

Preliminary Site Investigation and Limited Sampling, Karratha Airport



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Table of Contents

Acronyms	i
Executive Summary	ii
1.0 Introduction	1
1.1 Background	1
1.2 Objectives	2
1.3 Scope of Works	2
2.0 Site Identification	4
2.1 Certificate of Title	4
2.2 Land Use	4
2.2.1 Current Land Use	4
2.2.2 Surrounding Land Use	5
3.0 Environmental Setting	6
3.1 Topography	6
3.2 Climate	6
3.3 Geology	6
3.3.1 Regional Geology	6
3.3.2 Site Specific Geology	6
3.3.3 Acid Sulfate Soils	6
3.4 Hydrogeology	6
3.4.1 Regional Hydrogeology	6
3.4.2 Site Specific Hydrogeology	7
3.4.3 Groundwater Use Within and Around the Airport	7
3.5 Surface Water Hydrology	7
4.0 Historical Site Information	8
4.1 Airservices Land Use	8
4.2 Ownership of Airservices Operational Lots	8
4.3 Dangerous Goods	9
4.4 Contaminated Sites	9
4.5 Airport Environment Site Register	9
4.6 Historical Aerial Photographs	9
4.7 Previous Reports	11
4.8 Historical AFFF Use	14
4.8.1 Lot 217 - ARFF Fire Station	14
4.8.2 Lot 217 - Administration Buildings and Air Traffic Control Tower	14
4.8.3 Lot 4923 - Warehouse (Former ARFF Maintenance Area) and Powerhouse	14
4.8.4 Air Navigational Facilities	15
4.8.5 Former Fire Training Ground – Lot 4564 and Lot 302	15
4.9 Fire Suppression Activities	16
5.0 Site Inspection and Stakeholder Engagement	17
5.1 Observations, Interviews and Anecdotal Information	17
6.0 Data Quality Objectives	20
7.0 Areas of Environmental Concern	22
8.0 Limited Site Investigation Methodology	23
8.1 Health and Safety Planning	24
8.2 Underground Services Identification (Subsurface Clearance)	24
8.3 Non-Destructive Digging	24
8.4 Drilling Methodology	24
8.5 Soil Bore Logging and Sampling Methodology	25
9.0 Quality Assurance / Quality Control	30
9.1 QA/QC Samples	30
9.2 Laboratory Analysis Plan	30
9.3 Analytical Data Validation	30
9.4 Corrective Actions	31
9.5 Soil Data Validation	31

	9.6	Groundwater Data Validation	32
	9.7	Sediment Data Validation	33
10.0	Adopted	Assessment Criteria	34
	10.1	Overview	34
	10.2	Human Health	34
		10.2.1 Soil and Sediment	34
		10.2.2 Groundwater	34
	10.3	Ecological	34
		10.3.1 Soil and Sediment	34
		10.3.2 Groundwater	34
11.0	Results		36
	11.1	Field Observations	36
		11.1.2 Groundwater	37
	11.2	Analytical Results	38
		11.2.1 Soil and Sediment	38
		11.2.2 Groundwater	38
12.0	Updated	Conceptual Site Model (CSM)	40
	12.1	Potential Sources of Contamination	40
	12.2	Potential Receptors	41
	12.3	Potential Transport Mechanisms and Exposure Pathways	41
	12.4	Source Pathway and Receptor Linkages	42
13.0	Summary	and Conclusions	46
	13.1	Summary of Findings	46
	13.2	Conclusions	46
14.0	References		47
15.0	Standard	Limitations	49
Appendix A			
		Certificates of Title	A
Appendix B			
		Site Visit Photo Log	B
Appendix C			
		Bore Information	C
Appendix D			
		Contaminated Sites Information	D
Appendix E			
		Aerial Photographs	E
Appendix F			
		Historical Site Sampling	F
Appendix G			
		Subsurface Utility Clearance Report & Survey Data	G
Appendix H			
		Calibration Certificates	H
Appendix I			
		Bore Logs	I
Appendix J			
		Field Groundwater Purging Data	J
Appendix K			
		Field Quality Control Data	K
Appendix L			
		Laboratory Documentation	L

List of Tables (in Text)

Table 1-1	Completed Works and Sample Plan Deviation	3
Table 2-1	Airport Site Details	4
Table 2-2	Surrounding Land Use Summary	5
Table 4-1	Summary of Certificate of Title Information and Site Ownership History	8
Table 4-2	Aerial Photograph Review	9
Table 4-3	Summary of Historical Reports	13
Table 5-1	Summary of Observations and Anecdotal Information	18
Table 6-1	Summary of Data Quality Objectives	21
Table 7-1	Areas of Potential Environmental Concern	22
Table 8-1	Field Work Activity Summary	23
Table 8-2	Analysis Suites and Methods	28
Table 8-3	Detailed Analyte suite (CoPC)	29
Table 10-1	Adopted Assessment Criteria Summary	35
Table 11-1	Summary of Lithology – June 2017	36
Table 11-2	Groundwater Field observations	37
Table 12-1	Potential Receptors	41
Table 12-2	Updated Conceptual Model	43

List of Figures (Attached)

Figure 1a	Site Location
Figure 1b	Site Layout
Figure 1c	Site Hydrology – Surface Water Drainage
Figure 2a	Groundwater Sampling and Monitoring Well Locations - APEC 1 and 2
Figure 2b	Groundwater Sampling and Monitoring Well Locations - APEC 3
Figure 2c	Sediment Sampling Locations
Figure 3a	Groundwater Elevation and Interpreted Groundwater Flow Contours (June 2017) - APEC 1 and APEC 2
Figure 3b	Groundwater Elevation and Interpreted Groundwater Flow Contours (June 2017) - APEC 3
Figure 4a	Soil and Sediment Analytical Results - PFAS, PFAS, TRH & BTEXN - APEC 1 and APEC 2
Figure 4b	Soil and Sediment Analytical Results - PFAS, PFAS, TRH & BTEXN - APEC 3
Figure 5a	Groundwater Analytical Results - PFAS, TRH & BTEXN– APEC 1 and 2
Figure 5b	Groundwater Analytical Results - PFAS, TRH & BTEXN - APEC 1 and APEC

Tables (Attached)

Table 1	MW Register and Gauging Data
Table 2	Groundwater Field Chemistry
Table 3	Laboratory Analytical Results – PFAS Concentrations in Soil and Sediment
Table 4	Laboratory Analytical Results – PFAS Concentrations in Groundwater
Table 5	Laboratory Analytical Results – Hydrocarbon Concentrations in Soil and Sediment
Table 6	Laboratory Analytical Results – Hydrocarbon Concentrations in Groundwater

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
bgl	Below Ground Level
BOM	Bureau of Meteorology
BTEXN	Benzene, Ethylbenzene, Toluene, Xylene, Naphthalene
btoc	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
PFAS	Per- and Poly- fluoro alkyl substances
PFHxS	Perfluorohexane Sulfonate
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctane Sulfonate
PSCA	Preliminary Site Contamination Assessment
PSH	Phase Separated Hydrocarbons
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 Karratha 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 Groundwater.
 - **Data Gap 3:** Presence/Absence of PFAS impacts at Site Boundaries.
- Investigate three (3) APEC with AFFF related sources of contamination and identify key receptors and potential contaminant transport pathways.
- Update the conceptual site model (CSM).

The review of available data, Site interviews and inspections has indicated that multiple locations have been (or may have been) impacted by historical AFFF activities at the Site:

- Fuels and AFFF were used at the former fire training ground (FFTG) during training exercises and it is understood that there have been no intrusive investigations in this area.
- AFFF was variously stored at the ARFF fire station, buildings or in external Lot 4923 locations (Warehouse and Former Maintenance Area) and the FFTG between 1988 and 2011. AFFF was also potentially stored at fuel depots and hangars (operated by other parties) over an undetermined timeframe.
- PFAS compounds have been detected in soil and groundwater investigations at and around the ARFF Fire Station on Lot 217. No PFAS related investigations have been undertaken in other airport areas.
- Unrelated to AFFF effects, hydrocarbon impacts to soil and groundwater were detected and have since been remediated at the Powerhouse facilities (Lot 4923).

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 three APEC:

- APEC 1: ARFF Fire Station
- APEC 2: Warehouse (Former ARFF Maintenance Area) and Powerhouse
- APEC 3: Former Fire Training Ground

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 two locations within APEC 3.
- PFAS impacts in groundwater were reported within all APECs at concentrations greater than the adopted human health assessment criteria. It is noted that a potable water supply has not been identified within at least 2 km of the site.

- PFAS impacts in groundwater were also reported above the adopted ecological assessment criteria at all APECs, including highly disturbed freshwater ecosystems and in consideration of toxicological effects on aquatic organisms.
- Total recoverable hydrocarbons (TRH) and benzene, toluene, ethyl benzene, total xylenes and naphthalene (BTEXN) were not reported at concentrations greater than the LOR or adopted assessment criteria

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

- The following data gaps determined in the SAQP (AECOM 2017b) have been assessed and closed:
 - **Data Gap 1:** PFAS impacts are marginally present in soil but limited to APEC 3. PFAS was reported in sediment samples but at concentrations less than the adopted criteria.
 - **Data Gap 2:** PFAS impacts are present in groundwater at all three APECs.
 - **Data Gap 3:** PFAS impacts are present at the Site boundary in groundwater and reported in soil at concentrations less than the adopted criteria.
- The updated CSM indicates that source, pathway and receptor linkages remain "*possible*" based on the data collected during the limited sampling.

1.0 Introduction

AECOM Australia Pty Ltd (AECOM) was engaged by Airservices Australia (Airservices) to undertake a Preliminary Site Investigation (PSI) and limited sampling at Karratha Airport, herein referred to as the Site. The Site location is shown on **Figure 1a**. 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 the Site.

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 previous 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 three Areas of Potential Environmental Concern (APEC) (**Figure 1b**).

The draft PSI Report (AECOM, 2017a) and associated 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. Following issue of the draft PSI Report, AECOM provided a Sampling and Analysis Quality Plan (SAQP) (AECOM, 2017b) for a Limited Site Investigation as reported herein.

1.1 Background

Airservices operations at the Site are provided from subleased areas of the Karratha Airport Estate including the following facilities and land parcels:

- The ARFF Fire Station (FS) building
- Former Fire Training Ground (FFTG)
- Administration Buildings and the Air Traffic Control Tower
- Land parcel housing a Powerhouse, Warehouse facilities and an ARFF Maintenance Area/ Workshop (WKSP)
- Airfield Navigational Facilities

AFFF has been used for fire-fighting purposes around Australia since the late 1970s/early 1980s. On airports, AFFF has been stored and/or used at fuel depots, hangars and for operational and fire training purposes at ARFF areas. At the Site, firefighting services have historically been provided by various agencies as follows:

- Department of Fire and Emergency Services (DFES) until 1988
- Civil Aviation Authority (CAA) from 1988 to July 1995. (The CAA was established in July 1988 but split into two separate government organisations in July 1995: Airservices Australia and the Civil Aviation Safety Authority.)
- Airservices between 1995 and 2003
- DFES from 2003 to 2009
- Airservices from 2009 to present

It is understood that AFFF was stored onsite until 2011, but was not used by Airservices after 2010. 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. Perfluorooctane 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 sampling 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 Groundwater
 - **Data Gap 3:** Presence/Absence of PFAS Impacts at Site Boundaries
- Confirm the presence or absence of PFAS or other identified CoPC impacts to soil or sediment (in surface drains), within shallow groundwater and at inferred APEC or at overall Airport Estate boundaries.
- Investigate the three APEC with AFFF related sources of contamination and identify key receptors and potential contaminant transport pathways:
 - APEC 1: ARFF Fire Station
 - APEC 2: Warehouse (Former ARFF Maintenance Area) and Powerhouse
 - APEC 3: Former Fire Training Ground
- Update the conceptual site model (CSM) and identify any outstanding data gaps 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 **Figures 1b and 1c**. 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:

- Development of the PSI and SAQP to conduct a targeted PFAS and hydrocarbon contamination investigation at the identified APEC.
- Developed a Site specific Health Safety and Environment Plan (HSEP);
- Acquired Dial-Before-You-Dig (DBYD) underground utility plans;
- Liaised with both Airservices and other Stakeholders to obtain available as-built or block plans;
- Supervised Veris, certified cable location contractors for the mark out of underground utilities in the areas of investigation;
- Supervision of non-destructive digging (NDD) by hand auger to clear services at 23 locations to a minimum depth of 1.5 m bgl prior to the commencement of any mechanical drilling activities;
- Supervision of drilling works undertaken by [REDACTED] followed the by completion of 23 soils bores, of which 14 were converted to monitoring wells;
- Soil logging of the geological profile at each location;
- Development of all 14 wells using a submersible down-hole pump conducted by [REDACTED];
- Gauging round of all groundwater monitoring wells conducted by AECOM;
- Collection of soil sediment and groundwater samples.
- Surveying of all bores for location and elevation conducted by [REDACTED]; and
- Completion of this PSI with limited sampling report detailing the works undertaken, analytical results and updating the preliminary CSM.

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

Table 1-1 Completed Works and Sample Plan Deviation

APEC	Completed works (June/ July 2017) and Rationale (as per SAQP, 2017b)	Deviation from SAQP (AECOM, 2017b)	Sample Plan
APEC 1: Fire Station (FS) (0.2 Ha)	Advancement of five (5) soil bores (SBs) (SB01 – SB03 and SB05 and SB08) beyond the paved surfaces around the FS. A further two (2) SBs were advanced outside of the APEC 1 boundary; one on the eastern boundary of the neighbouring Water Storage Facility (WSF) (SB04) and one to west (SB09). As expected, the previously installed monitoring well (MW) located within the WSF had been destroyed. Conversion of four (4) SBs to MWs (SB03/ MW01, SB04/ MW02, SB05/ MW03 and SB09/ MW04) to approximately 4.5 m bgl, generally in the inferred direction of drainage and groundwater flow (to the north and east). The previously existing MW located west of SB09/ MW04 could not be located and is considered destroyed. Collection of sediment samples from the road-side drainage swale to the north of APEC 1. .	The high voltage (HV) electricity and fibre optic cable north of Norman Road could not be located by the Ground Penetrating Radar (GPR), due to ground conditions, therefore rendering it unsafe to advance the proposed SB (to be converted to a MW) north of APEC 1. The substation power inlet/outlets could not be confirmed with GPR, due to ground conditions and no As-built plans were available for this area. As such, SB05/ MW03 originally proposed adjacent to the substation was relocated approximately 15m south. As a result, one (1) proposed SB was removed as it would have been too close to SB05/ MW03. Proposed SB directly north of the FS gate was not advanced due to the inability of the GPR to pick up the water services known to be in the area (Fire Water and Hydrant connection). Soil samples were collected at higher frequency than specified in the SAQP (AECOM, 2017b) (0.0 - 0.1 and 0.1 - 0.5 m bgl) to provide better vertical delineation of the soil profile and a better understanding of soil condition near the water table. Two opportunistic surface water (SW) samples could not be collected from the roadside drains as they were dry.	Seven (7) soil bore locations sampled across various depths dependent on the geology encountered: 0.1, 0.5, 0.8, 1.0, 1.5, 2.5 and 3.4 m bgl. Collection of sediment samples (SED04 and SED06) from the road-side drainage swale to the north. Collection of groundwater samples from five monitoring wells (1 of which was existing).
APEC 2: Warehouse and Powerhouse (0.3 Ha)	The APEC extends to the boundary of Lot 4923 but excludes the air navigation facility. Advancement of six (6) SBs (SB11 – SB16 on the western boundary of APEC 2 and to the east and northeast. SB locations focused towards APEC boundaries but were designed to investigate the unsealed ground to the northeast, where PFAS was once reportedly stored. Conversion of four (4) of SBs to MWs (SB14/ MW08, SB16/ MW07, SB12/ MW06 and SB13/ MW05) to approximately 4.5 m bgl, in order to supplement the thorough monitoring well network already installed in the southwest of the site.	Conversion of an additional two soil bores (SB13/ MW05 and SB12/ MW06) to monitoring wells to provide representation on the western boundary of APEC 2 The high voltage (HV) electricity and fibre optic cable north of Norman Road and south of APEC 2 could not be located by the GPR, due to ground conditions, therefore rendering it unsafe to advance the two proposed SBs (one be converted to a MW) south of the APEC 2 boundary. Confirmation of a total of 8 existing monitoring wells as opposed to the 13 anticipated Soil samples were collected at higher frequency than specified in the SAQP (AECOM, 2017b) (0.0 - 0.1 and 0.1 - 0.5 m bgl) to provide better vertical delineation of the soil profile and a better understanding of soil condition near the water table.	Six (6) soil bore locations sampled across various depths dependent on the geology encountered: 0.1, 0.5, 0.8, 1.0, 1.5, 2.5 and 3.4 m bgl Collection of groundwater samples from 12 monitoring wells (8 of which were existing).
APEC 3: FFTG (0.8 Ha)	Advancement of six (6) SBs (SB20 – SB25) whose locations were designed to directly investigate soil quality within APEC 3. Advancement of a further two (2) SBs (SB18 and SB19) along the eastern boundary of APEC 3. Conversion of four (4) SBs to MWs to approximately 4.5 mbgl to provide FFTG coverage within the APEC 3 boundary. Conversion of two (2) SBs to MWs (SB18/ MW12 and SB19/ MW09) approximately 4.5 mbgl outside of the APEC 3 boundary to the east. Collection of sediment samples from channels of the former jet-boat park and the inferred discharged channel of the nearby water feature were collected (SED01 and SED02).	Elimination of one proposed sediment sample located to the south west of the jet boat park due to access and safety reasons. Relocation of proposed soil bore location originally to the southwest of APEC 3 to the mid-southern boundary (and a few meters north of the original location) of APEC 3 due to the potential fibre optic or HV cables in the area Soil samples were collected at higher frequency than specified in the SAQP (AECOM, 2017b) (0.0 - 0.1 and 0.1 - 0.5 m bgl) to provide better vertical delineation of the soil profile and a better understanding of soil condition near the water table.	Eight (8) SB locations sampled across various depths dependent on the geology encountered: 0.1, 0.5, 0.8, 1.0, 1.5, 2.5 and 3.4 m bgl Collection of groundwater samples from four (4) MWs (none of which were existing). Collection of two sediment samples (SED01 and SED02)
Airport Boundary	Advancement of a SB converted to MW (SB26/ MW15) to approximately 4.5 m bgl adjacent to the airport boundary to the northeast of APEC 2. Collection of a sediment sample (SED05) north of (SB26/MW15). Collection of the sediment sample (SED07) to the west of the fuel bulk storage facility drainage channel to northwest of APEC 2. Advancement of a SB converted to MW (SB17/ MW13) to approximately 4.5 m bgl north of the FFTG (APEC 3) to supplement the northern Airport Estate boundary, north of the FFTG. Collection of a sediment sample on the northern airport boundary, north of the former jet-boat park and inferred discharge channel of the nearby water feature (SED03).	None	Two (2) SB locations sampled across various depths dependent on the geology encountered: 0.1, 0.5, 0.8, 1.0, 1.5, 2.5 and 3.4 m bgl Collection of groundwater samples from two (1) MWs (MW13 and MW15) (none of which were existing). Collection of two sediment samples (SED03 and SED07)

2.0 Site Identification

In 1966, Hamersley Iron constructed an airport on the present Karratha Airport Site with a sealed gravel runway and small terminal building and named it Dampier Airport. After several years as a private airport, it was taken over by the Shire of Roebourne, (now the City of Karratha, which encompasses the towns of Karratha, Dampier, Roebourne, Point Samson and Wickham). The Site is located 14 km from Karratha and 9.3 km south of Dampier. The Karratha Airport Estate details are summarised in **Table 2-1** below.

Table 2-1 Airport Site Details

Item	Description
Site Owner	City of Karratha
Site Occupiers	City of Karratha Various aviation related leaseholders and tenants
Site Address	Gap Ridge, WA, 6714
Local Government Authority	City of Karratha (previously Shire of Roebourne)
Current Zoning	Other public purposes - airport
Current Land Use	Operational airport, commercial facilities and aviation fire station
Proposed Land Use	No change
Site Elevation	5-12 m Australian Height Datum (AHD)
Site Location	Figure 1a
Site Layout	Figure 1b

2.1 Certificate of Title

A review of available Certificates of Title (**Appendix A** and **Section 4.2**) confirms:

- The airport is mostly situated on Lot 300 and Lot 302 on a Qualified Certificate of Crown Land Title. However, the airport also includes Lots 207, 4923 and 4564 as indicated on **Figure 1b**
- Under the Qualified Certificate of Crown Land Title, the Primary Interest Holder of Lot 300 and Lot 302 is the City of Karratha

2.2 Land Use

2.2.1 Current Land Use

The primary land use is for domestic airport purposes, including the following primary airport facilities:

- Runways and taxiways
- 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 Woodside Energy Limited and Bristow Helicopters Australia Pty)
- Cargo handling and storage areas
- Fuel storage facilities (operated by Shell and BP)
- ARFF Fire station and Former Fire Training Ground (FFTG);
- Former jet boat recreational park
- Weather station
- Surrounding carparks and landscaped areas.

The initial site visit (AECOM, 2017a) photo log is provided in **Appendix B**.

2.2.2 Surrounding Land Use

Surrounding land uses within Karratha Airport are summarised in **Table 2-2** and shown on **Figure 1b**.

Table 2-2 Surrounding Land Use Summary

Direction	Description
North	Salt works, including evaporation ponds, stockpiles and processing facilities.
East	To the east of the airport is the Gap Ridge flood plain. A man-made channel "Bitterns Channel" runs from the salt works towards Nickol Bay with deltas along the length of the channel creating the Gap Ridge flood plain.
South	Vacant land beyond which Dampier Highway extends from the west to the south of the airport, and leads to residential and commercial areas of Nickol, Baynton and Millars Well.
West	Dampier Highway beyond which are salt works and evaporation ponds further to the west.

3.0 Environmental Setting

3.1 Topography

The topography of the Site and surrounding area can be described as gently flat with a gentle slope towards the north, and an elevation of approximately 5 m Australian Height Datum (AHD) (PB, 2010).

3.2 Climate

BOM weather station 009021, located at the Site has been operational since 1972. Weather observations between 1993 and 2016 indicate the following:

- Average annual rainfall is approximately 298.6 mm, with January to March typically the wetter months (>40 mm per month);
- Average monthly maximum temperature from 1993 to 2016 ranged between 26.2°C and 36.1°C with January to March being the warmest months;
- Average monthly minimum temperature from 1993 to 2016 ranged between 13.7°C and 26.7°C with June to August being the coldest months.

3.3 Geology

3.3.1 Regional Geology

A review of the Department of Water Hydrogeological Atlas indicates that the Site geology comprises fractured rock described as Precambrian granite-greenstone terrain overlain by surficial sediments (<http://atlases.water.wa.gov.au/idelve/hydroatlas/>).

The regional superficial geology has been mapped by the Geological Survey of Western Australia 1:250,000 Environmental Geology Series, Dampier to Barrow Island Map Sheet (GSWA, 2003) as Quaternary alluvial sands comprising of silts and clays on floodplains underlain by Archean and Proterozoic granites and metasediments of the Pilbara Craton (PB, 2010).

3.3.2 Site Specific Geology

The lithology previously encountered at the powerhouse and former warehouse comprises approximately 0.5 to 1.0 m loose, red and brown silty, gravelly, sands. These loose sands are underlain by calcrete from 1.5 m to 2.5 m below ground level (bgl) with mixed clays and limestone gravels to approximately 4-6 m bgl. The stiffness and plasticity of the clays have been reported to increase with depth. High silt and clay content soils were identified at the groundwater level during drilling activities. It was suggested that due to the presence of clays at depth, there is a possibility that preferential pathways exist beneath the Site, with potential clay lenses influencing the flow of groundwater (MPL, 2006). This was not confirmed during the limited sampling conducted. Lithology encountered during the limited sampling is presented in **Section 11.1**.

3.3.3 Acid Sulfate Soils

A review of ASRIS Atlas of Australian Acid Sulfate Soils map indicates the Site is regarded as having an extremely low probability of ASS occurrence over its entirety.

3.4 Hydrogeology

3.4.1 Regional Hydrogeology

The regional ground water table is generally within 5 to 10 metres of the surface in the granitic areas, but may be quite deep below the greenstone hills (reference for DoW Hydrogeologic Atlas). The major aquifers are encountered within quartz veins, chert layers, fractured sandstones and shallow alluvium. Groundwater is mainly fresh, ranging up to brackish towards the coast.

3.4.2 Site Specific Hydrogeology

Groundwater beneath the Site has been encountered at a depth of approximately 2.2 to 2.8 m below top of casing (btoc), corresponding to a groundwater elevation of approximately 3.3 to 3.4 m AHD (PB, 2010). The aquifer permeability is inferred to be low due to clay content of subsurface. The groundwater flow direction is interpreted to vary across the Site. Shallow groundwater beneath the northern portion of the airport was inferred to flow in an easterly direction in 2010 (PB, 2010) but was previously interpreted to flow in a north, north-westerly direction (MPL, 2006). Because the airport is surrounded to the west, north and east by tidally inundated flats the localised groundwater flow direction may vary spatially and temporally (PB, 2010).

The groundwater velocity is not well understood and has been estimated to range between 0.37 m/year (PB, 2010) and 150 m/year (MPL, 2006).

3.4.3 Groundwater Use Within and Around the Airport

Karratha Airport facilities are connected to the Town of Karratha's mains water supply.

A search was conducted of the Department of Water (DoW) Water Register for licenced extraction bores in and around the airport (**Appendix C - Figure C-1**). Bore records indicated a single registered bore is located on Lot 319 in the north of the airport estate. [REDACTED] and allows an annual allocation (water volume) of 110 kL

It is assumed that this groundwater is predominately used for irrigation of landscaped areas.

In addition to licensed bores, the DoW Water Information Reporting database also provides information on monitoring bores or extraction bores exempt from abstraction licencing, such as private irrigation bores. A search for registered groundwater bores indicated another bore located south of the Karratha airport runway, within the airport boundary (**Appendix C – Figure C-2**). It is understood that this bore was used during the early stages of the airport development and may have been used for construction and/or irrigation purposes. It is not known whether the bore is currently used; however it is noted that this bore is up gradient from all APEC assessed as part of this report.

3.5 Surface Water Hydrology

The closest surface water bodies to Karratha Airport are the salt ponds which are located less than 1 km to the north and west of the Site. Based on aerial imagery, the Nullagine River appears to be incorporated into the salt ponds. These surface water features are presented in **Figure 1c**.

Nickol Bay is located approximately 3.5 km to the northeast of the Site. The coastline is tidally influenced as evidenced by meandering rivers and wetlands referred to as the Gap Ridge flood plain which extends to Pegs Creek, located immediately north of Karratha. An ephemeral river system (Coongan River) is located less than 1 km to the northeast of the Site and discharges into Nickol Bay.

A man-made channel, Bitterns Channel, extends from the southwestern corner of the salt ponds to Nickol Bay.

4.0 Historical Site Information

Lots 300 and 302 comprise the majority of the Site, however, Airservices has only provided services from portions of Lots 217, 302, 4923, and 4564, which are shown on **Figure 1b**. The historical Site information presented below is limited to the four Lots where Airservices has operated.

4.1 Airservices Land Use

Airservices operated at the Karratha Airport Estate between 1995 and 2003 and recommenced their involvement in 2009. Airservices currently provides airport operation services from the following facilities/locations (after PB, 2010):

- ARFF Fire Station (Lot 217)
- Administration Buildings and Air Traffic Control Tower (Lot 217)
- Air Navigational Facilities (Lot 4923)

The following facilities were previously used by Airservices but are no longer used:

- Former Fire Training Grounds (FFTG) (portion of Lot 4564 and Lot 302)
- Warehouse (Former ARFF Maintenance Area) and Powerhouse (Lot 4923)

These locations are indicated in the Site Layout information presented in **Figure 1b**.

4.2 Ownership of Airservices Operational Lots

The Certificate of Title information presented in **Appendix A** indicates that the airport was privately owned land prior to 1967. Between 1923 and the early 1960's the Site was likely utilised livestock grazing and farming. Hamersley Iron (Rio Tinto) purchased the land in 1967 when the airport was established. The ownership history of the four Lots from which Airservices has operated is indicated in **Table 4-1** (below).

Table 4-1 Summary of Certificate of Title Information and Site Ownership History

Volume and Folio	Survey Information	Date	Site Owner
All Four Lots			
Vol. 2317 Fol. 1923	All four Lots	26/10/1923	[REDACTED]
Vol. 1394 Fol. 1936	All four Lots	1/01/1935	[REDACTED]
Vol. 55 Fol. 1967	All four Lots	16/01/1967	[REDACTED]
Lots 4564 and 302 – Former Fire Training Ground			
Vol. 55 Fol. 1967	Lots 96, 99 & 100 on Deposited Plan 213519 *Reserve 30948*	8/07/1975	[REDACTED]
Volume LR3142, Folio 719	Lot 302 on Deposited Plan 41933	13/2/2007	City of Karratha
Volume LR3103, Folio 882	Lot 4564 on Deposited Plan 192375	13/1/2016	City of Karratha
Lot 4923 – Warehouse, Powerhouse, Air Navigational Facilities			
Vol. 55 Fol. 1967	Lot 216 & 217 on Deposited Plan 188164 *Reserve 40457*	26/04/1988	[REDACTED]
Vol. 3063 Fol. 616	Lots 216 on Land Administration Diagram 88164	13/06/1995	Civil Aviation Authority (Sundry F901497)
Vol. 3131 Fol. 350	Lot 4923 on Deposited Plan 36621	15/08/2002	City of Karratha (Airservices Australia Under Management Order)
Vol. 3131 Fol. 350	Lot 4923 on Deposited Plan 36621	25/07/2006	City of Karratha (Airservices Australia Under Management Order)

Volume and Folio	Survey Information	Date	Site Owner
Lot 217 – ARFF Fire Station, administration buildings and air traffic control tower			
Vol. 55 Fol. 1967	Lot 216 & 217 on Deposited Plan 188164 *Reserve 40457*	26/04/1988	
Vol. 3063 Fol. 617	Lot 217 on Land Administration Diagram 88164	13/06/1995	Civil Aviation Authority (Sundry F901497)
Vol. 3127 Fol. 185	Lot 217 on Deposited Plan 188164	15/08/2002	City of Karratha (Airservices Australia Under Management Order)
Vol. 3127 Fol. 185	Lot 217 on Deposited Plan 188164	25/07/2006	City of Karratha (Airservices Australia Under Management Order)

4.3 Dangerous Goods

A freedom of information request pertaining to the dangerous goods storage registered to Karratha Airport was submitted to the Department of Mines and Petroleum. There were no reports pertaining to PFAS storage contained within these records.

4.4 Contaminated Sites

A search of the DER Contaminated Sites database identified that Lot 4923 on Plan 36621 and Lot 217 on Plan 188164 are classified as '*possibly contaminated – investigation required*' (PCIR) under the Contaminated Sites (CS) Act 2003 due to the presence of hydrocarbons in soil and groundwater and PFOS and PFOA in groundwater. Lot 4564 and Lot 302 have not been classified under the CS Act 2003.

The data base search did not find any registered .sites on Lot 300 of Deposited Plan 41931, which comprises the runways of Karratha Airport. The database search results are provided within

Appendix D

4.5 Airport Environment Site Register

No environmental or contaminated sites register was available for Karratha Airport. However, a hazardous materials survey of the air traffic control tower, ARFF building and the air navigation facilities was undertaken in 2009.

4.6 Historical Aerial Photographs

The following summary information presented in **Table 4-2** below was derived from reviewing historical aerial photographs for the Site and the surrounding area. The photographs were obtained from Landgate. Enlarged sections of selected aerial photographs are included in **Appendix E**.

Table 4-2 Aerial Photograph Review

Photograph	Description
Sep1957 Black & White Appendix E1	Site appears to be undeveloped grass and pasture
May 1968 Black & White Appendix E2	Helicopter Hangers - The area remained as undeveloped grass and pasture Terminals - A small terminal building and apron are visible in the south ARFF Fire Station Zone - No change from the 1957 aerial photograph FFTG - No change from the 1957 aerial photograph. Airside runways - A single airstrip and taxiways are visible to the north of the area

Photograph	Description
Sep 1971 Black & White Appendix E3	Helicopter Hangers - A hangar building is visible and presumed to be the current Woodside Hangar with two small sheds to the west Terminals - Two additional buildings to the building visible on the 1968 aerial photograph - Two sheds are visible to the east of the terminal area - Soil disturbance in the area is visible to the north ARFF Fire Station Zone - Soil disturbance is present throughout the area FFTG - No change from the 1968 aerial photograph Airside runways - Airstrip appears to have been widened and white lines are present on the runway - Extensions to the taxiway were visible leading to the terminal buildings
Jul 1980 Black & White Appendix E4	Helicopter Hangers - The sheds identified in the 1968 aerial photograph have been removed - Two hangar buildings to the west of the Woodside hangar have been constructed - A bitumen taxiway or road is visible leading from the far westerly hangar building Terminals - A large rectangular concrete apron is visible to the east of the terminal apron - Three buildings believed to be airport maintenance workshops are present along the north of the concrete apron - A square cleared area to the north of the terminal building may have been a carpark - Areas of disturbed soils are visible to the north ARFF Fire Station Zone - Soil disturbance is visible throughout the area - An exposed dirt track runs along the southern boundary of the area FFTG - An exposed circular track and pad is shown at the western end of the FFTG - A darkened object can be seen which may indicate a fire training ground - An exposed dirt track is visible crossing the western portion of the area Airside runways - A exposed dirt road runs alongside the runway to the south - A right angled exposed dirt road and instrumentation is seen to the south of the area - Extensions to the taxiway leading to the terminal buildings are visible
Aug 2000 Colour Appendix E5	Helicopter Hangers - The Woodside Hangar appears to have been upgraded - The Bristow hangar can be seen to the west of the Woodside Hangar - The Royal Flying Doctor Service (RFDS) hangar is visible to the west of the Bristow Hangar - Bitumen taxiways from the runway are visible Terminals - A bitumen carpark is indicated north of the terminal building - The fuel storage facilities are present in the north east - Over seven buildings/sheds are present along the northern boundary ARFF Fire Station Zone - A round structure is present to the east of the maintenance workshop - Exposed soils are visible in the north - Bitumen areas are present around the maintenance workshop FFTG - Grey burn areas or gravel surround the concrete pad of the FFTG - The former Jet Boat facility is indicated to the west of the FFTG - An exposed dirt access track to the FFTG from the ARFF Fire Station is visible - A dark circular burn patch is present in the centre of the FFTG Airside runways - New bitumen runway appears to be under construction, south of the former runway

Photograph	Description
Nov 2008 Colour Appendix E6	Helicopter Hangers • A large bitumen apron extending to the west from the RFDS hangar is present • A building to the north of the Woodside Hangar is visible Terminals • The terminal building airside entrance appears to have been extended • The terminal carpark has been expanded with an additional carpark along the northern boundary • Two hangars are visible to the east of the terminal building • Over seven buildings and sheds run along the northern boundary ARFF Fire Station Zone • No significant changes from the 2000 aerial photograph were noted FFTG • No significant changes at the FFTG were noted Airside runways • Two taxiways linking the new runway to existing taxiways were identified
Jul 2015 Colour Appendix E7	Helicopter Hangers • Extensions to the Bristow Hangar were noted • Woodside Hangar appears to have been replaced with a new building to the north • The concrete aprons in front of the RFDS and Bristow Hangers are visible Terminals • The terminal has been extended • The terminal carpark has been expanded with an additional carpark along the northern boundary ARFF Fire Station Zone • Four water tanks to the east of the ARFF Fire Station are visible • The concrete apron at the front of the ARFF Fire Station has been upgraded • Upgrades to the truck wash down bay are also visible • There is bitumen surrounding the maintenance workshop FFTG • No significant changes at the FFTG were noted Airside runways • No significant changes were noted from the 2008 aerial photograph
Apr 2016 Colour Appendix E8	No significant changes were noted from the 2015 aerial

4.7 Previous Reports

AECOM is aware of the following previous reports relating to environmental investigations completed at the Site.

- CMPS&F (1996) Environmental Audit, Airservices Australia Rescue and Fire Fighting Service Karratha
- MPL (2003) Preliminary Stage 2 ESA – Former UST Area, Karratha Airport, WA
- OTEK (2003) Environmental Assessment Report, Karratha Airport, Regional Rescue and Firefighting services, Dampier road, Karratha, Western Australia
- MPL (2006) Evaluation of Monitored Natural Attenuation in the Remediation of Petroleum Hydrocarbon Impacted Soil and Groundwater – Powerhouse
- CBRE (2008) Condition Assessments, Karratha Airport and Port Hedland Airport
- PB (2009) Environmental Due Diligence Report, Karratha Airport, Aviation and Fire Rescue Fighting and Air Traffic Control Tower Facilities, July, 2009
- PB (2009) Hazardous Materials Survey
- PB (2010) Detailed Site Investigation, Lot 217 and Lot 4923 Norman Road, Karratha Airport, Western Australia

- PB (2011) Stockpile Assessment, Lot 217 Norman Road, Karratha Airport, Karratha, WA
- QED (2013) Industrial Waste Water Quality Assessment, December 2013
- AECOM, (2017a). Draft Preliminary Site investigation of ARFF Services at Karratha Airport, PRD 11383 Airservices Australia, Document Reference: 60509115-007-ENV-RPT-1, dated 8 March 2017.
- AECOM, (2017b). Sampling Analysis and Quality Plan Form Limited Site investigations at Karratha Airport, PRN 11383 Airservices Australia, Document Reference: 60509115-007-ENV-RPT-002_B, dated 9 March 2017.

Table 4-3 below summarises key aspects and findings made within these reports. A summary of previous site investigation locations indicated within the above reports is provided in **Figure F-1** of **Appendix F**.

It is noted that the analytical Limits of Reporting (LOR) for PFAS substances have varied over the period of reporting spanned by the documents summarised below. Similarly, environmental and health risk assessment Guidelines referenced in the individual reports are not consistent. Where statements regarding analytical LOR or Guidelines are made, these are statements specific to the analytical limits and guidelines adopted by the specific report being referenced.

Several other historical reports are noted below, but were either unavailable or incomplete at the time of reporting.

- MPL (2003) Hazardous Materials Assessment
- OTEK (2005) Geotechnical Investigation
- MPL (2006) Groundwater Well and Passive Skimmer Installation
- Coffey (2007) Environmental Site Assessment Airservices, Lot 4923 Australia Karratha Airport, Karratha WA

Table 4-3 Summary of Historical Reports

Report	Sample Date	Airport Estate Area	Sampling Information	COPCs	Report Summary/ Comments
CMPS&F, Environmental Audit, 1996	February, 1996	ARFF Fire Station	No samples collected	Not applicable.	An environmental audit was conducted on the Rescue and Fire Fighting Service facilities on 6 th February 1996. Recommendations were made with regard to the storage of fuels in bunds and in accordance with the Department of Mines and Energy requirements.
MPL - Preliminary Stage 2 ESA, 2003	June, 2003	Lot 4923 (Powerhouse)	Eight soil bores were drilled to a maximum depth of 2.5 m bgl. A total of four groundwater samples were collected.	TPH, BTXEN and PAHs.	MPL conducted a preliminary stage II ESA of the former powerhouse, UST area and transformer. The investigation found that diesel had been lost from the UST based on soil and groundwater monitoring. The transformer was reported to have lost insulating oil to nearby soil. The diesel UST was removed as part of the works, however, it is understood that due to the nearby surrounding infrastructure the excavation was backfilled without collecting validation samples and no further excavation of contaminated material occurred. The report also identified leaks within the diesel AST both inside the Powerhouse and pipework that extends out of the building. Soil samples were reported above the guideline criteria for the Ecological Investigation Limits for TPH fractions C10-C14 and TPH C15-C28 in half of the samples
OTEK – Environmental Assessment Report, 2003	July, 2003	Former Fire Training Ground	Six soil bores were drilled to a maximum depth of 2 m bgl and seven soil samples were collected.	TPH, TRH and BTEX	OTEK conducted a soil investigation to determine if there were any subsurface soil impacts within the former fire training ground after the cessation of activities by Airservices on site. All COPCs were reported below LOR in all samples.
MPL – MNA Evaluation, 2006	May, 2006	Lot 4923 (Powerhouse)	No samples collected	Not applicable.	MPL conducted an investigation of the previously reported phase separated hydrocarbon (PSH) contamination within the Powerhouse. It was recommended that a passive skimmer be used to remove PSH from groundwater in conjunction with direct injection of oxygen. Installation of new groundwater wells and soil samples to extend the network for delineation purposes and the resurvey of all monitoring wells was also recommended. General hydrogeological uncertainties were noted, and it was recommended that further investigations be completed in order to understand both plume and groundwater characteristics.
PB - Environmental Due Diligence Report, 2009	July, 2009	Lot 4923 and Lot 217	No samples collected	Not applicable.	PB conducted an environmental due diligence report prior to Airservices returning to Karratha Airport and reopening the ARFF Facility. Based on a report reviewed (Coffey, 2007), the groundwater flow was inferred to flow in a north-easterly direction.
PB – Hazardous Materials Survey, 2010	February, 2010	Lot 217 (Admin buildings and air traffic control tower)	No samples collected	Not applicable.	PB conducted a risk assessment of hazardous materials at the ARFF and Air Control Tower Facilities. A building condition survey for asbestos containing materials (ACM); ozone depleting substances (ODS); synthetic mineral fibre (SMF); polychlorinated biphenyls (PCB), Bromochlorodifluoromethane (BFCs) and lead in paint was performed. Asbestos, ODS, SMF and lead (in the form of batteries) were identified within the administration building.
PB - Detailed Site Investigation, 2010	July, 2010	Lot 4923 and Lot 217	Thirty one soil bores were drilled to a maximum depth of 5.6 m bgl. Eight of the soil bores were converted to monitoring wells and groundwater samples were collected	Soil: TPH, BTEX, PAH, OP/OCs, metals and PFOS, PFOA, 6:2 FtS Groundwater: TPH, BTEX, PAH, natural attenuation (NA) parameters, metals and PFOS, PFOA, 6:2 FtS.	PB conducted a DSI of Lot 217 and Lot 4923 Norman Road, Karratha. The objectives of the DSI were to identify onsite soil and groundwater impacts with respect to historical activities and assess the requirement for remediation. The investigation determined that asbestos was present in a number of locations, which may pose a risk to on-site workers. PSH was detected in one well where there was a historic spill of diesel and dieldrin and heavy metals were detected in soils around the warehouse area (Lot 4923). PFOS and PFOA were detected in the majority of soil samples around the administration buildings, Air Traffic Control Tower and the ARFF building (Lot 217). PFOS and PFOA were also detected in groundwater in these areas. No analysis for AFFF constituents undertaken on soil or groundwater samples collected from Lot 4923. The investigations identified the presence of contaminants including: AFFF compounds (PFOS, PFOA and 6:2 FtS), organochlorine (OC) pesticides, dieldrin and heavy metals (nickel and zinc). The investigations did not fully delineate the extent of soil impacts present at the Site and recommendations for further investigation were made. The lateral extent of hydrocarbon impacts to groundwater were considered sufficiently delineated.
PB - Stockpile Assessment, Lot 217 Norman Road, 2011	January, 2011	Lot 217 (Admin buildings and air traffic control tower)	A total of seven soil samples were collected from stockpiles	PFOS, PFOA and 6:2 FtS, OC pesticides and heavy metals.	Upgrades at the ARFF facilities required the excavation of soil from three areas, generating stockpiles of soil which was stored in three stockpiles for disposal. A total of 63 m ³ of soil was stored in the stockpiles. AFFF compounds were detected in all of the stockpiles.
QED - Industrial Waste Water Quality Assessment, 2013	December, 2013	Lot 217 (ARFF Fire Station)	One sample.	Field parameters, physiochemical parameters, PAHs, TPH, TRH, BTEX, heavy metals and surfactants (MBAS) and PFAS (PFOA and PFOS).	QED performed industrial waste water sampling on the oil/water separator at the ARFF Fire Station to assess the quality of water treated onsite and discharged into the sewage system. Concentrations were noted above the LOR for TPH, TRH, BTEX and metals, but were reported below the Water Corporation guidelines for waste disposal. Concentrations above the LOR were reported for MBAS, PFOA and PFOS.

