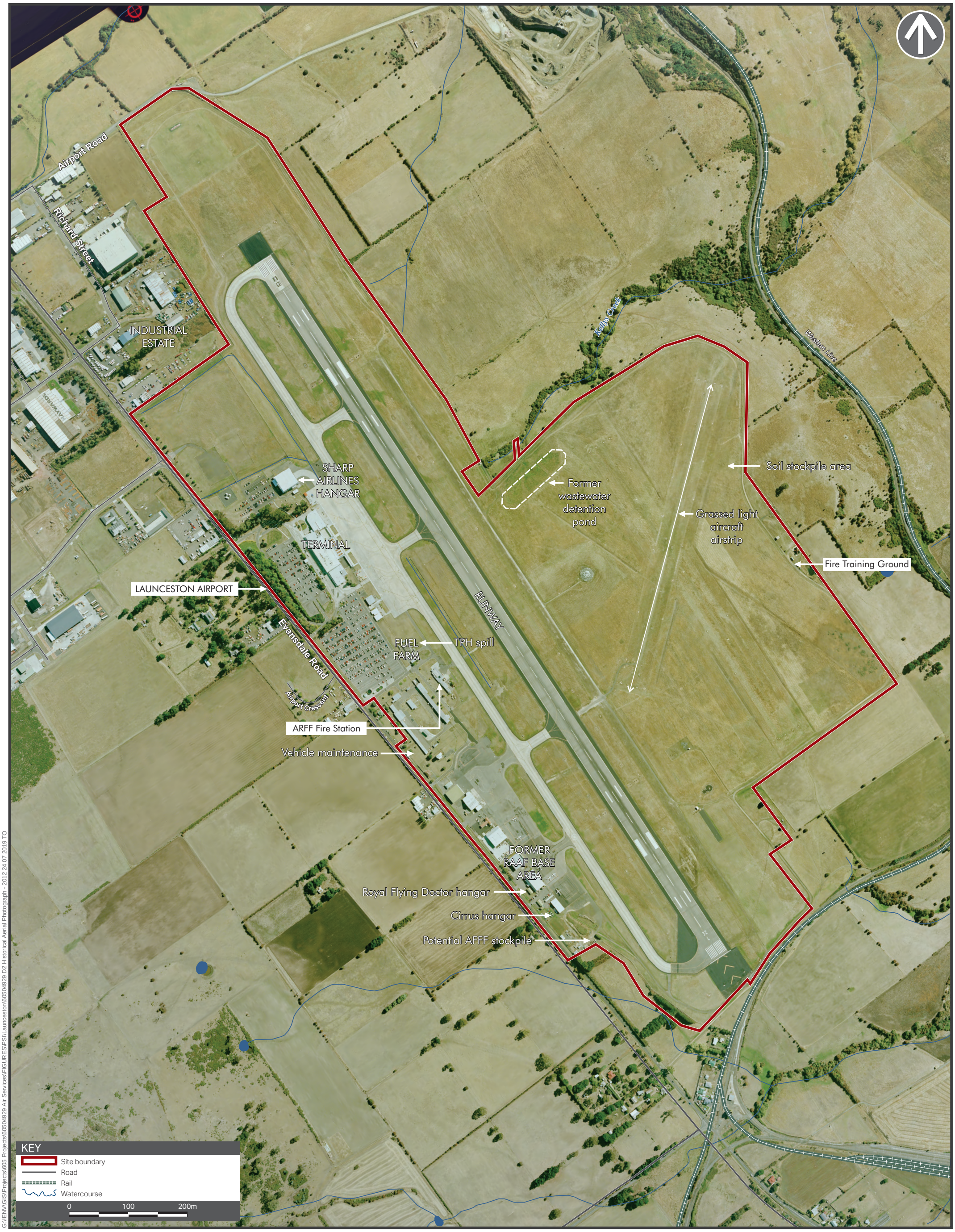
G:\ENVGIS\Projects\605 Projects\60504929 Air Services\FIGURES\PSI\Launceston\60504929 D-1 Historical Aerial Photograph - 2016 24 07 2019 TO

AECOM
Built to deliver a better world

HISTORICAL AERIAL PHOTOGRAPH - 2016

Preliminary Site Investigation
Launceston Airport, Launceston, Tasmania

APPENDIX D-1



G:\ENVIGIS\Projects\605 Projects\60504929 Air Services\FIGURES\PSI\Launceston\60504929 D2 Historical Aerial Photograph - 2012 24 07 2019 TO

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HISTORICAL AERIAL PHOTOGRAPH - 2012

Preliminary Site Investigation
Launceston Airport, Launceston, Tasmania

APPENDIX D-2

G:\ENVIGIS\Projects\605 Projects\60504929 Air Services\FIGURES\PSI\Launceston\60504929 FD-3 Historical Aerial Photograph - 2003 24 07 2019 TO

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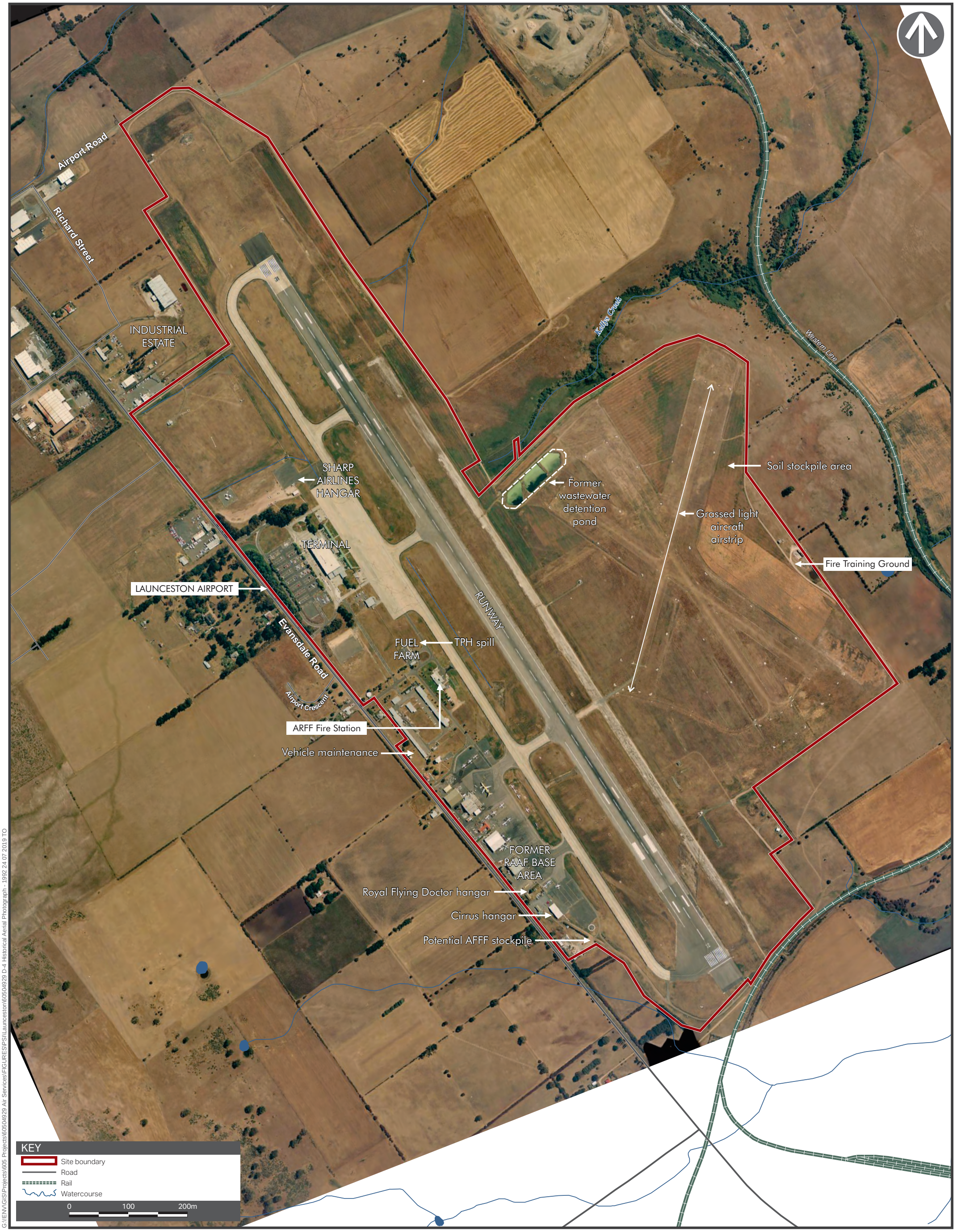
HISTORICAL AERIAL PHOTOGRAPH - 2003

Preliminary Site Investigation
Launceston Airport, Launceston, Tasmania

APPENDIX D-3



G:\ENVGIS\Projects\605 Projects\60504929 Air Services\FIGURES\PSI\Launceston\60504929 D-4 Historical Aerial Photograph - 1992 24 07 2019 TO

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HISTORICAL AERIAL PHOTOGRAPH - 1992

Preliminary Site Investigation
Launceston Airport, Launceston, Tasmania

APPENDIX D-4

Airport Road
Richard Street
INDUSTRIAL ESTATE
Kellys Creek
Western Line
SHARP AIRLINES HANGAR
TERMINAL
LAUNCESTON AIRPORT
Evansdale Road
Airport Crescent
ARFF Fire Station
Vehicle maintenance
FUEL FARM
TPH spill
RUNWAY
Former wastewater detention pond
Soil stockpile area
Grassed light aircraft airstrip
Fire Training Ground
FORMER RAAF BASE AREA
Royal Flying Doctor hangar
Cirrus hangar
Potential AFFF stockpile

KEY
Site boundary
Road
Rail
Watercourse
0 100 200m

G:\IENVGIS\Projects\605 Projects\60504929 Air Services\FIGURES\PS\Launceston\60504929 D-5 Historical Aerial Photograph - 1986 24 07 2019 TO

AECOM
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HISTORICAL AERIAL PHOTOGRAPH - 1986

Preliminary Site Investigation
Launceston Airport, Launceston, Tasmania

APPENDIX D-5

Airport Road
Richard Street
INDUSTRIAL ESTATE
Kellys Creek
Western Line
SHARP AIRLINES HANGAR
Former wastewater detention pond
Soil stockpile area
Grassed light aircraft airstrip
TERMINAL
Fire Training Ground
LAUNCESTON AIRPORT
RUNWAY
Evandale Road
FUEL FARM
TPH spill
Airport Crescent
ARFF Fire Station
Vehicle maintenance
FORMER RAAF BASE AREA
Royal Flying Doctor hangar
Cirrus hangar
Potential AFFF stockpile

KEY
Site boundary
Road
Rail
Watercourse
0 100 200m

G:\IENVIGIS\Projects\605 Projects\60504929 Air Services\FIGURES\PSI\Launceston\60504929 D-6 Historical Aerial Photograph - 1971 24 07 2019 TO

AECOM
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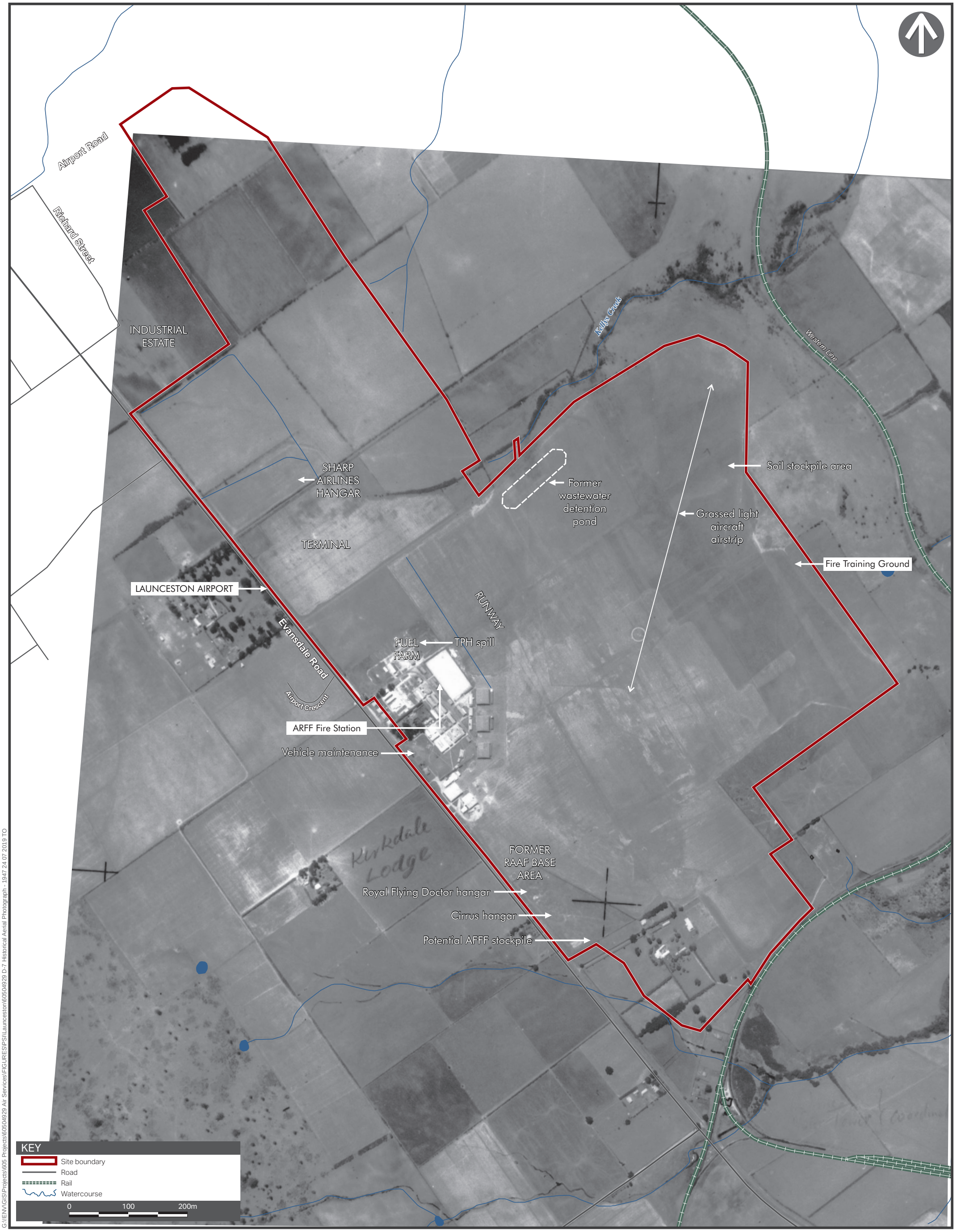
HISTORICAL AERIAL PHOTOGRAPH - 1971

Preliminary Site Investigation
Launceston Airport, Launceston, Tasmania

APPENDIX D-6



G:\ENVGIS\Projects\605 Projects\60504929 Air Services\FIGURES\PSI\Launceston\60504929 D-7 Historical Aerial Photograph - 1947 24 07 2019 TO

AECOM
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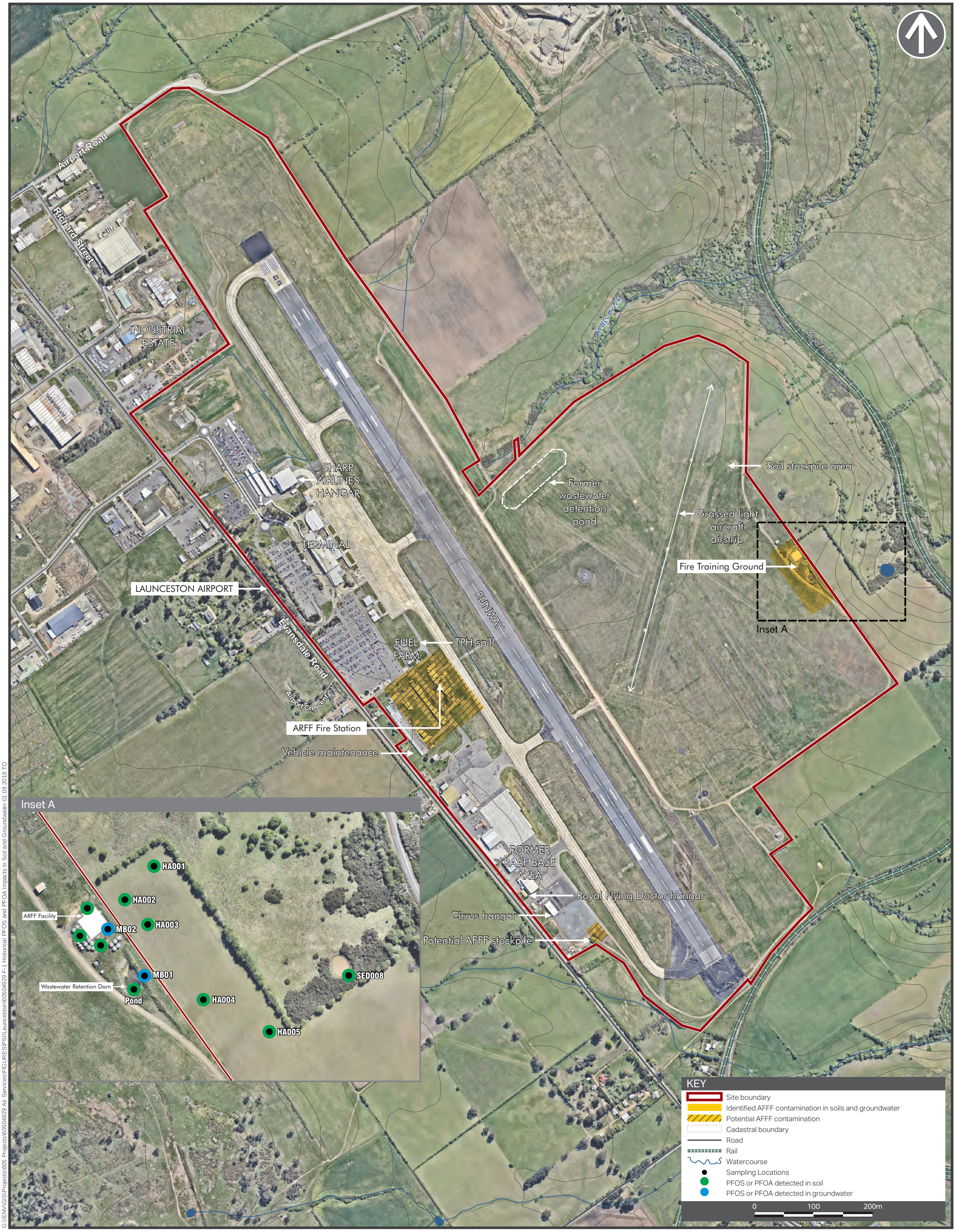
HISTORICAL AERIAL PHOTOGRAPH - 1947

Preliminary Site Investigation
Launceston Airport, Launceston, Tasmania

APPENDIX D-7

Appendix F

Historical Site Sampling



G:\ENVGIS\Projects\605 Projects\60504929 Air Services\FIGURES\PSI\Launceston\605049 29 F-1 Historical PFOS and PFOA Impacts in Soil and Groundwater 01 08 2019 TO

AECOM
Built to deliver a better world

HISTORICAL PFOS AND PFOA IMPACTS IN SOIL AND GROUNDWATER

Preliminary Site Investigation
Launceston Airport, Launceston, Tasmania

APPENDIX F-1

Appendix G

Incident Reports

ARFF Incident Detail Report

Air Services Australia LAUNCESTON **Incident No:** 318

ARFF Incident Details for **Aircraft - Crash** **27/12/2006**

Incident Site:	RNWY 32 @ 150 metre mark	**Number of Lives Saved:**	0
Origin of Call:	FCC Observation	**Number of Deaths:**	0
Company:	[redacted]	**Number of Injuries:**	0
Est Damage Value:	$0	**Est Facility Value:**	$0

Incident Times (UTC)

Call Time:	27/12/2006 03:56:00	**Arrival Time:**	27/12/2006 04:40:00	**End Time:**	27/12/2006 06:02:00
Dispatch Time:	27/12/2006 04:13:00	**Control Time:**	27/12/2006 05:05:00	**Return Time:**	27/12/2006 06:03:00

Materials Used

DCP Used:	0.00 **kg**	**Foam Used:**	3 **litres**
WaterUsed:	50 **litres**	**Other Used:**	

Vehicles Involved

Vehicle Code	Quantity	Vehicle Code	Quantity	Vehicle Code	Quantity
ULFV 6	1	LFV	1	Police	1
Ambulance	1	MFB	1	Airport Safety	1

Staff in Attendance

Team Leader: [redacted] **FSM:**

Other Staff:

[redacted] [redacted] [redacted]

[redacted]

Actions Taken

FCC Operator monitored VH JTK Trinidad TB 20 Socota transmission with ATC re electrical problem/ Nil indication of undercarriage locked and intermittent radio comms. ACFT at this time was approximately 20 DME.
ARFF took up standby position.
ACFT performed fly by for undercarriage observation. ATC, Launceston operations and ARFF observed and confirmed nose wheel not locked in position.
ATC advised local standby and implemented AEPs. ACFT was held in holding pattern until emergency services were in position,
ARFF moved to taxiway and took up stand by positions. ACFT attempted landing on RNWY 32 upon which nose wheel collapsed immediatley. ARFFvehicles responded and took up tactical position on nose of ACFT.
ARFF deployed one line one length 50 mm hose with FB10X and 9kg DCP extinguisher to standby. Upon approach to incident occupants were exiting ACFT (Pilot [redacted], Passenger [redacted]) both residing in Hobart.
Occupants were directed away from ACFT. Inspection of ACFT revealed no fire, no heat or leaking fuel. Battery isolated. Damage sustained to ACFT was limited to propellor, nose wheel ,and nacel.
Ambulance was directed to occupants and removed them to the RFDS hangar for observation.
050500 UTC ARFF vehicle 3 returned to station. CASA requested Tas police photogragh the scene of the incident prior to removal of ACFT.
Tower reported Launceston main RNWY 14/32 closed until removal of ACFT.
Vehicle 1 remained on scene. Approval to remove ACFT was granted at 050700 UTC by ATC. ARFF assisted with the removal of ACFT and followed acft to GA apron parking area. ARFF returned to station. ARFF remained at Category 6 for the duration of the incident.

ARFF Incident Detail Report

Air Services Australia LAUNCESTON **Incident No:** 444

ARFF Incident Details for **Aircraft - Crash** **19/04/2009**

Incident Site:	1.2 K south of airport boundary	**Number of Lives Saved:**	1
Origin of Call:	Crash Alarm	**Number of Deaths:**	0
Company:	[redacted]	**Number of Injuries:**	1
Est Damage Value:	$35000	**Est Facility Value:**	$35000

Incident Times (UTC)

Call Time:	19/04/2009 07:42:00	**Arrival Time:**	19/04/2009 07:45:00	**End Time:**	19/04/2009 08:30:00
Dispatch Time:	19/04/2009 07:42:00	**Control Time:**	19/04/2009 07:47:00	**Return Time:**	19/04/2009 08:38:00

Materials Used

DCP Used:	0.00 **kg**	**Foam Used:**	6 **litres**
WaterUsed:	100 **litres**	**Other Used:**	

Vehicles Involved

Vehicle Code	Quantity	Vehicle Code	Quantity	Vehicle Code	Quantity
ULFV 6	2				

Staff in Attendance

Team Leader: [redacted] **FSM:**

Other Staff:

[redacted] [redacted] [redacted]

[redacted] [redacted]

Actions Taken

Incident 19/04/2009 07:42 -
Tower activated crash alarm, VH-ZMC experimental home built single seat acft crashed south of airport.
Pilot details - [redacted]

Dispatch 19/04/2009 07:42 -
ARFF responded via Evandale road, AEP's implemented, ARFF cat 0.

Arrival 19/04/2009 07:45 -
ARFF took up tactical position, light winds nil fire, pilot was 2 metres clear of acft.
Car 8 ([redacted] established command post 100 m S/E of incident site.

Control 19/04/2009 07:47 -
ARFF deployed FB10x and covered fuel with foam while 2 ARFF staff cared for pilot.
A doctor passing by arrived and provided assistance.

07:50 - Police and ambulance on scene and took over medical care of pilot.

07:52 - Evandale volunteer brigade on scene.

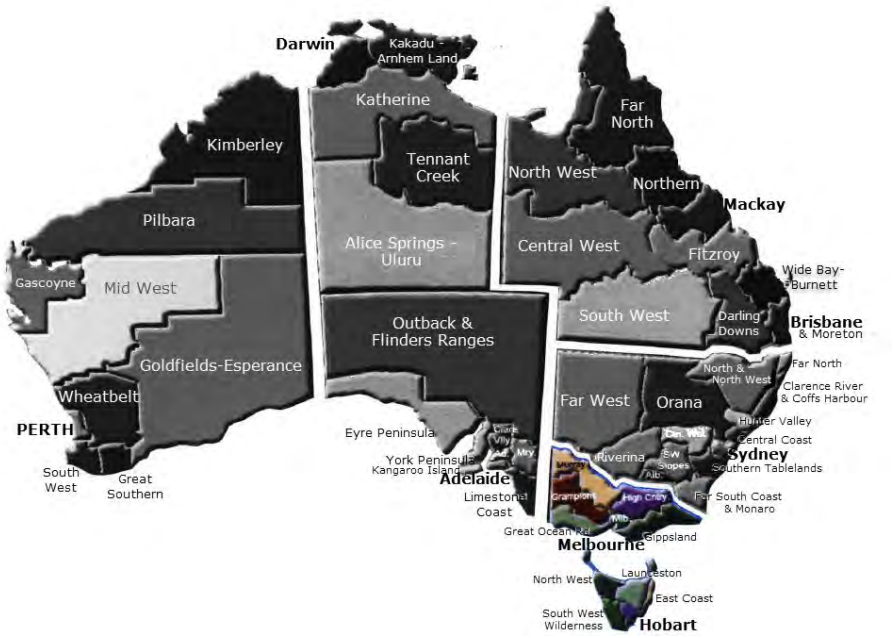
08:10 - Scene safe and handed over to police IC ([redacted]

End 19/04/2009 08:30 -
ARFF made up hoses and equipment.

Return 19/04/2009 08:38 -
ARFF returned to station.

Appendix H

Subsurface Utility Clearance Report & Survey Data



TELSTRA ACCREDITED PLANT LOCATORS – VICTORIA & TASMANIA.

Region VIC & TAS

Telstra plans are intended to be indicative only. A plant location service (Telstra accredited) is required to identify the exact location of the plant and ensure that the asset is protected during construction work. It is your responsibility as part of your "Duty of Care" to engage an Accredited Plant Locator.

*Optic fibre cable locations must be performed by a locator with Telstra optic fibre location accreditation.

Locators with Telstra optic fibre cable location accreditation are indicated by either a 'yes' in the 'Fibre' column or the DBYD Certified Locator Symbol.

Please contact a Telstra accredited locator from the pages following (fees apply).

Telstra Accredited Plant Locators – Victoria & Tasmania

VICTORIA

[redacted]	[redacted]	[redacted]	
[redacted]	DIAL BEFORE YOU DIG CERTIFIED LOCATOR	[redacted]	[redacted]
[redacted]	DIAL BEFORE YOU DIG CERTIFIED LOCATOR	[redacted]	[redacted]
[redacted]	DIAL BEFORE YOU DIG CERTIFIED LOCATOR	[redacted]	[redacted]
[redacted]	DIAL BEFORE YOU DIG CERTIFIED LOCATOR	[redacted]	[redacted]
[redacted]	DIAL BEFORE YOU DIG CERTIFIED LOCATOR	[redacted]	[redacted]
[redacted]	DIAL BEFORE YOU DIG CERTIFIED LOCATOR	[redacted]	[redacted]
[redacted]	DIAL BEFORE YOU DIG CERTIFIED LOCATOR	[redacted]	[redacted]
[redacted]	DIAL BEFORE YOU DIG CERTIFIED LOCATOR	[redacted]	[redacted]
[redacted]	DIAL BEFORE YOU DIG CERTIFIED LOCATOR	[redacted]	[redacted]
[redacted]	DIAL BEFORE YOU DIG CERTIFIED LOCATOR	[redacted]	[redacted]
[redacted]	DIAL BEFORE YOU DIG CERTIFIED LOCATOR	[redacted]	[redacted]
[redacted]	DIAL BEFORE YOU DIG CERTIFIED LOCATOR	[redacted]	[redacted]
[redacted]	DIAL BEFORE YOU DIG CERTIFIED LOCATOR	[redacted]	[redacted]

Telstra Accredited Plant Locators – Victoria & Tasmania

Telstra Accredited Plant Locators – Victoria & Tasmania

Telstra Accredited Plant Locators – Victoria & Tasmania

[redacted]		[redacted]	[redacted]

Telstra Accredited Plant Locators – Victoria & Tasmania

TASMANIA

[redacted]

Friday, 11 August 2017
Ref: 050 H02441 20 0005 1

[redacted]
Suite 6, Level 3
The Typewriter Factory
13-17 Castray Esplande
Hobart TAS 7000

[redacted]

RE: Monitoring Well Survey

The GDA94 Zone 55/Aust Height Datum (Tas) 1983 Coordinates for the monitoring wells surveyed at Launceston Airport are as follows:

	GDA 94 Coordinates		AHD (Tas) 1983	
Well/Location Name	**Easting**	**Northing**	**Ground Level**	**Top of Casing Level**
HA01	517438.470	5400663.106	167.87	
HA02	517472.746	5400612.248	168.11	
HA03	517806.433	5399977.580	167.09	
HA04	517766.408	5399955.004	167.83	
HA05	518140.834	5401140.270	166.43	
HA06	517638.960	5401081.583	160.85	
HA07	517602.865	5401048.387	161.22	
MW01	517447.141	5400649.003	168.07	167.94
MW02	517812.785	5399982.638	166.72	166.66
MW03	517642.702	5401120.639	160.86	160.80
SS01	517488.721	5400690.759	166.46	
SS02	517447.866	5400754.769	166.24	
SS03	517385.471	5400852.211	165.81	
SS04	517959.600	5399835.402	166.18	
SS05	518304.864	5400070.662	160.99	
SS06	517531.457	5401107.751	161.05	
SS07	517635.348	5401116.987	160.43	

Yours faithfully,

[redacted]

[redacted]
Surveyor

[redacted]

Appendix I

Calibration Certificates

ThermoFisher SCIENTIFIC

The world leader in serving science

RENTALS

Equipment Report – Solinst Model 122 Interface Meter

This Meter has been performance checked / calibrated as follows:

Cleaned/Tested **Pass?** ☑ **Yes** ☐ **No**

☑ Probe

☑ Tape/Reel

☑ Performance Test & Battery Voltage Check (8.7 V) 8.0V minimum

Date: 14TH AUG 2017 Checked by: [redacted]

Signed: [signature]

Please check that the following items are received and that all items are cleaned and decontaminated before return. A minimum $20 cleaning / service / repair charge may be applied to any unclean or damaged items. Items not returned will be billed for at the full replacement cost.

Sent	Received	Returned	Item
☑	☐	☐	Operations check OK
☑	☐	☐	Plastic Box / Bag
☑	☐	☐	Spare 9V Battery Qty 1
☑	☐	☐	Probe Cleaning Brush
☑	☐	☐	Decon
☑	☐	☐	Instruction leaflet
☑	☐	☐	Tape Guide
☐	☐	☐	

Processors Signature/ Initials [initials]

Quote Reference	CM008018	Condition on return
Customer Ref	60743717/1..	
Equipment ID	60 Meter SOL122-63	
Equipment serial no.		
Return Date	/ /	
Return Time		

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RENTALS

Equipment Certification Report – TPS 90FLMV Water Quality Meter

This Water Quality Meter has been performance checked and calibrated as follows:

Sensor	Concentration	Span 1	Span 2	Traceability Lot #	Pass?
pH	pH 6.88 / pH 4.01	6.88 pH	4.02 pH	301828/301911	☑
Conductivity	58.6 mS/cm	0 mS/cm	58.6 mS/cm	304160	☑
TDS	36.0 ppk	0 ppk	36.1 ppk	301887	☑
Dissolved Oxygen	Sodium Sulphite / Air	0 ppm in Sodium Sulphite	8.97 ppm Saturation in Air	788	☑

Check only

Redox (ORP) *	Electrode operability test	240mV +/- 10%	249 mV	1600	☑

* This meter uses an Ag/AgCl ORP electrode. To convert readings to SHE (Standard Hydrogen Electrode), add 199 mV to the mV reading.

☑ Battery Status 8.22 V (min 7.2V)
☑ Electrical Safety Tag attached (AS/NZS 3760)
☑ Temperature 19.9 °C
☑ Electrodes Cleaned and checked

Tag No: 000038

Valid to: 08/11/17

Date: 10/08/2017

Signed: [redacted]

Please check that the following items are received and that all items are cleaned and decontaminated before return. A minimum $30 cleaning / service / repair charge may be applied to any unclean or damaged items. Items not returned will be billed for at the full replacement cost.

Sent	Returned	Item
☑	☐	90FLMV Unit. Ops check/Battery status: 8.2V
☑	☐	pH sensor with wetting cap, 5m
☑	☐	Conductivity/TDS/Temperature K=10 sensor, 5m
☑	☐	Dissolved oxygen YSI5739 sensor with wetting cap, 5m
☑	☐	Redox (ORP) sensor with wetting cap, 5m
☑	☐	Power supply 240V to 12V DC 200mA
☑	☐	Instruction Manual
☑	☐	Quick Guide
☑	☐	Syringe with storage solution for pH and ORP sensors
☑	☐	Carry Case
☑	☐	Check to confirm electrical safety (tag must be valid)

Date: 11/08/2017

Signed: [redacted]

TFS Reference	AM008018	Return Date:	/ /
Customer Reference	605437 17/1.0	Return Time:	
Equipment ID	90FLMVI	Condition on return:	
Equipment Serial No.			

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RENTALS

EQUIPMENT CERTIFICATION REPORT

Sample Pro Micro Purge Low-Flow Bladder Sampling Pump

This Pump has been checked as follows:

Cleaned / checked	Description
☑	Clean and check all components

Date: 14th August. 2017.

Checked by: [redacted]

Signature: [redacted]

Sent	Received	Returned	Description
☑	☐	☐	QED Sample MicroPurge Pump Serial No: 12312
☑	☐	☐	Pump Operating Field Guide laminated
☑	☐	☐	Pump Controller ID: QMP10 **Batt Status** 3.7v
☑	☐	☐	Pump Controller Blue Airline Hose
☑	☐	☐	Blue Airline Hose **Quick Connect Fitting** for ¼" Airline
☑	☐	☐	Pump Tube & Cap
☑	☐	☐	Hanger Cable S/steel, length 65 **m**
☑	☐	☐	Hanger Cable Clamp – Black with Orange Tip
☑	☐	☐	Controller Instructions inside case
☑	☐	☐	Compressor ID: TM4161K.
☑	☐	☐	Comp connecting Hose & Push lock fittings
☐	☐	☐	Gas Bottle CO2 ID: _____
☐	☐	☐	CO2D Gas Regulator ID: _____ in Carry Case
☐	☐	☐	CO2D Cylinder Gas Regulator Shift Spanner
☐	☐	☐	Gas Bottle Trolley
☐	☐	☐	Cylinder weight… Without Trolley _____ **KG**
☑	☐	☐	Flow Cell ID: EFC500M. With Lid (Yes)/No
☑	☐	☐	Spare Disposable Bladders, qty 2
☑	☐	☐	Spare Accessories Jar
[redacted]			Processors Signature/ Initials

Please check that the following items are received and all items are returned. Please clean equipment before returning. **A minimum $30 service/repair charge applies to any unclean or damaged items.**

TFS Reference	CM0080818	Return Date:	
Customer Reference	6054371711.0	Return Time:	
Equipment ID	MPKIT16 - -	Condition on return:	
Equipment Serial No.			

Appendix J

Bore Logs

AECOM
Level 45, 80 Collins Street
MELBOURNE VIC 3004
Telephone: 03 9653 1234
Fax: 03 9654 7117

BORING/WELL CONSTRUCTION LOG

MW01

PROJECT NUMBER 60543717
PROJECT NAME Launceston Airport
LOCATION Launceston Airport
DRILLING METHOD HA/SFA/DHH
SAMPLING METHOD Grab
SURFACE ELEVATION
WELL HEAD/TOC
LOGGED BY [redacted]
COMMENTS Checked TS 16/1/2018

DATE 9/8/2017
BLANK 2
SCREEN 4
GRAVEL PACK 4.5
SANITARY SEAL/BENTONITE 1.5
STABILISED WATER LEVEL 4.12 m bTOC
GROUND WATER ELEVATION

PID (ppm)	BLOW COUNTS	RECOVERY	SAMPLE NUMBER	ANALYSED	DEPTH (mBGS)	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH	WELL DIAGRAM
			MW01_0-0.1 MW01_0.2-0.3 MW01_0.4-0.5				FILL: soft, brown, sandy CLAY, good structure, rootlets, reef quartz inclusions, moist no odour		
								0.60	
			MW01_0.6-0.7 MW01_0.8-0.9		1		Soft, red to brown, CLAY, good structure, moist, no odour, no inclusions Becoing paler, light brown		
			MW01_1.0-1.1					1.20	
			MW01_2.0-2.1		2		Soft, light brown, sandy CLAY, good structure, moist, no odour, no inclusions weathered basalt fragments and basalt gravels		
								2.60	
			MW01_2.9-3.0		3		Consolidated basalt, fresh grey basalt, wet at approximately 3.1 m bgl		
			MW01_3.9-4.0		4				
					5				
					6			6.00	
							EOH @ 6.0 m bgl Total Depth: 6.00 m		

BORING / WELL CONSTRUCTION LOG BORELOGS.GPJ HLA_SYD.GDT 16/1/18

AECOM
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MELBOURNE VIC 3004
Telephone: 03 9653 1234
Fax: 03 9654 7117

BORING/WELL CONSTRUCTION LOG

MW02

PROJECT NUMBER 60543717
PROJECT NAME Launceston Airport
LOCATION Launceston Airport
DRILLING METHOD HA/SFA/DHH
SAMPLING METHOD Grab
SURFACE ELEVATION
WELL HEAD/TOC
LOGGED BY [redacted]
COMMENTS Checked TS 16/1/2018

DATE 10/8/2017
BLANK 4.5
SCREEN 3.5
GRAVEL PACK 5
SANITARY SEAL/BENTONITE 4
STABILISED WATER LEVEL 5.26 m bTOC
GROUND WATER ELEVATION

PID (ppm)	BLOW COUNTS	RECOVERY	SAMPLE NUMBER	ANALYSED	DEPTH (mBGS)	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH	WELL DIAGRAM
			MW02_0-0.1 MW0.2-0.2-0.3 MW02_0.4-0.5 MW02_0.6-0.7 MW02_0.8-0.9 MW02_1.0-1.1		1		FILL: soft brown, CLAY, rootletts, river gravels throughout (10-50 mm), moist, moderately plastic	0.50	
			MW02_1.9-2.0		2		Firm, red to brown, basaltic CLAY, good structure, moist, no odour, moderately plastic		
			MW02_2.9-3.0		3				
			MW02_3.9-4.0		4			4.20	
			MW02_4.9-5.0		5		Consolidated basalt, fresh grey basalt, wet at approximately 4.9 m bgl Grey to orange weathered basalt		
			MW02_5.9-6.0		6				
			MW02_6.9-7.0		7				
			MW02_7.9-8.0		8		EOH @ 8.0 m bgl	8.00	

Total Depth: 8.00 m

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BORING/WELL CONSTRUCTION LOG

MW03

PROJECT NUMBER 60543717
PROJECT NAME Launceston Airport
LOCATION Launceston Airport
DRILLING METHOD HA/SFA
SAMPLING METHOD Grab
SURFACE ELEVATION
WELL HEAD/TOC
LOGGED BY [redacted]
COMMENTS Checked TS 16/1/2018

DATE 10/8/2017
BLANK 1
SCREEN 3
GRAVEL PACK 3.5
SANITARY SEAL/BENTONITE 0.5
STABILISED WATER LEVEL 0.00 m bTOC
GROUND WATER ELEVATION

PID (ppm)	BLOW COUNTS	RECOVERY	SAMPLE NUMBER	ANALYSED	DEPTH (mBGS)	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH	WELL DIAGRAM
			MW03_0-0.1 MW03_0.2-0.3 MW03_0.4-05 MW02_0.6-0.7 MW02_0.8-0.9 MW02_1.0-1.1 MW02_1.9-2.0 MW02_2.9-3.0 MW02_3.9-4.0		1 2 3 4		FILL: soft, sandy CLAY, rootletts, some crushed basalt inclusions, high plasticity, very wet, no odour Soft, dark grey, silty CLAY, wet, very plastic, slight natural organic odour loose, brown, clayey GRAVEL, wet, no odour EOH @ 4.0 m bgl Total Depth: 4.00 m	0.60 3.40 4.00	

BORING / WELL CONSTRUCTION LOG BORELOGS.GPJ HLA_SYD.GDT 16/1/18

AECOM
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BORING/WELL CONSTRUCTION LOG

HA01

PROJECT NUMBER 60543717
PROJECT NAME Launceston Airport
LOCATION Launceston Airport
DRILLING METHOD Hand Auger
SAMPLING METHOD Grab
SURFACE ELEVATION
WELL HEAD/TOC
LOGGED BY [redacted]
COMMENTS Checked TS 16/1/2018

DATE 9/8/2017
BLANK
SCREEN
GRAVEL PACK N/A
SANITARY SEAL/BENTONITE
STABILISED WATER LEVEL
GROUND WATER ELEVATION

PID (ppm)	BLOW COUNTS	RECOVERY	SAMPLE NUMBER	ANALYSED	DEPTH (mBGS)	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH
			HA01_0-0.1				FILL: soft, brown, sandy CLAY, rootletts, moist, low plasticity, no odour	
			HA01_0.2-0.3				FILL: soft, brown, sandy CLAY, rootletts, crushed baslat throughout (50-200 mm), moist, moderate plasticity, no odour	0.20
			HA01_0.4-0.5					0.50
			HA01_0.6-0.7				Soft, red to brown, CLAY, good structure, moderately plastic, moist, no odour	
			HA01_0.8-0.9				BEcoming firm and pale brown	
			HA01_1.0-1.1		1			1.10
							EOH @ 1.1 m bgl Total Depth: 1.10 m	

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BORING/WELL CONSTRUCTION LOG

HA02

PROJECT NUMBER 60543717
PROJECT NAME Launceston Airport
LOCATION Launceston Airport
DRILLING METHOD Hand Auger
SAMPLING METHOD Grab
SURFACE ELEVATION
WELL HEAD/TOC
LOGGED BY [redacted]
COMMENTS Checked TS 16/1/2018

DATE 9/8/2017
BLANK
SCREEN
GRAVEL PACK N/A
SANITARY SEAL/BENTONITE
STABILISED WATER LEVEL
GROUND WATER ELEVATION

PID (ppm)	BLOW COUNTS	RECOVERY	SAMPLE NUMBER	ANALYSED	DEPTH (mBGS)	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH
			HA02_ 0-0.1				FILL: soft, brown, sandy CLAY, rootletts, moist, low plasticity, no odour	
			HA02_ 0.2-0.3				FILL: soft, brown, sandy CLAY, some rootletts, very moist, moderate plasticity, soem gravel inclusions, no odour	0.20
			HA02_ 0.4-0.5					0.50
			HA02_ 0.6-0.7				FILL: soft light brown and orange mottled, CLAY, wet, moderate to high plasticity, no odour	
			HA02_ 0.8-0.9					
			HA02_ 1.0-1.1		1		Crushed basalt inclusions (20-60 mm)	1.10
							EOH @ 1.1 m bgl Total Depth: 1.10 m	