4.8 Historical AFFF Use

It is understood that two PFAS containing AFFF products were stored and used by ARFF operations at the Site:

- 3M Light Water™ AFFF (PFOS based surfactant) FC-206CF 6%, used between 1988 and 2003
- ANSUL Ansulite 6% AFFF (Formula 1559-22 ICAO-B) used between 2009 and 2011.

It is not known what product was used between 2003 and 2009, when DFES controlled ARFF activities.

During the period that PFAS-bearing AFFF products were stored and used on the Site, the following activities may have generated the potential for AFFF to be released to the environment:

- Fire training activities
- Firefighting and incident responses
- Maintenance of firefighting infrastructure, including washing and testing of tenders and their monitors and draining and drying of hoses employed to discharge AFFF
- Direct releases and/or spillages to ground from faulty infrastructure or during transfer of AFFF from Intermediate Bulk Containers (IBCs) or storage tanks to fire-fighting equipment.

These activities have previously and predominantly occurred at:

- ARFF Fire Station
- Warehouse (former ARFF Maintenance Area) and Powerhouse
- Former Fire Training Ground.

4.8.1 Lot 217 - ARFF Fire Station

The ARFF Fire Station was constructed in 1987, was vacated in 2003 and was re-occupied in 2009. The facilities are located on Norman Road and include offices, storage rooms, amenity facilities, internal storage for two fire trucks and outside car parking for staff. The ARFF building comprises brick walls and concrete flooring, including the parking area for the fire trucks. The remainder of the Site comprises either blue-metal gravel (used for staff parking) or areas of native shrubs and grasses. A concrete based wash down bay area is located on the eastern boundary of the ARFF building, which drains into an oil interceptor trap (OIT) (PB, 2010). The OIT discharges into stormwater drains within the airport facility. There are four Aboveground Storage Tanks (AST) located next to the fire station, one of which was used to store AFFF.

4.8.2 Lot 217 - Administration Buildings and Air Traffic Control Tower

Immediately west of the ARFF building on Lot 217 is the Air Traffic Control Tower, which includes a navigation control tower and a communications room. The unmanned communication room is currently utilised for navigation purposes (i.e. telecommunications). The administration building has been utilised as a storage space by the City of Karratha and Airservices since 2003 (PB, 2010). None of the information reviewed has suggested AFFF was stored in these buildings; but PFAS compounds have been detected in soils north of the carpark areas to the north of these buildings. (PB, 2010)

4.8.3 Lot 4923 - Warehouse (Former ARFF Maintenance Area) and Powerhouse

The warehouse building located on the southern portion of Lot 4923 was previously used as a workshop and lies approximately 50 metres north of the ARFF Fire Station. The warehouse comprises concrete foundations, brick walls and fibreboard panel ceilings.

The former ARFF maintenance area was used as a mechanical workshop for ARFF vehicles and has been used to store AFFF in banded IBCs. (PB, 2010) Firefighting tenders and equipment were serviced at the former workshop but anecdotal information suggests that testing of the fire tenders was undertaken on the front apron of the ARFF Fire Station.

Two below ground concrete septic tanks are located along the eastern end of the Norman Street in front of the building, as well as another OIT. An onsite drain is located on the northern side of the workshop building. Ground surfaces north of the workshop slope towards a drain that collects surrounding surface water runoff, including waste water from the Workshop (PB, 2010).

Historically, materials stored in the workshop have included (CMPS&F, 1996):

- 4,500 L diesel Underground Storage Tank (UST) (removed in 2000)
- 10 x 200 L kerosene drums
- 10 x 200 L AFFF drums
- 20-40 kg dry chemical containers
- Up to 50 L of oil and other lubricants
- Less than 20 L degreasers and paint, solvents and degreasers in fire proof cabinets
- Up to 20 L of corrosion inhibitor
- Up to 200 L of waste oil stored in drum containers
- Gas cylinders for oxyacetylene welding.

It is understood that the City of Karratha and Airservices have used an area to the north of the Workshop and south or southeast of the Air Navigation Facility for storage purposes, with the following being stored in this area (PB, 2010):

- AST adjacent to this chemical storage area
- Unused machinery, trailers and electrical cables
- 200 L drums
- 1,000 L pallets of aqueous film-forming foam concentrate
- Purple K – dry chemical powder.

A Powerhouse building is located on the western side of the warehouse, which contains two diesel generators installed in 1982. An associated 700 L diesel AST (MPL, 2003) is located in the southwest corner of the building. The Powerhouse has concrete foundations, brick walls and fibreboard panels lining the inside of the roof (PB, 2010).

A former diesel UST was decommissioned and removed in 2000 after diesel leaks were identified. Based on the nearby grouping of groundwater monitoring wells, the UST is interpreted to have been located directly south of the eastern end of the Powerhouse. The Powerhouse also contains a diesel AST within the southwest of the building, which was previously reported to be leaking inside the building, as well as outside the building onto surrounding soils.

4.8.4 Air Navigational Facilities

The air navigation facility (ANF) is also located on Lot 4923. This facility comprises a demountable building and a small communication tower for airport navigation systems and is separately fenced-off from the other buildings and features of Lot 4923.

4.8.5 Former Fire Training Ground – Lot 4564 and Lot 302

The Former Fire Training Ground (FFTG) (referred to in some reports as the Firefighting Drill Ground) is believed to have been vacant land prior to its construction approximately 30 years ago. It is located to the northeast of the Airport facilities and immediately east of a former recreational jet boat park.

The FFTG includes a mock fire training plane structure which remains on a concrete pad, surrounded by gravel. A drain in the centre of the concrete pad would direct water during training activities to an onsite sump. A timber smoke-hut is also located onsite and wrecked cars have been stored along the western boundary. With respect to previous fuel storage, 200 L drums containing kerosene were previously stored to the north of the FFTG (OTEK, 2003). No UST or associated pipework ever existed at the FFTG (CMPS&F, 1996).

Airservices firefighting training was relocated from Port Hedland Airport to Karratha Airport between 2002 and 2003. Based on anecdotal information all fire training activities were subsequently centralised from regional airports to the Perth Airport from approximately 2008. It is understood that DFES may have used the FFTG from 2003 to 2009.

4.9 Fire Suppression Activities

Anecdotal information suggests that fire fighters responded to an incident at Karratha Airport in 1988; however, no records were available on this incident at the time of reporting.

5.0 Site Inspection and Stakeholder Engagement

A questionnaire was sent to both the Karratha Airport and ARFF representatives prior to the Site inspection and stakeholder meetings to identify the potential Site uses and activities that could have led to AFFF releases and contamination concerns. On 28 July 2016 [REDACTED]

[REDACTED] met with the following Karratha Airport representatives:

- [REDACTED] – Airport Manager
- [REDACTED] – Airport Operations Manager

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

- [REDACTED] (Fire Station Manager)
- [REDACTED] (Acting Fire Commander)

During the Site visit with the ARFF Station Manager a visual inspection of the airport and areas that may be impacted with PFAS were undertaken. A photo log of the Site inspection is provided in **Appendix B**. The areas of the Karratha Airport Estate that were inspected included:

- Former Fire Training Ground, current ARFF Fire Station and maintenance building area;
- Terminal areas, helicopter hangar; and
- Bulk fuel storage facilities.

5.1 Observations, Interviews and Anecdotal Information

Observations made during the Site inspection are summarised in **Table 5-1** below. 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		
Plate #	Airport Facility / Area	Detail
1	ARFF Fire Station	The ARFF Fire station tender bay, triple interceptor and Solberg foam storage area;
2		The front apron of the ARFF Fire Station was observed to contain a surface water drain in front of the fire tender bays and drains to the grass to the south.
3		Four ASTs containing water were observed. These were reportedly used as back up water supply for the Fire Station.
4		The Powerhouse and Airservices Mechanical Workshop building located to the north of the Fire Station.
5		Within the mechanical workshop building and along the north eastern corner, AFFF was stored in bunded 1000 L plastic IBCs.
6		The ATC and administration buildings to the west of the Fire Station were observed.
9		The stormwater drainage evaporation pond along the northern boundary.
7	FFTG	The Former Fire Training Ground with steel mock plane on a cracked concrete bund.
8		Within the Former Fire Training Ground an area of burnt car bodies and a smoke hut which previously contained water and dry chemical fire extinguishers.
10		Soil stockpiles along the western boundary of the Former Fire Training Ground.
11	Terminals	The terminal building was observed with a bitumen apron.
12	Helicopter Hangers	The Woodside helicopter hangar along the north western boundary contained a water fire suppression system.
13		AFFF containing fire extinguisher on Woodside apron.
14		The Bristow Hangar to the south of the Woodside hangar and a blue fire extinguisher containing AFFF on the concrete apron refueling area

ARFF Station Representatives Comments		
#	Airport Facility / Area	Detail
1	ARFF Fire Station	Airservices operated ARFF facilities from 1988 – 2003 and recommenced in 2009.
2		During the period of 2003 – 2009 the Fire Station was used by Water Police.
3		All vehicle testing of AFFF and water discharged during maintenance was undertaken at the front apron of the Fire Station.
4		AFFF was stored in 200 L drums and/or 1000 L IBC containers at the northeast corner of the maintenance workshop area.
5		Stormwater from the ARFF Fire Station is directed to the drainage triple interceptor and then directed to the open spoon drain to the north of the station to evaporate.
6	FFTG	DFES and Fire and Emergency Services Authority of WA (FESA) occasionally used the FFTG. The nature of those activities is unknown.
7		In 2011 soil was removed from the apron area of the Fire Station during extensions and resurfacing works. This soil was reportedly stockpiled to the west of the Fire Station along the access road to the FFTG and this stockpile has been added to over time with airport construction works.
8		A FFTG was located in to the west of the Fire Station adjacent to the former jet boat facility and contained a fabricated mock plane, smoke hut and cars.
9		It is likely that weekly training was undertaken from 1988 – 2003 at the FFTG where 40 L of AFFF may have been applied during some of the scenarios.
10	Airport (general)	There was no recollection of any aircraft incidents at the Karratha Airport where AFFF may have been applied.
11	Helicopter Hangers and Terminals	It was suggested that only water was used in fire suppression systems of the hangars.
12	Fuel Depots	The bulk fuel storage facilities fire suppression systems may contain AFFF in 20 L drums stored in roadside cabinets.

Karratha Airport Representatives Comments		
#	Airport Facility / Area	Detail
1	Airport (general)	Karratha Airport has operated as a domestic airport for 50 years.
2		The airport was originally owned by Hammersley Iron (Rio Tinto), from 1966 – 1970 when ownership was transferred to Shire of Roebourne that changed its name to City of Karratha in 2014.
3		Prior to 1966 the airport was undeveloped grazing land and was part of a regional cattle station.
4		Prior to the commissioning of the water treatment plant (in approximately 2012), waste water was directed to unspecified evaporation pond facilities north of the airport.
5		Treated waste water is currently used for non-potable supply including fire hydrants and irrigation.
6		There is no reported contaminated sites register kept for the airport.
7		There is no groundwater used at the airport but there are monitoring bores throughout the airport with the locations of these to be supplied.
8	Airside runways	The ‘foxtrot’ taxiway located beside the current runway was the original runway and the present runway was relocated in the early 1990’s and extended in 2008.
9	FFTG	There were stockpiles of soil and bitumen located beside the former jet boat recreational park and FFTG. The origin of these is not known.
10		ARFF had attended fuel spills on the terminal aprons. Water was used for the clean-up.
11	Helicopter Hangers and Terminals	There was no recollection of fire retardant products such as AFFF used / stored by the charter operators at the airport hangars or at the bulk fuel storage facilities. MSDS sheets for these products would be requested.
12	Terminals	Sewerage water was treated onsite in septic systems that have since been decommissioned after the creation of the onsite water treatment plant two years ago.
13		Stormwater is directed through drains to a separate evaporation pond located north of the bulk fuel storage facilities.

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 and/or Sediment	Data Gap 2: Presence/Absence of PFAS Impacts in Groundwater	Data Gap 3: Presence/Absence of PFAS Impacts at Site Boundaries
Step 1 Problem Statement	Problem Statement: Confirmation of presence or absence of PFAS or other identified CoPC impacts to soil or sediment (in surface drains). Decision Makers/Stakeholders: AECOM, Airservices and Karratha Airport Resources: Intrusive site investigation resources: surface and shallow depth soil samples collected by hand-auger and small drill rig	Problem Statement: Confirmation of presence or absence of PFAS impacts within shallow groundwater. Decision Makers/Stakeholders: AECOM, Airservices and Karratha Airport Resources: Intrusive site investigation resources. Installation of shallow groundwater monitoring wells with a small drilling rig.	Problem Statement: Confirmation of the presence or absence of PFAS impacts at inferred APEC or at overall Airport Estate boundaries to inform of the potential risks posed to potential off-site receptors. Decision Makers/Stakeholders: AECOM, Airservices and Karratha Airport Resources: Site investigation resources required for the collection of surface water, sediment and groundwater samples.
Step 2 Decision Identification	<i>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?</i>	<i>Have PFAS impacts migrated to groundwater within those APEC where PFAS in soil has previously been detected (or inferred by analyses of excavated soils)?</i>	<i>Have PFAS impacts migrated beyond specific APEC or Airport boundaries? To what extent do surface water pathways cause direct off-site discharge of AFFF derived contaminants?</i>
Step 3 Decision Inputs	Conducted a soil and sediment sampling program within and close to APECs. <u>APEC 1: ARFF Fire Station</u> - Seven soil-bore locations (SB01, SB02, SB03, SB04, SB05, SB08, SB09) - Two sediment sample locations (SED04 and SED06) <u>APEC 2: Warehouse (Former ARFF Maintenance Area) and Powerhouse</u> - Six soil-bore locations (SB11, SB12, SB13, SB14, SB15, SB16) <u>APEC 3: FFTG</u> - Nine soil-bore locations (SB17 – SB25) - Two sediment sample locations (SED01 and SED02) <u>Site wide (boundary):</u> - One soil bore converted to a groundwater monitoring well on the northern airport boundary (SB26/ MW15). - One sediment/surface water sample to the northwest of APEC 2 (SED05), hydraulically up gradient of fuel depot facilities and one sediment sample to the northwest of APEC 3 (SED03) at the site boundary. - One sediment sample (SED07) to the northwest of APEC2, along Bayley Avenue in the storm water drain south of the bulk fuel storage facilities.	Conduct monitoring well installation and site wide groundwater sampling event: <u>APEC 1: ARFF Fire Station</u> - Converted four of the proposed seven soil-bores to monitoring wells - Conducted a groundwater monitoring event for utilising the new (4) and existing (1) monitoring wells <u>APEC 2: Warehouse (Former ARFF Maintenance Area) and Power house</u> - Converted four of the proposed six soil-bores to monitoring wells - Conducted a groundwater monitoring event for utilising the new (4) and a selection of the existing (8) monitoring wells <u>APEC 3: FFTG</u> - Convert five of the proposed nine soil-bores to monitoring wells - Conduct groundwater monitoring utilising the new (5) monitoring wells <u>Site wide:</u> - Sample the new groundwater monitoring well on the northern airport boundary during the groundwater monitoring event.	As indicated in relation to Data Gaps 1 and 2, several sampling locations were located at APEC / cadastral / Airport boundaries, in order to best utilise the limited investigation scope to evaluate potential cross-boundary impacts. Conducted groundwater sampling from new and selected existing groundwater monitoring infrastructure at locations close to APEC / Airport boundaries. No surface water sampling was undertaken and locations were dry.
Step 4 Study Boundaries	Spatial: Within or at Airport boundaries as shown in attached Figure 1b Temporal: Timely consultation with Karratha Airport and Airservices to allow access to proposed sampling locations. Constraints: Approvals from Karratha Airport, Airservices and other site users/stakeholders and potential conflicts between investigation locations and critical services.	Spatial: Within Airport boundaries only and specifically at APEC 1, 2 and 3 as shown by Figure 1b Temporal: Timely consultation with Karratha Airport and Airservices to allow access to proposed locations. Constraints: Approvals from Airport, Airservices and other site users/stakeholders. Potential conflicts between investigation locations and critical airport services may exist.	Spatial: In proximity to APEC and Airport boundaries. Temporal: Timely consultation with Karratha Airport and Airservices to allow access to proposed locations. Constraints: Approvals from Airport, Airservices and other site users/stakeholders. Potential conflicts between investigation locations and critical airport services may exist.
Step 5 Decision Rules	Soil analytical data was assessed against adopted Assessment Criteria (refer Section 10.0). The initial soil quality studies undertaken in this Limited investigation, as per the SAQP (AECOM, 2017a) were designed to confirm presence or absence of PFAS only.	Groundwater analytical data will be assessed against the adopted Assessment Criteria (refer Section 10.0). The initial groundwater quality studies undertaken in this limited investigation, as per the SAQP (AECOM, 2017a) were designed to confirm presence or absence of PFAS only. Full delineation may not be achieved based on the limited number of investigation locations proposed.	Analytical data will be assessed against the adopted Assessment Criteria (refer Section 10.0 below).
Step 6 Decision Error Limitation	The potential for significant decision errors was minimised via a robust QA/QC program in accordance with NEPM guideline requirements. Standard operating procedures were followed to ensure accurate and representative data acquisition. Data quality indicators (DQIs) were 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 any necessary corrective actions.		
Step 7 Design Optimisation	Soil and sediment sampling locations were selected on the basis of accessibility and proximity to potential or suspected PFAS impacted areas. Note that not all proposed locations were installed (refer to deviations from SAQP in Section 1.3) as some locations were deemed to be unsafe due to the presence of services that could not be identified due to ground conditions.	Proposed monitoring well locations were selected to confirm the presence or absence of PFAS impacts. Existing monitoring wells should be utilised in subsequent Groundwater Monitoring Events.	Sampling locations were refined based on site observations and: - The ability to Safely access sampling locations - The likelihood of the location being a continuous or ephemeral surface water feature

7.0 Areas of Environmental Concern

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

It should be noted that APEC 4 and 5 pertain to areas where Airservices has not operated and these areas are therefore not shown on the attached figures, nor developed further in CSM considerations in **Section 12.0** and were not targeted as part of the Limited Site Investigation.

Table 7-1 Areas of Potential Environmental Concern

APEC	APEC Description	Airport Area	Known Issues	COPC
1	ARFF Fire Station	Lot 217	- Historical AST storage of AFFF - Historical AFFF use on apron during testing of equipment and tenders - Current diesel and Solberg AST. - PFAS and pesticides in soil - PFAS and slightly elevated dissolved zinc in groundwater	TPH, PFAS
2	Warehouse (Former ARFF Maintenance Area) and Powerhouse (including transformer)	Lot 4923	- Historical AFFF storage area - Powerhouse diesel UST had a leak and was removed in 2000 - Skimmer PSH remediation from 2005. - Hydrocarbons and pesticides in soil - Hydrocarbons slightly elevated dissolved copper nickel and zinc in groundwater	TPH, PCBs, PFAS
3	Former Fire Training Ground	Parts of Lot 302 and Lot 4564 (Northeast airport boundary)	- Fuels and AFFF use for training purposes (1988-2003) and potential impacts to soil and groundwater - Stockpiles of soil of unknown origin - Fire training activities	TPH, PFAS
4	Bristow and Woodside Airport Hangers	Lot 302 (west of main terminal)	- Unknown Fire Suppression Systems and uncertain use of PFOS/PFOA historically; and - Presence of PFAS containing fire extinguisher in the Bristow hanger.	TPH, PFAS
5	Bulk fuel storage facilities	Lot 302 (north of the main terminal and carparks)	- Unknown Fire Suppression Systems and uncertain use of PFOS/ PFOA historically; - Unknown if there are any PFAS containing fire extinguishers.	TPH, PFAS

8.0 Limited Site Investigation Methodology

Field activities were conducted at the site in accordance with:

- 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 is provided in **Table 8-1** below:

Table 8-1 Field Work Activity Summary

Dates	Activities	Contractors / AECOM Personnel
12 to 13 June 2017	Services / utilities clearance was undertaken at all new soil bore locations using GPR (ground penetrating radar) and CAT (cable avoidance tool) methods.	
21 to 23 June 2017	Supervision of the advancement of 23 soil bores to a maximum depth of 4.5 m below ground level (bgl), comprising: • APEC 1: 7 soil bores (SB01 – SB05, SB08 – SB09). • APEC 2: 6 soil bores (SB11 – SB16). • APEC 3: 9 soil bores (SB17 – SB25). • Airport boundary: 1 soil bore (SB26) downgradient of APEC1 and APEC2. Conversion of 12 soil bores into groundwater monitoring wells comprising: • APEC 1: 4 monitoring wells (MW01 – MW04). • APEC 2: 4 monitoring wells (MW05 – MW08). • APEC 3: 4 monitoring wells (MW09 – MW12). • Airport boundary: 1 monitoring well (MW15) Collection of 47 primary soil samples for laboratory analysis of PFAS and 13 primary soil samples for hydrocarbons; Drilling methods applied were push tube and hollow stem auger with a Geoprobe® rig	
29 June to 1 July 2017	Collection of 7 sediment samples from the on-site drainage network including at the site boundaries, for laboratory analysis of PFAS and hydrocarbon compounds. Completion of a GME with a peristaltic pump including the gauging and sampling of 23 groundwater monitoring using low-flow sampling techniques; Collection of 23 primary groundwater samples for laboratory analysis of PFAS and hydrocarbon compounds. Groundwater samples were collected from 14 newly installed monitoring wells (MW01 – MW13, and MW15) 9 existing monitoring wells (MW13 – MW18, MW19A – MW19C, MW20 – MW21) installed by GHD in 2016 on behalf of Karratha Airport.	
30 June 2017	Surveying of newly installed groundwater monitoring wells to m AHD.	

8.1 Health and Safety Planning

Prior to commencement of site works, a site-specific Health, Safety and Environment Plan (HSEP) was developed accordance with AECOM and Airservices Australia policy. All site works undertaken by AECOM, and AECOM preferred subcontractors [REDACTED]

[REDACTED] was conducted in accordance with the AECOM HSEP titled: *Limited Site Investigations – Karratha Airport & Port Hedland International Airport, Reference 60543717 dated 8 June 2017*.

All AECOM subcontractors and AECOM field personnel undertaking the works at Karratha Airport completed the Airservices Australia Contractor General Induction Course, Karratha Fire Station Induction 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.

Permits were not required to access any investigation areas on site as none of the locations were Airside.

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.

Dial before you dig (DBYD) utility plans were obtained by AECOM from Horizon Power, Telstra, WA and Water Corporation, WA, DBYD Job Numbers 12440856 (APEC 1 and 2) and 12440900 (APEC 3).

The service identification and clearance was informed by the current Dial Before you Dig (DBYD) plan 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 with regards to obtaining Service Identification and Clearance Variation Approval for drilling in proximity to services and amendments to the hand clearance requirements. Refer to **Appendix G** for the Subsurface Utility Clearance Report provided by [REDACTED]

8.3 Non-Destructive Digging

In addition, to the service clearance of all locations using GPR and CAT, all drill locations were cleared by non-destructive digging (NDD) methods by [REDACTED] using a hand auger to remove soil. Non-destructive clearance was advanced to a minimum of 1.5 m bgl 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.

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 NDD as described above, soil bores were advanced using a Geoprobe® rig.

Where ground conditions allowed, the soil bores were advanced using direct push techniques to allow the collection of relatively undisturbed soil samples for logging and sub-sampling for laboratory analysis.

Note that the direct push tube could not be used at locations where the ground was hard or refusal encountered therefore hollow stem augers (drill diameter of 150mm) were used to advance the soil bores to the required depth.

8.4.2 Groundwater Monitoring Well Installation

Select soil bores were converted to groundwater monitoring wells utilising hollow stem auger drilling methods. Monitoring wells were 50 mm in diameter and constructed using Class 18 uPVC. Monitoring wells were constructed with a minimum 3.0 m screen length attached to plain casing screw fitting installed in an approximately 225 mm diameter bore. The 3 metre screen length was installed to allow collection of samples from the shallow groundwater and to account for seasonal groundwater fluctuations. Screened sections were installed in a gravel filter pack, placed approximately 0.5 to 1.0 m above the top of the screen and to be isolated with a bentonite seal with any remaining void to the ground surface backfilled with bentonite cement grout.

The annulus around the screen was backfilled with a clean sand filter pack. The screened section was isolated with a 0.5 m thick bentonite seal, with the remaining void to the ground surface backfilled with cement grout.

Each well was fitted with a lockable well cap and a trafficable flush-mounted gatic cover secured into position with concrete with the exception of four wells in APEC 3 (MW11 – MW13) and the northern boundary well (MW15) which were fitted with steel risers (secured in concrete) for better visibility as they were located in vegetated areas.

All wells were developed immediately following installation using a 12V submersible pump to purge the remaining drill cutting, fines/ and or mud and any introduced water following installation. Each bore was developed until the purge water turned clear, or to a minimum purge volume of 50L of purge water. The screened section of the wells was targeted during the well development. All water generated was contained within 205L sealed drums to be removed and disposed of 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 I**.

8.4.3 Decontamination and Waste Management

Hand auger, drilling equipment and the 12V submersible pump 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 thorough rinsing. A water Liquinox mix was applied using a pressure washer between drill locations to avoid potential cross-contamination. Excess waste soil was temporarily stored in 205 L drums, for subsequent collection, transport and disposal 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.

Collection of soil cores via the use of percussive push-tube sampling was not possible for all soil bores. As such, representative samples of sub-surface soils for some bores were recovered from the drill arising's on the rotary augers.

Soil and sediment samples were collected using field equipment including a stainless a hand-auger to advance shallow soil bores.

Hand auger advanced soil bores were completed using the following methodology:

- Soil bores were advanced using a hand auger to a target depth of 1.5m bgl. In some locations, the depth of 1.5m bgl could not be achieved due to ground conditions (refusal).
- Disturbed soil samples were collected from 0.0- 0.2 m bgl (surface) and 0.5 - 1.5 m bgl
- Soil samples were collected directly from the hand auger into laboratory prepared sample jars for PFAS and hydrocarbons. Note: where when specific PFAS sampling containers, ran out, samples were collected in glass jars with 'Teflon' Liners' removed.

Surface 'sediment' samples (from base/invert of drains) were collected directly into the laboratory-supplied samples jars using nitrile gloves.

- Surface or sediment samples were collected by scraping surface soils to a maximum depth of 0.2 m bgl
- A single disturbed sediment sample was collected at each location directly into laboratory prepared sample jars.

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 or refrigerator 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 organic contaminants within soil, sub-samples were obtained at regular depth intervals, placed in a half-full 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 H**. The specific depths for the soil samples collected are detailed on the soil bore logs in **Appendix I**.

8.6 Groundwater Sampling

Gauging of static water level (SWL) was completed on 29 June 2017 prior to the commencement of the GME sampling program.

All groundwater monitoring wells were purged using low-flow techniques¹, 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). A peristaltic pump was used to recover groundwater samples dependent on response zone depth, with the pump inlet positioned 0.5m below the SWL in each well screen for all shallow wells. Two deep wells, MW19B and MW19C which formed a cluster of three wells (MW19A/B/C) were sampled at an intake depth of 8.0m and 12.7m btoc and 6.0m and 10.3m below the SWL respectively.

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.

¹ 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.

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 peristaltic 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 H**;
- Collection of groundwater samples directly into laboratory supplied and appropriately preserved bottles;
- Collection of groundwater samples and field QA/QC samples for laboratory analysis;
- Temporary storage of purged water on-site in 205 L sealed drums prior to removal and disposal in an appropriate manner by a licensed waste disposal contractor; and
- Decontamination of all non-dedicated sampling equipment between sample locations.

8.7 Groundwater Monitoring Well Elevation Surveying

All new and existing groundwater monitoring well locations were surveyed on 30 June 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 50mm in the x, y plane and to +/- 2mm vertically, relative to AHD. A copy of the survey data are provided in **Appendix G**.

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 all 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 H**.

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 Perth 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 Limit of Reporting (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 9.3 – 9.7**. Field Quality Control Data are provided in **Appendix K**.

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 lab 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 L**. Field Quality Assurance / Quality Control (QA/QC) data are included in **Appendix K**.

9.5 Soil Data Validation

Validation of the soil data is discussed below:

- Soil samples were collected in laboratory supplied sample containers.
- A field blank (SSQA01_210617, SSQA06_220617 and SSQA011_230617) was collected at a frequency of one each per day of sampling. Field blank concentrations were below the LOR for all analytes, with the exception of SSQA011_230617 which reported concentrations above the LOR for PFAS (0.06 µg/L), PFHxS (0.03 µg/L) and PFOS (0.03 µg/L). Note that these concentrations are negligible considering soil concentrations were up to two orders of magnitude higher. Rinsate blanks were not collected as part of this investigation as soil samples were collected using a fresh nitrile glove at each location to fill soil directly into the jars. No trip blanks were required as part of the PFAS investigation as there were not volatiles being analyzed.
- Two trips blanks (1 per esky) were collected for hydrocarbon analysis but not scheduled. It is noted that TRH concentration were reported at concentrations less than the LOR in all soil samples analysed.

- Primary and duplicate soil samples were received correctly preserved with ice, noting that samples were sent by road. ALS laboratory received the samples at a temperature of 10.3 °C in primary batch EP1707039, above the recommended temperature of 4 °C ± 2 °C. The triplicate soil sample was received correctly preserved at the Eurofins laboratory (batch 552888) with ice at a temperature of 10.3 °C. The sample receipt temperature is not considered to affect the integrity of the PFAS soil samples and there were no observations of hydrocarbon impact in the field as confirmed by the laboratory analysis suggesting that the sample receipt temperature for hydrocarbons would have had no influence.
- A total of 4 field duplicates and 3 field triplicates (inter-laboratory duplicates) were collected for PFAS analysis meeting the frequency of one in twenty primary samples (i.e. one of each). Field relative percentage differences (RPDs) were within control limits between the primary and duplicate sample and between the primary and triplicate sample
- All soil samples were extracted and analysed within recommended holding times, with the following exception: Soil moisture content exceeded holding times by 1 day for 13 samples.
- Method blanks were within control limits.
- Laboratory duplicates were within control limits.
- Laboratory control outliers were not reported.
- No surrogate outliers were reported.
- Matrix spike recoveries were within control limits, the exception of matrix spike recoveries not determined for: PFBS (S09_0.1), PFHxS (SS09_0.1, SS11_0.5, and SS18_3.4), PFOS (SS09_0.1 and SS11_0.5), PFHxA (SS09_0.1, SS11_0.5 and S18_3.4) and PFOA (SS11_0.5) due to the background level greater than or equal to 4x spike level.
- Batch EP1707039 (EP231): Particular samples required dilution due to the presence of high concentrations of contaminants. LOR values were adjusted accordingly.

No apparent anomalies between field observations and resultant data occurred.

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

9.6 Groundwater Data Validation

Validation of the groundwater data is discussed below:

- Groundwater samples were collected in laboratory supplied sample containers
- A field blank, trip blank and rinsate sample was collected at a frequency of one each per day of sampling. Field and rinsate blank concentrations were below the LOR for all analytes (**Appendix K**)
- A field blank (WQA01_300617 and WQA07_010717) and rinsate samples (WQA02_300617 and WQA08_010717) were collected at a minimum frequency of one each per day of sampling. Field blank concentrations were below the LOR for all analytes (PFAS and hydrocarbons). Rinsate blank concentrations were below the LOR for all analytes, with the exception of PFAS, PFHxS and, PFOA and PFOS with the highest concentrations reported at 2.24 µg/L, 0.28 µg/L, 0.03 µg/L and 1.69 µg/L respectively. Note that the potential for cross contamination to have impacted on the results is considered marginal as concentrations encountered in groundwater were orders of magnitude higher with the majority in exceedance of guideline values.
- Trip blank samples were collected at a frequency of one per esky and reported concentrations below the LOR all analytes.
- Primary and duplicate groundwater samples were received correctly preserved with ice, noting that samples were sent by road. ALS laboratory received the samples at a temperature of 0.3 °C in primary (batch EP1707076), below the minimum recommended temperature of 4 °C ± 2 °C. The triplicate soil sample was received correctly preserved at the Eurofins laboratory (batch 552886) with ice with no temperature recorded. The sample receipt temperature is not considered to affect the integrity of the PFAS soil samples and there were no observations of hydrocarbon impact in the field, with the exception of one sample (MW10_300617) as confirmed by the laboratory analysis suggesting that the sample receipt temperature for hydrocarbons would have had marginal influence.

- A total of 3 field duplicates and 3 field triplicates (inter-laboratory duplicates) were collected at a frequency of one in ten primary samples (i.e. one of each). Where field relative percentage differences (RPDs) were outside of control limits between the primary and duplicate sample and between the primary and triplicate sample, the highest value was presented for conservatism (**Appendix K**).
- All groundwater samples were extracted and analysed within recommended holding times, with the exception of TBW571 (TB) and TBW573_080617 for TRH - Semivolatile Fraction. It is noted that all sample results, with the exception of MW10, were reported at concentrations less than the LOR therefore cross contamination is considered unlikely. However, in noting the holding time exceedance it is possible that volatile loss may have occurred in samples taken from MW10. This is not considered to have affected the PFAS results.
- Method blanks were within control limits.
- Laboratory duplicates were within control limits.
- Laboratory control outliers were not reported.
- No surrogate outliers were reported.
- Matrix spike recoveries were within control limits, the exception of matrix spike recoveries not determined for MW02 for PFBS, PFPeS, PFHxS, PFOS, PFPeA, PFHxA, PFOA and FOSA due to the background level being greater than or equal to 4x spike level.
- Batch EP1707076 (EP231) - Particular samples required dilution due to the presence of high level contaminants; or dilution due high conductivity. LOR values were adjusted accordingly by the laboratory.

No apparent anomalies between field observations and resultant data occurred.

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

9.7 Sediment Data Validation

Validation of the sediment samples is included in the groundwater sampling discussed above as these samples were taken during the same event. Two field duplicate were taken for a total of 7 primary samples.

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

- WA 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

- WA DER (2017) Non-potable and Recreational Use Guideline.
- WA 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

- WA 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

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	--	--	WA DER (2017) Non-potable and Recreational Use Guideline.
		0.5	--	5	--	--	--	WA 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	--	--	WA DER (2017) Freshwater Guideline for Highly Disturbed Systems – 90% species protection.
		31	31	1824	31	--	--	WA DER (2017) Freshwater Guideline for Highly Disturbed Systems – 80% species protection.
		--	--	2900	6.66	2900	--	Airservices (GHD, 2015) EISLs – toxicity effects on aquatic organisms.

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 June 2017 limited investigation. Refer to **Appendix I** for the Bore logs. No visual and/or olfactory observations of potential contamination were reported any of the soil bores.

Table 11-1 Summary of Lithology – June 2017

Depth intervals (m bgs)	Lithology
APEC 1 – FS	
0 – 0.3	Gravel with shell fragments/ Fill (gravel)/ gravel with clay/ fine-grained (f-g) powdery white sand/ red moderate plasticity clay/ fill, road base, gravelly sand/ red sand, with high plasticity clay/ white, f-g sand, powdery/ red, moderate plasticity clay
0.3 – 1.5	Clay with limestone/ alluvial clays/ clay/ rock (0.5 to 0.7)/ clay with limestone/ red moderate plasticity clay/ limestone with gravel.
1.5 – 2.7	Gravelly clay/ clay/ medium to coarse-grained (c-g) clay with quartz/ gravelly limestone, with clay/ red, clay, with gravel.
2.7 – 3.7	Gravelly limestone, with clay/ red/ clay with gravel/ red, clay, with gravel.
3.7 – 4.5	Gravelly clay/ red, clay, with gravel.
Refusal Depths (m bgl) (push tube) - 2.7 m (SB03/ MW01), 3.7 m (SB05/ MW03), 3.1 m (SB09/ MW04), 1.3 m (SB08)	
APEC 2 – Workshop	
0 – 0.5	FILL, sand with crushed limestone/ bitumen fill/ gravel/ red, m-g sand/ gravelly clay, with calcrete/ red, m-g sand, with rock and gravel/ red, medium c-g sand, with rock/ medium grained sand, with gravel/ m-g sand.
0.5 – 1.2	Red clay/ clay/ gravelly clay, with calcrete/ brown, m-g to c-g sand with gravel/ high plasticity clay/ clay with calcrete/ sand/ granite rock
1.2 – 2.0	Clay with rock/ gravelly clay/ gravelly clay with calcrete/ sand/ rock (granite).
2.0 – 3.5	Rock with clay/ gravelly clay with calcrete/ gravelly clay/ high plasticity clay/ clay with gravel and limestone/ red clay/ f-g to m-g sand with gravel/ Rock/ clay with calcrete.
3.5 – 4.5	Gravelly clay
Refusal Depths (m bgl) (push tube) - 2.7 m (SB13/ MW05), 3.0 m (SB12/ MW06), 2.4 m (SB16/ MW07), 3.1 m (SB11), 2.6 m (SB15), 2.7 m (SB26/ MW015)	
APEC 3 – FFTG	
0 – 0.3	Red f-g sand with limestone/ red f-g sand with blue metal/ limestone/ f-g to m-g sand with gravel/ brown, m-g to c-g, gravelly sand/ f-g to m-g sand with limestone/ calcrete/ red f-g sand with gravel/ f-g sand with gravel/ red f-g to m-g sand with gravel
0.3 – 1.0	Limestone/ gravelly clay/ limestone/ gravel with rock and clay/ Limestone/ gravel with red clay/ gravelly clay with limestone clasts up to 100mm.
1.0 – 2	Gravelly clay/ clay with limestone/ f-g clay with gravel/ clay with gravel and calcrete/ clayey gravel with limestone/ gravelly clay with weathered limestone.
2.0 – 3.5	Gravelly clay with calcrete/ Clay with calcrete/ clay with gravel and calcrete/ clay with limestone/ calcrete/ brown f-g sand with gravel (1.0 – 1.2), clay with gravel and limestone,.
3.5 – 4.5	Gravelly clay with shiny material (potentially mica)/ gravelly clay/ gravelly clay with calcrete
Refusal Depths (m bgl) (push tube) - 3.1 m (SB22/ MW10), 3.6 m (SB18/ MW012), 3.5 m (SB20), 3.0 m (SB21), 3.0 m (SB21), 2.9 m (SB22), 3.5 m (SB25)	

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 J** for the field groundwater purging data, **Table 1** and **Table 2** (attached) for groundwater elevation and field chemistry data. **Figures 3a** and **3b** present the groundwater contours.

Table 11-2 Groundwater Field observations

Field Observation	June 2017 GME
Groundwater Elevation (m AHD)	Groundwater beneath the Site (29 June 2017) was encountered at a depth of approximately 1.6 to 2.8 m btoc, with corresponding groundwater elevation of approximately 2.6 to 4.1 m AHD. The aquifer permeability is inferred to be low due to clay content of subsurface and the observed delay in groundwater recharge in the soil bore during the groundwater monitoring well installation. Groundwater flow direction is shown to flow in a north easterly direction as was indicated from the gauging undertaken in June 2017.
Dissolved Oxygen (DO) (mg/L)	APEC 1 (FS) – 0.13 (MW14) to 1.38 (MW02) mg/L. APEC 2 (WKSP) – 0.10 (MW19A) to 6.02 (MW17) mg/L. APEC 3 (FFTG) – 0.96 (MW09) to 2.35 (MW12) mg/L. # MW19B and MW19C reported 0.59 mg/L and 0.88 mg/L respectively. ♦ MW13 and MW15 reported 2.17 and 0.48 mg/L respectively
pH (pH units)	pH was similar across all APECs ranging from 6.37 (MW19C and MW10) to 8.31 (MW21).
Electrical Conductivity (EC) (µS/cm)	APEC 1 (FS) – 1,710 (MW04) – 9,640 (MW01) µS/cm. APEC 2 (WKSP) – 805 (MW05) – 5,273 (MW07) µS/cm. APEC 3 (FFTG) – 57,566 (MW10) – 81,710 (MW12) µS/cm. #MW19B and MW19C reported 90,076 µS/cm and 128,255 µS/cm respectively. ♦ MW13 and MW15 reported 223,804 and 5,456 µS/cm respectively
Total Dissolved Solids (TDS)* (mg/L)	APEC 1 (FS) – 1,111.5 (MW04) to 6,266 (MW02) mg/L. APEC 2 (WKSP) – 523.3 (MW05) to 3,427.5 (MW07) mg/L. APEC 3 (FFTG) – 37,418 (MW10) to 53,112 (MW12) mg/L. # MW19B and MW19C reported 58,549 mg/L and 83,366 mg/L respectively. ♦ MW13 and MW15 reported 223,804 and 5,456 µS/cm respectively
Redox Potential (mV)	APEC 1 (FS) – -148 (MW14) to 99.5 (MW04) mV APEC 2 (WKSP) – -156.2 (MW19A) to 119.3 (MW17) mV APEC 3 (FFTG) – 113 (MW12) to 214.8 (MW10) mV # MW19B and MW19C reported 137.7 and 138.7 mV and respectively. ♦ MW13 and MW15 reported 185.2 and 72.9 mV respectively
Temperature (°C)	Temperature was similar across all APECs ranging from 24.9 (MW17) to 31.9 (MW08) °C
General Comments and evidence of impact	Purged water was noted to be low turbidity, colourless to light brown/ light red/ light yellow and odourless. No visual and/or olfactory observations of potential contamination were reported any of the groundwater wells, with the exception of MW10 noted to be foamy.

Notes: * TDS calculated from EC readings: EC x 0.65

MW19B and MW19C screened in the deeper section than the rest of the monitoring well network

♦ MW13 is the boundary well located in APEC 3 and MW015 is the boundary well located to the north of APEC 2

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 Table 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
- **Figures 2a** Sampling and Monitoring Well Locations – APEC 1 and 2
- **Figures 2b** Sampling and Monitoring Well Locations – APEC 3
- **Figure 2c** Sediment Sampling Locations
- **Figure 4a** Soil and Sediment Analytical Results - APEC 1 and APEC 2
- **Figure 4b** Soil and Sediment Analytical Results - APEC 3

PFAS concentrations in all soil and sediment samples were reported less than the adopted assessment criteria for human health at all locations within each APEC.

PFOS concentrations in soil were reported above the adopted assessment criteria for ecological protection (4.71 mg/kg) for commercial/industrial land use (Airservices (GHD, 2015)) at two locations within APEC 3 including:

- SB22_0.5 m (5.4 mg/kg) located directly north of the FFTG concrete pad at APEC 3; and
- SB21_0.8 m (9.8 mg/kg) located directly south of the FFTG concrete pad at APEC 3.

Reported concentrations of TRH/ BTEXN were less than the LOR in all samples analysed.

11.2.2 Groundwater

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

- **Table 4** Laboratory Analytical Results – PFAS Concentrations Detected in Groundwater and Surface Water
- **Table 6** Hydrocarbon Concentrations Detected in Groundwater
- **Figure 1c** Site Hydrology – Surface Water Drainage
- **Figures 2a** Sampling and Monitoring Well Locations – APEC 1 and 2,
- **Figures 2b** Sampling and Monitoring Well Locations – APEC 3
- **Figure 3a** Groundwater Elevation and Interpreted Groundwater Flow Contours (June 2017) - APEC 1 and APEC 2
- **Figure 3b** Groundwater Elevation and Interpreted Groundwater Flow Contours (June 2017) - APEC 3
- **Figure 5a** Groundwater Analytical Results - APEC 1 and 2
- **Figure 5b** Groundwater Analytical Results - APEC 1 and APEC 2

PFAS impacts in groundwater were observed within all APECs and at selected down-gradient monitoring well locations, with PFAS concentrations reported above the adopted assessment criteria summarised in the sections below.

Petroleum hydrocarbons were reported at concentrations less than the LOR in all monitoring wells with the exception of MW10:

- MW10 located north of the concrete pad in the FFTG reported >C10-C40 fraction (sum) of 320 µg/L for fractions >C10-C16 fraction, >C10-C16 (minus Naphthalene)(F2) and >C16-C34 fraction. These concentrations are less than the site assessment criteria.

11.2.2.1 Non-Potable / Recreational Criteria

- PFHxS concentrations were greater than the criteria for non-potable groundwater use (5 µg/L - DER, 2017) at 13 monitoring wells, with concentrations ranging up to 5,570 µg/L.
- Monitoring well locations not exceeding these criteria all located in APEC 2:
 - MW05 (0.08 µg/L), MW16 (4.32 µg/L) MW17 (0.08 µg/L), located down-gradient of the FSWKP of APEC 2
 - MW19C (<0.05 µg/L), the deep well located to the west of the workshop
 - and MW20 (1.36 µg/L) located to the west of the workshop
- PFOS + PFHxS (sum) concentrations were greater than the criteria for non-potable groundwater use (5 µg/L - DER, 2017) at 15 monitoring wells, with concentrations ranging up to 11,100 µg/L.
- PFOS concentrations were greater than the criteria for non-potable groundwater use (5 µg/L - DER, 2017) at 14 monitoring wells, with concentrations ranging up to 5,560 µg/L.
- PFOA concentrations were greater than the criteria for non-potable groundwater use (50 µg/L - DER, 2017) at three monitoring wells, with concentrations ranging up to 391 µg/L.

11.2.2.2 Drinking Water Criteria

- PFOS + PFHxS (sum) concentrations were greater than the DoH/FSANZ criteria for potable groundwater use (0.07 µg/L - DoH, 2017) at 22 monitoring wells.
- PFOS + PFHxS (sum) concentrations were greater than the DER criteria for potable groundwater use (0.5 µg/L - DER, 2017)) at 20 monitoring wells.
- PFOA concentrations were greater than the DoH/FSANZ criteria for potable groundwater use (0.56 µg/L - DoH, 2017) at 12 monitoring wells.
- PFOA concentrations were greater than the DER criteria for potable groundwater use (5 µg/L - DER, (2017) at 6 monitoring wells.

11.2.2.3 Ecological Guidelines

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

- PFHxS concentrations were greater than the criteria for highly disturbed freshwater ecosystems (90% species protection) (2 µg/L - DER, 2017) at 15 monitoring wells.
- PFOS + PFHxS (sum) concentrations were greater than the criteria for highly disturbed freshwater ecosystems (90% species protection) (2 µg/L - DER, 2017) at the majority (19 of 23) of monitoring wells, with some locations reported at four orders of magnitude above the criteria.
- PFOS concentrations were greater than the criteria for highly disturbed freshwater ecosystems (90% species protection) (2 µg/L - DER, 2017) at 15 monitoring wells.
- PFOS concentrations were greater than the criteria for ecological protection derived by GHD (2015) (6.66 µg/L) in consideration of toxicological effects on aquatic organisms at 13 monitoring wells.

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 June 2017 in general accordance with the SAQP (AECOM, 2017b) addressed the following data gaps:

- The presence/absence of PFAS impacts in soil and/or sediment;
- The presence/absence of PFAS impacts in groundwater; and
- The presence/absence of PFAS impacts at the Site boundaries.

The updated CSM is provided in **Table 12-2** (below).

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.

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 investigations, Site inspections and Site interviews conducted at the Site, a tabulated updated CSM is presented below (**Table 12-2**).

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.

Three APECs are detailed in the updated CSM presented in **Table 12-2** below, with the fourth and fifth APECs from **Table 12-1** excluded, because AFFF use in these areas is not confirmed or understood. AFFF related sources of contamination are therefore further examined in **Table 12-1** as:

1. ARFF Fire Station
2. Warehouse (Former ARFF Maintenance Area) and Powerhouse
3. Former Fire Training Ground.

12.2 Potential Receptors

Potential receptors to AFFF related contamination at the Site 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. Treated waste water is currently used for non-potable water supply including for fire hydrants and irrigation.
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 neighbouring properties. No registered off-site groundwater abstraction licenses exist however. A DoW search request (Section 3.4.3) indicated the presence of a single registered bore located on [REDACTED] is a private, registered bore and allows an annual allocation (water volume) [REDACTED]. It is assumed that groundwater pumped for this bore is predominately used for irrigation of landscaped areas. The DoW Water Information Reporting database indicated that a registered bore is located south of the Karratha airport runway, within the airport boundary. It is understood that this bore was used during the early stages of the airport development and may have been used for construction and/or irrigation purposes.
Aquatic and terrestrial ecological receptors within receiving aquatic environments beyond Airport boundaries	As described in (Section 3.5), the closest surface water bodies to the Site are the salt ponds and are located less than 1 km to the north and west of the Site. Based on aerial imagery, the Nullagine River appears to be incorporated into the salt ponds. Regional groundwater flow is inferred to be towards Nickol Bay, the Gap Ridge flood plain and/or the salt ponds. Surface water is also inferred to discharge to Nickol Bay through an open swale drainage network. These surface water features are presented in Figure 1c. Nickol Bay is located approximately 3.5 km to the northeast of the Site. The coastline is tidally influenced as evidenced by meandering rivers and wetlands referred to as the Gap Ridge flood plain which extends to Pegs Creek, located immediately north of Karratha. An ephemeral river system (Coongan River) is located less than 1 km to the northeast of the Site and discharges into Nickol Bay. Bitterns Channel (man-made), extends from the southwestern corner of the salt ponds to Nickol Bay. Invertebrates and macrofauna of these catchments may be directly exposed. Higher order species (predation) may lead to wider exposure within and beyond these drainage catchments.

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
- 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)
- Ingestion of locally caught fish and seafood
- 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							
Source	Transport Mechanism(s)	Exposure Pathway(s)	Receptors	SPR Status	Data Gap	Discussion	Data Gaps Status
Soils impacted from historical AFFF use from fire maintenance activities	Direct contact with historically impacted soils	Ingestion, dermal contact and dust inhalation.	On-site intrusive maintenance workers	Possible	<u>The presence/absence of PFAS impacts in soil and/or sediment.</u>	- PFAS was reported at concentrations greater than the LOR in all soil and sediment samples. - PFAS concentrations in all soil and sediment samples were reported below the adopted assessment criteria at all locations in APEC 1. - PFAS concentrations generally decreased with depth, with the exception of SB02 located to the southeast of the Fire Station. - Locations SB01 and SB02 were located in areas that had previously been excavated to upgrade the concrete apron between SB01 and SB02 and function as runoff areas. These locations had shallow and deeper zone soil impacts of similar concentration. - Sediment sample though on the lower end of concentration to the majority of shallow soil samples, reported PFAS concentrations exceeding the LOR.	<u>Data gap considered closed based on the presence of PFAS in soil and sediment 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>
			On-site airport workers / operators	Possible			
			Ecological	Possible			
	Further migration in dissolved form and/or adsorbed to soil/sediment Vertical infiltration of contaminants or leaching of (soil-bound) contaminants into groundwater and lateral migration of soluble contaminants in the direction of groundwater flow.	Direct contact with impacted ground water - Ingestion and dermal contact	On-site and or off-site intrusive maintenance workers	Possible	<u>The presence/absence of PFAS impacts in groundwater.</u>	- PFAS was reported at concentration greater than the LOR in all groundwater samples - PFAS concentrations reported above the adopted assessment criteria.	<u>Data gap considered closed based on the presence of PFAS in groundwater 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>
			On-site and or off-site workers	Possible			
			Ecological	Possible			
	Further migration within receiving catchments – in dissolved form and/or adsorbed to soil/sediment. Contaminants in storm water run-off via discharge to drainage systems and further migration within receiving catchments (Nickol Bay, Coongan River, Bitterns Channel) – in dissolved form and/or adsorbed to soil/sediment.	Direct contact with impacted surface water or stormwater - Ingestion and dermal contact	On-site and or off-site intrusive maintenance workers	Possible			
			On-site and or off-site workers	Possible			
			Ecological	Possible			

APEC 2 – Warehouse (Former ARFF Maintenance Area) and Powerhouse (including transformer)							
Source	Transport Mechanisms	Exposure Pathway	Receptors	SPR Status	Data Gap	Discussion	Data Gaps Status
Soils impacted from historical AFFF use from fire maintenance activities	Direct contact with historically impacted soils	Ingestion, dermal contact and dust inhalation	On-site intrusive maintenance workers	Possible	<u>The presence/absence of PFAS impacts in soil and/or sediment.</u>	- PFAS was reported at concentrations greater than the LOR in all soil samples (no sediment samples collected adjacent to APEC 2. - PFAS concentrations in all soil samples were reported below the adopted assessment criteria at all locations in APEC 2. - PFAS concentrations generally decreased with depth.	Data gap considered closed based on the presence of PFAS in soil samples in APEC 2. It is noted that the SPR linkages remain possible based on the data collected during the Limited Investigation.
			On-site airport workers / operators	Possible			
			Ecological	Possible			
	Further migration in dissolved form and/or adsorbed to soil/sediment Vertical infiltration of contaminants or leaching of (soil-bound) contaminants into groundwater and lateral migration of soluble contaminants in the direction of groundwater flow.	Direct contact with impacted ground water - Ingestion and dermal contact	On-site and or off-site intrusive maintenance workers	Possible	<u>The presence/absence of PFAS impacts in groundwater.</u>	- PFAS was reported at concentration greater than the LOR in all groundwater samples, with the exception of the single deep well (MW19c). - PFAS concentrations reported above the adopted assessment criteria. - No surface water samples were collected as they were dry.	<u>Data gap considered closed based on the presence of PFAS in groundwater samples in and adjacent to APEC 2.</u> <u>It is noted that the SPR linkages remain possible based on the data collected during the Limited Investigation.</u>
			On-site and or off-site workers	Possible			
			Ecological	Possible			
	Further migration within receiving catchments – in dissolved form and/or adsorbed to soil/sediment. Contaminants in storm water run-off via discharge to drainage systems and further migration within receiving catchments (Nickol Bay, Coongan River, Bitterns Channel) – in dissolved form and/or adsorbed to soil/sediment.	Direct contact with impacted surface water or stormwater (Ingestion and dermal contact)	On-site and or off-site intrusive maintenance workers	Possible			
			On-site and or off-site workers	Possible			
			Ecological	Possible			
			Ecological	Possible			

APEC 3 – Former Fire Training Ground							
Source	Transport Mechanisms	Exposure Pathway	Receptors	SPR Status	Data Gap	Discussion	Data Gaps Status
Soils impacted from historical AFFF use from fire maintenance activities	Direct contact with historically impacted soils	Ingestion, dermal contact and dust inhalation	On-site intrusive maintenance workers	Possible	<u>The presence/absence of PFAS impacts in soil and/or sediment.</u>	- PFAS was reported at concentrations greater than the LOR in all soil and sediment samples collected in and adjacent to APEC 3. - PFAS concentrations in all soil samples were reported below the adopted assessment criteria at all locations in APEC 3 with the exception of SB21, which exceeded the Airservices (GHD, 2015) PFOS EIL for commercial/ industrial land use. - The concrete apron around the mock plane is observed to be cracking.	<u>Data gap considered closed based on the presence of PFAS in soil samples in APEC 3.</u> <u>It is noted that the SPR linkages remain possible based on the data collected during the Limited Investigation.</u>
			On-site airport workers / operators	Possible			
			Ecological	Possible			
	Further migration in dissolved form and/or adsorbed to soil/sediment Vertical infiltration of contaminants or leaching of (soil-bound) contaminants into groundwater and lateral migration of soluble contaminants in the direction of groundwater flow.	Direct contact with impacted ground water - Ingestion and dermal contact	On-site and or off-site intrusive maintenance workers	Possible	<u>The presence/absence of PFAS impacts in groundwater.</u>	- PFAS was reported at concentration greater than the LOR in all groundwater samples. - PFAS concentrations reported above the adopted assessment criteria.	<u>Data gap considered closed based on the presence of PFAS in groundwater samples in and adjacent to APEC 3.</u> <u>It is noted that the SPR linkages remain possible based on the data collected during the Limited Investigation.</u>
			On-site and or off-site workers	Possible			
			Ecological	Possible			
	Further migration within receiving catchments – in dissolved form and/or adsorbed to soil/sediment. Contaminants in storm water run-off via discharge to drainage systems and further migration within receiving catchments (Nickol Bay, Coongan River, Bitterns Channel) – in dissolved form and/or adsorbed to soil/sediment.	Direct contact with impacted surface water or stormwater (Ingestion and dermal contact)	On-site and or off-site intrusive maintenance workers	Possible			
			On-site and or off-site workers	Possible			
			Ecological	Possible			

13.0 Summary and Conclusions

13.1 Summary of Findings

The Preliminary Site Investigation documented that multiple areas may have been impacted by historical AFFF use at the Site, including:

- Fuels and AFFF were used at the FFTG during training exercises.
- AFFF was variously stored at the ARFF fire station, buildings or in external Lot 4923 locations (Warehouse and Former Maintenance Area) and the FFTG between 1988 and 2011 and potentially at other airport areas managed by others.
- PFAS compounds were detected in previous soil and groundwater investigations at and around the ARFF Fire Station on Lot 217. No other PFAS related investigations had been undertaken in other airport areas.
- Unrelated to AFFF activities, hydrocarbon impacts were detected and remediated at the Powerhouse facilities (Lot 4923).

The results of the Limited Site Investigation 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 two locations within APEC 3.
- PFAS impacts in groundwater were reported within all APECs at concentrations greater than the adopted human health assessment criteria. It is noted that a potable water supply has not been identified within at least 2 km of the site.
- PFAS impacts in groundwater were also reported above the adopted ecological assessment criteria at all APECs.
- TRH and BTEXN were not reported either at concentrations greater than the LOR or adopted assessment criteria in soil, sediment or groundwater samples.

13.2 Conclusions

Based on the information obtained as part of the Preliminary and Limited Site Investigation, the following conclusions can be made:

- The data gaps determined in the SAQP (AECOM 2017b) have been assessed and closed:
 - **Data Gap 1:** PFAS impacts are marginally present in soil but limited to APEC 3. PFAS was reported in sediment samples but at concentrations less than the adopted criteria.
 - **Data Gap 2:** PFAS impacts are present in groundwater at all three APECs.
 - **Data Gap 3:** PFAS impacts are present at the Site boundary in groundwater and reported in soil at concentrations less than the adopted criteria.
- The updated CSM indicates that SPR linkages remain “possible” based on the data collected during the limited sampling.

14.0 References

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15.0 Standard Limitations

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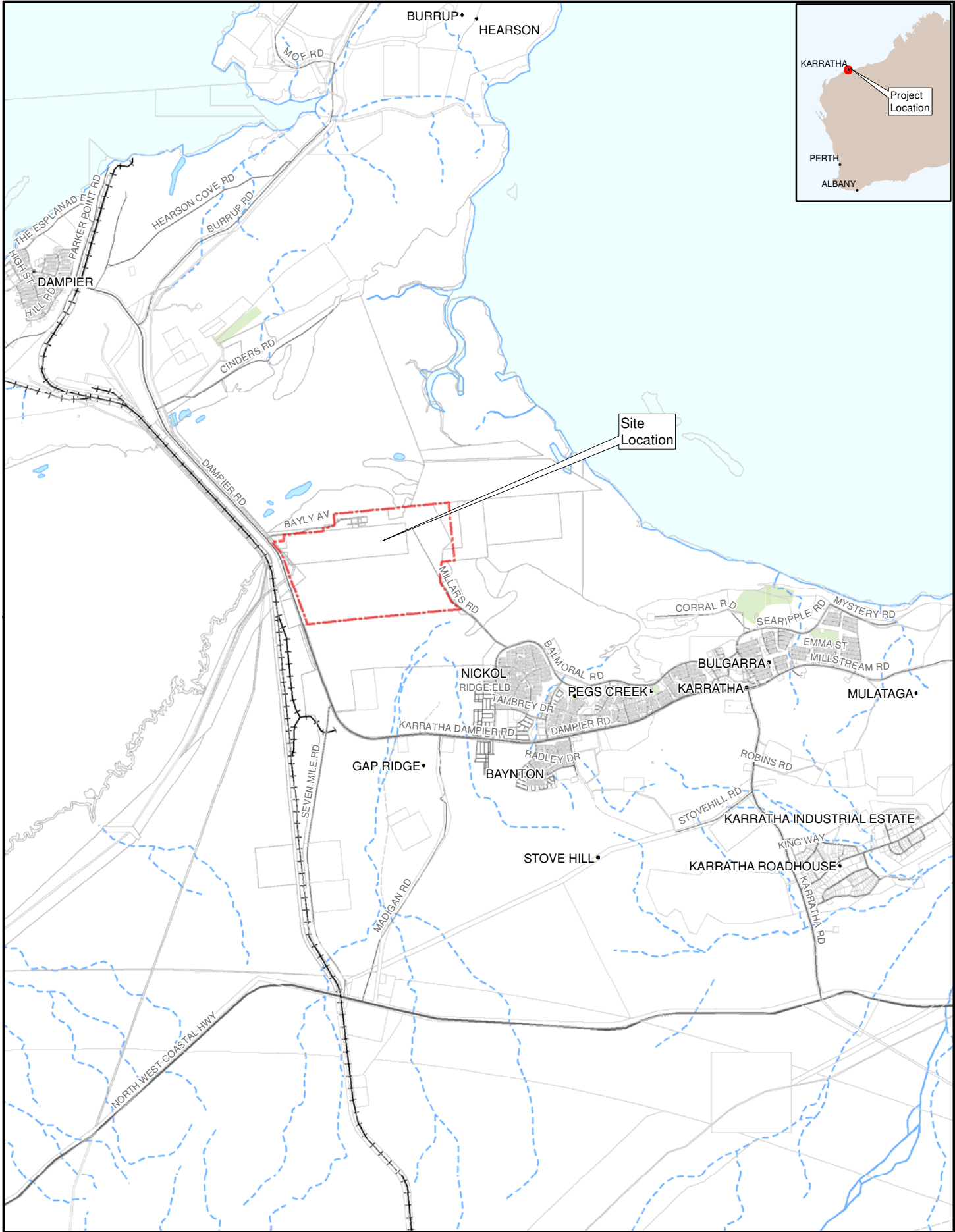
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0 0.5 1 1.5 2
Kilometers

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LEGEND
 Airport Estate Boundary
 Cadastral Boundary
 Parks
 Lakes
 Watercourses

Highway
 Major Road
 Minor Road
 Track
 Railways

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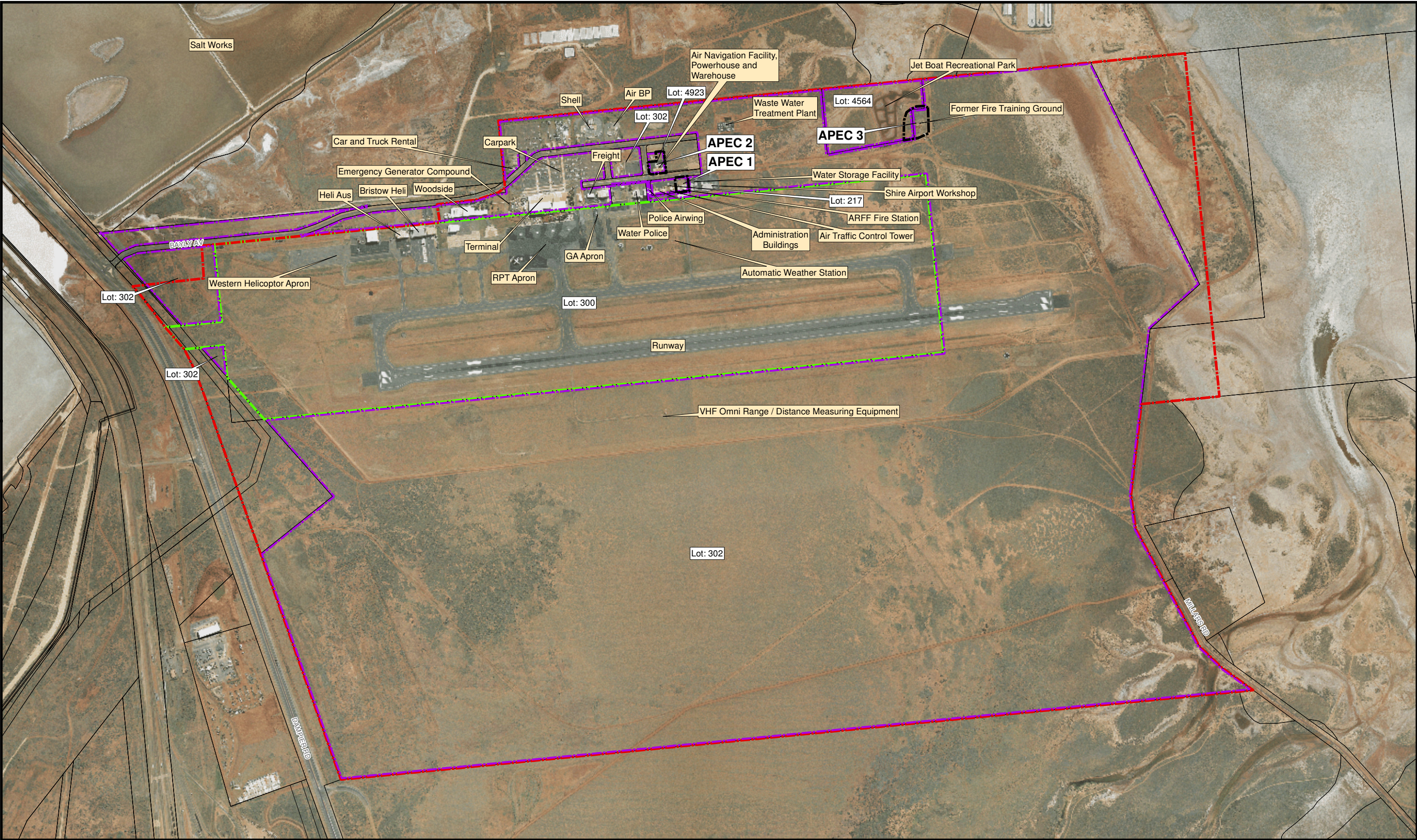
Site Location

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PRELIMINARY SITE INVESTIGATION AND LIMITED SAMPLING, KARRATHA AIRPORT

Figure
1a

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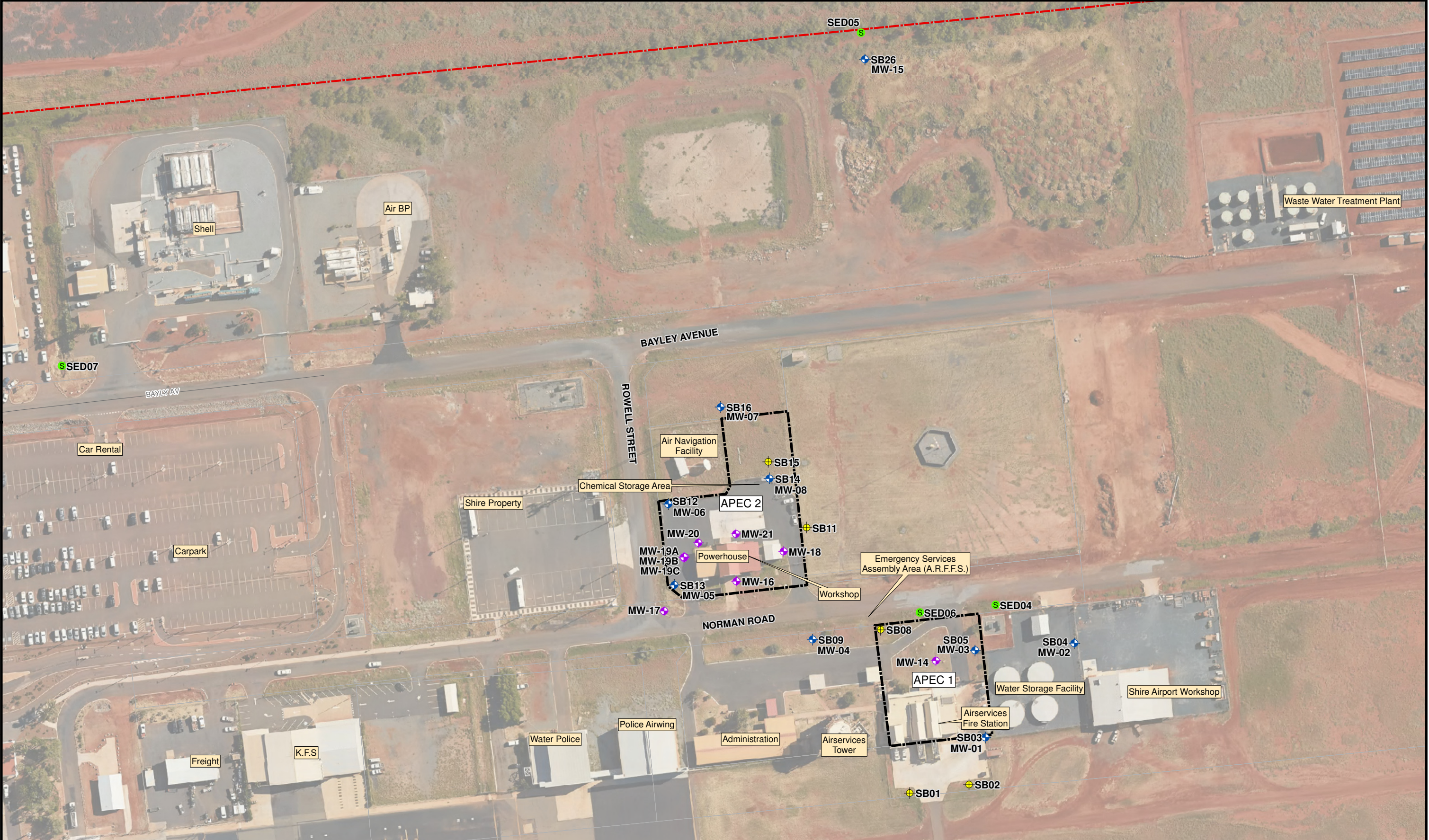
PROJECT ID 60543717 CREATED BY [Logo] APPROVED BY [Logo] LAST MODIFIED 02 FEB 2018 AECOM www.aecom.com DATUM GDA 1994, PROJECTION MGA ZONE 50 0 100 200 300 400 metres 1:12,000 (when printed at A3)		LEGEND - Airport Estate Boundary - Cadastral Boundary - Lots where Airservices have provided services - Lot 300	Data sources: Landgate Imagery (04/07/2015) Base Data: (c) Based on information provided by and with the permission of the Western Australian Land Information Authority trading as Landgate (2010).	Site Layout AIRSERVICES AUSTRALIA <i>PRELIMINARY SITE INVESTIGATION AND LIMITED SAMPLING, KARRATHA AIRPORT</i>	Figure 1b
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PROJECT ID 60543717 CREATED BY [Redacted] APPROVED BY [Redacted] LAST MODIFIED 02 FEB 2018	AECOM www.aecom.com	LEGEND - Airport Estate Boundary - Airport Related Operations Boundary - Cadastral Boundary - Area Subject to Inundation - Salt Ponds - Watercourse - minor, non-perennial - Drain - major - Coastal Waterline	Data sources: Imagery Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community Base Data: (c) Based on information provided by and with the permission of the Western Australian Land Information Authority trading as Landgate (2010).	Site Hydrology – Surface Water Drainage	
DATUM GDA 1994, PROJECTION MGA ZONE 50 0 200 400 600 800 metres 1:25,000 (when printed at A3)				AIRSERVICES AUSTRALIA PRELIMINARY SITE INVESTIGATION AND LIMITED SAMPLING, KARRATHA AIRPORT	Figure 1c

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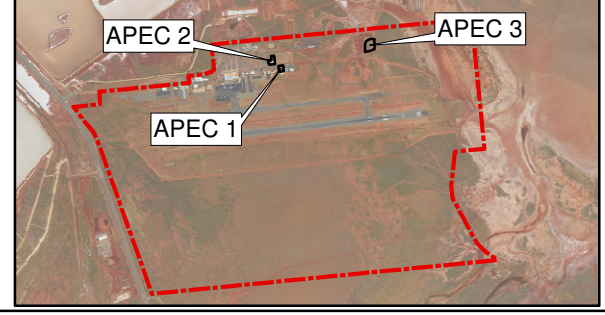
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0 10 20 30 40
metres
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LEGEND

- Monitoring Well (AECOM, 2017)
- Monitoring Well (GHD, 2016)
- Soil Bore
- Sediment Sample Location
- Areas of Potential Environmental Concern
- Airport Estate Boundary
- Cadastral Boundary

Data sources: Landgate Imagery (Sept, 2016)
Base Data: (c) Based on information provided by and with the permission of the Western Australian Land Information Authority trading as Landgate (2010).

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.



Sampling and Monitoring Well Locations - APEC 1 and 2

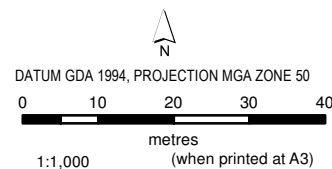
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Figure
2a

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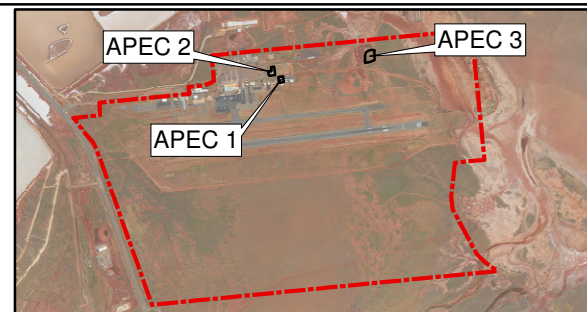
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- LEGEND**
- Monitoring Well (AECOM, 2017)
 - Soil Bore
 - Sediment Sample Location
 - Areas of Potential Environmental Concern
 - Airport Estate Boundary
 - Cadastral Boundary

Data sources: Landgate Imagery (Sept, 2016)
Base Data: (c) Based on information provided by and with the permission of the Western Australian Land Information Authority trading as Landgate (2010).

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Sampling and Monitoring Well Locations - APEC 3

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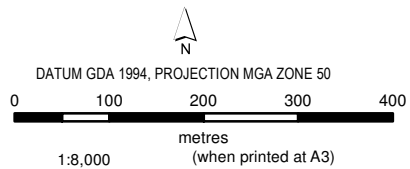
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- LEGEND**
- Sediment Sample Location
 - Areas of Potential Environmental Concern
 - Airport Estate Boundary
 - Cadastral Boundary

Data sources: Landgate Imagery (Sept, 2016)
Base Data: (c) Based on information provided by and with the permission of the Western Australian Land Information Authority trading as Landgate (2010).

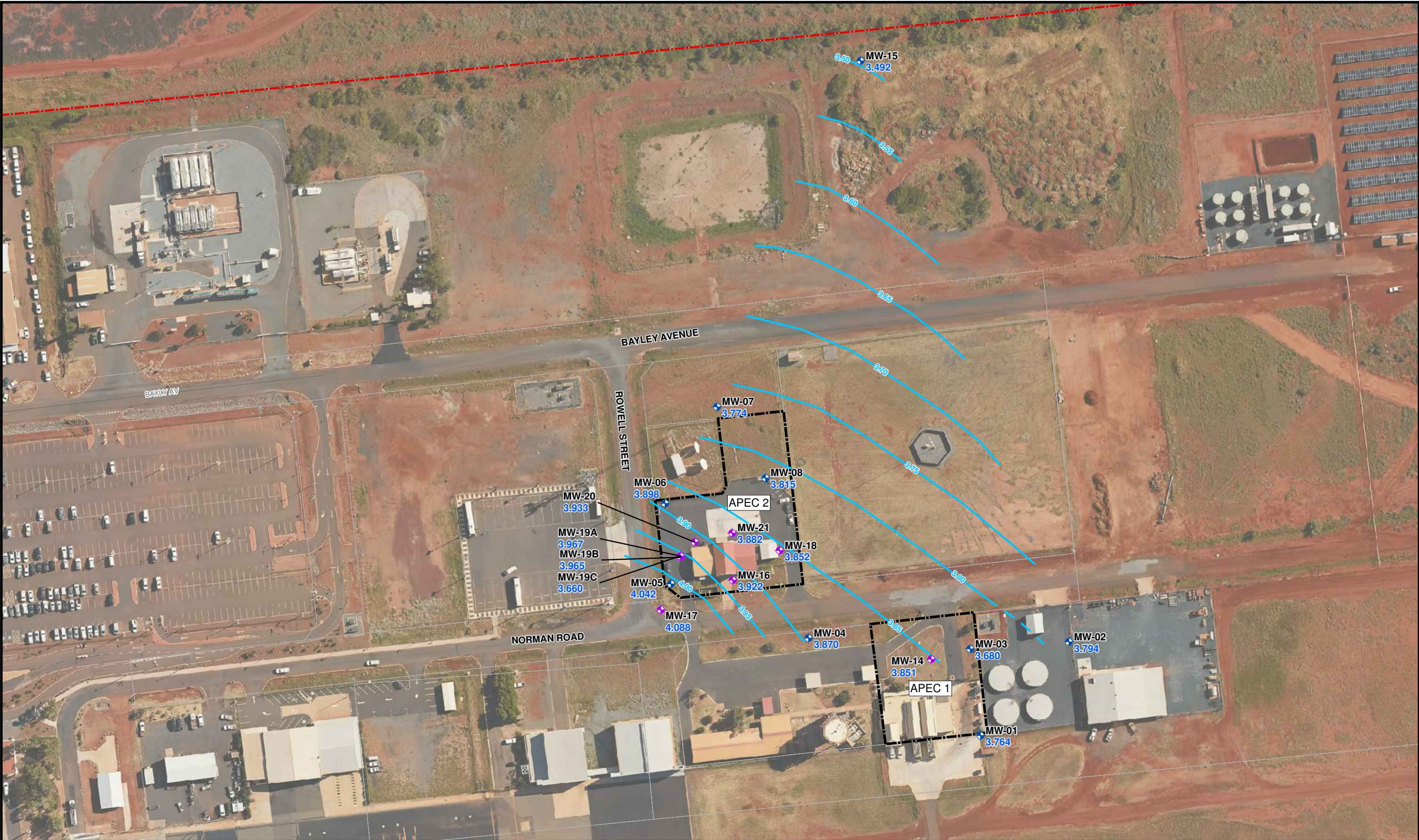
It is noted that the APEC boundaries were broadly identified based on historical land use activities and are not directly correlated with the current Airservices lease areas.

Sediment Sampling Locations

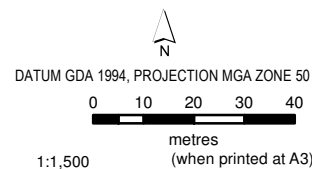
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- LEGEND**
- 0.846 Groundwater Elevation (m AHD)
 - Monitoring Well (AECOM, 2017)
 - Monitoring Well (GHD, 2016)
 - Inferred Flow Direction
 - Interpolated Groundwater Contours (mAHD)
 - Areas of Potential Environmental Concern
 - Airport Estate Boundary
 - Cadastral Boundary

Data sources: Landgate Imagery (Sept, 2016)
Base Data: (c) Based on information provided by and with the permission of the Western Australian Land Information Authority trading as Landgate (2010).

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.