BORING / WELL CONSTRUCTION LOG SOIL_BORELOGS.GPJ HLA_SYD.GDT 16/1/18

AECOM
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BORING/WELL CONSTRUCTION LOG

HA03

PROJECT NUMBER 60543717
PROJECT NAME Launceston Airport
LOCATION Launceston Airport
DRILLING METHOD Hand Auger
SAMPLING METHOD Grab
SURFACE ELEVATION
WELL HEAD/TOC
LOGGED BY [redacted]
COMMENTS Checked TS 16/1/2018

DATE 9/8/2017
BLANK
SCREEN
GRAVEL PACK N/A
SANITARY SEAL/BENTONITE
STABILISED WATER LEVEL
GROUND WATER ELEVATION

PID (ppm)	BLOW COUNTS	RECOVERY	SAMPLE NUMBER	ANALYSED	DEPTH (mBGS)	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH
			HA03_0-0.1				FILL: soft dark brown, sandy CLAY, organic matter and rootletts throughout, moist, moderate plasticity, no odour	0.20
			HA03_0.2-0.3				FILL: soft dark brown, sandy CLAY, organic matter and rootletts throughout, cruashed basalt inclusions (20-60 mm) moist, moderate plasticity, no odour	0.50
			HA03_0.4-0.5		1		Firm, orange, CLAY, good structure, slightly moist, moderate plasticity, no odour	1.10
			HA03_0.6-0.7				EOH @ 1.1 m bgl Total Depth: 1.10 m	
			HA03_0.8-0.9					
			HA03_1.0-1.1					

BORING / WELL CONSTRUCTION LOG SOIL_BORELOGS.GPJ HLA_SYD.GDT 16/1/18

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BORING/WELL CONSTRUCTION LOG

HA04

PROJECT NUMBER 60543717
PROJECT NAME Launceston Airport
LOCATION Launceston Airport
DRILLING METHOD Hand Auger
SAMPLING METHOD Grab
SURFACE ELEVATION
WELL HEAD/TOC
LOGGED BY [redacted]
COMMENTS Checked TS 16/1/2018

DATE 9/8/2017
BLANK
SCREEN
GRAVEL PACK N/A
SANITARY SEAL/BENTONITE
STABILISED WATER LEVEL
GROUND WATER ELEVATION

PID (ppm)	BLOW COUNTS	RECOVERY	SAMPLE NUMBER	ANALYSED	DEPTH (mBGS)	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH
			HA04_0-0.1				FILL: dense, grey to brown, sandy GRAVEL, minor rootletts, dry, no odour	
			HA04_0.2-0.3				FILL: firm, brown, sandy CLAY, crushed basalt inclusions (10-30 mm), slightly moist, no odour	0.20
			HA04_0.3-0.4					
			HA04_0.4-0.5					0.65
							FILL: dense, orange, clayey GRAVEL, slightly moist, no odour	
			HA04_0.8-0.9					0.90
							EOH @ 0.9 m bgl Refusal on compacted gravels Total Depth: 0.90 m	

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BORING/WELL CONSTRUCTION LOG

HA05

PROJECT NUMBER 60543717
PROJECT NAME Launceston Airport
LOCATION Launceston Airport
DRILLING METHOD Hand Auger
SAMPLING METHOD Grab
SURFACE ELEVATION
WELL HEAD/TOC
LOGGED BY [redacted]
COMMENTS Checked TS 16/1/2018

DATE 10/8/2017
BLANK
SCREEN
GRAVEL PACK N/A
SANITARY SEAL/BENTONITE
STABILISED WATER LEVEL
GROUND WATER ELEVATION

PID (ppm)	BLOW COUNTS	RECOVERY	SAMPLE NUMBER	ANALYSED	DEPTH (mBGS)	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH
			HA05_0-0.1				Soft, dark brown, CLAY, rootlets, minor crushed basalt inclusions at the surface, moist, moderate plasticity, no odour	
			HA05_0.2-0.3					
			HA05_0.4-0.5					
			HA05_0.6-0.7					
								0.70
			HA05_0.8-0.9				Firm, grey to brown, CLAY, good structure, moist, moderate plasticity, no odour	
			HA05_1.0-1.1		1			
								1.10
							EOH @ 1.1 m bgl Total Depth: 1.10 m	

BORING / WELL CONSTRUCTION LOG SOIL_BORELOGS.GPJ HLA_SYD.GDT 16/1/18

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BORING/WELL CONSTRUCTION LOG

HA06

PROJECT NUMBER 60543717
PROJECT NAME Launceston Airport
LOCATION Launceston Airport
DRILLING METHOD Hand Auger
SAMPLING METHOD Grab
SURFACE ELEVATION
WELL HEAD/TOC
LOGGED BY [redacted]
COMMENTS Checked TS 16/1/2018

DATE 10/8/2017
BLANK
SCREEN
GRAVEL PACK N/A
SANITARY SEAL/BENTONITE
STABILISED WATER LEVEL
GROUND WATER ELEVATION

PID (ppm)	BLOW COUNTS	RECOVERY	SAMPLE NUMBER	ANALYSED	DEPTH (mBGS)	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH
			HA06_0-0.1				Soft, red to brown, graveley sandy CLAY, rootletts, some weathered basalt pebbles at the surface (20-50 mm), wet, moderate plasticity, no odour	
			HA06_0.2-0.3					
			HA06_0.4-0.5					
			HA06_0.6-0.7					
								0.70
			HA06_0.8-0.9				Very soft, dark brown, silty CLAY, good structure, wet, high plasticity, very slight natural organic odour	
			HA06_1.0-1.1		1			
								1.10
							EOH @ 1.1 m bgl Total Depth: 1.10 m	

BORING / WELL CONSTRUCTION LOG SOIL_BORELOGS.GPJ HLA_SYD.GDT 16/1/18

AECOM
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Fax: 03 9654 7117

BORING/WELL CONSTRUCTION LOG

HA07

PROJECT NUMBER 60543717
PROJECT NAME Launceston Airport
LOCATION Launceston Airport
DRILLING METHOD Hand Auger
SAMPLING METHOD Grab
SURFACE ELEVATION
WELL HEAD/TOC
LOGGED BY [redacted]
COMMENTS Checked TS 16/1/2018

DATE 10/8/2017
BLANK
SCREEN
GRAVEL PACK N/A
SANITARY SEAL/BENTONITE
STABILISED WATER LEVEL
GROUND WATER ELEVATION

PID (ppm)	BLOW COUNTS	RECOVERY	SAMPLE NUMBER	ANALYSED	DEPTH (mBGS)	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH
			HA07_0-0.1				Soft, brown, sandy CLAY, high percent of organic matter, wet, low plasticity, no odour	
			HA07_0.2-0.3					0.20
							Soft, brown, sandy CLAY, some weathered basalt pebbles (50-60 mm), wet, moderate plasticity, no odour	
			HA07_0.4-0.5					
			HA07_0.6-0.7					
								0.70
							Soft, dark grey, silty CLAY, high plasticity, very moist, slight natural organic odour	
			HA07_0.8-0.9					
			HA07_1.0-1.1		1			
								1.10
							EOH @ 1.1 m bgl Total Depth: 1.10 m	

BORING / WELL CONSTRUCTION LOG SOIL_BORELOGS.GPJ HLA_SYD.GDT 16/1/18

Appendix K

Field Groundwater Purging Data

Site Contamination Analysis – Water Quality Sampling Form

AECOM

Project Name: LOUISBOURG AIRPORT	Project Number: 60543717	Well No: MW01
Recorded By: [redacted]	Well Type: ☑ Monitor ☐ Extractor ☐ Other	
Date: 16/8/17	Well Material: ☑ PVC ☐ SS ☐ Other	

Well Purging

Well Details	Purge Method
Well Diameter (D in mm): ☑ 50 ☐ 100 ☐ Other:	☐ Bailer – Type: ☐ PVC ☐ SS ☐ Teflon ☐ Other:
Total Depth of Well (TD in m BTOC): 5.90	☑ Pump – Type: ☐ Submersible ☑ Bladder ☐ Other:
Water Level Depth (WL in m BTOC): 4.059	**Pump Intake Setting**
Number of bore volumes (BV) to be purged (# VOLS) ☐ 3 ☐ 4 ☐ 5 ☐ 10 ☐ Other	Depth pump set (m BTOC): 5.4 Screen Interval (m BTOC) Top : Bottom:

Purge Volume Calculation: (accounting for porosity of packing material surrounding well in bore hole)

[(____ (TD) - ____ (WL)) x (____ (D) /2)^2 x 0.00314] + [0.2 x (0.00314 x ____ (borehole radius)^2 x ____ (TD-WL)) – 0.2 x (0.00314 x ____ (well radius)^2 x ____ (TD-WL))] = ____ 1 BV (L)

Start Time:	Stop Time:	Elapsed Time:	Initial depth to water: (with pump in well)	Final depth to water: (after sampling, with pump in well)

Field Parameter Measurements

Actual Time	Elapsed minutes	Purge Vol (L)	DO (mg/L)	EC. (µS/cm)	pH	Redox (mV)	Temp (°C)	SWL (m BTOC)	Pump setting (rate)
1035	0		8.13	567	6.62	173	12.7	4.064	4 rpm / 10 DSC
1040	5		8.07	521	6.68	145	14.0	4.112	4 rpm / 5 DSC
1045	10		7.33	502	6.70	141	14.1	4.072	4 rpm / 5 DSC
1050	15		7.20	483	6.72	140	14.0	4.065	"
1055	20		7.19	489	6.70	135	13.7	4.062	"
1100	25		7.12	464	6.67	150	13.2	4.062	"
1105	30		7.16	453	6.67	142	12.8	"	"
1110	35	3L	7.17	482	6.67	139	12.5	"	"
Groundwater equilibrium reached at			± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	(3 consecutive measurements)	

Observations in first 1L purged (turbidity, colour, odour, sheen): Transparent LT Brn, NO SHEEN, NO ODOR, V Low TURBID

Observations during sampling (turbidity, colour, odour, sheen): NO CHANGE

Discharge water disposal: ☑ Drums ☐ Sanitary sewer ☐ Storm sewer ☐ Surface ☐ Other

Well Sampling

Sampling Method ☑ Same as purge method ☐ Other:.....

Sample Distribution Sample Series:

Sample No.	Vol/Cont.	Analysis	Preservatives	Lab	Comments

Quality Control Samples

QA/QC Sample ID	Sample Type (duplicate, etc)	Parent Sample ID
QC1	DUP	MW01
QC2	SPLIT	MW01

Sampling notes: well condition, weather, change in pump depth, equipment difficulties

Do ECs need review? ☐ Yes ☐ No Are salinity corrections warranted?: ☐ Yes ☐ No

Note: m BTOC = m below top of casing

Site Contamination Analysis – Water Quality Sampling Form

AECOM

Project Name: LANGLEY AIR PORT	Project Number: 60543717	Well No: MW02
Recorded By: [redacted]	Well Type: ☐ Monitor ☐ Extractor ☐ Other	
Date: 16/8/17	Well Material: ☐ PVC ☐ SS ☐ Other	

Well Purging

Well Details	Purge Method
Well Diameter (D in mm): ☐ 50 ☐ 100 ☐ Other:	☐ Bailer – Type: ☐ PVC ☐ SS ☐ Teflon ☐ Other:
Total Depth of Well (TD in m BTOC): 7.780	☑ Pump – Type: ☐ Submersible ☑ Bladder ☐ Other:
Water Level Depth (WL in m BTOC): 5.172	**Pump Intake Setting**
Number of bore volumes (BV) to be purged (# VOLS)	Depth pump set (m BTOC): 7.2
☐ 3 ☐ 4 ☐ 5 ☐ 10 ☐ Other	Screen Interval (m BTOC) Top : Bottom:

Purge Volume Calculation: (accounting for porosity of packing material surrounding well in bore hole)

[(____ (TD) - ____ (WL)) x (____ (D)/2)^2 x 0.00314] + [0.2 x (0.00314 x ____ (borehole radius)^2 x ____ (TD-WL)) – 0.2 x (0.00314 x ____ (well radius)^2 x ____ (TD-WL))] = ____ 1 BV (L)

Start Time:	Stop Time:	Elapsed Time:	Initial depth to water: (with pump in well)	Final depth to water: (after sampling, with pump in well)

Field Parameter Measurements

Actual Time	Elapsed minutes	Purge Vol (L)	DO (mg/L)	EC. (µS/cm)	pH	Redox (mV)	Temp (°C)	SWL (m BTOC)	Pump setting (rate)
1345	0		7.75	642	6.90	154	13.4	3.208	4psm / 5 DISC
1350	5		6.17	632	6.87	161	13.4	2.195	3psm / 5 DISC
1355	10		4.96	643	6.87	166	13.6	2.191	"
1400	15		4.77	645	6.87	165	13.5	2.193	"
1405	20		4.71	646	6.87	170	13.5	"	"
1410	25		4.68	648	6.87	171	13.5	"	"
1415	30		4.43	649	6.87	172	13.3	"	"
1420	35	6	4.38	651	6.87	173	13.2	"	"
Groundwater equilibrium reached at			± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	(3 consecutive measurements)	

Observations in first 1L purged (turbidity, colour, odour, sheen): TRANSPARENT CLEAR, NO OD, NO SHEEN

Observations during sampling (turbidity, colour, odour, sheen): CLEAR, NO OD, NO SHEEN

Discharge water disposal: ☑ Drums ☐ Sanitary sewer ☐ Storm sewer ☐ Surface ☐ Other

Well Sampling

Sampling Method ☑ Same as purge method ☐ Other:.....

Sample Distribution Sample Series:

Sample No.	Vol/Cont.	Analysis	Preservatives	Lab	Comments

Quality Control Samples

QA/QC Sample ID	Sample Type (duplicate, etc)	Parent Sample ID

Sampling notes: well condition, weather, change in pump depth, equipment difficulties

Do ECs need review? ☐ Yes ☐ No Are salinity corrections warranted?: ☐ Yes ☐ No

Note: m BTOC = m below top of casing

Site Contamination Analysis – Water Quality Sampling Form

AECOM

Project Name: Ajax Airport	Project Number: 60543717	Well No: MW03
Recorded By: [redacted]	Well Type: ☑ Monitor ☐ Extractor ☐ Other	
Date: 17/8/17	Well Material: ☑ PVC ☐ SS ☐ Other	

Well Purging

Well Details	Purge Method
Well Diameter (D in mm): ☑ 50 ☐ 100 ☐ Other:	☐ Bailer – Type: ☐ PVC ☐ SS ☐ Teflon ☐ Other:
Total Depth of Well (TD in m BTOC):	☑ Pump – Type: ☐ Submersible ☑ Bladder ☐ Other:
Water Level Depth (WL in m BTOC):	**Pump Intake Setting**
Number of bore volumes (BV) to be purged (# VOLS)	Depth pump set (m BTOC):
☐ 3 ☑ 4 ☐ 5 ☐ 10 ☐ Other	Screen Interval (m BTOC) Top : Bottom:

Purge Volume Calculation: (accounting for porosity of packing material surrounding well in bore hole)

[(____ (TD) - ____ (WL)) x (____ (D) /2)^2 x 0.00314] + [0.2 x (0.00314 x ____ (borehole radius)^2 x ____ (TD-WL)) – 0.2 x (0.00314 x ____ (well radius)^2 x ____ (TD-WL))] = ____ 1 BV (L)

Start Time:	Stop Time:	Elapsed Time:	Initial depth to water: (with pump in well)	Final depth to water: (after sampling, with pump in well)

Field Parameter Measurements

Actual Time	Elapsed minutes	Purge Vol (L)	DO (mg/L)	EC. (µS/cm)	pH	Redox (mV)	Temp (°C)	SWL (m BTOC)	Pump setting (rate)
955	0		3.41	1933	7.73	127	11.6	TOC	4 L/min / 5 DSC
1000	5		1.04	1980	7.62	122	11.9	TOC	"
1005	10		0.27	1981	7.60	120	12.1	"	"
1015	20		0.09	1980	7.60	116	12.1	"	"
1020	25		0.12	1980	7.61	114	12.3	"	"
1025	30		0.10	1997	7.61	113	12.3	"	"
1030	35	12	0.08	1980	7.61	113	12.3	"	"
Groundwater equilibrium reached at			± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	(3 consecutive measurements)	

Observations in first 1L purged (turbidity, colour, odour, sheen): TURBID, BR, OPAQUE, NO SHEEN, SC NOT OBTAINED OD

Observations during sampling (turbidity, colour, odour, sheen): BECOME CLEAR

Discharge water disposal: ☑ Drums ☐ Sanitary sewer ☐ Storm sewer ☐ Surface ☐ Other

Well Sampling

Sampling Method ☑ Same as purge method ☐ Other:.....

Sample Distribution Sample Series:

Sample No.	Vol/Cont.	Analysis	Preservatives	Lab	Comments

Quality Control Samples

QA/QC Sample ID	Sample Type (duplicate, etc)	Parent Sample ID

Sampling notes: well condition, weather, change in pump depth, equipment difficulties

Do ECs need review? ☐ Yes ☐ No Are salinity corrections warranted?: ☐ Yes ☐ No

Note: m BTOC = m below top of casing

Site Contamination Analysis – Water Quality Sampling Form

AECOM

Project Name: launceston air port	Project Number: 60543717	Well No: MW04 ?
Recorded By: [redacted]	Well Type: ☑ Monitor ☐ Extractor ☐ Other	
Date: 15/8/17	Well Material: ☑ PVC ☐ SS ☐ Other	

Well Purging

Well Details	Purge Method
Well Diameter (D in mm): ☑ 50 ☐ 100 ☐ Other:	☐ Bailer – Type: ☐ PVC ☐ SS ☐ Teflon ☐ Other:
Total Depth of Well (TD in m BTOC): 6.030	☑ Pump – Type: ☐ Submersible ☑ Bladder ☐ Other:
Water Level Depth (WL in m BTOC): 5.364	**Pump Intake Setting**
Number of bore volumes (BV) to be purged (# VOLS)	Depth pump set (m BTOC): 5.8
☐ 3 ☐ 4 ☐ 5 ☐ 10 ☐ Other	Screen Interval (m BTOC) Top : Bottom:

Purge Volume Calculation: (accounting for porosity of packing material surrounding well in bore hole)

[(____ (TD) - ____ (WL)) x (____ (D) /2)^2 x 0.00314] + [0.2 x (0.00314 x ____ (borehole radius)^2 x ____ (TD-WL)) – 0.2 x (0.00314 x ____ (well radius)^2 x ____ (TD-WL)] = ____ 1 BV (L)

Start Time:	Stop Time:	Elapsed Time:	Initial depth to water: (with pump in well)	Final depth to water: (after sampling, with pump in well)

Field Parameter Measurements

Actual Time	Elapsed minutes	Purge Vol (L)	DO (mg/L)	EC. (µS/cm)	pH	Redox (mV)	Temp (°C)	SWL (m BTOC)	Pump setting (rate)
1235	0		7.44	1722	669	153	13.2	5.414	4rpm / 3DSL
1240	5		3.42	1776	6.56	161	14.1	5.440	3rpm / 5DSL
1245	10		3.07	1719	6.54	164	14.8	5.398	〃
1250	15		2.95	1664	6.54	167	15.0	5.404	〃
1255	20		2.98	1640	6.54	169	15.2	5.403	〃
1300	25		2.98	1603	6.53	170	15.2	〃	〃
1305	30		2.97	1555	6.53	171	14.8	〃	〃
1310	35		3.02	1523	6.53	173	14.6	〃	〃
1315	40		3.01	1504	6.52	173	14.7	〃	〃
1320	45	15	3.06	1498	6.52	175	14.8	〃	〃
Groundwater equilibrium reached at			± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	(3 consecutive measurements)	

Observations in first 1L purged (turbidity, colour, odour, sheen): clear, non-turbid, no odour, no sheen

Observations during sampling (turbidity, colour, odour, sheen): no change

Discharge water disposal: ☑ Drums ☐ Sanitary sewer ☐ Storm sewer ☐ Surface ☐ Other

Well Sampling

Sampling Method ☐ Same as purge method ☐ Other:.....

Sample Distribution Sample Series:

Sample No.	Vol/Cont.	Analysis	Preservatives	Lab	Comments

Quality Control Samples

QA/QC Sample ID	Sample Type (duplicate, etc)	Parent Sample ID

Sampling notes: well condition, weather, change in pump depth, equipment difficulties

Do ECs need review? ☐ Yes ☐ No Are salinity corrections warranted?: ☐ Yes ☐ No

Note: m BTOC = m below top of casing

Site Contamination Analysis – Water Quality Sampling Form

AECOM

Project Name: Launceston Airport	Project Number: 60543717	Well No: GW18
Recorded By: [redacted]	Well Type: ☑ Monitor ☐ Extractor ☐ Other	
Date: 16/8/17	Well Material: ☑ PVC ☐ SS ☐ Other	

Well Purging

Well Details	Purge Method
Well Diameter (D in mm): ☑ 50 ☐ 100 ☐ Other:	☐ Bailer – Type: ☐ PVC ☐ SS ☐ Teflon ☐ Other:
Total Depth of Well (TD in m BTOC): 10.38	☑ Pump – Type: ☐ Submersible ☑ Bladder ☐ Other:
Water Level Depth (WL in m BTOC): 4.180	**Pump Intake Setting**
Number of bore volumes (BV) to be purged (# VOLS)	Depth pump set (m BTOC): 9.8
☐ 3 ☐ 4 ☐ 5 ☐ 10 ☐ Other	Screen Interval (m BTOC) Top : Bottom:

Purge Volume Calculation: (accounting for porosity of packing material surrounding well in bore hole)

[(____ (TD) - ____ (WL)) x (____ (D) /2)^2 x 0.00314] + [0.2 x (0.00314 x ____ (borehole radius)^2 x ____ (TD-WL)) – 0.2 x (0.00314 x ____ (well radius)^2 x ____ (TD-WL))] = ____ 1 BV (L)

Start Time:	Stop Time:	Elapsed Time:	Initial depth to water: (with pump in well)	Final depth to water: (after sampling, with pump in well)

Field Parameter Measurements

Actual Time	Elapsed minutes	Purge Vol (L)	DO (mg/L)	EC. (µS/cm)	pH	Redox (mV)	Temp (°C)	SWL (m BTOC)	Pump setting (rate)
1145	0		5.01	3.74	6.96	166	13.8	4.181	4 spm / 35 Hz
1150	5		3.58	3.84	6.96	159	14.7	"	"
1155	10		3.28	3.81	6.96	158	14.8	"	"
1200	15		3.17	3.78	6.95	156	14.7	"	"
1205	20		3.10	3.77	6.94	156	14.6	"	"
1210	25		3.08	3.79	6.94	156	14.6	"	"
1215	30	11	3.07	3.74	6.93	156	14.5	"	"
Groundwater equilibrium reached at			± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	(3 consecutive measurements)	

Observations in first 1L purged (turbidity, colour, odour, sheen): TURBID, BR, NO SHEEN, NO OD

Observations during sampling (turbidity, colour, odour, sheen): clear, NO SHEEN, NO OD,

Discharge water disposal: ☑ Drums ☐ Sanitary sewer ☐ Storm sewer ☐ Surface ☐ Other

Well Sampling

Sampling Method ☑ Same as purge method ☐ Other:.....

Sample Distribution Sample Series:

Sample No.	Vol/Cont.	Analysis	Preservatives	Lab	Comments

Quality Control Samples

QA/QC Sample ID	Sample Type (duplicate, etc)	Parent Sample ID

Sampling notes: well condition, weather, change in pump depth, equipment difficulties

Do ECs need review? ☐ Yes ☐ No Are salinity corrections warranted?: ☐ Yes ☐ No

Note: m BTOC = m below top of casing

Site Contamination Analysis – Water Quality Sampling Form

AECOM

Project Name: Lowerville	Project Number: 60543717	Well No: GW10
Recorded By: [redacted]	Well Type: ☑ Monitor ☐ Extractor ☐ Other	
Date: 16/8/17	Well Material: ☑ PVC ☐ SS ☐ Other	

Well Purging

Well Details	Purge Method
Well Diameter (D in mm): ☐ 50 ☐ 100 ☐ Other:	☐ Bailer – Type: ☐ PVC ☐ SS ☐ Teflon ☐ Other:
Total Depth of Well (TD in m BTOC): 10.855	☑ Pump – Type: ☐ Submersible ☑ Bladder ☐ Other:
Water Level Depth (WL in m BTOC): 6.931	**Pump Intake Setting**
Number of bore volumes (BV) to be purged (# VOLS)	Depth pump set (m BTOC): 10.3
☐ 3 ☐ 4 ☐ 5 ☐ 10 ☐ Other	Screen Interval (m BTOC) Top: Bottom:

Purge Volume Calculation: (accounting for porosity of packing material surrounding well in bore hole)

[(_____ (TD) - _____ (WL)) x (_____ (D)/2)^2 x 0.00314] + [0.2 x (0.00314 x _____ (borehole radius)^2 x _____ (TD-WL)) – 0.2 x (0.00314 x _____ (well radius)^2 x _____ (TD-WL))] = _____ (1 BV (L))

Start Time:	Stop Time:	Elapsed Time:	Initial depth to water: (with pump in well)	Final depth to water: (after sampling, with pump in well)

Field Parameter Measurements

Actual Time	Elapsed minutes	Purge Vol (L)	DO (mg/L)	EC. (µS/cm)	pH	Redox (mV)	Temp (°C)	SWL (m BTOC)	Pump setting (rate)
1500	0		3.00	1672	7.21	150	12.3	7.101	4 psi / 5 disc
1505	5		0.60	1691	7.19	114	12.7	7.207	3 psi / 5 disc
1515	15		0.45	1685	7.21	106	12.4	7.190	"
1520	20		0.43	1691	7.22	104	12.5	7.192	"
1525	25		0.43	1693	7.23	103	12.5	7.192	"
1530	30		0.39	1696	7.23	103	12.3	7.184	"
1535	35	10	0.32	1696	7.23	103	12.3	7.179	"
Groundwater equilibrium reached at			± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	(3 consecutive measurements)	

Observations in first 1L purged (turbidity, colour, odour, sheen): TRANSPARENT TO, [redacted], NO SHEEN, SLIGHT HYC ODOUR

Observations during sampling (turbidity, colour, odour, sheen): NO CHANGE

Discharge water disposal: ☑ Drums ☐ Sanitary sewer ☐ Storm sewer ☐ Surface ☐ Other

Well Sampling

Sampling Method ☑ Same as purge method ☐ Other:.....

Sample Distribution Sample Series:

Sample No.	Vol/Cont.	Analysis	Preservatives	Lab	Comments

Quality Control Samples

QA/QC Sample ID	Sample Type (duplicate, etc)	Parent Sample ID

Sampling notes: well condition, weather, change in pump depth, equipment difficulties

Do ECs need review? ☐ Yes ☐ No Are salinity corrections warranted?: ☐ Yes ☐ No

Note: m BTOC = m below top of casing

Site Contamination Analysis – Water Quality Sampling Form

AECOM

Project Name: Launceston Airport	Project Number: 60543717 — Well No: MR1
Recorded By: [redacted]	Well Type: ☑ Monitor ☐ Extractor ☐ Other
Date: 17/8/17	Well Material: ☑ PVC ☐ SS ☐ Other

Well Purging

Well Details	Purge Method
Well Diameter (D in mm): ☑ 50 ☐ 100 ☐ Other:	☐ Bailer – Type: ☐ PVC ☐ SS ☐ Teflon ☐ Other:
Total Depth of Well (TD in m BTOC): 6.040	☑ Pump – Type: ☐ Submersible ☑ Bladder ☐ Other:
Water Level Depth (WL in m BTOC): 4.186	**Pump Intake Setting**
Number of bore volumes (BV) to be purged (# VOLS)	Depth pump set (m BTOC): 5.5
☐ 3 ☐ 4 ☐ 5 ☐ 10 ☐ Other	Screen Interval (m BTOC) Top : Bottom:

Purge Volume Calculation: (accounting for porosity of packing material surrounding well in bore hole)

[(______ - ______) x (______/2)^2 x 0.00314] + [0.2 x (0.00314 x ______^{2} x ______) – 0.2 x (0.00314 x ______^{2} x ______)] = ______

TD WL D borehole radius TD-WL well radius TD-WL 1 BV (L)

Start Time:	Stop Time:	Elapsed Time:	Initial depth to water: (with pump in well)	Final depth to water: (after sampling, with pump in well)

Field Parameter Measurements

Actual Time	Elapsed minutes	Purge Vol (L)	DO (mg/L)	EC. (µS/cm)	pH	Redox (mV)	Temp (°C)	SWL (m BTOC)	Pump setting (rate)
835	0		5.18	719	8.60	118	11.3	4.202	3spm / 4psc
840	5		3.92	701	7.43	112	13.0	4.202	"
845	10		3.41	717	730	109	13.3	4.202	"
850	15		304	731	726	108	134	"	"
855	20		245	748	724	107	136	"	"
900	25		2.75	755	7.24	106	137	"	"
905	30		1.95	764	7.24	106	"	"	"
910	35		1.83	770	7.24	106	13.7	"	"
915	40	10	1.85	777	7.24	106	14.0	"	"
Groundwater equilibrium reached at			± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	(3 consecutive measurements)	

Observations in first 1L purged (turbidity, colour, odour, sheen): Transparent, no OD, NO SHEEN, NOT-TURBID

Observations during sampling (turbidity, colour, odour, sheen): Clear, NO OD, NO SHEEN,

Discharge water disposal: ☑ Drums ☐ Sanitary sewer ☐ Storm sewer ☐ Surface ☐ Other

Well Sampling

Sampling Method ☑ Same as purge method ☐ Other:..

Sample Distribution Sample Series:

Sample No.	Vol/Cont.	Analysis	Preservatives	Lab	Comments

Quality Control Samples

QA/QC Sample ID	Sample Type (duplicate, etc)	Parent Sample ID

Sampling notes: well condition, weather, change in pump depth, equipment difficulties

Do ECs need review? ☐ Yes ☐ No Are salinity corrections warranted?: ☐ Yes ☐ No

Note: m BTOC = m below top of casing

Appendix L

Field Quality Control Data

DATA VALIDATION REPORT

Project number:	60543717	**Validation by:**	[redacted]	**Date:**	06/09/2017
Client:	Airservices Australia				
Site:	Launceston Airport	**Data verified by:**	[redacted]	**Date:**	15/9/2017
Matrix type:	Soil / sediment				
Primary samples:	27	**Project Manager:**	[redacted]		
Laboratory:	ALS; Eurofins|MGT				
Lab reference:	EM1710771 and 558872				

Key Findings:

No major QA/QC issues were identified in the field or laboratory datasets that could have a material implication to decision-making on the project.

However, based on the DVAL below, the following should be considered during data interpretation:

- Elevated RPDs should be taken into consideration when using data for Sum of PFAS, Sum of PFAS (WA DER List), PFHpS, FOSA and PFDS quantitatively.
- Elevated RPDs should be taken into consideration when interpreting data for PFOS where close to guidelines.

Quality Assurance/Quality Control Measures – AS 4482-1

Measurement	Soil	Water	Frequency	RPD (%)	Recovery (%)
Type of Quality Control Samples to be Prepared or Taken On-Site					
Rinsate Blanks	-	ü	1 per day per field piece of equipment	-	-
Trip Blanks (VOC analysis only)	-	ü	1 per esky or 1 per batch	-	-
Intra Laboratory Duplicates	ü	ü	1 in 20 samples collected or 1 per batch	30 - 50	-
Inter Laboratory Duplicates	ü	ü	1 in 20 samples collected or 1 per batch	30 - 50	-
Quality Control Samples to be Prepared by Laboratory					
Laboratory Blanks	ü	ü	1 per batch	-	-
Laboratory Duplicates	ü	ü	1 in 10 samples collected or 1 per batch (whichever is smaller)	30	-
Matrix Spike Recoveries	ü	ü	1 in 20 samples collected or 1 per batch	-	70 - 130
Spike Recoveries	ü	ü	1 in 20 samples collected or 1 per batch	-	70 - 130
Surrogates	ü	ü	Each analysis done by GC-MS (all organics except C10+ TPH)	-	70 - 130

Field Quality Assurance and Quality Control

Sampling Personnel	All sampling was conducted by [redacted] on 9, 10 and 11 August 2017.
Sampling Methodology	Soil samples were collected directly from the hand auger, push tube core trays or recovered from the drill auger and surface soil samples were collected using a trowel. Samples were placed into laboratory supplied acid-rinsed jars. Sediment samples were collected using a clean, decontaminated hand tools (e.g. a shovel) or directly into the sample jar.
Chain of Custody (COC)	Chain of custody documents were completed by [redacted].
Analysis Request	Laboratory analysis request and sample receipt notification was reviewed and approved by [redacted]

DATA VALIDATION REPORT

Project number:	60543717	**Validation by:**	[redacted]	**Date:**	06/09/2017
Client:	Airservices Australia				
Site:	Launceston Airport	**Data verified by:**	[redacted]	**Date:**	15/9/2017
Matrix type:	Soil / sediment				
Primary samples:	27	**Project Manager:**	[redacted]		
Laboratory:	ALS; Eurofins|MGT				
Lab reference:	EM1710771 and 558872				

Field Blank	Two field blank samples were analysed, below the required frequency of one per day (three in total). As all concentrations were reported below the limit of reporting (LOR) for all analytes tested in the field blank and rinsate samples, this lower frequency is not considered to affect the interpretation of results.
Rinsate Blank	Rinsate blank samples were collected at a frequency of one per day per piece of equipment (three in total). Two rinsate blank samples were collected from the hand auger and one was collected from the trowel. Concentrations of all analytes reported for rinsate blank samples were below the LOR.
Trip Blank	Trip blanks were included at a frequency of one per cooler (two in total). Concentrations were not detected above the LOR for all volatile analytes tested.
Frequency of Field QC	Field duplicate samples were collected at a frequency greater than one in twenty primary samples (three in total). Field triplicate (inter-laboratory duplicate) samples were collected at a frequency lower than one in twenty primary samples (one in total). The precision of the data can be assessed as acceptable based on the available intra-laboratory duplicate RPDs and the laboratory duplicate RPDs which were reported above the required frequencies and generally within control limits.
Handling and Preservation	Primary, duplicate and triplicate soil / sediment samples were received preserved and chilled at the laboratories. Sample receipt temperature (1.7°C) was within the recommended range (≤6°C) in primary batch EM1710771. The triplicate sample was received at the secondary laboratory at an elevated temperature (10.1°C). Potential under reporting must be taken into consideration. However, as the inter-laboratory duplicate sample was received only marginally outside of the specified temperature range, the sample was immediately cooled upon collection, the primary and inter-laboratory RPDs were generally within control limits and all volatile concentrations were reported below LOR, the potential for under reporting is not considered to materially affect the interpretation of results. All samples were received at the laboratories in appropriate sample containers.

Laboratory QA/QC

Tests Requested/Reported	Samples were analysed and reported as requested on the chain of custody (COC).
Holding Time Compliance	Samples were extracted and analysed within recommended holding times.
Laboratory Accreditation	The laboratory analysis was conducted by ALS Environmental Pty Ltd (Melbourne and Sydney) and the triplicate sample was analysed at Eurofins-MGT (Melbourne). Both laboratories are accredited by the National Association of Testing Authorities Australia (NATA) for the analyses undertaken.
Frequency of Laboratory QC	The laboratory reported a sufficient frequency of quality control samples to assess whether the results have been reported to an acceptable accuracy and precision.
Method Blank	Method blank concentrations were reported below the LOR for all analytes tested.

DATA VALIDATION REPORT

Project number:	60543717	**Validation by:**	[redacted]	**Date:**	06/09/2017
Client:	Airservices Australia				
Site:	Launceston Airport	**Data verified by:**	[redacted]	**Date:**	15/9/2017
Matrix type:	Soil / sediment				
Primary samples:	27	**Project Manager:**	[redacted]		
Laboratory:	ALS; Eurofins|MGT				
Lab reference:	EM1710771 and 558872				

Laboratory Duplicate RPDs	Laboratory duplicate relative percentage differences (RPDs) were within control limits. The laboratory duplicate RPDs are presented in the laboratory Quality Control Report.
Laboratory Control Spike Recovery	Laboratory control spike (LCS) recoveries were within control limits.
Matrix Spike Recovery	Matrix spike (MS) recoveries (where reported) were within control limits. The following recoveries were not determined:

Analyte	Recovery (%)	Comment
PFHxS (MW01_0-0.1)	Not determined	MS recovery not determined, background level greater than or equal to 4x spike level
PFHxS (SS01)		
PFOS (MW01_0-0.1)		
PFOS (SS01)		

These non-determinations do not reflect method bias and do not affect data interpretation. The accuracy of the data can be assessed as acceptable based on method blanks, LCS and surrogate spike recoveries (which were reported at the required frequencies and within control limits), and available matrix spike recoveries for the same analytical method group (which were reported within control limits).

Surrogate Spike Recovery	Surrogate spike recoveries were within control limits.

QA/QC Data Evaluation

Comparison of Field Observations and Laboratory Results	Anomalous results between field observations and analysis results were not observed, except that no hydrocarbon odour was noted in MW02 during drilling; however TPH/TRH concentrations were reported above LOR.
Data Transcription	A random 10% check of the laboratory results identified no anomalies within the electronic data, the laboratory reports, and tables generated by AECOM.
Limits of Reporting	Limits of reporting (LORs) were sufficiently low to enable assessment against adopted guideline criteria.

DATA VALIDATION REPORT

Project number:	60543717	**Validation by:**	[redacted]	**Date:**	06/09/2017
Client:	Airservices Australia				
Site:	Launceston Airport	**Data verified by:**	[redacted]	**Date:**	15/9/2017
Matrix type:	Soil / sediment				
Primary samples:	27	**Project Manager:**	[redacted]		
Laboratory:	ALS; Eurofins|MGT				
Lab reference:	EM1710771 and 558872				

Field Duplicate RPDs

Field duplicate RPDs were outside of control limits for a number of PFAS analytes, as shown in the Soil RPDs table. Only one exceedance occurred for petroleum analytes, as indicated below (the sample with the higher concentration is in bold):

- HA05_0-0.1 and **QC03** for TRH >C_{10}-C_{40} fraction (75%)

Elevated RPDs are common in soil samples due to their heterogeneous nature.

As there are no adopted guideline values for Sum of PFAS, PFHpS, FOSA and PFDS the elevated RPDs are not expected to affect interpretation of results against guidelines. However, the elevated RPDs should be taken into consideration when using the data quantitatively.

As all concentrations of PFHxS were reported well below the adopted guidelines, the elevated RPD is not considered to affect the interpretation of results against guidelines. However, the elevated RPD should be taken into consideration when using the data quantitatively.

As concentrations of TRH >C_{10}-C_{40} fraction, PFPeS, PFOA, PFPeA, PFBS, PFHxA and PFUnA are less than 10 x LOR, where precision is low and actual differences minor, the data is considered to be of an acceptable precision and these elevated RPDs are not considered to affect the interpretation of results against guidelines (where available).

Field Triplicate RPDs

Field triplicate RPDs were reported within control limits, with the exception of the following sample analysis (the sample with the higher reported concentrations is in bold):

- SS05 and **QC18** for Sum of PFAS - WA DER List (100%)
- SS05 and **QC18** for TPH C_{10}-C_{36} fraction (101%)
- SS05 and **QC18** for TRH >C_{16}-C_{34} fraction (33%)
- SS05 and **QC18** for PFOS (108%)

Elevated RPDs are common in sediment samples due to their heterogeneous nature.

As there is no adopted guideline value for Sum of PFAS – WA DER List the elevated RPD is not expected to affect interpretation of results against guidelines. However, the potential for over or under reporting should be taken into consideration when using the data quantitatively.

This apparent lack of precision should be taken into consideration when interpreting concentrations for PFOS close to guidelines.

As concentrations of TPH C_{10}-C_{36} and TRH >C_{16}-C_{34} fractions are less than 10 x LOR, where precision is low and actual differences minor, the data is considered to be of an acceptable precision and these elevated RPDs are not considered to affect the interpretation of results.

Other

DATA VALIDATION REPORT

Project number:	60543717	**Validation by:**	[redacted]	**Date:**	06/09/2017
Client:	Airservices Australia				
Site:	Launceston Airport	**Data verified by:**	[redacted]	**Date:**	15/9/2017
Matrix type:	Soil / sediment				
Primary samples:	27	**Project Manager:**	[redacted]		
Laboratory:	ALS; Eurofins|MGT				
Lab reference:	EM1710771 and 558872				

Sum Totals	Sum of PFAS, Sum of PFAS (WA DER List), Sum of PFHxS and PFOS, TPH C_{10}-C_{36} (sum), TRH C_6-C_{10} (minus BTEX)(F1), TRH C_{10}-C_{16} (minus naphthalene)(F2), TRH C_{10}-C_{40} (sum), total xylenes and total BTEX were laboratory reported or manually calculated by AECOM.
General Comments	ALS did not note any additional comments on the COA.