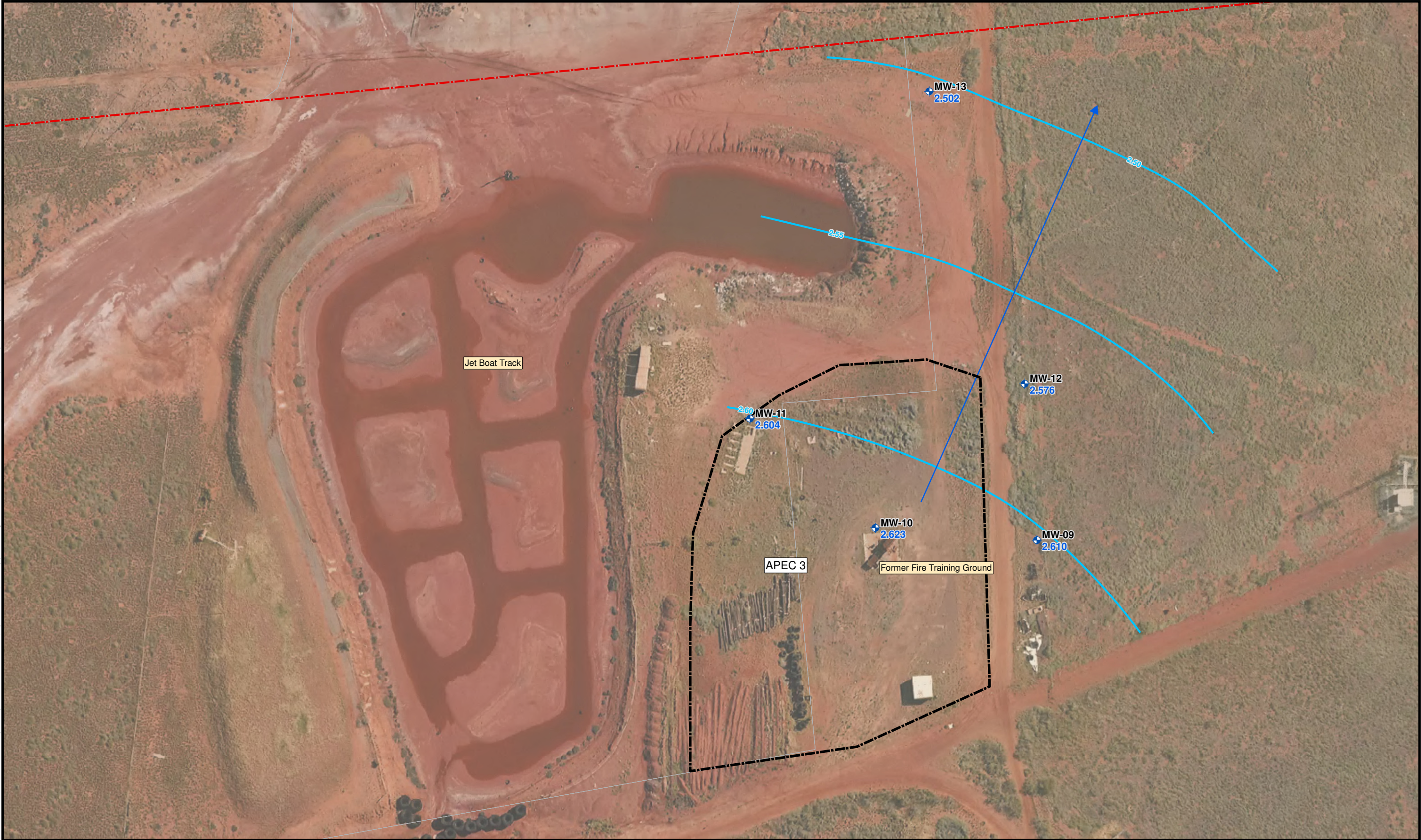
Groundwater Elevation and Interpreted Groundwater Flow Contours (June 2017) - APEC 1 and APEC 2

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Figure
3a

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LEGEND
0.846 Groundwater Elevation (m AHD)
 Monitoring Well (AECOM, 2017)
 Inferred Flow Direction
 Interpolated Groundwater Contours (mAHD)
 Areas of Potential Environmental Concern
 Airport Estate Boundary
 Cadastral Boundary

Data sources: Landgate Imagery (Sept, 2016)
Base Data: (c) Based on information provided by and with the permission of the Western Australian Land Information Authority trading as Landgate (2010).

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.

Groundwater Elevation and Interpreted Groundwater Flow Contours (June 2017) - APEC 3

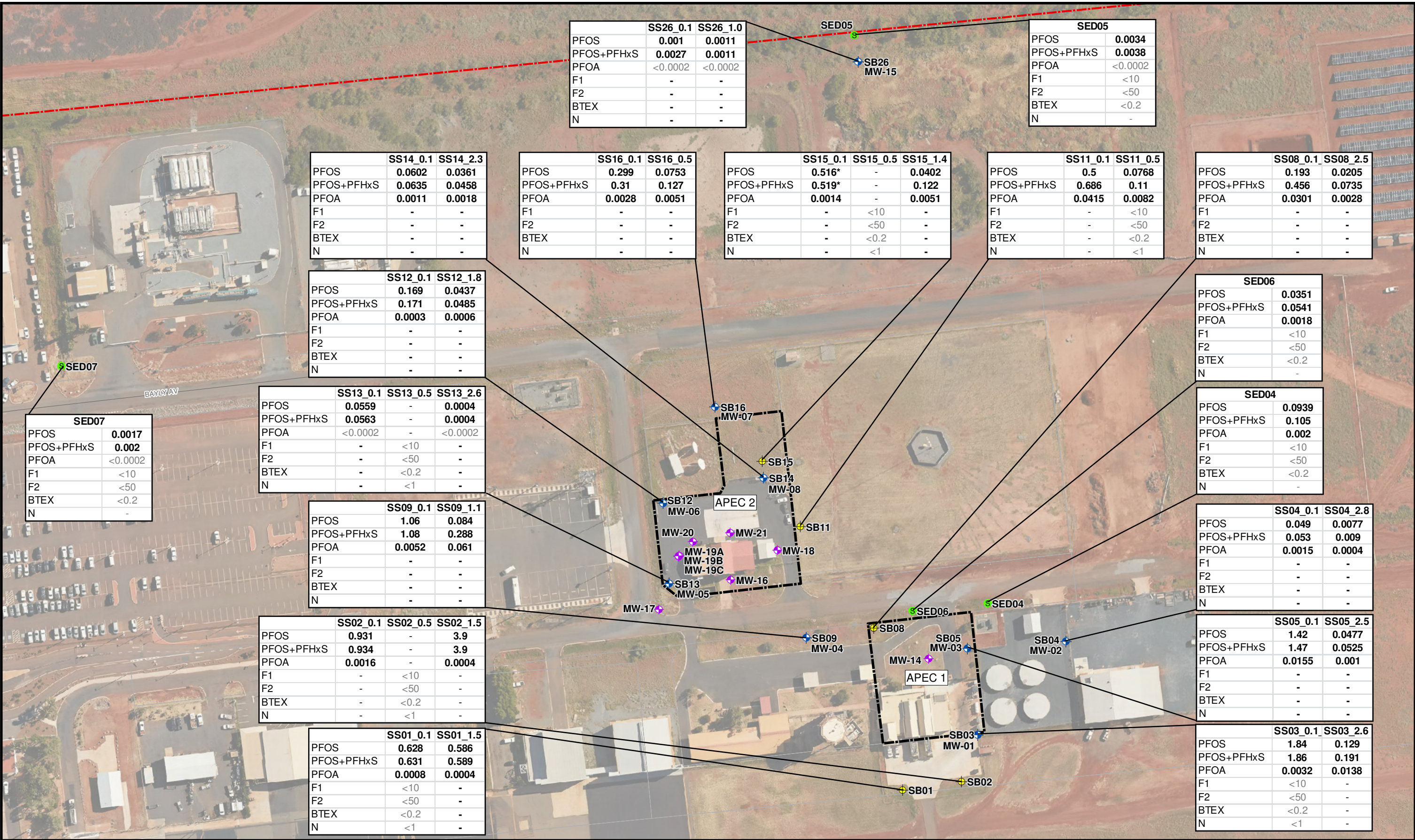
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Figure

3b

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LEGEND

- Monitoring Well (AECOM, 2017)
- Monitoring Well (GHD, 2016)
- Soil Bore
- Sediment Sample Location
- Areas of Potential Environmental Concern
- Airport Estate Boundary
- Cadastral Boundary

Data sources: Landgate Imagery (Sept, 2016)
Base Data: (c) Based on information provided by and with the permission of the Western Australian Land Information Authority trading as Landgate (2010).

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 sample value adopted for conservatism
** = triplicate sample value adopted for conservatism

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

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.

Soil and Sediment Sample Analytical Results
APEC 1 and APEC 2

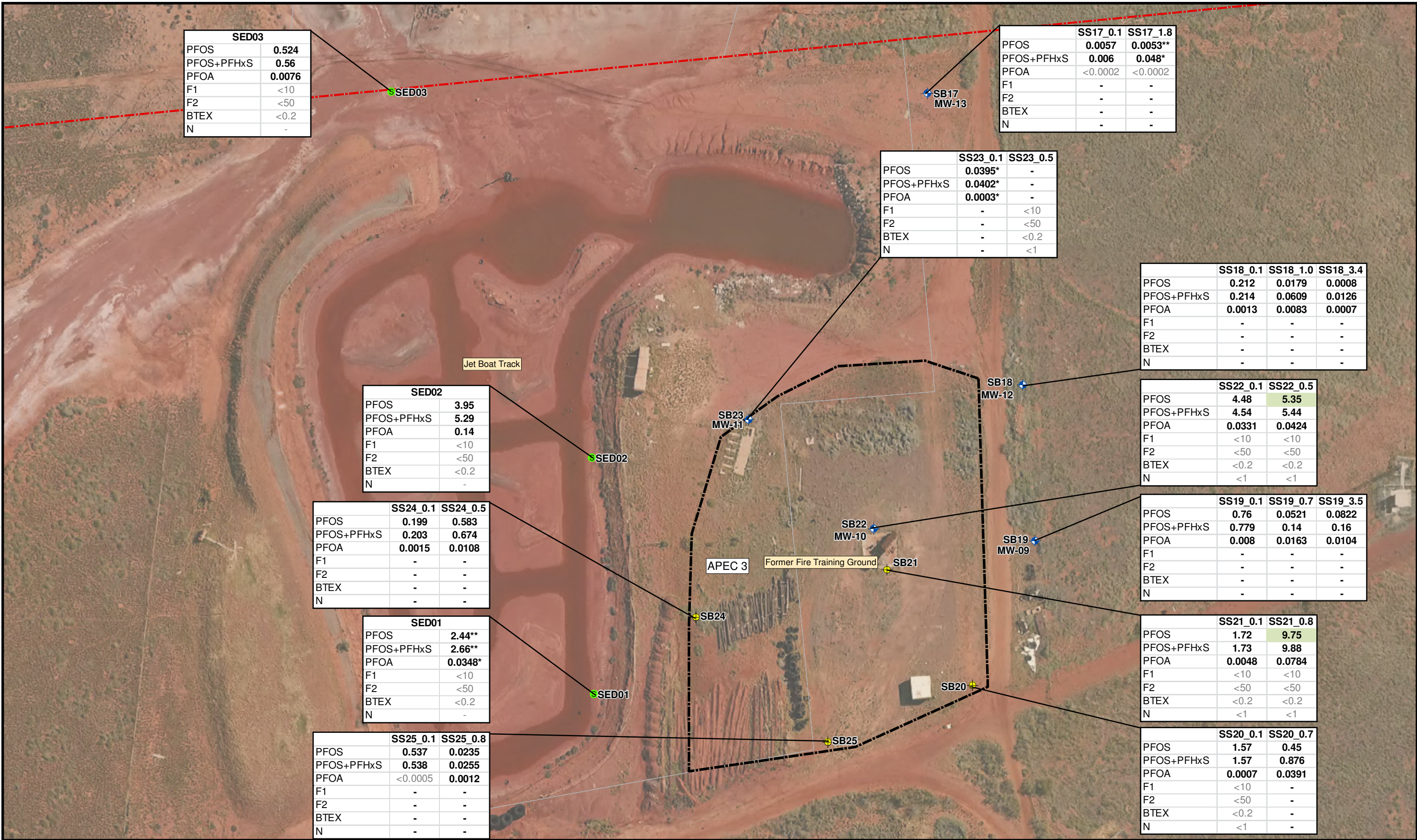
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Figure

4a

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PROJECT ID
60543717

CREATED BY
[Redacted]

APPROVED BY
[Redacted]

LAST MODIFIED
15 DEC 2017

www.aecom.com

DATUM GDA 1994, PROJECTION MGA ZONE 50

010203040

metres

1:1,000
(when printed at A3)

N

metres

Monitoring Well (AECOM, 2017)

Soil Bore

Sediment Sample Location

Areas of Potential Environmental Concern

Airport Estate Boundary

Cadastral Boundary

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 sample value adopted for conservatism

** = triplicate sample value adopted for conservatism

Data sources: Landgate Imagery (Sept, 2016)

Base Data: (c) Based on information provided by and with the permission of the Western Australian Land Information Authority trading as Landgate (2010).

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

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.

Soil and Sediment Sample Analytical Results

APEC 3

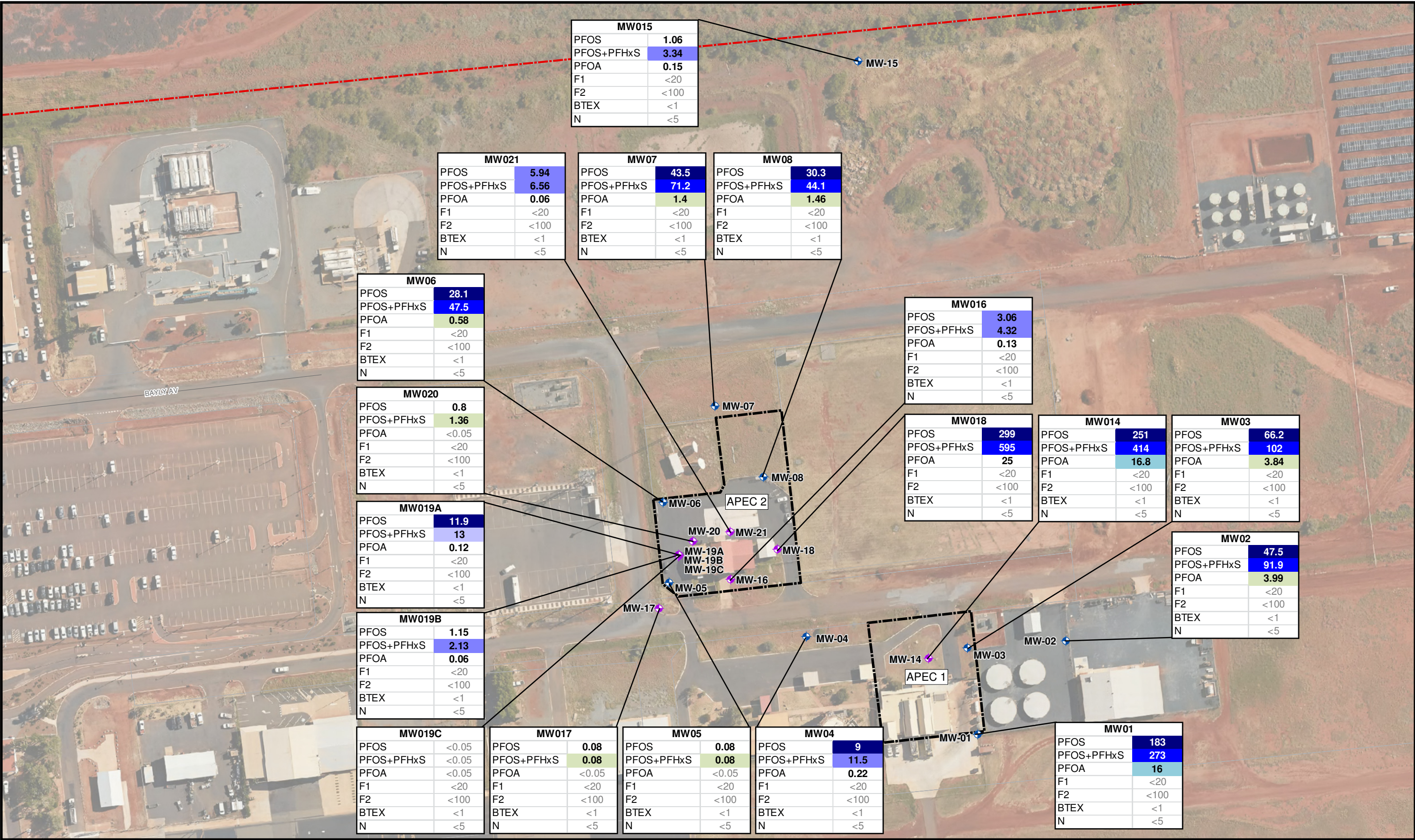
AIRSERVICES AUSTRALIA

PRELIMINARY SITE INVESTIGATION AND LIMITED SAMPLING, KARRATHA AIRPORT

Figure

4b

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PROJECT ID 60543717
CREATED BY
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DATUM GDA 1994, PROJECTION MGA ZONE 50
0 10 20 30 40
metres
1:1,500
(when printed at A3)

LEGEND

- Monitoring Well (AECOM, 2017)
- Monitoring Well (GHD, 2016)
- Areas of Potential Environmental Concern
- Airport Estate Boundary
- Cadastral Boundary

PFOS = Perfluorooctane sulfonic acid
PFOS + PFHxS = Sum of Perfluorooctane sulfonic acid and Perfluorohexane sulfonic acid
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F2 = >C10-C16 (minus Naphthalene)(F2)
BTEX = Total BTEX
N = Naphthalene
All units are in µg/L
NA = not analysed
* = duplicate sample value adopted for conservatism
** = triplicate sample value adopted for conservatism

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)

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.

Groundwater Sampling Analytical Results APEC 1 and APEC 2

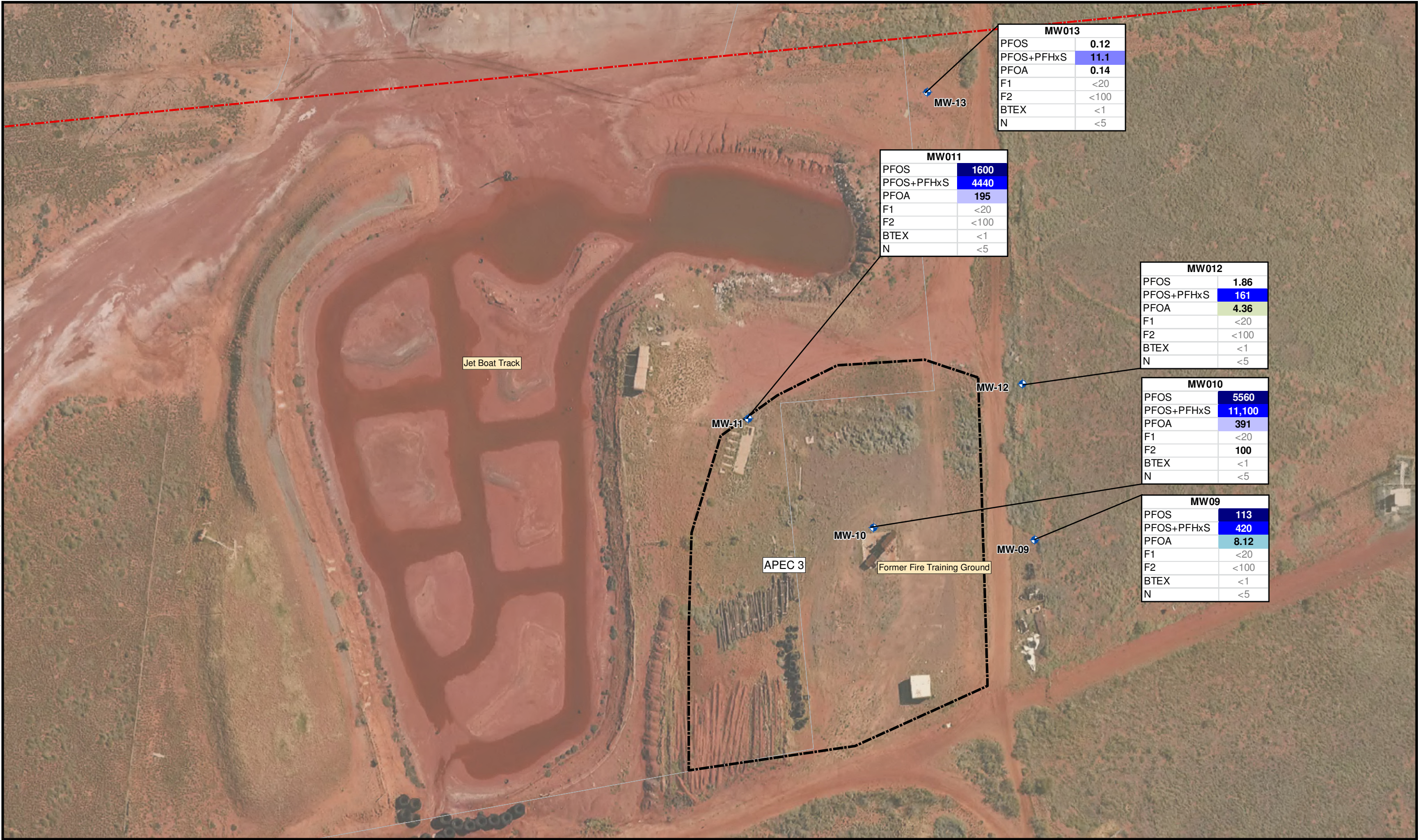
AIRSERVICES AUSTRALIA

PRELIMINARY SITE INVESTIGATION AND LIMITED SAMPLING, KARRATHA AIRPORT

Figure

5a

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AECOM

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Monitoring Well (AECOM, 2017)

Areas of Potential Environmental Concern

Airport Estate Boundary

Cadastral Boundary

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

All units are in µg/L

NA = not analysed

* = duplicate sample value adopted for conservatism

** = triplicate sample value adopted for conservatism

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)

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.

GROUNDWATER SAMPLING ANALYTICAL RESULTS APEC 3

AIRSERVICES AUSTRALIA

PRELIMINARY SITE INVESTIGATION AND LIMITED SAMPLING, KARRATHA AIRPORT

Figure

5b

Map Document: \\AUPER1\FP001.au.aecomnet.com\Projects\605X\605091154. Tech Work Area\4.99 GIS\02_MXD\slPSI_LIKA_Karratha_Airport_Aug2017\G60543717_Fig 5b_GWSampling_APEC3_v2_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	Top of Well Cover (mAHD)	Ground Level (mAHD)
APEC 1 Fire Station (FS)	MW01	29/06/2017	5.864	4.435	2.100	3.764	476542.392	7710111.971	5.979	5.926
	MW02	29/06/2017	5.344	4.470	1.550	3.794	476579.629	7710151.450	5.464	5.445
	MW03	29/06/2017	5.855	4.760	2.175	3.680	476538.041	7710148.437	5.952	5.849
	MW04	29/06/2017	5.810	4.230	1.940	3.870	476469.999	7710153.058	5.925	5.841
	MW014#	29/06/2017	5.951	4.500	2.100	3.851	476521.609	7710144.138	5.981	5.986
APEC 2 Workshop Powerhouse (WKSP)	MW05#	29/06/2017	6.027	4.650	1.985	4.042	476411.997	7710175.955	6.131	6.068
	MW06	29/06/2017	6.078	4.380	2.180	3.898	476409.557	7710209.940	6.142	6.142
	MW07	29/06/2017	5.719	4.490	1.945	3.774	476431.365	7710250.539	5.809	5.725
	MW08	29/06/2017	6.150	4.500	2.335	3.815	476451.829	7710220.609	6.268	6.272
	MW016#	29/06/2017	6.172	3.960	2.250	3.922	476438.086	7710177.425	6.283	6.276
	MW017#	29/06/2017	6.073	4.750	1.985	4.088	476407.766	7710165.097	6.134	6.045
	MW018#	29/06/2017	6.182	2.445	2.330	3.852	476457.807	7710189.958	6.249	6.216
	MW019A#	29/06/2017	6.057	4.200	2.090	3.967	476416.402	7710187.586	6.153	6.189
	MW019B#	29/06/2017	6.005	8.970	2.040	3.965	476416.115	7710187.089	6.162	6.189
	MW019C#	29/06/2017	6.040	13.300	2.380	3.660	476416.019	7710187.718	6.157	6.189
	MW020#	29/06/2017	6.168	4.470	2.235	3.933	476422.142	7710193.443	6.245	6.245
	MW021#	29/06/2017	6.192	3.620	2.310	3.882	476437.895	7710197.425	6.225	6.194
APEC 3 Former Fire Training Ground (FFTG)	MW09	29/06/2017	4.860	4.480	2.250	2.610	477366.751	7710350.090	4.980	4.939
	MW010	29/06/2017	5.138	4.500	2.515	2.623	477321.388	7710353.467	5.223	5.182
	MW011*	29/06/2017	5.519	4.980	2.915	2.604	477286.144	7710384.199	5.700	5.042
	MW012*	29/06/2017	5.311	5.040	2.735	2.576	477363.330	7710393.989	5.525	4.802
Boundry (BDY)	MW013*	29/06/2017	5.774	4.935	3.272	2.502	477336.493	7710476.023	5.975	5.313
	MW015*	29/06/2017	6.204	5.000	2.712	3.492	476491.933	7710396.247	6.383	5.684

Legend

mAHD = meters Australian Height Datum

m = metres

mbtoc = metres below top of casing

Monitoring Well Survey Completed on 30 June 2017. Horizontal Datum MGA94 Zone 50

Vertical Datum AHD

* = Monitoring wells installed as Stick-up wells with steel casing as opposed to flush mounted gatic cover

Monitoring wells installed by GHD (2016). Note all other wells installed in June 2017

Karratha Airport
Preliminary Site Investigation and Limited Sampling
Airservices Australia

Legend
L = Litres
mg/L = milligrams per litre
µS/cm = micro Siemens per centimetre
mV = millivolts
°C = degrees Celsius
*TDS is calculated as EC x 0.65
Monitoring Well Survey Completed on 30 June 2017

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

				APEC 1 Fire Station (FS)												
				Location	MW01			MW02			MW03			MW04		
				Sample ID	SS03 0.1 220617	SS03 2.6 220617	SS04 0.1 210617	SS04 2.8 210617	SS05 0.1 210617	SS05 2.5 210617	SS09 0.1 210617	SS09 1.1 210617				
				Smample Depth	0.1	2.6	0.1	2.8	0.1	2.5	0.1	1.1				
				Sample Date	22/06/2017	22/06/2017	21/06/2017	21/06/2017	21/06/2017	21/06/2017	21/06/2017	21/06/2017				
				Sample Type	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary				
				Lab Report No.	EP1707039	EP1707039	EP1707039	EP1707039	EP1707039	EP1707039	EP1707039	EP1707039				
				ASA (GHD) 2015.	ASA (GHD) 2015.	ASA (GHD) 2017.	WA DER - 2017.									
				EISLs - Comm / Ind 60% species protection level	HISLs- Industrial (direct Contact)	HBSC Comm / Ind (after FSANZ TDI)	Health Baased Screening Levels Comm / Ind									
Analyte	Units	LOR														
Per- / Poly - fluoroalkyl	Sum of PFAS	mg/kg	0.0002					1.9	0.303	0.0673	0.0108	1.56	0.0596			
	Sum of PFAS (WA DER List)	mg/kg	0.0002					1.88	0.279	0.0632	0.0106	1.54	0.0577			
	Sum of PFHxS and PFOS	mg/kg	0.0002					1.86	0.191	0.053	0.009	1.47	0.0525			
	10:2 FTS	mg/kg	0.0005					0.0007	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005			
	MeFOSAA	mg/kg	0.0002					<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002			
	PFPeS	mg/kg	0.0002					0.0016	0.0155	0.0008	0.0002	0.0088	0.0009			
	PFHpS	mg/kg	0.0002					0.0023	0.0084	0.001	<0.0002	0.0085	0.0004			
	PFHxS	mg/kg	0.0002				100	0.0151	0.0621	0.004	0.0013	0.0468	0.0048			
Surfactant	EtFOSAA	mg/kg	0.0002					<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002			
	6:2 FTS	mg/kg	0.0005	NA	900			0.002	0.0078	<0.0005	<0.0005	0.0014	<0.0005			
	PFOA	mg/kg	0.0002	3.73	240	680		0.0032	0.0138	0.0015	0.0004	0.0155	0.001			
Organic	PFOS	mg/kg	0.0002	4.71	90			1.84	0.129	0.049	0.0077	1.42	0.0477			
	4:2 FTS	mg/kg	0.0005					<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005			
	PFBA	mg/kg	0.001					<0.001	0.004	0.003	<0.001	0.004	<0.001			
Perfluorinated Compounds (PFCs)	PFPeA	mg/kg	0.0002					0.0024	0.0085	0.0016	<0.0002	0.0086	0.0005			
	8:2 FTS	mg/kg	0.0005	3.73	240			0.0161	<0.0005	<0.0005	0.0007	0.0013	0.0008			
	N-Me-FOSA	mg/kg	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			
	FOSA	mg/kg	0.0002					0.0034	<0.0002	<0.0002	<0.0002	0.0003	0.0006			
	PFBS	mg/kg	0.0002					0.0012	0.0137	0.0011	<0.0002	0.0148	0.0008			
	PFDS	mg/kg	0.0002					0.0029	<0.0002	<0.0002	<0.0002	0.0014	<0.0002			
	PFTeDA	mg/kg	0.0005					<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005			
	PFTriDA	mg/kg	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			
	PFDoA	mg/kg	0.0002					0.002	<0.0002	<0.0002	<0.0002	0.0005	<0.0002			
	PFHpA	mg/kg	0.0002					0.0006	0.0055	0.0005	<0.0002	0.0031	0.0004			
	PFHxA	mg/kg	0.0002					0.0053	0.0343	0.0025	0.0005	0.0237	0.0017			
	N-Et-FOSE	mg/kg	0.0005					<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005			
	PFDoA	mg/kg	0.0002					<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002			
	PFNA	mg/kg	0.0002					0.0005	<0.0002	0.0023	<0.0002	0.0011	<0.0002			
	PFUnA	mg/kg	0.0002					<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002			
	Moisture Content	%	1					4	15.6	12.2	11.7	5	15.3			
													8.3	8.4		

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 Landuse
Airservices (GHD) (2017) Derivation of PFAS Soil and Water Criteria - Health Based Screening Criteria (HBSC) - Commercial / Industrial Landuse - Based on FSANZ TDI 2017
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Airservices (GHD) (2015) Derivation of PFAS Soil and Water Criteria - Ecological Interim Screening levels (EISLs)- Commercial and industrial at 60% protection, low reliability

LOR = Limit of Reporting
- = not analysed
mg/kg = milligrams per kilogram

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

				APEC 1 Fire Station (FS)											
				Location	SB01		SB02		SB08		SED04	SED06			
				Sample ID	SS01 0.1 220617	SS01 1.5 220617	SS02 0.1 220617	SS02 1.5 220617	SS08 0.1 210617	SS08 2.5 210617	SED04 010717	SED06 010717			
				Smample Depth	0.1	1.5	0.1		0.1	2.5					
				Sample Date	22/06/2017	22/06/2017	22/06/2017	22/06/2017	21/06/2017	21/06/2017	1/07/2017	1/07/2017			
				Sample Type	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary			
				Lab Report No.	EP1707039	EP1707039	EP1707039	EP1707039	EP1707039	EP1707039	EP1707076	EP1707076			
				ASA (GHD) 2015.	ASA (GHD) 2015.	ASA (GHD) 2017.	WA DER - 2017.								
				EISLs - Comm / Ind 60% species protection level	HISLs- Industrial (direct Contact)	HBSC Comm / Ind (after FSANZ TDI)	Health Baased Screening Levels Comm / Ind								
Analyte	Units	LOR													
Per- / Poly - fluoroalkyl	Sum of PFAS	mg/kg	0.0002					0.634	0.59	1.06	3.91	0.999	0.145	0.116	0.0706
	Sum of PFAS (WA DER List)	mg/kg	0.0002					0.632	0.59	1.06	3.91	0.872	0.127	0.115	0.0618
	Sum of PFHxS and PFOS	mg/kg	0.0002					0.631	0.589	0.934	3.9	0.456	0.0735	0.105	0.0541
	10:2 FTS	mg/kg	0.0005					<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0013
	MeFOSAA	mg/kg	0.0002					<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002
	PFPeS	mg/kg	0.0002					<0.0002	<0.0002	0.0002	<0.0002	0.114	0.0175	0.0008	0.0007
	PFHpS	mg/kg	0.0002					0.0003	0.0003	0.0006	0.0004	0.0128	0.0005	<0.0005	0.0005
	PFHxS	mg/kg	0.0002				100	0.0028	0.0028	0.0034	0.003	0.263	0.053	0.0109	0.019
	EtFOSAA	mg/kg	0.0002					<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002
	6:2 FTS	mg/kg	0.0005	NA	900			<0.0005	<0.0005	0.0007	0.0007	<0.0005	<0.0005	<0.0005	<0.0005
Surfactant	PFOA	mg/kg	0.0002	3.73	240	680		0.0008	0.0004	0.0016	0.0004	0.0301	0.0028	0.002	0.0018
	PFOS	mg/kg	0.0002	4.71	90			0.628	0.586	0.931	3.9	0.193	0.0205	0.0939	0.0351
Organic	4:2 FTS	mg/kg	0.0005					<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
	PFBA	mg/kg	0.001					<0.001	<0.001	<0.001	<0.001	0.009	<0.001	<0.001	<0.001
	PFPeA	mg/kg	0.0002					<0.0002	<0.0002	0.0003	<0.0002	0.0459	0.0054	<0.0005	0.0004
Perfluorinated Compounds (PFCs)	8:2 FTS	mg/kg	0.0005	3.73	240			<0.0005	<0.0005	0.121	0.0052	<0.0005	<0.0005	0.0038	0.0025
	N-Me-FOSA	mg/kg	0.0005					<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0012	<0.0005
	N-Me-FOSE	mg/kg	0.0005					<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0012	<0.0005
	FOSA	mg/kg	0.0002					0.0012	<0.0002	0.0022	<0.0002	<0.0002	<0.0002	<0.0005	0.0023
	PFBS	mg/kg	0.0002					<0.0002	<0.0002	<0.0002	<0.0002	0.138	0.0175	<0.0005	0.0005
	PFDS	mg/kg	0.0002					<0.0002	<0.0002	0.0004	<0.0002	0.0004	<0.0002	<0.0005	0.002
	PFTeDA	mg/kg	0.0005					<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0012	0.0006
	PFTrDA	mg/kg	0.0002					<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	0.0003
	N-Et-FOSA	mg/kg	0.0005					<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0012	<0.0005
	PFDCa	mg/kg	0.0002					0.0002	<0.0002	0.0019	0.0002	<0.0002	<0.0002	<0.0005	0.0003
	PFHpA	mg/kg	0.0002					0.0002	<0.0002	0.0005	<0.0002	0.0176	0.0032	0.0012	0.0009
	PFHxA	mg/kg	0.0002					0.0006	0.0005	0.0005	0.0005	0.175	0.0247	0.003	0.0016
	N-Et-FOSE	mg/kg	0.0005					<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0012	<0.0005
	PFDoA	mg/kg	0.0002					<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	0.0004
	PFNA	mg/kg	0.0002					<0.0002	<0.0002	0.0007	0.0012	0.0002	<0.0002	<0.0005	0.0004
	PFUnA	mg/kg	0.0002					<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002
	Moisture Content	%	1					5.6	11.2	3.4	11.3	13	17.3	13.1	10.9

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 Landuse

Airservices (GHD) (2017) Derivation of PFAS Soil and Water Criteria - Health Based Screening Criteria (HBSC) - Commercial / Industrial Landuse - Based on FSANZ TDI 2017

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LOR = Limit of Reporting
- = not analysed
mg/kg = milligrams per kilogram

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

				APEC 2 Warehouse and Powerhouse												
				Location	MW05			MW06			MW07			MW08		
				Sample ID	SS13 0.1 210617	SS13 2.6 210617	SS12 0.1 210617	SS12 1.8 210617	SS16 0.1 220617	SS16 0.5 220617	SS14 0.1 220617	SS14 2.3 220617				
				Smample Depth	0.1	2.6	0.1	1.8	0.1	0.5	0.1	2.3				
				Sample Date	21/06/2017	21/06/2017	21/06/2017	21/06/2017	22/06/2017	22/06/2017	22/06/2017	22/06/2017				
				Sample Type	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary				
				Lab Report No.	EP1707039	EP1707039	EP1707039	EP1707039	EP1707039	EP1707039	EP1707039	EP1707039				
				ASA (GHD) 2015.	ASA (GHD) 2015.	ASA (GHD) 2017.	WA DER - 2017.									
				EISLs - Comm / Ind 60% species protection level	HISLs- Industrial (direct Contact)	HBSC Comm / Ind (after FSANZ TDI)	Health Baased Screening Levels Comm / Ind									
Analyte	Units	LOR														
Per- / Poly - fluoroalkyl	Sum of PFAS	mg/kg	0.0002					0.0569	0.0004	0.174	0.0518	0.32	0.156	0.0657	0.0587	
	Sum of PFAS (WA DER List)	mg/kg	0.0002					0.0565	0.0004	0.172	0.051	0.316	0.144	0.0649	0.0572	
	Sum of PFHxS and PFOS	mg/kg	0.0002					0.0563	0.0004	0.171	0.0485	0.31	0.127	0.0635	0.0458	
	10:2 FTS	mg/kg	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	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
	PFPeS	mg/kg	0.0002					<0.0002	<0.0002	0.0002	0.0005	0.0014	0.0071	<0.0002	0.0009	
	PFHpS	mg/kg	0.0002					<0.0002	<0.0002	0.0003	0.0003	0.0024	0.0045	0.0008	0.0006	
	PFHxS	mg/kg	0.0002				100	0.0004	<0.0002	0.0021	0.0048	0.0106	0.0513	0.0033	0.0097	
Surfactant	EtFOSAA	mg/kg	0.0002					<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
	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	
	PFOA	mg/kg	0.0002	3.73	240	680		<0.0002	<0.0002	0.0003	0.0006	0.0028	0.0051	0.0011	0.0018	
Organic	PFOS	mg/kg	0.0002	4.71	90			0.0559	0.0004	0.169	0.0437	0.299	0.0753	0.0602	0.0361	
Perfluorinated Compounds (PFCs)	4:2 FTS	mg/kg	0.0005					<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
	PFBA	mg/kg	0.001					<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	
	PFPeA	mg/kg	0.0002					<0.0002	<0.0002	<0.0002	0.0003	0.0005	0.0012	<0.0002	0.0005	
	8:2 FTS	mg/kg	0.0005	3.73	240			<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0006	
	N-Me-FOSA	mg/kg	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	
	FOSA	mg/kg	0.0002					<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
	PFBS	mg/kg	0.0002					<0.0002	<0.0002	<0.0002	0.0003	0.0013	0.0036	<0.0002	0.0024	
	PFDS	mg/kg	0.0002					0.0002	<0.0002	0.0002	<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	
	PFTriDA	mg/kg	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	
	PFDCa	mg/kg	0.0002					0.0002	<0.0002	0.0007	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
	PFHpA	mg/kg	0.0002					<0.0002	<0.0002	<0.0002	<0.0002	0.0003	0.001	<0.0002	0.0005	
	PFHxA	mg/kg	0.0002					0.0002	<0.0002	0.0003	0.0013	0.002	0.0065	0.0003	0.0056	
	N-Et-FOSE	mg/kg	0.0005					<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
	PFDoA	mg/kg	0.0002					<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
	PFNA	mg/kg	0.0002					<0.0002	<0.0002	0.001	<0.0002	0.0002	<0.0002	<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		
Moisture Content	%	1						3.9	14.9	10.4	15.8	3.4	9	7.9	17.3	

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 Landuse
Airservices (GHD) (2017) Derivation of PFAS Soil and Water Criteria - Health Based Screening Criteria (HBSC) - Commercial / Industrial Landuse - Based on FSANZ TDI 2017
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

LOR = Limit of Reporting
- = not analysed
mg/kg = milligrams per kilogram

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

				APEC 2 Warehouse and Powerhouse									
				Location	SB11				SB15				
				Sample ID	SS11 0.1 220617	SS11 0.5 220617	SS15 0.1 220617	SSQA08 220617	SSQA07 230617	SS15 1.4 220617			
				Smample Depth	0.1	0.5	0.1	0.1	0.1	1.4			
				Sample Date	22/06/2017	22/06/2017	22/06/2017	22/06/2017	22/06/2017	22/06/2017			
				Sample Type	Primary	Primary	Primary	Duplicate	Triplicate	Primary			
				Lab Report No.	EP1707039	EP1707039	EP1707039	EP1707039	552888	EP1707039			
				ASA (GHD) 2015.	ASA (GHD) 2015.	ASA (GHD) 2017.	WA DER - 2017.						
	Analyte	Units	LOR	EISLs - Comm / Ind 60% species protection level	HISLs- Industrial (direct Contact)	HBSC Comm / Ind (after FSANZ TDI)	Health Baased Screening Levels Comm / Ind						
Per- / Poly - fluoroalkyl	Sum of PFAS	mg/kg	0.0002					0.826	0.14	0.276	0.525	-	0.149
	Sum of PFAS (WA DER List)	mg/kg	0.0002					0.787	0.131	0.274	0.522	-	0.137
	Sum of PFHxS and PFOS	mg/kg	0.0002					0.686	0.11	0.271	0.519	-	0.122
	10:2 FTS	mg/kg	0.0005					<0.0005	<0.0005	<0.0005	<0.0005	<0.005	<0.0005
	MeFOSAA	mg/kg	0.0002					<0.0002	<0.0002	<0.0002	<0.0002	<0.01	<0.0002
	PFPeS	mg/kg	0.0002					0.0216	0.0046	0.0005	0.0006	<0.005	0.0078
	PFHpS	mg/kg	0.0002					0.0154	0.0037	0.001	0.0008	<0.005	0.004
	PFHxS	mg/kg	0.0002				100	0.186	0.0335	0.003	0.003	<0.005	0.0823
	EtFOSAA	mg/kg	0.0002					<0.0002	<0.0002	<0.0002	<0.0002	<0.01	<0.0002
Surfactant	6:2 FTS	mg/kg	0.0005	NA	900			<0.0005	<0.0005	<0.0005	<0.0005	<0.01	<0.0005
	PFOA	mg/kg	0.0002	3.73	240	680		0.0414	0.0082	0.0014	0.0014	<0.005	0.0051
	PFOS	mg/kg	0.0002	4.71	90			0.5	0.0768	0.268	0.516	0.43 ^{#1}	0.0402
Organic	4:2 FTS	mg/kg	0.0005					<0.0005	<0.0005	<0.0005	<0.0005	<0.005	<0.0005
	PFBA	mg/kg	0.001					<0.001	<0.001	<0.001	<0.001	<0.005	<0.001
	PFPeA	mg/kg	0.0002					0.0054	0.0015	<0.0002	<0.0002	<0.005	0.0008
Perfluorinated Compounds (PFCs)	8:2 FTS	mg/kg	0.0005	3.73	240			<0.0005	<0.0005	<0.0005	<0.0005	<0.005	<0.0005
	N-Me-FOSA	mg/kg	0.0005					<0.0005	<0.0005	<0.0005	<0.0005	<0.005	<0.0005
	N-Me-FOSE	mg/kg	0.0005					<0.0005	<0.0005	<0.0005	<0.0005	<0.005	<0.0005
	FOSA	mg/kg	0.0002					0.0002	<0.0002	<0.0002	<0.0002	<0.005	<0.0002
	PFBS	mg/kg	0.0002					0.0108	0.0016	0.0003	0.0007	<0.005	0.0021
	PFDS	mg/kg	0.0002					0.0015	<0.0002	0.0007	0.0007	<0.005	<0.0002
	PFTeDA	mg/kg	0.0005					<0.0005	<0.0005	<0.0005	<0.0005	<0.005	<0.0005
	PFTrDA	mg/kg	0.0002					<0.0002	<0.0002	<0.0002	<0.0002	<0.005	<0.0002
	N-Et-FOSA	mg/kg	0.0005					<0.0005	<0.0005	<0.0005	<0.0005	<0.005	<0.0005
	PFDCa	mg/kg	0.0002					<0.0002	<0.0002	<0.0002	0.0002	<0.005	<0.0002
	PFHpA	mg/kg	0.0002					0.014	0.003	<0.0002	<0.0002	<0.005	0.0013
	PFHxA	mg/kg	0.0002					0.0292	0.0068	0.0008	0.0014	<0.005	0.0053
	N-Et-FOSE	mg/kg	0.0005					<0.0005	<0.0005	<0.0005	<0.0005	<0.005	<0.0005
	PFDoA	mg/kg	0.0002					<0.0002	<0.0002	<0.0002	<0.0002	<0.005	<0.0002
	PFNA	mg/kg	0.0002					0.0005	<0.0002	<0.0002	<0.0002	<0.005	<0.0002
	PFUnA	mg/kg	0.0002					<0.0002	<0.0002	<0.0002	<0.0002	<0.005	<0.0002
	Moisture Content		%	1					9.9	4	4.4	5.1	3.8