Field Relative Percentage Differences Table - Soil

				MW01_0-0.1			HA05_0-0.1			SS05					
			SDG	EM1710771	EM1710771		EM1710771	EM1710771		EM1710771	EM1710771		EM1710771	558872	
			Field ID	MW01_0-0.1	QC01	RPD (%)	HA05_0-0.1	QC03	RPD (%)	SS05	QC17	RPD (%)	SS05	QC18	RPD (%)
			Sample Type	Primary	Duplicate		Primary	Duplicate		Primary	Duplicate		Primary	Triplicate	
			Sample Date	9/08/2017	9/08/2017		10/08/2017	10/08/2017		11/08/2017	11/08/2017		11/08/2017	11/08/2017	
Analyte Group	**Analyte**	**Units**	**LOR**												
Per- and Polyfluoroalkyl Subst	Sum of PFAS	mg/kg	0.0002 : 0.05 (Interlab)	0.275	0.244	12	0.0225	0.0273	19	0.0107	0.0114	6	0.0107	<0.05	0
	Sum of PFAS (WA DER List)	mg/kg	0.0002 : 0.01 (Interlab)	0.264	0.219	19	0.0225	0.027	18	0.0107	0.0114	6	**0.0107**	**0.032**	**100**
	Sum of PFHxS and PFOS	mg/kg	0.0002	0.262	0.216	19	0.0221	0.0261	17	0.0107	0.0114	6	0.0107		
	10:2 FTS	mg/kg	0.0005 : 0.005 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
	MeFOSAA	mg/kg	0.0002 : 0.01 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.01	0
	PFPeS	mg/kg	0.0002 : 0.005 (Interlab)	**0.0009**	**0.0005**	**57**	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
	PFHpS	mg/kg	0.0002 : 0.005 (Interlab)	0.0012	0.0009	29	**<0.0002**	**0.0003**	**40**	<0.0002	<0.0002	0	<0.0002	<0.005	0
	PFHxS	mg/kg	0.0002 : 0.005 (Interlab)	**0.0219**	**0.0148**	**39**	**0.002**	**0.0029**	**37**	**0.0012**	**0.0007**	**53**	0.0012	<0.005	0
	EtFOSAA	mg/kg	0.0002 : 0.01 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.01	0
Total Petroleum Hydrocarbons	C6-C9 fraction	mg/kg	10 : 20 (Interlab)	<10	<10	0	<10	<10	0	<10	<10	0	<10	<20	0
	C10-C14 fraction	mg/kg	50 : 20 (Interlab)	<50	<50	0	<50	<50	0	<50	<50	0	<50	<20	0
	C15-C28 fraction	mg/kg	100 : 50 (Interlab)	<100	<100	0	<100	<100	0	<100	<100	0	<100	66	0
	C29-C36 fraction	mg/kg	100 : 50 (Interlab)	<100	<100	0	<100	<100	0	<100	<100	0	<100	86	0
	C10-C36 fraction (sum)	mg/kg	50	<50	<50	0	<50	<50	0	<50	<50	0	**<50**	**152**	**101**
Total Recoverable Hydrocarbons	C6-C10 fraction	mg/kg	10 : 20 (Interlab)	<10	<10	0	<10	<10	0	<10	<10	0	<10	<20	0
	C6-C10 fraction (minus BTEX)(F1)	mg/kg	10 : 20 (Interlab)	<10	<10	0	<10	<10	0	<10	<10	0	<10	<20	0
	>C10-C16 fraction	mg/kg	50	<50	<50	0	<50	<50	0	<50	<50	0	<50	<50	0
	>C10-C16 (minus Naphthalene)(F2)	mg/kg	50	<50	<50	0	<50	<50	0	<50	<50	0	<50	<50	0
	>C16-C34 fraction	mg/kg	100	<100	<100	0	<100	110	10	<100	<100	0	**<100**	**140**	**33**
	>C34-C40 fraction	mg/kg	100	<100	<100	0	<100	<100	0	<100	<100	0	<100	<100	0
	>C10-C40 fraction (sum)	mg/kg	50	<50	<50	0	**<50**	**110**	**75**	<50	<50	0	<50		
BTEXN	Benzene	mg/kg	0.2 : 0.1 (Interlab)	<0.2	<0.2	0	<0.2	<0.2	0	<0.2	<0.2	0	<0.2	<0.1	0
	Toluene	mg/kg	0.5 : 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.1	0
	Ethylbenzene	mg/kg	0.5 : 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.1	0
	m&p-Xylene	mg/kg	0.5 : 0.2 (Interlab)	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.2	0
	o-Xylene	mg/kg	0.5 : 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.1	0
	Total Xylenes	mg/kg	0.5 : 0.3 (Interlab)	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.3	0
	Total BTEX	mg/kg	0.2	<0.2	<0.2	0	<0.2	<0.2	0	<0.2	<0.2	0	<0.2		
	Naphthalene (VOC)	mg/kg	1	<1	<1	0	<1	<1	0	<1	<1	0	<1		
	Moisture Content	%	1	22.4	21.7	3	33.2	40.9	21	49.7	40.2	21	49.7	40	22
Surfactants	6:2 FTS	mg/kg	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.01	0
	PFOA	mg/kg	0.0002 : 0.005 (Interlab)	**0.0004**	**0.001**	**86**	<0.0002	0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
	PFOS	mg/kg	0.0002 : 0.005 (Interlab)	0.24	0.201	18	0.0201	0.0232	14	0.0095	0.0107	12	**0.0095**	**0.032**	**108**
Organic	4:2 FTS	mg/kg	0.0005 : 0.005 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
	PFBA	mg/kg	0.001 : 0.005 (Interlab)	<0.001	<0.001	0	<0.001	<0.001	0	<0.001	<0.001	0	<0.001	<0.005	0
	PFPeA	mg/kg	0.0002 : 0.005 (Interlab)	**0.0006**	**0.0004**	**40**	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluorinated Compounds (PFCs)	8:2 FTS	mg/kg	0.0005 : 0.005 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
	N-Me-FOSA	mg/kg	0.0005 : 0.005 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
	N-Me-FOSE	mg/kg	0.0005 : 0.005 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
	FOSA	mg/kg	0.0002 : 0.005 (Interlab)	**0.002**	**0.0055**	**93**	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
	PFBS	mg/kg	0.0002 : 0.005 (Interlab)	**0.0004**	**0.0006**	**40**	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
	PFDS	mg/kg	0.0002 : 0.005 (Interlab)	**0.006**	**0.0171**	**96**	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
	PFTeDA	mg/kg	0.0005 : 0.005 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
	PFTrDA	mg/kg	0.0002 : 0.005 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
	N-Et-FOSA	mg/kg	0.0005 : 0.005 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
	PFDcA	mg/kg	0.0002 : 0.005 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
	PFHpA	mg/kg	0.0002 : 0.005 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
	PFHxA	mg/kg	0.0002 : 0.005 (Interlab)	0.001	0.001	0	**0.0004**	**0.0007**	**55**	<0.0002	<0.0002	0	<0.0002	<0.005	0
	N-Et-FOSE	mg/kg	0.0005 : 0.005 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
	PFDoA	mg/kg	0.0002 : 0.005 (Interlab)	0.0006	0.0005	18	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
	PFNA	mg/kg	0.0002 : 0.005 (Interlab)	0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
	PFUnA	mg/kg	0.0002 : 0.005 (Interlab)	**<0.0002**	**0.0003**	**40**	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.005	0

Legend
RPD = Relative Percentage Difference
LOR = Limit of Reporting
*High RPDs are in bold (Acceptable RPDs for each LOR multiplier range are: 30 (1-10 x LOR); 30 (10-20 x LOR); 30 (> 20 x LOR))
**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
mg/kg = milligrams per kilogram

Field Blanks Table - Soil

			SDG	EM1710771	EM1710771	EM1710771	EM1710771	EM1710771	EM1710771	EM1710771
			Sample ID	QC05	QC06	QC07	QC08	QC09	QC12	QC19
			Sample Date	9/08/2017	9/08/2017	10/08/2017	10/08/2017	10/08/2017	10/08/2017	11/08/2017
			Sample Type	Field Blank	Rinsate	Field Blank	Rinsate	Trip Blank	Trip Blank	Rinsate
Analyte Group	**Analyte**	**Units**	**LOR**							
Per- and Polyfluoroalkyl	Sum of PFAS	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	-	-	<0.01
	Sum of PFAS (WA DER List)	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	-	-	<0.01
	Sum of PFHxS and PFOS	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	-	-	<0.01
	10:2 FTS	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	-	-	<0.05
	MeFOSAA	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	-	-	<0.02
	PFPeS	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	-	-	<0.02
	PFHpS	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	-	-	<0.02
	PFHxS	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	-	-	<0.02
	EtFOSAA	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	-	-	<0.02
TPH	C6-C9 fraction	µg/L	20	<20	<20	<20	<20	<20	<20	<20
	C10-C14 fraction	µg/L	50	<50	<50	<50	<50	-	-	<50
	C15-C28 fraction	µg/L	100	<100	<100	<100	<100	-	-	<100
	C29-C36 fraction	µg/L	50	<50	<50	<50	<50	-	-	<50
	C10-C36 fraction (sum)	µg/L	50	<50	<50	<50	<50	-	-	<50
TRH	C6-C10 fraction	µg/L	20	<20	<20	<20	<20	<20	<20	<20
	C6-C10 fraction (minus BTEX)(F1)	µg/L	20	<20	<20	<20	<20	<20	<20	<20
	>C10-C16 fraction	µg/L	100	<100	<100	<100	<100	-	-	<100
	>C10-C16 (minus Naphthalene)(F2)	µg/L	100	<100	<100	<100	<100	-	-	<100
	>C16-C34 fraction	µg/L	100	<100	<100	<100	<100	-	-	<100
	>C34-C40 fraction	µg/L	100	<100	<100	<100	<100	-	-	<100
	>C10-C40 fraction (sum)	µg/L	100	<100	<100	<100	<100	-	-	<100
BTEXN	Benzene	µg/L	1	<1	<1	<1	<1	<1	<1	<1
	Toluene	µg/L	2	<2	<2	<2	<2	<2	<2	<2
	Ethylbenzene	µg/L	2	<2	<2	<2	<2	<2	<2	<2
	m&p-Xylene	µg/L	2	<2	<2	<2	<2	<2	<2	<2
	o-Xylene	µg/L	2	<2	<2	<2	<2	<2	<2	<2
	Total Xylenes	µg/L	2	<2	<2	<2	<2	<2	<2	<2
	Total BTEX	µg/L	1	<1	<1	<1	<1	<1	<1	<1
	Naphthalene (VOC)	µg/L	5	<5	<5	<5	<5	<5	<5	<5
Surfactants	6:2 FTS	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	-	-	<0.05
	PFOA	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	-	-	<0.01
	PFOS	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	-	-	<0.01
Organic	4:2 FTS	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	-	-	<0.05
	PFBA	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	-	-	<0.1
	PFPeA	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	-	-	<0.02
Perfluorinated Compounds (PFCs)	8:2 FTS	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	-	-	<0.05
	N-Me-FOSA	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	-	-	<0.05
	N-Me-FOSE	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	-	-	<0.05
	FOSA	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	-	-	<0.02
	PFBS	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	-	-	<0.02
	PFDS	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	-	-	<0.02
	PFTeDA	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	-	-	<0.05
	PFTrDA	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	-	-	<0.02
	N-Et-FOSA	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	-	-	<0.05
	PFDcA	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	-	-	<0.02
	PFHpA	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	-	-	<0.02
	PFHxA	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	-	-	<0.02
	N-Et-FOSE	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	-	-	<0.05
	PFDoA	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	-	-	<0.02
	PFNA	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	-	-	<0.02
	PFUnA	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	-	-	<0.02

Legend
LOR = Limit of reporting
µg/L = micrograms per litre

QAQC Frequency Table - Soil

Site Name Launceston Airport
Project No. 60543717
Project Manager [redacted]
Matrix Soil
Laboratory ALS and Eurofins|MGT
Batch File Number EM1710771 & 558872

NOTES:
(a) ü - holding times are within project guideline limits.
û - holding times exceed project guideline limits.
(b) ü - Limits of reporting (LORs) comply with project specifications.
û - LORs do not comply with project specifications.
NA - Not Applicable

Analytical Method	Analytical Parameter	Number of Tests Requested	Number of Tests Reported	Number of Primary Samples	Holding Times (a)	Limits of Reporting (b)	Field Blank (1 per day)		Rinsate Blank (1 per day per piece of equipment)		Trip Blank (1 per esky with VOCs)		Method Blank (1 per batch)		Intra-Laboratory Duplicate Sample (1 in 20)		Inter-Laboratory Duplicate Sample (1 in 20)		Lab Duplicate (1 in 10)		Matrix Spike (1 in 20)		LCS (1 per batch)		Surrogates (GC-MS organics)	
							Number Required	Number Reported	Number Required	Number Reported	Number Required	Number Reported	Number Required	Number Reported	Number Required	Number Reported	Number Required	Number Reported	Number Required	Number Reported	Number Required	Number Reported	Number Required	Number Reported	Reported	OK
EP080/071: Total Petroleum Hydrocarbons	C10-C14 fraction	30	30	27	ü	ü	3	2	6	3	0	0	1	2	2	3	2	1	3	4		2	1	2		
	C10-C36 fraction (sum)	30	30	27	ü	ü	3	2	6	3	0	0	1	2	2	3	2	1	3	4		0	0	0		
	C15-C28 fraction	30	30	27	ü	ü	3	2	6	3	0	0	1	2	2	3	2	1	3	4	2	2	1	2	-	-
	C29-C36 fraction	30	30	27	ü	ü	3	2	6	3	0	0	1	2	2	3	2	1	3	4		2	1	2		
	C6-C9 fraction	30	30	27	ü	ü	3	2	6	3	2	2	1	3	2	3	2	1	3	6	2	3	1	3	ü	ü
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions	>C10-C16 (minus Naphthalene)(F2)	30	30	27	ü	ü	3	2	6	3	0	0	0	0	2	3	2	1	3	0		0	0	0		
	>C10-C16 fraction	30	30	27	ü	ü	3	2	6	3	0	0	1	2	2	3	2	1	3	4		2	1	2		
	>C10-C40 fraction (sum)	30	30	27	ü	ü	3	2	6	3	0	0	1	2	2	3	0	0	3	4	2	0	0	0	-	-
	>C16-C34 fraction	30	30	27	ü	ü	3	2	6	3	0	0	1	2	2	3	2	1	3	4		2	1	2		
	>C34-C40 fraction	30	30	27	ü	ü	3	2	6	3	0	0	1	2	2	3	2	1	3	4		2	1	2		
	C6-C10 fraction	30	30	27	ü	ü	3	2	6	3	2	2	1	3	2	3	2	1	3	6		3	1	3		
	C6-C10 fraction (minus BTEX)(F1)	30	30	27	ü	ü	3	2	6	3	2	2	0	0	2	3	2	1	3	0	2	0	0	0	ü	ü
EP080: BTEXN	Benzene	30	30	27	ü	ü	3	2	6	3	2	2	1	3	2	3	2	1	3	6		3	1	3		
	Ethylbenzene	30	30	27	ü	ü	3	2	6	3	2	2	1	3	2	3	2	1	3	6		0	1	3		
	m&p-Xylene	30	30	27	ü	ü	3	2	6	3	2	2	1	3	2	3	2	1	3	6		0	1	3		
	Naphthalene (VOC)	30	30	27	ü	ü	3	2	6	3	2	2	1	3	2	3	2	1	3	6		0	1	3		
	o-Xylene	30	30	27	ü	ü	3	2	6	3	2	2	1	3	2	3	2	1	3	6	2	0	1	3	ü	ü
	Toluene	30	30	27	ü	ü	3	2	6	3	2	2	1	3	2	3	2	1	3	6		3	1	3		
	Total BTEX	30	30	27	ü	ü	3	2	6	3	2	2	0	0	2	3	0	0	3	0		0	0	0		
	Total Xylenes	30	30	27	ü	ü	3	2	6	3	2	2	0	0	2	3	2	1	3	0		0	0	0		
EP231D: (n:2) Fluorotelomer Sulfonic Acids	10:2 FTS	30	30	27	ü	ü	3	2	6	3	0	0	1	3	2	3	2	1	3	6		3	1	3		
	6:2 FTS	30	30	27	ü	ü	3	2	6	3	0	0	1	3	2	3	2	1	3	6		3	1	3		
	4:2 FTS	30	30	27	ü	ü	3	2	6	3	0	0	1	3	2	3	2	1	3	6	2	3	1	3	ü	ü
	8:2 FTS	30	30	27	ü	ü	3	2	6	3	0	0	1	3	2	3	2	1	3	6		3	1	3		
EP231C: Perfluoroalkyl Sulfonamides	N-Et-FOSE	30	30	27	ü	ü	3	2	6	3	0	0	1	3	2	3	2	1	3	6		3	1	3		
	MeFOSAA	30	30	27	ü	ü	3	2	6	3	0	0	1	3	2	3	2	1	3	6		3	1	3		
	EtFOSAA	30	30	27	ü	ü	3	2	6	3	0	0	1	3	2	3	2	1	3	6		3	1	3		
	N-Me-FOSE	30	30	27	ü	ü	3	2	6	3	0	0	1	3	2	3	2	1	3	6	2	3	1	3	ü	ü
	N-Et-FOSA	30	30	27	ü	ü	3	2	6	3	0	0	1	3	2	3	2	1	3	6		3	1	3		
	N-Me-FOSA	30	30	27	ü	ü	3	2	6	3	0	0	1	3	2	3	2	1	3	6		3	1	3		
	FOSA	30	30	27	ü	ü	3	2	6	3	0	0	1	3	2	3	2	1	3	6		3	1	3		
EP231B: Perfluoroalkyl Carboxylic Acids	PFUnA	30	30	27	ü	ü	3	2	6	3	0	0	1	3	2	3	2	1	3	6		3	1	3		
	PFHxA	30	30	27	ü	ü	3	2	6	3	0	0	1	3	2	3	2	2	3	6		3	1	3		
	PFPeA	30	30	27	ü	ü	3	2	6	3	0	0	1	3	2	3	2	1	3	6		3	1	3		
	PFDoA	30	30	27	ü	ü	3	2	6	3	0	0	1	3	2	3	2	1	3	6		3	1	3		
	PFDcA	30	30	27	ü	ü	3	2	6	3	0	0	1	3	2	3	2	2	3	6		3	1	3		
	PFOA	30	30	27	ü	ü	3	2	6	3	0	0	1	3	2	3	2	1	3	6	2	3	1	3	ü	ü
	PFNA	30	30	27	ü	ü	3	2	6	3	0	0	1	3	2	3	2	1	3	6		3	1	3		
	PFTeDA	30	30	27	ü	ü	3	2	6	3	0	0	1	3	2	3	2	1	3	6		3	1	3		
	PFTrDA	30	30	27	ü	ü	3	2	6	3	0	0	1	3	2	3	2	1	3	6		3	1	3		
	PFHpA	30	30	27	ü	ü	3	2	6	3	0	0	1	3	2	3	2	1	3	6		3	1	3		
	PFBA	30	30	27	ü	ü	3	2	6	3	0	0	1	3	2	3	2	1	3	6		3	1	3		
EP231A: Perfluoroalkyl Sulfonic Acids	PFPeS	30	30	27	ü	ü	3	2	6	3	0	0	1	3	2	3	2	1	3	6		3	1	3		
	PFHxS	30	30	27	ü	ü	3	2	6	3	0	0	1	3	2	3	2	1	3	6		3	1	3		
	PFOS	30	30	27	ü	ü	3	2	6	3	0	0	1	3	2	3	2	1	3	6		3	1	3		
	PFBS	30	30	27	ü	ü	3	2	6	3	0	0	1	3	2	3	2	1	3	6	2	3	1	3	ü	ü
	PFHpS	30	30	27	ü	ü	3	2	6	3	0	0	1	3	2	3	2	1	3	6		3	1	3		
	PFDS	30	30	27	ü	ü	3	2	6	3	0	0	1	3	2	3	2	1	3	6		3	1	3		
EP231P: PFAS Sums	Sum of PFHxS and PFOS	30	30	27	ü	ü	3	2	6	3	0	0	0	0	2	3	0	0	3	0		0	0	0		
	Sum of PFAS (WA DER List)	30	30	27	ü	ü	3	2	6	3	0	0	0	0	2	3	2	1	3	0	0	0	0	0	ü	ü
	Sum of PFAS	30	30	27	ü	ü	3	2	6	3	0	0	0	0	2	3	2	1	3	0		0	0	0		
EA055: Moisture Content (Dried @ 105-110°C)	Moisture Content	30	30	27	ü	ü	3	2	6	3	0	0	0	0	2	3	2	1	3	6	0	0	0	0	-	-

DATA VALIDATION REPORT

Project number:	60543717	**Validation by:**	[redacted]	**Date:**	06/09/2017
Client:	Airservices Australia				
Site:	Launceston Airport	**Data verified by:**	[redacted]	**Date:**	15/09/2017
Matrix type:	Water				
Primary samples:	7	**Project Manager:**	[redacted]		
Laboratory:	ALS; Eurofins|MGT				
Lab reference:	EM1711072 & 559840				

Key Findings:

No major QA/QC issues were identified in the field or laboratory datasets that could have a material implication to decision-making on the project.

However, based on the DVAL below, the following should be considered during data interpretation:

- Elevated RPDs should be taken into consideration when using data for Sum of PFAS, Sum of PFAS (WA DER List), PFHpS, PFBS, PFHxA and PFNA quantitatively.
- Elevated RPDs should be taken into consideration when interpreting data for Sum of PFHxS and PFOS, PFHxS and PFOS where close to guidelines.

Quality Assurance/Quality Control Measures – AS 4482-1

Measurement	Soil	Water	Frequency	RPD (%)	Recovery (%)
Type of Quality Control Samples to be Prepared or Taken On-Site					
Rinsate Blanks	-	ü	1 per day per field piece of equipment	-	-
Trip Blanks (VOC analysis only)	-	ü	1 per esky or 1 per batch	-	-
Intra Laboratory Duplicates	ü	ü	1 in 20 samples collected or 1 per batch	30 - 50	-
Inter Laboratory Duplicates	ü	ü	1 in 20 samples collected or 1 per batch	30 - 50	-
Quality Control Samples to be Prepared by Laboratory					
Laboratory Blanks	ü	ü	1 per batch	-	-
Laboratory Duplicates	ü	ü	1 in 10 samples collected or 1 per batch (whichever is smaller)	30	-
Matrix Spike Recoveries	ü	ü	1 in 20 samples collected or 1 per batch	-	70 - 130
Spike Recoveries	ü	ü	1 in 20 samples collected or 1 per batch	-	70 - 130
Surrogates	ü	ü	Each analysis done by GC-MS (all organics except C10+ TPH)	-	70 - 130

Field Quality Assurance and Quality Control

Sampling Personnel	All sampling was conducted by [redacted] on 16 and 17 August 2017.
Sampling Methodology	Samples were collected using low flow directly into laboratory supplied bottles.
Chain of Custody (COC)	Chain of custody documents were completed by [redacted].
Analysis Request	Laboratory analysis request and sample receipt notification was reviewed and approved by [redacted].

DATA VALIDATION REPORT

Project number:	60543717	**Validation by:**	[redacted]	**Date:**	06/09/2017
Client:	Airservices Australia				
Site:	Launceston Airport	**Data verified by:**	[redacted]	**Date:**	15/09/2017
Matrix type:	Water				
Primary samples:	7	**Project Manager:**	[redacted]		
Laboratory:	ALS; Eurofins|MGT				
Lab reference:	EM1711072 & 559840				

Field Blank	Field blank samples were collected at a frequency of one per day of sampling (two in total). Concentrations were reported below the limit of reporting (LOR) for all analytes tested.
Rinsate Blank	As per project specifications, rinsate blank samples were not analysed at a frequency of one per day per piece of equipment. Two rinsate samples, collected from the interface probe, were analysed over the two days of sampling. All sampling equipment was either dedicated, disposable or decontaminated with a solution of water and Liquinox between sampling locations, and the decontamination methods and field staff were consistent over the course of the sampling event. A minor concentration of PFOS was detected in QC04 (0.04 µg/L). Concentrations of PFOS detected in all primary, duplicate and triplicate samples exceeded this result by at least two orders of magnitude, thus this minor rinsate concentration will not affect the interpretation of results.
Trip Blank	Trip blanks were included at a frequency of one per cooler (one in total). Concentrations were not detected above the LOR for all volatile analytes tested.
Frequency of Field QC	Field duplicate and triplicate (inter-laboratory duplicate) samples were collected at a frequency of one in twenty primary samples (one of each in total).
Handling and Preservation	Primary, duplicate and triplicate groundwater samples were received preserved and chilled at the laboratories. Sample receipt temperature (2.6°C) was within the recommended range (≤6°C) in primary batch EM1711072. The triplicate sample was received at the secondary laboratory at an elevated temperature (9.6°C). Potential under reporting must be taken into consideration. However, as the inter-laboratory duplicate sample was received only marginally outside of the specified temperature range and the sample was immediately cooled upon collection, the potential for under reporting is not considered to materially affect the interpretation of results. All samples were received at the laboratories in appropriate sample containers.
Laboratory QA/QC	
Tests Requested/Reported	Samples were analysed and reported as requested on the chain of custody (COC).
Holding Time Compliance	Samples were extracted and analysed within recommended holding times.
Laboratory Accreditation	The laboratory analysis was conducted by ALS Environmental Pty Ltd (Melbourne and Sydney) and the triplicate sample was analysed at Eurofins-MGT (Melbourne). Both laboratories are accredited by the National Association of Testing Authorities Australia (NATA) for the analyses undertaken.
Frequency of Laboratory QC	Laboratory duplicate samples were not reported for TRH / TPH semi-volatile fractions. The precision of the data can be assessed as acceptable based on intra- and inter-laboratory duplicate RPDs which were reported at the required frequencies and within control limits. Matrix spikes were not reported for TRH / TPH semi-volatile fractions. The accuracy of the data can be assessed as acceptable based on method blanks and LCS (which were reported at the required frequencies and within control limits)

DATA VALIDATION REPORT

Project number:	60543717	**Validation by:**	[redacted]	**Date:**	06/09/2017
Client:	Airservices Australia				
Site:	Launceston Airport	**Data verified by:**	[redacted]	**Date:**	15/09/2017
Matrix type:	Water				
Primary samples:	7	**Project Manager:**	[redacted]		
Laboratory:	ALS; Eurofins|MGT				
Lab reference:	EM1711072 & 559840				

Method Blank	Method blank concentrations were reported below the LOR for all analytes tested.
Laboratory Duplicate RPDs	Laboratory duplicate relative percentage differences (RPDs) were within control limits. The laboratory duplicate RPDs are presented in the laboratory Quality Control Report.
Laboratory Control Spike Recovery	Laboratory control spike (LCS) recoveries were within control limits.
Matrix Spike Recovery	Matrix spike (MS) recoveries (where reported) were within control limits. The following recoveries were not determined:

Analyte	Recovery (%)	Comment
PFBS	Not determined	MS recovery not determined, background level greater than or equal to 4x spike level
PFPeS		
PFHxS		
PFHpS		
PFOS		
PFPeA		
PFHxA		
PFHpA		
PFOA		

These non-determinations do not reflect method bias and do not affect data interpretation. The accuracy of the data can be assessed as acceptable based on method blanks, LCS and surrogate spike recoveries (which were reported at the required frequencies and within control limits), and available matrix spike recoveries for the same analytical method group (which were reported within control limits).

Surrogate Spike Recovery	Surrogate spike recoveries were within control limits.

QA/QC Data Evaluation

Comparison of Field Observations and Laboratory Results	No anomalous results between field observations and analysis results were noted.
Data Transcription	A random 10% check of the laboratory results identified no anomalies within the electronic data, the laboratory reports, and tables generated by AECOM.
Limits of Reporting	Limits of reporting (LORs) were sufficiently low to enable assessment against adopted guideline criteria.

DATA VALIDATION REPORT

Project number:	60543717	**Validation by:**	[redacted]	**Date:**	06/09/2017
Client:	Airservices Australia				
Site:	Launceston Airport	**Data verified by:**	[redacted]	**Date:**	15/09/2017
Matrix type:	Water				
Primary samples:	7	**Project Manager:**	[redacted]		
Laboratory:	ALS; Eurofins|MGT				
Lab reference:	EM1711072 & 559840				

Field Duplicate RPDs	Field duplicate RPDs were reported within control limits, with the exception of the following sample analysis (the sample with the higher reported concentrations is in bold): · MW01 and **QC01** for PFHpS (46%) As there is no adopted guideline value for PFHpS the elevated RPD is not expected to affect interpretation of results against guidelines. However, the elevated RPD should be taken into consideration when using the data quantitatively.
Field Triplicate RPDs	Field triplicate RPDs were reported outside of control limits for numerous PFAS analytes, as shown in the Water RPDs table. As there are no adopted guideline values for Sum of PFAS, Sum of PFAS (WA DER List), PFHpS, PFBS, PFHxA and PFNA the elevated RPDs are not expected to affect interpretation of results against guidelines. However, the potential for under or over reporting should be taken into consideration when using the data quantitatively. This apparent lack of precision should be taken into consideration when interpreting concentrations for Sum of PFHxS and PFOS, PFHxS and PFOS close to guidelines.
Other	
Sum Totals	Sum of PFAS, Sum of PFAS (WA DER List), Sum of PFHxS and PFOS, TPH C_{10}-C_{36} (sum), TRH C_6-C_{10} (minus BTEX)(F1), TRH C_{10}-C_{16} (minus naphthalene)(F2), TRH C_{10}-C_{40} (sum), total xylenes and total BTEX were laboratory reported or manually calculated by AECOM.
General Comments	ALS did not note any additional comments on the COA.

Water Relative Percentage Differences Table

SDG			EM1711072	EM1711072		EM1711072	559840	
Field ID			MW01	QC01	**RPD (%)**	MW01	QC02	**RPD (%)**
Sample Type			Primary	Duplicate		Primary	Triplicate	
Sample Date			16/08/2017	16/08/2017		16/08/2017	16/08/2017	
Analyte		**Units**	**LOR**						
Per- and Polyfluoroalkyl Subst	Sum of PFAS	µg/L	0.01 : 0.1 (Interlab)	358	330	8	**358**	**568.6**	**45**
	Sum of PFAS (WA DER List)	µg/L	0.01 : 0.05 (Interlab)	330	297	11	**330**	**529.6**	**46**
	Sum of PFHxS and PFOS	µg/L	0.01	276	245	12	**276**	**450#**	**48**
	10:2 FTS	µg/L	0.05 : 0.01 (Interlab)	<0.05	<0.05	0	<0.05	<0.01	0
	MeFOSAA	µg/L	0.02 : 0.05 (Interlab)	<0.02	<0.02	0	<0.02	<0.05	0
	PFPeS	µg/L	0.02 : 0.01 (Interlab)	14.9	14.3	4	14.9	19	24
	PFHpS	µg/L	0.02 : 0.01 (Interlab)	**12**	**19.1**	**46**	**12**	**20**	**50**
	PFHxS	µg/L	0.02 : 0.01 (Interlab)	130	115	12	**130**	**180**	**32**
	EtFOSAA	µg/L	0.02 : 0.05 (Interlab)	<0.02	<0.02	0	<0.02	<0.05	0
Total Petroleum Hydrocarbons	C6-C9 fraction	µg/L	20	<20	<20	0	<20	<20	0
	C10-C14 fraction	µg/L	50	<50	<50	0	<50	<50	0
	C15-C28 fraction	µg/L	100	<100	<100	0	<100	<100	0
	C29-C36 fraction	µg/L	50 : 100 (Interlab)	<50	<50	0	<50	<100	0
	C10-C36 fraction (sum)	µg/L	50 : 100 (Interlab)	<50	<50	0	<50	<100	0
Total Recoverable Hydrocarbons	C6-C10 fraction	µg/L	20	<20	<20	0	<20	<20	0
	C6-C10 fraction (minus BTEX)(F1)	µg/L	20	<20	<20	0	<20	<20	0
	>C10-C16 fraction	µg/L	100 : 50 (Interlab)	<100	<100	0	<100	<50	0
	>C10-C16 (minus Naphthalene)(F2)	µg/L	100 : 50 (Interlab)	<100	<100	0	<100	<50	0
	>C16-C34 fraction	µg/L	100	<100	<100	0	<100	<100	0
	>C34-C40 fraction	µg/L	100	<100	<100	0	<100	<100	0
	>C10-C40 fraction (sum)	µg/L	100	<100	<100	0	<100	<250#	0
BTEXN	Benzene	µg/L	1	<1	<1	0	<1	<1	0
	Toluene	µg/L	2 : 1 (Interlab)	<2	<2	0	<2	<1	0
	Ethylbenzene	µg/L	2 : 1 (Interlab)	<2	<2	0	<2	<1	0
	m&p-Xylene	µg/L	2	<2	<2	0	<2	<2	0
	o-Xylene	µg/L	2 : 1 (Interlab)	<2	<2	0	<2	<1	0
	Total Xylenes	µg/L	2 : 3 (Interlab)	<2	<2	0	<2	<3	0
	Total BTEX	µg/L	1	<1	<1	0	<1	<6#	0
	Naphthalene (VOC)	µg/L	5 : 10 (Interlab)	<5	<5	0	<5	<10	0
Surfactants	6:2 FTS	µg/L	0.05	0.05	0.06	18	0.05	<0.05	0
	PFOA	µg/L	0.01	13.1	13	1	13.1	15	14
	PFOS	µg/L	0.01	146	130	12	**146**	**270**	**60**
Organic	4:2 FTS	ug/L	0.05 : 0.01 (Interlab)	<0.05	<0.05	0	<0.05	<0.01	0
	PFBA	ug/L	0.1 : 0.05 (Interlab)	3.5	3.2	9	3.5	3.3	6
	PFPeA	ug/L	0.02 : 0.01 (Interlab)	5.57	5.13	8	5.57	6.8	20
Perfluorinated Compounds (PFCs)	8:2 FTS	µg/L	0.05 : 0.01 (Interlab)	<0.05	<0.05	0	<0.05	<0.01	0
	N-Me-FOSA	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0
	N-Me-FOSE	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0
	FOSA	µg/L	0.02 : 0.05 (Interlab)	<0.02	<0.02	0	<0.02	<0.05	0
	PFBS	µg/L	0.02 : 0.01 (Interlab)	11	10.1	9	**11**	**21**	**63**
	PFDS	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.01	0
	PFTeDA	µg/L	0.05 : 0.01 (Interlab)	<0.05	<0.05	0	<0.05	<0.01	0
	PFTrDA	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.01	0
	N-Et-FOSA	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0
	PFDcA	µg/L	0.02 : 0.01 (Interlab)	0.02	<0.02	0	0.02	<0.01	67
	PFHpA	µg/L	0.02 : 0.01 (Interlab)	4.13	3.48	17	4.13	4.5	9
	PFHxA	µg/L	0.02 : 0.01 (Interlab)	17.2	17	1	**17.2**	**29**	**51**
	N-Et-FOSE	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0
	PFDoA	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.01	0
	PFNA	µg/L	0.02 : 0.01 (Interlab)	0.13	0.13	0	**0.13**	**<0.01**	**171**
	PFUnA	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.01	0

Legend
RPD = Relative Percentage Difference
LOR = Limit of Reporting
*High RPDs are in bold (Acceptable RPDs for each LOR multiplier range are: 30 (1-10 x LOR); 30 (10-20 x LOR); 30 (> 20 x LOR))
**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
ug/L = micrograms per litre

Field Blanks Table - Water

SDG				EM1711072	EM1711072	EM1711072	EM1711072	EM1711072
Sample ID				QC03	QC04	QC05	QC06	QC07
Sample Date				16/08/2017	16/08/2017	17/08/2017	17/08/2017	17/08/2017
Sample Type				Field Blank	Rinsate	Field Blank	Rinsate	Trip Blank
Analyte Group	**Analyte**	**Units**	**LOR**					
Per- and Polyfluoroalkyl Substances	Sum of PFAS	µg/L	0.01	<0.01	**0.04**	<0.01	<0.01	-
	Sum of PFAS (WA DER List)	µg/L	0.01	<0.01	**0.04**	<0.01	<0.01	-
	Sum of PFHxS and PFOS	µg/L	0.01	<0.01	**0.04**	<0.01	<0.01	-
	10:2 FTS	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	-
	MeFOSAA	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	-
	PFPeS	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	-
	PFHpS	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	-
	PFHxS	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	-
	EtFOSAA	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	-
Total Petroleum Hydrocarbons	C6-C9 fraction	µg/L	20	<20	<20	<20	<20	<20
	C10-C14 fraction	µg/L	50	<50	<50	<50	<50	-
	C15-C28 fraction	µg/L	100	<100	<100	<100	<100	-
	C29-C36 fraction	µg/L	50	<50	<50	<50	<50	-
	C10-C36 fraction (sum)	µg/L	50	<50	<50	<50	<50	-
Total Recoverable Hydrocarbons	C6-C10 fraction	µg/L	20	<20	<20	<20	<20	<20
	C6-C10 fraction (minus BTEX)(F1)	µg/L	20	<20	<20	<20	<20	<20
	>C10-C16 fraction	µg/L	100	<100	<100	<100	<100	-
	>C10-C16 (minus Naphthalene)(F2)	µg/L	100	<100	<100	<100	<100	-
	>C16-C34 fraction	µg/L	100	<100	<100	<100	<100	-
	>C34-C40 fraction	µg/L	100	<100	<100	<100	<100	-
	>C10-C40 fraction (sum)	µg/L	100	<100	<100	<100	<100	-
BTEXN	Benzene	µg/L	1	<1	<1	<1	<1	<1
	Toluene	µg/L	2	<2	<2	<2	<2	<2
	Ethylbenzene	µg/L	2	<2	<2	<2	<2	<2
	m&p-Xylene	µg/L	2	<2	<2	<2	<2	<2
	o-Xylene	µg/L	2	<2	<2	<2	<2	<2
	Total Xylenes	µg/L	2	<2	<2	<2	<2	<2
	Total BTEX	µg/L	1	<1	<1	<1	<1	<1
	Naphthalene (VOC)	µg/L	5	<5	<5	<5	<5	<5
Surfactants	6:2 FTS	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	-
	PFOA	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	-
	PFOS	µg/L	0.01	<0.01	**0.04**	<0.01	<0.01	-
Organic	4:2 FTS	ug/L	0.05	<0.05	<0.05	<0.05	<0.05	-
	PFBA	ug/L	0.1	<0.1	<0.1	<0.1	<0.1	-
	PFPeA	ug/L	0.02	<0.02	<0.02	<0.02	<0.02	-
Perfluorinated Compounds (PFCs)	8:2 FTS	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	-
	N-Me-FOSA	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	-
	N-Me-FOSE	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	-
	FOSA	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	-
	PFBS	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	-
	PFDS	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	-
	PFTeDA	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	-
	PFTrDA	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	-
	N-Et-FOSA	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	-
	PFDcA	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	-
	PFHpA	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	-
	PFHxA	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	-
	N-Et-FOSE	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	-
	PFDoA	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	-
	PFNA	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	-
	PFUnA	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	-

Legend
LOR = Limit of reporting
µg/L = micrograms per litre

QAQC Frequency Table - Water

Site Name TAS_ASA_Launceston
Project No. 60543717
Project Manager [redacted]
Matrix Water
Laboratory ALS and Eurofins|MGT
Batch File Number EM1711072 & 559840

NOTES:
(a) ü - holding times are within project guideline limits.
û - holding times exceed project guideline limits.
(b) ü - Limits of reporting (LORs) comply with project specifications.
û - LORs do not comply with project specifications.
NA - Not Applicable

Analytical Method	Analytical Parameter	Number of Tests Requested	Number of Tests Reported	Number of Primary Samples	Holding Times (a)	Limits of Reporting (b)	Field Blank (1 per day)		Rinsate Blank (1 per day per piece of equipment)		Trip Blank (1 per esky with VOCs)		Method Blank (1 per batch)		Intra-Laboratory Duplicate Sample (1 in 20)		Inter-Laboratory Duplicate Sample (1 in 20)		Lab Duplicate (1 in 10)		Matrix Spike (1 in 20)		LCS (1 per batch)		Surrogates (GC-MS organics)	
							Number Required	Number Reported	Number Required	Number Reported	Number Required	Number Reported	Number Required	Number Reported	Number Required	Number Reported	Number Required	Number Reported	Number Required	Number Reported	Number Required	Number Reported	Number Required	Number Reported	Reported	OK
EP080/071: Total Petroleum Hydrocarbons	C10-C14 fraction	12	12	7	ü	ü	2	2	2	2	0	0	1	1	1	1	1	1	2	0		0	1	1		
	C10-C36 fraction (sum)	12	12	7	ü	ü	2	2	2	2	0	0	0	0	1	1	1	1	2	0		0	0	0		
	C15-C28 fraction	12	12	7	ü	ü	2	2	2	2	0	0	1	1	1	1	1	1	2	0	1	0	1	1	-	-
	C29-C36 fraction	12	12	7	ü	ü	2	2	2	2	0	0	1	1	1	1	1	1	2	0		0	1	1		
	C6-C9 fraction	13	13	7	ü	ü	2	2	2	2	1	1	1	1	1	1	1	1	2	2	1	1	1	1	ü	ü
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions	>C10-C16 (minus Naphthalene)(F2)	12	12	7	ü	ü	2	2	2	2	0	0	0	0	1	1	1	1	2	0		0	0	0		
	>C10-C16 fraction	12	12	7	ü	ü	2	2	2	2	0	0	1	1	1	1	1	1	2	0		0	1	1		
	>C10-C40 fraction (sum)	12	12	7	ü	ü	2	2	2	2	0	0	0	0	1	1	0	0	2	0	1	0	0	0	-	-
	>C16-C34 fraction	12	12	7	ü	ü	2	2	2	2	0	0	1	1	1	1	1	1	2	0		0	1	1		
	>C34-C40 fraction	12	12	7	ü	ü	2	2	2	2	0	0	1	1	1	1	1	1	2	0		0	1	1		
	C6-C10 fraction	13	13	7	ü	ü	2	2	2	2	1	1	1	1	1	1	1	1	2	2		1	1	1		
	C6-C10 fraction (minus BTEX)(F1)	13	13	7	ü	ü	2	2	2	2	1	1	0	0	1	1	1	1	0	0	1	0	0	0	ü	ü
EP080: BTEXN	Benzene	13	13	7	ü	ü	2	2	2	2	1	1	1	1	1	1	1	1	2	2		1	1	1		
	Ethylbenzene	13	13	7	ü	ü	2	2	2	2	1	1	1	1	1	1	1	1	2	2		0	1	1		
	m&p-Xylene	13	13	7	ü	ü	2	2	2	2	1	1	1	1	1	1	1	1	2	2		0	1	1		
	Naphthalene (VOC)	13	13	7	ü	ü	2	2	2	2	1	1	1	1	1	1	1	1	2	2		0	1	1		
	o-Xylene	13	13	7	ü	ü	2	2	2	2	1	1	1	1	1	1	1	1	2	2	1	0	1	1	ü	ü
	Toluene	13	13	7	ü	ü	2	2	2	2	1	1	1	1	1	1	1	1	2	2		1	1	1		
	Total BTEX	13	13	7	ü	ü	2	2	2	2	1	1	0	0	1	1	1	0	0	0		0	0	0		
	Total Xylenes	13	13	7	ü	ü	2	2	2	2	1	1	0	0	1	1	1	1	0	0		0	0	0		
EP231D: (n:2) Fluorotelomer Sulfonic Acids	10:2 FTS	12	12	7	ü	ü	2	2	2	2	0	0	1	1	1	1	1	1	2	2		1	1	1		
	6:2 FTS	12	12	7	ü	ü	2	2	2	2	0	0	1	1	1	1	1	1	2	2		1	1	1		
	4:2 FTS	12	12	7	ü	ü	2	2	2	2	0	0	1	1	1	1	1	1	2	2	1	1	1	1	ü	ü
	8:2 FTS	12	12	7	ü	ü	2	2	2	2	0	0	1	1	1	1	1	1	2	2		1	1	1		
EP231C: Perfluoroalkyl Sulfonamides	N-Et-FOSE	12	12	7	ü	ü	2	2	2	2	0	0	1	1	1	1	1	1	2	2		1	1	1		
	MeFOSAA	12	12	7	ü	ü	2	2	2	2	0	0	1	1	1	1	1	1	2	2		1	1	1		
	EtFOSAA	12	12	7	ü	ü	2	2	2	2	0	0	1	1	1	1	1	1	2	2		1	1	1		
	N-Me-FOSE	12	12	7	ü	ü	2	2	2	2	0	0	1	1	1	1	1	1	2	2	1	1	1	1	ü	ü
	N-Et-FOSA	12	12	7	ü	ü	2	2	2	2	0	0	1	1	1	1	1	1	2	2		1	1	1		
	N-Me-FOSA	12	12	7	ü	ü	2	2	2	2	0	0	1	1	1	1	1	1	2	2		1	1	1		
	FOSA	12	12	7	ü	ü	2	2	2	2	0	0	1	1	1	1	1	1	2	2		1	1	1		
EP231B: Perfluoroalkyl Carboxylic Acids	PFUnA	12	12	7	ü	ü	2	2	2	2	0	0	1	1	1	1	1	1	2	2		1	1	1		
	PFHxA	12	12	7	ü	ü	2	2	2	2	0	0	1	1	1	1	1	1	2	2		1	1	1		
	PFPeA	12	12	7	ü	ü	2	2	2	2	0	0	1	1	1	1	1	1	2	2		1	1	1		
	PFDoA	12	12	7	ü	ü	2	2	2	2	0	0	1	1	1	1	1	1	2	2		1	1	1		
	PFDcA	12	12	7	ü	ü	2	2	2	2	0	0	1	1	1	1	1	1	2	2		1	1	1		
	PFOA	12	12	7	ü	ü	2	2	2	2	0	0	1	1	1	1	1	1	2	2	1	1	1	1	ü	ü
	PFNA	12	12	7	ü	ü	2	2	2	2	0	0	1	1	1	1	1	1	2	2		1	1	1		
	PFTeDA	12	12	7	ü	ü	2	2	2	2	0	0	1	1	1	1	1	1	2	2		1	1	1		
	PFTrDA	12	12	7	ü	ü	2	2	2	2	0	0	1	1	1	1	1	1	2	2		1	1	1		
	PFHpA	12	12	7	ü	ü	2	2	2	2	0	0	1	1	1	1	1	1	2	2		1	1	1		
	PFBA	12	12	7	ü	ü	2	2	2	2	0	0	1	1	1	1	1	1	2	2		1	1	1		
EP231A: Perfluoroalkyl Sulfonic Acids	PFPeS	12	12	7	ü	ü	2	2	2	2	0	0	1	1	1	1	1	1	2	2		1	1	1		
	PFHxS	12	12	7	ü	ü	2	2	2	2	0	0	1	1	1	1	1	1	2	2		1	1	1		
	PFOS	12	12	7	ü	ü	2	2	2	2	0	0	1	1	1	1	1	1	2	2		1	1	1		
	PFBS	12	12	7	ü	ü	2	2	2	2	0	0	1	1	1	1	1	1	2	2	1	1	1	1	ü	ü
	PFHpS	12	12	7	ü	ü	2	2	2	2	0	0	1	1	1	1	1	1	2	2		1	1	1		
	PFDS	12	12	7	ü	ü	2	2	2	2	0	0	1	1	1	1	1	1	2	2		1	1	1		
EP231P: PFAS Sums	Sum of PFHxS and PFOS	12	12	7	ü	ü	2	2	2	2	0	0	0	0	1	1	0	0	0	0		0	0	0		
	Sum of PFAS (WA DER List)	12	12	7	ü	ü	2	2	2	2	0	0	0	0	1	1	1	1	0	0	0	0	0	0	ü	ü
	Sum of PFAS	12	12	7	ü	ü	2	2	2	2	0	0	0	0	1	1	1	1	2	2		0	0	0		

Field Relative Percentage Differences Table - Soil

				MW01_0-0.1			HA05_0-0.1			SS05					
			SDG	EM1710771	EM1710771		EM1710771	EM1710771		EM1710771	EM1710771		EM1710771	558872	
			Field ID	MW01_0-0.1	QC01	RPD (%)	HA05_0-0.1	QC03	RPD (%)	SS05	QC17	RPD (%)	SS05	QC18	RPD (%)
			Sample Type	Primary	Duplicate		Primary	Duplicate		Primary	Duplicate		Primary	Triplicate	
			Sample Date	9/08/2017	9/08/2017		10/08/2017	10/08/2017		11/08/2017	11/08/2017		11/08/2017	11/08/2017	
Analyte Group	**Analyte**	**Units**	**LOR**												
Per- and Polyfluoroalkyl Subst	Sum of PFAS	mg/kg	0.0002 : 0.05 (Interlab)	0.275	0.244	12	0.0225	0.0273	19	0.0107	0.0114	6	0.0107	<0.05	0
	Sum of PFAS (WA DER List)	mg/kg	0.0002 : 0.01 (Interlab)	0.264	0.219	19	0.0225	0.027	18	0.0107	0.0114	6	**0.0107**	**0.032**	**100**
	Sum of PFHxS and PFOS	mg/kg	0.0002	0.262	0.216	19	0.0221	0.0261	17	0.0107	0.0114	6	0.0107		
	10:2 FTS	mg/kg	0.0005 : 0.005 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
	MeFOSAA	mg/kg	0.0002 : 0.01 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.01	0
	PFPeS	mg/kg	0.0002 : 0.005 (Interlab)	**0.0009**	**0.0005**	**57**	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
	PFHpS	mg/kg	0.0002 : 0.005 (Interlab)	0.0012	0.0009	29	**<0.0002**	**0.0003**	**40**	<0.0002	<0.0002	0	<0.0002	<0.005	0
	PFHxS	mg/kg	0.0002 : 0.005 (Interlab)	**0.0219**	**0.0148**	**39**	**0.002**	**0.0029**	**37**	**0.0012**	**0.0007**	**53**	0.0012	<0.005	0
	EtFOSAA	mg/kg	0.0002 : 0.01 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.01	0
Total Petroleum Hydrocarbons	C6-C9 fraction	mg/kg	10 : 20 (Interlab)	<10	<10	0	<10	<10	0	<10	<10	0	<10	<20	0
	C10-C14 fraction	mg/kg	50 : 20 (Interlab)	<50	<50	0	<50	<50	0	<50	<50	0	<50	<20	0
	C15-C28 fraction	mg/kg	100 : 50 (Interlab)	<100	<100	0	<100	<100	0	<100	<100	0	<100	66	0
	C29-C36 fraction	mg/kg	100 : 50 (Interlab)	<100	<100	0	<100	<100	0	<100	<100	0	<100	86	0
	C10-C36 fraction (sum)	mg/kg	50	<50	<50	0	<50	<50	0	<50	<50	0	**<50**	**152**	**101**
Total Recoverable Hydrocarbons	C6-C10 fraction	mg/kg	10 : 20 (Interlab)	<10	<10	0	<10	<10	0	<10	<10	0	<10	<20	0
	C6-C10 fraction (minus BTEX)(F1)	mg/kg	10 : 20 (Interlab)	<10	<10	0	<10	<10	0	<10	<10	0	<10	<20	0
	>C10-C16 fraction	mg/kg	50	<50	<50	0	<50	<50	0	<50	<50	0	<50	<50	0
	>C10-C16 (minus Naphthalene)(F2)	mg/kg	50	<50	<50	0	<50	<50	0	<50	<50	0	<50	<50	0
	>C16-C34 fraction	mg/kg	100	<100	<100	0	<100	110	10	<100	<100	0	**<100**	**140**	**33**
	>C34-C40 fraction	mg/kg	100	<100	<100	0	<100	<100	0	<100	<100	0	<100	<100	0
	>C10-C40 fraction (sum)	mg/kg	50	<50	<50	0	**<50**	**110**	**75**	<50	<50	0	<50		
BTEXN	Benzene	mg/kg	0.2 : 0.1 (Interlab)	<0.2	<0.2	0	<0.2	<0.2	0	<0.2	<0.2	0	<0.2	<0.1	0
	Toluene	mg/kg	0.5 : 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.1	0
	Ethylbenzene	mg/kg	0.5 : 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.1	0
	m&p-Xylene	mg/kg	0.5 : 0.2 (Interlab)	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.2	0
	o-Xylene	mg/kg	0.5 : 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.1	0
	Total Xylenes	mg/kg	0.5 : 0.3 (Interlab)	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.3	0
	Total BTEX	mg/kg	0.2	<0.2	<0.2	0	<0.2	<0.2	0	<0.2	<0.2	0	<0.2		
	Naphthalene (VOC)	mg/kg	1	<1	<1	0	<1	<1	0	<1	<1	0	<1		
	Moisture Content	%	1	22.4	21.7	3	33.2	40.9	21	49.7	40.2	21	49.7	40	22
Surfactants	6:2 FTS	mg/kg	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.01	0
	PFOA	mg/kg	0.0002 : 0.005 (Interlab)	**0.0004**	**0.001**	**86**	<0.0002	0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
	PFOS	mg/kg	0.0002 : 0.005 (Interlab)	0.24	0.201	18	0.0201	0.0232	14	0.0095	0.0107	12	**0.0095**	**0.032**	**108**
Organic	4:2 FTS	mg/kg	0.0005 : 0.005 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
	PFBA	mg/kg	0.001 : 0.005 (Interlab)	<0.001	<0.001	0	<0.001	<0.001	0	<0.001	<0.001	0	<0.001	<0.005	0
	PFPeA	mg/kg	0.0002 : 0.005 (Interlab)	**0.0006**	**0.0004**	**40**	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluorinated Compounds (PFCs)	8:2 FTS	mg/kg	0.0005 : 0.005 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
	N-Me-FOSA	mg/kg	0.0005 : 0.005 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
	N-Me-FOSE	mg/kg	0.0005 : 0.005 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
	FOSA	mg/kg	0.0002 : 0.005 (Interlab)	**0.002**	**0.0055**	**93**	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
	PFBS	mg/kg	0.0002 : 0.005 (Interlab)	**0.0004**	**0.0006**	**40**	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
	PFDS	mg/kg	0.0002 : 0.005 (Interlab)	**0.006**	**0.0171**	**96**	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
	PFTeDA	mg/kg	0.0005 : 0.005 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
	PFTrDA	mg/kg	0.0002 : 0.005 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
	N-Et-FOSA	mg/kg	0.0005 : 0.005 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
	PFDcA	mg/kg	0.0002 : 0.005 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
	PFHpA	mg/kg	0.0002 : 0.005 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
	PFHxA	mg/kg	0.0002 : 0.005 (Interlab)	0.001	0.001	0	**0.0004**	**0.0007**	**55**	<0.0002	<0.0002	0	<0.0002	<0.005	0
	N-Et-FOSE	mg/kg	0.0005 : 0.005 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
	PFDoA	mg/kg	0.0002 : 0.005 (Interlab)	0.0006	0.0005	18	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
	PFNA	mg/kg	0.0002 : 0.005 (Interlab)	0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
	PFUnA	mg/kg	0.0002 : 0.005 (Interlab)	**<0.0002**	**0.0003**	**40**	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.005	0

Legend
RPD = Relative Percentage Difference
LOR = Limit of Reporting
*High RPDs are in bold (Acceptable RPDs for each LOR multiplier range are: 30 (1-10 x LOR); 30 (10-20 x LOR); 30 (> 20 x LOR))
**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
mg/kg = milligrams per kilogram

Field Blanks Table - Soil

	SDG	EM1710771	EM1710771	EM1710771	EM1710771	EM1710771	EM1710771	EM1710771
	Sample ID	QC05	QC06	QC07	QC08	QC09	QC12	QC19
	Sample Date	9/08/2017	9/08/2017	10/08/2017	10/08/2017	10/08/2017	10/08/2017	11/08/2017
	Sample Type	Field Blank	Rinsate	Field Blank	Rinsate	Trip Blank	Trip Blank	Rinsate
Analyte Group	**Analyte**	**Units**	**LOR**							
Per- and Polyfluoroalkyl	Sum of PFAS	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	-	-	<0.01
	Sum of PFAS (WA DER List)	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	-	-	<0.01
	Sum of PFHxS and PFOS	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	-	-	<0.01
	10:2 FTS	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	-	-	<0.05
	MeFOSAA	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	-	-	<0.02
	PFPeS	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	-	-	<0.02
	PFHpS	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	-	-	<0.02
	PFHxS	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	-	-	<0.02
	EtFOSAA	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	-	-	<0.02
TPH	C6-C9 fraction	µg/L	20	<20	<20	<20	<20	<20	<20	<20
	C10-C14 fraction	µg/L	50	<50	<50	<50	<50	-	-	<50
	C15-C28 fraction	µg/L	100	<100	<100	<100	<100	-	-	<100
	C29-C36 fraction	µg/L	50	<50	<50	<50	<50	-	-	<50
	C10-C36 fraction (sum)	µg/L	50	<50	<50	<50	<50	-	-	<50
TRH	C6-C10 fraction	µg/L	20	<20	<20	<20	<20	<20	<20	<20
	C6-C10 fraction (minus BTEX)(F1)	µg/L	20	<20	<20	<20	<20	<20	<20	<20
	>C10-C16 fraction	µg/L	100	<100	<100	<100	<100	-	-	<100
	>C10-C16 (minus Naphthalene)(F2)	µg/L	100	<100	<100	<100	<100	-	-	<100
	>C16-C34 fraction	µg/L	100	<100	<100	<100	<100	-	-	<100
	>C34-C40 fraction	µg/L	100	<100	<100	<100	<100	-	-	<100
	>C10-C40 fraction (sum)	µg/L	100	<100	<100	<100	<100	-	-	<100
BTEXN	Benzene	µg/L	1	<1	<1	<1	<1	<1	<1	<1
	Toluene	µg/L	2	<2	<2	<2	<2	<2	<2	<2
	Ethylbenzene	µg/L	2	<2	<2	<2	<2	<2	<2	<2
	m&p-Xylene	µg/L	2	<2	<2	<2	<2	<2	<2	<2
	o-Xylene	µg/L	2	<2	<2	<2	<2	<2	<2	<2
	Total Xylenes	µg/L	2	<2	<2	<2	<2	<2	<2	<2
	Total BTEX	µg/L	1	<1	<1	<1	<1	<1	<1	<1
	Naphthalene (VOC)	µg/L	5	<5	<5	<5	<5	<5	<5	<5
Surfactants	6:2 FTS	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	-	-	<0.05
	PFOA	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	-	-	<0.01
	PFOS	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	-	-	<0.01
Organic	4:2 FTS	ug/L	0.05	<0.05	<0.05	<0.05	<0.05	-	-	<0.05
	PFBA	ug/L	0.1	<0.1	<0.1	<0.1	<0.1	-	-	<0.1
	PFPeA	ug/L	0.02	<0.02	<0.02	<0.02	<0.02	-	-	<0.02
Perfluorinated Compounds (PFCs)	8:2 FTS	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	-	-	<0.05
	N-Me-FOSA	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	-	-	<0.05
	N-Me-FOSE	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	-	-	<0.05
	FOSA	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	-	-	<0.02
	PFBS	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	-	-	<0.02
	PFDS	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	-	-	<0.02
	PFTeDA	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	-	-	<0.05
	PFTrDA	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	-	-	<0.02
	N-Et-FOSA	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	-	-	<0.05
	PFDcA	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	-	-	<0.02
	PFHpA	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	-	-	<0.02
	PFHxA	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	-	-	<0.02
	N-Et-FOSE	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	-	-	<0.05
	PFDoA	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	-	-	<0.02
	PFNA	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	-	-	<0.02
	PFUnA	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	-	-	<0.02

Legend
LOR = Limit of reporting
µg/L = micrograms per litre

Water Relative Percentage Differences Table

SDG			EM1711072	EM1711072		EM1711072	559840		
Field ID			MW01	QC01	**RPD (%)**	MW01	QC02	**RPD (%)**	
Sample Type			Primary	Duplicate		Primary	Triplicate		
Sample Date			16/08/2017	16/08/2017		16/08/2017	16/08/2017		
Analyte		**Units**	**LOR**						
Per- and Polyfluoroalkyl Subst	Sum of PFAS	µg/L	0.01 : 0.1 (Interlab)	358	330	8	**358**	**568.6**	**45**
	Sum of PFAS (WA DER List)	µg/L	0.01 : 0.05 (Interlab)	330	297	11	**330**	**529.6**	**46**
	Sum of PFHxS and PFOS	µg/L	0.01	276	245	12	**276**	**450#**	**48**
	10:2 FTS	µg/L	0.05 : 0.01 (Interlab)	<0.05	<0.05	0	<0.05	<0.01	0
	MeFOSAA	µg/L	0.02 : 0.05 (Interlab)	<0.02	<0.02	0	<0.02	<0.05	0
	PFPeS	µg/L	0.02 : 0.01 (Interlab)	14.9	14.3	4	14.9	19	24
	PFHpS	µg/L	0.02 : 0.01 (Interlab)	**12**	**19.1**	**46**	**12**	**20**	**50**
	PFHxS	µg/L	0.02 : 0.01 (Interlab)	130	115	12	**130**	**180**	**32**
	EtFOSAA	µg/L	0.02 : 0.05 (Interlab)	<0.02	<0.02	0	<0.02	<0.05	0
Total Petroleum Hydrocarbons	C6-C9 fraction	µg/L	20	<20	<20	0	<20	<20	0
	C10-C14 fraction	µg/L	50	<50	<50	0	<50	<50	0
	C15-C28 fraction	µg/L	100	<100	<100	0	<100	<100	0
	C29-C36 fraction	µg/L	50 : 100 (Interlab)	<50	<50	0	<50	<100	0
	C10-C36 fraction (sum)	µg/L	50 : 100 (Interlab)	<50	<50	0	<50	<100	0
Total Recoverable Hydrocarbons	C6-C10 fraction	µg/L	20	<20	<20	0	<20	<20	0
	C6-C10 fraction (minus BTEX)(F1)	µg/L	20	<20	<20	0	<20	<20	0
	>C10-C16 fraction	µg/L	100 : 50 (Interlab)	<100	<100	0	<100	<50	0
	>C10-C16 (minus Naphthalene)(F2)	µg/L	100 : 50 (Interlab)	<100	<100	0	<100	<50	0
	>C16-C34 fraction	µg/L	100	<100	<100	0	<100	<100	0
	>C34-C40 fraction	µg/L	100	<100	<100	0	<100	<100	0
	>C10-C40 fraction (sum)	µg/L	100	<100	<100	0	<100	<250#	0
BTEXN	Benzene	µg/L	1	<1	<1	0	<1	<1	0
	Toluene	µg/L	2 : 1 (Interlab)	<2	<2	0	<2	<1	0
	Ethylbenzene	µg/L	2 : 1 (Interlab)	<2	<2	0	<2	<1	0
	m&p-Xylene	µg/L	2	<2	<2	0	<2	<2	0
	o-Xylene	µg/L	2 : 1 (Interlab)	<2	<2	0	<2	<1	0
	Total Xylenes	µg/L	2 : 3 (Interlab)	<2	<2	0	<2	<3	0
	Total BTEX	µg/L	1	<1	<1	0	<1	<6#	0
	Naphthalene (VOC)	µg/L	5 : 10 (Interlab)	<5	<5	0	<5	<10	0
Surfactants	6:2 FTS	µg/L	0.05	0.05	0.06	18	0.05	<0.05	0
	PFOA	µg/L	0.01	13.1	13	1	13.1	15	14
	PFOS	µg/L	0.01	146	130	12	**146**	**270**	**60**
Organic	4:2 FTS	ug/L	0.05 : 0.01 (Interlab)	<0.05	<0.05	0	<0.05	<0.01	0
	PFBA	ug/L	0.1 : 0.05 (Interlab)	3.5	3.2	9	3.5	3.3	6
	PFPeA	ug/L	0.02 : 0.01 (Interlab)	5.57	5.13	8	5.57	6.8	20
Perfluorinated Compounds (PFCs)	8:2 FTS	µg/L	0.05 : 0.01 (Interlab)	<0.05	<0.05	0	<0.05	<0.01	0
	N-Me-FOSA	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0
	N-Me-FOSE	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0
	FOSA	µg/L	0.02 : 0.05 (Interlab)	<0.02	<0.02	0	<0.02	<0.05	0
	PFBS	µg/L	0.02 : 0.01 (Interlab)	11	10.1	9	**11**	**21**	**63**
	PFDS	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.01	0
	PFTeDA	µg/L	0.05 : 0.01 (Interlab)	<0.05	<0.05	0	<0.05	<0.01	0
	PFTrDA	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.01	0
	N-Et-FOSA	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0
	PFDcA	µg/L	0.02 : 0.01 (Interlab)	0.02	<0.02	0	0.02	<0.01	67
	PFHpA	µg/L	0.02 : 0.01 (Interlab)	4.13	3.48	17	4.13	4.5	9
	PFHxA	µg/L	0.02 : 0.01 (Interlab)	17.2	17	1	**17.2**	**29**	**51**
	N-Et-FOSE	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0
	PFDoA	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.01	0
	PFNA	µg/L	0.02 : 0.01 (Interlab)	0.13	0.13	0	**0.13**	**<0.01**	**171**
	PFUnA	µg/L	0.02 : 0.01 (Interlab)	<0.02	<0.02	0	<0.02	<0.01	0

Legend
RPD = Relative Percentage Difference
LOR = Limit of Reporting
*High RPDs are in bold (Acceptable RPDs for each LOR multiplier range are: 30 (1-10 x LOR); 30 (10-20 x LOR); 30 (> 20 x LOR))
**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
ug/L = micrograms per litre

Field Blanks Table - Water

SDG				EM1711072	EM1711072	EM1711072	EM1711072	EM1711072
Sample ID				QC03	QC04	QC05	QC06	QC07
Sample Date				16/08/2017	16/08/2017	17/08/2017	17/08/2017	17/08/2017
Sample Type				Field Blank	Rinsate	Field Blank	Rinsate	Trip Blank
Analyte Group	**Analyte**	**Units**	**LOR**					
Per- and Polyfluoroalkyl Substances	Sum of PFAS	µg/L	0.01	<0.01	**0.04**	<0.01	<0.01	-
	Sum of PFAS (WA DER List)	µg/L	0.01	<0.01	**0.04**	<0.01	<0.01	-
	Sum of PFHxS and PFOS	µg/L	0.01	<0.01	**0.04**	<0.01	<0.01	-
	10:2 FTS	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	-
	MeFOSAA	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	-
	PFPeS	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	-
	PFHpS	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	-
	PFHxS	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	-
	EtFOSAA	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	-
Total Petroleum Hydrocarbons	C6-C9 fraction	µg/L	20	<20	<20	<20	<20	<20
	C10-C14 fraction	µg/L	50	<50	<50	<50	<50	-
	C15-C28 fraction	µg/L	100	<100	<100	<100	<100	-
	C29-C36 fraction	µg/L	50	<50	<50	<50	<50	-
	C10-C36 fraction (sum)	µg/L	50	<50	<50	<50	<50	-
Total Recoverable Hydrocarbons	C6-C10 fraction	µg/L	20	<20	<20	<20	<20	<20
	C6-C10 fraction (minus BTEX)(F1)	µg/L	20	<20	<20	<20	<20	<20
	>C10-C16 fraction	µg/L	100	<100	<100	<100	<100	-
	>C10-C16 (minus Naphthalene)(F2)	µg/L	100	<100	<100	<100	<100	-
	>C16-C34 fraction	µg/L	100	<100	<100	<100	<100	-
	>C34-C40 fraction	µg/L	100	<100	<100	<100	<100	-
	>C10-C40 fraction (sum)	µg/L	100	<100	<100	<100	<100	-
BTEXN	Benzene	µg/L	1	<1	<1	<1	<1	<1
	Toluene	µg/L	2	<2	<2	<2	<2	<2
	Ethylbenzene	µg/L	2	<2	<2	<2	<2	<2
	m&p-Xylene	µg/L	2	<2	<2	<2	<2	<2
	o-Xylene	µg/L	2	<2	<2	<2	<2	<2
	Total Xylenes	µg/L	2	<2	<2	<2	<2	<2
	Total BTEX	µg/L	1	<1	<1	<1	<1	<1
	Naphthalene (VOC)	µg/L	5	<5	<5	<5	<5	<5
Surfactants	6:2 FTS	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	-
	PFOA	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	-
	PFOS	µg/L	0.01	<0.01	**0.04**	<0.01	<0.01	-
Organic	4:2 FTS	ug/L	0.05	<0.05	<0.05	<0.05	<0.05	-
	PFBA	ug/L	0.1	<0.1	<0.1	<0.1	<0.1	-
	PFPeA	ug/L	0.02	<0.02	<0.02	<0.02	<0.02	-
Perfluorinated Compounds (PFCs)	8:2 FTS	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	-
	N-Me-FOSA	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	-
	N-Me-FOSE	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	-
	FOSA	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	-
	PFBS	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	-
	PFDS	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	-
	PFTeDA	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	-
	PFTrDA	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	-
	N-Et-FOSA	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	-
	PFDcA	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	-
	PFHpA	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	-
	PFHxA	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	-
	N-Et-FOSE	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	-
	PFDoA	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	-
	PFNA	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	-
	PFUnA	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	-

Legend
LOR = Limit of reporting
µg/L = micrograms per litre

Appendix M

Laboratory Documentation

FREIGHT

Samples received without CoC

CLIENT / SENDER:	ABCOM
PROJECT:	60563717
CONTACT NAME:	[redacted]
CONTACT NUMBER:	
CARRIER:	TAS FAST
CONSIGNOTE REFERENCE:	741405
SAMPLER:	
NUMBER OF SAMPLES/MATRIX:	9 Bsteen Soils
Client services notified by:	

COC SEQUENCE NUMBER (Circle)

COC: - 1 2 3 4 5 6 7

OF: 1 2 3 4 5 6 7

SAMPLES RECEIVED BY: [illegible]

DATE/TIME: 14/4, 10:50

ANALYSIS RECEIVED BY:

DATE/TIME:

Comments

Environmental Division
Melbourne
Work Order Reference
EM1710771

Telephone : +61-3-8549 9600

LAB ID	SAMPLE DETAILS: SAMPLE ID	DATE	MATRIX	NUMBER OF CONTAINERS	Additional Information

FREIGHT

Samples received without CoC

CLIENT / SENDER:	AECOM
PROJECT:	60563717
CONTACT NAME:	[redacted]
CONTACT NUMBER:	
CARRIER:	TAS FAST
CONSIGNNOTE REFERENCE:	741405
SAMPLER:	
NUMBER OF SAMPLES/MATRIX:	9 Bsluge Soils
Client services notified by:	

COC SEQUENCE NUMBER (Circle)

COC: - 1 2 3 4 5 6 7

OF: 1 2 3 4 5 6 7

SAMPLES RECEIVED BY: Laura (AM)

DATE/TIME: 14/8, 10:50

ANALYSIS RECEIVED BY:

DATE/TIME:

Comments

Environmental Division
Melbourne
Work Order Reference
EM1710771

Telephone : + 61-3-8549 9600

SAMPLE DETAILS			NUMBER OF CONTAINERS	Additional Information
SAMPLE ID	DATE	MATRIX		
				Forwarded to Secondary Lab Initials AM Date 15/8

Analysis rec'd 14/8/17 2:16 pm - ALS PR

AECOM

Chain of Custody

AECOM Australia Pty Ltd		**Laboratory Details**	Tel: 03 9763 2500
AECOM Office Address: Lvl 10, Tower 2, 727 Collins St	T 03 9563 1234	**Lab. Name: ALS**	Fax: 03 9763 2633
Melbourne 3008	F 03 9654 7117	**Lab. Address:** Springvale	Preliminary Report by:
		Contact Name: [redacted]	Final Report by:
		Lab. Ref:	Lab Quote No:
Site Name: Launceston Airport	Cluster:	Site/Reference ID:	
Sampled By: [redacted]	AECOM Project Number: 60543717, 1.0	Project Manager: [redacted]	

Data required to be reported in PDF and EQuIS Format

Specifications:	Yes (tick)
Standard Turnaround Required (5 days)	Yes
Is any sediment layer present in waters to be excluded from extractions?	No
Special storage requirements? (details: _____)	No
Report to be delivered in EQuIS and PDF formats to : jothe.ramesh@aecom.com	

Lab. ID	Sample ID	Sampling Date	Matrix: soil	Matrix: water	Matrix: other	Preservation: frit'ed	Preservation: acid	Preservation: ice	Preservation: other	Container (No. & type)	Analysis Request: PFAS	BTEXN	TPH (C6-C40)							HOLD	Comments
1	MW01_0-0.1	09-August-2017	X					X			X	X	X								
2	MW01_0.2-0.3	09-August-2017	X					X													
3	MW01_0.4-0.5	09-August-2017	X					X													
4	MW01_0.6-0.7	09-August-2017	X					X													
5	MW01_0.8-0.9	09-August-2017	X					X													
6	MW01_1.0-1.1	09-August-2017	X					X			x	x	x								
7	MW01_2.0-2.1	09-August-2017	X					X													
8	MW01_2.9-3.0	09-August-2017	X					X													
9	MW01_3.9-4.0	09-August-2017	X					X													
10	MW02_0-0.1	10-August-2017	X					X			x	x	x								
11	MW02_0.2-0.3	10-August-2017	X					X													
12	MW02_0.4-0.5	10-August-2017	X					X													
13	MW02_0.6-0.7	10-August-2017	X					X													
14	MW02_0.8-0.9	10-August-2017	X					X													
15	MW02_1.0-1.1	10-August-2017	X					X			x	x	x								
16	MW02_1.9-2.0	10-August-2017	X					X													
17	MW02_2.9-3.0	10-August-2017	X					X													
18	MW02_3.9-4.0	10-August-2017	X					X													
19	MW02_4.9-5.0	10-August-2017	X					X													
20	MW02_5.9-6.0	10-August-2017	X					X													
21	MW02_6.9-7.0	10-August-2017	X					X													
22	MW02_7.9-8.0	10-August-2017	X					X													

Comments:

EsdyID

Relinquished by: [redacted]	Signed: [redacted]	Date: 11/08/2017	Relinquished by:		Date:
Recieved by:	Signed:	Date:	Recieved by:		Date:

AECOM

Chain of Custody

AECOM Australia Pty Ltd		**Laboratory Details**	Tel: 03 9763 2500
AECOM Office Address: Lvl 10, Tower 2, 727 Collins St	T 03 9563 1234	**Lab. Name: ALS**	Fax: 03 9763 2633
Melbourne 3008	F 03 9654 7117	**Lab. Address:** Springvale	Preliminary Report by:
		Contact Name: [redacted]	Final Report by:
		Lab. Ref:	Lab Quote No:
Site Name: Launceston Airport	Cluster:	Site/Reference ID:	
Sampled By: [redacted]	AECOM Project Number: 60543717, 1.0	Project Manager: [redacted]	

Data required to be reported in PDF and EQuIS Format

Specifications:	Yes (tick)
Standard Turnaround Required (5 days)	Yes
Is any sediment layer present in waters to be excluded from extractions?	No
Special storage requirements? (details: _____)	No
Report to be delivered in EQuIS and PDF formats to : jothe.ramesh@aecom.com	

Lab. ID	Sample ID	Sampling Date	Matrix			Preservation				Container	Analysis Request											Comments
			soil	water	other	filt'ed	acid	ice	other	(No. & type)	PFAS	BTEXN	TPH (C6-C40)								HOLD	
23	MW03_0-0.1	10-August-2017	X					X			X	X	X									
24	MW03_0.2-0.3	10-August-2017	X					X														
25	MW03_0.4-0.5	10-August-2017	X					X														
26	MW03_0.6-0.7	10-August-2017	X					X														
27	MW03_0.8-0.9	10-August-2017	X					X														
28	MW03_1.0-1.1	10-August-2017	X					X			X	X	X									
29	MW03_1.9-2.0	10-August-2017	X					X														
30	MW03_2.9-3.0	10-August-2017	X					X														
31	MW03_3.9-4.0	10-August-2017	X					X														
32	HA01_0-0.1	09-August-2017	X					X			X	X	X									
33	HA01_0.2-0.3	09-August-2017	X					X														
34	HA01_0.4-0.5	09-August-2017	X					X														
35	HA01_0.6-0.7	09-August-2017	X					X														
36	HA01_0.8-0.9	09-August-2017	X					X														
37	HA01_1.0-1.1	09-August-2017	X					X			X	X	X									
38	HA02_0-0.1	09-August-2017	X					X			X	X	X									
39	HA02_0.2-0.3	09-August-2017	X					X														
40 N/R	HA02_0.4-0.5	09-August-2017	X					X														
41	HA02_0.6-0.7	09-August-2017	X					X														
42	HA02_0.8-0.9	09-August-2017	X					X														
43	HA02_1.0-1.1	09-August-2017	X					X			X	X	X									
			Comments:																		Esky ID	

Relinquished by:	[redacted]	Signed:	[redacted]	Date: 11/08/2017	Relinquished by: Date:
Recieved by:	[redacted]	Signed:		Date:	Recieved by: Date:

AECOM

AECOM Australia Pty Ltd	
AECOM Office Address: Lvl 10, Tower 2, 727 Collins St	T 03 9563 1234
Melbourne 3008	F 03 9654 7117

Laboratory Details	Tel: 03 9763 :
Lab. Name: ALS	Fax: 03 9763
Lab. Address: Springvale	Preliminary R
Contact Name: [redacted]	Final Report t
Lab. Ref:	Lab Quote Nc

Site Name: Launceston Airport	Cluster:	Site/Reference ID:
Sampled By: [redacted]	AECOM Project Number: 60543717, 1.0	Project Manager: [redacted]

Data required to be reported in PDF and EQuIS Format

Specifications:

	Yes (tick)
Standard Turnaround Required (5 days)	Yes
Is any sediment layer present in waters to be excluded from extractions?	No
Special storage requirements? (details: _____)	No

Report to be delivered in EQuIS and PDF formats to : jothe.ramesh@aecom.com

Lab. ID	Sample ID	Sampling Date	Matrix			Preservation				Container	Analysis Request						
			soil	water	other	filt'ed	acid	ice	other	(No. & type)	PFAS	BTEXN	TPH (C6-C40)				
44	HA03_0-0.1	09-August-2017	X					X			X	X	X				
45	HA03_0.2-0.3	09-August-2017	X					X									
46	HA03_0.4-0.5	09-August-2017	X					X									
47	HA03_0.6-0.7	09-August-2017	X					X									
48	HA03_0.8-0.9	09-August-2017	X					X									
49	HA03_1.0-1.1	09-August-2017	X					X			X	X	X				
50	HA04_0-0.1	09-August-2017	X					X			X	X	X				
51	HA04_0.2-0.3	09-August-2017	X					X									
52	HA04_0.4-0.5	09-August-2017	X					X									
53	HA04_0.6-0.7	09-August-2017	X					X									
54	HA04_0.8-0.9 0.7 - 0.8	09-August-2017	X					X			X	X	X				
55	HA05_0-0.1	10-August-2017	X					X			X	X	X				
56	HA05_0.2-0.3	10-August-2017	X					X									
[redacted]	HA05_0.2-0.3	10-August-2017	X					X									
58	HA05_0.4-0.5	10-August-2017	X					X									
59	HA05_0.6-0.7	10-August-2017	X					X									
60	HA05_0.8-0.9	10-August-2017	X					X									
61	HA05_1.0-1.1	10-August-2017	X					X			X	X	X				
62	HA06_0-0.1 0.1	10-August-2017	X					X			X	X	X				
63	HA06_0.2-0.3	10-August-2017	X					X									
64	HA06_0.4-0.5	10-August-2017	X					X									

Comments:

Relinquished by: [redacted]	Signed: [redacted]	Date: 11/08/2017	Relinquished by:		
Recieved by:	Signed:	Date:	Recieved by:		

AECOM

AECOM Australia Pty Ltd		**Laboratory Details**	Tel: 03 9763 :
AECOM Office Address: Lvl 10, Tower 2, 727 Collins St	T 03 9563 1234	**Lab. Name: ALS**	Fax: 03 9763
Melbourne 3008	F 03 9654 7117	**Lab. Address:** Springvale	Preliminary R
		Contact Name: [redacted]	Final Report t
		Lab. Ref:	Lab Quote Nc
Site Name: Launceston Airport	Cluster:	Site/Reference ID:	
Sampled By: [redacted]	AECOM Project Number: 60543717, 1.0	Project Manager: [redacted]	

Data required to be reported in PDF and EQuIS Format

Specifications:	Yes (tick)
Standard Turnaround Required (5 days)	Yes
Is any sediment layer present in waters to be excluded from extractions?	No
Special storage requirements? (details: _____)	No
Report to be delivered in EQuIS and PDF formats to : jothe.ramesh@aecom.com	

Lab. ID	Sample ID	Sampling Date	Matrix			Preservation				Container	Analysis Request						
			soil	water	other	filt'ed	acid	ice	other	(No. & type)	PFAS	BTEXN	TPH (C6-C40)	TPH (C6-C9)			
65	HA06_0.6-0.7	10-August-2017	X					X									
66	HA06_0.8-0.9	10-August-2017	X					X									
67	HA06_1.0-1.1	10-August-2017	X					X			X	X	X				
68	HA07_0-0.1	10-August-2017	X					X			X	X	X				
69	HA07_0.2-0.3	10-August-2017	X					X									
70	HA07_0.4-0.5	10-August-2017	X					X									
71	HA07_0.6-0.7	10-August-2017	X					X									
72	HA07_0.8-0.9	10-August-2017	X					X									
73	HA07_1.0-1.1	10-August-2017	X					X			X	X	X				
74	QC01	09-August-2017	X					X			X	X	X				
75	QC03	10-August-2017	X					X			X	X	X				
76	QC05	09-August-2017		X				X			X	X	X				
77	QC06	09-August-2017		X				X			X	X	X				
78	QC07	10-August-2017		X				X			X	X	X				
79	QC08	10-August-2017		X				X			X	X	X				
80	QC10	11-August-2017		X				X			✓	✓	✓				
81	QC11	11-August-2017		X				X									
82	QC12	11-August-2017		X				X				X		X			
83	QC13	11-August-2017		X				X									
84	QC14	11-August-2017		X				X									
85	QC09	11-August-2017		X				X			✓	✓	✓				

10/8

Comments:

Relinquished by: [redacted]	Signed: [redacted]	Date: 11/08/2017	Relinquished by:		
Recieved by:	Signed:	Date:	Recieved by:		

AECOM

AECOM Australia Pty Ltd		**Laboratory Details**	Tel: 03 9763
AECOM Office Address: Lvl 10, Tower 2, 727 Collins St	T 03 9663 1234	**Lab. Name: ALS**	Fax: 03 9763
Melbourne 3008	F 03 9654 7117	**Lab. Address:** Springvale	Preliminary R
		Contact Name: [redacted]	Final Report t
		Lab. Ref:	Lab Quote Nc
Site Name: Launceston Airport	Cluster:	Site/Reference ID:	
Sampled By: [redacted]	AECOM Project Number: 60543717, 1.0	Project Manager [redacted]	

Data required to be reported in PDF and EQuIS Format

Specifications:	Yes (tick)
Standard Turnaround Required (5 days)	Yes
Is any sediment layer present in waters to be excluded from extractions?	No
Special storage requirements? (details:)	No
Report to be delivered in EQuIS and PDF formats to : jothe.ramesh@aecom.com	

Lab. ID	Sample ID	Sampling Date	Matrix: soil	Matrix: water	Matrix: other	Preservation: filtered	Preservation: acid	Preservation: ice	Preservation: other	Container (No. & type)	Analysis Request: PFAS	BTEXN	TPH (C6-C40)	TPH (C6-C9)			
86	QC15 10/8	11-August-2017		X				X									
87	QC16 ↓	11-August-2017		X				X									
88	SS01	11-August-2017			X						X	X	X				
89	SS02	11-August-2017			X						X	X	X				
90	SS03	11-August-2017			X						X	X	X				
91	SS04	11-August-2017			X						X	X	X				
92	SS05	11-August-2017			X						X	X	X				
93	SS06	11-August-2017			X						X	X	X				
94	SS07	11-August-2017			X						X	X	X				
	Extra Samples																
95	QC17	11/8															
96	QC18	11/8															
97	QC19	11/8															
98	QC20	11/8															
99	MW01_5.9-6.0	9/8															
100	MW02_5.9-6.0	10/8															

Comments:

Relinquished by: [redacted]	Signed: [redacted]	Date: 11/08/2017	Relinquished by:		
Recieved by:	Signed:	Date:	Recieved by:		

FREIGHT

Samples received without CoC

Environmental Division
Melbourne
Work Order Reference
EM1710771

Telephone : + 61-3-8549 9600

ENT / SENDER:	ABCOM
OJECT:	60[redacted]
NTACT NAME:	
NTACT NUMBER:	
RRIER:	TAS FAST
NNOTE REFERENCE:	741405
MPLER:	
MBER OF SAMPLES/MATRIX:	9 Eskies Soils
ent services notified by:	

COC SEQUENCE NUMBER (Circle)

COC:	1	2	3	4	5	6	7
OF:	1	2	3	4	5	6	7

SAMPLES RECEIVED BY: Laura Paul

DATE/TIME: 14/8, 10:50

ANALYSIS RECEIVED BY:

DATE/TIME:

Comments

LAB ID	SAMPLE DETAILS: SAMPLE ID	DATE	MATRIX	NUMBER OF CONTAINERS	Additional Information
					Forwarded to Secondary Lab Initials AD Date 15/8

AD 15/8/17

Analysis rec'd 14/8/17 2:16 pm - ALS BR

AECOM

Chain of Custody

AECOM Australia Pty Ltd		**Laboratory Details**	Tel: 03 9763 2500
AECOM Office Address: Lvl 10, Tower 2, 727 Collins St	T 03 9563 1234	**Lab. Name: ALS**	Fax: 03 9763 2633
Melbourne 3008	F 03 9654 7117	**Lab. Address:** Springvale	Preliminary Report by:
		Contact Name: [redacted]	Final Report by:
		Lab. Ref:	Lab Quote No:
Site Name: Launceston Airport	Cluster:	Site/Reference ID:	
Sampled By: [redacted]	AECOM Project Number: 60543717, 1.0	Project Manager: [redacted]	

Data required to be reported in PDF and EQuIS Format

Specifications:	Yes (tick)
Standard Turnaround Required (5 days)	Yes
Is any sediment layer present in waters to be excluded from extractions?	No
Special storage requirements? (details: _____)	No
Report to be delivered in EQuIS and PDF formats to : jothe.ramesh@aecom.com	

Lab. ID	Sample ID	Sampling Date	Matrix			Preservation				Container	Analysis Request											Comments
			soil	water	other	filtered	acid	ice	other	(No. & type)	PFAS	BTEXN	TPH (C6-C40)								HOLD	
1	MW01_0-0.1	09-August-2017	X					X			X	X	X									
2	MW01_0.2-0.3	09-August-2017	X					X														
3	MW01_0.4-0.5	09-August-2017	X					X														
4	MW01_0.6-0.7	09-August-2017	X					X														
5	MW01_0.8-0.9	09-August-2017	X					X														
6	MW01_1.0-1.1	09-August-2017	X					X			x	x	x									
7	MW01_2.0-2.1	09-August-2017	X					X														
8	MW01_2.9-3.0	09-August-2017	X					X														
9	MW01_3.9-4.0	09-August-2017	X					X														
10	MW02_0-0.1	10-August-2017	X					X			x	x	x									
11	MW02_0.2-0.3	10-August-2017	X					X														
12	MW02_0.4-0.5	10-August-2017	X					X														
13	MW02_0.6-0.7	10-August-2017	X					X														
14	MW02_0.8-0.9	10-August-2017	X					X														
15	MW02_1.0-1.1	10-August-2017	X					X			x	x	x									
16	MW02_1.9-2.0	10-August-2017	X					X														
17	MW02_2.9-3.0	10-August-2017	X					X														
18	MW02_3.9-4.0	10-August-2017	X					X														
19	MW02_4.9-5.0	10-August-2017	X					X														
20	MW02_5.9-6.0	10-August-2017	X					X														
21	MW02_6.9-7.0	10-August-2017	X					X														
22	MW02_7.9-8.0	10-August-2017	X					X														