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 Landuse
Airservices (GHD) (2017) Derivation of PFAS Soil and Water Criteria - Health Based Screening Criteria (HBSC) - Commercial / Industrial Landuse - Based on FSANZ TDI 2017
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
LOR = Limit of Reporting
- = not analysed
mg/kg = milligrams per kilogram

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

				APEC 3 Former Fire Training Ground (FFTG)												
				Location	MW09			MW010			MW011					
				Sample ID	SS19 0.1 230617	SS19 0.7 230617	SS19 3.5 230617	SS22 0.1 230617	SS22 0.5 230617	SS23 0.1 230617	SQA015 230617	SSQA016 230617	SS18 0.1 230617			
				Smaple Depth	0.1	0.7	3.5	0.1	0.5	0.1	0.1	0.1	0.1			
				Sample Date	23/06/2017	23/06/2017	23/06/2017	23/06/2017	23/06/2017	23/06/2017	23/06/2017	23/06/2017	23/06/2017			
				Sample Type	Primary	Primary	Primary	Primary	Primary	Primary	Duplicate	Triplicate	Primary			
				Lab Report No.	EP1707039	EP1707039	EP1707039	EP1707039	EP1707039	EP1707039	EP1707039	552888	EP1707039			
				ASA (GHD) 2015.	ASA (GHD) 2015.	ASA (GHD) 2017.	WA DER - 2017.									
				EISLs - Comm / Ind 60% species protection level	HISLs- Industiral (direct Contact)	HBSC Comm / Ind (after FSANZ TDI)	Health Baased Screening Levels Comm / Ind									
Analyte	Units	LOR														
Sum of PFAS	mg/kg	0.0002						0.806	0.193	0.236	5.28	6.12	0.0264	0.0445	-	0.227
Sum of PFAS (WA DER List)	mg/kg	0.0002						0.789	0.174	0.214	5.16	6.08	0.026	0.0428	-	0.216
Sum of PFHxS and PFOS	mg/kg	0.0002						0.779	0.14	0.16	4.54	5.44	0.026	0.0402	-	0.214
10:2 FTS	mg/kg	0.0005						<0.0005	<0.0005	<0.0005	<0.005	<0.005	<0.0005	<0.0005	<0.005	<0.0005
MeFOSAA	mg/kg	0.0002						<0.0005	<0.0002	<0.0002	<0.005	<0.005	<0.0002	<0.0002	<0.01	<0.0002
PFPeS	mg/kg	0.0002						0.0006	0.0076	0.0136	0.0057	0.012	<0.0002	<0.0002	<0.005	<0.0002
PFHpS	mg/kg	0.0002						0.0167	0.0112	0.0089	0.0062	0.0073	<0.0002	<0.0002	<0.005	0.0005
PFHxS	mg/kg	0.0002					100	0.0189	0.0878	0.078	0.0611	0.0926	0.0003	0.0007	<0.005	0.0024
EtFOSAA	mg/kg	0.0002						<0.0005	<0.0002	<0.0002	<0.005	<0.005	<0.0002	<0.0002	<0.01	<0.0002
6:2 FTS	mg/kg	0.0005		NA	900			<0.0005	<0.0005	0.0012	0.0114	0.0272	<0.0005	0.0005	<0.01	<0.0005
PFOA	mg/kg	0.0002		3.73	240	680		0.008	0.0163	0.0104	0.0331	0.0424	<0.0002	0.0003	<0.005	0.0013
PFOS	mg/kg	0.0002		4.71	90			0.76	0.0521	0.0822	4.48	5.35	0.0257	0.0395	0.0069 ^{#1}	0.212
4:2 FTS	mg/kg	0.0005						<0.0005	<0.0005	<0.0005	<0.005	<0.005	<0.0005	<0.0005	<0.005	<0.0005
PFBA	mg/kg	0.001						<0.001	<0.001	<0.001	<0.005	<0.005	<0.001	<0.001	<0.005	<0.001
PFPeA	mg/kg	0.0002						<0.0005	0.0016	0.0037	<0.005	<0.005	<0.0002	<0.0002	<0.005	<0.0002
8:2 FTS	mg/kg	0.0005		3.73	240			<0.0005	<0.0005	<0.0005	0.524	0.459	<0.0005	0.0015	<0.005	<0.0005
N-Me-FOSA	mg/kg	0.0005						<0.0012	<0.0005	<0.0005	<0.0125	<0.0125	<0.0005	<0.0005	<0.005	<0.0005
N-Me-FOSE	mg/kg	0.0005						<0.0012	<0.0005	<0.0005	<0.0125	<0.0125	<0.0005	<0.0005	<0.005	<0.0005
FOSA	mg/kg	0.0002						<0.0005	<0.0002	<0.0002	0.0714	0.0199	<0.0002	0.0004	<0.005	0.0003
PFBS	mg/kg	0.0002						<0.0005	0.0032	0.0078	0.0057	0.0131	<0.0002	<0.0002	<0.005	<0.0002
PFDS	mg/kg	0.0002						<0.0005	<0.0002	<0.0002	0.0264	<0.005	0.0004	0.0006	<0.005	0.0074
PFTeDA	mg/kg	0.0005						<0.0012	<0.0005	<0.0005	<0.0125	<0.0125	<0.0005	<0.0005	<0.005	<0.0005
PFTriDA	mg/kg	0.0002						<0.0005	<0.0002	<0.0002	<0.005	<0.005	<0.0002	<0.0002	<0.005	<0.0002
N-Et-FOSA	mg/kg	0.0005						<0.0012	<0.0005	<0.0005	<0.0125	<0.0125	<0.0005	<0.0005	<0.005	<0.0005
PFDcA	mg/kg	0.0002						<0.0005	<0.0002	<0.0002	0.0052	<0.005	<0.0002	0.0003	<0.005	0.0007
PFHpA	mg/kg	0.0002						<0.0005	0.002	0.003	<0.005	0.0094	<0.0002	<0.0002	<0.005	<0.0002
PFHxA	mg/kg	0.0002						0.0021	0.0109	0.0277	0.0466	0.09	<0.0002	0.0003	<0.005	0.0007
N-Et-FOSE	mg/kg	0.0005						<0.0012	<0.0005	<0.0005	<0.0125	<0.0125	<0.0005	<0.0005	<0.005	<0.0005
PFDcA	mg/kg	0.0002						<0.0005	<0.0002	<0.0002	<0.005	<0.005	<0.0002	<0.0002	<0.005	<0.0002
PFNA	mg/kg	0.0002						<0.0005	<0.0002	<0.0002	<0.005	<0.005	<0.0002	0.0004	<0.005	0.0008
PFUnA	mg/kg	0.0002						<0.0005	<0.0002	<0.0002	<0.005	<0.005	<0.0002	<0.0002	<0.005	0.0005
Moisture Content	%	1						7.9	9.5	17.5	3.4	4.4	2.3	2.3	1.3	3.3

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 Landuse

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Airservices (GHD) (2015) Derivation of PFAS Soil and Water Criteria - Ecological Interim Screening levels (EISLs)- Commercial and industrial at 60% protection, low reliability

LOR = Limit of Reporting
- = not analysed
mg/kg = milligrams per kilogram

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

				APEC 3 Former Fire Training Ground (FFTG)												
				Location	MW012	SB20				SB21		SB24				
				Sample ID	SS18 1.0 230617	SS18 3.4 230617	SS20 0.1 230617	SS20 0.7 230617	SS21 0.1 230617	SS21 0.8 230617	SS24 0.1 230617	SS24 0.5 230617	SQA017 230617			
				Smample Depth	1.0	3.4	0.1	0.7	0.1	0.8	0.1	0.5	0.5			
				Sample Date	23/06/2017	23/06/2017	23/06/2017	23/06/2017	23/06/2017	23/06/2017	23/06/2017	23/06/2017	23/06/2017			
				Sample Type	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Duplicate			
				Lab Report No.	EP1707039	EP1707039	EP1707039	EP1707039	EP1707039	EP1707039	EP1707039	EP1707039	EP1707039			
				ASA (GHD) 2015.	ASA (GHD) 2015.	ASA (GHD) 2017.	WA DER - 2017.									
				EISLs - Comm / Ind 60% species protection level	HISLs- Industiral (direct Contact)	HBSC Comm / Ind (after FSANZ TDI)	Health Baased Screening Levels Comm / Ind									
Per / Poly - fluoroalkyl	Analyte	Units	LOR					0.0867	0.0285	1.58	1.12	2.1	10.2	0.212	0.788	0.156
	Sum of PFAS	mg/kg	0.0002					0.0763	0.0262	1.58	1.03	2.05	10.2	0.205	0.771	0.151
	Sum of PFHxS and PFOS	mg/kg	0.0002					0.0609	0.0126	1.57	0.876	1.73	9.88	0.203	0.674	0.15
	10:2 FTS	mg/kg	0.0005					<0.0005	<0.0005	<0.0005	<0.0005	0.0022	<0.005	<0.0005	<0.0005	<0.0005
	MeFOSAA	mg/kg	0.0002					<0.0002	<0.0002	<0.0005	<0.0005	<0.005	<0.0002	<0.0002	<0.0002	<0.0002
	PFPeS	mg/kg	0.0002					0.0024	0.0019	0.0007	0.0387	0.0014	0.0108	<0.0002	0.0043	<0.0002
	PFHpS	mg/kg	0.0002					0.008	0.0004	<0.0005	0.0574	0.001	0.0189	0.0027	0.0119	0.0018
	PFHxS	mg/kg	0.0002				100	0.043	0.0118	0.0035	0.426	0.0103	0.135	0.0036	0.0913	0.0025
Surfactant	EtFOSAA	mg/kg	0.0002					<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.005	<0.0002	<0.0002	<0.0002
	6:2 FTS	mg/kg	0.0005	NA	900			<0.0005	<0.0005	<0.0005	0.0148	0.0027	0.0832	<0.0005	0.0433	<0.0005
	PFOA	mg/kg	0.0002	3.73	240	680		0.0083	0.0007	0.0007	0.0391	0.0048	0.0784	0.0015	0.0108	0.0011
Organic	PFOS	mg/kg	0.0002	4.71	90			0.0179	0.0008	1.57	0.45	1.72	9.75	0.199	0.583	0.147
	4:2 FTS	mg/kg	0.0005					<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.005	<0.0005	<0.0005	<0.0005
	PFBA	mg/kg	0.001					<0.001	<0.001	<0.001	<0.001	<0.001	<0.005	<0.001	<0.001	<0.001
Perfluorinated Compounds (PFCs)	PFPeA	mg/kg	0.0002					0.0011	0.0007	<0.0005	0.0048	0.0005	<0.005	<0.0002	0.0028	<0.0002
	8:2 FTS	mg/kg	0.0005	3.73	240			<0.0005	<0.0005	0.0026	<0.0005	0.301	0.0081	<0.0005	0.0094	<0.0005
	N-Me-FOSA	mg/kg	0.0005					<0.0005	<0.0005	<0.0012	<0.0012	<0.0012	<0.0125	<0.0005	<0.0005	<0.0005
	N-Me-FOSE	mg/kg	0.0005					<0.0005	<0.0005	<0.0012	<0.0012	<0.0012	<0.0125	<0.0005	<0.0005	<0.0005
	FOSA	mg/kg	0.0002					<0.0002	<0.0002	0.0009	<0.0005	0.0267	<0.005	0.0004	<0.0002	0.0003
	PFBS	mg/kg	0.0002					0.0016	0.0054	0.0006	0.0262	0.0016	0.0076	0.0002	0.0136	<0.0002
	PFDS	mg/kg	0.0002					<0.0002	<0.0002	<0.0005	<0.0005	0.0095	<0.005	<0.0002	<0.0002	<0.0002
	PFTeDA	mg/kg	0.0005					<0.0005	<0.0005	<0.0012	<0.0012	<0.0012	<0.0125	<0.0005	<0.0005	<0.0005
	PFTTrDA	mg/kg	0.0002					<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.005	<0.0002	<0.0002	<0.0002
	N-Et-FOSA	mg/kg	0.0005					<0.0005	<0.0005	<0.0012	<0.0012	<0.0012	<0.0125	<0.0005	<0.0005	<0.0005
	PFDcA	mg/kg	0.0002					<0.0002	<0.0002	<0.0005	<0.0005	0.0032	<0.005	<0.0002	<0.0002	<0.0002
	PFHpA	mg/kg	0.0002					0.0006	0.0005	<0.0005	0.0117	0.0015	0.0178	<0.0002	0.0018	<0.0002
	PFHxA	mg/kg	0.0002					0.0038	0.0063	0.0014	0.0536	0.0095	0.0811	0.0007	0.0153	0.0006
	N-Et-FOSE	mg/kg	0.0005					<0.0005	<0.0005	<0.0012	<0.0012	<0.0012	<0.0125	<0.0005	<0.0005	<0.0005
	PFDaA	mg/kg	0.0002					<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.005	<0.0002	<0.0002	<0.0002
	PFNA	mg/kg	0.0002					<0.0002	<0.0002	0.0006	<0.0005	<0.0005	<0.005	0.0034	0.0007	0.0027
	PFUnA	mg/kg	0.0002					<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.005	<0.0002	<0.0002	<0.0002
	Moisture Content	%	1					8	18.7	2.4	10.2	4.1	7.5	3.5	14	3.7

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 Landuse

Airservices (GHD) (2017) Derivation of PFAS Soil and Water Criteria - Health Based Screening Criteria (HBSC) - Commercial / Industrial Landuse - Based on FSANZ TDI 2017

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

LOR = Limit of Reporting

- = not analysed

mg/kg = milligrams per kilogram

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

				APEC 3 Former Fire Training Ground (FFTG)											
				Location	SB24		SB25		SED01			SED02			
				Sample ID	SSQA018 230617		SS25 0.1 230617		SS25 0.8 230617		SED01 010717	SEDQA01 010717	SEDQA02 010717	SED02 010717	
				Smample Depth	0.5		0.1		0.8						
				Sample Date	23/06/2017		23/06/2017		23/06/2017		1/07/2017	1/07/2017	1/07/2017	1/07/2017	
				Sample Type	Triplicate		Primary		Primary		Primary	Duplicate	Triplicate	Primary	
				Lab Report No.	552888		EP1707039		EP1707039		EP1707076	EP1707076	EP1707076	EP1707076	
				ASA (GHD) 2015.	ASA (GHD) 2015.	ASA (GHD) 2017.	WA DER - 2017.								
				EISLs - Comm / Ind 60% species protection level	HISLs- Industiral (direct Contact)	HBSC Comm / Ind (after FSANZ TDI)	Health Baased Screening Levels Comm / Ind								
Per- / Poly - fluoroalkyl	Sum of PFAS	mg/kg	0.0002					-	0.541	0.0287	2.21	2.51	2.92	6.12	
	Sum of PFAS (WA DER List)	mg/kg	0.0002					-	0.539	0.0267	2.16	2.42	2.86	5.8	
	Sum of PFHxS and PFOS	mg/kg	0.0002					-	0.538	0.0255	1.98	2.16	2.66	5.29	
	10:2 FTS	mg/kg	0.0005					<0.005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
	MeFOSAA	mg/kg	0.0002					<0.01	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	
	PFPeS	mg/kg	0.0002					<0.005	<0.0005	<0.0002	0.0247	0.044	0.0327	0.0673	
	PFHpS	mg/kg	0.0002					<0.005	<0.0005	0.002	0.026	0.0417	0.0273	0.246	
	PFHxS	mg/kg	0.0002				100	<0.005	0.0008	0.002	0.174	0.299	0.22	1.34	
Surfactant	EtFOSAA	mg/kg	0.0002					<0.01	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	
	6:2 FTS	mg/kg	0.0005	NA	900			<0.01	<0.0005	<0.0005	0.0253	0.0432	0.0313	0.111	
	PFOA	mg/kg	0.0002	3.73	240	680		<0.005	<0.0005	0.0012	0.0219	0.0348	0.0247	0.14	
	PFOS	mg/kg	0.0002	4.71	90			0.12 ^{#1}	0.537	0.0235	1.81	1.86	2.44	3.95	
Organic	4:2 FTS	mg/kg	0.0005					<0.005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
	PFBA	mg/kg	0.001					<0.005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	
	PFPeA	mg/kg	0.0002					<0.005	<0.0005	<0.0002	0.0073	0.0143	0.008	0.0268	
Perfluorinated Compounds (PFCS)	8:2 FTS	mg/kg	0.0005	3.73	240			<0.005	0.001	<0.0005	0.0227	0.0478	0.0474	0.0022	
	N-Me-FOSA	mg/kg	0.0005					<0.005	<0.0012	<0.0005	<0.0012	<0.0012	<0.0012	<0.0012	
	N-Me-FOSE	mg/kg	0.0005					<0.005	<0.0012	<0.0005	<0.0012	<0.0012	<0.0012	<0.0012	
	FOSA	mg/kg	0.0002					<0.005	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	
	PFBS	mg/kg	0.0002					<0.005	<0.0005	<0.0002	0.0249	0.03	0.0214	0.0556	
	PFDS	mg/kg	0.0002					<0.005	0.0018	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	
	PFTeDA	mg/kg	0.0005					<0.005	<0.0012	<0.0005	<0.0012	<0.0012	<0.0012	<0.0012	
	PFTrDA	mg/kg	0.0002					<0.005	<0.0005	<0.0002	<0.0005	<0.0005	0.0005	<0.0005	
	N-Et-FOSA	mg/kg	0.0005					<0.005	<0.0012	<0.0005	<0.0012	<0.0012	<0.0012	<0.0012	
	PFDCa	mg/kg	0.0002					<0.005	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	
	PFHpA	mg/kg	0.0002					<0.005	<0.0005	<0.0002	0.0072	0.0124	0.0096	0.0276	
	PFHxA	mg/kg	0.0002					<0.005	<0.0005	<0.0002	0.0639	0.0802	0.0566	0.148	
	N-Et-FOSE	mg/kg	0.0005					<0.005	<0.0012	<0.0005	<0.0012	<0.0012	<0.0012	<0.0012	
	PFDoA	mg/kg	0.0002					<0.005	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	
	PFNA	mg/kg	0.0002					<0.005	<0.0005	<0.0002	<0.0005	0.0017	0.0017	0.0052	
	PFUnA	mg/kg	0.0002					<0.005	<0.0005	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	
	Moisture Content		%	1					2.5	3.4	13.2	30	23.2	24	30.5

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 linear/branched standard.

Legend
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 - Based on FSANZ TDI 2017
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
LOR = Limit of Reporting
- = not analysed
mg/kg = milligrams per kilogram

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

				Boundary (BDY)													
				Location	MW013				MW015				SED03	SED05	SED07		
				Sample ID	SS17 0.1 230617	SS17 1.8 230617	SSQA013 230617	SSQA014 230617	SS26 0.1 220617	SS26 1.0 220617	SED03 010717	SED05 300617	SED07 010717				
				Smaple Depth	0.1	1.8	1.8	1.8	0.1	1.0							
				Sample Date	23/06/2017	23/06/2017	23/06/2017	23/06/2017	22/06/2017	22/06/2017	1/07/2017	30/06/2017	1/07/2017				
				Sample Type	Primary	Primary	Duplicate	Triplicate	Primary	Primary	Primary	Primary	Primary				
				Lab Report No.	EP1707039	EP1707039	EP1707039	552888	EP1707039	EP1707039	EP1707076	EP1707076	EP1707076				
				ASA (GHD) 2015.	ASA (GHD) 2015.	ASA (GHD) 2017.	WA DER - 2017.										
				EISLs - Comm / Ind 60% species protection level	HISLs- Industiral (direct Contact)	HBSC Comm / Ind (after FSANZ TDI)	Health Baased Screening Levels Comm / Ind										
Per- / Poly - fluoroalkyl	Analyte	Units	LOR					0.006	0.0014	0.0048	-	0.0035	0.0011	0.586	0.0038	0.002	
	Sum of PFAS	mg/kg	0.0002					0.006	0.0012	0.0048	-	0.0032	0.0011	0.572	0.0038	0.002	
	Sum of PFAS (WA DER List)	mg/kg	0.0002					0.006	0.0007	0.0048	-	0.0027	0.0011	0.56	0.0038	0.002	
	Sum of PFHxS and PFOS	mg/kg	0.0002					0.006	0.0007	0.0048	-	0.0027	0.0011	0.56	0.0038	0.002	
	10:2 FTS	mg/kg	0.0005					<0.0005	<0.0005	<0.0005	<0.005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
	MeFOSAA	mg/kg	0.0002					<0.0002	<0.0002	<0.0002	<0.01	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	
	PFPeS	mg/kg	0.0002					<0.0002	0.0002	<0.0002	<0.005	0.0003	<0.0002	0.0014	<0.0002	<0.0002	
	PFHpS	mg/kg	0.0002					<0.0002	<0.0002	<0.0002	<0.005	<0.0002	<0.0002	0.0125	<0.0002	<0.0002	
	PFHxS	mg/kg	0.0002				100	0.0003	0.0007	0.0003	<0.005	0.0017	<0.0002	0.0356	0.0004	0.0003	
Surfactant	EiFOSAA	mg/kg	0.0002					<0.0002	<0.0002	<0.0002	<0.01	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	
	6:2 FTS	mg/kg	0.0005	NA	900			<0.0005	<0.0005	<0.0005	<0.01	<0.0005	<0.0005	0.0015	<0.0005	<0.0005	
	PFOA	mg/kg	0.0002	3.73	240	680		<0.0002	<0.0002	<0.0002	<0.005	<0.0002	<0.0002	0.0076	<0.0002	<0.0002	
	PFOS	mg/kg	0.0002	4.71	90			0.0057	<0.0002	0.0045	0.0053	0.001	0.0011	0.524	0.0034	0.0017	
Organic	4:2 FTS	mg/kg	0.0005					<0.0005	<0.0005	<0.0005	<0.005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
	PFBA	mg/kg	0.001					<0.001	<0.001	<0.001	<0.005	<0.001	<0.001	<0.001	<0.001	<0.001	
	PFPeA	mg/kg	0.0002					<0.0002	<0.0002	<0.0002	<0.005	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	
Perfluorinated Compounds (PFCS)	8:2 FTS	mg/kg	0.0005	3.73	240			<0.0005	<0.0005	<0.0005	<0.005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
	N-Me-FOSA	mg/kg	0.0005					<0.0005	<0.0005	<0.0005	<0.005	<0.0005	<0.0005	<0.0012	<0.0005	<0.0005	
	N-Me-FOSE	mg/kg	0.0005					<0.0005	<0.0005	<0.0005	<0.005	<0.0005	<0.0005	<0.0012	<0.0005	<0.0005	
	FOSA	mg/kg	0.0002					<0.0002	<0.0002	<0.0002	<0.005	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	
	PFBS	mg/kg	0.0002					<0.0002	0.0005	<0.0002	<0.005	0.0002	<0.0002	<0.0005	<0.0002	<0.0002	
	PFDS	mg/kg	0.0002					<0.0002	<0.0002	<0.0002	<0.005	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	
	PFTeDA	mg/kg	0.0005					<0.0005	<0.0005	<0.0005	<0.005	<0.0005	<0.0005	<0.0012	<0.0005	<0.0005	
	PFTriDA	mg/kg	0.0002					<0.0002	<0.0002	<0.0002	<0.005	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	
	N-Et-FOSA	mg/kg	0.0005					<0.0005	<0.0005	<0.0005	<0.005	<0.0005	<0.0005	<0.0012	<0.0005	<0.0005	
	PFDcA	mg/kg	0.0002					<0.0002	<0.0002	<0.0002	<0.005	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	
	PFHpA	mg/kg	0.0002					<0.0002	<0.0002	<0.0002	<0.005	<0.0002	<0.0002	0.0012	<0.0002	<0.0002	
	PFHxA	mg/kg	0.0002					<0.0002	<0.0002	<0.0002	<0.005	0.0003	<0.0002	0.0023	<0.0002	<0.0002	
	N-Et-FOSE	mg/kg	0.0005					<0.0005	<0.0005	<0.0005	<0.005	<0.0005	<0.0005	<0.0012	<0.0005	<0.0005	
	PFDaA	mg/kg	0.0002					<0.0002	<0.0002	<0.0002	<0.005	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	
	PFNA	mg/kg	0.0002					<0.0002	<0.0002	<0.0002	<0.005	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	
	PFUnA	mg/kg	0.0002					<0.0002	<0.0002	<0.0002	<0.005	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	
	Moisture Content		%	1					7.6	10.2	7.6	7.1	6	9	20.2	6	8.5

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 linear/branched standard.

Legend

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 - Based on FSANZ TDI 2017

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

LOR = Limit of Reporting

- = not analysed

mg/kg = milligrams per kilogram

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

										APEC 1 Fire Station (FS)								APEC 3 Former Fire Training Ground (FFTG)							
										MW01		MW02	MW03	MW04	MW014	MW09	MW010		MW011	MW012					
Location										Primary	Duplicate	Triplicate	Primary	Primary	Primary	Primary	Primary	Primary	Duplicate	Triplicate	Primary	Primary			
Sample Type										MW01_010717	WQA09_010717	WQA010_010717	MW02_300617	MW03_010717	MW04_010717	MW014_010717	MW09_300617	Primary_300617	WQA03_300617	WQA04_300617	Primary_300617	Primary_300617			
Sample ID										1/07/2017	1/07/2017	1/07/2017	30/06/2017	1/07/2017	1/07/2017	1/07/2017	30/06/2017	30/06/2017	30/06/2017	30/06/2017	30/06/2017	30/06/2017			
Lab Report No.										EP1707076	EP1707076	552886	EP1707076	EP1707076	EP1707076	EP1707076	EP1707076	EP1707076	EP1707076	552886	EP1707076	EP1707076			
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% species protection	WA DER 2017 Highly disturbed systems FW 80% species protection	Airservices (GHD) (2015) EISLs (toxicity effects on aquatic organisms)																	
Per- & Poly- fluoroalkyl substances	Sum of PFAS	µg/L	0.01						480	387	-	126	136	14.4	594	528	16,800	11,200	-	6960	331				
	Sum of PFAS (WA DER List)	µg/L	0.01						428	362		119	126	13.8	552	502	15,600	10,400		6510	292				
	Sum of PFHxS and PFOS	µg/L	0.01	0.07	0.5	5	2	31		273	263	2850	91.9	102	11.5	414	420	11100	8110	6200	4440	161			
Organic c	6:2 FTS	µg/L	0.05						<0.1	<0.05	<5	<0.05	<0.05	<0.05	<0.1	<0.1	<0.05	<10	<1	<0.05					
	PFPeS	µg/L	0.02						37.3	17.7	210 ^{#1}	2.98	6.34	0.42	34.3	17.1	694	609	520 ^{#1}	269	36				
	PFHpS	µg/L	0.02						15	7.3	86 ^{#1}	1.63	1.77	0.2	6.65	9.22	452	140	280 ^{#1}	176	3				
	PFHxS	µg/L	0.02			5	2	31	89.8	82.3	950 ^{#1}	44.4	36.1	2.46	163	307	5570	3330	2600 ^{#1}	2840	159				
	6:2 FTS	µg/L	0.05					NA	4.3	2.18	34	1.92	0.25	<0.05	0.14	0.67	548	341	320	292	0.76				
	PFOA	µg/L	0.01	0.56	5	50	632	1,824	2900	16	7.37	75 ^{#1}	3.99	3.84	0.22	16.8	8.12	391	206	220 ^{#1}	195	4.36			
	PFOS	µg/L	0.01			5	2	31	6.66	183	181	1900 ^{#1}	47.5	66.2	9	251	113	5560	4780	3600 ^{#1}	1600	1.86			
	4:2 FTS	ng/L	50						<100	<50	<5000	<50	<50	<50	<100	<100	11,200	4420	<10,000	7700	<50				
	PFBA	MG/L	0.0001						0.0135	0.0056	0.077	0.001	<0.0001	0.0008	0.006	0.0028	0.206	0.142	0.2	0.0805	0.0073				
	PFPeA	ng/L	20						21,600	10,200	140,000 ^{#1}	2230	2550	210	9990	5350	316,000	339,000	260,000 ^{#1}	141,000	11,600				
	8:2 FTS	µg/L	0.05					2900	0.3	0.16	<5	1.79	0.46	<0.05	0.16	<0.1	4.9	3.18	<10	<1	<0.05				
	N-Me-FOSA	µg/L	0.05						<0.25	<0.12	<5	<0.05	<0.05	<0.12	<0.25	<0.25	<2.5	<0.12	<10	<2.5	<0.12				
	N-Me-FOSE	µg/L	0.05						<0.25	<0.12	<5	<0.05	<0.05	<0.12	<0.25	<0.25	<2.5	<0.12	<10	<2.5	<0.12				
	FOSA	µg/L	0.02						0.53	0.17	<5	2.02	1.87	<0.05	1.44	<0.1	<1	0.5	<10	<1	<0.05				
	PFBS	µg/L	0.02						44.3	21.1	230 ^{#1}	4.33	6.36	0.44	36.8	24.5	946	266	550 ^{#1}	395	48.7				
	PFDS	µg/L	0.02						<0.1	<0.05	<5	0.12	<0.02	<0.05	<0.1	<0.1	<1	<0.05	<10	<1	<0.05				
	PFTeDA	µg/L	0.05						<0.25	<0.12	<5	<0.05	<0.05	<0.12	<0.25	<0.25	<2.5	<0.12	<10	<2.5	<0.12				
	PFTriDA	µg/L	0.02						<0.1	<0.05	<5	<0.02	<0.02	<0.05	<0.1	<0.1	<1	<0.05	<10	<1	<0.05				
	N-Et-FOSA	µg/L	0.05						<0.25	<0.12	<5	<0.05	<0.05	<0.12	<0.25	<0.25	<2.5	<0.12	<10	<2.5	<0.12				
	PFDoA	µg/L	0.02						<0.1	<0.05	<5	0.05	0.02	<0.05	<0.1	<0.1	<1	<0.05	<10	<1	<0.05				
PFHpA	µg/L	0.02						10.1	4.72	46 ^{#1}	1.67	1.88	0.1	8.81	2.97	193	110	130 ^{#1}	86.3	4.4					
PFHxA	µg/L	0.02						44.7	47.6	690 ^{#1}	10.4	8.79	0.55	59.1	37.7	1870	910	1300 ^{#1}	877	53.8					
N-Et-FOSE	µg/L	0.05						<0.25	<0.12	<5	<0.05	<0.05	<0.12	<0.25	<0.25	<2.5	<0.12	<10	<2.5	<0.12					
PFDoA	µg/L	0.02						<0.1	<0.05	<5	<0.02	<0.02	<0.05	<0.1	<0.1	<1	<0.05	<10	<1	<0.05					
PFNA	µg/L	0.02						0.15	<0.05	<5	0.13	0.09	<0.05	0.23	<0.1	1.6	0.92	<10	<1	<0.05					
PFUnA	µg/L	0.02						<0.1	<0.05	<5	<0.02	<0.02	<0.05	<0.1	<0.1	<1	<0.05	<10	<1	<0.05					

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
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
- = not analysed
mg/kg = milligrams per kilogram
NL = Not Limiting

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

										APEC 2 Warehouse and Powerhouse														Boundary (BDY)				
										Location	MW05	MW06			MW07	MW08	MW016	MW017	MW018	MW019A	MW019B	MW019C	MW020	MW021	MW013	MW015		
										Sample Type	Primary	Primary	Duplicate	Triplicate	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary				
										Sample ID	MW05_300617	MW06_300617	WQA05_300617	WQA06_300617	MW07_300617	MW08_300617	MW016_010717	MW017_010717	MW018_300617	MW19A_300617	MW19B_300617	MW19C_300617	MW020_300617	MW021_300617	Primary	Primary		
										Sample Date	30/06/2017	30/06/2017	30/06/2017	30/06/2017	30/06/2017	30/06/2017	1/07/2017	1/07/2017	30/06/2017	30/06/2017	30/06/2017	30/06/2017	30/06/2017	30/06/2017	30/06/2017	30/06/2017	30/06/2017	30/06/2017
										Lab Report No.	EP1707076	EP1707076	EP1707076	552886	EP1707076	EP1707076	EP1707076	EP1707076	EP1707076	EP1707076	EP1707076	EP1707076	EP1707076	EP1707076	EP1707076	EP1707076	EP1707076	EP1707076
Category	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% species protection	WA DER 2017 Highly disturbed systems FW 80% species protection	Airservices (GHD) (2015) EISLs (toxicity effects on aquatic organisms)																			
Per- and poly- fluoroalkyl substances	Sum of PFAS	µg/L	0.01							0.08	53.9	39.6	-	93.7	64.3	6.83	0.08	764	13.6	2.81	<0.05	1.65	7.12	20.3	5.98			
	Sum of PFAS (WA DER List)	µg/L	0.01							0.08	52.7	38.3	-	87.9	59.9	6.45	0.08	729	13.2	2.59	<0.05	1.55	6.9	17.7	5.41			
	Sum of PFHxS and PFOS	µg/L	0.01	0.07	0.5	5	2	31		0.08	47.5	34.9	27.1	71.2	44.1	4.32	0.08	595	13	2.13	<0.05	1.36	6.56	11.1	3.34			
	10:2 FTS	µg/L	0.05							<0.05	<0.1	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05			
	PFPeS	µg/L	0.02							<0.05	0.87	0.81	0.46 ^{#1}	4.41	2.8	0.3	<0.05	21.6	0.09	0.16	<0.05	0.1	0.12	2.5	0.44			
	PFHpS	µg/L	0.02							<0.05	0.41	0.36	0.25 ^{#1}	1.42	1.68	0.08	<0.05	11.7	0.28	0.06	<0.05	<0.05	0.1	0.1	0.13			
Surfactants	PFHxS	µg/L	0.02			5	2	31		<0.05	19.4	7.51	5.1 ^{#1}	27.7	13.8	1.26	<0.05	296	1.1	0.98	<0.05	0.56	0.62	11	2.28			
	6:2 FTS	µg/L	0.05						NA	<0.05	0.1	<0.05	<0.05	<0.05	1.66	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05			
	PFOA	µg/L	0.01	0.56	5	50	632	1,824	2900	<0.05	0.58	0.48	0.32 ^{#1}	1.4	1.46	0.13	<0.05	25	0.12	0.06	<0.05	<0.05	0.06	0.14	0.15			
Organic compounds	PFOS	µg/L	0.01			5	2	31	6.66	0.08	28.1	27.4	22 ^{#1}	43.5	30.3	3.06	0.08	299	11.9	1.15	<0.05	0.8	5.94	0.12	1.06			
	4:2 FTS	ng/L	50							<50	<100	<50	<10	<50	<50	<50	<50	<100	<50	<50	<50	<50	<50	<50	<50			
Perfluorinated Compounds (PFCs)	PFBA	MG/L	0.0001							<0.0002	0.0011	<0.0001	0.00012	0.0012	0.0013	0.0011	<0.0002	0.0029	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0005			
	PFPeA	ng/L	20							<50	160	310	240 ^{#1}	1620	1360	160	<50	12,400	<50	<50	<50	<50	<50	580	220			
	8:2 FTS	µg/L	0.05							<0.05	<0.1	<0.05	0.02	<0.05	<0.05	<0.05	<0.05	1.44	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05			
	N-Me-FOSA	µg/L	0.05							<0.12	<0.25	<0.05	<0.05	<0.12	<0.12	<0.12	<0.12	<0.25	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12			
	N-Me-FOSE	µg/L	0.05							<0.12	<0.25	<0.05	<0.05	<0.12	<0.12	<0.12	<0.12	<0.25	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12			
	FOSA	µg/L	0.02							<0.05	<0.1	0.06	<0.05 ^{#1}	<0.05	<0.05	<0.05	<0.05	1.42	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05			
	PFBS	µg/L	0.02							<0.05	0.86	0.67	0.42 ^{#1}	4.9	3.58	0.3	<0.05	25.3	<0.05	0.2	<0.05	0.1	0.14	2.98	0.58			
	PFDS	µg/L	0.02							<0.05	<0.1	<0.02	<0.01	<0.05	<0.05	<0.05	<0.05	0.23	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05			
	PFTeDA	µg/L	0.05							<0.12	<0.25	<0.05	<0.01	<0.12	<0.12	<0.12	<0.12	<0.25	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12			
	PFTrDA	µg/L	0.02							<0.05	<0.1	<0.02	<0.01	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05			
	N-Et-FOSA	µg/L	0.05							<0.12	<0.25	<0.05	<0.05	<0.12	<0.12	<0.12	<0.12	<0.25	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12			
	PFDoA	µg/L	0.02							<0.05	<0.1	<0.02	<0.01	<0.05	<0.05	<0.05	<0.05	0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05			
	PFHpA	µg/L	0.02							<0.05	0.21	0.23	0.14 ^{#1}	0.92	0.72	0.08	<0.05	8.36	<0.05	<0.05	<0.05	<0.05	<0.05	0.28	0.08			
	PFHxA	µg/L	0.02							<0.05	2.15	1.74	1.5 ^{#1}	6.64	5.68	0.36	<0.05	58.7	0.12	0.2	<0.05	0.09	0.14	2.61	0.54			
	N-Et-FOSE	µg/L	0.05							<0.12	<0.25	<0.05	<0.05	<0.12	<0.12	<0.12	<0.12	<0.25	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12			
	PFDoA	µg/L	0.02							<0.05	<0.1	<0.02	<0.01	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05			
	PFNA	µg/L	0.02							<0.05	<0.1	0.02	<0.01	<0.05	<0.05	<0.05	<0.05	0.22	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05			
	PFUnA	µg/L	0.02							<0.05	<0.1	<0.02	<0.01	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05			

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

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

- = not analysed

mg/kg = milligrams per kilogram

NL = Not Limiting

Table 5: Laboratory Analytical Results – Hydrocarbon Concentrations Detected in Soil and Sediment

				APEC 1 Fire Station (FS)					APEC 2 Warehouse and Powerhouse				
				Location	MW01	SB01	SB02	SED04	SED06	MW05	MW06	SB11	SB15
				Sample ID	SS03 0.1 220617	SS01 0.1 220617	SS02 0.5 220617	SED04 010717	SED06 010717	SS13 0.5 210617	SS12 0.5 210617	SS11 0.5 220617	SS15 0.5 220617
				Sample Depth	0.1	0.1	0.5			0.5	0.5	0.5	0.5
				Sample Date	22/06/2017	22/06/2017	22/06/2017	1/07/2017	1/07/2017	21/06/2017	21/06/2017	22/06/2017	22/06/2017
				Sample Type	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary
				Lab Report No.	EP1707039	EP1707039	EP1707039	EP1707076	EP1707076	EP1707039	EP1707039	EP1707039	EP1707039
				NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand	CRC Care 2011 Table B4 Com/Ind D Soil HSL Direct Contact	CRC Care 2011 Table B4 Soil HSL Direct Contact (Int. Main. Worker)							
Analyte		Units	LOR	0-1m									
TRH	C6-C10 fraction	mg/kg	10				<10	<10	<10	<10	<10	<10	<10
	C6-C10 fraction (minus BTEX)(F1)	mg/kg	10	260	26000	82000	<10	<10	<10	<10	<10	<10	<10
	>C10-C16 fraction	mg/kg	50				<50	<50	<50	<50	<50	<50	<50
	>C10-C16 (minus Naphthalene)(F2)	mg/kg	50	NL	20000	62000	<50	<50	<50	<50	<50	<50	<50
	>C16-C34 fraction	mg/kg	100		27000	85000	<100	<100	<100	<100	<100	<100	<100
	>C34-C40 fraction	mg/kg	100		38000	120000	<100	<100	<100	<100	<100	<100	<100
	>C10-C40 fraction (sum)	mg/kg	50				<50	<50	<50	<50	<50	<50	<50
BTEXN	Benzene	mg/kg	0.2	3	430	1100	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
	Toluene	mg/kg	0.5	NL	99000	120000	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Ethylbenzene	mg/kg	0.5	NL	27000	85000	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	m&p-Xylene	mg/kg	0.5				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	o-Xylene	mg/kg	0.5				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Total Xylenes	mg/kg	0.5	230	81000	130000	<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
	Naphthalene	mg/kg	1	NL			<1	<1	<1	-	-	<1	<1