Comments: [redacted]

Entry ID

Relinquished by: [redacted]	Signed:	Date: 11/08/2017	Relinquished by:		Date:
Recieved by:	Signed:	Date:	Recieved by:		Date:

AECOM

Chain of Custody

AECOM Australia Pty Ltd		**Laboratory Details**	Tel: 03 9763 2500
AECOM Office Address: Lvl 10, Tower 2, 727 Collins St Melbourne 3008	T 03 9563 1234 F 03 9654 7117	**Lab. Name: ALS** **Lab. Address:** Springvale Contact Name: [redacted] Lab. Ref:	Fax: 03 9763 2633 Preliminary Report by: Final Report by: Lab Quote No:
Site Name: Launceston Airport	Cluster:	Site/Reference ID:	
Sampled By: [redacted]	AECOM Project Number: 60543717, 1.0	Project Manager: [redacted]	

Data required to be reported in PDF and EQuIS Format

Specifications:	Yes (tick)
Standard Turnaround Required (5 days)	Yes
Is any sediment layer present in waters to be excluded from extractions?	No
Special storage requirements? (details: _____)	No
Report to be delivered in EQuIS and PDF formats to : jothe.ramesh@aecom.com	

Lab. ID	Sample ID	Sampling Date	Matrix			Preservation				Container	Analysis Request											Comments
			soil	water	other	filt'ed	acid	ice	other	(No & type)	PFAS	BTEXN	TPH (C6-C40)								HOLD	
23	MW03_0-0.1	10-August-2017	X					X			X	X	X									
24	MW03_0.2-0.3	10-August-2017	X					X														
25	MW03_0.4-0.5	10-August-2017	X					X														
26	MW03_0.6-0.7	10-August-2017	X					X														
27	MW03_0.8-0.9	10-August-2017	X					X														
28	MW03_1.0-1.1	10-August-2017	X					X			X	X	X									
29	MW03_1.9-2.0	10-August-2017	X					X														
30	MW03_2.9-3.0	10-August-2017	X					X														
31	MW03_3.9-4.0	10-August-2017	X					X														
32	HA01_0-0.1	09-August-2017	X					X			X	X	X									
33	HA01_0.2-0.3	09-August-2017	X					X														
34	HA01_0.4-0.5	09-August-2017	X					X														
35	HA01_0.6-0.7	09-August-2017	X					X														
36	HA01_0.8-0.9	09-August-2017	X					X														
37	HA01_1.0-1.1	09-August-2017	X					X			X	X	X									
38	HA02_0-0.1	09-August-2017	X					X			X	X	X									
39	HA02_0.2-0.3	09-August-2017	X					X														
40	HA02_0.4-0.5	09-August-2017	X					X														
41	HA02_0.6-0.7	09-August-2017	X					X														
42	HA02_0.8-0.9	09-August-2017	X					X														
43	HA02_1.0-1.1	09-August-2017	X					X			X	X	X									

Comments:

EskyID

Relinquished by: [redacted]	Signed: [redacted]	Date: 11/08/2017	Relinquished by:		Date:
Recieved by:	Signed:	Date:	Recieved by:		Date:

AECOM

AECOM Australia Pty Ltd		**Laboratory Details**	Tel: 03 9763
AECOM Office Address: Lvl 10, Tower 2, 727 Collins St	T 03 9563 1234	**Lab. Name:** ALS	Fax: 03 9763
Melbourne 3008	F 03 9654 7117	**Lab. Address:** Springvale	Preliminary R
		Contact Name: [redacted]	Final Report t
		Lab. Ref:	Lab Quote Nc
Site Name: Launceston Airport	Cluster:	Site/Reference ID:	
Sampled By: [redacted]	AECOM Project Number: 60543717. 1.0	Project Manager: [redacted]	

Data required to be reported in PDF and EQuIS Format

Specifications:	Yes (tick)
Standard Turnaround Required (5 days)	Yes
Is any sediment layer present in waters to be excluded from extractions?	No
Special storage requirements? (details: _____)	No
Report to be delivered in EQuIS and PDF formats to : jothe.ramesh@aecom.com	

Lab. ID	Sample ID	Sampling Date	Matrix			Preservation				Container	Analysis Request						
			soil	water	other	filt'ed	acid	ice	other	(No. & type)	PFAS	BTEXN	TPH (C6-C40)				
44	HA03_0-0.1	09-August-2017	X					X			X	X	X				
45	HA03_0.2-0.3	09-August-2017	X					X									
46	HA03_0.4-0.5	09-August-2017	X					X									
47	HA03_0.6-0.7	09-August-2017	X					X									
48	HA03_0.8-0.9	09-August-2017	X					X									
49	HA03_1.0-1.1	09-August-2017	X					X			X	X	X				
50	HA04_0-0.1	09-August-2017	X					X			X	X	X				
51	HA04_0.2-0.3	09-August-2017	X					X									
52	HA04_0.4-0.5	09-August-2017	X					X									
53	HA04_0.5-0.7	09-August-2017	X					X									
54	HA04_0.8-0.9 0.7 - 0.8	09-August-2017	X					X			X	X	X				
55	HA05_0-0.1	10-August-2017	X					X			X	X	X				
56	HA05_0.2-0.3	10-August-2017	X					X									
57	HA05_0.2-0.3	10-August-2017	X					X									
58	HA05_0.4-0.5	10-August-2017	X					X									
59	HA05_0.6-0.7	10-August-2017	X					X									
60	HA05_0.8-0.9	10-August-2017	X					X									
61	HA05_1.0-1.1	10-August-2017	X					X			X	X	X				
62	HA06_0-0.1 0.1	10-August-2017	X					X			X	X	X				
63	HA06_0.2-0.3	10-August-2017	X					X									
64	HA06_0.4-0.5	10-August-2017	X					X									

Comments: [redacted]

Relinquished by: [redacted]	Signed: [redacted]	Date: 11/08/2017	Relinquished by:		
Recieved by:	Signed: [redacted]	Date:	Recieved by:		

AECOM

AECOM Australia Pty Ltd		**Laboratory Details**	Tel: 03 9763 :
AECOM Office Address: Lvl 10, Tower 2, 727 Collins St	T 03 9563 1234	**Lab. Name: ALS**	Fax: 03 9763
Melbourne 3008	F 03 9654 7117	**Lab. Address: Springvale**	Preliminary R
		Contact Name: [redacted]	Final Report t
		Lab. Ref:	Lab Quote Nc
Site Name: Launceston Airport	Cluster:	Site/Reference ID:	
Sampled By: [redacted]	AECOM Project Number: 60543717, 1.0	Project Manager: [redacted]	

Data required to be reported in PDF and EQuIS Format

Specifications:

	Yes (tick)
Standard Turnaround Required (5 days)	Yes
Is any sediment layer present in waters to be excluded from extractions?	No
Special storage requirements? (details:)	No

Report to be delivered in EQuIS and PDF formats to : jothe.ramesh@aecom.com

Lab. ID	Sample ID	Sampling Date	Matrix			Preservation				Container	Analysis Request						
			soil	water	other	filt'ed	acid	ice	other	(No. & type)	PFAS	BTEXN	TPH (C6-C40)	TPH (C6-C9)			
65	HA06_0.6-0.7	10-August-2017	X					X									
66	HA06_0.8-0.9	10-August-2017	X					X									
67	HA06_1.0-1.1	10-August-2017	X					X			X	X	X				
68	HA07_0-0.1	10-August-2017	X					X			X	X	X				
69	HA07_0.2-0.3	10-August-2017	X					X									
70	HA07_0.4-0.5	10-August-2017	X					X									
71	HA07_0.6-0.7	10-August-2017	X					X									
72	HA07_0.8-0.9	10-August-2017	X					X									
73	HA07_1.0-1.1	10-August-2017	X					X			X	X	X				
74	QC01	09-August-2017	X					X			X	X	X				
75	QC03	10-August-2017	X					X			X	X	X				
76	QC05	09-August-2017		X				X			X	X	X				
77	QC06	09-August-2017		X				X			X	X	X				
78	QC07	10-August-2017		X				X			X	X	X				
79	QC08	10-August-2017		X				X			X	X	X				
80	QC10	11-August-2017		X				X			✓	✓	✓				
81	QC11	11-August-2017		X				X									
82	QC12	11-August-2017		X				X				X		X			
83	QC13	11-August-2017		X				X									
84	QC14	11-August-2017		X				X									
85	QC09	11-August-2017		X				X			✓	✓	✓				

10/8

Comments: [redacted]

Relinquished by: [redacted]	Signed: [redacted]	Date: 11/08/2017	Relinquished by:		
Recieved by:	Signed: [redacted]	Date:	Recieved by:		

AECOM

AECOM Australia Pty Ltd		**Laboratory Details**	Tel: 03 9763 :
AECOM Office Address: Lvl 10, Tower 2, 727 Collins St	T 03 9563 1234	**Lab. Name:** ALS	Fax: 03 9763
Melbourne 3008	F 03 9654 7117	**Lab. Address:** Springvale	Preliminary R
		Contact Name: [redacted]	Final Report t
		Lab. Ref:	Lab Quote Nc
Site Name: Launceston Airport	Cluster:	Site/Reference ID:	
Sampled By: [redacted]	AECOM Project Number: 60543717, 1.0	Project Manager: [redacted]	

Data required to be reported in PDF and EQuIS Format

Specifications:	Yes (tick)
Standard Turnaround Required (5 days)	Yes
Is any sediment layer present in waters to be excluded from extractions?	No
Special storage requirements? (details: _____)	No

Report to be delivered in EQuIS and PDF formats to : jothe.ramesh@aecom.com

Lab. ID	Sample ID	Sampling Date	Matrix			Preservation				Container	Analysis Request						
			soil	water	other	filt'ed	acid	ice	other	(No. & type)	PFAS	BTEXN	TPH (C6-C40)	TPH (C6-C9)			
85	QC15 10/8	11-August-2017		X				X									
87	QC16 ↓	11-August-2017		X				X									
88	SS01	11-August-2017			X						X	X	X				
89	SS02	11-August-2017			X						X	X	X				
90	SS03	11-August-2017			X						X	X	X				
91	SS04	11-August-2017			X						X	X	X				
92	SS05	11-August-2017			X						X	X	X				
93	SS06	11-August-2017			X						X	X	X				
94	SS07	11-August-2017			X						X	X	X				
	Extra Samples																
95	QC17	11/8															
96	QC18	11/8															
97	QC19	11/8															
98	QC20	11/8															
99	MW01_5.9-6.0	9/8															
100	MW02_5.9-6.0	10/8															

Comments:

Relinquished by: [redacted]	Signed: [redacted]	Date: 11/08/2017	Relinquished by:		
Recieved by:	Signed:	Date:	Recieved by:		

[redacted]

From: [redacted]
Sent: Tuesday, 15 August 2017 3:09 PM
To: [redacted]
Subject: RE: EM1710771 - AECOMAU - Launceston Airport

[redacted]

Please see my comments below in Red.

[redacted]

[redacted]

AECOM
Collins Square, Level 10, Tower Two, 727 Collins Street, Melbourne, VIC 3008
T +61 3 9653 1234 F +61 3 9654 7117
aecom.com

Imagine it. Delivered.

LinkedIn Twitter Facebook Instagram

From: [redacted]
Sent: Tuesday, 15 August 2017 2:49 PM
To: [redacted]
Subject: FW: EM1710771 - AECOMAU - Launceston Airport

[redacted]

In relation to the attached, below are some queries

Sample 040 was not received That's fine, thanks.

Sample 056 is duplicated on the COC as sample 057. Thanks, that was a typographical error.

- Sample 057 marked as not received. Thanks, that was a typographical error.

Where 1 jar and 1 bag were received, we will use the bag for PFAS where applicable. That's right, also, please note that some jars will have (PFOS) written on them. These jars have had their Teflon seal removed and should also be used for PFOS analysis where available.

Sample 080 was received as 1 x VOC vial. Thanks. Please remove ALL analysis for this sample

- W-18 to be analysed. Cannot perform svTPH or PFAS Thanks. Please remove ALL analysis for this sample.

FYI, samples 010, 088, 092 & 094 have a reasonable amount of moisture/water in the snaplock bags. This is expected as these were sediment samples

- Analysis added and assigned for PFAS where requested Thanks
- Jars did not appear to have same high moisture/free water. Noted

ID for sample 054 on COC = HA04_0.8-0.9
ID for sample 054 on jar = HA04_0.7-0.8

- Used COC ID for now. That's correct. Thanks.

Sampling dates for samples 081-087 listed on COC as 11/8.
Sampling dates for samples 081-087 listed on containers as 10/8.

- Used COC dates for now. Please use dates on Jars

EXTRA SAMPLES:

ALS ID:	Container ID:	Date:	Containers:
095	QC17	11/8	jar + bag Please add to COC and have this sample analysed for PFAS, BTEXN, TPH (C6-C40)
096	QC18	11/8	jar + bag Please add to EurofinsMGT COC and have this sample analysed for PFAS, BTEXN, TPH (C6-C40). Please have this sample forwarded to MGT.
097	QC19	11/8	amber + vial + Pfas Please add to COC and have this sample analysed for PFAS, BTEXN, TPH (C6-C40)
098	QC20	11/8	amber + Pfas Please add to COC, no analysis
099	MW01_5.9-6.0	9/8	2 x jar Please add to COC, no analysis
100*	MW02_5.9-6.0	10/8	2 x jar noted

*#100 has the same ID as sample 020 but both jars for 100 are 150mL and the contents of the jars does not seem to 'fit in' with samples 019 and 021 etc.

- Assumed to be a different sample as 2 x 250 mL jars received for sample 020.

Thanks

Regards

[redacted]

We are keen for your feedback! Please click here for your 1 question survey

EnviroMail™ 113 - Amoeba Confirmation PCR
EnviroMail™ 112 - Algal Capabilities
EnviroMail™ 111 - Analysis of VOCs by Thermal Desorption Analysis
EnviroMail™ 110 - Identifying Hidden PFAS Chemicals in Environmental Samples and Firefighting Foams
EnviroMail™ 00 - Summary of all EnviroMails™ by Category

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MS: 2921

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EM1710771**

Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Melbourne
Contact	: [redacted]	Contact	: [redacted]
Address	: COLLINS SQUARE LEVEL 10, TOWER TWO 727 COLLINS STREET MELBOURNE VIC, AUSTRALIA 3004	Address	: 4 Westall Rd Springvale VIC Australia 3171
E-mail	: [redacted]	E-mail	: [redacted]
Telephone	: [redacted]	Telephone	: [redacted]
Facsimile	: [redacted]	Facsimile	: +61-3-8549 9601
Project	: 60543717	Page	: 1 of 6
Order number	: 60543717.1.0	Quote number	: EB2015AECOMAU0580 (EN/004/16)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: Launceston Airport		
Sampler	: [redacted]		

Dates

Date Samples Received	: 14-Aug-2017 10:50	Issue Date	: 16-Aug-2017
Client Requested Due Date	: 23-Aug-2017	Scheduled Reporting Date	: **23-Aug-2017**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 9	Temperature	: 1.7°C - Ice present
Receipt Detail	:	No. of samples received / analysed	: 97 / 37

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Please direct any queries related to sample condition / numbering / breakages to Client Services.**
- Sample Disposal - Aqueous (14 days), Solid (60 days) from date of completion of work order.
- **Analytical work for this work order will be conducted at ALS Springvale and ALS Sydney.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**

Sample Container(s)/Preservation Non-Compliances

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

Method Client sample ID	Sample Container Received	Preferred Sample Container for Analysis
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS : EP231X		
MW02_0-0.1	- Snap Lock Bag	- HDPE Soil Jar
HA05_0-0.1	- Snap Lock Bag	- HDPE Soil Jar
HA05_1.0-1.1	- Snap Lock Bag	- HDPE Soil Jar
QC03	- Snap Lock Bag	- HDPE Soil Jar
SS01	- Snap Lock Bag	- HDPE Soil Jar
SS02	- Snap Lock Bag	- HDPE Soil Jar
SS03	- Snap Lock Bag	- HDPE Soil Jar
SS04	- Snap Lock Bag	- HDPE Soil Jar
SS05	- Snap Lock Bag	- HDPE Soil Jar
SS06	- Snap Lock Bag	- HDPE Soil Jar
SS07	- Snap Lock Bag	- HDPE Soil Jar
QC17	- Snap Lock Bag	- HDPE Soil Jar

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	Client sampling date / time	Client sample ID	(On Hold) SOIL No analysis requested	SOIL - EA055-103 Moisture Content	SOIL - EP231X (solids) PFAS - Full Suite (28 analytes)	SOIL - S-04 TRH/BTEXN
EM1710771-001	09-Aug-2017 00:00	MW01_0-0.1		✓	✓	✓
EM1710771-002	09-Aug-2017 00:00	MW01_0.2-0.3	✓			
EM1710771-003	09-Aug-2017 00:00	MW01_0.4-0.5	✓			
EM1710771-004	09-Aug-2017 00:00	MW01_0.6-0.7	✓			
EM1710771-005	09-Aug-2017 00:00	MW01_0.8-0.9	✓			
EM1710771-006	09-Aug-2017 00:00	MW01_1.0-1.1		✓	✓	✓
EM1710771-007	09-Aug-2017 00:00	MW01_2.0-2.1	✓			
EM1710771-008	09-Aug-2017 00:00	MW01_2.9-3.0	✓			
EM1710771-009	09-Aug-2017 00:00	MW01_3.9-4.0	✓			
EM1710771-010	10-Aug-2017 00:00	MW02_0-0.1		✓	✓	✓
EM1710771-011	10-Aug-2017 00:00	MW02_0.2-0.3	✓			
EM1710771-012	10-Aug-2017 00:00	MW02_0.4-0.5	✓			
EM1710771-013	10-Aug-2017 00:00	MW02_0.6-0.7	✓			
EM1710771-014	10-Aug-2017 00:00	MW02_0.8-0.9	✓			
EM1710771-015	10-Aug-2017 00:00	MW02_1.0-1.1		✓	✓	✓
EM1710771-016	10-Aug-2017 00:00	MW02_1.9-2.0	✓			
EM1710771-017	10-Aug-2017 00:00	MW02_2.9-3.0	✓			
EM1710771-018	10-Aug-2017 00:00	MW02_3.9-4.0	✓			
EM1710771-019	10-Aug-2017 00:00	MW02_4.9-5.0	✓			
EM1710771-020	10-Aug-2017 00:00	MW02_5.9-6.0	✓			
EM1710771-021	10-Aug-2017 00:00	MW02_6.9-7.0	✓			
EM1710771-022	10-Aug-2017 00:00	MW02_7.9-8.0	✓			
EM1710771-023	10-Aug-2017 00:00	MW03_0.0-0.1		✓	✓	✓
EM1710771-024	10-Aug-2017 00:00	MW03_0.2-0.3	✓			

			(On Hold) SOIL No analysis requested	SOIL - EA055-103 Moisture Content	SOIL - EP231X (solids) PFAS - Full Suite (28 analytes)	SOIL - S-04 TRH/BTEXN
EM1710771-025	10-Aug-2017 00:00	MW03_0.4-0.5	✓			
EM1710771-026	10-Aug-2017 00:00	MW03_0.6-0.7	✓			
EM1710771-027	10-Aug-2017 00:00	MW03_0.8-0.9	✓			
EM1710771-028	10-Aug-2017 00:00	MW03_1.0-1.1		✓	✓	✓
EM1710771-029	10-Aug-2017 00:00	MW03_1.9-2.0	✓			
EM1710771-030	10-Aug-2017 00:00	MW03_2.9-3.0	✓			
EM1710771-031	10-Aug-2017 00:00	MW03_3.9-4.0	✓			
EM1710771-032	09-Aug-2017 00:00	HA01_0-0.1		✓	✓	✓
EM1710771-033	09-Aug-2017 00:00	HA01_0.2-0.3	✓			
EM1710771-034	09-Aug-2017 00:00	HA01_0.4-0.5	✓			
EM1710771-035	09-Aug-2017 00:00	HA01_0.6-0.7	✓			
EM1710771-036	09-Aug-2017 00:00	HA01_0.8-0.9	✓			
EM1710771-037	09-Aug-2017 00:00	HA01_1.0-1.1		✓	✓	✓
EM1710771-038	09-Aug-2017 00:00	HA02_0-0.1		✓	✓	✓
EM1710771-039	09-Aug-2017 00:00	HA02_0.2-0.3	✓			
EM1710771-041	09-Aug-2017 00:00	HA02_0.6-0.7	✓			
EM1710771-042	09-Aug-2017 00:00	HA02_0.8-0.9	✓			
EM1710771-043	09-Aug-2017 00:00	HA02_1.0-1.1		✓	✓	✓
EM1710771-044	09-Aug-2017 00:00	HA03_0-0.1		✓	✓	✓
EM1710771-045	09-Aug-2017 00:00	HA03_0.2-0.3	✓			
EM1710771-046	09-Aug-2017 00:00	HA03_0.4-0.5	✓			
EM1710771-047	09-Aug-2017 00:00	HA03_0.6-0.7	✓			
EM1710771-048	09-Aug-2017 00:00	HA03_0.8-0.9	✓			
EM1710771-049	09-Aug-2017 00:00	HA03_1.0-1.1		✓	✓	✓
EM1710771-050	09-Aug-2017 00:00	HA04_0-0.1		✓	✓	✓
EM1710771-051	09-Aug-2017 00:00	HA04_0.2-0.3	✓			
EM1710771-052	09-Aug-2017 00:00	HA04_0.4-0.5	✓			
EM1710771-053	09-Aug-2017 00:00	HA04_0.6-0.7	✓			
EM1710771-054	09-Aug-2017 00:00	HA04_0.8-0.9		✓	✓	✓
EM1710771-055	10-Aug-2017 00:00	HA05_0-0.1		✓	✓	✓
EM1710771-056	10-Aug-2017 00:00	HA05_0.2-0.3	✓			
EM1710771-058	10-Aug-2017 00:00	HA05_0.4-0.5	✓			
EM1710771-059	10-Aug-2017 00:00	HA05_0.6-0.7	✓			
EM1710771-060	10-Aug-2017 00:00	HA05_0.8-0.9	✓			
EM1710771-061	10-Aug-2017 00:00	HA05_1.0-1.1		✓	✓	✓
EM1710771-062	10-Aug-2017 00:00	HA06_0-0.1		✓	✓	✓
EM1710771-063	10-Aug-2017 00:00	HA06_0.2-0.3	✓			
EM1710771-064	10-Aug-2017 00:00	HA06_0.4-0.5	✓			
EM1710771-065	10-Aug-2017 00:00	HA06_0.6-0.7	✓			
EM1710771-066	10-Aug-2017 00:00	HA06_0.8-0.9	✓			
EM1710771-067	10-Aug-2017 00:00	HA06_1.0-1.1		✓	✓	✓

			(On Hold) SOIL No analysis requested	SOIL - EA055-103 Moisture Content	SOIL - EP231X (solids) PFAS - Full Suite (28 analytes)	SOIL - S-04 TRH/BTEXN
EM1710771-068	10-Aug-2017 00:00	HA07_0-0.1		✓	✓	✓
EM1710771-069	10-Aug-2017 00:00	HA07_0.2-0.3	✓			
EM1710771-070	10-Aug-2017 00:00	HA07_0.4-0.5	✓			
EM1710771-071	10-Aug-2017 00:00	HA07_0.6-0.7	✓			
EM1710771-072	10-Aug-2017 00:00	HA07_0.8-0.9	✓			
EM1710771-073	10-Aug-2017 00:00	HA07_1.0-1.1		✓	✓	✓
EM1710771-074	09-Aug-2017 00:00	QC01		✓	✓	✓
EM1710771-075	10-Aug-2017 00:00	QC03		✓	✓	✓
EM1710771-088	11-Aug-2017 00:00	SS01		✓	✓	✓
EM1710771-089	11-Aug-2017 00:00	SS02		✓	✓	✓
EM1710771-090	11-Aug-2017 00:00	SS03		✓	✓	✓
EM1710771-091	11-Aug-2017 00:00	SS04		✓	✓	✓
EM1710771-092	11-Aug-2017 00:00	SS05		✓	✓	✓
EM1710771-093	11-Aug-2017 00:00	SS06		✓	✓	✓
EM1710771-094	11-Aug-2017 00:00	SS07		✓	✓	✓
EM1710771-095	11-Aug-2017 00:00	QC17		✓	✓	✓
EM1710771-099	09-Aug-2017 00:00	MW01_5.9-6.0	✓			
EM1710771-100	10-Aug-2017 00:00	MW02_5.9-6.0	✓			

Matrix: **WATER**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	(On Hold) WATER No analysis requested	WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - W-04 TRH/BTEXN
EM1710771-076	09-Aug-2017 00:00	QC05		✓	✓
EM1710771-077	09-Aug-2017 00:00	QC06		✓	✓
EM1710771-078	10-Aug-2017 00:00	QC07		✓	✓
EM1710771-079	10-Aug-2017 00:00	QC08		✓	✓
EM1710771-080	11-Aug-2017 00:00	QC10	✓		
EM1710771-081	10-Aug-2017 00:00	QC11	✓		
EM1710771-083	10-Aug-2017 00:00	QC13	✓		
EM1710771-084	10-Aug-2017 00:00	QC14	✓		
EM1710771-086	10-Aug-2017 00:00	QC15	✓		
EM1710771-087	10-Aug-2017 00:00	QC16	✓		
EM1710771-097	11-Aug-2017 00:00	QC19		✓	✓

			(On Hold) WATER No analysis requested	WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - W-04 TRH/BTEXN
EM1710771-098	11-Aug-2017 00:00	QC20	✓		

Matrix: **WATER**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	WATER - W-18 TRH(C6 - C9)/BTEXN
EM1710771-082	10-Aug-2017 00:00	QC12	✓
EM1710771-085	10-Aug-2017 00:00	QC09	✓

Proactive Holding Time Report

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

Requested Deliverables

ACCOUNTS PAYABLE

- A4 - AU Tax Invoice (INV)	Email	[redacted]
[redacted]		
- *AU Certificate of Analysis - NATA (COA)	Email	[redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	[redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	[redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	[redacted]
- Chain of Custody (CoC) (COC)	Email	[redacted]
- EDI Format - ENMRG (ENMRG)	Email	[redacted]
- EDI Format - EQUIS V5 URS (EQUIS_V5_AECOM)	Email	[redacted]
- EDI Format - ESDAT (ESDAT)	Email	[redacted]
- EDI Format - XTab (XTAB)	Email	[redacted]
- Electronic SRN for EQuIS (ESRN_EQUIS)	Email	[redacted]
[redacted]		
- *AU Certificate of Analysis - NATA (COA)	Email	[redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	[redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	[redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	[redacted]
- Chain of Custody (CoC) (COC)	Email	[redacted]
- EDI Format - ENMRG (ENMRG)	Email	[redacted]
- EDI Format - EQUIS V5 URS (EQUIS_V5_AECOM)	Email	[redacted]
- EDI Format - ESDAT (ESDAT)	Email	[redacted]
- EDI Format - XTab (XTAB)	Email	[redacted]
- Electronic SRN for EQuIS (ESRN_EQUIS)	Email	[redacted]
[redacted]		
- *AU Certificate of Analysis - NATA (COA)	Email	[redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	[redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	[redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	[redacted]
- Chain of Custody (CoC) (COC)	Email	[redacted]
- EDI Format - ENMRG (ENMRG)	Email	[redacted]
- EDI Format - EQUIS V5 URS (EQUIS_V5_AECOM)	Email	[redacted]
- EDI Format - ESDAT (ESDAT)	Email	[redacted]
- EDI Format - XTab (XTAB)	Email	[redacted]
- Electronic SRN for EQuIS (ESRN_EQUIS)	Email	[redacted]

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EM1710771**	Page	: 1 of 27
Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Melbourne
Contact	: [redacted]	Contact	: [redacted]
Address	: COLLINS SQUARE LEVEL 10, TOWER TWO 727 COLLINS STREET MELBOURNE VIC, AUSTRALIA 3004	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: 02 8934 0000	Telephone	: +61-3-8549 9608
Project	: 60543717	Date Samples Received	: 14-Aug-2017 10:50
Order number	: 60543717.1.0	Date Analysis Commenced	: 15-Aug-2017
C-O-C number	: ----	Issue Date	: 23-Aug-2017 16:47
Sampler	: [redacted]		
Site	: Launceston Airport		
Quote number	: EN/004/16		
No. of samples received	: 97		
No. of samples analysed	: 37		

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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

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

Signatories

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

Signatories	*Position*	*Accreditation Category*
[redacted]	Organic Chemist	Sydney Organics, Smithfield, NSW
[redacted]	Non-Metals Team Leader	Melbourne Inorganics, Springvale, VIC
[redacted]	Senior Organic Chemist	Melbourne Organics, Springvale, VIC

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

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

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

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

When 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.

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

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

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	MW01_0-0.1	MW01_1.0-1.1	MW02_0-0.1	MW02_1.0-1.1	MW03_0.0-0.1
				Client sampling date / time	09-Aug-2017 00:00	09-Aug-2017 00:00	10-Aug-2017 00:00	10-Aug-2017 00:00	10-Aug-2017 00:00
Compound	CAS Number	LOR	Unit		EM1710771-001	EM1710771-006	EM1710771-010	EM1710771-015	EM1710771-023
					Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		**22.4**	**16.1**	**18.9**	**30.0**	**32.8**
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg		<100	<100	<100	**510**	<100
C29 - C36 Fraction	----	100	mg/kg		<100	<100	<100	**1200**	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	<50	<50	**1710**	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg		<100	<100	<100	**1340**	<100
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	**920**	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		<50	<50	<50	**2260**	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	<50	<50	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	1330-20-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	<1
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg		**0.0004**	**0.0007**	<0.0002	<0.0002	**0.0011**
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg		**0.0009**	**0.0004**	<0.0002	<0.0002	**0.0026**
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg		**0.0219**	**0.0086**	**0.0015**	<0.0002	**0.0241**
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg		**0.0012**	**0.0004**	<0.0002	<0.0002	**0.0044**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	MW01_0-0.1	MW01_1.0-1.1	MW02_0-0.1	MW02_1.0-1.1	MW03_0.0-0.1
				Client sampling date / time	09-Aug-2017 00:00	09-Aug-2017 00:00	10-Aug-2017 00:00	10-Aug-2017 00:00	10-Aug-2017 00:00
Compound	CAS Number	LOR	Unit		EM1710771-001	EM1710771-006	EM1710771-010	EM1710771-015	EM1710771-023
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg		**0.240**	**0.320**	**0.0092**	<0.0002	**0.0393**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg		**0.0060**	**0.0013**	<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		**0.0006**	**0.0005**	<0.0002	<0.0002	**0.0005**
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg		**0.0010**	**0.0016**	<0.0002	<0.0002	**0.0021**
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	**0.0003**
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg		**0.0004**	**0.0005**	<0.0002	<0.0002	**0.0005**
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		**0.0006**	<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		**0.0020**	**0.0016**	<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
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)	2448-09-7	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

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	MW01_0-0.1	MW01_1.0-1.1	MW02_0-0.1	MW02_1.0-1.1	MW03_0.0-0.1
				Client sampling date / time	09-Aug-2017 00:00	09-Aug-2017 00:00	10-Aug-2017 00:00	10-Aug-2017 00:00	10-Aug-2017 00:00
Compound	CAS Number	LOR	Unit		EM1710771-001	EM1710771-006	EM1710771-010	EM1710771-015	EM1710771-023
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
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		**0.275**	**0.336**	**0.0107**	<0.0002	**0.0749**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		**0.262**	**0.329**	**0.0107**	<0.0002	**0.0634**
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		**0.264**	**0.332**	**0.0107**	<0.0002	**0.0679**
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		**85.1**	**84.8**	**69.4**	**92.4**	**81.7**
Toluene-D8	2037-26-5	0.2	%		**76.8**	**80.7**	**65.1**	**87.0**	**79.5**
4-Bromofluorobenzene	460-00-4	0.2	%		**102**	**101**	**80.1**	**103**	**93.7**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**85.0**	**75.0**	**88.0**	**110**	**78.0**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	MW03_1.0-1.1	HA01_0-0.1	HA01_1.0-1.1	HA02_0-0.1	HA02_1.0-1.1
				Client sampling date / time	10-Aug-2017 00:00	09-Aug-2017 00:00	09-Aug-2017 00:00	09-Aug-2017 00:00	09-Aug-2017 00:00
Compound	CAS Number	LOR	Unit		EM1710771-028	EM1710771-032	EM1710771-037	EM1710771-038	EM1710771-043
					Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		**41.0**	**28.6**	**26.2**	**34.2**	**33.2**
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg		<100	<100	<100	**140**	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	<50	<50	**140**	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg		<100	<100	<100	**160**	<100
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		<50	<50	<50	**160**	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	<50	<50	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	1330-20-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	<1
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg		**0.0012**	**0.0019**	**0.0018**	**0.0023**	**0.0008**
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg		**0.0029**	**0.0028**	**0.0029**	**0.0083**	**0.0022**
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg		**0.0301**	**0.0265**	**0.0342**	**0.187**	**0.0478**
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg		**0.0058**	**0.0019**	**0.0025**	**0.0158**	**0.0029**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	MW03_1.0-1.1	HA01_0-0.1	HA01_1.0-1.1	HA02_0-0.1	HA02_1.0-1.1
				Client sampling date / time	10-Aug-2017 00:00	09-Aug-2017 00:00	09-Aug-2017 00:00	09-Aug-2017 00:00	09-Aug-2017 00:00
Compound	CAS Number	LOR	Unit		EM1710771-028	EM1710771-032	EM1710771-037	EM1710771-038	EM1710771-043
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg		**0.419**	**0.428**	**2.24**	**10.4**	**3.88**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg		<0.0002	**0.0221**	**0.0014**	**0.0354**	**0.0026**
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg		<0.001	**0.008**	<0.001	**0.002**	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg		**0.0009**	**0.0048**	**0.0022**	**0.0068**	**0.0017**
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg		**0.0059**	**0.0034**	**0.0049**	**0.0321**	**0.0090**
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg		**0.0013**	**0.0003**	**0.0006**	**0.0038**	**0.0009**
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg		**0.0028**	**0.0007**	**0.0020**	**0.0114**	**0.0021**
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg		<0.0002	**0.0007**	**0.0003**	**0.0044**	**0.0007**
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg		<0.0002	**0.0003**	<0.0002	**0.0034**	**0.0005**
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		<0.0002	**0.0002**	<0.0002	**0.0011**	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		<0.0002	**0.0013**	<0.0002	**0.0049**	<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	**0.0043**	**0.0007**	**0.186**	**0.0030**
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
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)	2448-09-7	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	**0.0024**	<0.0002

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	MW03_1.0-1.1	HA01_0-0.1	HA01_1.0-1.1	HA02_0-0.1	HA02_1.0-1.1
				Client sampling date / time	10-Aug-2017 00:00	09-Aug-2017 00:00	09-Aug-2017 00:00	09-Aug-2017 00:00	09-Aug-2017 00:00
Compound	CAS Number	LOR	Unit		EM1710771-028	EM1710771-032	EM1710771-037	EM1710771-038	EM1710771-043
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	**0.0047**	<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		**0.470**	**0.507**	**2.29**	**10.9**	**3.95**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		**0.449**	**0.454**	**2.27**	**10.6**	**3.93**
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		**0.461**	**0.474**	**2.28**	**10.6**	**3.94**
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		**66.0**	**80.7**	**77.5**	**70.0**	**84.2**
Toluene-D8	2037-26-5	0.2	%		**59.6**	**80.9**	**77.6**	**62.7**	**80.8**
4-Bromofluorobenzene	460-00-4	0.2	%		**78.8**	**93.5**	**99.4**	**82.9**	**99.8**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**80.0**	**92.0**	**70.0**	**71.0**	**80.0**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	HA03_0-0.1	HA03_1.0-1.1	HA04_0-0.1	HA04_0.8-0.9	HA05_0-0.1
				Client sampling date / time	09-Aug-2017 00:00	09-Aug-2017 00:00	09-Aug-2017 00:00	09-Aug-2017 00:00	10-Aug-2017 00:00
Compound	CAS Number	LOR	Unit		EM1710771-044	EM1710771-049	EM1710771-050	EM1710771-054	EM1710771-055
					Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		**27.6**	**25.7**	**10.3**	**16.4**	**33.2**
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg		**110**	<100	<100	<100	<100
^ **C10 - C36 Fraction (sum)**	----	50	mg/kg		**110**	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	<10
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg		**110**	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ **>C10 - C40 Fraction (sum)**	----	50	mg/kg		**110**	<50	<50	<50	<50
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	50	mg/kg		<50	<50	<50	<50	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ **Sum of BTEX**	----	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
^ **Total Xylenes**	1330-20-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	<1
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg		**0.0002**	<0.0002	<0.0002	**0.0007**	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	**0.0014**	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg		**0.0012**	**0.0020**	**0.0007**	**0.0374**	**0.0020**
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg		<0.0002	**0.0006**	<0.0002	**0.0060**	<0.0002

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	HA03_0-0.1	HA03_1.0-1.1	HA04_0-0.1	HA04_0.8-0.9	HA05_0-0.1
				Client sampling date / time	09-Aug-2017 00:00	09-Aug-2017 00:00	09-Aug-2017 00:00	09-Aug-2017 00:00	10-Aug-2017 00:00
Compound	CAS Number	LOR	Unit		EM1710771-044	EM1710771-049	EM1710771-050	EM1710771-054	EM1710771-055
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg		**0.0160**	**0.0055**	**0.0160**	**0.0243**	**0.0201**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg		**0.0003**	<0.0002	**0.0009**	**0.0003**	<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		**0.0005**	<0.0002	<0.0002	**0.0006**	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg		**0.0005**	**0.0004**	<0.0002	**0.0017**	**0.0004**
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	**0.0059**	<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	**0.0003**	<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
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)	2448-09-7	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

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	HA03_0-0.1	HA03_1.0-1.1	HA04_0-0.1	HA04_0.8-0.9	HA05_0-0.1
				Client sampling date / time	09-Aug-2017 00:00	09-Aug-2017 00:00	09-Aug-2017 00:00	09-Aug-2017 00:00	10-Aug-2017 00:00
Compound	CAS Number	LOR	Unit		EM1710771-044	EM1710771-049	EM1710771-050	EM1710771-054	EM1710771-055
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
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		**0.0187**	**0.0085**	**0.0179**	**0.0785**	**0.0225**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		**0.0172**	**0.0075**	**0.0167**	**0.0617**	**0.0221**
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		**0.0184**	**0.0079**	**0.0167**	**0.0708**	**0.0225**
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		**70.6**	**76.7**	**85.5**	**79.0**	**64.8**
Toluene-D8	2037-26-5	0.2	%		**64.0**	**66.2**	**80.3**	**72.1**	**55.2**
4-Bromofluorobenzene	460-00-4	0.2	%		**81.8**	**85.1**	**95.9**	**98.8**	**74.4**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**90.0**	**79.0**	**84.0**	**74.0**	**72.0**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	HA05_1.0-1.1	HA06_0-0.1	HA06_1.0-1.1	HA07_0-0.1	HA07_1.0-1.1
				Client sampling date / time	10-Aug-2017 00:00	10-Aug-2017 00:00	10-Aug-2017 00:00	10-Aug-2017 00:00	10-Aug-2017 00:00
Compound	CAS Number	LOR	Unit		EM1710771-061	EM1710771-062	EM1710771-067	EM1710771-068	EM1710771-073
					Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		**32.9**	**42.9**	**38.5**	**38.8**	**42.1**
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ **C10 - C36 Fraction (sum)**	----	50	mg/kg		<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	<10
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ **>C10 - C40 Fraction (sum)**	----	50	mg/kg		<50	<50	<50	<50	<50
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	50	mg/kg		<50	<50	<50	<50	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ **Sum of BTEX**	----	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
^ **Total Xylenes**	1330-20-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	<1
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg		<0.0002	**0.0015**	**0.0016**	**0.0004**	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg		<0.0002	**0.0041**	**0.0026**	**0.0015**	**0.0004**
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg		<0.0002	**0.0384**	**0.0254**	**0.0221**	**0.0066**
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg		<0.0002	**0.0049**	**0.0051**	**0.0021**	**0.0009**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	HA05_1.0-1.1	HA06_0-0.1	HA06_1.0-1.1	HA07_0-0.1	HA07_1.0-1.1
				Client sampling date / time	10-Aug-2017 00:00	10-Aug-2017 00:00	10-Aug-2017 00:00	10-Aug-2017 00:00	10-Aug-2017 00:00
Compound	CAS Number	LOR	Unit		EM1710771-061	EM1710771-062	EM1710771-067	EM1710771-068	EM1710771-073
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg		<0.0002	**0.0641**	**0.482**	**0.145**	**0.223**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	**0.0004**	**0.0012**
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	**0.0006**	**0.0006**	**0.0008**	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg		<0.0002	**0.0042**	**0.0035**	**0.0019**	**0.0008**
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg		<0.0002	**0.0009**	**0.0007**	**0.0005**	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg		<0.0002	**0.0022**	**0.0016**	**0.0013**	**0.0003**
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	**0.0003**	**0.0008**
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
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)	2448-09-7	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

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	HA05_1.0-1.1	HA06_0-0.1	HA06_1.0-1.1	HA07_0-0.1	HA07_1.0-1.1
				Client sampling date / time	10-Aug-2017 00:00	10-Aug-2017 00:00	10-Aug-2017 00:00	10-Aug-2017 00:00	10-Aug-2017 00:00
Compound	CAS Number	LOR	Unit		EM1710771-061	EM1710771-062	EM1710771-067	EM1710771-068	EM1710771-073
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	<0.0002	**0.0005**	<0.0002	**0.0030**
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	**0.121**	**0.524**	**0.176**	**0.237**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		<0.0002	**0.102**	**0.507**	**0.167**	**0.230**
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		<0.0002	**0.112**	**0.515**	**0.172**	**0.231**
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		**74.9**	**82.1**	**79.3**	**82.8**	**70.6**
Toluene-D8	2037-26-5	0.2	%		**65.0**	**77.4**	**72.7**	**77.9**	**76.7**
4-Bromofluorobenzene	460-00-4	0.2	%		**90.5**	**95.0**	**92.9**	**95.8**	**89.1**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**72.0**	**82.0**	**73.0**	**70.0**	**81.0**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	QC01	QC03	SS01	SS02	SS03
				Client sampling date / time	09-Aug-2017 00:00	10-Aug-2017 00:00	11-Aug-2017 00:00	11-Aug-2017 00:00	11-Aug-2017 00:00
Compound	CAS Number	LOR	Unit		EM1710771-074	EM1710771-075	EM1710771-088	EM1710771-089	EM1710771-090
					Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		**21.7**	**40.9**	**38.0**	**37.1**	**35.1**
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ **C10 - C36 Fraction (sum)**	----	50	mg/kg		<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	<10
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg		<100	**110**	<100	<100	<100
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ **>C10 - C40 Fraction (sum)**	----	50	mg/kg		<50	**110**	<50	<50	<50
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	50	mg/kg		<50	<50	<50	<50	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ **Sum of BTEX**	----	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
^ **Total Xylenes**	1330-20-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	<1
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg		**0.0006**	<0.0002	**0.0032**	**0.0012**	**0.0008**
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg		**0.0005**	<0.0002	**0.0017**	**0.0011**	**0.0008**
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg		**0.0148**	**0.0029**	**0.0551**	**0.0240**	**0.0204**
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg		**0.0009**	**0.0003**	**0.0004**	**0.0007**	**0.0005**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	QC01	QC03	SS01	SS02	SS03
				Client sampling date / time	09-Aug-2017 00:00	10-Aug-2017 00:00	11-Aug-2017 00:00	11-Aug-2017 00:00	11-Aug-2017 00:00
Compound	CAS Number	LOR	Unit		EM1710771-074	EM1710771-075	EM1710771-088	EM1710771-089	EM1710771-090
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg		**0.201**	**0.0232**	**0.0536**	**0.0598**	**0.0714**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg		**0.0171**	<0.0002	**0.0004**	**0.0006**	**0.0009**
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg		<0.001	<0.001	**0.002**	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg		**0.0004**	<0.0002	**0.0026**	**0.0020**	**0.0008**
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg		**0.0010**	**0.0007**	**0.0061**	**0.0024**	**0.0022**
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	**0.0005**	**0.0004**
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg		**0.0010**	**0.0002**	**0.0010**	**0.0021**	**0.0014**
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	**0.0004**	**0.0003**
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	**0.0003**
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		**0.0003**	<0.0002	**0.0002**	<0.0002	**0.0002**
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		**0.0005**	<0.0002	**0.0003**	<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		**0.0055**	<0.0002	**0.0011**	**0.0009**	**0.0023**
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
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)	2448-09-7	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

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	QC01	QC03	SS01	SS02	SS03
				Client sampling date / time	09-Aug-2017 00:00	10-Aug-2017 00:00	11-Aug-2017 00:00	11-Aug-2017 00:00	11-Aug-2017 00:00
Compound	CAS Number	LOR	Unit		EM1710771-074	EM1710771-075	EM1710771-088	EM1710771-089	EM1710771-090
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
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		**0.244**	**0.0273**	**0.128**	**0.0957**	**0.103**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		**0.216**	**0.0261**	**0.109**	**0.0838**	**0.0918**
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		**0.219**	**0.0270**	**0.124**	**0.0920**	**0.0974**
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		**70.7**	**68.4**	**69.0**	**58.6**	**73.4**
Toluene-D8	2037-26-5	0.2	%		**68.7**	**66.9**	**66.5**	**57.1**	**70.9**
4-Bromofluorobenzene	460-00-4	0.2	%		**84.2**	**82.0**	**83.6**	**69.9**	**86.5**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**95.0**	**85.0**	**107**	**90.0**	**95.0**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SS04	SS05	SS06	SS07	QC17
				Client sampling date / time	11-Aug-2017 00:00	11-Aug-2017 00:00	11-Aug-2017 00:00	11-Aug-2017 00:00	11-Aug-2017 00:00
Compound	CAS Number	LOR	Unit		EM1710771-091	EM1710771-092	EM1710771-093	EM1710771-094	EM1710771-095
					Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		**41.2**	**49.7**	**41.2**	**49.5**	**40.2**
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg		**1200**	<100	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg		**430**	<100	<100	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg		**1630**	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg		**90**	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg		**1450**	<100	**110**	<100	<100
>C34 - C40 Fraction	----	100	mg/kg		**160**	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		**1700**	<50	**110**	<50	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		**90**	<50	<50	<50	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	1330-20-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	<1
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg		**0.0006**	<0.0002	<0.0002	**0.0061**	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg		**0.0004**	<0.0002	<0.0002	**0.0080**	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg		**0.0026**	**0.0012**	**0.0014**	**0.179**	**0.0007**
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	**0.0113**	<0.0002

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SS04	SS05	SS06	SS07	QC17
				Client sampling date / time	11-Aug-2017 00:00	11-Aug-2017 00:00	11-Aug-2017 00:00	11-Aug-2017 00:00	11-Aug-2017 00:00
Compound	CAS Number	LOR	Unit		EM1710771-091	EM1710771-092	EM1710771-093	EM1710771-094	EM1710771-095
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg		**0.0247**	**0.0095**	**0.0124**	**0.359**	**0.0107**
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg		**0.0003**	<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	**0.0012**	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg		**0.0002**	<0.0002	<0.0002	**0.0090**	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	**0.0024**	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	**0.0101**	<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
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)	2448-09-7	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

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SS04	SS05	SS06	SS07	QC17
				Client sampling date / time	11-Aug-2017 00:00	11-Aug-2017 00:00	11-Aug-2017 00:00	11-Aug-2017 00:00	11-Aug-2017 00:00
Compound	CAS Number	LOR	Unit		EM1710771-091	EM1710771-092	EM1710771-093	EM1710771-094	EM1710771-095
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
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		**0.0288**	**0.0107**	**0.0138**	**0.586**	**0.0114**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		**0.0273**	**0.0107**	**0.0138**	**0.538**	**0.0114**
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		**0.0281**	**0.0107**	**0.0138**	**0.567**	**0.0114**
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		**70.6**	**61.0**	**71.5**	**67.7**	**54.5**
Toluene-D8	2037-26-5	0.2	%		**65.0**	**61.7**	**68.4**	**66.0**	**72.4**
4-Bromofluorobenzene	460-00-4	0.2	%		**85.3**	**75.6**	**82.8**	**82.0**	**63.7**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**89.0**	**115**	**99.0**	**101**	**103**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	QC05	QC06	QC07	QC08	QC12
				Client sampling date / time	09-Aug-2017 00:00	09-Aug-2017 00:00	10-Aug-2017 00:00	10-Aug-2017 00:00	10-Aug-2017 00:00
Compound	CAS Number	LOR	Unit		EM1710771-076	EM1710771-077	EM1710771-078	EM1710771-079	EM1710771-082
					Result	Result	Result	Result	Result
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	----
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	----
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	----
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	<50	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	----
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	----
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	<100	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ Total Xylenes	1330-20-7	2	µg/L		<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<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	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	QC05	QC06	QC07	QC08	QC12
				Client sampling date / time	09-Aug-2017 00:00	09-Aug-2017 00:00	10-Aug-2017 00:00	10-Aug-2017 00:00	10-Aug-2017 00:00
Compound	CAS Number	LOR	Unit		EM1710771-076	EM1710771-077	EM1710771-078	EM1710771-079	EM1710771-082
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<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	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<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	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<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	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L		<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	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	QC05	QC06	QC07	QC08	QC12
				Client sampling date / time	09-Aug-2017 00:00	09-Aug-2017 00:00	10-Aug-2017 00:00	10-Aug-2017 00:00	10-Aug-2017 00:00
Compound	CAS Number	LOR	Unit		EM1710771-076	EM1710771-077	EM1710771-078	EM1710771-079	EM1710771-082
					Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<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	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**97.4**	**97.1**	**109**	**97.9**	**103**
Toluene-D8	2037-26-5	2	%		**77.2**	**72.6**	**84.5**	**74.7**	**83.3**
4-Bromofluorobenzene	460-00-4	2	%		**87.1**	**71.8**	**94.0**	**83.0**	**94.8**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**96.0**	**97.1**	**96.0**	**92.8**	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	QC09	QC19	----	----	----
				Client sampling date / time	10-Aug-2017 00:00	11-Aug-2017 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EM1710771-085	EM1710771-097	--------	--------	--------
					Result	Result	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	----	----	----
C10 - C14 Fraction	----	50	µg/L		----	<50	----	----	----
C15 - C28 Fraction	----	100	µg/L		----	<100	----	----	----
C29 - C36 Fraction	----	50	µg/L		----	<50	----	----	----
^ **C10 - C36 Fraction (sum)**	----	50	µg/L		----	<50	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	----	----	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	<20	----	----	----
>C10 - C16 Fraction	----	100	µg/L		----	<100	----	----	----
>C16 - C34 Fraction	----	100	µg/L		----	<100	----	----	----
>C34 - C40 Fraction	----	100	µg/L		----	<100	----	----	----
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		----	<100	----	----	----
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L		----	<100	----	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	----	----	----
Toluene	108-88-3	2	µg/L		<2	<2	----	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	<2	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	----	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	<2	----	----	----
^ **Total Xylenes**	1330-20-7	2	µg/L		<2	<2	----	----	----
^ **Sum of BTEX**	----	1	µg/L		<1	<1	----	----	----
Naphthalene	91-20-3	5	µg/L		<5	<5	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		----	<0.02	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		----	<0.02	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		----	<0.02	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		----	<0.02	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		----	<0.01	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	QC09	QC19	----	----	----
				Client sampling date / time	10-Aug-2017 00:00	11-Aug-2017 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EM1710771-085	EM1710771-097	--------	--------	--------
					Result	Result	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
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	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		----	<0.02	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		----	<0.05	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		----	<0.02	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		----	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		----	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L		----	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		----	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		----	<0.02	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		----	<0.02	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	QC09	QC19	----	----	----
				Client sampling date / time	10-Aug-2017 00:00	11-Aug-2017 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EM1710771-085	EM1710771-097	--------	--------	--------
					Result	Result	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		----	<0.05	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		----	<0.05	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		----	<0.05	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		----	<0.05	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		----	<0.01	----	----	----
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	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**100**	**102**	----	----	----
Toluene-D8	2037-26-5	2	%		**77.5**	**88.0**	----	----	----
4-Bromofluorobenzene	460-00-4	2	%		**87.2**	**103**	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		----	**104**	----	----	----

Surrogate Control Limits

Sub-Matrix: SOIL		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	51	125
Toluene-D8	2037-26-5	55	125
4-Bromofluorobenzene	460-00-4	56	124
EP231S: PFAS Surrogate			
13C4-PFOS	----	70	130

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	73	129
Toluene-D8	2037-26-5	70	125
4-Bromofluorobenzene	460-00-4	71	129
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	130

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EM1710771**	Page	: 1 of 27
Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Melbourne
Contact	: [redacted]	Contact	: [redacted]
Address	: COLLINS SQUARE LEVEL 10, TOWER TWO 727 COLLINS STREET MELBOURNE VIC, AUSTRALIA 3004	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: 02 8934 0000	Telephone	: +61-3-8549 9608
Project	: 60543717	Date Samples Received	: 14-Aug-2017
Order number	: 60543717.1.0	Date Analysis Commenced	: 15-Aug-2017
C-O-C number	: ----	Issue Date	: 23-Aug-2017
Sampler	: [redacted]		
Site	: Launceston Airport		
Quote number	: EN/004/16		
No. of samples received	: 97		
No. of samples analysed	: 37		

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. 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*
[redacted]	Organic Chemist	Sydney Organics, Smithfield, NSW
[redacted]	Non-Metals Team Leader	Melbourne Inorganics, Springvale, VIC
[redacted]	Senior Organic Chemist	Melbourne Organics, Springvale, VIC

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

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

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

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 1055974)									
EM1710669-001	Anonymous	EA055: Moisture Content	----	1	%	30.8	32.9	6.78	0% - 20%
EM1710669-019	Anonymous	EA055: Moisture Content	----	1	%	22.9	25.2	9.61	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 1055975)									
EM1710771-032	HA01_0-0.1	EA055: Moisture Content	----	1	%	28.6	26.4	8.26	0% - 20%
EM1710771-062	HA06_0-0.1	EA055: Moisture Content	----	1	%	42.9	41.1	4.33	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 1055976)									
EM1710771-092	SS05	EA055: Moisture Content	----	1	%	49.7	49.9	0.401	0% - 20%
EM1710772-010	Anonymous	EA055: Moisture Content	----	1	%	13.9	17.0	20.0	0% - 50%
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1053773)									
EM1710771-001	MW01_0-0.1	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EM1710771-044	HA03_0-0.1	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1054389)									
EM1710771-074	QC01	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EM1710772-002	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1056276)									
EM1710771-095	QC17	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EM1710881-030	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1058586)									
EM1710771-001	MW01_0-0.1	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
		EP071: C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	0.00	No Limit
EM1710771-044	HA03_0-0.1	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	110	110	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1058586) - continued									
EM1710771-044	HA03_0-0.1	EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
		EP071: C10 - C36 Fraction (sum)	----	50	mg/kg	110	110	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1060545)									
EM1710771-074	QC01	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
		EP071: C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	0.00	No Limit
EM1710955-001	Anonymous	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
		EP071: C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1053773)									
EM1710771-001	MW01_0-0.1	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EM1710771-044	HA03_0-0.1	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1054389)									
EM1710771-074	QC01	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EM1710772-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1056276)									
EM1710771-095	QC17	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EM1710881-030	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1058586)									
EM1710771-001	MW01_0-0.1	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
		EP071: >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	<50	0.00	No Limit
EM1710771-044	HA03_0-0.1	EP071: >C16 - C34 Fraction	----	100	mg/kg	110	110	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
		EP071: >C10 - C40 Fraction (sum)	----	50	mg/kg	110	110	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1060545)									
EM1710771-074	QC01	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
		EP071: >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	<50	0.00	No Limit
EM1710955-001	Anonymous	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
		EP071: >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	<50	0.00	No Limit
EP080: BTEXN (QC Lot: 1053773)									

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP080: BTEXN (QC Lot: 1053773) - continued									
EM1710771-001	MW01_0-0.1	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
EM1710771-044	HA03_0-0.1	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
EP080: BTEXN (QC Lot: 1054389)									
EM1710771-074	QC01	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
EM1710772-002	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
EP080: BTEXN (QC Lot: 1056276)									
EM1710771-095	QC17	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
EM1710881-030	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP080: BTEXN (QC Lot: 1056276) - continued									
EM1710881-030	Anonymous	EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 1057633)									
EM1710771-001	MW01_0-0.1	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	0.0004	0.0003	48.6	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	0.0009	0.0007	19.9	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	0.0219	0.0190	14.2	0% - 20%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	0.0012	0.0009	31.5	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.240	0.259	7.42	0% - 20%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	0.0060	0.0050	16.6	0% - 20%
EM1710771-044	HA03_0-0.1	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	0.0002	0.0002	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	0.0012	0.0014	12.2	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0160	0.0186	14.5	0% - 20%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	0.0003	0.0002	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 1057635)									
EM1710771-088	SS01	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	0.0032	0.0032	0.00	0% - 50%
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	0.0017	0.0016	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	0.0551	0.0562	2.09	0% - 20%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	0.0004	0.0004	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0536	0.0527	1.67	0% - 20%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	0.0004	0.0004	0.00	No Limit
EM1710772-008	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 1060317)									
EB1716527-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0003	0.0003	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
EM1710877-003	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	0.0003	<0.0002	42.8	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	0.0012	<0.0002	143	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 1060317) - continued									
EM1710877-003	Anonymous	EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 1057633)									
EM1710771-001	MW01_0-0.1	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	0.0006	0.0004	31.8	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	0.0010	0.0008	21.4	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	0.0004	0.0003	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	0.0006	0.0004	33.1	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.00	No Limit
EM1710771-044	HA03_0-0.1	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	0.0005	0.0005	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	0.0005	0.0006	23.9	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 1057635)									
EM1710771-088	SS01	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	0.0026	0.0026	0.00	0% - 50%
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	0.0061	0.0062	0.00	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.0002	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	0.0010	0.0010	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	0.0003	0.0002	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	0.002	0.002	0.00	No Limit
EM1710772-008	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 1057635) - continued									
EM1710772-008	Anonymous	EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.0002	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.0003	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 1060317)									
EB1716527-001	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.00	No Limit
EM1710877-003	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 1057633)									
EM1710771-001	MW01_0-0.1	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	0.0020	0.0013	38.3	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 1057633) - continued									
EM1710771-001	MW01_0-0.1	EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
EM1710771-044	HA03_0-0.1	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 1057635)									
EM1710771-088	SS01	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	0.0011	0.0011	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
EM1710772-008	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 1057635) - continued									
EM1710772-008	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 1060317)									
EB1716527-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
EM1710877-003	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 1057633)									
EM1710771-001	MW01_0-0.1	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 1057633) - continued									
EM1710771-001	MW01_0-0.1	EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
EM1710771-044	HA03_0-0.1	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 1057635)									
EM1710771-088	SS01	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
EM1710772-008	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 1060317)									
EB1716527-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
EM1710877-003	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 1060317) - continued									
EM1710877-003	Anonymous	EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1055326)									
EM1710771-076	QC05	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1057511)									
EM1710745-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EM1710891-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	20	20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1055326)									
EM1710771-076	QC05	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1057511)									
EM1710745-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EM1710891-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	30	30	0.00	No Limit
EP080: BTEXN (QC Lot: 1055326)									
EM1710771-076	QC05	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EP080: BTEXN (QC Lot: 1057511)									
EM1710745-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EM1710891-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 1057650)									
EB1716622-003	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
ES1720379-001	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	1.81	1.79	1.11	0% - 50%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.10	0.11	9.52	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.21	0.26	21.3	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	0.83	0.92	10.3	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.10	<0.10	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.10	<0.10	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 1057650)									
EB1716622-003	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
ES1720379-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.17	0.17	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.10	<0.10	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.71	0.73	2.78	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.10	<0.10	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.10	<0.10	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.10	<0.10	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.10	<0.10	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.10	<0.10	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.10	<0.10	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.25	<0.25	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.5	<0.5	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 1057650)									
EB1716622-003	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 1057650) - continued									
EB1716622-003	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
ES1720379-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.10	<0.10	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.10	<0.10	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.10	<0.10	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.25	<0.25	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.25	<0.25	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.25	<0.25	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.25	<0.25	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 1057650)									
EB1716622-003	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
ES1720379-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.10	<0.10	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	1.44	1.76	20.0	0% - 50%
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.10	<0.10	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.10	<0.10	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 1057650)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231P: PFAS Sums (QC Lot: 1057650) - continued									
EB1716622-003	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.00	No Limit
ES1720379-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	5.27	5.74	8.54	0% - 20%

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1053773)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	36 mg/kg	76.6	70	127
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1054389)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	36 mg/kg	93.8	70	127
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1056276)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	36 mg/kg	85.8	70	127
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1058586)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	837 mg/kg	108	65	131
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	3061 mg/kg	105	70	126
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	1592 mg/kg	101	70	122
EP071: C10 - C36 Fraction (sum)	----	50	mg/kg	<50	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1060545)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	837 mg/kg	110	65	131
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	3061 mg/kg	106	70	126
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	1592 mg/kg	103	70	122
EP071: C10 - C36 Fraction (sum)	----	50	mg/kg	<50	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1053773)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	45 mg/kg	73.6	68	125
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1054389)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	45 mg/kg	89.9	68	125
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1056276)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	45 mg/kg	82.0	68	125
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1058586)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	1222 mg/kg	105	68	130
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	3919 mg/kg	105	72	116
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	316 mg/kg	96.2	38	132
EP071: >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1060545)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	1222 mg/kg	109	68	130
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	3919 mg/kg	107	72	116
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	316 mg/kg	101	38	132
EP071: >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	----	----	----	----
EP080: BTEXN (QCLot: 1053773)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	2 mg/kg	76.4	74	124

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP080: BTEXN (QCLot: 1053773) - continued								
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	2 mg/kg	82.3	77	125
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	2 mg/kg	81.3	73	125
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	4 mg/kg	89.2	77	128
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	2 mg/kg	95.3	81	128
EP080: Naphthalene	91-20-3	1	mg/kg	<1	0.5 mg/kg	86.6	66	130
EP080: BTEXN (QCLot: 1054389)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	2 mg/kg	93.2	74	124
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	2 mg/kg	97.6	77	125
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	2 mg/kg	96.7	73	125
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	4 mg/kg	103	77	128
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	2 mg/kg	104	81	128
EP080: Naphthalene	91-20-3	1	mg/kg	<1	0.5 mg/kg	92.4	66	130
EP080: BTEXN (QCLot: 1056276)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	2 mg/kg	82.6	74	124
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	2 mg/kg	94.4	77	125
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	2 mg/kg	87.0	73	125
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	4 mg/kg	89.3	77	128
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	2 mg/kg	90.6	81	128
EP080: Naphthalene	91-20-3	1	mg/kg	<1	0.5 mg/kg	86.5	66	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 1057633)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	68.2	57	121
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	71.1	55	125
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	66.6	52	126
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	69.7	54	123
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	69.4	55	127
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	70.8	54	125
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 1057635)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	111	57	121
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	88.2	55	125
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	69.9	52	126
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	72.0	54	123
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	70.6	55	127
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	82.5	54	125
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 1060317)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	66.2	57	121

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 1060317) - continued								
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	90.2	55	125
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	75.9	52	126
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	74.0	54	123
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	74.1	55	127
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	95.6	54	125
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 1057633)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	77.7	52	128
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	64.0	54	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	73.8	58	127
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	74.2	57	128
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	68.4	60	134
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	70.6	63	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	61.3	55	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	73.6	62	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	101	53	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	78.4	49	129
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	64.6	59	129
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 1057635)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	102	52	128
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	79.5	54	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	89.8	58	127
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	67.2	57	128
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	72.3	60	134
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	79.5	63	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	72.7	55	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	75.0	62	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	81.0	53	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	68.7	49	129
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	75.5	59	129
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 1060317)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	88.3	52	128
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	71.0	54	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	72.7	58	127
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	70.7	57	128
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	80.2	60	134
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	65.0	63	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	66.2	55	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	69.1	62	130

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 1060317) - continued								
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	64.3	53	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	78.0	49	129
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	79.2	59	129
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 1057633)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	69.1	52	132
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	77.2	65	126
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	100	64	126
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	73.3	63	124
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	82.8	58	125
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	61.3	61	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	67.1	55	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 1057635)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	65.6	52	132
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	76.4	65	126
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	106	64	126
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	81.9	63	124
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	80.2	58	125
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	75.2	61	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	112	55	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 1060317)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	87.9	52	132
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	87.5	65	126
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	113	64	126
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	77.9	63	124
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	90.2	58	125
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	116	61	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	112	55	130

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 1057633)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	78.7	54	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	81.8	61	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	70.5	62	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	78.7	60	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 1057635)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	72.5	54	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	72.2	61	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	67.1	62	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	83.7	60	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 1060317)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	65.4	54	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	78.4	61	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	78.6	62	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	67.7	60	130

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1054001)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	3368 µg/L	100	53	123
EP071: C15 - C28 Fraction	----	100	µg/L	<100	14735 µg/L	114	57	133
EP071: C29 - C36 Fraction	----	50	µg/L	<50	7856 µg/L	116	55	141
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1055326)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	360 µg/L	81.8	67	127
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1056166)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	3368 µg/L	96.4	53	123
EP071: C15 - C28 Fraction	----	100	µg/L	<100	14735 µg/L	104	57	133
EP071: C29 - C36 Fraction	----	50	µg/L	<50	7856 µg/L	100	55	141
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1057511)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	360 µg/L	81.2	67	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1054001)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	5225 µg/L	107	54	122
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	19994 µg/L	114	56	132
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	1449 µg/L	112	51	137
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1055326)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	450 µg/L	78.8	65	125
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1056166)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	5225 µg/L	97.4	54	122

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1056166) - continued								
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	19994 µg/L	99.7	56	132
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	1449 µg/L	114	51	137
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1057511)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	450 µg/L	79.7	65	125
EP080: BTEXN (QCLot: 1055326)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	89.9	76	120
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	92.9	76	124
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	91.6	72	124
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	94.9	72	130
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	98.3	78	128
EP080: Naphthalene	91-20-3	5	µg/L	<5	5 µg/L	104	71	129
EP080: BTEXN (QCLot: 1057511)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	91.1	76	120
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	90.0	76	124
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	90.9	72	124
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	92.3	72	130
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	96.2	78	128
EP080: Naphthalene	91-20-3	5	µg/L	<5	5 µg/L	98.6	71	129
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 1057650)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.5 µg/L	87.0	70	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.5 µg/L	93.8	70	130
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.5 µg/L	91.0	70	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.5 µg/L	94.4	70	130
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.5 µg/L	93.8	70	130
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.5 µg/L	81.6	70	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 1057650)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	2.5 µg/L	88.7	70	130
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.5 µg/L	98.8	70	130
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.5 µg/L	97.4	70	130
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.5 µg/L	98.8	70	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.5 µg/L	102	70	130
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.5 µg/L	85.6	70	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.5 µg/L	92.8	70	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.5 µg/L	104	70	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.5 µg/L	105	70	130
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.5 µg/L	110	70	130

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 1057650) - continued								
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	1.25 µg/L	104	70	150
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 1057650)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.5 µg/L	103	70	130
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	1.25 µg/L	112	70	150
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	1.25 µg/L	139	70	150
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.05	1.25 µg/L	93.9	70	150
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	1.25 µg/L	114	70	150
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.5 µg/L	76.0	70	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.5 µg/L	100	70	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 1057650)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.5 µg/L	89.0	70	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.5 µg/L	111	70	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.5 µg/L	100	70	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.5 µg/L	70.4	70	130

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1053773)							
EM1710771-006	MW01_1.0-1.1	EP080: C6 - C9 Fraction	----	28 mg/kg	82.3	42	131
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1054389)							
EM1710771-075	QC03	EP080: C6 - C9 Fraction	----	28 mg/kg	53.5	42	131
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1056276)							
EM1710881-001	Anonymous	EP080: C6 - C9 Fraction	----	28 mg/kg	89.1	42	131
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1058586)							
EM1710771-006	MW01_1.0-1.1	EP071: C10 - C14 Fraction	----	837 mg/kg	106	53	123
		EP071: C15 - C28 Fraction	----	3061 mg/kg	101	70	124
		EP071: C29 - C36 Fraction	----	1592 mg/kg	98.1	64	118
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1060545)							

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1060545) - continued							
EM1710771-075	QC03	EP071: C10 - C14 Fraction	----	837 mg/kg	98.0	53	123
		EP071: C15 - C28 Fraction	----	3061 mg/kg	94.0	70	124
		EP071: C29 - C36 Fraction	----	1592 mg/kg	89.7	64	118
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1053773)							
EM1710771-006	MW01_1.0-1.1	EP080: C6 - C10 Fraction	C6_C10	33 mg/kg	77.8	39	129
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1054389)							
EM1710771-075	QC03	EP080: C6 - C10 Fraction	C6_C10	33 mg/kg	51.4	39	129
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1056276)							
EM1710881-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	33 mg/kg	83.6	39	129
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1058586)							
EM1710771-006	MW01_1.0-1.1	EP071: >C10 - C16 Fraction	----	1222 mg/kg	102	65	123
		EP071: >C16 - C34 Fraction	----	3919 mg/kg	102	67	121
		EP071: >C34 - C40 Fraction	----	316 mg/kg	96.5	44	126
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1060545)							
EM1710771-075	QC03	EP071: >C10 - C16 Fraction	----	1222 mg/kg	96.6	65	123
		EP071: >C16 - C34 Fraction	----	3919 mg/kg	94.4	67	121
		EP071: >C34 - C40 Fraction	----	316 mg/kg	90.2	44	126
EP080: BTEXN (QCLot: 1053773)							
EM1710771-006	MW01_1.0-1.1	EP080: Benzene	71-43-2	2 mg/kg	101	50	136
		EP080: Toluene	108-88-3	2 mg/kg	104	56	139
EP080: BTEXN (QCLot: 1054389)							
EM1710771-075	QC03	EP080: Benzene	71-43-2	2 mg/kg	72.1	50	136
		EP080: Toluene	108-88-3	2 mg/kg	75.1	56	139
EP080: BTEXN (QCLot: 1056276)							
EM1710881-001	Anonymous	EP080: Benzene	71-43-2	2 mg/kg	93.9	50	136
		EP080: Toluene	108-88-3	2 mg/kg	101	56	139
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 1057633)							
EM1710771-001	MW01_0-0.1	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	127	50	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	128	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	# Not Determined	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	66.9	50	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	# Not Determined	50	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	78.0	50	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 1057635)							

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 1057635) - continued							
EM1710771-088	SS01	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	96.8	50	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	66.8	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	# Not Determined	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	76.4	50	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	# Not Determined	50	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	50.4	50	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 1060317)							
EB1716527-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	54.8	50	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	54.7	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	56.8	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	52.4	50	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	96.7	50	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	72.2	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 1057633)							
EM1710771-001	MW01_0-0.1	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	101	30	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	83.3	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	127	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	62.2	50	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	65.2	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	73.4	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	65.5	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	56.3	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	124	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	42.2	30	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	84.3	30	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 1057635)							
EM1710771-088	SS01	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	45.6	30	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	95.5	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	55.2	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	92.2	50	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	100	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	97.2	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	91.0	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	118	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	109	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	54.4	30	130

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 1057635) - continued							
EM1710771-088	SS01	EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	105	30	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 1060317)							
EB1716527-001	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	84.4	30	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	71.6	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	65.1	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	68.4	50	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	87.4	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	65.8	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	68.3	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	63.9	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	62.7	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	98.2	30	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	83.9	30	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 1057633)							
EM1710771-001	MW01_0-0.1	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	63.7	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	95.9	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	107	30	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.00312 mg/kg	61.1	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	92.3	30	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	58.9	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	72.3	30	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 1057635)							
EM1710771-088	SS01	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	86.5	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	69.9	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	74.7	30	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.00312 mg/kg	42.9	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	55.6	30	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	54.4	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	122	30	130

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 1060317)							
EB1716527-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	60.9	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	93.2	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	96.5	30	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.00312 mg/kg	64.8	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	67.9	30	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	88.5	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	104	30	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 1057633)							
EM1710771-001	MW01_0-0.1	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	67.2	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	61.4	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	59.6	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	113	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 1057635)							
EM1710771-088	SS01	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	96.0	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	91.3	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	88.1	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	128	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 1060317)							
EB1716527-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	66.6	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	89.3	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	101	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	93.0	50	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1055326)							
EM1710771-077	QC06	EP080: C6 - C9 Fraction	----	280 µg/L	53.4	43	125
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1057511)							
EM1710771-097	QC19	EP080: C6 - C9 Fraction	----	280 µg/L	56.1	43	125
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1055326)							
EM1710771-077	QC06	EP080: C6 - C10 Fraction	C6_C10	330 µg/L	49.4	44	122
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1057511)							

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1057511) - continued							
EM1710771-097	QC19	EP080: C6 - C10 Fraction	C6_C10	330 µg/L	52.3	44	122
EP080: BTEXN (QCLot: 1055326)							
EM1710771-077	QC06	EP080: Benzene	71-43-2	20 µg/L	81.5	68	130
		EP080: Toluene	108-88-3	20 µg/L	82.2	72	132
EP080: BTEXN (QCLot: 1057511)							
EM1710771-097	QC19	EP080: Benzene	71-43-2	20 µg/L	83.3	68	130
		EP080: Toluene	108-88-3	20 µg/L	80.3	72	132
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 1057650)							
EB1716622-003	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.5 µg/L	96.6	50	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.5 µg/L	108	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.5 µg/L	98.8	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.5 µg/L	103	50	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.5 µg/L	110	50	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.5 µg/L	96.0	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 1057650)							
EB1716622-003	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	2.5 µg/L	101	50	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.5 µg/L	107	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.5 µg/L	107	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.5 µg/L	110	50	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.5 µg/L	112	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.5 µg/L	117	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.5 µg/L	119	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.5 µg/L	92.4	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.5 µg/L	112	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.5 µg/L	128	50	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	1.25 µg/L	127	50	150
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 1057650)							
EB1716622-003	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.5 µg/L	118	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	1.25 µg/L	109	50	150
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	1.25 µg/L	123	50	150
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	1.25 µg/L	102	50	150
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	1.25 µg/L	125	50	150
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.5 µg/L	94.4	50	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 1057650) - continued							
EB1716622-003	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.5 µg/L	126	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 1057650)							
EB1716622-003	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.5 µg/L	101	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.5 µg/L	123	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.5 µg/L	117	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.5 µg/L	75.8	50	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EM1710771**	Page	: 1 of 15
Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Melbourne
Contact	: [redacted]	Telephone	: [redacted]
Project	: 60543717	Date Samples Received	: 14-Aug-2017
Site	: Launceston Airport	Issue Date	: 23-Aug-2017
Sampler	: [redacted]	No. of samples received	: 97
Order number	: 60543717.1.0	No. of samples analysed	: 37

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EP231A: Perfluoroalkyl Sulfonic Acids	EM1710771--001	MW01_0-0.1	**Perfluorohexane sulfonic acid (PFHxS)**	355-46-4	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231A: Perfluoroalkyl Sulfonic Acids	EM1710771--088	SS01	**Perfluorohexane sulfonic acid (PFHxS)**	355-46-4	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231A: Perfluoroalkyl Sulfonic Acids	EM1710771--001	MW01_0-0.1	**Perfluorooctane sulfonic acid (PFOS)**	1763-23-1	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231A: Perfluoroalkyl Sulfonic Acids	EM1710771--088	SS01	**Perfluorooctane sulfonic acid (PFOS)**	1763-23-1	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count QC	Count Regular	Rate (%) Actual	Rate (%) Expected	Quality Control Specification
Laboratory Duplicates (DUP)					
TRH - Semivolatile Fraction	0	25	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
TRH - Semivolatile Fraction	0	25	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***	*Due for extraction*	*Evaluation*	*Analysis* ***Date analysed***	*Due for analysis*	*Evaluation*

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content (Dried @ 105-110°C)								
Soil Glass Jar - Unpreserved (EA055)								
MW01_0-0.1,	MW01_1.0-1.1,	**09-Aug-2017**	**----**	----	----	**16-Aug-2017**	23-Aug-2017	✓
HA01_0-0.1,	HA01_1.0-1.1,							
HA02_0-0.1,	HA02_1.0-1.1,							
HA03_0-0.1,	HA03_1.0-1.1,							
HA04_0-0.1,	HA04_0.8-0.9,							
QC01								
Soil Glass Jar - Unpreserved (EA055)								
MW02_0-0.1,	MW02_1.0-1.1,	**10-Aug-2017**	**----**	----	----	**16-Aug-2017**	24-Aug-2017	✓
MW03_0.0-0.1,	MW03_1.0-1.1,							
HA05_0-0.1,	HA05_1.0-1.1,							
HA06_0-0.1,	HA06_1.0-1.1,							
HA07_0-0.1,	HA07_1.0-1.1,							
QC03								
Soil Glass Jar - Unpreserved (EA055)								
SS01,	SS02,	**11-Aug-2017**	**----**	----	----	**16-Aug-2017**	25-Aug-2017	✓
SS03,	SS04,							
SS05,	SS06,							
SS07,	QC17							

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
EP080/071: Total Petroleum Hydrocarbons								
Soil Glass Jar - Unpreserved (EP080)								
MW01_0-0.1,	MW01_1.0-1.1,	**09-Aug-2017**	**15-Aug-2017**	23-Aug-2017	✓	**18-Aug-2017**	23-Aug-2017	✓
HA01_0-0.1,	HA01_1.0-1.1,							
HA02_0-0.1,	HA02_1.0-1.1,							
HA03_0-0.1,	HA03_1.0-1.1,							
HA04_0-0.1,	HA04_0.8-0.9							
Soil Glass Jar - Unpreserved (EP080)								
QC01		**09-Aug-2017**	**16-Aug-2017**	23-Aug-2017	✓	**18-Aug-2017**	23-Aug-2017	✓
Soil Glass Jar - Unpreserved (EP071)								
MW01_0-0.1,	MW01_1.0-1.1,	**09-Aug-2017**	**18-Aug-2017**	23-Aug-2017	✓	**18-Aug-2017**	27-Sep-2017	✓
HA01_0-0.1,	HA01_1.0-1.1,							
HA02_0-0.1,	HA02_1.0-1.1,							
HA03_0-0.1,	HA03_1.0-1.1,							
HA04_0-0.1,	HA04_0.8-0.9,							
QC01								
Soil Glass Jar - Unpreserved (EP080)								
MW02_0-0.1,	MW02_1.0-1.1,	**10-Aug-2017**	**15-Aug-2017**	24-Aug-2017	✓	**18-Aug-2017**	24-Aug-2017	✓
MW03_0.0-0.1,	MW03_1.0-1.1,							
HA05_0-0.1,	HA05_1.0-1.1,							
HA06_0-0.1,	HA06_1.0-1.1,							
HA07_0-0.1,	HA07_1.0-1.1							
Soil Glass Jar - Unpreserved (EP080)								
QC03		**10-Aug-2017**	**16-Aug-2017**	24-Aug-2017	✓	**18-Aug-2017**	24-Aug-2017	✓
Soil Glass Jar - Unpreserved (EP071)								
MW02_0-0.1,	MW02_1.0-1.1,	**10-Aug-2017**	**18-Aug-2017**	24-Aug-2017	✓	**18-Aug-2017**	27-Sep-2017	✓
MW03_0.0-0.1,	MW03_1.0-1.1,							
HA05_0-0.1,	HA05_1.0-1.1,							
HA06_0-0.1,	HA06_1.0-1.1,							
HA07_0-0.1,	HA07_1.0-1.1,							
QC03								
Soil Glass Jar - Unpreserved (EP080)								
SS01,	SS02,	**11-Aug-2017**	**16-Aug-2017**	25-Aug-2017	✓	**18-Aug-2017**	25-Aug-2017	✓
SS03,	SS04,							
SS05,	SS06,							
SS07,	QC17							
Soil Glass Jar - Unpreserved (EP071)								
SS01,	SS02,	**11-Aug-2017**	**18-Aug-2017**	25-Aug-2017	✓	**18-Aug-2017**	27-Sep-2017	✓
SS03,	SS04,							
SS05,	SS06,							
SS07,	QC17							

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
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Soil Glass Jar - Unpreserved (EP080)							
MW01_0-0.1, MW01_1.0-1.1, HA01_0-0.1, HA01_1.0-1.1, HA02_0-0.1, HA02_1.0-1.1, HA03_0-0.1, HA03_1.0-1.1, HA04_0-0.1, HA04_0.8-0.9	**09-Aug-2017**	**15-Aug-2017**	23-Aug-2017	✓	**18-Aug-2017**	23-Aug-2017	✓
Soil Glass Jar - Unpreserved (EP080)							
QC01	**09-Aug-2017**	**16-Aug-2017**	23-Aug-2017	✓	**18-Aug-2017**	23-Aug-2017	✓
Soil Glass Jar - Unpreserved (EP071)							
MW01_0-0.1, MW01_1.0-1.1, HA01_0-0.1, HA01_1.0-1.1, HA02_0-0.1, HA02_1.0-1.1, HA03_0-0.1, HA03_1.0-1.1, HA04_0-0.1, HA04_0.8-0.9, QC01	**09-Aug-2017**	**18-Aug-2017**	23-Aug-2017	✓	**18-Aug-2017**	27-Sep-2017	✓
Soil Glass Jar - Unpreserved (EP080)							
MW02_0-0.1, MW02_1.0-1.1, MW03_0.0-0.1, MW03_1.0-1.1, HA05_0-0.1, HA05_1.0-1.1, HA06_0-0.1, HA06_1.0-1.1, HA07_0-0.1, HA07_1.0-1.1	**10-Aug-2017**	**15-Aug-2017**	24-Aug-2017	✓	**18-Aug-2017**	24-Aug-2017	✓
Soil Glass Jar - Unpreserved (EP080)							
QC03	**10-Aug-2017**	**16-Aug-2017**	24-Aug-2017	✓	**18-Aug-2017**	24-Aug-2017	✓
Soil Glass Jar - Unpreserved (EP071)							
MW02_0-0.1, MW02_1.0-1.1, MW03_0.0-0.1, MW03_1.0-1.1, HA05_0-0.1, HA05_1.0-1.1, HA06_0-0.1, HA06_1.0-1.1, HA07_0-0.1, HA07_1.0-1.1, QC03	**10-Aug-2017**	**18-Aug-2017**	24-Aug-2017	✓	**18-Aug-2017**	27-Sep-2017	✓
Soil Glass Jar - Unpreserved (EP080)							
SS01, SS02, SS03, SS04, SS05, SS06, SS07, QC17	**11-Aug-2017**	**16-Aug-2017**	25-Aug-2017	✓	**18-Aug-2017**	25-Aug-2017	✓
Soil Glass Jar - Unpreserved (EP071)							
SS01, SS02, SS03, SS04, SS05, SS06, SS07, QC17	**11-Aug-2017**	**18-Aug-2017**	25-Aug-2017	✓	**18-Aug-2017**	27-Sep-2017	✓

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
EP080: BTEXN							
Soil Glass Jar - Unpreserved (EP080)							
MW01_0-0.1, MW01_1.0-1.1, HA01_0-0.1, HA01_1.0-1.1, HA02_0-0.1, HA02_1.0-1.1, HA03_0-0.1, HA03_1.0-1.1, HA04_0-0.1, HA04_0.8-0.9	**09-Aug-2017**	**15-Aug-2017**	23-Aug-2017	✓	**18-Aug-2017**	23-Aug-2017	✓
Soil Glass Jar - Unpreserved (EP080)							
QC01	**09-Aug-2017**	**16-Aug-2017**	23-Aug-2017	✓	**18-Aug-2017**	23-Aug-2017	✓
Soil Glass Jar - Unpreserved (EP080)							
MW02_0-0.1, MW02_1.0-1.1, MW03_0.0-0.1, MW03_1.0-1.1, HA05_0-0.1, HA05_1.0-1.1, HA06_0-0.1, HA06_1.0-1.1, HA07_0-0.1, HA07_1.0-1.1	**10-Aug-2017**	**15-Aug-2017**	24-Aug-2017	✓	**18-Aug-2017**	24-Aug-2017	✓
Soil Glass Jar - Unpreserved (EP080)							
QC03	**10-Aug-2017**	**16-Aug-2017**	24-Aug-2017	✓	**18-Aug-2017**	24-Aug-2017	✓
Soil Glass Jar - Unpreserved (EP080)							
SS01, SS02, SS03, SS04, SS05, SS06, SS07, QC17	**11-Aug-2017**	**16-Aug-2017**	25-Aug-2017	✓	**18-Aug-2017**	25-Aug-2017	✓

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
EP231A: Perfluoroalkyl Sulfonic Acids							
Snap Lock Bag (EP231X) MW02_0-0.1, HA05_0-0.1, HA05_1.0-1.1, QC03	**10-Aug-2017**	**18-Aug-2017**	06-Feb-2018	✓	**18-Aug-2017**	27-Sep-2017	✓
Snap Lock Bag (EP231X) SS01, SS02, SS03, SS04, SS05, SS06, SS07	**11-Aug-2017**	**18-Aug-2017**	07-Feb-2018	✓	**18-Aug-2017**	27-Sep-2017	✓
Snap Lock Bag (EP231X) QC17	**11-Aug-2017**	**21-Aug-2017**	07-Feb-2018	✓	**21-Aug-2017**	30-Sep-2017	✓
Soil Glass Jar - Unpreserved (EP231X) MW01_0-0.1, MW01_1.0-1.1, HA01_0-0.1, HA01_1.0-1.1, HA02_0-0.1, HA02_1.0-1.1, HA03_0-0.1, HA04_0-0.1, HA04_0.8-0.9	**09-Aug-2017**	**18-Aug-2017**	05-Feb-2018	✓	**18-Aug-2017**	27-Sep-2017	✓
Soil Glass Jar - Unpreserved (EP231X) HA03_1.0-1.1, QC01	**09-Aug-2017**	**21-Aug-2017**	05-Feb-2018	✓	**21-Aug-2017**	30-Sep-2017	✓
Soil Glass Jar - Unpreserved (EP231X) MW02_1.0-1.1, MW03_0.0-0.1, MW03_1.0-1.1, HA06_0-0.1, HA06_1.0-1.1, HA07_0-0.1, HA07_1.0-1.1	**10-Aug-2017**	**18-Aug-2017**	06-Feb-2018	✓	**18-Aug-2017**	27-Sep-2017	✓