Legend
CRC Care 2011 Table B4 Soil HSL Direct Contact (Int. Main. Worker)
CRC Care 2011 Table B4 Com/Ind D Soil HSL Direct Contact
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand

LOR = Limit of Reporting
- = not analysed
mg/kg = milligrams per kilogram
NL = Not Limiting

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 Soil and Sediment

			APEC 3 Former Fire Training Ground (FFTG)											
			Location		MW010		MW011	SB20	SB21	SB21	SED01		SED02	
			Sample ID		SS22 0.1 230617	SS22 0.5 230617	SS23 0.5 230617	SS20 0.1 230617	SS21 0.1 230617	SS21 0.8 230617	SED01 010717	SEDQA01 010717	SEDQA02 010717	SED02 010717
			Sample Depth		0.1	0.5	0.5	0.1	0.1	0.8				
			Sample Date		23/06/2017	23/06/2017	23/06/2017	23/06/2017	23/06/2017	23/06/2017	1/07/2017	1/07/2017	1/07/2017	1/07/2017
			Sample Type		Primary	Primary	Primary	Primary	Primary	Primary	Primary	Duplicate	Duplicate	Primary
			Lab Report No.		EP1707039	EP1707039	EP1707039	EP1707039	EP1707039	EP1707039	EP1707076	EP1707076	EP1707076	EP1707076
			NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand	CRC Care 2011 Table B4 Com/Ind D Soil HSL Direct Contact	CRC Care 2011 Table B4 Soil HSL Direct Contact (Int. Main. Worker)									
			0-1m											
TRH	Analyte	Units	LOR		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	C6-C10 fraction	mg/kg	10		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	C6-C10 fraction (minus BTEX)(F1)	mg/kg	10	260	26000	82000	<10	<10	<10	<10	<10	<10	<10	<10
	>C10-C16 fraction	mg/kg	50		<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
	>C10-C16 (minus Naphthalene)(F2)	mg/kg	50	NL	20000	62000	<50	<50	<50	<50	<50	<50	<50	<50
	>C16-C34 fraction	mg/kg	100		<100	<100	180	<100	<100	<100	<100	<100	<100	<100
BTEXN	>C34-C40 fraction	mg/kg	100		<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
	>C10-C40 fraction (sum)	mg/kg	50		<50	<50	180	<50	<50	<50	<50	<50	<50	<50
	Benzene	mg/kg	0.2	3	430	1100	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
	Toluene	mg/kg	0.5	NL	99000	120000	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Ethylbenzene	mg/kg	0.5	NL	27000	85000	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	m&p-Xylene	mg/kg	0.5				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	o-Xylene	mg/kg	0.5				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Total Xylenes	mg/kg	0.5	230	81000	130000	<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
	Naphthalene	mg/kg	1	NL			<1	<1	<1	<1	-	-	-	-

Legend
CRC Care 2011 Table B4 Soil HSL Direct Contact (Int. Main. Worker)
CRC Care 2011 Table B4 Com/Ind D Soil HSL Direct Contact
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand

LOR = Limit of Reporting
- = not analysed
mg/kg = milligrams per kilogram
NL = Not Limiting

NL (Csat in mg/kg) - The soil saturation concentration (Csat) is defined as the soil concentration at which the porewater phase cannot dissolve any mor 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 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 showi

Table 5: Laboratory Analytical Results – Hydrocarbon Concentrations Detected in Soil and Sediment

							Boundary (BDY)		
				Location	SED03	SED05	SED07		
				Sample ID	SED03 010717	SED05 300617	SED07 010717		
				Sample Depth					
				Sample Date	1/07/2017	30/06/2017	1/07/2017		
				Sample Type	Primary	Primary	Primary		
				Lab Report No.	EP1707076	EP1707076	EP1707076		
				NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand	CRC Care 2011 Table B4 Com/Ind D Soil HSL Direct Contact	CRC Care 2011 Table B4 Soil HSL Direct Contact (Int. Main. Worker)			
	Analyte	Units	LOR	0-1m					
TRH	C6-C10 fraction	mg/kg	10				<10	<10	<10
	C6-C10 fraction (minus BTEX)(F1)	mg/kg	10	260	26000	82000	<10	<10	<10
	>C10-C16 fraction	mg/kg	50				<50	<50	<50
	>C10-C16 (minus Naphthalene)(F2)	mg/kg	50	NL	20000	62000	<50	<50	<50
	>C16-C34 fraction	mg/kg	100		27000	85000	<100	<100	<100
	>C34-C40 fraction	mg/kg	100		38000	120000	<100	<100	<100
	>C10-C40 fraction (sum)	mg/kg	50				<50	<50	<50
BTEXN	Benzene	mg/kg	0.2	3	430	1100	<0.2	<0.2	<0.2
	Toluene	mg/kg	0.5	NL	99000	120000	<0.5	<0.5	<0.5
	Ethylbenzene	mg/kg	0.5	NL	27000	85000	<0.5	<0.5	<0.5
	m&p-Xylene	mg/kg	0.5				<0.5	<0.5	<0.5
	o-Xylene	mg/kg	0.5				<0.5	<0.5	<0.5
	Total Xylenes	mg/kg	0.5	230	81000	130000	<0.5	<0.5	<0.5
	Total BTEX	mg/kg	0.2				<0.2	<0.2	<0.2
	Naphthalene	mg/kg	1	NL			-	-	-

Legend

CRC Care 2011 Table B4 Soil HSL Direct Contact (Int. Main. Worker)

CRC Care 2011 Table B4 Com/Ind D Soil HSL Direct Contact

NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand

LOR = Limit of Reporting
- = not analysed
mg/kg = milligrams per kilogram
NL = Not Limiting

NL (Csat in mg/kg) - The soil saturation concentration (Csat) is defined as the soil concentration at which the porewater phase cannot dissolve any mor 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 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 showi

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

								APEC 1 Fire Station (FS)								
								Location		MW01			MW02	MW03	MW04	MW014
								Sample ID		MW01 010717	WQA09 010717	WQA010 010717	MW02 300617	MW03 010717	MW04 010717	MW014 010717
								Sample Date		1/07/2017	1/07/2017	1/07/2017	30/06/2017	1/07/2017	1/07/2017	1/07/2017
								Lab Report No		EP1707076	EP1707076	552886	EP1707076	EP1707076	EP1707076	EP1707076
								Sample Type		Primary	Duplicate	Triplicate	Primary	Primary	Primary	Primary
				CRC Care 2011 Table B2 GW HSL Int. Main. Worker (Shallow Trench), Sand	WA DER 2014 Domestic Non- Potable Groundwater Use	Airport Regulations 1997	NEPM 2013 GILs Freshwater	NEPM 2013 Table 1A(4) Comm/Ind HSL D GW for Vapour Intrusion, Sand								
Total Recoverable Hydrocarbons	Analyte	Units	LOR	2-4m				2-4m								
	C6-C10 fraction	µg/L	20						<20	<20	<20	<20	<20	<20	<20	
	C6-C10 fraction (minus BTEX)(F1)	µg/L	20	NL				6000	<20	<20	<20	<20	<20	<20	<20	
	>C10-C16 fraction	µg/L	100						<100	<100	<50	<100	<100	<100	<100	
	>C10-C16 (minus Naphthalene)(F2)	µg/L	100	NL	1000			NL	<100	<100	<50	<100	<100	<100	<100	
	>C16-C34 fraction	µg/L	100		900				<100	<100	<100	<100	<100	<100	<100	
	>C34-C40 fraction	µg/L	100		900				<100	<100	<100	<100	<100	<100	<100	
>C10-C40 fraction (sum)	µg/L	100						<100	<100	-	<100	<100	<100	<100		
Monocyclic Aromatic Hydrocarbons	Benzene	µg/L	1	NL	10	300	950	5000	<1	<1	<1	<1	<1	<1	<1	
	Toluene	µg/L	2	NL	25			NL	<2	<2	<1	<2	<2	<2	<2	
	Ethylbenzene	µg/L	2	NL	3			NL	<2	<2	<1	<2	<2	<2	<2	
	m&p-Xylene	µg/L	2				200		<2	<2	<2	<2	<2	<2	<2	
	o-Xylene	µg/L	2				350		<2	<2	<1	<2	<2	<2	<2	
	Total Xylenes	µg/L	2	NL	20			NL	<2	<2	<3	<2	<2	<2	<2	
	Total BTEX	µg/L	1						<1	<1	-	<1	<1	<1	<1	
	Naphthalene (VOC)	µg/L	5	NL			16	NL	<5	<5	<10	<5	<5	<5	<5	

Legend
CRC Care 2011 Table B2 GW HSL Intrusive Maintenance Worker (Shallow Trench), Sand
WA DER 2014 Domestic Non-Potable Groundwater Use
Airport Regulations 1997
NEPM 2013 - GILs Freshwater
NEPM 2013 Table 1A(4) Rec HSL C GW for Vapour Intrusion, Sand
LOR = Limit of Reporting
- = not analysed
mg/kg = milligrams per kilogram

NL = Not Limiting
FFTG- Former Fire Training Ground
FS- Fire Station
WKSP- Workshop
BDY- Boundary

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

				APEC 2 Warehouse and Powerhouse											
				Location	MW05	MW06		MW06	MW07	MW08	MW016	MW017			
				Sample ID	MW05 300617	MW06 300617	WQA05 300617	WQA06 300617	MW07 300617	MW08 300617	MW016 010717	MW017 010717			
				Sample Date	30/06/2017	30/06/2017	30/06/2017	30/06/2017	30/06/2017	30/06/2017	1/07/2017	1/07/2017			
				Lab Report No	EP1707076	EP1707076	EP1707076	552886	EP1707076	EP1707076	EP1707076	EP1707076			
				Sample Type	Primary	Primary	Duplicate	Triplicate	Primary	Primary	Primary	Primary			
				CRC Care 2011 Table B2 GW HSL Int. Main. Worker (Shallow Trench), Sand	WA DER 2014 Domestic Non- Potable Groundwater Use	Airport Regulations 1997	NEPM 2013 GILs Freshwater	NEPM 2013 Table 1A(4) Comm/Ind HSL D GW for Vapour Intrusion, Sand							
				2-4m				2-4m							
Total Recoverable Hydrocarbons	Analyte	Units	LOR						<20	<20	<20	<20	<20	<20	<20
	C6-C10 fraction	µg/L	20	NL				6000	<20	<20	<20	<20	<20	<20	<20
	C6-C10 fraction (minus BTEX)(F1)	µg/L	20	NL				6000	<20	<20	<20	<20	<20	<20	<20
	>C10-C16 fraction	µg/L	100	NL	1000			NL	<100	<100	<100	<50	<100	<100	<100
	>C10-C16 (minus Naphthalene)(F2)	µg/L	100	NL	1000			NL	<100	<100	<100	<50	<100	<100	<100
	>C16-C34 fraction	µg/L	100		900				<100	<100	<100	<100	<100	<100	<100
	>C34-C40 fraction	µg/L	100		900				<100	<100	<100	<100	<100	<100	<100
				>C10-C40 fraction (sum)	µg/L	100			<100	<100	<100	-	<100	<100	<100
Monocyclic Aromatic Hydrocarbons	Benzene	µg/L	1	NL	10	300	950	5000	<1	<1	<1	<1	<1	<1	<1
	Toluene	µg/L	2	NL	25			NL	<2	<2	<2	<1	<2	<2	<2
	Ethylbenzene	µg/L	2	NL	3			NL	<2	<2	<2	<1	<2	<2	<2
	m&p-Xylene	µg/L	2				200		<2	<2	<2	<2	<2	<2	<2
	o-Xylene	µg/L	2				350		<2	<2	<2	<1	<2	<2	<2
	Total Xylenes	µg/L	2	NL	20			NL	<2	<2	<2	<3	<2	<2	<2
	Total BTEX	µg/L	1						<1	<1	<1	<1	<1	<1	<1
	Naphthalene (VOC)	µg/L	5	NL			16	NL	<5	<5	<5	<10	<5	<5	<5

Legend
CRC Care 2011 Table B2 GW HSL Intrusive Maintenance Worker (Shallow Trench), Sand
WA DER 2014 Domestic Non-Potable Groundwater Use
Airport Regulations 1997
NEPM 2013 - GILs Freshwater
NEPM 2013 Table 1A(4) Rec HSL C GW for Vapour Intrusion, Sand
LOR = Limit of Reporting
- = not analysed
mg/kg = milligrams per kilogram

NL = Not Limiting
FFTG- Former Fire Training Ground
FS- Fire Station
WKSP- Workshop
BDY- Boundary

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

								APEC 2 Warehouse and Powerhouse						APEC 3 Former Fire Training Ground (FFTG)			
				Location	MW018	MW019A	MW019B	MW019C	MW020	MW021				MW010			
				Sample ID	MW018_300617	MW19A_300617	MW19B_300617	MW19C_300617	MW020_300617	MW021_300617				MW010_300617	WOA03_300617	WOA04_300617	
				Sample Date	30/06/2017	30/06/2017	30/06/2017	30/06/2017	30/06/2017	30/06/2017				30/06/2017	30/06/2017	30/06/2017	
				Lab Report No	EP1707076	EP1707076	EP1707076	EP1707076	EP1707076	EP1707076				EP1707076	EP1707076	552886	
				Sample Type	Primary	Primary	Primary	Primary	Primary	Primary				Primary	Duplicate	TriPLICATE	
				CRC Care 2011 Table B2 GW HSL Int. Main. Worker (Shallow Trench), Sand	WA DER 2014 Domestic Non- Potable Groundwater Use	Airport Regulations 1997	NEPM 2013 GILs Freshwater	NEPM 2013 Table 1A(4) Comm/Ind HSL D GW for Vapour Intrusion, Sand									
				2-4m				2-4m									
Total Recoverable Hydrocarbons	Analyte	Units	LOR						<20	<20	<20	<20	<20	<20	<20	<20	<20
	C6-C10 fraction	µg/L	20	NL				6000	<20	<20	<20	<20	<20	<20	<20	<20	<20
	C6-C10 fraction (minus BTEX)(F1)	µg/L	20						<100	<100	<100	<100	<100	<100	100	110	<50
	>C10-C16 fraction	µg/L	100					NL	<100	<100	<100	<100	<100	<100	100	110	<50
	>C10-C16 (minus Naphthalene)(F2)	µg/L	100	NL	1000				<100	<100	<100	<100	<100	<100	220	200	<100
	>C16-C34 fraction	µg/L	100		900				<100	<100	<100	<100	<100	<100	<100	<100	<100
	>C34-C40 fraction	µg/L	100		900				<100	<100	<100	<100	<100	<100	<100	<100	<100
				>C10-C40 fraction (sum)	µg/L	100			<100	<100	<100	<100	<100	<100	320	310	-
Monocyclic Aromatic Hydrocarbons	Benzene	µg/L	1	NL	10	300	950	5000	<1	<1	<1	<1	<1	<1	<1	<1	<1
	Toluene	µg/L	2	NL	25			NL	<2	<2	<2	<2	<2	<2	<2	<2	<1
	Ethylbenzene	µg/L	2	NL	3			NL	<2	<2	<2	<2	<2	<2	<2	<2	<1
	m&p-Xylene	µg/L	2				200		<2	<2	<2	<2	<2	<2	<2	<2	<2
	o-Xylene	µg/L	2				350		<2	<2	<2	<2	<2	<2	<2	<2	<1
	Total Xylenes	µg/L	2	NL	20			NL	<2	<2	<2	<2	<2	<2	<2	<2	<3
	Total BTEX	µg/L	1						<1	<1	<1	<1	<1	<1	<1	<1	-
	Naphthalene (VOC)	µg/L	5	NL			16	NL	<5	<5	<5	<5	<5	<5	<5	<5	<10

Legend
CRC Care 2011 Table B2 GW HSL Intrusive Maintenance Worker (Shallow Trench), Sand
WA DER 2014 Domestic Non-Potable Groundwater Use
Airport Regulations 1997
NEPM 2013 - GILs Freshwater
NEPM 2013 Table 1A(4) Rec HSL C GW for Vapour Intrusion, Sand
LOR = Limit of Reporting
- = not analysed
mg/kg = milligrams per kilogram

NL = Not Limiting
FFTG- Former Fire Training Ground
FS- Fire Station
WKSP- Workshop
BDY- Boundary

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

				APEC 3 Former Fire Training Ground (FFTG)				Boundary (BDY)	
				Location	MW011	MW012	MW09	MW013	MW015
				Sample ID	MW011 300617	MW012 300617	MW09 300617	MW013 300617	MW015 300617
				Sample Date	30/06/2017	30/06/2017	30/06/2017	30/06/2017	30/06/2017
				Lab Report No	EP1707076	EP1707076	EP1707076	EP1707076	EP1707076
				Sample Type	Primary	Primary	Primary	Primary	Primary
				CRC Care 2011 Table B2 GW HSL Int. Main. Worker (Shallow Trench), Sand	WA DER 2014 Domestic Non- Potable Groundwater Use	Airport Regulations 1997	NEPM 2013 GILs Freshwater	NEPM 2013 Table 1A(4) Comm/Ind HSL D GW for Vapour Intrusion, Sand	
				2-4m					
Total Recoverable Hydrocarbons	Analyte	Units	LOR						
	C6-C10 fraction	µg/L	20					<20	<20
	C6-C10 fraction (minus BTEX)(F1)	µg/L	20	NL			6000	<20	<20
	>C10-C16 fraction	µg/L	100					<100	<100
	>C10-C16 (minus Naphthalene)(F2)	µg/L	100	NL	1000		NL	<100	<100
	>C16-C34 fraction	µg/L	100		900			<100	<100
	>C34-C40 fraction	µg/L	100		900			<100	<100
Monocyclic Aromatic Hydrocarbons	>C10-C40 fraction (sum)	µg/L	100					<100	<100
	Benzene	µg/L	1	NL	10	300	950	5000	<1
	Toluene	µg/L	2	NL	25			NL	<2
	Ethylbenzene	µg/L	2	NL	3			NL	<2
	m&p-Xylene	µg/L	2				200		<2
	o-Xylene	µg/L	2				350		<2
	Total Xylenes	µg/L	2	NL	20			NL	<2
	Total BTEX	µg/L	1						<1
	Naphthalene (VOC)	µg/L	5	NL			16	NL	<5

Legend
CRC Care 2011 Table B2 GW HSL Intrusive Maintenance Worker (Shallow Trench), Sand
WA DER 2014 Domestic Non-Potable Groundwater Use
Airport Regulations 1997
NEPM 2013 - GILs Freshwater
NEPM 2013 Table 1A(4) Rec HSL C GW for Vapour Intrusion, Sand
LOR = Limit of Reporting
- = not analysed
mg/kg = milligrams per kilogram

NL = Not Limiting
FFTG- Former Fire Training Ground
FS- Fire Station
WKSP- Workshop
BDY- Boundary

Appendix A

Certificates of Title

WESTERN



AUSTRALIA

REGISTER NUMBER	
300/DP41931	
DUPLICATE EDITION	DATE DUPLICATE ISSUED
N/A	N/A

RECORD OF QUALIFIED CERTIFICATE
OF
CROWN LAND TITLE

VOLUME
LR3142FOLIO
717

UNDER THE TRANSFER OF LAND ACT 1893
AND THE LAND ADMINISTRATION ACT 1997

NO DUPLICATE CREATED

The undermentioned land is Crown land in the name of the STATE of WESTERN AUSTRALIA, subject to the interests and Status Orders shown in the first schedule which are in turn subject to the limitations, interests, encumbrances and notifications shown in the second schedule.

REGISTRAR OF TITLES

**LAND DESCRIPTION:**

LOT 300 ON DEPOSITED PLAN 41931

STATUS ORDER AND PRIMARY INTEREST HOLDER:
(FIRST SCHEDULE)

STATUS ORDER/INTEREST: RESERVE UNDER MANAGEMENT ORDER

PRIMARY INTEREST HOLDER: SHIRE OF ROEBOURNE OF POST OFFICE BOX 219, KARRATHA.
(XE J426221) REGISTERED 8 SEPTEMBER 2005

LIMITATIONS, INTERESTS, ENCUMBRANCES AND NOTIFICATIONS:
(SECOND SCHEDULE)

1. K087084 PART RESERVE 30948 FOR THE PURPOSE OF AIRPORT (KARRATHA) REGISTERED 13.2.2007.
J426221 MANAGEMENT ORDER. CONTAINS CONDITIONS TO BE OBSERVED. WITH POWER TO LEASE FOR ANY TERM NOT EXCEEDING 42 YEARS, SUBJECT TO THE CONSENT OF THE MINISTER FOR LANDS. REGISTERED 8.9.2005.
2. E054685 EASEMENT TO THE STATE ENERGY COMMISSION OF WESTERN AUSTRALIA AND SEE DEPOSITED PLAN 95335. REGISTERED 1.1.1989.
H635883 SUNDRY. THE GRANTEE OF TRANSFER E054685 IS NOW THE DBNGP LAND ACCESS MINISTER PURSUANT TO THE DAMPIER TO BUNBURY PIPELINE ACT 1997. REGISTERED 3.1.2001.
3. H635883 SUNDRY. PORTION OF THE LAND HEREIN IS WITHIN THE DBNGP CORRIDOR PURSUANT TO THE DAMPIER TO BUNBURY PIPELINE ACT 1997. SEE DEPOSITED PLAN 215500. REGISTERED 3.1.2001.
4. J304972 LEASE TO HELICOPTERS (AUSTRALIA) PTY LTD OF 17 VALENTINE ROAD, PERTH AIRPORT EXPIRES: SEE LEASE. AS TO PORTION ONLY. REGISTERED 31.5.2005.
5. J447454 LEASE TO BRISTOW HELICOPTERS AUSTRALIA PTY LTD OF IRENE DEAN-WILLIAMS BUILDING, 130 FAUNTLEROY AVENUE, REDCLIFFE EXPIRES: SEE LEASE. AS TO PORTION ONLY. REGISTERED 27.9.2005.
6. J662049 LEASE TO WOODSIDE ENERGY LTD OF 240 ST GEORGE'S TERRACE, PERTH EXPIRES: SEE LEASE. AS TO PORTION ONLY REGISTERED 16.3.2006.

Warning: (1) A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required.

END OF PAGE 1 - CONTINUED OVER

ORIGINAL CERTIFICATE OF CROWN LAND TITLE
QUALIFIED

REGISTER NUMBER: 300/DP41931

VOLUME/FOLIO: LR3142-717

PAGE 2

- (2) Lot as described in the land description may be a lot or location.
(3) The land and interests etc. shown hereon may be affected by interests etc. that can be, but are not, shown on the register.
The interests etc. shown hereon may have a different priority than shown.

-----END OF CERTIFICATE OF CROWN LAND TITLE-----

STATEMENTS:

The statements set out below are not intended to be nor should they be relied on as substitutes for inspection of the land and the relevant documents or for local government, legal, surveying or other professional advice.

SKETCH OF LAND: DP41931 [SHEET 1].
PREVIOUS TITLE: LR3137-459.
PROPERTY STREET ADDRESS: NO STREET ADDRESS INFORMATION AVAILABLE.
LOCAL GOVERNMENT AREA: SHIRE OF ROEBOURNE.

NOTE 1: K087079 CORRESPONDENCE FILE 02024-1998-01R0
NOTE 2: K117498 SUBJECT TO SURVEY - NOT FOR ALIENATION PURPOSES

WESTERN



AUSTRALIA

REGISTER NUMBER 302/DP41933	
DUPLICATE EDITION N/A	DATE DUPLICATE ISSUED N/A

RECORD OF QUALIFIED CERTIFICATE
OF
CROWN LAND TITLE

UNDER THE TRANSFER OF LAND ACT 1893
AND THE LAND ADMINISTRATION ACT 1997

VOLUME
LR3142

FOLIO
719

NO DUPLICATE CREATED

The undermentioned land is Crown land in the name of the STATE of WESTERN AUSTRALIA, subject to the interests and Status Orders shown in the first schedule which are in turn subject to the limitations, interests, encumbrances and notifications shown in the second schedule.

REGISTRAR OF TITLES



LAND DESCRIPTION:

LOT 302 ON DEPOSITED PLAN 41933

STATUS ORDER AND PRIMARY INTEREST HOLDER:
(FIRST SCHEDULE)

STATUS ORDER/INTEREST: RESERVE UNDER MANAGEMENT ORDER

PRIMARY INTEREST HOLDER: CITY OF KARRATHA OF POST OFFICE BOX 219 KARRATHA
(XE N224594) REGISTERED 13 JANUARY 2016

LIMITATIONS, INTERESTS, ENCUMBRANCES AND NOTIFICATIONS:
(SECOND SCHEDULE)

1. K087084 PART RESERVE 30948 FOR THE PURPOSE OF AIRPORT (KARRATHA) REGISTERED
13.2.2007.
N224594 MANAGEMENT ORDER. CONTAINS CONDITIONS TO BE OBSERVED. WITH
POWER TO LEASE FOR ANY TERM NOT EXCEEDING 42 YEARS, SUBJECT TO THE
CONSENT OF THE MINISTER FOR LANDS. REGISTERED 13.1.2016.
2. G966277 LEASE TO HELICOPTERS (AUSTRALIA) PTY LTD OF HANGAR 214, HELICOPTERS
(AUSTRALIA) BUILDING, BUNGANA AVENUE, PERTH AIRPORT, GUILDFORD EXPIRES:
SEE LEASE. AS TO PORTION ONLY. REGISTERED 1.12.1998.
3. H046736 LEASE TO TELSTRA CORPORATION LTD OF TELSTRA CENTRE, 80 STIRLING STREET,
PERTH EXPIRES: SEE LEASE. AS TO PORTION ONLY. REGISTERED 9.3.1999.
4. H063620 LEASE TO WOODSIDE ENERGY LTD OF 1 ADELAIDE TERRACE, PERTH EXPIRES: SEE
LEASE. AS TO PORTION ONLY. REGISTERED 26.3.1999.
5. H331748 LEASE TO ILHA PTY LTD OF 130 HECTOR STREET, OSBORNE PARK EXPIRES: SEE
LEASE. AS TO PORTION ONLY. REGISTERED 10.1.2000.
6. I202473 LEASE TO AUS WEST AIRLINES PTY LTD OF SUITE 12A, 222 WALTER ROAD, MORLEY
EXPIRES: SEE LEASE. AS TO PORTION ONLY. REGISTERED 12.8.2002.
7. I753765 LEASE TO SANLEA PTY LTD OF 571 EMMA STREET, BULGARRA EXPIRES: SEE LEASE.
AS TO PORTION ONLY. REGISTERED 8.1.2004.
8. I947618 LEASE TO B P AUSTRALIA PTY LTD OF LEVEL 29, THE TOWER MELBOURNE CENTRAL,
360 ELIZABETH STREET, MELBOURNE, VICTORIA EXPIRES: SEE LEASE. AS TO
PORTION ONLY. REGISTERED 8.7.2004.

END OF PAGE 1 - CONTINUED OVER

ORIGINAL CERTIFICATE OF CROWN LAND TITLE
QUALIFIED

REGISTER NUMBER: 302/DP41933

VOLUME/FOLIO: LR3142-719

PAGE 2

9. J392599 LEASE TO CHALKWEST PTY LTD OF 83 BELMONT AVENUE, BELMONT EXPIRES: SEE LEASE. AS TO PORTION ONLY. REGISTERED 11.8.2005.
10. J392603 LEASE TO W T H PTY LTD OF LEVEL 2, 15 BOURKE ROAD, MASCOT, NEW SOUTH WALES EXPIRES: SEE LEASE. AS TO PORTION ONLY. REGISTERED 11.8.2005.
11. J427867 LEASE TO KARRATHA FLYING SERVICES PTY LTD OF 12 COSSOCK ROAD, KARRATHA EXPIRES: SEE LEASE. AS TO PORTION ONLY. REGISTERED 9.9.2005.
12. J476773 LEASE TO AUS WEST AIRLINES PTY LTD OF SUITE 12A, 222 WALTER ROAD, MORLEY EXPIRES: SEE LEASE. AS TO PORTION ONLY. REGISTERED 19.10.2005.
13. J534178 LEASE TO HERTZ AUSTRALIA PTY LTD OF LEVEL 6, 10 DORCAS STREET, SOUTH MELBOURNE, VICTORIA EXPIRES: SEE LEASE. AS TO PORTION ONLY. REGISTERED 2.12.2005.
14. K067762 LEASE TO THE SHELL COMPANY OF AUSTRALIA LTD OF LEVEL 2 LS, 8 REDFERN ROAD, HAWTHORN EAST, VICTORIA. EXPIRES: SEE LEASE. AS TO PORTION ONLY. REGISTERED 24.1.2007.
- M720427 CAVEAT AFFECTING LEASE K067762 , CAVEAT BY THE SHELL COMPANY OF AUSTRALIA LTD LODGED 30.7.2014.
- M890867 TRANSFER OF LEASE K067762 , LESSEE NOW SHELL AVIATION AUSTRALIA PTY LTD OF 8 REDFERN ROAD, HAWTHORN EAST, VICTORIA REGISTERED 21.1.2015.
15. L341347 LEASE TO AIRSERVICES AUSTRALIA OF PO BOX 367, CANBERRA, AUSTRALIAN CAPITAL TERRITORY EXPIRES: SEE LEASE. AS TO PORTION ONLY REGISTERED 10.6.2010.
16. L423037 LEASE TO OPTUS MOBILE PTY LTD OF 1 LYONPARK ROAD, MACQUARIE PARK, NEW SOUTH WALES EXPIRES: SEE LEASE. AS TO PORTION ONLY REGISTERED 8.9.2010.

Warning: (1) A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required.
(2) Lot as described in the land description may be a lot or location.
(3) The land and interests etc. shown hereon may be affected by interests etc. that can be, but are not, shown on the register.
The interests etc. shown hereon may have a different priority than shown.

-----END OF CERTIFICATE OF CROWN LAND TITLE-----

STATEMENTS:

The statements set out below are not intended to be nor should they be relied on as substitutes for inspection of the land and the relevant documents or for local government, legal, surveying or other professional advice.

SKETCH OF LAND: DP41933.
PREVIOUS TITLE: LR3137-461.
PROPERTY STREET ADDRESS: LOT 302 BAYLY AV, GAP RIDGE.
LOCAL GOVERNMENT AREA: CITY OF KARRATHA.
RESPONSIBLE AGENCY: DEPARTMENT OF LANDS (SLSD).

NOTE 1: K087080 SUBJECT TO SURVEY - NOT FOR ALIENATION PURPOSES
NOTE 2: N224594 CORRESPONDENCE FILE 01197-1971-21RO.

WESTERN



AUSTRALIA

REGISTER NUMBER 4564/DP192375	
DUPLICATE EDITION N/A	DATE DUPLICATE ISSUED N/A

RECORD OF QUALIFIED CERTIFICATE
OF
CROWN LAND TITLE

VOLUME
LR3103FOLIO
882

UNDER THE TRANSFER OF LAND ACT 1893
AND THE LAND ADMINISTRATION ACT 1997

NO DUPLICATE CREATED

The undermentioned land is Crown land in the name of the STATE of WESTERN AUSTRALIA, subject to the interests and Status Orders shown in the first schedule which are in turn subject to the limitations, interests, encumbrances and notifications shown in the second schedule.



REGISTRAR OF TITLES

LAND DESCRIPTION:

LOT 4564 ON DEPOSITED PLAN 192375

STATUS ORDER AND PRIMARY INTEREST HOLDER:
(FIRST SCHEDULE)

STATUS ORDER/INTEREST: RESERVE UNDER MANAGEMENT ORDER

PRIMARY INTEREST HOLDER: CITY OF KARRATHA OF POST OFFICE BOX 219 KARRATHA
(XE N224594) REGISTERED 13 JANUARY 2016

LIMITATIONS, INTERESTS, ENCUMBRANCES AND NOTIFICATIONS:
(SECOND SCHEDULE)

1. N224593 PART RESERVE 30948 FOR THE PURPOSE OF AIRPORT (KARRATHA) REGISTERED 13.1.2016.
N224594 MANAGEMENT ORDER. CONTAINS CONDITIONS TO BE OBSERVED. WITH POWER TO LEASE FOR ANY TERM NOT EXCEEDING 42 YEARS, SUBJECT TO THE CONSENT OF THE MINISTER FOR LANDS. REGISTERED 13.1.2016.

- Warning: (1) A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required.
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(3) The land and interests etc. shown hereon may be affected by interests etc. that can be, but are not, shown on the register.
The interests etc. shown hereon may have a different priority than shown.

-----END OF CERTIFICATE OF CROWN LAND TITLE-----

STATEMENTS:

The statements set out below are not intended to be nor should they be relied on as substitutes for inspection of the land and the relevant documents or for local government, legal, surveying or other professional advice.

SKETCH OF LAND: LR3103-882 (4564/DP192375).
PREVIOUS TITLE: LR3062-549.
PROPERTY STREET ADDRESS: NO STREET ADDRESS INFORMATION AVAILABLE.
LOCAL GOVERNMENT AREA: CITY OF KARRATHA.
RESPONSIBLE AGENCY: DEPARTMENT OF LANDS (SLSD).

END OF PAGE 1 - CONTINUED OVER

ORIGINAL CERTIFICATE OF CROWN LAND TITLE
QUALIFIED

REGISTER NUMBER: 4564/DP192375

VOLUME/FOLIO: LR3103-882

PAGE 2

NOTE 1: A000001A LAND PARCEL IDENTIFIER OF KARRATHA TOWN LOT/LOT 4564 ON SUPERSEDED
PAPER CERTIFICATE OF CROWN LAND TITLE CHANGED TO LOT 4564 ON
DEPOSITED PLAN 192375 ON 31-AUG-02 TO ENABLE ISSUE OF A DIGITAL
CERTIFICATE OF TITLE.
NOTE 2: THE ABOVE NOTE MAY NOT BE SHOWN ON THE SUPERSEDED PAPER CERTIFICATE
OF TITLE.
NOTE 3: N224593 CORRESPONDENCE FILE 01197-1971-21RO



Historical Search Summary Report

Company Name: AECOM
 Your Reference: [REDACTED]
 Our Reference: CS16-9768
 Officers Name: [REDACTED]

Current Tenure Lot 217 on Deposited Plan 188164 (Karratha Airport)					
Tenure Search	Survey/Crown Allotment	Ownership	Document	Date Acquired	Previous Tenure
Crown Land Record 3127-185 *Reserve 40457*	Lot 217 on Deposited Plan 188164	Primary Interest holder - Airservices Australia	Application J846870	25/07/2006	Previous Version Crown Land record 3127-185
Previous Version Crown Land record 3127-185	Lot 217 on Deposited Plan 188164	Primary Interest holder - Airservices Australia	Application I205841	15/08/2002	Crown Land record 3063-617
Crown Land Record 3131-350 *Reserve 40457*	Lot 4923 on Deposited Plan 36621	Primary Interest holder - Airservices Australia	Application J846870	25/07/2006	Previous version Crown Land record 3131-350
Previous version Crown Land record 3131-350	Lot 4923 on Deposited Plan 36621	Primary Interest holder - Airservices Australia	Application I205841	15/08/2002	Crown Land record 3063-617
Crown Land record 3063-617	De Witt Location 216 & 217 on Land Administration Diagram 88164	Primary Interest Holder- Civil Aviation Authority	Sundry F901497	13/06/1995	Crown Land record 3063-616
Crown Land record 3063-616	De Witt Location 216 & 217 on Land Administration Diagram 88164	Primary Interest Holder- Civil Aviation Authority	Sundry F901497	13/06/1995	Deposited Plan 188164
Deposited Plan 188164	De Witt Locations 216 & 217 (Reserve 40457)			26/04/1988	Deposited Plan 213519
Deposited Plan 213519 *Reserve 30948*	De Witt Locations 96, 99 & 100			8/07/1975	Previously Land Act 3114/464 Crown lease 55/1967
Previously Land Act 3114/464 Crown lease 55/1967	De Witt District - North West Division	Hamersley Iron Pty Limited		16/01/1967	Land Act 394-907 Crown Lease 1394/1936
Land Act 394-907 Crown Lease 1394/1936	De Witt District - North West Division	Ernest Samuel Foulkes Taylor & William Allan Leslie		1/01/1935	Land Act 2601-96 Crown Lease 2317-1923
Land Act 2601-96 Crown Lease 2317-1923	De Witt District - North West Division	John Gregory Withnell & Ellen Amelia Withnell & William John Withnell, Ella Louisa Dick, E. W. Withnell		26/10/1923	Land Act 102-220 *Application for a Pastoral Lease within the Goldfield or mining district Section 102 Land Act 1898*

APPLICATION I205838

WESTERN



AUSTRALIA

REGISTER NUMBER

N/A

QUALIFIED CERTIFICATE
OF
CROWN LAND TITLE

UNDER THE TRANSFER OF LAND ACT 1893
AND THE LAND ADMINISTRATION ACT 1997

NO DUPLICATE CREATED

VOLUME FOLIO
LR 3127 185



The undermentioned land is Crown land in the name of the STATE of WESTERN AUSTRALIA, subject to the interests and Status Orders shown in the first schedule which are in turn subject to the limitations, interests, encumbrances and notifications shown in the second schedule.

LAND DESCRIPTION:

REGISTRAR OF TITLES



LOT 217 ON DEPOSITED PLAN 188164

STATUS ORDER AND PRIMARY INTEREST HOLDER:
(FIRST SCHEDULE continued overleaf)

STATUS ORDER/INTEREST: RESERVE UNDER MANAGEMENT ORDER

PRIMARY INTEREST HOLDER: AIRSERVICES AUSTRALIA OF GPO BOX X2212, PERTH
(XE I205841) REGISTERED 15 AUGUST 2002

LIMITATIONS, INTERESTS, ENCUMBRANCES AND NOTIFICATIONS:
(SECOND SCHEDULE continued overleaf)

1. PART RESERVE 40457 FOR THE PURPOSE OF AERONAUTICAL NAVIGATIONAL AIDS AND COMMUNICATIONS, SATELLITE GROUND STATION, TELECOMMUNICATIONS AND FIRE STATION.
I205841 MANAGEMENT ORDER. CONTAINS CONDITIONS TO BE OBSERVED. REGISTERED 15.8.2002.

- Warning: (1) A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required.
Lot as described in the land description may be a lot or location.
(2) The land and interests etc. shown hereon may be affected by interests etc. that can be, but are not, shown on the register.
(3) The interests etc. shown hereon may have a different priority than shown.

-----END OF CERTIFICATE OF CROWN LAND TITLE-----

STATEMENTS:

The statement set out below are not intended to be nor should they be relied on as substitutes for inspection of the land and the relevant documents or for local government, legal, surveying or other professional advice.

SKETCH OF THE LAND: DP 188164
PREVIOUS TITLE: LR3063-617
PROPERTY STREET ADDRESS: NO STREET ADDRESS INFORMATION AVAILABLE.
LOCAL GOVERNMENT AREA: NO LOCAL GOVERNMENT AUTHORITY INFORMATION AVAILABLE.

NOTE 1: A000001A CORRESPONDENCE FILE 02909-1987-01RO
NOTE 2: LAND PARCEL IDENTIFIER OF DE WITT LOCATION 217 CHANGED TO LOT 217 ON DEPOSITED PLAN 188164 ON 15-AUG-02 TO ENABLE ISSUE OF A DIGITAL CERTIFICATE OF TITLE.

END OF PAGE 1 - CONTINUED OVER

ORIGINAL CERTIFICATE OF CROWN LAND TITLE

REGISTER NUMBER: N/A

VOLUME/FOLIO: LR3127-185

PAGE 2

APPLICATION I205838

WESTERN



AUSTRALIA

REGISTER NUMBER

N/A

QUALIFIED CERTIFICATE OF CROWN LAND TITLE

UNDER THE TRANSFER OF LAND ACT 1893
AND THE LAND ADMINISTRATION ACT 1997

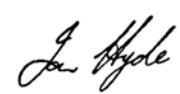
NO DUPLICATE CREATED

VOLUME FOLIO
LR 3131 350



The undermentioned land is Crown land in the name of the STATE of WESTERN AUSTRALIA, subject to the interests and Status Orders shown in the first schedule which are in turn subject to the limitations, interests, encumbrances and notifications shown in the second schedule.

LAND DESCRIPTION:


 REGISTRAR OF TITLES


LOT 4923 ON DEPOSITED PLAN 36621

STATUS ORDER AND PRIMARY INTEREST HOLDER: (FIRST SCHEDULE continued overleaf)

STATUS ORDER/INTEREST: RESERVE UNDER MANAGEMENT ORDER

PRIMARY INTEREST HOLDER: AIRSERVICES AUSTRALIA OF GPO BOX X2212, PERTH
(XE I205841) REGISTERED 15 AUGUST 2002

LIMITATIONS, INTERESTS, ENCUMBRANCES AND NOTIFICATIONS: (SECOND SCHEDULE continued overleaf)

- PART RESERVE 40457 FOR THE PURPOSE OF AERONAUTICAL NAVIGATIONAL AIDS AND COMMUNICATIONS, SATELLITE GROUND STATION, TELECOMMUNICATIONS AND FIRE STATION.
I205841 MANAGEMENT ORDER. CONTAINS CONDITIONS TO BE OBSERVED. REGISTERED 15.8.2002.