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							
Snap Lock Bag (EP231X) MW02_0-0.1, HA05_0-0.1, HA05_1.0-1.1, QC03	**10-Aug-2017**	**18-Aug-2017**	06-Feb-2018	✓	**18-Aug-2017**	27-Sep-2017	✓
Snap Lock Bag (EP231X) SS01, SS02, SS03, SS04, SS05, SS06, SS07	**11-Aug-2017**	**18-Aug-2017**	07-Feb-2018	✓	**18-Aug-2017**	27-Sep-2017	✓
Snap Lock Bag (EP231X) QC17	**11-Aug-2017**	**21-Aug-2017**	07-Feb-2018	✓	**21-Aug-2017**	30-Sep-2017	✓
Soil Glass Jar - Unpreserved (EP231X) MW01_0-0.1, MW01_1.0-1.1, HA01_0-0.1, HA01_1.0-1.1, HA02_0-0.1, HA02_1.0-1.1, HA03_0-0.1, HA04_0-0.1, HA04_0.8-0.9	**09-Aug-2017**	**18-Aug-2017**	05-Feb-2018	✓	**18-Aug-2017**	27-Sep-2017	✓
Soil Glass Jar - Unpreserved (EP231X) HA03_1.0-1.1, QC01	**09-Aug-2017**	**21-Aug-2017**	05-Feb-2018	✓	**21-Aug-2017**	30-Sep-2017	✓
Soil Glass Jar - Unpreserved (EP231X) MW02_1.0-1.1, MW03_0.0-0.1, MW03_1.0-1.1, HA06_0-0.1, HA06_1.0-1.1, HA07_0-0.1, HA07_1.0-1.1	**10-Aug-2017**	**18-Aug-2017**	06-Feb-2018	✓	**18-Aug-2017**	27-Sep-2017	✓

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
EP231C: Perfluoroalkyl Sulfonamides							
Snap Lock Bag (EP231X) MW02_0-0.1, HA05_0-0.1, HA05_1.0-1.1, QC03	**10-Aug-2017**	**18-Aug-2017**	06-Feb-2018	✓	**18-Aug-2017**	27-Sep-2017	✓
Snap Lock Bag (EP231X) SS01, SS02, SS03, SS04, SS05, SS06, SS07	**11-Aug-2017**	**18-Aug-2017**	07-Feb-2018	✓	**18-Aug-2017**	27-Sep-2017	✓
Snap Lock Bag (EP231X) QC17	**11-Aug-2017**	**21-Aug-2017**	07-Feb-2018	✓	**21-Aug-2017**	30-Sep-2017	✓
Soil Glass Jar - Unpreserved (EP231X) MW01_0-0.1, MW01_1.0-1.1, HA01_0-0.1, HA01_1.0-1.1, HA02_0-0.1, HA02_1.0-1.1, HA03_0-0.1, HA04_0-0.1, HA04_0.8-0.9	**09-Aug-2017**	**18-Aug-2017**	05-Feb-2018	✓	**18-Aug-2017**	27-Sep-2017	✓
Soil Glass Jar - Unpreserved (EP231X) HA03_1.0-1.1, QC01	**09-Aug-2017**	**21-Aug-2017**	05-Feb-2018	✓	**21-Aug-2017**	30-Sep-2017	✓
Soil Glass Jar - Unpreserved (EP231X) MW02_1.0-1.1, MW03_0.0-0.1, MW03_1.0-1.1, HA06_0-0.1, HA06_1.0-1.1, HA07_0-0.1, HA07_1.0-1.1	**10-Aug-2017**	**18-Aug-2017**	06-Feb-2018	✓	**18-Aug-2017**	27-Sep-2017	✓

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							
Snap Lock Bag (EP231X) MW02_0-0.1, HA05_0-0.1, HA05_1.0-1.1, QC03	**10-Aug-2017**	**18-Aug-2017**	06-Feb-2018	✓	**18-Aug-2017**	27-Sep-2017	✓
Snap Lock Bag (EP231X) SS01, SS02, SS03, SS04, SS05, SS06, SS07	**11-Aug-2017**	**18-Aug-2017**	07-Feb-2018	✓	**18-Aug-2017**	27-Sep-2017	✓
Snap Lock Bag (EP231X) QC17	**11-Aug-2017**	**21-Aug-2017**	07-Feb-2018	✓	**21-Aug-2017**	30-Sep-2017	✓
Soil Glass Jar - Unpreserved (EP231X) MW01_0-0.1, MW01_1.0-1.1, HA01_0-0.1, HA01_1.0-1.1, HA02_0-0.1, HA02_1.0-1.1, HA03_0-0.1, HA04_0-0.1, HA04_0.8-0.9	**09-Aug-2017**	**18-Aug-2017**	05-Feb-2018	✓	**18-Aug-2017**	27-Sep-2017	✓
Soil Glass Jar - Unpreserved (EP231X) HA03_1.0-1.1, QC01	**09-Aug-2017**	**21-Aug-2017**	05-Feb-2018	✓	**21-Aug-2017**	30-Sep-2017	✓
Soil Glass Jar - Unpreserved (EP231X) MW02_1.0-1.1, MW03_0.0-0.1, MW03_1.0-1.1, HA06_0-0.1, HA06_1.0-1.1, HA07_0-0.1, HA07_1.0-1.1	**10-Aug-2017**	**18-Aug-2017**	06-Feb-2018	✓	**18-Aug-2017**	27-Sep-2017	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231P: PFAS Sums							
Snap Lock Bag (EP231X) MW02_0-0.1, HA05_0-0.1, HA05_1.0-1.1, QC03	**10-Aug-2017**	**18-Aug-2017**	06-Feb-2018	✓	**18-Aug-2017**	27-Sep-2017	✓
Snap Lock Bag (EP231X) SS01, SS02, SS03, SS04, SS05, SS06, SS07	**11-Aug-2017**	**18-Aug-2017**	07-Feb-2018	✓	**18-Aug-2017**	27-Sep-2017	✓
Snap Lock Bag (EP231X) QC17	**11-Aug-2017**	**21-Aug-2017**	07-Feb-2018	✓	**21-Aug-2017**	30-Sep-2017	✓
Soil Glass Jar - Unpreserved (EP231X) MW01_0-0.1, MW01_1.0-1.1, HA01_0-0.1, HA01_1.0-1.1, HA02_0-0.1, HA02_1.0-1.1, HA03_0-0.1, HA04_0-0.1, HA04_0.8-0.9	**09-Aug-2017**	**18-Aug-2017**	05-Feb-2018	✓	**18-Aug-2017**	27-Sep-2017	✓
Soil Glass Jar - Unpreserved (EP231X) HA03_1.0-1.1, QC01	**09-Aug-2017**	**21-Aug-2017**	05-Feb-2018	✓	**21-Aug-2017**	30-Sep-2017	✓
Soil Glass Jar - Unpreserved (EP231X) MW02_1.0-1.1, MW03_0.0-0.1, MW03_1.0-1.1, HA06_0-0.1, HA06_1.0-1.1, HA07_0-0.1, HA07_1.0-1.1	**10-Aug-2017**	**18-Aug-2017**	06-Feb-2018	✓	**18-Aug-2017**	27-Sep-2017	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071) QC05, QC06	**09-Aug-2017**	**16-Aug-2017**	16-Aug-2017	✓	**16-Aug-2017**	25-Sep-2017	✓
Amber Glass Bottle - Unpreserved (EP071) QC07, QC08	**10-Aug-2017**	**16-Aug-2017**	17-Aug-2017	✓	**16-Aug-2017**	25-Sep-2017	✓
Amber Glass Bottle - Unpreserved (EP071) QC19	**11-Aug-2017**	**16-Aug-2017**	18-Aug-2017	✓	**17-Aug-2017**	25-Sep-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080) QC05, QC06	**09-Aug-2017**	**16-Aug-2017**	23-Aug-2017	✓	**18-Aug-2017**	23-Aug-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080) QC07, QC08, QC12, QC09	**10-Aug-2017**	**16-Aug-2017**	24-Aug-2017	✓	**18-Aug-2017**	24-Aug-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080) QC19	**11-Aug-2017**	**17-Aug-2017**	25-Aug-2017	✓	**18-Aug-2017**	25-Aug-2017	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071) QC05, QC06	**09-Aug-2017**	**16-Aug-2017**	16-Aug-2017	✓	**16-Aug-2017**	25-Sep-2017	✓
Amber Glass Bottle - Unpreserved (EP071) QC07, QC08	**10-Aug-2017**	**16-Aug-2017**	17-Aug-2017	✓	**16-Aug-2017**	25-Sep-2017	✓
Amber Glass Bottle - Unpreserved (EP071) QC19	**11-Aug-2017**	**16-Aug-2017**	18-Aug-2017	✓	**17-Aug-2017**	25-Sep-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080) QC05, QC06	**09-Aug-2017**	**16-Aug-2017**	23-Aug-2017	✓	**18-Aug-2017**	23-Aug-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080) QC07, QC08, QC12, QC09	**10-Aug-2017**	**16-Aug-2017**	24-Aug-2017	✓	**18-Aug-2017**	24-Aug-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080) QC19	**11-Aug-2017**	**17-Aug-2017**	25-Aug-2017	✓	**18-Aug-2017**	25-Aug-2017	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080) QC05, QC06	**09-Aug-2017**	**16-Aug-2017**	23-Aug-2017	✓	**18-Aug-2017**	23-Aug-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080) QC07, QC08, QC12, QC09	**10-Aug-2017**	**16-Aug-2017**	24-Aug-2017	✓	**18-Aug-2017**	24-Aug-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080) QC19	**11-Aug-2017**	**17-Aug-2017**	25-Aug-2017	✓	**18-Aug-2017**	25-Aug-2017	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X) QC05, QC06	**09-Aug-2017**	**----**	----	----	**18-Aug-2017**	05-Feb-2018	✓
HDPE (no PTFE) (EP231X) QC07, QC08	**10-Aug-2017**	**----**	----	----	**18-Aug-2017**	06-Feb-2018	✓
HDPE (no PTFE) (EP231X) QC19	**11-Aug-2017**	**----**	----	----	**18-Aug-2017**	07-Feb-2018	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X) QC05, QC06	**09-Aug-2017**	**----**	----	----	**18-Aug-2017**	05-Feb-2018	✓
HDPE (no PTFE) (EP231X) QC07, QC08	**10-Aug-2017**	**----**	----	----	**18-Aug-2017**	06-Feb-2018	✓
HDPE (no PTFE) (EP231X) QC19	**11-Aug-2017**	**----**	----	----	**18-Aug-2017**	07-Feb-2018	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X) QC05, QC06	**09-Aug-2017**	**----**	----	----	**18-Aug-2017**	05-Feb-2018	✓
HDPE (no PTFE) (EP231X) QC07, QC08	**10-Aug-2017**	**----**	----	----	**18-Aug-2017**	06-Feb-2018	✓
HDPE (no PTFE) (EP231X) QC19	**11-Aug-2017**	**----**	----	----	**18-Aug-2017**	07-Feb-2018	✓

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
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE (no PTFE) (EP231X) QC05,	QC06	**09-Aug-2017**	**----**	----	----	**18-Aug-2017**	05-Feb-2018	✓
HDPE (no PTFE) (EP231X) QC07,	QC08	**10-Aug-2017**	**----**	----	----	**18-Aug-2017**	06-Feb-2018	✓
HDPE (no PTFE) (EP231X) QC19		**11-Aug-2017**	**----**	----	----	**18-Aug-2017**	07-Feb-2018	✓
EP231P: PFAS Sums								
HDPE (no PTFE) (EP231X) QC05,	QC06	**09-Aug-2017**	**----**	----	----	**18-Aug-2017**	05-Feb-2018	✓
HDPE (no PTFE) (EP231X) QC07,	QC08	**10-Aug-2017**	**----**	----	----	**18-Aug-2017**	06-Feb-2018	✓
HDPE (no PTFE) (EP231X) QC19		**11-Aug-2017**	**----**	----	----	**18-Aug-2017**	07-Feb-2018	✓

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	6	60	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	6	48	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	4	38	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	6	52	11.54	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	3	48	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	38	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	3	52	5.77	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	3	48	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	38	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	3	52	5.77	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	3	48	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	38	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	3	52	5.77	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	15	13.33	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	25	0.00	10.00	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	3	27	11.11	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
TRH - Semivolatile Fraction	EP071	2	25	8.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	27	7.41	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
TRH - Semivolatile Fraction	EP071	2	25	8.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	27	7.41	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	25	0.00	5.00	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	27	7.41	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 (2013) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
TRH - Semivolatile Fraction	EP071	SOIL	In house: Referenced to USEPA SW 846 - 8015A Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM amended 2013.
TRH Volatiles/BTEX	EP080	SOIL	In house: Referenced to USEPA SW 846 - 8260B. Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. Compliant with NEPM amended 2013.
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	SOIL	In-House. A portion of soil is extracted with MTBE. The extract is taken to dryness, made up in mobile phase. Analysis is by LC/MSMS, ESI Negative Mode using MRM. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers.
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In house: Direct injection analysis of fresh waters after dilution (1:1) with methanol. Analysis by LC-Electrospray-MS-MS, Negative Mode using MRM. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers.

Preparation Methods	Method	Matrix	Method Descriptions
Sample Extraction for PFAS	EP231-PR	SOIL	In house
Methanolic Extraction of Soils for Purge and Trap	ORG16	SOIL	In house: Referenced to USEPA SW 846 - 5030A. 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.
Tumbler Extraction of Solids	ORG17	SOIL	In house: Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

AECOM

(6)

AECOM Australia Pty Ltd AECOM Office Address: Lvl 10, Tower 2, 727 Collins St Melbourne 3008	T 03 9563 1234 F 03 9654 7117	**Laboratory Details** **Lab. Name: ALS** **Lab. Address:** Springvale Contact Name: [redacted] Lab. Ref:
		Tel: 03 9763 Fax: 03 9763 Preliminary R Final Report I Lab Quote No
Site Name: Launceston Airport	Cluster:	Site/Reference ID:
Sampled By: [redacted]	AECOM Project Number: 60543717, 1.0	Project Manager: [redacted]

Data required to be reported in PDF and EQuIS Format

Specifications:	Yes (tick)
Standard Turnaround Required (5 days)	Yes
Is any sediment layer present in waters to be excluded from extractions?	No
Special storage requirements? (details: ______)	No
Report to be delivered in EQuIS and PDF formats to : jothe.ramesh@aecom.com	

Lab. ID	Sample ID	Sampling Date	Matrix: soil	Matrix: water	Matrix: other	Preservation: filt'ed	Preservation: acid	Preservation: ice	Preservation: other	Container (No & type)	Analysis Request: PFAS	BTEXN	TPH (C6-C40)	TPH (C6-C9)		
86	QC15 10/8 ↓	11-August-2017		X				X								
87	QC16	11-August-2017		X				X								
88	SS01	11-August-2017			X						X	X	X			
89	SS02	11-August-2017			X						X	X	X			
90	SS03	11-August-2017			X						X	X	X			
91	SS04	11-August-2017			X						X	X	X			
92	SS05	11-August-2017			X						X	X	X			
93	SS06	11-August-2017			X						X	X	X			
94	SS07	11-August-2017			X						X	X	X			
	Extra Samples															
95	QC17	11/8														
96	QC18	11/8														
97	QC19	11/8														
98	QC20	11/8														
99	MW01_5.9-6.0	9/8														
100	MW02 5.9-6.0	10/8														

MF [signature]
558872
16/8
12:08PM

Comments:

Relinquished by: [redacted]	Signed: [redacted]	Date: 11/08/2017	Relinquished by:
Recieved by:	Signed:	Date:	Recieved by:

Relinquished by – [signature] 16/8/17 @ 10:50am

Printed copies of this document are uncontrolled

Sampling dates for samples 081-087 listed on COC as 11/8.
Sampling dates for samples 081-087 listed on containers as 10/8.

- Used COC dates for now. Please use dates on Jars

#6

EXTRA SAMPLES:

ALS ID:	Container ID:	Date:	Containers:
095	QC17	11/8	jar + bag Please add to COC and have this sample analysed for PFAS, BTEXN, TPH (C6-C40)
096	QC18	11/8	jar + bag Please add to EurofinsMGT COC and have this sample analysed for PFAS, BTEXN, TPH (C6-C40). Please have this sample forwarded to MGT.
097	QC19	11/8	amber + vial + Pfas Please add to COC and have this sample analysed for PFAS, BTEXN, TPH (C6-C40)
098	QC20	11/8	amber + Pfas Please add to COC, no analysis
099	MW01_5.9-6.0	9/8	2 x jar Please add to COC, no analysis
100*	MW02_5.9-6.0	10/8	2 x jar noted

*#100 has the same ID as sample 020 but both jars for 100 are 150mL and the contents of the jars does not seem to 'fit in' with samples 019 and 021 etc.

- Assumed to be a different sample as 2 x 250 mL jars received for sample 020.

Thanks

Regards

[redacted]

Relinquished by [redacted] 16/8/21-C 10:30

We are keen for your feedback! Please click here for your 1 question survey

EnviroMail™ 113 - Amoeba Confirmation PCR
EnviroMail™ 112 - Algal Capabilities
EnviroMail™ 111 - Analysis of VOCs by Thermal Desorption Analysis
EnviroMail™ 110 - Identifying Hidden PFAS Chemicals in Environmental Samples and Firefighting Foams
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NATA # 1261 Site # 23736

ABN – 50 005 085 521 e.mail : EnviroSales@eurofins.com web : www.eurofins.com.au

Sample Receipt Advice

Company name:	**AECOM Aust Pty Ltd Melbourne**
Contact name:	[redacted]
Project name:	LAUNCESTON AIRPORT
Project ID:	60543717.1.0
COC number:	Not provided
Turn around time:	5 Day
Date/Time received:	Aug 16, 2017 12:08 PM
Eurofins | mgt reference:	**558872**

Sample information

☑ A detailed list of analytes logged into our LIMS, is included in the attached summary table.

☑ Sample Temperature of a random sample selected from the batch as recorded by Eurofins | mgt Sample Receipt : 10.1 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.

☒ Some samples have been subcontracted.

N/A Custody Seals intact (if used).

Contact notes

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

[redacted]

Results will be delivered electronically via e.mail to [redacted]

Note: A copy of these results will also be delivered to the general AECOM Aust Pty Ltd Melbourne email address.

eurofins | mgt

Certificate of Analysis

AECOM Services P/L (fmly URS Aus P/L) VIC
Collins Square, Tower 2, Level 11, 727 Collins Street
Docklands
VIC 3008

NATA Accredited
Accreditation Number 1261
Site Number 1254

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

Attention: [redacted]

Report **558872-S**
Project name LAUNCESTON AIRPORT
Project ID 60543717.1.0
Received Date Aug 16, 2017

Client Sample ID			**QC18**
Sample Matrix			**Soil**
Eurofins | mgt Sample No.			**M17-Au19477**
Date Sampled			**Aug 11, 2017**
Test/Reference	LOR	Unit	
Total Recoverable Hydrocarbons - 1999 NEPM Fractions			
TRH C6-C9	20	mg/kg	< 20
TRH C10-C14	20	mg/kg	< 20
TRH C15-C28	50	mg/kg	66
TRH C29-C36	50	mg/kg	86
TRH C10-36 (Total)	50	mg/kg	152
BTEX			
Benzene	0.1	mg/kg	< 0.1
Toluene	0.1	mg/kg	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2
o-Xylene	0.1	mg/kg	< 0.1
Xylenes - Total	0.3	mg/kg	< 0.3
4-Bromofluorobenzene (surr.)	1	%	80
Total Recoverable Hydrocarbons - 2013 NEPM Fractions			
Naphthalene[N02]	0.5	mg/kg	< 0.5
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20
TRH C6-C10	20	mg/kg	< 20
TRH >C10-C16	50	mg/kg	< 50
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50
TRH >C16-C34	100	mg/kg	140
TRH >C34-C40	100	mg/kg	< 100
Perfluoroalkyl carboxylic acids (PFCAs)			
Perfluorobutanoic acid (PFBA)[N11]	5	ug/kg	< 5
Perfluoropentanoic acid (PFPeA)[N11]	5	ug/kg	< 5
Perfluorohexanoic acid (PFHxA)[N11]	5	ug/kg	< 5
Perfluoroheptanoic acid (PFHpA)[N11]	5	ug/kg	< 5
Perfluorooctanoic acid (PFOA)[N11]	5	ug/kg	< 5
Perfluorononanoic acid (PFNA)[N11]	5	ug/kg	< 5
Perfluorodecanoic acid (PFDA)[N11]	5	ug/kg	< 5
Perfluoroundecanoic acid (PFUnA)[N11]	5	ug/kg	< 5
Perfluorododecanoic acid (PFDoA)[N11]	5	ug/kg	< 5
Perfluorotridecanoic acid (PFTrDA)	5	ug/kg	< 5
Perfluorotetradecanoic acid (PFTeDA)[N11]	5	ug/kg	< 5
13C4-PFBA (surr.)	1	%	95
13C5-PFPeA (surr.)	1	%	89

Client Sample ID			QC18
Sample Matrix			Soil
Eurofins | mgt Sample No.			M17-Au19477
Date Sampled			Aug 11, 2017
Test/Reference	LOR	Unit	
Perfluoroalkyl carboxylic acids (PFCAs)			
13C5-PFHxA (surr.)	1	%	100
13C4-PFHpA (surr.)	1	%	90
13C8-PFOA (surr.)	1	%	93
13C5-PFNA (surr.)	1	%	99
13C6-PFDA (surr.)	1	%	105
13C2-PFUnDA (surr.)	1	%	107
13C2-PFDoDA (surr.)	1	%	109
13C2-PFTeDA (surr.)	1	%	119
Perfluoroalkane sulfonamides (PFASAs)			
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	%	69
D3-N-MeFOSA (surr.)	1	%	122
D5-N-EtFOSA (surr.)	1	%	113
D7-N-MeFOSE (surr.)	1	%	77
D9-N-EtFOSE (surr.)	1	%	92
D5-N-EtFOSAA (surr.)	1	%	127
D3-N-MeFOSAA (surr.)	1	%	142
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSAs)			
Perfluorobutanesulfonic acid (PFBS)[N11]	5	ug/kg	< 5
Perfluoropentanesulfonic acid (PFPeS)	5	ug/kg	< 5
Perfluorohexanesulfonic acid (PFHxS)[N11]	5	ug/kg	< 5
Perfluoroheptanesulfonic acid (PFHpS)	5	ug/kg	< 5
Perfluorooctanesulfonic acid (PFOS)[N11]	5	ug/kg	[N09]32
Perfluorodecanesulfonic acid (PFDS)	5	ug/kg	< 5
13C3-PFBS (surr.)	1	%	96
18O2-PFHxS (surr.)	1	%	97
13C8-PFOS (surr.)	1	%	104
n:2 Fluorotelomer sulfonic acids			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)[N11]	5	ug/kg	< 5
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)[N11]	10	ug/kg	< 10
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)[N11]	5	ug/kg	< 5
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)	5	ug/kg	< 5
13C2-4:2 FTS (surr.)	1	%	80
13C2-6:2 FTS (surr.)	1	%	81
13C2-8:2 FTS (surr.)	1	%	107

Client Sample ID			QC18
Sample Matrix			**Soil**
Eurofins | mgt Sample No.			**M17-Au19477**
Date Sampled			**Aug 11, 2017**
Test/Reference	LOR	Unit	
PFASs Summations			
Sum (PFHxS + PFOS)	5	ug/kg	32
Sum of US EPA PFAS (PFOS + PFOA)	5	ug/kg	32
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)	5	ug/kg	32
Sum of WA DER PFAS (n=10)	10	ug/kg	32
Sum of PFASs (n=28)	50	ug/kg	< 50
% Moisture	1	%	40

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

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

Description	Testing Site	Extracted	Holding Time
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Melbourne	Aug 18, 2017	14 Day
- Method: LTM-ORG-2010 TRH C6-C36			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	Aug 18, 2017	14 Day
- Method: TRH C6-C40 - LTM-ORG-2010			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	Aug 18, 2017	14 Day
- Method: TRH C6-C40 - LTM-ORG-2010			
BTEX and Naphthalene			
BTEX	Melbourne	Aug 18, 2017	14 Day
- Method: TRH C6-C40 - LTM-ORG-2010			
Per- and Polyfluorinated Alkyl Substances (PFASs)			
Perfluoroalkyl carboxylic acids (PFCAs)	Brisbane	Aug 18, 2017	180 Day
- Method: LTM-ORG-2100 Per- and Polyfluorinated Alkyl Substances by LC-MS/MS			
Perfluoroalkane sulfonamides (PFASAs)	Brisbane	Aug 18, 2017	180 Day
- Method: LTM-ORG-2100 Per- and Polyfluorinated Alkyl Substances by LC-MS/MS			
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSAs)	Brisbane	Aug 18, 2017	180 Day
- Method: LTM-ORG-2100 Per- and Polyfluorinated Alkyl Substances by LC-MS/MS			
n:2 Fluorotelomer sulfonic acids	Brisbane	Aug 18, 2017	180 Day
- Method: LTM-ORG-2100 Per- and Polyfluorinated Alkyl Substances by LC-MS/MS			
% Moisture	Melbourne	Aug 16, 2017	14 Day
- Method: LTM-GEN-7080 Moisture			

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NATA # 1261 Site # 20794

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Kewdale WA 6105
Phone : +61 8 9251 9600
NATA # 1261
Site # 23736

Company Name:	AECOM Services P/L (fmly URS Aus P/L) VIC	**Order No.:**	
Address:	Collins Square, Tower 2, Level 11, 727 Collins Street Docklands VIC 3008	**Report #:**	558872
		Phone:	3 9653 1234
		Fax:	3 9654 7117
Project Name:	LAUNCESTON AIRPORT		
Project ID:	60543717.1.0		

Received:	Aug 16, 2017 12:08 PM
Due:	Aug 23, 2017
Priority:	5 Day
Contact Name:	[redacted]

Eurofins | mgt Analytical Services Manager : [redacted]

Sample Detail						BTEX and Naphthalene	Moisture Set	Total Recoverable Hydrocarbons	Per- and Polyfluorinated Alkyl Substances (PFASs)
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	
Sydney Laboratory - NATA Site # 18217									
Brisbane Laboratory - NATA Site # 20794									X
Perth Laboratory - NATA Site # 23736									
External Laboratory									
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**				
1	QC18	Aug 11, 2017		Soil	M17-Au19477	X	X	X	X
Test Counts						1	1	1	1

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. All biota 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. 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 Sample Receipt Advice.

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.

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

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

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

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - 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.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	Quality Systems Manual ver 5.1 US Department of Defense
CP	Client Parent - QC was performed on samples pertaining to this report
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.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

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

Results <10 times the LOR : No Limit

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

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

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

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.1 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. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	mg/kg	< 20			20	Pass	
TRH C10-C14	mg/kg	< 20			20	Pass	
TRH C15-C28	mg/kg	< 50			50	Pass	
TRH C29-C36	mg/kg	< 50			50	Pass	
Method Blank							
BTEX							
Benzene	mg/kg	< 0.1			0.1	Pass	
Toluene	mg/kg	< 0.1			0.1	Pass	
Ethylbenzene	mg/kg	< 0.1			0.1	Pass	
m&p-Xylenes	mg/kg	< 0.2			0.2	Pass	
o-Xylene	mg/kg	< 0.1			0.1	Pass	
Xylenes - Total	mg/kg	< 0.3			0.3	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	mg/kg	< 0.5			0.5	Pass	
TRH C6-C10	mg/kg	< 20			20	Pass	
TRH >C10-C16	mg/kg	< 50			50	Pass	
TRH >C16-C34	mg/kg	< 100			100	Pass	
TRH >C34-C40	mg/kg	< 100			100	Pass	
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 (PFUnA)	ug/kg	< 5			5	Pass	
Perfluorododecanoic acid (PFDoA)	ug/kg	< 5			5	Pass	
Perfluorotridecanoic acid (PFTrDA)	ug/kg	< 5			5	Pass	
Perfluorotetradecanoic acid (PFTeDA)	ug/kg	< 5			5	Pass	
Method Blank							
Perfluoroalkane sulfonamides (PFASAs)							
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							
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSAs)							
Perfluorobutanesulfonic acid (PFBS)	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	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
n:2 Fluorotelomer sulfonic acids							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	ug/kg	< 5			5	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	ug/kg	< 10			10	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	ug/kg	< 5			5	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)	ug/kg	< 5			5	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	%	96			70-130	Pass	
TRH C10-C14	%	86			70-130	Pass	
LCS - % Recovery							
BTEX							
Benzene	%	87			70-130	Pass	
Toluene	%	86			70-130	Pass	
Ethylbenzene	%	88			70-130	Pass	
m&p-Xylenes	%	88			70-130	Pass	
Xylenes - Total	%	89			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	%	75			70-130	Pass	
TRH C6-C10	%	101			70-130	Pass	
TRH >C10-C16	%	91			70-130	Pass	
LCS - % Recovery							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	%	103			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	112			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	100			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	102			50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	98			50-150	Pass	
Perfluorononanoic acid (PFNA)	%	97			50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	98			50-150	Pass	
Perfluoroundecanoic acid (PFUnA)	%	93			50-150	Pass	
Perfluorododecanoic acid (PFDoA)	%	95			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	%	80			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	97			50-150	Pass	
LCS - % Recovery							
Perfluoroalkane sulfonamides (PFASAs)							
Perfluorooctane sulfonamide (FOSA)	%	106			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	%	97			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	%	126			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	%	130			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	%	83			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	%	104			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	%	99			50-150	Pass	
LCS - % Recovery							
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSAs)							
Perfluorobutanesulfonic acid (PFBS)	%	99			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	%	91			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	%	100			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	%	98			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	%	101			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	%	96			50-150	Pass	
LCS - % Recovery							
n:2 Fluorotelomer sulfonic acids							

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)			%	105			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)			%	109			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)			%	97			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)			%	136			50-150	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C6-C9	M17-Au19942	NCP	%	82			70-130	Pass	
TRH C10-C14	M17-Au19196	NCP	%	85			70-130	Pass	
Spike - % Recovery									
BTEX				Result 1					
Benzene	M17-Au19942	NCP	%	85			70-130	Pass	
Toluene	M17-Au19942	NCP	%	88			70-130	Pass	
Ethylbenzene	M17-Au19942	NCP	%	88			70-130	Pass	
m&p-Xylenes	M17-Au19942	NCP	%	89			70-130	Pass	
o-Xylene	M17-Au19942	NCP	%	92			70-130	Pass	
Xylenes - Total	M17-Au19942	NCP	%	90			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	M17-Au19942	NCP	%	101			70-130	Pass	
TRH C6-C10	M17-Au19942	NCP	%	85			70-130	Pass	
TRH >C10-C16	M17-Au19196	NCP	%	88			70-130	Pass	
Spike - % Recovery									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1					
Perfluorobutanoic acid (PFBA)	M17-Au17382	NCP	%	108			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	M17-Au17382	NCP	%	123			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	M17-Au17382	NCP	%	111			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	M17-Au17382	NCP	%	105			50-150	Pass	
Perfluorooctanoic acid (PFOA)	M17-Au17382	NCP	%	101			50-150	Pass	
Perfluorononanoic acid (PFNA)	M17-Au17382	NCP	%	101			50-150	Pass	
Perfluorodecanoic acid (PFDA)	M17-Au17382	NCP	%	96			50-150	Pass	
Perfluoroundecanoic acid (PFUnA)	M17-Au17382	NCP	%	109			50-150	Pass	
Perfluorododecanoic acid (PFDoA)	M17-Au17382	NCP	%	101			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	M17-Au17382	NCP	%	83			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	M17-Au17382	NCP	%	99			50-150	Pass	
Spike - % Recovery									
Perfluoroalkane sulfonamides (PFASAs)				Result 1					
Perfluorooctane sulfonamide (FOSA)	M17-Au17382	NCP	%	111			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	M17-Au17382	NCP	%	99			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	M17-Au17382	NCP	%	134			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	M17-Au17382	NCP	%	130			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	M17-Au17382	NCP	%	99			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	M17-Au17382	NCP	%	117			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	M17-Au17382	NCP	%	115			50-150	Pass	
Spike - % Recovery									
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSAs)				Result 1					

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Perfluorobutanesulfonic acid (PFBS)	M17-Au17382	NCP	%	107			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	M17-Au17382	NCP	%	100			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	M17-Au17382	NCP	%	105			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	M17-Au17382	NCP	%	108			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	M17-Au17382	NCP	%	121			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	M17-Au17382	NCP	%	103			50-150	Pass	
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids				Result 1					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	M17-Au17382	NCP	%	112			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	M17-Au17382	NCP	%	108			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	M17-Au17382	NCP	%	109			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)	M17-Au17382	NCP	%	145			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	M17-Au21877	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C10-C14	M17-Au18981	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C15-C28	M17-Au18981	NCP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH C29-C36	M17-Au18981	NCP	mg/kg	< 50	< 50	<1	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	M17-Au21877	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Toluene	M17-Au21877	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Ethylbenzene	M17-Au21877	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
m&p-Xylenes	M17-Au21877	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
o-Xylene	M17-Au21877	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Xylenes - Total	M17-Au21877	NCP	mg/kg	< 0.3	< 0.3	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	M17-Au21877	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
TRH C6-C10	M17-Au21877	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH >C10-C16	M17-Au18981	NCP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH >C16-C34	M17-Au18981	NCP	mg/kg	< 100	< 100	<1	30%	Pass	
TRH >C34-C40	M17-Au18981	NCP	mg/kg	< 100	< 100	<1	30%	Pass	
Duplicate									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1	Result 2	RPD			
Perfluorobutanoic acid (PFBA)	B17-Au16711	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	B17-Au16711	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorohexanoic acid (PFHxA)	B17-Au16711	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	B17-Au16711	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	B17-Au16711	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorononanoic acid (PFNA)	B17-Au16711	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorodecanoic acid (PFDA)	B17-Au16711	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnA)	B17-Au16711	NCP	ug/kg	< 5	< 5	<1	30%	Pass	

Duplicate									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1	Result 2	RPD			
Perfluorododecanoic acid (PFDoA)	B17-Au16711	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorotridecanoic acid (PFTrDA)	B17-Au16711	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	B17-Au16711	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Duplicate									
Perfluoroalkane sulfonamides (PFASAs)				Result 1	Result 2	RPD			
Perfluorooctane sulfonamide (FOSA)	B17-Au16711	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	B17-Au16711	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	B17-Au16711	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	B17-Au16711	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	B17-Au16711	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	B17-Au16711	NCP	ug/kg	< 10	< 10	<1	30%	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	B17-Au16711	NCP	ug/kg	< 10	< 10	<1	30%	Pass	
Duplicate									
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSAs)				Result 1	Result 2	RPD			
Perfluorobutanesulfonic acid (PFBS)	B17-Au16711	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoropentanesulfonic acid (PFPeS)	B17-Au16711	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorohexanesulfonic acid (PFHxS)	B17-Au16711	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	B17-Au16711	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorooctanesulfonic acid (PFOS)	B17-Au16711	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorodecanesulfonic acid (PFDS)	B17-Au16711	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Duplicate									
n:2 Fluorotelomer sulfonic acids				Result 1	Result 2	RPD			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	B17-Au16711	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	B17-Au16711	NCP	ug/kg	< 10	< 10	<1	30%	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	B17-Au16711	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)	B17-Au16711	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	S17-Au19560	NCP	%	16	16	2.0	30%	Pass	

Comments

Sample Integrity

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

Qualifier Codes/Comments

Code	Description
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.
N09	Quantification of linear and branched isomers has been conducted as a single total response using the relative response factor for the corresponding linear/branched standard.
N11	Isotope dilution is used for calibration of each native compound for which an exact labelled analogue is available (Isotope Dilution Quantitation). The isotopically labelled analogues allow identification and recovery correction of the concentration of the associated native PFAS compounds. 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

[redacted]	Analytical Services Manager
[redacted]	Senior Analyst-Metal (VIC)
[redacted]	Senior Analyst-Organic (VIC)
[redacted]	Senior Analyst-Volatile (VIC)
[redacted]	Senior Analyst-Inorganic (VIC)
[redacted]	Senior Analyst-Organic (QLD)
[redacted]	Senior Analyst-Organic (VIC)

[redacted]

National Operations 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.

FREIGHT

Samples received without CoC

Environmental Division
Melbourne
Work Order Reference
EM1711072

Telephone : + 61-3-8549 9600

ENT / SENDER:	AECOM
OJECT:	60543717
NTACT NAME:	[redacted]
NTACT NUMBER:	
RRIER:	TASFAST
NNOTE REFERENCE:	738060
MPLER:	
MBER OF SAMPLES/MATRIX:	1 Esky water
ent services notified by:	Samples

COC SEQUENCE NUMBER (Circle)

COC: - 1 2 3 4 5 6 7

OF: 1 2 3 4 5 6 7

SAMPLES RECEIVED BY: Marra Carl

DATE/TIME: 18/8 10:45

ANALYSIS RECEIVED BY:

DATE/TIME:

Comments

LAB ID	SAMPLE DETAILS: SAMPLE ID	DATE	MATRIX	NUMBER OF CONTAINERS	Additional Information

FREIGHT

Samples received without CoC

ENT / SENDER:	AECOM
OJECT:	60543717
NTACT NAME:	[redacted]
NTACT NUMBER:	
RRIER:	TNT
NNOTE REFERENCE:	738060
MPLER:	
MBER OF SAMPLES/MATRIX:	1 Esky water
ent services notified by:	Sampler

COC SEQUENCE NUMBER (Circle)

COC: - 1 2 3 4 5 6 7

OF: 1 2 3 4 5 6 7

SAMPLES RECEIVED BY: [illegible]

DATE/TIME: 18/8 1045

ANALYSIS RECEIVED BY:

DATE/TIME:

Comments

Environmental Division
Melbourne
Work Order Reference
EM1711072

Telephone : +61-3-8549 9600

LAB ID	SAMPLE DETAILS: SAMPLE ID	DATE	MATRIX	NUMBER OF CONTAINERS	Additional Information

AECOM Analysis rec'd 20/8/17 9:44 pm - ALS PR

Chain of Custody

AECOM Australia Pty Ltd		**Laboratory Details**	Tel: 03 9763 2500
AECOM Office Address: Lvl 10, Tower 2, 727 Collins St	T 03 9563 1234	**Lab. Name:** ALS	Fax: 03 9763 2633
Melbourne 3008	F 03 9654 7117	**Lab. Address:** Springvale	Preliminary Report by:
		Contact Name: [redacted]	Final Report by:
		Lab. Ref:	Lab Quote No:
Site Name: Launceston Airport	Cluster:	Site/Reference ID:	
Sampled By: [redacted]	AECOM Project Number: 60543717, 1.0	Project Manager: [redacted]	

Data required to be reported in PDF and EQuIS Format

Specifications:	Yes (tick)
Standard Turnaround Required (5 days)	Yes
Is any sediment layer present in waters to be excluded from extractions?	No
Special storage requirements? (details: _____)	No
Report to be delivered in EQuIS and PDF formats to : jothe.ramesh@aecom.com	

Lab. ID	Sample ID	Sampling Date	Matrix			Preservation				Container	Analysis Request												Comments
			soil	water	other	filt'ed	acid	ice	other	(No. & type)	PFAS Extended - PR 21/8	BTEXN	TPH (C6-C40)	TPH (C6-C10)							HOLD	
1	MW01	16-August-2017		X				X			X	X	X										
2	MW02	16-August-2017		X				X			X	X	X										
3	MW03	17-August-2017		X				X			X	X	X										
4	MW04	16-August-2017		X				X			X	X	X										
5	GW10	16-August-2017		X				X			X	X	X										
6	GW18	16-August-2017		X				X			X	X	X										
7	MR01	17-August-2017		X				X			X	X	X										
8	QC01	16-August-2017		X				X			X	X	X										
9	QC03	16-August-2017		X				X			X	X	X										
10	QC04	16-August-2017		X				X			X	X	X										
11	QC05	17-August-2017		X				X			X	X	X										
12	QC06	17-August-2017		X				X			X	X	X										
13	QC07	17-August-2017		X				X				X		X									
14																							
15																							
16																							
17																							
18																							
19																							
20																							
21																							
22																							

Comments:

Esky ID

Relinquished by: [redacted]	Signed:	Date: 18/08/2017	Relinquished by:		Date:
Recieved by:	Signed:	Date:	Recieved by:		Date:

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EM1711072**

Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Melbourne
Contact	: [redacted]	Contact	: [redacted]
Address	: COLLINS SQUARE LEVEL 10, TOWER TWO 727 COLLINS STREET MELBOURNE VIC, AUSTRALIA 3004	Address	: 4 Westall Rd Springvale VIC Australia 3171
E-mail	: [redacted]	E-mail	: [redacted]
Telephone	: [redacted]	Telephone	: [redacted]
Facsimile	: [redacted]	Facsimile	: [redacted]
Project	: 60543717	Page	: 1 of 3
Order number	: 60543717, 1.0	Quote number	: EB2015AECOMAU0580 (EN/004/16)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: Launceston Airport		
Sampler	: [redacted]		

Dates

Date Samples Received	: 18-Aug-2017 10:45	Issue Date	: 21-Aug-2017
Client Requested Due Date	: 28-Aug-2017	Scheduled Reporting Date	: **28-Aug-2017**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 1	Temperature	: 2.6°C - Ice present
Receipt Detail	:	No. of samples received / analysed	: 13 / 13

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Please direct any queries related to sample condition / numbering / breakages to Client Services.**
- Sample Disposal - Aqueous (14 days), Solid (60 days) from date of completion of work order.
- **Analytical work for this work order will be conducted at ALS Springvale and ALS Sydney.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**

Sample Container(s)/Preservation Non-Compliances

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

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - W-04 TRH/BTEXN	WATER - W-18 TRH(C6 - C9)/BTEXN
EM1711072-001	16-Aug-2017 00:00	MW01	✓	✓	
EM1711072-002	16-Aug-2017 00:00	MW02	✓	✓	
EM1711072-003	17-Aug-2017 00:00	MW03	✓	✓	
EM1711072-004	16-Aug-2017 00:00	MW04	✓	✓	
EM1711072-005	16-Aug-2017 00:00	GW10	✓	✓	
EM1711072-006	16-Aug-2017 00:00	GW18	✓	✓	
EM1711072-007	17-Aug-2017 00:00	MR01	✓	✓	
EM1711072-008	16-Aug-2017 00:00	QC01	✓	✓	
EM1711072-009	16-Aug-2017 00:00	QC03	✓	✓	
EM1711072-010	16-Aug-2017 00:00	QC04	✓	✓	
EM1711072-011	17-Aug-2017 00:00	QC05	✓	✓	
EM1711072-012	17-Aug-2017 00:00	QC06	✓	✓	
EM1711072-013	17-Aug-2017 00:00	QC07			✓

Proactive Holding Time Report

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

Requested Deliverables

ACCOUNTS PAYABLE

- A4 - AU Tax Invoice (INV)	Email	[redacted]
- Chain of Custody (CoC) (COC)	Email	[redacted]

[redacted]

- *AU Certificate of Analysis - NATA (COA)	Email	[redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	[redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	[redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	[redacted]
- Chain of Custody (CoC) (COC)	Email	[redacted]
- EDI Format - ENMRG (ENMRG)	Email	[redacted]
- EDI Format - EQUIS V5 URS (EQUIS_V5_AECOM)	Email	[redacted]
- EDI Format - ESDAT (ESDAT)	Email	[redacted]
- EDI Format - XTab (XTAB)	Email	[redacted]
- Electronic SRN for EQuIS (ESRN_EQUIS)	Email	[redacted]

[redacted]

- *AU Certificate of Analysis - NATA (COA)	Email	[redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	[redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	[redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	[redacted]
- Chain of Custody (CoC) (COC)	Email	[redacted]
- EDI Format - ENMRG (ENMRG)	Email	[redacted]
- EDI Format - EQUIS V5 URS (EQUIS_V5_AECOM)	Email	[redacted]
- EDI Format - ESDAT (ESDAT)	Email	[redacted]
- EDI Format - XTab (XTAB)	Email	[redacted]
- Electronic SRN for EQuIS (ESRN_EQUIS)	Email	[redacted]

[redacted]

- *AU Certificate of Analysis - NATA (COA)	Email	[redacted]
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	[redacted]
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	[redacted]
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	[redacted]
- Chain of Custody (CoC) (COC)	Email	[redacted]
- EDI Format - ENMRG (ENMRG)	Email	[redacted]
- EDI Format - EQUIS V5 URS (EQUIS_V5_AECOM)	Email	[redacted]
- EDI Format - ESDAT (ESDAT)	Email	[redacted]
- EDI Format - XTab (XTAB)	Email	[redacted]
- Electronic SRN for EQuIS (ESRN_EQUIS)	Email	[redacted]

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EM1711072**	Page	: 1 of 12
Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Melbourne
Contact	: [redacted]	Contact	: [redacted]
Address	: COLLINS SQUARE LEVEL 10, TOWER TWO 727 COLLINS STREET MELBOURNE VIC, AUSTRALIA 3004	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: 02 8934 0000	Telephone	: +61-3-8549 9608
Project	: 60543717	Date Samples Received	: 18-Aug-2017 10:45
Order number	: 60543717, 1.0	Date Analysis Commenced	: 22-Aug-2017
C-O-C number	: ----	Issue Date	: 29-Aug-2017 16:54
Sampler	: [redacted]		
Site	: Launceston Airport		
Quote number	: EN/004/16		
No. of samples received	: 13		
No. of samples analysed	: 13		

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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

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

Signatories

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

Signatories	*Position*	*Accreditation Category*
[redacted]	Organic Chemist	Sydney Organics, Smithfield, NSW
[redacted]	Senior Organic Chemist	Melbourne Organics, Springvale, VIC

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

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

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

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

When 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.