- Warning: (1) A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required.
Lot as described in the land description may be a lot or location.
- (2) The land and interests etc. shown hereon may be affected by interests etc. that can be, but are not, shown on the register.
- (3) The interests etc. shown hereon may have a different priority than shown.

-----END OF CERTIFICATE OF CROWN LAND TITLE-----

STATEMENTS:

The statement set out below are not intended to be nor should they be relied on as substitutes for inspection of the land and the relevant documents or for local government, legal, surveying or other professional advice.

SKETCH OF THE LAND:	DP 36621
PREVIOUS TITLE:	LR3063-617
PROPERTY STREET ADDRESS:	NO STREET ADDRESS INFORMATION AVAILABLE.
LOCAL GOVERNMENT AREA:	NO LOCAL GOVERNMENT AUTHORITY INFORMATION AVAILABLE.

NOTE 1: A000001A CORRESPONDENCE FILE 02909-1987-01RO
NOTE 2: LAND PARCEL IDENTIFIER OF KARRATHA LOT 4923 CHANGED TO LOT 4923 ON DEPOSITED PLAN 36621 ON 15-AUG-02 TO ENABLE ISSUE OF A DIGITAL CERTIFICATE OF TITLE.

END OF PAGE 1 - CONTINUED OVER

ORIGINAL CERTIFICATE OF CROWN LAND TITLE

REGISTER NUMBER: N/A

VOLUME/FOLIO: LR3131-350

PAGE 2

Reserve Enquiry Detail [5100L][Screen Friendly](#) [Print Page](#)

Reserve	30948	Legal Area (ha)	728.6793
Name	Status Current		
Type	Current Purpose AIRPORT (KARRATHA)		
Notes	WITH POWER TO LEASE FOR ANY TERM NOT EXCEEDING 42 YEARS SUBJECT TO THE CONSENT OF THE MINISTER FOR LANDS.		
File Number	1197/71		
Additional Reserve Information	RESERVE COMPRISES LOT 300 ON DP41931 LOT 302 ON DP41933, LOT 86 ON DP213104, LOT 100 ON DP213519, LOT 4229 ON DP188048, LOT 99 ON DP213519 & LOT 4564 ON DP192375 (N224593).		

Class	Responsible Agency	Date of Last Change
C	DEPARTMENT FOR PLANNING AND INFRASTRUCTURE	28/01/2016

Management Orders	Document	Land Use	Local Government Authority
CITY OF KARRATHA	N224594	AIRPORT	KARRATHA, CITY OF

Add Item	CLT Number	Parcel Identifier	Street Address	Suburb	File Number	PIN	Area (sqm)	Map Viewer
☐	LR3103-882	Lot 4564 On Plan 192375			01197-1971-21RO	1145114	66194.0	✎
☐	LR3137-460	Lot 86 On Plan 213104	86 BAYLY AV	GAP RIDGE	01197-1971-21RO. 705493	705493	8099.621	✎
☐	LR3137-462	Lot 99 On Plan 213519	99 BAYLY AV	GAP RIDGE	01197-1971-21RO. 705491	705491	4740.777	✎
☐	LR3137-462	Lot 99 On Plan 213519	99 BAYLY AV	GAP RIDGE	01197-1971-21RO. 1229804	1229804	252.588	✎
☐	LR3137-463	Lot 100 On Plan 213519	100 BAYLY AV	GAP RIDGE	01197-1971-21RO. 705502	705502	315755.525	✎
☐	LR3137-464	Lot 4229 On Plan 188048	4229 BAYLY AV	GAP RIDGE	01197-1971-21RO. 705503	705503	685701.822	✎
☐	LR3142-717	Lot 300 On Plan 41931	300 BAYLY AV	GAP RIDGE	01197-1971-21RO. 11290227	11290227	1461798.0	✎
☐	LR3142-719	Lot 302 On Plan 41933	302 BAYLY AV	GAP RIDGE	01197-1971-21RO. 11390998	11390998	4654905.0	✎
☐	LR3142-719	Lot 302 On Plan 41933	302 BAYLY AV	GAP RIDGE	01197-1971-21RO. 11390999	11390999	44998.0	✎
☐	LR3142-719	Lot 302 On Plan 41933	302 BAYLY AV	GAP RIDGE	01197-1971-21RO. 11391000	11391000	4294.0	✎
☐	LR3142-719	Lot 302 On Plan 41933	302 BAYLY AV	GAP RIDGE	01197-1971-21RO. 11391001	11391001	60106.0	✎
☐	LR3142-719	Lot 302 On Plan 41933	302 BAYLY AV	GAP RIDGE	01197-1971-21RO. 11391004	11391004	10671.0	✎

Reserve Number 30948

Previous Certificates of Title		Historic Crown Allotments		
CL713-1966	Cancelled	DE WITT	Location	27
LR3062-345	Cancelled	DE WITT	Location	86
LR3062-549	Cancelled	DE WITT	Location	96
LR3099-695	Cancelled	DE WITT	Location	99
		DE WITT	Location	100

KARRATHA Town lot/Lot 4229

Gaz Page/Document	Date	Type	Text
N224592	13/01/2016	Vesting Revoked	REVOKED
N224593	13/01/2016	Current Area	728.6793
N224594	13/01/2016	Current Vesting	MANAGEMENT ORDER CITY OF KARRATHA
K87084	13/02/2007	Historical Area	722.0599
J426220	08/09/2005	Vesting Revoked	REVOKED
J426221	08/09/2005	Historical Vesting	MANAGEMENT ORDER SHIRE OF ROEBOURNE
5977	28/10/1997	Historical Area	737.4104 BY RESUMPTION
2729	13/06/1997	Historical Vesting	VEST. SHIRE OF ROEBOURNE W.P.L AND MINISTER FOR LAND APPROVAL REQUIRED (21YRS)
2738	13/06/1997	Historical Area	742.7171
2738	13/06/1997	Location	DE WITT LOCS 27,86,96,99 & 100
2738	13/06/1997	Public Plan	NICKOL BAY SW (25)
2738	13/06/1997	Survey Number	CS DIA 92375
2741	13/06/1997	Current Purpose	AIRPORT (KARRATHA)
	13/06/1997	Vesting Revoked	REVOKED ORDER DATE 25 MAR 1988
2303	13/06/1995	Historical Area	749.3365
2156	14/07/1989	Historical Area	749.7865
2156	14/07/1989	Lot/Town Lot	KARRATHA LOT 4229
2156	14/07/1989	Street Name	DAMPIER ROAD
	10/04/1989	Easement	EASEMENT NO.3134B/327
894	25/03/1988	Historical Vesting	VEST SHIRE OF ROEBOURNE W P L 21 YEARS
895	25/03/1988	Vesting Revoked	REVOKED (ORDER DATED 15/06/1976)
910	25/03/1988	Historical Area	751.1346
2144	30/06/1978	Historical Area	684.4912
491	18/02/1977	Area Increased by	686.3649
2166	25/06/1976	Historical Vesting	VEST SHIRE OF ROEBOURNE W P L 21YRS
2180	25/06/1976	Area Increased by	654.7848
2180	25/06/1976	Vesting Revoked	
1187	15/04/1976	Area Increased by	149.6913
3062	17/08/1973	Historical Vesting	VEST ROEBOURNE SHIRE W P L 21YRS
3062	17/08/1973	Vesting Revoked	
3066	20/08/1971	Historical Vesting	VEST ROEBOURNE SHIRE
3076	20/08/1971	Original Gazettal and page	ORIGINAL GAZETTE
	20/08/1971	Class	C
	20/08/1971	Correspondence File Number	1197/71
	20/08/1971	Historical Purposes	AERODROME
	20/08/1971	Original Area	367.3.23
	01/01/0001	Historical Purposes	AERODROME

This product is for information purposes only. A search of the original documentation is required for all legal purposes
Western Australian Land Information Authority (Landgate)

Reserve Enquiry Detail [5100L]

Screen Friendly Pr

Reserve	40457	Legal Area (ha)	1.0748
Name		Status	Current
Type		Current Purpose	AERONAUTICAL NAVIGATIONAL AIDS & COMMUNICATIO SATELLITE GROUND STATION, TELECOMMUNICATIONS STATION & STORAGE OF EQUIPMENT
Notes	POWER TO LICENSE.		
File Number	02909- 1987- 01RO		

Class	Responsible Agency	Date of Last Chan
C	DEPARTMENT FOR PLANNING AND INFRASTRUCTURE	23/08/2006

Management Orders	Document	Land Use	Local Government Autho
AIRSERVICES AUSTRALIA	J846870	COMMUNICATIONS FIRE STATION SITE NAVIGATION AID SATELITE GROUND STATION TELECOMMUNICATIONS SITE	KARRATHA, CITY OF

Add Item	CLT Number	Parcel Identifier	Street Address	Suburb	File Number	PIN	Area (sqm)	Map
☐	LR3127-185	Lot 217 On Plan 188164			02909-1987- 01RO.	705495	6514.789	
☐	LR3131-350	Lot 4923 On Plan 4923 36621	NORMAN RD GAP RIDGE		02909-1987- 01RO.	11147462	4233.0	

Reserve Number 40457

Previous Certificates of Title		Historic Crown Allotments	
LR3063-616	Cancelled	DE WITT	Location 217
LR3063-617	Cancelled	KARRATHA	Town lot/Lot 4923

Gaz Page/Document	Date	Type	Text
J846868	25/07/2006	Vesting Revoked	REVOKED
J846869	25/07/2006	Current Purpose	AERONAUTICAL NAVIGATIONAL AIDS & COMMUNICATIONS SATELLITE GROUND STATION, TELECOMMUNICATIONS, FI STATION & STORAGE OF EQUIPMENT
J846870	25/07/2006	Current Vesting	MANAGEMENT ORDER AIRSERVICES AUSTRALIA
I470401	06/05/2003	Location	DE WITT LOC 217 & KARRATHA LOT 4923
I470401	06/05/2003	Survey Number	DP 36621 & DP 188164
	06/05/2003	Previous Lot/Locations	DE WITT LOC 216
909	16/08/2002	Correspondence File Number	02909-1987-01RO
I205839	15/08/2002	Vesting Revoked	REVOKED ORDER DATED 16.4.1996
I205840	15/08/2002	Historical Purposes	AERONAUTICAL NAVIGATIONAL AIDS & COMMUNICATIONS SATELLITE GROUND STATION, TELECOMMUNICATIONS & STATION
I205841	15/08/2002	Historical Vesting	VEST: AIRSERVICES AUSTRALIA
1701	16/04/1996	Vesting Revoked	REVOKED(ORDER DATED 16/06/1989)
1702	16/04/1996	Historical Vesting	VEST:AIRSERVICES AUSTRALIA
2304	13/06/1995	Current Area	1.0748

2304	13/06/1995 Public Plan	NICKOL BAY S.W. (25).
1705	23/06/1989 Historical Vesting	VEST CIVIL AVIATION AUTHORITY
1705	23/06/1989 Vesting Revoked	REVOKED (ORDER DATED 15/03/1988)
895	25/03/1988 Historical Vesting	VEST THE COMMONWEALTH OF AUSTRALIA
909	25/03/1988 Class	C
909	25/03/1988 Historical Area *	1.9289
909	25/03/1988 Historical Purposes	AIR TRAFFIC CONTROL TOWER
909	25/03/1988 Original Gazettal and page	ORIGINAL GAZETTE
909	25/03/1988 Street Name	NEAR KARRATHA TOWNSITE

This product is for information purposes only. A search of the original documentation is required for all legal purposes
Western Australian Land Information Authority (Landgate)

REGISTRATION FEE PAID

CL 0055 1967 F

C.L. No.

55
1967

Lease No.

3114
461

WI



STRALIA

EXPIRED

PASTORAL LEASE

(Under Section 114 of the Land Act, 1933, and Amendments)

THIS LEASE IS ISSUED IN LIEU OF PASTORAL LEASE NO. 394-907 (CL. 1394/1936)

North West

DIVISION

De Witt

DISTRICT

Elizabeth the Second, by the Grace of God, of the United Kingdom, Australia and Her other Realms and Territories, Queen, Head of the Commonwealth, Defender of the Faith. To all to whom these Presents shall come, Greeting: Know Ye that We of our especial Grace and in exercise of the powers in this behalf to Us given by the Land Act, 1933, and Amendments, do by these presents lease to Hamersley Iron Pty. Limited of 95 Collins Street Melbourne in the State of Victoria-----

hereinafter called "the Lessee," which term includes the Lessee, ~~his executors, administrators, and assigns~~ its successors and permitted assigns the natural surface of all that piece or parcel of land situated in the District of De Witt being ~~the De Witt Location 264 & 1015, 501, 503, on De Plan 64827, and containing~~ 291,886 acres as delineated by a border of green colour on the plan herein: ~~Let's 300 to 302 on Deposited Plan 75875~~

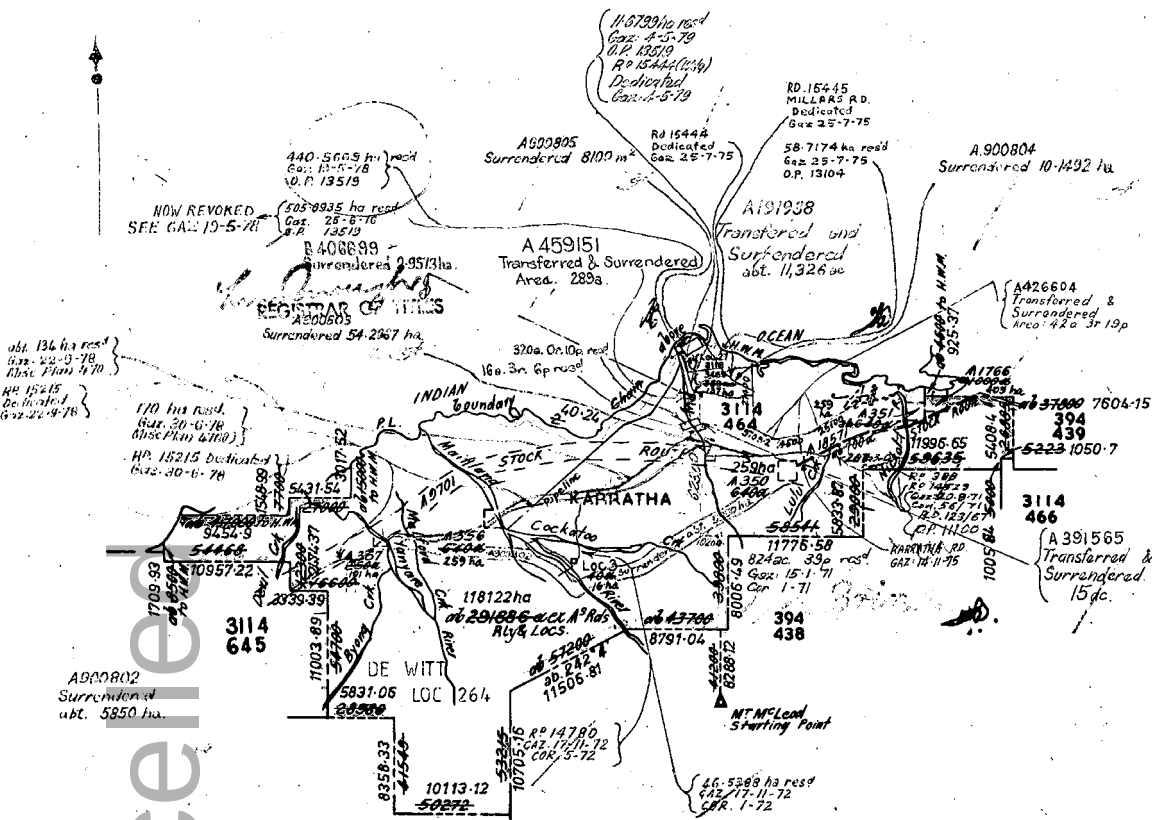
To hold unto the said Lessee for pastoral purposes under and subject to the provisions of Part VI of the said Act and except as hereinafter provided, for the term of 48 years 5 months 15 days to be computed from the Sixteenth day of January 1967, until the thirtieth day of June, 2015. Yielding and Paying therefor unto Us, Our Heirs and Successors, the yearly rent of \$1029.28 from the said Sixteenth day of January

19 67, until the Thirtieth day of June 19 67, and thereafter during the said terms, subject nevertheless to the rent payable after the last mentioned date being determined from time to time on re-appraisal under the provisions of Part VI of the said Act: And Yielding and Paying, whenever the yearly rent is varied on re-appraisal, such yearly rent as is so determined; and the rent payable for the time being by the Lessee shall be paid to Our Minister for Lands by equal half-yearly payments in advance on or before the first day of March and the first day of September in every year: Provided always, and it is hereby declared, that if the rent hereby reserved, and payable for the time being, or any part thereof, is not duly paid by the Lessee as herein and by section one hundred and thirty-nine of the said Act prescribed; or in case of the breach by the Lessee of any condition on which, in accordance with the said Act this lease is granted; or if the Lessee assigns or underlets the demised premises or any part thereof without Our said Minister's approval, in writing as required by the said Act, first obtained; then these presents shall become void, and the term hereby granted shall be absolutely and indefeasibly forfeited, and it shall thereupon be lawful for Us, Our Heirs and Successors, into and upon the demised premises, or any part thereof in the name of the whole, to re-enter, and the same to have again, repossess, and enjoy as if this deed-poll had never been executed, without making any compensation to the Lessee: Provided also, that this lease is granted on the following conditions: (1) That the Lessee will comply effectively and to the satisfaction of the Minister for Agriculture with the provisions of the Vermin Act, 1919, and its amendments and with the requirements of any notice issued under that Act in respect to vermin on the area leased. (2) That the Lessee will, to the satisfaction of the Minister for Agriculture, take part in and contribute to any programmes or measures for the control of vermin organised by a local Vermin Control Authority or by the Agriculture Protection Board, whether on the area leased by the Lessee or on areas leased by other Lessees or on Crown land. (3) That the Lessee will to the satisfaction of the Minister for Agriculture comply effectively with the provisions of the Soil Conservation Act, 1945, and its amendments, and with the provisions of the Noxious Weeds Act, 1950, and its amendments. (4) That the Lessee will maintain on the area leased good and improving soil and plant conditions. (5) That the Commissioner of Soil Conservation may, in any case where the construction of a large dam is contemplated, implement in respect of the area leased special provisions for full control of water catchment areas. (6) That the Lessee will not permit or suffer any grazing on all or part of the area leased where grazing is prohibited under the powers contained in the Soil Conservation Act, 1945, and its amendments.

Provided also, that this lease is granted subject to the powers, conditions and reservations relating thereto in Part VI of the said Act contained, and to the provisions of the Mining Act, 1904, and the Forests Act, 1918, and to all rights and privileges lawfully acquired or exercisable thereunder; and that the right is reserved to Us, Our Heirs and Successors, to dispose of such portions of the demised land under the provisions of the said Act as may be required for any purpose of public utility or for otherwise facilitating the improvement and settlement of the State as therein prescribed.

EXPIRED

C.L. 55-1967



ROAD SUBJECT TO CLOSURE
Under Land Act 1933

ACTION PENDING
See Document E339257

THE AREA DENOTED BY THE
UNSHADDED PORTION OF THE
PLAN IS NOT SHOWN

1:475200

SCALE 600 CHAINS TO ONE INCH

The area and measurements on the above Plan are more or less.

IN WITNESS whereof we have caused Our said Minister for Lands to affix hereto his Seal and set his hand.

Dated this Sixteenth day of January 1967.

An Officer authorised in this behalf by the Governor.
By order of the Minister for Lands.

Registered the 16th day of January 1967,

in conformity with Section 81c of the Act No. 56 Victoria No. 14 and numbered

PRICE PER 1,000 ACRES

PLAN DAMPIER 817/80
YARRALLOOLA

CORR. 2141/64

Asst. Registrar of Titles.

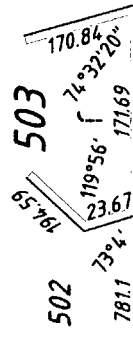
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EXPIRED



SCALE 1:10000
REF: DP 64827
FILE: 00245-1964/05
SHIRE OF ROEBOURNE
Amalgamation L43761
Reg. 17-8-2009

ENLARGEMENT
NOT TO SCALE

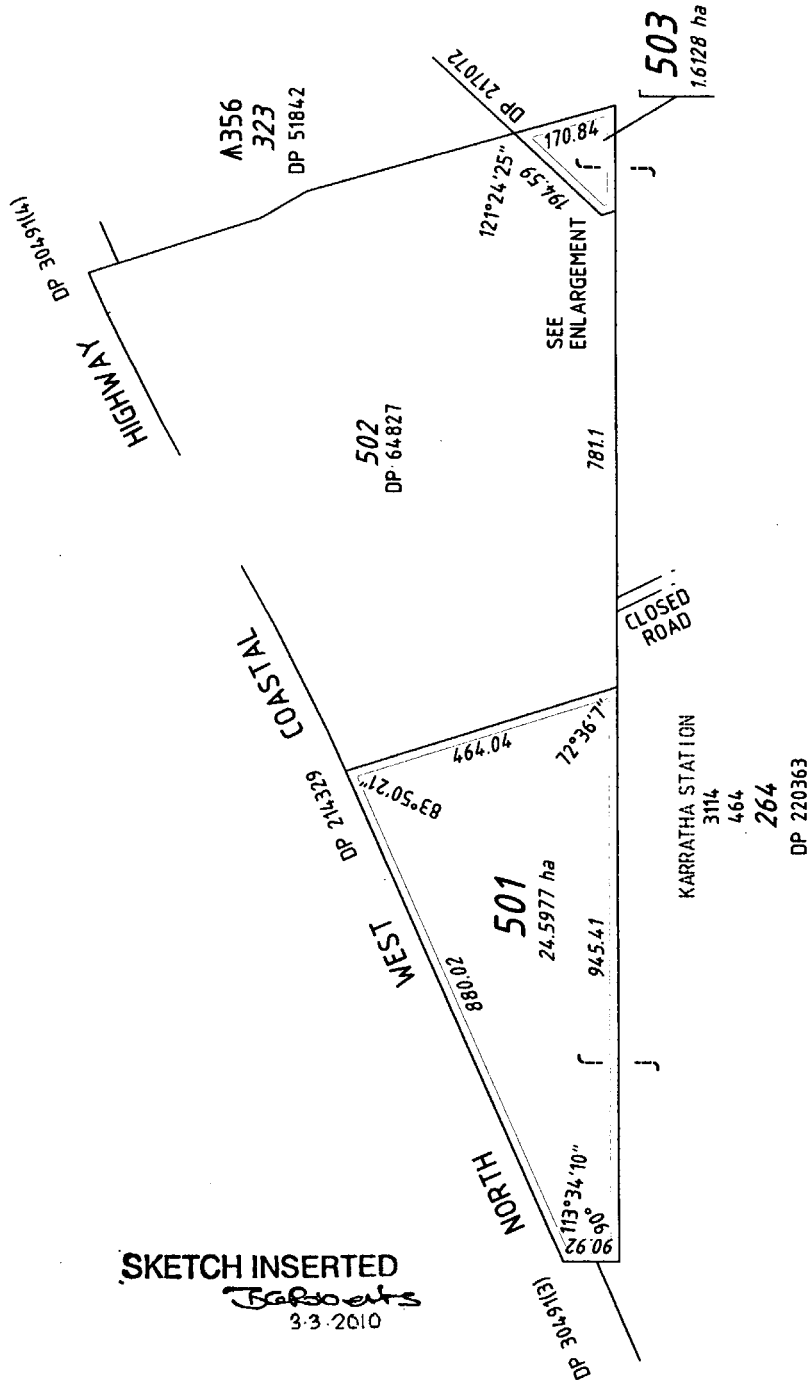


C.L. 55-1967

KARRATHA STATION
3114
464
264
DP 220363

Pg. ④

Cancelled

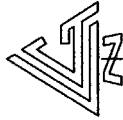


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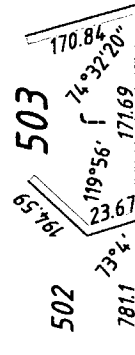
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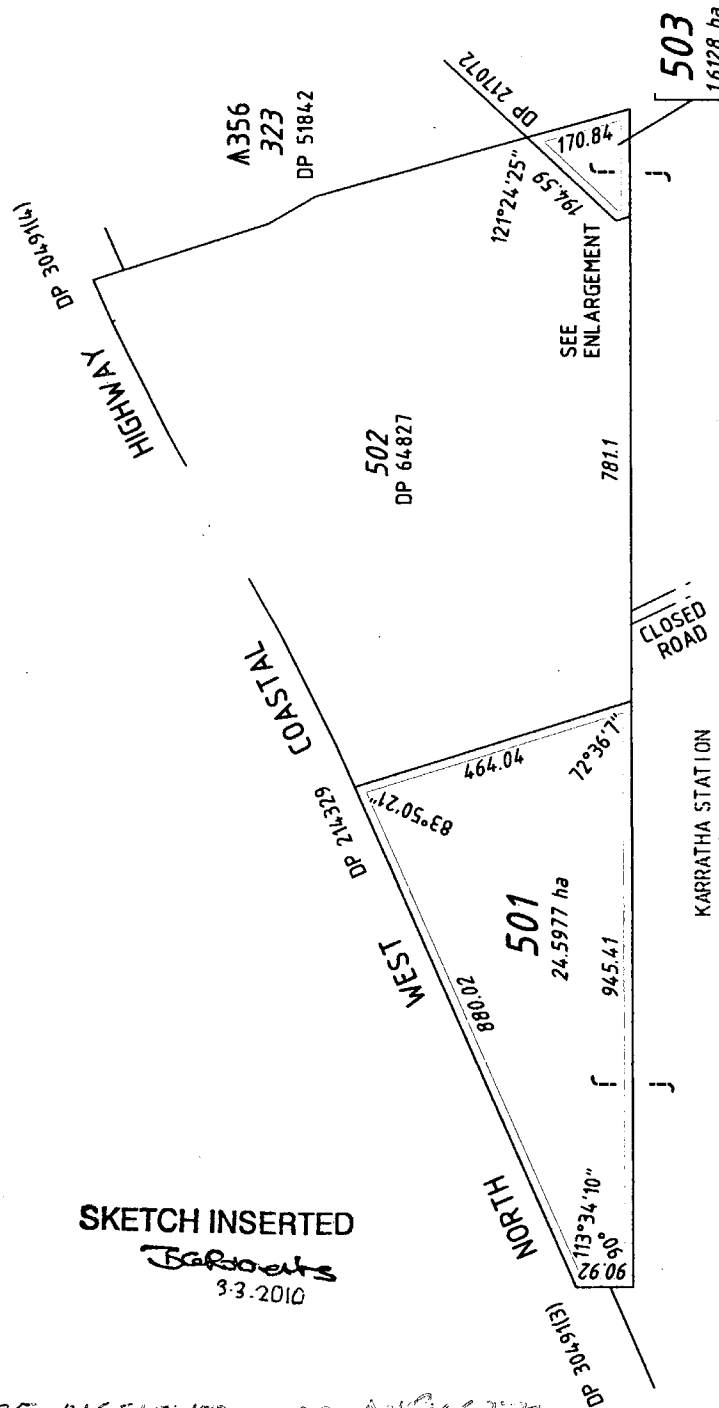


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REF: DP 64827
FILE: 00245-1964/05
SHIRE OF ROEBOURNE
Amalgamation L43761
Reg. 17-8-2009

ENLARGEMENT
NOT TO SCALE



KARRATHA STATION
3114
464
264
DP 220363



SKETCH INSERTED
Barbours
3-3-2010

TO BE INSERTED AND APPROVED
Cfr when used in the office

Cancelled

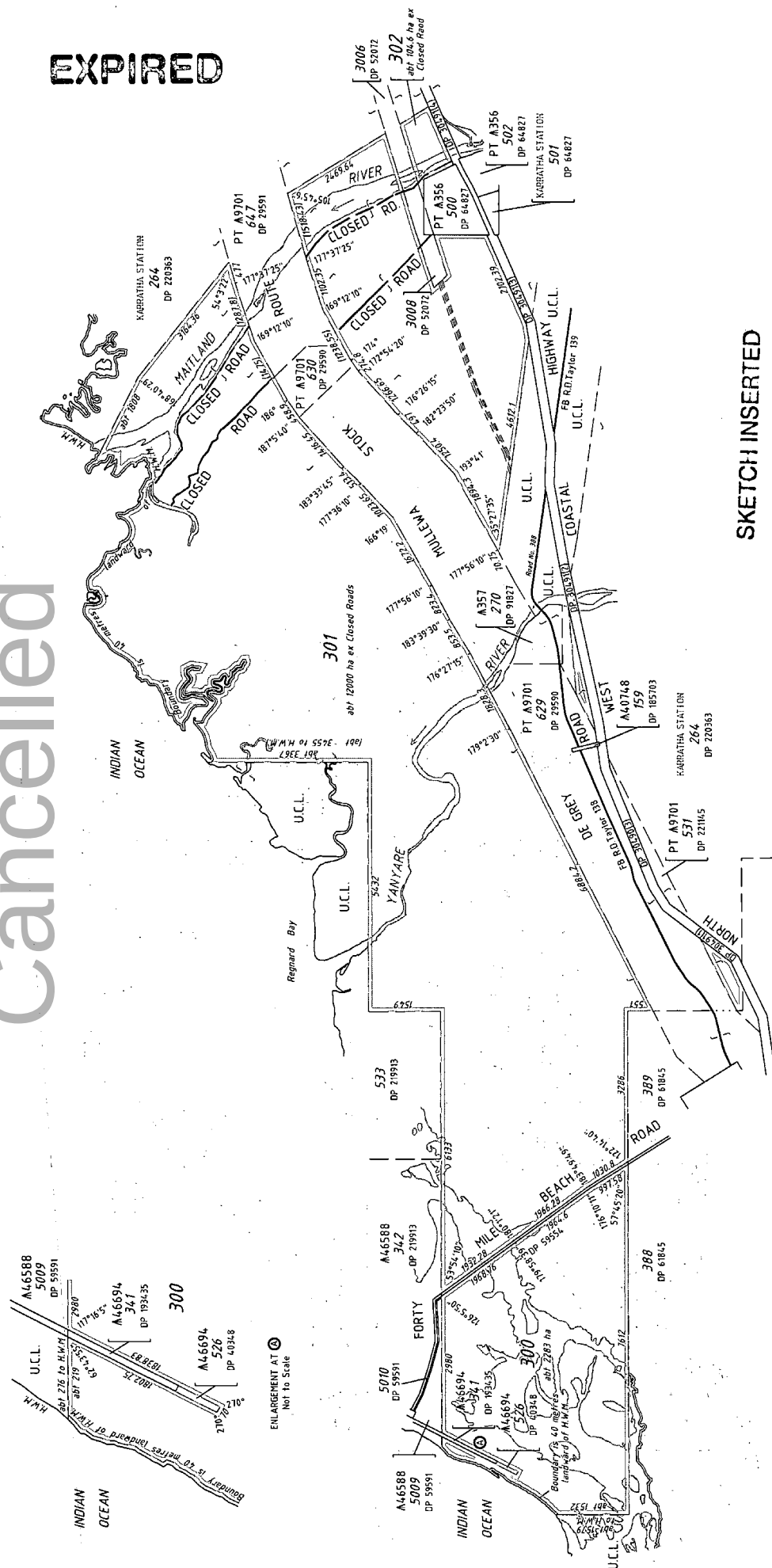
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CL. 55-1967

SKETCH INSERTED

Registrar of Titles

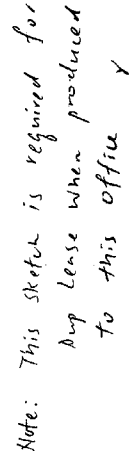
5-3-15



SCALE 1:100000
TRIM FILE: 18549-2011
DEPOSITED PLAN 75875
LOCAL AUTHORITY - CITY OF KALGOORLY

Cancelled

Cancelled



SKETCH INSERTED.

Registrar of Titles

5-3-15



SCALE 1:100000
TRIM FILE: 18549-2011
DEPOSITED PLAN 75875
LOCAL AUTHORITY - CITY OF KALGOORLY

Cancelled

Sur 3067/67

RECEIPTS:

6

R 22/73

EXPIRED

C.L. 55-1967

To to Portion Only:

Public Works Act 1902-1955 Sec. 17 (5)

RD 123/1967. NOTICE OF INTENTION TO RESUME

GOV. GAZ. 5-5-67 ITEM 1
10-5-68
16-5-69

[Signature]
[Signature]
Asst. Registrar of Titles

Transfer A191938. Transferred and Surrendered to Her Majesty Queen Elizabeth the Second. Registered 18th July 1969 at 3.46.00.

ASSISTANT REGISTRAR OF TITLES

Transfer A191938. portion of the within lease (11,326 acres) is now transferred and surrendered to Her Majesty Queen Elizabeth the Second. Registered 18th July 1969 at 3.46.00.

[Signature]

ASSISTANT REGISTRAR OF TITLES

The area of the within lease is now reduced to 280,545 acres and the half yearly rental to \$494.26.

[Signature]

ASSISTANT REGISTRAR OF TITLES

Baseat A270839. Lodged 17-3-1970 at 2.45.00

WITHDRAWN



as to Portion Only.

R.D. 123/1967. Public Works Act 1902-1955 Sec. 17 (5) NOTICE OF INTENTION TO RESUME

GOV. GAZ. 15/5/70 ITEM 1
14-5-71

[Signature]
[Signature]
Asst. Registrar of Titles

2000 1-71 15-1-71 804 39p 74225

Portion

Quarry & Road

23-12-70

[Signature]

Transfer A391565 portion of the within lease (15 acres) is now transferred and surrendered to Her Majesty Queen Elizabeth the Second. Registered 19th April 1971 at 12.07.00.



The area of the within lease is now reduced to 280,545 acres.



Corr. 8/1971 Schedule 35

The area of the within lease has been amended to 279,721 acres - roads - perches and the half yearly rental to \$492.80.

[Signature]
Asst. Registrar of Titles

pg ⑦

C.L. 55-1967



9

9.

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NL:

Garrel

23

RG

EXPIRED

perches
Carbafum
 Asst. Registrar of Titles

[Signature]
Asst. Registrar of Titles

the margin here in

3114
49
904.68
54.2967 ha.
904.91
600.2
600

3114
464

PR
3116
4984
LOC. 32

PR
3116
4984
LOC. 32

Scale.

the margin here in

3114
49
904.68
54.2967 ha.
904.91
600.2
600

3114
464

PR
3116
4984
LOC. 32

PR
3116
4984
LOC. 32

Scale.

Pg. (8)
CL 55-1967

OFFICE OF TITLES
Western Australia



OFFICE OF THE
Western Australia

EXPIRED

Pg 9
C.L. 55-1967

1-75 25-7-75 58-7174ha O.P. 13102
Portion ROAD
16-7-75
Corr. 2-75 132
106,798 ha and its HALF
YEARLY \$464.64
Lundonough
Actg. Registrar of Titles

NOW REVOKED
15-6-76 505-0935 ha 5.0 Plan 8
19-5-78
Lundonough
Actg. Registrar of Titles

As to the portion coloured green on the map in the margin hereof
Withdrawal B 354437 of caveat A 270437 lodged
16-6-1977 at 1.25 oc
3116 4538
Not to Scale
Rt. Karratha, N.W.
1:25,000
3114 464
Office of Titles
Western Australia

Surrender B 406699. Portion of the within lease 2.9573 ha, is now
surrendered to Her Majesty Queen Elizabeth the Second, Registered
22nd September 1977 at 11.28 oc
Office of Titles
Western Australia

Surrender B 406699. The area of the within lease is now
reduced to 106,795 ha.
Office of Titles
Western Australia

19-5-78 440-5663 ha O.P. 13519
Portion AIRPORT (KARRATHA)
10-5-78
Lundonough
Actg. Registrar of Titles

From 8/1971 Schedule 7 As from 1st July
day of 1977 the total rent yearly to be paid
to be paid by the within lessee shall be decreased to \$619-60
Lundonough
Assistant Registrar of Titles

As to portion only
123/67 Public Works Act 1902-1955 Sec. 17 (5)
NOTICE OF INTENTION TO RESUME
GOV. GAZ 9-5-78 ITEM 1
Lundonough
Assistant Registrar of Titles

30-6-78 Area 170 ha
Portion of the land herein comprised is resumed for
the purpose of Road
proclamation dated 21-6-78
Lundonough
Registrar of Titles

EXPIRED

pg 10
C.L. 55-1967

Corr. 2-78 Schedule 44
The area of the within lease has been amended to
106354 ha and the Half
yearly rental to \$ 309.03
Limbrough
Registrar of Titles.

Land Act 1933.
Clause 22-2-75 Area cdt. 1216.111g. Misc Plan 419
Portion of the land herein contained is resumed for
Road
18-2-78
Limbrough
Registrar of Titles.

AS TO PORTION ONLY

A.D. 16/79 Public Works Act 1902-1958 Sec. 17 (5)
NOTICE OF INTENTION TO RESUME

GOV. GAZ. 16-2-79 ITEM

ACTION COMPLETE

ASSISTANT REGISTRAR OF TITLES

Corr. 2-79 Schedule 20
The area of the within lease has been amended to
106184 ha and the Half
yearly rental to \$ 308.30
Limbrough
Registrar of Titles.

Land Act 1933.
Clause 22-2-75 Area cdt. 1216.111g. Misc Plan 419
Portion of the land herein contained is resumed for
the purpose of Road Reserves
18-2-79
Limbrough
Registrar of Titles.

Corr. 2-79 Schedule 21 & 22
The area of the within lease has been amended to
106199 ha
Limbrough
Registrar of Titles.

R.D. 18-19 Misc 983
d. 18-5-78
Portion
Her Majesty

Limbrough

Corr. 2-80 Schedule 11
The area of the within lease has been amended to
106189 ha
Limbrough
Registrar of Titles.

Corr. 2-80 Schedule 12
The area of the within lease has been amended to
102252 ha and the Half
Yearly rental to \$ 296.87
Limbrough
Registrar of Titles.

As to the portion the subject of Surrender B 867696.
Withdrawal B 867695 of Caveat A270839. Lodged 21-2-1980 at 9.02 a.m.



As to the portion the subject of Surrender B 867698.
Withdrawal B 867697 of Caveat A270839. Lodged 21-2-1980 at 9.02 a.m.



SEE OVER.

EXPIRED

Pg. 01
C.L. 55-1967

Surrender B867698. Portion of the within lease 9.994 ha. is now surrendered to Her Majesty Queen Elizabeth the Second. Registered 21st February 1980 at 9.02 a.c.



Surrender B867698. The area of the within lease is now reduced to 106189 ha.



Surrender B867696. Portion of the within lease 3937 ha. is now surrendered to Her Majesty Queen Elizabeth the Second. Registered 21st February 1980 at 9.02 a.c.



Surrender B867696. The area of the within lease is now reduced to 102252 ha and the half yearly rental to \$296.87.



Corr. 2-80 Schedule 28

The area of the within lease has been amended to 102098 ha and the half yearly rent to \$296.42

[Signature]
Registrar of Titles

Withdrawal B980681 of caveat A270839. Lodged 27.8.1980 at 11.00 a.c.



As to the portion the subject of Surrender B980682 only. Surrender B980682. Portion of the within lease (17.91 ha) is now surrendered to Her Majesty Queen Elizabeth the Second. Registered 27th August 1980 at 11.00 a.c.



As to the portion the subject of Surrender B980672 only. Withdrawal B980671 of caveat A 270839. Lodged 27th August 1980 at 11.00 a.c.



Surrender B980672. Portion of the within lease (17.72 ha) is now surrendered to Her Majesty Queen Elizabeth the Second. Registered 27th August 1980 at 11.00 a.c.



Surrender B980672. The area of the within lease is now reduced to (102,008 ha) and the half yearly rental to \$296.16.



As to the portion the subject of Surrender C289644 only. Withdrawal C289643 of caveat A270839. Lodged 20.1.1982 at 10.36 a.c.



Surrender C289644. Portion of the within lease is (1016.5222 ha) is now surrendered to Her Majesty Queen Elizabeth the Second. Registered 20th January, 1982 at 10.36 a.c.



EXPIRED

pg (12)

C.L 55-1967

Surrender C289644 the area of the within lease is now reduced to (102,001 ha).



19-3-82
MISC PLAN 1125
Portion of the land within registered to reduced for
POWERLINE
19-3-82
Asst. Registrar of Titles

Corr. 8/1982 Schedule 23
The area of the within lease has been amended to
abt. 101,927 ha and the half
yearly rental to \$295.95
Asst. Registrar of Titles

PUBLIC WORKS ACT 1902-1955 SEC. 17 (5)
NOTICE OF INTENTION TO RESUME
AS TO PORTION ONLY
R.D. 33/83
SCHEDULE 33
ITEM 1
Gaz. 15-4-83
P. 1202
Asst. Registrar of Titles

Corr 8/1984 Schedule 169
At from the 1st day of JANUARY 1984 the total half yearly rental required
to be paid by the within lessee shall be decreased to
increased to
Asst. Registrar of Titles

Corr. 8/1984 Schedule 171
The area of the within lease has been amended to
101,926 ha
Asst. Registrar of Titles

Surrender D336683. Portion of the within lease (area ab 1546ha) is now surrendered to
Her Majesty Queen Elizabeth the Second. Registered 7th October, 1986 at 3.05 o/c.



Surrender D336683. The area of the within lease is now reduced to 100380ha and the
half yearly rental to \$291.46.