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

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

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MW01	MW02	MW03	MW04	GW10
				Client sampling date / time	16-Aug-2017 00:00	16-Aug-2017 00:00	17-Aug-2017 00:00	16-Aug-2017 00:00	16-Aug-2017 00:00
Compound	CAS Number	LOR	Unit		EM1711072-001	EM1711072-002	EM1711072-003	EM1711072-004	EM1711072-005
					Result	Result	Result	Result	Result
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	**40**
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	**1300**
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	**520**
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	**100**
^ **C10 - C36 Fraction (sum)**	----	50	µg/L		<50	<50	<50	<50	**1920**
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	**70**
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	**70**
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	**1440**
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	**370**
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	<100	<100	<100	**1810**
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L		<100	<100	<100	<100	**1430**
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ **Total Xylenes**	1330-20-7	2	µg/L		<2	<2	<2	<2	<2
^ **Sum of BTEX**	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	**8**
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		**11.0**	**0.35**	**5.70**	**0.80**	**51.6**
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		**14.9**	**0.38**	**7.95**	**0.98**	**72.8**
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		**130**	**3.38**	**34.2**	**5.83**	**411**
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		**12.0**	**0.25**	**4.43**	**0.23**	**40.2**
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**146**	**4.81**	**43.7**	**3.22**	**1240**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MW01	MW02	MW03	MW04	GW10
				Client sampling date / time	16-Aug-2017 00:00	16-Aug-2017 00:00	17-Aug-2017 00:00	16-Aug-2017 00:00	16-Aug-2017 00:00
Compound	CAS Number	LOR	Unit		EM1711072-001	EM1711072-002	EM1711072-003	EM1711072-004	EM1711072-005
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	**0.16**
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		**3.5**	<0.1	<0.1	<0.1	**29.8**
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		**5.57**	**0.14**	**1.58**	**0.39**	**39.6**
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		**17.2**	**0.40**	**7.53**	**1.01**	**99.6**
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		**4.13**	**0.10**	**1.24**	**0.19**	**19.0**
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		**13.1**	**0.16**	**3.22**	**0.37**	**46.9**
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		**0.13**	<0.02	**0.02**	<0.02	**9.38**
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		**0.02**	<0.02	<0.02	<0.02	**1.93**
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	**0.10**
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	**0.52**
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
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	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									

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MW01	MW02	MW03	MW04	GW10
				Client sampling date / time	16-Aug-2017 00:00	16-Aug-2017 00:00	17-Aug-2017 00:00	16-Aug-2017 00:00	16-Aug-2017 00:00
Compound	CAS Number	LOR	Unit		EM1711072-001	EM1711072-002	EM1711072-003	EM1711072-004	EM1711072-005
					Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
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**	**0.08**	<0.05	<0.05	**4.40**
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	**8.00**
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		**358**	**10.0**	**110**	**13.0**	**2070**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**276**	**8.19**	**77.9**	**9.05**	**1650**
Sum of PFAS (WA DER List)	----	0.01	µg/L		**330**	**9.42**	**97.2**	**11.8**	**1950**
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**96.8**	**82.1**	**87.4**	**79.1**	**96.4**
Toluene-D8	2037-26-5	2	%		**88.8**	**77.6**	**77.2**	**71.3**	**116**
4-Bromofluorobenzene	460-00-4	2	%		**86.9**	**79.8**	**77.7**	**88.9**	**104**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**72.8**	**103**	**88.0**	**99.7**	**63.0**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	GW18	MR01	QC01	QC03	QC04
				Client sampling date / time	16-Aug-2017 00:00	17-Aug-2017 00:00	16-Aug-2017 00:00	16-Aug-2017 00:00	16-Aug-2017 00:00
Compound	CAS Number	LOR	Unit		EM1711072-006	EM1711072-007	EM1711072-008	EM1711072-009	EM1711072-010
					Result	Result	Result	Result	Result
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
^ **C10 - C36 Fraction (sum)**	----	50	µg/L		<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	<100	<100	<100	<100
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L		<100	<100	<100	<100	<100
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ **Total Xylenes**	1330-20-7	2	µg/L		<2	<2	<2	<2	<2
^ **Sum of BTEX**	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		**0.35**	**29.3**	**10.1**	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		**0.39**	**37.9**	**14.3**	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		**2.45**	**258**	**115**	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		**0.27**	**16.3**	**19.1**	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**10.7**	**582**	**130**	<0.01	**0.04**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	GW18	MR01	QC01	QC03	QC04
				Client sampling date / time	16-Aug-2017 00:00	17-Aug-2017 00:00	16-Aug-2017 00:00	16-Aug-2017 00:00	16-Aug-2017 00:00
Compound	CAS Number	LOR	Unit		EM1711072-006	EM1711072-007	EM1711072-008	EM1711072-009	EM1711072-010
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	**0.04**	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	**17.2**	**3.2**	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		**0.16**	**24.8**	**5.13**	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		**0.63**	**60.3**	**17.0**	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		**0.09**	**10.7**	**3.48**	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		**0.21**	**21.9**	**13.0**	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		**0.02**	**4.54**	**0.13**	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	**0.33**	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	**0.06**	<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	**0.25**	<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
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	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									

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	GW18	MR01	QC01	QC03	QC04
				Client sampling date / time	16-Aug-2017 00:00	17-Aug-2017 00:00	16-Aug-2017 00:00	16-Aug-2017 00:00	16-Aug-2017 00:00
Compound	CAS Number	LOR	Unit		EM1711072-006	EM1711072-007	EM1711072-008	EM1711072-009	EM1711072-010
					Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
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	**2.54**	**0.06**	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		**0.07**	**3.33**	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**15.3**	**1070**	**330**	<0.01	**0.04**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**13.2**	**840**	**245**	<0.01	**0.04**
Sum of PFAS (WA DER List)	----	0.01	µg/L		**14.7**	**1010**	**297**	<0.01	**0.04**
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**95.3**	**99.5**	**86.3**	**91.4**	**85.6**
Toluene-D8	2037-26-5	2	%		**95.6**	**105**	**76.2**	**82.0**	**72.4**
4-Bromofluorobenzene	460-00-4	2	%		**103**	**89.8**	**77.1**	**83.0**	**79.7**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**111**	**73.8**	**65.1**	**104**	**104**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	QC05	QC06	QC07	----	----
				Client sampling date / time	17-Aug-2017 00:00	17-Aug-2017 00:00	17-Aug-2017 00:00	----	----
Compound	CAS Number	LOR	Unit		EM1711072-011	EM1711072-012	EM1711072-013	--------	--------
					Result	Result	Result	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	----	----
C10 - C14 Fraction	----	50	µg/L		<50	<50	----	----	----
C15 - C28 Fraction	----	100	µg/L		<100	<100	----	----	----
C29 - C36 Fraction	----	50	µg/L		<50	<50	----	----	----
^ **C10 - C36 Fraction (sum)**	----	50	µg/L		<50	<50	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	----	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	<20	<20	----	----
>C10 - C16 Fraction	----	100	µg/L		<100	<100	----	----	----
>C16 - C34 Fraction	----	100	µg/L		<100	<100	----	----	----
>C34 - C40 Fraction	----	100	µg/L		<100	<100	----	----	----
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	<100	----	----	----
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L		<100	<100	----	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	----	----
Toluene	108-88-3	2	µg/L		<2	<2	<2	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	----	----
^ **Total Xylenes**	1330-20-7	2	µg/L		<2	<2	<2	----	----
^ **Sum of BTEX**	----	1	µg/L		<1	<1	<1	----	----
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	QC05	QC06	QC07	----	----
				Client sampling date / time	17-Aug-2017 00:00	17-Aug-2017 00:00	17-Aug-2017 00:00	----	----
Compound	CAS Number	LOR	Unit		EM1711072-011	EM1711072-012	EM1711072-013	--------	--------
					Result	Result	Result	----	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
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		<0.02	<0.02	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<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	----	----	----
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	----	----	----
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)	2448-09-7	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	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	QC05	QC06	QC07	----	----
				Client sampling date / time	17-Aug-2017 00:00	17-Aug-2017 00:00	17-Aug-2017 00:00	----	----
Compound	CAS Number	LOR	Unit		EM1711072-011	EM1711072-012	EM1711072-013	--------	--------
					Result	Result	Result	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
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	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**97.9**	**86.0**	**85.4**	----	----
Toluene-D8	2037-26-5	2	%		**74.7**	**80.9**	**73.6**	----	----
4-Bromofluorobenzene	460-00-4	2	%		**72.2**	**82.4**	**83.8**	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**106**	**109**	----	----	----

Surrogate Control Limits

Sub-Matrix: **WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	73	129
Toluene-D8	2037-26-5	70	125
4-Bromofluorobenzene	460-00-4	71	129
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	130

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EM1711072**	Page	: 1 of 8
Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Melbourne
Contact	: [redacted]	Contact	: [redacted]
Address	: COLLINS SQUARE LEVEL 10, TOWER TWO 727 COLLINS STREET MELBOURNE VIC, AUSTRALIA 3004	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: [redacted]	Telephone	: [redacted]
Project	: 60543717	Date Samples Received	: 18-Aug-2017
Order number	: 60543717, 1.0	Date Analysis Commenced	: 22-Aug-2017
C-O-C number	: ----	Issue Date	: 29-Aug-2017
Sampler	: [redacted]		
Site	: Launceston Airport		
Quote number	: EN/004/16		
No. of samples received	: 13		
No. of samples analysed	: 13		

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. 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*
[redacted]	Organic Chemist	Sydney Organics, Smithfield, NSW
[redacted]	Senior Organic Chemist	Melbourne Organics, Springvale, VIC

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

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

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

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1066064)									
EM1711072-001	MW01	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EM1711072-011	QC05	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1066064)									
EM1711072-001	MW01	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EM1711072-011	QC05	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 1066064)									
EM1711072-001	MW01	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EM1711072-011	QC05	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 1068853)									
EM1711072-001	MW01	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	146	155	5.84	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	11.0	10.0	9.52	0% - 20%
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	14.9	14.1	5.59	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 1068853) - continued									
EM1711072-001	MW01	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	130	134	3.02	0% - 20%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	12.0	12.3	2.89	0% - 20%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EM1711072-003	MW03	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	43.7	47.0	7.28	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	5.70	5.53	2.96	0% - 20%
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	7.95	8.32	4.50	0% - 20%
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	34.2	40.0	15.8	0% - 20%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	4.43	4.43	0.00	0% - 20%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 1068853)									
EM1711072-001	MW01	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	13.1	13.4	2.06	0% - 20%
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	5.57	5.56	0.00	0% - 20%
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	17.2	17.1	0.757	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	4.13	3.96	4.28	0% - 20%
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	0.13	0.12	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	3.5	3.5	0.00	0% - 20%
EM1711072-003	MW03	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	3.22	3.40	5.38	0% - 20%
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	1.58	1.57	0.00	0% - 20%
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	7.53	7.59	0.807	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	1.24	1.24	0.00	0% - 20%
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	0.02	0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 1068853)									
EM1711072-001	MW01	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 1068853) - continued									
EM1711072-001	MW01	EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EM1711072-003	MW03	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 1068853)									
EM1711072-001	MW01	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	0.05	0.06	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EM1711072-003	MW03	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 1068853)									
EM1711072-001	MW01	EP231X: Sum of PFAS	----	0.01	µg/L	358	369	3.16	0% - 20%
EM1711072-003	MW03	EP231X: Sum of PFAS	----	0.01	µg/L	110	119	8.34	0% - 20%

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1065011)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	3368 µg/L	82.6	53	123
EP071: C15 - C28 Fraction	----	100	µg/L	<100	14735 µg/L	84.8	57	133
EP071: C29 - C36 Fraction	----	50	µg/L	<50	7856 µg/L	81.5	55	141
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1066064)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	360 µg/L	87.4	67	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1065011)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	5225 µg/L	81.4	54	122
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	19994 µg/L	81.0	56	132
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	1449 µg/L	87.6	51	137
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1066064)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	450 µg/L	85.6	65	125
EP080: BTEXN (QCLot: 1066064)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	96.5	76	120
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	96.1	76	124
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	93.6	72	124
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	93.6	72	130
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	98.5	78	128
EP080: Naphthalene	91-20-3	5	µg/L	<5	5 µg/L	105	71	129
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 1068853)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.5 µg/L	93.4	70	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.5 µg/L	108	70	130
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.5 µg/L	116	70	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.5 µg/L	104	70	130
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.5 µg/L	99.2	70	130
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.5 µg/L	103	70	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 1068853)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	2.5 µg/L	102	70	130
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.5 µg/L	113	70	130
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.5 µg/L	111	70	130
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.5 µg/L	104	70	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.5 µg/L	117	70	130
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.5 µg/L	113	70	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.5 µg/L	110	70	130

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 1068853) - continued								
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.5 µg/L	110	70	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.5 µg/L	125	70	130
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.5 µg/L	122	70	130
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	1.25 µg/L	128	70	150
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 1068853)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.5 µg/L	122	70	130
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	1.25 µg/L	130	70	150
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	1.25 µg/L	104	70	150
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.05	1.25 µg/L	126	70	150
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	1.25 µg/L	122	70	150
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.5 µg/L	118	70	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.5 µg/L	120	70	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 1068853)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.5 µg/L	118	70	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.5 µg/L	114	70	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.5 µg/L	126	70	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.5 µg/L	92.6	70	130

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1066064)							
EM1711072-002	MW02	EP080: C6 - C9 Fraction	----	280 µg/L	50.7	43	125
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1066064)							
EM1711072-002	MW02	EP080: C6 - C10 Fraction	C6_C10	330 µg/L	47.4	44	122
EP080: BTEXN (QCLot: 1066064)							
EM1711072-002	MW02	EP080: Benzene	71-43-2	20 µg/L	81.5	68	130
		EP080: Toluene	108-88-3	20 µg/L	82.1	72	132
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 1068853)							

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 1068853) - continued							
EM1711072-001	MW01	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.5 µg/L	# Not Determined	50	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.5 µg/L	# Not Determined	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.5 µg/L	# Not Determined	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.5 µg/L	# Not Determined	50	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.5 µg/L	# Not Determined	50	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.5 µg/L	84.2	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 1068853)							
EM1711072-001	MW01	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	2.5 µg/L	62.9	50	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.5 µg/L	# Not Determined	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.5 µg/L	# Not Determined	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.5 µg/L	# Not Determined	50	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.5 µg/L	# Not Determined	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.5 µg/L	124	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.5 µg/L	115	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.5 µg/L	119	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.5 µg/L	91.4	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.5 µg/L	52.0	50	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	1.25 µg/L	107	50	150
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 1068853)							
EM1711072-001	MW01	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.5 µg/L	114	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	1.25 µg/L	127	50	150
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	1.25 µg/L	86.1	50	150
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	1.25 µg/L	110	50	150
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	1.25 µg/L	113	50	150
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.5 µg/L	120	50	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 1068853) - continued							
EM1711072-001	MW01	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.5 µg/L	112	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 1068853)							
EM1711072-001	MW01	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.5 µg/L	126	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.5 µg/L	126	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.5 µg/L	112	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.5 µg/L	122	50	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EM1711072**	Page	: 1 of 7
Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Melbourne
Contact	: [redacted]	Telephone	: [redacted]
Project	: 60543717	Date Samples Received	: 18-Aug-2017
Site	: Launceston Airport	Issue Date	: 29-Aug-2017
Sampler	: [redacted]	No. of samples received	: 13
Order number	: 60543717, 1.0	No. of samples analysed	: 13

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EP231A: Perfluoroalkyl Sulfonic Acids	EM1711072--001	MW01	**Perfluorobutane sulfonic acid (PFBS)**	375-73-5	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231A: Perfluoroalkyl Sulfonic Acids	EM1711072--001	MW01	**Perfluoropentane sulfonic acid (PFPeS)**	2706-91-4	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231A: Perfluoroalkyl Sulfonic Acids	EM1711072--001	MW01	**Perfluorohexane sulfonic acid (PFHxS)**	355-46-4	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231A: Perfluoroalkyl Sulfonic Acids	EM1711072--001	MW01	**Perfluoroheptane sulfonic acid (PFHpS)**	375-92-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231A: Perfluoroalkyl Sulfonic Acids	EM1711072--001	MW01	**Perfluorooctane sulfonic acid (PFOS)**	1763-23-1	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231B: Perfluoroalkyl Carboxylic Acids	EM1711072--001	MW01	**Perfluoropentanoic acid (PFPeA)**	2706-90-3	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231B: Perfluoroalkyl Carboxylic Acids	EM1711072--001	MW01	**Perfluorohexanoic acid (PFHxA)**	307-24-4	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231B: Perfluoroalkyl Carboxylic Acids	EM1711072--001	MW01	**Perfluoroheptanoic acid (PFHpA)**	375-85-9	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231B: Perfluoroalkyl Carboxylic Acids	EM1711072--001	MW01	**Perfluorooctanoic acid (PFOA)**	335-67-1	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count QC	Count Regular	Rate (%) Actual	Rate (%) Expected	Quality Control Specification
Laboratory Duplicates (DUP)					
TRH - Semivolatile Fraction	0	14	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
TRH - Semivolatile Fraction	0	14	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071)							
MW01, MW02, MW04, GW10, GW18, QC01, QC03, QC04	**16-Aug-2017**	**22-Aug-2017**	23-Aug-2017	✓	**23-Aug-2017**	01-Oct-2017	✓
Amber Glass Bottle - Unpreserved (EP071)							
MW03, MR01, QC05, QC06	**17-Aug-2017**	**22-Aug-2017**	24-Aug-2017	✓	**23-Aug-2017**	01-Oct-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
MW01, MW02, MW04, GW10, GW18, QC01, QC03, QC04	**16-Aug-2017**	**22-Aug-2017**	30-Aug-2017	✓	**24-Aug-2017**	30-Aug-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
MW03, MR01, QC05, QC06, QC07	**17-Aug-2017**	**22-Aug-2017**	31-Aug-2017	✓	**24-Aug-2017**	31-Aug-2017	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071)							
MW01, MW02, MW04, GW10, GW18, QC01, QC03, QC04	**16-Aug-2017**	**22-Aug-2017**	23-Aug-2017	✓	**23-Aug-2017**	01-Oct-2017	✓
Amber Glass Bottle - Unpreserved (EP071)							
MW03, MR01, QC05, QC06	**17-Aug-2017**	**22-Aug-2017**	24-Aug-2017	✓	**23-Aug-2017**	01-Oct-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
MW01, MW02, MW04, GW10, GW18, QC01, QC03, QC04	**16-Aug-2017**	**22-Aug-2017**	30-Aug-2017	✓	**24-Aug-2017**	30-Aug-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
MW03, MR01, QC05, QC06, QC07	**17-Aug-2017**	**22-Aug-2017**	31-Aug-2017	✓	**24-Aug-2017**	31-Aug-2017	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080)							
MW01, MW02, MW04, GW10, GW18, QC01, QC03, QC04	**16-Aug-2017**	**22-Aug-2017**	30-Aug-2017	✓	**24-Aug-2017**	30-Aug-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
MW03, MR01, QC05, QC06, QC07	**17-Aug-2017**	**22-Aug-2017**	31-Aug-2017	✓	**24-Aug-2017**	31-Aug-2017	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
MW01, MW02, MW04, GW10, GW18, QC01, QC03, QC04	**16-Aug-2017**	**----**	----	----	**24-Aug-2017**	12-Feb-2018	✓
HDPE (no PTFE) (EP231X)							
MW03, MR01, QC05, QC06	**17-Aug-2017**	**----**	----	----	**24-Aug-2017**	13-Feb-2018	✓

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)							
MW01, MW02, MW04, GW10, GW18, QC01, QC03, QC04	**16-Aug-2017**	**----**	----	----	**24-Aug-2017**	12-Feb-2018	✓
HDPE (no PTFE) (EP231X)							
MW03, MR01, QC05, QC06	**17-Aug-2017**	**----**	----	----	**24-Aug-2017**	13-Feb-2018	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
MW01, MW02, MW04, GW10, GW18, QC01, QC03, QC04	**16-Aug-2017**	**----**	----	----	**24-Aug-2017**	12-Feb-2018	✓
HDPE (no PTFE) (EP231X)							
MW03, MR01, QC05, QC06	**17-Aug-2017**	**----**	----	----	**24-Aug-2017**	13-Feb-2018	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
MW01, MW02, MW04, GW10, GW18, QC01, QC03, QC04	**16-Aug-2017**	**----**	----	----	**24-Aug-2017**	12-Feb-2018	✓
HDPE (no PTFE) (EP231X)							
MW03, MR01, QC05, QC06	**17-Aug-2017**	**----**	----	----	**24-Aug-2017**	13-Feb-2018	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
MW01, MW02, MW04, GW10, GW18, QC01, QC03, QC04	**16-Aug-2017**	**----**	----	----	**24-Aug-2017**	12-Feb-2018	✓
HDPE (no PTFE) (EP231X)							
MW03, MR01, QC05, QC06	**17-Aug-2017**	**----**	----	----	**24-Aug-2017**	13-Feb-2018	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	14	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	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
TRH - Semivolatile Fraction	EP071	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	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
TRH - Semivolatile Fraction	EP071	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	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
TRH - Semivolatile Fraction	EP071	0	14	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	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
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In house: Direct injection analysis of fresh waters after dilution (1:1) with methanol. Analysis by LC-Electrospray-MS-MS, Negative Mode using MRM. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers.

Preparation Methods	Method	Matrix	Method Descriptions
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

AECOM

(2)

Chain of Custody

AECOM Australia Pty Ltd	**Laboratory Details**
AECOM Office Address: Lvl 10, Tower 2, 727 Collins St	T 03 9563 1234
Melbourne 3008	F 03 9654 7117
	Lab. Name: Eurofins/MGT
	Lab. Address:
	Contact Name:
	Lab. Ref:
Site Name: Launceston Airport	Cluster:
	Site/Reference ID:
Sampled By: [redacted]	AECOM Project Number: 60543717, 1.0
	Project Manager: [redacted]

Data required to be reported in PDF and EQuIS Format

Specifications:	Yes (tick)
Standard Turnaround Required (5 days)	Yes
Is any sediment layer present in waters to be excluded from extractions?	No
Special storage requirements? (details: _____)	No
Report to be delivered in EQuIS and PDF formats to : jothe.ramesh@aecom.com	

Lab. ID	Sample ID	Sampling Date	Matrix			Preservation				Container (No. & type)	Analysis Request									Comments
			soil	water	other	filt'ed	acid	ice	other		PFAS	BTEXN	TPH (C6-C40)	TPH (C6-C9)					HOLD	
1	QC02	16-August-2017		X				X			X	X	X							
2																				

Comments: M= 55[redacted]840 22/8 2:[redacted]PM

Esky ID

Relinquished by: [redacted]	Signed:	Date: 18/08/2017	Relinquished by: [redacted]		Date:
Recieved by:	Signed:	Date:	Recieved by:		Date:

Melbourne
3-5 Kingston Town Close
Oakleigh Vic 3166
Phone : +61 3 8564 5000
NATA # 1261
Site # 1254 & 14271

Sydney
Unit F3, Building F
16 Mars Road
Lane Cove West NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Perth
2/91 Leach Highway
Kewdale WA 6105
Phone : +61 8 9251 9600
NATA # 1261 Site # 23736

ABN – 50 005 085 521 e.mail : EnviroSales@eurofins.com web : www.eurofins.com.au

Sample Receipt Advice

Company name: **AECOM Services P/L (fmly URS Aus P/L) VIC**

Contact name: [redacted]
Project name: LAUNCENSTON AIRPORT
Project ID: 60543717 1.0
COC number: Not provided
Turn around time: 5 Day
Date/Time received: Aug 22, 2017 2:13 PM
Eurofins | mgt reference: **559840**

Sample information

☑ A detailed list of analytes logged into our LIMS, is included in the attached summary table.

☑ Sample Temperature of a random sample selected from the batch as recorded by Eurofins | mgt Sample Receipt : 9.6 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.

☒ Some samples have been subcontracted.

N/A Custody Seals intact (if used).

Contact notes

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

[redacted]

Results will be delivered electronically via e.mail to [redacted]

eurofins | mgt

Certificate of Analysis

AECOM Services P/L (fmly URS Aus P/L) VIC
Collins Square, Tower 2, Level 11, 727 Collins Street
Docklands
VIC 3008

NATA Accredited
Accreditation Number 1261
Site Number 1254

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

Attention: [redacted]

Report **559840-W**
Project name LAUNCENSTON AIRPORT
Project ID 60543717 1.0
Received Date Aug 22, 2017

Client Sample ID			**QC02**
Sample Matrix			**Water**
Eurofins | mgt Sample No.			**M17-Au26807**
Date Sampled			**Aug 16, 2017**
Test/Reference	LOR	Unit	
Total Recoverable Hydrocarbons - 1999 NEPM Fractions			
TRH C6-C9	0.02	mg/L	< 0.02
TRH C10-C14	0.05	mg/L	< 0.05
TRH C15-C28	0.1	mg/L	< 0.1
TRH C29-C36	0.1	mg/L	< 0.1
TRH C10-36 (Total)	0.1	mg/L	< 0.1
BTEX			
Benzene	0.001	mg/L	< 0.001
Toluene	0.001	mg/L	< 0.001
Ethylbenzene	0.001	mg/L	< 0.001
m&p-Xylenes	0.002	mg/L	< 0.002
o-Xylene	0.001	mg/L	< 0.001
Xylenes - Total	0.003	mg/L	< 0.003
4-Bromofluorobenzene (surr.)	1	%	101
Total Recoverable Hydrocarbons - 2013 NEPM Fractions			
Naphthalene[N02]	0.01	mg/L	< 0.01
TRH C6-C10 less BTEX (F1)[N04]	0.02	mg/L	< 0.02
TRH C6-C10	0.02	mg/L	< 0.02
TRH >C10-C16	0.05	mg/L	< 0.05
TRH >C10-C16 less Naphthalene (F2)[N01]	0.05	mg/L	< 0.05
TRH >C16-C34	0.1	mg/L	< 0.1
TRH >C34-C40	0.1	mg/L	< 0.1
Perfluoroalkyl carboxylic acids (PFCAs)			
Perfluorobutanoic acid (PFBA)[N11]	0.05	ug/L	3.3
Perfluoropentanoic acid (PFPeA)[N11]	0.01	ug/L	[N09]6.8
Perfluorohexanoic acid (PFHxA)[N11]	0.01	ug/L	[N09]29
Perfluoroheptanoic acid (PFHpA)[N11]	0.01	ug/L	[N09]4.5
Perfluorooctanoic acid (PFOA)[N11]	0.01	ug/L	[N09]15
Perfluorononanoic acid (PFNA)[N11]	0.01	ug/L	< 0.01
Perfluorodecanoic acid (PFDA)[N11]	0.01	ug/L	< 0.01
Perfluoroundecanoic acid (PFUnA)[N11]	0.01	ug/L	< 0.01
Perfluorododecanoic acid (PFDoA)[N11]	0.01	ug/L	< 0.01
Perfluorotridecanoic acid (PFTrDA)	0.01	ug/L	< 0.01
Perfluorotetradecanoic acid (PFTeDA)[N11]	0.01	ug/L	< 0.01
13C4-PFBA (surr.)	1	%	95
13C5-PFPeA (surr.)	1	%	91

Client Sample ID			QC02
Sample Matrix			**Water**
Eurofins | mgt Sample No.			**M17-Au26807**
Date Sampled			**Aug 16, 2017**
Test/Reference	LOR	Unit	
Perfluoroalkyl carboxylic acids (PFCAs)			
13C5-PFHxA (surr.)	1	%	98
13C4-PFHpA (surr.)	1	%	100
13C8-PFOA (surr.)	1	%	95
13C5-PFNA (surr.)	1	%	93
13C6-PFDA (surr.)	1	%	72
13C2-PFUnDA (surr.)	1	%	82
13C2-PFDoDA (surr.)	1	%	61
13C2-PFTeDA (surr.)	1	%	10
Perfluoroalkane sulfonamides (PFASAs)			
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	%	79
D3-N-MeFOSA (surr.)	1	%	60
D5-N-EtFOSA (surr.)	1	%	42
D7-N-MeFOSE (surr.)	1	%	64
D9-N-EtFOSE (surr.)	1	%	49
D5-N-EtFOSAA (surr.)	1	%	85
D3-N-MeFOSAA (surr.)	1	%	82
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSAs)			
Perfluorobutanesulfonic acid (PFBS)[N11]	0.01	ug/L	[N09]21
Perfluoropentanesulfonic acid (PFPeS)	0.01	ug/L	[N09]19
Perfluorohexanesulfonic acid (PFHxS)[N11]	0.01	ug/L	[N09]180
Perfluoroheptanesulfonic acid (PFHpS)	0.01	ug/L	[N09]20
Perfluorooctanesulfonic acid (PFOS)[N11]	0.01	ug/L	[N09]270
Perfluorodecanesulfonic acid (PFDS)	0.01	ug/L	< 0.01
13C3-PFBS (surr.)	1	%	94
18O2-PFHxS (surr.)	1	%	81
13C8-PFOS (surr.)	1	%	31
n:2 Fluorotelomer sulfonic acids			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)[N11]	0.01	ug/L	< 0.01
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)[N11]	0.05	ug/L	< 0.05
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)[N11]	0.01	ug/L	< 0.01
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)	0.01	ug/L	< 0.01
13C2-4:2 FTS (surr.)	1	%	140
13C2-6:2 FTS (surr.)	1	%	133
13C2-8:2 FTS (surr.)	1	%	107

Client Sample ID			QC02
Sample Matrix			**Water**
Eurofins | mgt Sample No.			**M17-Au26807**
Date Sampled			**Aug 16, 2017**
Test/Reference	LOR	Unit	
PFASs Summations			
Sum (PFHxS + PFOS)	0.01	ug/L	450
Sum of US EPA PFAS (PFOS + PFOA)	0.01	ug/L	285
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)	0.01	ug/L	465
Sum of WA DER PFAS (n=10)	0.05	ug/L	529.6
Sum of PFASs (n=28)	0.1	ug/L	568.6

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

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

Description	Testing Site	Extracted	Holding Time
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Melbourne	Aug 25, 2017	7 Day
- Method: LTM-ORG-2010 TRH C6-C36			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	Aug 24, 2017	7 Day
- Method: TRH C6-C40 - LTM-ORG-2010			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	Aug 25, 2017	7 Day
- Method: TRH C6-C40 - LTM-ORG-2010			
BTEX and Naphthalene			
BTEX	Melbourne	Aug 24, 2017	14 Day
- Method: TRH C6-C40 - LTM-ORG-2010			
Per- and Polyfluorinated Alkyl Substances (PFASs)			
Perfluoroalkyl carboxylic acids (PFCAs)	Brisbane	Aug 25, 2017	14 Day
- Method: LTM-ORG-2100 Per- and Polyfluorinated Alkyl Substances by LC-MS/MS			
Perfluoroalkane sulfonamides (PFASAs)	Brisbane	Aug 25, 2017	14 Day
- Method: LTM-ORG-2100 Per- and Polyfluorinated Alkyl Substances by LC-MS/MS			
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSAs)	Brisbane	Aug 25, 2017	14 Day
- Method: LTM-ORG-2100 Per- and Polyfluorinated Alkyl Substances by LC-MS/MS			
n:2 Fluorotelomer sulfonic acids	Brisbane	Aug 25, 2017	14 Day
- Method: LTM-ORG-2100 Per- and Polyfluorinated Alkyl Substances by LC-MS/MS			

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NATA # 1261 Site # 20794

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Kewdale WA 6105
Phone : +61 8 9251 9600
NATA # 1261
Site # 23736

Company Name: AECOM Services P/L (fmly URS Aus P/L) VIC
Address: Collins Square, Tower 2, Level 11, 727 Collins Street
Docklands
VIC 3008

Project Name: LAUNCENSTON AIRPORT
Project ID: 60543717 1.0

Order No.:
Report #: 559840
Phone: 3 9653 1234
Fax: 3 9654 7117

Received: Aug 22, 2017 2:13 PM
Due: Aug 29, 2017
Priority: 5 Day
Contact Name: [redacted]

Eurofins | mgt Analytical Services Manager : [redacted]

Sample Detail						BTEX and Naphthalene	Total Recoverable Hydrocarbons	Per- and Polyfluorinated Alkyl Substances (PFASs)
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794								X
Perth Laboratory - NATA Site # 23736								
External Laboratory								
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**			
1	QC02	Aug 16, 2017		Water	M17-Au26807	X	X	X
Test Counts						1	1	1

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. All biota 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. 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 Sample Receipt Advice.

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.

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

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

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

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - 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.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	Quality Systems Manual ver 5.1 US Department of Defense
CP	Client Parent - QC was performed on samples pertaining to this report
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.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

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

Results <10 times the LOR : No Limit

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

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

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

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.1 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. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	mg/L	< 0.02			0.02	Pass	
TRH C10-C14	mg/L	< 0.05			0.05	Pass	
TRH C15-C28	mg/L	< 0.1			0.1	Pass	
TRH C29-C36	mg/L	< 0.1			0.1	Pass	
Method Blank							
BTEX							
Benzene	mg/L	< 0.001			0.001	Pass	
Toluene	mg/L	< 0.001			0.001	Pass	
Ethylbenzene	mg/L	< 0.001			0.001	Pass	
m&p-Xylenes	mg/L	< 0.002			0.002	Pass	
o-Xylene	mg/L	< 0.001			0.001	Pass	
Xylenes - Total	mg/L	< 0.003			0.003	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	mg/L	< 0.01			0.01	Pass	
TRH C6-C10	mg/L	< 0.02			0.02	Pass	
TRH >C10-C16	mg/L	< 0.05			0.05	Pass	
TRH >C16-C34	mg/L	< 0.1			0.1	Pass	
TRH >C34-C40	mg/L	< 0.1			0.1	Pass	
Method Blank							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	ug/L	< 0.05			0.05	Pass	
Perfluoropentanoic acid (PFPeA)	ug/L	< 0.01			0.01	Pass	
Perfluorohexanoic acid (PFHxA)	ug/L	< 0.01			0.01	Pass	
Perfluoroheptanoic acid (PFHpA)	ug/L	< 0.01			0.01	Pass	
Perfluorooctanoic acid (PFOA)	ug/L	< 0.01			0.01	Pass	
Perfluorononanoic acid (PFNA)	ug/L	< 0.01			0.01	Pass	
Perfluorodecanoic acid (PFDA)	ug/L	< 0.01			0.01	Pass	
Perfluoroundecanoic acid (PFUnA)	ug/L	< 0.01			0.01	Pass	
Perfluorododecanoic acid (PFDoA)	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							
Perfluoroalkane sulfonamides (PFASAs)							
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							
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSAs)							
Perfluorobutanesulfonic acid (PFBS)	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	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
n:2 Fluorotelomer sulfonic acids							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	ug/L	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	ug/L	< 0.05			0.05	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	ug/L	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)	ug/L	< 0.01			0.01	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C10-C14	%	84			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
TRH >C10-C16	%	90			70-130	Pass	
LCS - % Recovery							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	%	98			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	107			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	107			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	101			50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	108			50-150	Pass	
Perfluorononanoic acid (PFNA)	%	106			50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	104			50-150	Pass	
Perfluoroundecanoic acid (PFUnA)	%	104			50-150	Pass	
Perfluorododecanoic acid (PFDoA)	%	115			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	%	93			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	100			50-150	Pass	
LCS - % Recovery							
Perfluoroalkane sulfonamides (PFASAs)							
Perfluorooctane sulfonamide (FOSA)	%	100			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	%	105			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	%	100			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	%	103			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	%	106			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	%	95			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	%	102			50-150	Pass	
LCS - % Recovery							
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSAs)							
Perfluorobutanesulfonic acid (PFBS)	%	105			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	%	112			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	%	97			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	%	103			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	%	108			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	%	126			50-150	Pass	
LCS - % Recovery							
n:2 Fluorotelomer sulfonic acids							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	%	101			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	%	101			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	%	106			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)	%	110			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C10-C14	B17-Au26129	NCP	%	118			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
TRH >C10-C16	B17-Au26129	NCP	%	125			70-130	Pass	
Spike - % Recovery									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1					
Perfluorobutanoic acid (PFBA)	M17-Au24021	NCP	%	105			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	M17-Au24021	NCP	%	106			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	M17-Au24021	NCP	%	103			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	M17-Au24021	NCP	%	103			50-150	Pass	
Perfluorooctanoic acid (PFOA)	M17-Au24021	NCP	%	104			50-150	Pass	
Perfluorononanoic acid (PFNA)	M17-Au24021	NCP	%	106			50-150	Pass	
Perfluorodecanoic acid (PFDA)	M17-Au24021	NCP	%	104			50-150	Pass	
Perfluoroundecanoic acid (PFUnA)	M17-Au24021	NCP	%	99			50-150	Pass	
Perfluorododecanoic acid (PFDoA)	M17-Au24021	NCP	%	121			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	M17-Au24021	NCP	%	95			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	M17-Au24021	NCP	%	107			50-150	Pass	
Spike - % Recovery									
Perfluoroalkane sulfonamides (PFASAs)				Result 1					
Perfluorooctane sulfonamide (FOSA)	M17-Au24021	NCP	%	100			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	M17-Au24021	NCP	%	104			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	M17-Au24021	NCP	%	104			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	M17-Au24021	NCP	%	104			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	M17-Au24021	NCP	%	104			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	M17-Au24021	NCP	%	95			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	M17-Au24021	NCP	%	103			50-150	Pass	
Spike - % Recovery									
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSAs)				Result 1					
Perfluorobutanesulfonic acid (PFBS)	M17-Au24021	NCP	%	103			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	M17-Au24021	NCP	%	107			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	M17-Au24021	NCP	%	98			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	M17-Au24021	NCP	%	106			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	M17-Au24021	NCP	%	100			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	M17-Au24021	NCP	%	127			50-150	Pass	
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids				Result 1					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	M17-Au24021	NCP	%	106			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	M17-Au24021	NCP	%	104			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 FTS)	M17-Au24021	NCP	%	103			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)	M17-Au24021	NCP	%	110			50-150	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C10-C14	M17-Au27139	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
TRH C15-C28	M17-Au27139	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH C29-C36	M17-Au27139	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
TRH >C10-C16	M17-Au27139	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
TRH >C16-C34	M17-Au27139	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH >C34-C40	M17-Au27139	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
Duplicate									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1	Result 2	RPD			
Perfluorobutanoic acid (PFBA)	M17-Au24019	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	M17-Au24019	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorohexanoic acid (PFHxA)	M17-Au24019	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	M17-Au24019	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	M17-Au24019	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorononanoic acid (PFNA)	M17-Au24019	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorodecanoic acid (PFDA)	M17-Au24019	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnA)	M17-Au24019	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorododecanoic acid (PFDoA)	M17-Au24019	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotridecanoic acid (PFTrDA)	M17-Au24019	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	M17-Au24019	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Duplicate									
Perfluoroalkane sulfonamides (PFASAs)				Result 1	Result 2	RPD			
Perfluorooctane sulfonamide (FOSA)	M17-Au24019	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	M17-Au24019	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	M17-Au24019	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	M17-Au24019	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	M17-Au24019	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	M17-Au24019	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	M17-Au24019	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
Duplicate									
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSAs)				Result 1	Result 2	RPD			
Perfluorobutanesulfonic acid (PFBS)	M17-Au24019	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoropentanesulfonic acid (PFPeS)	M17-Au24019	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorohexanesulfonic acid (PFHxS)	M17-Au24019	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	M17-Au24019	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	

Duplicate									
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSAs)				Result 1	Result 2	RPD			
Perfluorooctanesulfonic acid (PFOS)	M17-Au24019	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorodecanesulfonic acid (PFDS)	M17-Au24019	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Duplicate									
n:2 Fluorotelomer sulfonic acids				Result 1	Result 2	RPD			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	M17-Au24019	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	M17-Au24019	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	M17-Au24019	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)	M17-Au24019	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
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.
N09	Quantification of linear and branched isomers has been conducted as a single total response using the relative response factor for the corresponding linear/branched standard.
N11	Isotope dilution is used for calibration of each native compound for which an exact labelled analogue is available (Isotope Dilution Quantitation). The isotopically labelled analogues allow identification and recovery correction of the concentration of the associated native PFAS compounds. 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

[redacted]	Analytical Services Manager
[redacted]	Senior Analyst-Organic (VIC)
[redacted]	Senior Analyst-Volatile (VIC)
[redacted]	Senior Analyst-Organic (QLD)
[redacted]	Senior Analyst-Organic (VIC)

[redacted]

National Operations 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.