Corr 8/1987 Schedule 494
As from the 1st day of January 1987 the total half yearly rental required
to be paid by the within lessee shall be decreased to \$220.90
increased to
Asst. Registrar of Titles

Surrender D441935 Portion of the within Lease (area 12.5436ha) is now surrendered to
Her Majesty Queen Elizabeth the Second. Registered 24th March 1987 at 11.22 o/c.

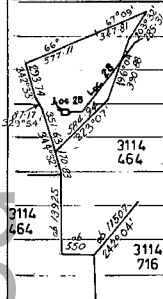


Surrender D441935 The area of the within lease is now reduced to (100367ha) and the
half yearly rental to \$220.87.



C.L. 55-1967

51 OFFICE OF TILES
O.C.
WESTERN AUSTRALIA

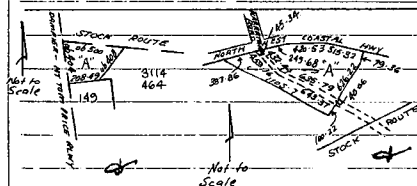


OFFICE OF TITLES
WESTERN AUSTRALIA

20.9.89



OFFICE OF TITLES
WESTERN AUSTRALIA



22 by S
OFFICE OF THE ATTORNEY GENERAL
WESTERN AUSTRALIA

EXPIRED

Pg. 14

C.L. 55-1967

Surrender E537104. Portion of the within lease (79.9307 ha) is now surrendered to Her Majesty Queen Elizabeth the Second. Registered 31st January, 1991 at 10.22 hrs.



Surrender E537104. The area of the within lease is now reduced to 100240 ha and the half yearly rental to \$220.59.



Surrender E759279. Portion of the within lease (24.3111 ha) is now surrendered to Her Majesty Queen Elizabeth the Second. Registered 4.12.91 at 8.14 hrs.

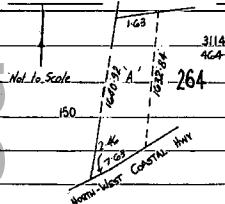


Surrender E759279. The area of the within lease is now reduced to 100216 ha and the half yearly rental reduced to \$220.54.



Transfer A3701 E144800.

The right to enter upon the portion of the within land marked 'A' on the map in the margin for the purpose of constructing, installing, maintaining and operating the installation for transmission and conveyance of natural gas as set out in Transfer E144800 is granted to The State Energy Commission of Western Australia. Registered 30th March, 1993 at 8.00 hrs.



Transfer E916244. The right to enter upon the portion of the within land coloured blue on the map in Transfer E916244 for the purpose of exercising certain petroleum pipeline rights as set out in the said Transfer is granted to Robe River Mining Co. Pty. Ltd. Mitsui Iron Ore Development Pty. Ltd. Peko-Wallsend Operations Ltd. Nippon Steel Australia Pty. Ltd. and Sumitomo Metal Australia Pty. Ltd. Registered 24th June, 1992 at 14.09 hrs.



Corr. 2141/1967

Schedule 895

The area of the within lease has been amended to 100215 ha and the half

yearly rental to remains unchanged.

Registrar of Titles.

EASEMENT G225412 recorded pursuant to section 19(4) of the Petroleum Pipelines Act 1969 as amended by the Pilbara Energy Project Agreement Act 1994 Recorded 10.7.1996 at 9.18 hrs.



Sundry G449669 Notice of Intention to Resume. Registered 21st March 1997 at 15.30 hrs.



Dup C/L not produced.

Notification G893569. Pursuant to Section 20(5) of the Petroleum Pipelines Act 1969, the grantee of Easement G225412 is now Epic Energy (Pilbara Pipeline) Pty. Ltd. Lodged 3.9.98 at 15.37 hrs.



As to portions only:

Notice of Intention to Take G937106. Notice of Intention to Take for the purpose of Shore Based Marine Facility and Associated and Ancillary Purposes. Registered 28th October, 1998 at 8.37 hrs.



EXPIRED

Pg. 15

C.L. 55-1967

Notice H234677. Notice of Intention to Take G937106 period of currency is now increased to 2 years from 28.10.98. Registered 28th September, 1999 at 9.14 hrs.



Authorization Order H345097. Authorization for the taking of interests. Registered 24th January, 2000 at 16.08 hrs.



As to portion only.

Notice H345102. Notice of Intention to Take for the designated purpose of Development for industrial and associated and ancillary purposes including buffer. Registered 24th January, 2000 at 16.08 hrs.



EXPIRED

Authorization Order H383413. Authorization for the taking of interests. Registered 8th March, 2000 at 11.34 hrs.



ACTION COMPLETE

As to portion only.

Notice H383275. Notice of Intention to Take for the designated purpose of Service corridors for infrastructure facilities. Registered 8th March, 2000 at 11.34 hrs.



ACTION COMPLETE

As to portion only :

Authorization Order H475917. Authorization for the taking of interests. Registered 19th June 2000 at 8.18 hrs.



As to portion only:

Notice H475918 Notice of Intention to Take for the designated purpose of bringing additional land in the DBNGP corridor, the DBNGP Land Access Minister holding State corridor rights and the conferral of rights on pipeline operators, under the Dampier to Bunbury Pipeline Act 1997. Registered 19th June 2000 at 8.18 hrs.



Sundry H635883. Portion of the land as shown on Land Administration Plans 15500, 15501, 15502 and 15599 is land within the DBNGP Corridor pursuant to the Dampier to Bunbury Pipeline Act 1997. (Dup. Crown Lease not produced). Registered 3rd January 2001 at 10.26 hrs.



Sundry H635883. The Grantee of Transfers E229563 and E144800 is now the DBNGP Land Access Minister pursuant to the Dampier to Bunbury Pipeline Act 1997. (Dup Crown Lease not produced). Registered 3rd January 2001 at 10.26 hrs.



Notice H640237. Notice of intention to Take H345102 period of currency is now increased to 2 years from the 24.1.2000. Registered 9th January 2001 at 14.56 hrs.



Notice H684929 Notice of Intention to Take H383275 period of currency is now increased to 2 years from 8.3.2000. Registered 6th March 2001 at 12.45 hrs. ACTION COMPLETE



Notice H780974 Notice of Intention to Take H475918 period of currency is now increased to 4 years from the 19.6.2000



EXPIRED

Taking Order H833123 All interests in the portion of the land herein comprised in Crown Miscellaneous Plan 19913 is hereby Taken as Crown land in the name of the State of Western Australia to Vol. 3115 Fol. 404. Registered 7th August 2001 at 13.28 hrs.
Dup C/L not prod.



Pg. (16)
C/L 55-1967

Taking Order H833123 All interests in the portion of the land herein the subject of Crown Diagram 93435 is hereby Taken as Crown land in the name of the State of Western Australia to Vol. 3043 Fol. 57. Registered 7th August 2001 at 13.28 hrs.

Dup C/L not prod.



Corr. 2141/1964 VS Schedule 1062 & 1080

The area of the within lease has been amended to
abt 100181 ha and the half
yearly rental to \$733.17
Registrar of Titles

Notice H977381 Notice of Intention to Take H345102 period of currency is now increased to 4 years from the 24.1.2000. Registered 7th January 2002 at 13.52 hrs.



Authorization Order H998583. As to portion only. Authorization for the taking of interests. Registered 29th January 2002 at 14.09 hrs.



REVOKED

Notice H998585. As to portion only. Notice of Intention to Take for the designated purpose of Recreation. Registered 29th January 2002 at 14.09 hrs.



Notice I023172 Notice of Intention to Take H383275 period of currency is now increased to 4 years from 8.3.2000. Registered 22nd February 2002 at 14.09 hrs.

ACTION COMPLETE



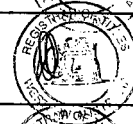
Sundry I209651. Portion of the within land as shown on Deposited Plans 220810 and 220811 is land within the DBNGP Corridor pursuant to the Dampier to Bunbury Pipeline Act 1997. Registered 20th August 2002 at 9.13 hrs.



Taking Order I209652. As to portion of the within land as shown on Deposited Plans 215501, 215502, 220810 and 220811 only. The designated purpose for the interest taken is State corridor rights to the DBNGP Land Access Minister under the provisions of the Dampier to Bunbury Pipeline Act 1997. Registered 20th August 2002 at 9.13 hrs.



Action complete for Authorization Order H475917 by Taking Order I209652. Registered 20th August 2002 at 9.13 hrs.



Action complete for Notice H475918 by Taking Order I209652. Registered 20th August 2002 at 9.13 hrs.



As to portion only:

Notice I517551 Notice of Intention to Take for the designated purpose of Reserve. Registered 16th June 2003 at 14.13 hrs.



ACTION COMPLETE

Withdrawal I561981 of Caveat A270839. Lodged 21.7.2003 at 14.39 hrs.



EXPIRED

55-1989

Pg. 17

2.

As to portion only:

NOTICE I689975.

Notice of Intention to Take for the designated purpose of Easement. Registered 10th November 2003 at 14.57 hrs.



EXPIRED (SEE Doc M198996) REGISTERED 28.2.13 at 15.44.

As to portion only:

*1.

Authorization Order I689974.

Authorization for the taking of interests. Registered 10th November 2003 at 14.57 hrs.



Notice I699065. Notice of Intention to Take H345102 period of currency is now increased to 6 years from 24.1.2000. Registered 18th November, 2003 at 12.39hrs.



Notice I812247. Notice of Intention to Take H383275 period of currency is now increased to 6 years from 8.3.2002. Registered 8th March 2004 at 14.19hrs.



ACTION COMPLETE

I517551

Notice I911159. Notice of Intention to Take period of currency is now increased to 3 years from 16.6.2003. Registered 8th June, 2004 at 13.56 hrs.



Notice J007409. Notice of Intention to Take for the designated purpose of Road (North West Coastal Highway). As to portion only. Registered 2nd September, 2004 at 9.21 hrs.



ACTION COMPLETE

Taking Order J114933 Portion comprised in Lot 666 on DP30491 to Vol. 3127 Fol. 300. Registered 10th December 2004 at 10.15 hrs.



Corr. 2141/964 vol. 5 Schedule 1119

The area of the within lease has been amended to
abt 00051 ha and the half

yearly rental to \$1272.58

J. Roberts
Registrar of Titles.

Taking Order J170362. Portions comprised in lots 3000 to 3002 (inc) on DP42721 to Vol. 3134 Fol. 797 to 799 (inc). Registered 2.2.2005



Corr. 2141/964 vol. 5 Schedule 1120

The area of the within lease has been amended to
abt 00028 ha and the half

yearly rental to \$1272.16

J. Roberts
Registrar of Titles.

Notice J263105 Notice of Intention to Take for the designated purpose of Road (North West Coastal Highway). As to portion only. Registered 27th April 2005 at 10.16 hrs.



ACTION COMPLETE

EXPIRED

C.L. 55-1967

Pg. 18

Notice J508874. Notice of Intention to Take H345102 period of currency is now increased to 8 years from 24.1.2000. Registered 14 November 2005 at 15.03hrs.



NOTICE J683835:

Notice of Intention to Take I517551 period of currency is now increased to 5 years from 16.6.2003. Registered 31st March 2006 at 16.24hrs.



ACTION COMPLETE K103053

Taking Order J620376. Portion comprised in Lot 625 on Deposited Plan 29588 included in Vol. 3125 Fol. 762, ~~portion comprised in Lot 638 on Deposited Plan 29588 to Vol. 3126 Fol. 33,~~
~~portion comprised in Lot 639 on Deposited Plan 29588 to Vol. 3126 Fol. 34.~~ (Dup. C/L not produced) Registered 13th February 2006 at 10.31 hrs.

Assist. Registrar of Titles
2-8-06.



Notice J645591 Notice of Intention to Take J263109 period of currency is now increased to 2 years from 27.4.2005. Registered 3rd March 2006 at 10.50 hrs.

ACTION COMPLETE
BY TAKING K128118.



Corr. 2141/964 vol. 6 Schedule 7

(Doc. J620376)

The area of the within lease has been amended to
abt 99575 ha

and the half

yearly rental to \$1206.15

Registers

Registrar of Titles.

Taking Order K103053. Portion comprised in Lot 526 on Deposited Plan 40348 to Vol. 3141 Fol. 923. (Dup C/L not produced) Registered 27th February, 2007 at 13.05 hrs.



Corr. 2141/964 vol. 6 Schedule 2A

(Doc. K103053)

The area of the within lease has been amended to
abt 99571 ha

and the half

yearly rental to remain unchanged.

Registers

Registrar of Titles.

Application K117498. Portion comprised in Lot 322 on Deposited Plan 42624 to Vol. 3142 Fol. 707. Registered 12th March, 2007 at 14.33hrs



Application K117499. Portion comprised in lot 323 on Deposited Plan 42629 to Vol. 3142 Fol. 721. Registered 12th March 2007, at 13.33hrs.

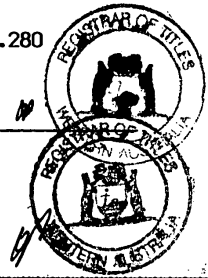


EXPIRED

0255/1967

pg (19)

Taking Order K128118. Portion comprised in Lot 3000 on Deposited Plan 41701 to Vol. 3148 Fol. 280
Registered 21st March, 2007 at 8.52hrs.



- ② Notice K661314. Notice of Intention to Take for the designated purpose of recreation. As to portion only. Registered 21st July, 2008 at 14.05hrs.

EXPIRED

- ① Taking Order K212457. Portion comprised in Lot 677 on Deposited Plan 32809 to Vol. 3153 Fol. 430, Lot 322 on Deposited Plan 42624 to Vol. 3142 Fol. 707 and Lot 323 on Deposited Plan 42629 to Vol. 3142 Fol. 721. Registered 1st June 2007 at 8.43 hrs.



Corr. 2141/964 vol. 6 Schedule 62

(Docs K128118 & K212457)

The area of the within lease has been amended to

abt 99088 ha

and the half

yearly rental to \$1259.05

Registrar of Titles.

Notice K988492. Notice of Intention to Take K661314 period of currency is now increased to 3 years from 21.7.2008. Registered 26th June, 2009 at 14.20hrs



Lease of Crown Land and Amalgamation Order L43761. Land Included into the Leasehold estate. Registered 17th August, 2009 at 15.12hrs

Corr. 2141/964 vol. 6 Schedule 133

Doc. L 043761.

The area of the within lease has been amended to

abt 99114 ha

and the half

yearly rental to \$4981.00

Registrar of Titles.

Notice L623263. Notice of Intention to Take K661314 period of currency is now increased to 5 years from 21st July, 2008.
Registered 10th May, 2011 at 14.19hrs



As to portion only. (Lot 264).

Authorization Order M42975. Authorization for the taking of interests.

Registered 10th September 2012 at 12.23hrs



Notice M42977. Notice of Intention to Take for the designated purpose of an infrastructure facility comprising railways, transportation pipelines for mineral ore, access and services (including for electricity, gas, water and telecommunications) corridors, and roads being associated and ancillary infrastructure, facilities and uses to support the development of the iron ore and other industries in the adjoining port and multi-user industrial precinct. Registered 10th September 2012 at 12.23hrs

As to lot 254 only. ATPO.



ACTION COMPLETE

EXPIRED

CL 55-1967

Pg. 20

Notice M282798. Notice of Intention to Take for the designated purpose of Warlu Road (Karratha - Tom Price Road Stage 2). As to portion only. Registered 24th May 2013 at 9.27 hrs.

ACTION COMPLETE BY TAKING ORDER M380823



Notice M372439 Notice of Intention to Take, period of currency is now increased to 3 years from 10.9.2012. Registered 14th August 2013 at 15.00 hrs.

ACTION COMPLETE



Taking Order M380823. Portion comprised in Lot 302 on Deposited Plan 66692 to Vol 3163 Fol 986. Registered 23rd August 2013 at 9.36 hrs.



Trim File. 04651-2014
Doc. M380823 Reg. 23-8-2013
The area of the within lease has been amended to 96.99001 ha
and the half yearly rental to \$ 4978.00
Registrar of Titles

Application M822191 Land description of lease is now Lot 264 on Deposited Plan 220363, Lots 501 and 503 on Deposited Plan 64827, Lots 300 to 302 on Deposited Plan 75875. Registered 10th November 2014 at 14.49 hrs.



Application M865205. Notice K661314 expired by operation of law. Registered 19th December, 2014 at 15.24 hrs.



Revocation M884898 of Authorisation Order H998583. Registered 14th January, 2015 at 15.03 hrs.



Application M917849 Notice H345102 expired by operation of law. Registered 19th February 2015 at 15.00 hrs.



Taking Order M993567. Portion comprised in Lots 384 and 386 on Deposited Plan 404469 to Vol.3165 Fol.708 and Vol.3165 Fol.709. Registered 8th May, 2015 at 16:15hrs



Trim File. 04651-2014
Doc. M993567 Reg. 8-5-15
The area of the within lease has been amended to 96.99999 ha
and the half yearly rental to \$ 2187.50
Registrar of Titles

APPLICATION N050299
LEASE EXPIRED

REGISTERED 1.7.2015



EXPIRED

Cancelled

Cancelled

NOTE

**CROWN LAND
TITLES**

3110/527	3165/156
3156/570	3165/157
3156/572	3165/158

**HAVE BEEN ISSUED
FOR THE LANDS
THE SUBJECT OF
THIS LEASE
CL 55/1967**

Cancelled

NOTE.—All dealings with this Lease must be in the forms prescribed under
"The Transfer of Land Act, 1893."

No.

394
907

WESTERN



AUSTRALIA.

C.L. No. 1394
1936

PASTORAL LEASE.

(Under Section 94 of "The Land Act, 1933.")

This Lease is issued in lieu of Pastoral Lease, No. 2601/96 and 3641/96

North West

DIVISION.

District or Locality De Witt

George the Fifth by the Grace of God, of Great Britain, Ireland, and the British Dominions beyond the Seas, King, Defender of the Faith, Emperor of India. To all to whom these Presents shall come, Greeting: Know Ye that We of our especial Grace, and in exercise of the powers in this behalf to Us given

by the Land Act, 1933, do by these presents lease to

Ernest Samuel Foulkes Taylor, of The Weld Club,
Barrack Street, Perth, and William Allan Leslie,
of 48, Mount Street, Perth, Pastoralists—

hereinafter called "the Lessee," which term includes the Lessees, their executors, administrators, and assigns, the natural surface of all that piece or parcel of land situated in the District of De Witt

and containing 354.175 acres as delineated by a border of green colour on the plan herein: To hold unto the said Lessees ^{as tenants in common in equal shares} for pastoral purposes under and subject to the provisions of Part VI. of the said Act and except as hereinafter provided, for the

term of 49 years—months to be computed from the first day of January 1934, until the thirty-first day of December, 1982. Yielding and Paying therefor unto Us, Our Heirs and Successors, the

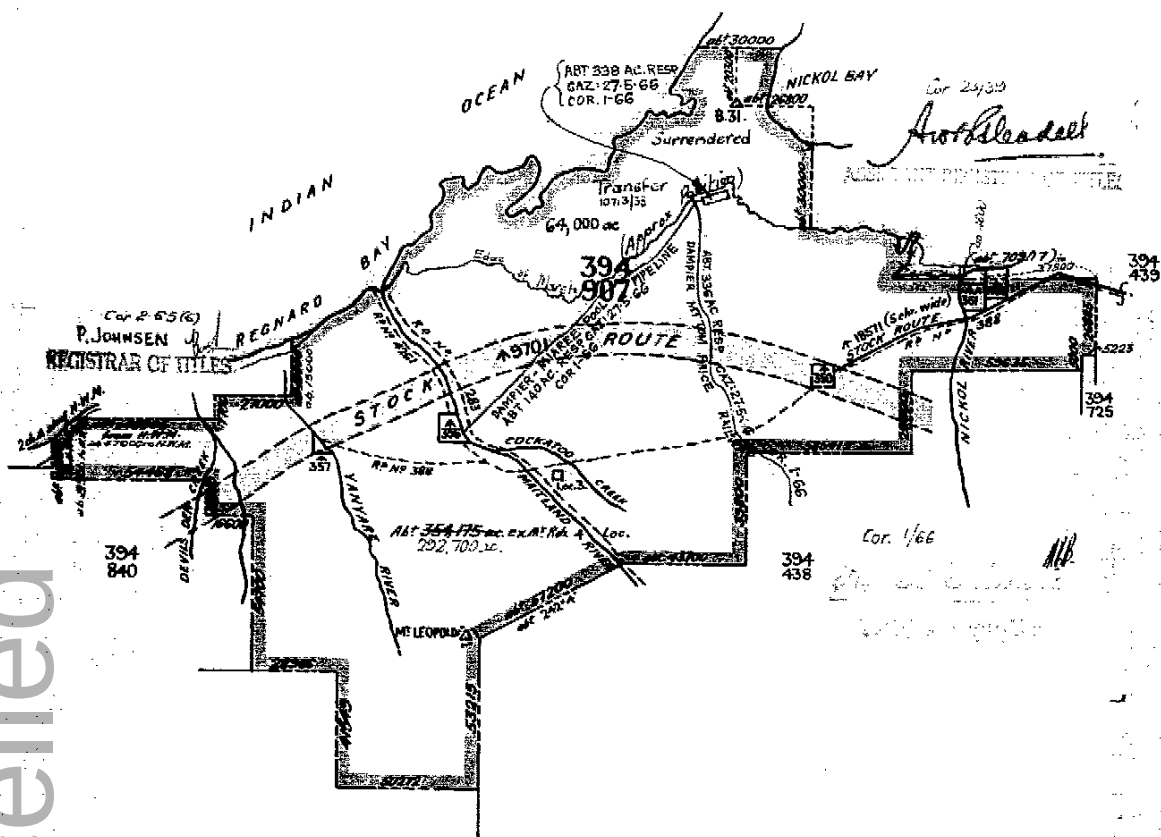
yearly rent of £426 - 0 - 0 from the said first day of January 1934, until the thirty first day of December 1941, and thereafter during the said terms, subject nevertheless to the rent payable after the last-mentioned date being determined from time to time on re-appraisalment under the provisions of Part VI. of the said Act: And Yielding and Paying, whenever the yearly rent is varied on re-appraisalment, such yearly rent as is so determined; and the rent payable for the time being by the Lessee shall be paid to Our Minister for Lands by equal half-yearly payments in advance on or before the first day of March and the first day of September in every year: Provided always, and it is hereby declared, that if the rent hereby reserved, and payable for the time being, or any part thereof, is not duly paid by the Lessee as herein and by section one hundred and thirty-nine of the said Act prescribed; or in case of the breach by the Lessee of any condition on which, in accordance with the said Act this lease is granted; or if the Lessee assigns or underlets the demised premises or any part thereof without Our said Minister's approval, in writing as required by the said Act, first obtained; then these presents shall become void, and the term hereby granted shall be absolutely and indefeasibly forfeited, and it shall thereupon be lawful for Us, Our Heirs and Successors, into and upon the demised premises, or any part thereof in the name of the whole, to re-enter, and the same to have again, repossess, and enjoy as if this deed-poll had never been executed, without making any compensation to the Lessee: Provided also, that this lease is granted, in accordance with section one hundred and two of the said Act, on condition that improvements within the meaning of that term in section one hundred and forty thereof are effected by the Lessee as follows:—

Within five years from the commencement of the lease to the value of five pounds, and within ten years from the commencement of the lease to the value of ten pounds (inclusive of the value of improvements effected during the first five years of the term) for each thousand acres of the area leased; and such improvements shall be maintained in good repair, and so far as necessary renewed, during the term of the lease.

Provided also, that this lease is granted subject to the powers, conditions and reservations relating thereto in Part VI. of the said Act contained, and to the provisions of the Mining Act, 1904, and the Forests Act, 1918, and to all rights and privileges lawfully acquired or exercisable thereunder; and that the right is reserved to Us, Our Heirs and Successors, to dispose of such portions of the demised land under the provisions of Part III. of the said Act as may be required for any purpose of public utility or for otherwise facilitating the improvement and settlement of the State as therein prescribed.

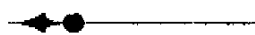
18398/35

SUBJECT TO A TWO CHAIR RESERVATION ABOVE
HIGH WATER MARK ALONG COAST.



Asst. Registrar of Titles.

Cancelled



Collateral to Bill of Sale stamped £40.12.6.
Mortgage 2780/1929 Ernest Samuel Doulkes Taylor and William
Allden Leslie to Edgar Goldsmith Meares of 36 Saint Georges Terrace
Perth Pastoralist. Registered 29th March 1929 at 12.50 o'clock
for J. D. Darnall (opp 1A) Darnall

Discharge 712/1938 of Mortgage 2780/1929. Registered 18th February 1938 at 12.20.0p.
R. C. Clifton

Collateral to General Lien stamped £31.5.0.
Mortgage 893/1938 Ernest Samuel Doulkes Taylor and William Allden
Leslie to Dalgety and Company Limited of William Street, Perth.
Registered 18th February 1938 at 12.20.0p.
R. C. Clifton

As to the land the subject of Transfer 10713/1938.
Discharge 5434/1938 of Mortgage 893/1938. Registered 9th December
1938 at 12.0.0.
R. C. Clifton

Transfer 10713/1938. Portion of the within lease about 64,000 a is
transferred and surrendered to His Majesty King George the Sixth.
Registered 9th December 1938 at 12.0.0.
R. C. Clifton

See 34th Dec 10713/1938. Area of the within lease is reduced to about
290,175 a and the annual rent to £349.4.0.
R. C. Clifton

Cor 23/39 The area of the within lease is now amended to abt.
292,700 ac and the yearly rental to £351.12.9.
for J. D. Darnall

Corr. 113/49, Pursuant to Section 98 of
Land Act 1933, the within rent as
from 1st Jan 1942 was reappraised
at £347.18-9

Assistant Registrar of Titles.

As to the ~~entire~~ ^{interest} ~~undivided~~ ^{interest} ~~half share~~ of Ernest Samuel Doulkes
Taylor only.

Application 302/1952. On the 14th August 1951 Ernest Samuel
Taylor died and on the 14th November 1951 probate
of his will and letters testamentary were granted to Roy Arthur
Long of 101 Melville Avenue Nedlands. Deceased's daughter
and Dorothy Nellie Rander Taylor of 39 Outram Street
West Perth. Widow. The successful claimant named.

7th August 1952
2740/1953 of Mortgage 893/1938.
R. C. Clifton

25th March 1953 at 10.30 o'clock.

D. Darnall
Assistant Registrar of Titles.

For further endorsement only, see over.

Cancelled

1876/87. 3236/38. 22705/38. 23755/52. 12196/53. 19343/60. 17264/62

RECEIPTS

Collateral to Bill of Sale stamped £40.12.6.
Mortgage 2780/1929. Ernest Samuel Foulkes Taylor and William
Arthur, 17 Leinster Road, London W.C.2. Registered 22nd March 1929 at 12.50 o'clock
Perth Proctorialist. Registered 22nd March 1929 at 12.50 o'clock
(Signed) A. J. War

ASSISTANT REGISTRAR OF TITLES

Discharge 712/1938 of Mortgage 2780/1929. Registered 18th February 1938 at

2. (Signed) R. L. C.

Collateral to General Lien stamped £31.5.0.
Mortgage 893/1938 Ernest Samuel Foulkes Taylor and William
Leslie, 10 Dalrymple Street, Glasgow, Scotland. Registered 18th February 1938 at 12.20 o'clock.
(Signed) R. L. C.

As to the land, the subject of Transfer 10713/1938.

TRANSFER 4594/1953 to William Allan Leslie, Pastoralist and Normana Leslie, Married Woman, both of Karratha Station, Roeburne, as tenants in common in equal shares in
Registered 25th March 1953 at 10.500c.
W. *W. Buchanan*
Registrar of Titles.

General Lien stamped £57.10.0.
MORTGAGE 3527/1953 William Allan Leslie and Normana Leslie Leslie to Dalgety and New Zealand Limited
Registered 25th March 1953 at 10.500c.
W. *W. Buchanan*
Registrar of Titles.

CORR 50/53 Sub. 27 Pursuant to Section 98(3) of Land Act 1933-1956 the within rent as from 1st January 1957 was reappraised at £516.8.0. *W. Edwards*
ASSISTANT REGISTRAR OF TITLES.

Transfer 8546/1960 to William Allan Leslie, Pastoralist, Normana Leslie, Married Woman, both of Karratha Station Roeburne, and Karratha Holdings Pty Ltd of First Floor Unit, Surf Club Building Howard Street Perth, as tenants in common in the following shares, that is to say to each of the said William Allan Leslie and Normana Leslie one undivided fourth share and to the said Karratha Holdings Pty Ltd the remaining two undivided fourth shares. Registered 25th May 1960 at 9.340c.

W. Edwards
ASSISTANT REGISTRAR OF TITLES.

As to Mortgage 3527/1953
APPLICATION 2351/1962 The correct name of the Mortgage is now DALGETY AND NEW ZEALAND LOAN LIMITED.
25th May 1962 *W. Edwards*
ASSISTANT REGISTRAR OF TITLES.

Corr. 2-65
The area of 7
ENTERED
IN
ERROR
P. JOHNSON
Registrar of Titles.

Land Act 1933.

Corr. 1-66. Gazette 27.5.66. Area 197.844c. Diag.
Portion of the land herein comprised is resumed for the purpose of "ROAD & RAILWAY, ROAD PIPELINE, AIRSTRIP"
by proclamation dated 18.5.66.

W. Edwards
Registrar of Titles.

Discharge 38345/66 of Mortgage 3527/1953. Registered 10th June 1966 at 9.020c.

ASSISTANT REGISTRAR OF TITLES.

Transfer 38346/66 to Transweld Iron Pty. Limited of 45 Caroline Street Melbourne, in the state of Victoria. Registered 10th June 1966 at 9.020c.

ASSISTANT REGISTRAR OF TITLES.

Corr. 2/66
Corr. 8/1966 Schedule 170
The area of the within lease has been amended to 291,886 acres roads ponds and the half yearly rental to \$5140.64
W. Edwards
ASSISTANT REGISTRAR OF TITLES.

Land Act 1933-1963 Sec 114.
Surrender 3067/67 . Surrendered and included in a
new lease 55/1967 issued in lieu hereof.
Registered 16th January
1967 at 10.16 o'clock
[Signature]
ASSISTANT REGISTRAR OF TITLES.

Cancelled



ORIGINAL

NOTE.—All dealings with this Lease must be in the forms prescribed under
"The Transfer of Land Act, 1893."

S. 297B.



No. 2601
96

WESTERN



AUSTRALIA.

CANCELLED

Date 220/102

PASTORAL LEASE.

(Under Section 96 of "The Land Act, 1898," and the amendments thereof, and registered under
"The Transfer of Land Act Amendment Act, 1905.")

100

North West DIVISION.

District or Locality De Wette

George the Fifth

by the Grace of God of the United Kingdom of Great Britain and Ireland, and of the British Dominions beyond the Seas, King, Defender of the Faith, Emperor of India. To all to whom these Presents shall come, Greeting: Know Ye that We of our especial Grace, and in consideration of the sum of £500

to Our Minister for Lands for Our State of Western Australia, already paid by John Gregory Withnell, North
Ellen Amelia Withnell, formerly widow William John Withnell, of Perth, in the County of York, in the State of Western Australia,
Heirs of John Gregory Withnell, deceased, and of Ellen Amelia Withnell, deceased, of Perth, in the County of York, in the State of Western Australia,

in the said State, hereinafter called the Lessee, and also in consideration of the rents hereinafter reserved on the part of the said Lessee, their Executors, Administrators, and Assigns to be paid, and in exercise of the powers in this behalf to Us given by "The Land Act, 1898," do by these Presents demise and lease unto the said Lessee, the natural surface of ALL THAT piece or parcel of land delineated by a border of green colour on the plan hereon, with the appurtenances; EXCEPT and always reserved to Us, Our Heirs and Successors, full power during the term hereby granted, from time to time to sell to any person or persons all or any unsold portion of the said demised Premises, subject to any claim for improvements that may be lawfully made in pursuance of the said Act; also full powers and absolute authority at any time during the continuance of this demise, to make grants or sales of all or any part or parts of the said demised Premises for public purposes; and also to except from sale, and reserve to Us, Our Heirs and Successors, or to resume and enter upon and dispose of in such other manner as for the public interest to Us, Our Heirs and Successors may seem best, such part or parts of the said demised Premises as may be required for public roads or other internal communications by land or water, or for the use and benefit of the Aboriginal inhabitants of the country, or for purposes of military defence, or as the sites of places of public worship, schools, or other public buildings, or as places for the interment of the dead, or places for the recreation and amusement of the inhabitants of any town or village, or as the sites of public quays or landing places on the sea-coast or shores of navigable streams, or for the construction of tramways, railways, or railway stations, or for the purpose of sinking shafts, and digging for and taking away gold, silver, copper, tin, lead, or other metals, ores, and minerals and other substances containing metals, all gems and precious stones, coal and mineral oil, and all phosphatic substances, or for any purposes of public defence, safety, utility, convenience, or enjoyment, or for otherwise facilitating the improvement and settlement of Our said State; and also permanently or for temporary use to lay out, declare open, and make public roads into, through, and out of or over any part of the said demised Premises; with the liberty to ourselves, our servants, agents, and workmen to enter upon the said demised Premises, and dig for, quarry, and take away any indigenous produce, rock, soil or other material required for public purposes; and to fell, cut, and remove all or any timber, sandalwood or other woods growing or being thereon, and to issue licenses to any person or persons, authorising him or them to cut, remove, and cart away the same, with full and free liberty to such licensed persons, at all reasonable time, of ingress, egress, and regress, for such purposes; and subject to any rights of the Lessee aforesaid, to license, to occupy, or to sell any other portion of the said Premises at any time, and with a right of immediate entry; also to depasture on the unenclosed or enclosed but otherwise unimproved portions of the said demised Premises any horses or cattle in the employment of the Government, working on or passing over the said demised Premises; also for any person or persons to enter, pass over, through and out of any such part of the said demised Premises, while passing from one part of the country to another, with or without horses, stock, teams, or other conveyances, on all necessary occasions; and full right to the Aboriginal natives of the said State at all times to enter upon any unenclosed or enclosed but otherwise unimproved part of the said demised Premises for the purpose of seeking their subsistence therefrom in their accustomed manner; and also full right to any person or persons to enter on any part of the said demised Premises to examine the mineral capabilities thereof, and to do all things necessary for the purpose of effectually making such examinations, but paying, nevertheless, full compensation for any damage arising therefrom. TO HAVE AND TO HOLD the Premises hereby demised (except as aforesaid and subject to the powers, reservations, and conditions herein and in the said Act contained, and with all the rights, powers, and privileges conferred by such of the said Act as are applicable hereto), unto the said Lessee, their Executors, Administrators, and Assigns, for the term of 30 years 9 months to be computed from the first day of April, 1910, until the thirty-first day of December, 1948, YIELDING AND PAYING for the same, during the said term, but subject as hereinafter provided, unto Us, Our Heirs

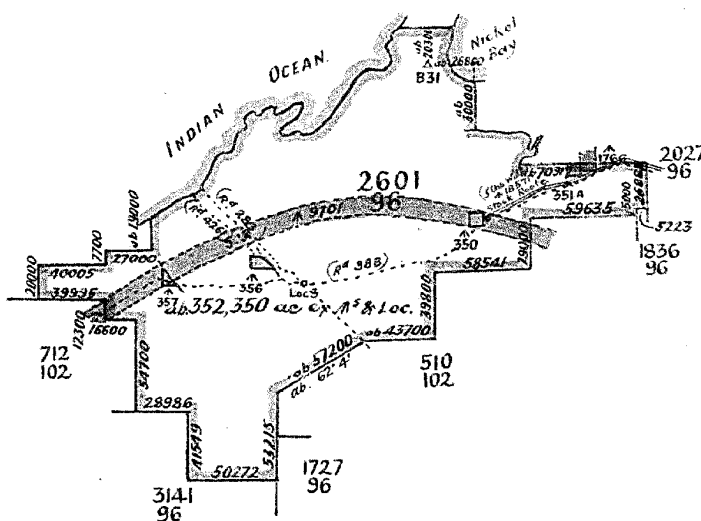
and Successors, the yearly rent of £443-12-6 without deduction, except such deduction as the said Lessee, their Executors, Administrators, or Assigns may be entitled to under the said Act, and such rent shall be paid to Our said Minister for Lands, by equal payments, half-yearly in advance, on or before the first day of March and the first day of September in every year. Provided that such annual rent shall, at the expiration of the first fifteen years of the term, be subject to re-appraisalment under and subject to the provisions of "The Land Act Amendment Act, 1917"; and on such re-appraisalment being made the amount of such annual rent to be paid by the Lessee, their Executors, Administrators, and Assigns shall be adjusted

100

accordingly. Provided, nevertheless, and it is hereby declared, that if the said rent be not paid in advance as prescribed by the said Act, or if the Lessee, ~~their~~ Executors, or Administrators shall assign or underlet the Premises or any part thereof without the Minister's approval, in writing, as required by the said Act first obtained; then these Presents shall become void, and the term hereby granted shall be absolutely and indefeasibly forfeited, and it shall thereupon be lawful for Us, our Heirs and Successors, into and upon the said demised Premises, or any part thereof in the name of the whole, to re-enter, and the same to have again, repossess, and enjoy as if this deed-poll had never been executed, without making any compensation to the said Lessee, ~~their~~ Executors, Administrators, or Assigns. Provided that the said Lessee, ~~their~~ Executors, or Administrators, or allowed Assigns, may at all times, during this demise, on any part of the said Premises fell, cut, and use any timber for his domestic and farm purposes, or for the construction of any buildings, fences, stockyards, or other improvements, and use any other materials for the like purposes, but so, nevertheless, that the said Lessee, ~~their~~ Executors, Administrators, or allowed Assigns shall not sell the said timber or material, or use the same, or suffer it to be used, except on the said demised Premises: Provided further that all improvements on the land hereby demised, except those which are owned by the Lessee, are our property and shall be paid for by the Lessee at such time and in such manner as Our Minister for Lands may direct. AND THAT We, Our Heirs and Successors, are not, nor shall be liable or responsible for any error in the descriptive boundaries of the land hereby demised, which may be shown by any survey hereafter to be made of the said lands, nor for any deficiency in the quantity and acreage of the lands hereby demised caused by any such error as aforesaid, nor in respect of any claims which may be set up by any other person or persons to any part or parts of the said demised Premises. PROVIDED, LASTLY, and it is hereby declared, that We, Our Heirs or Successors, shall not be liable to compensate the said Lessee, ~~their~~ Executors, Administrators, or allowed Assigns, for any loss or damage arising from the exercise of all or any of the powers or rights hereby reserved to Us, Our Heirs and Successors, save and except in so far as the same may be provided for by the said Act.

PLAN HEREIN REFERRED TO.

THEY ARE TO BE USED IN CONNECTION WITH THE
HIGH WATER MARK ALL YEAR ROUND.



SCALE...800...CHAINS TO ONE INCH.

The area and measurements on the above Plan are more or less.

IN WITNESS whereof we have caused Our said Minister for Lands to affix hereto his Seal and set his hand

this 26th day of October, 1923.

N.B. Bartlett
An Officer authorised in this behalf by the Governor.
By order of the Minister for Lands.

Registered the... day of... 1923.

in conformity with Section 5 of the Act No. 54 of 1909 and numbered...

PRICE PER 1,000 ACRES

PLAN

ORR

Registrar of Titles.

RECEIPTS: 22303/23 14508/15 20561.5279 9111
25 79

B

Primary security stamped £12.10/- Mortgage 149 John Gregory Withnell, William John Withnell, Ernest Belmont Withnell, Lilla Lewis, Dick and Elsie Amelia Withnell to Dalgety and Company Limited to secure £106.7.18.9. further advances and interest as therein

Registered 21st July 1921 at 2 p.m.

T. L. A. mortgage no 8582/23

Discharge 3328/1925 of Mortgage 8582/1923 (2149) Registered 20th August 1925 at 10.45 a.m.

R. Montgomery
FOR CLERK SECRETARY FOR LANDS

Transfer 6589/1925 Totally transferred to Edgar Goldsmith Meares of Karratha Station Roebourne Pastoralist Registered 20th August 1925 at 10.45 a.m.

Primary security Bill of Sale stamped £12-10-0

Mortgage 6113/1925 Edgar Goldsmith Meares to John Gregory Withnell of Chitalane Road Northam Pastoralist and Grazier to secure £10000 and interest at £6-10-0 per centum per annum Registered 20th August 1925 at 10.45 a.m.

Primary security Bill of Sale stamped £8-15-0

Mortgage 7224/1925 Edgar Goldsmith Meares to Dalgety and Company Limited of William Street Perth to secure advances and interest as therein Registered 28th September 1925 at 1 a.m.

Discharge 1015/1929 of Mortgage 6113/1925 Registered 22nd February 1929 at 2.50 p.m.

Asst. Registrar of Titles.

Discharge 1666/1929 of Mortgage 7224/1925 Registered 22nd March 1929 at 12.50 o'clock

Transfer 3248/1929 Transferred to Ernest Samuel Foulkes Taylor of The Wild Club Barrack Street Perth, and William Allan Leslie of 48 Mount Street Perth, both Pastoralists, as tenants in common in equal shares. Registered 22nd March 1929 at 12.50 o'clock

Collateral to bill of sale stamped £40.12.6

Mortgage 2780/1929 Ernest Samuel Foulkes Taylor and William Allan Leslie to Edgar Goldsmith Meares of 36 Saint George's Inn Street Perth, Pastoralist Registered 22nd March 1929 at 12.50 o'clock

For 119/35 The area of the within lease is now amended to 351,475 ac. by excision of 875 ac for Roads 4261, 388 283 and Reserve 18571.

The Land Act 1933 Section 114.

Surrender 372/1936 The within lease is now surrendered and the within described land included in new lease no. 1394/19 Registered 25th August 1936 at 2 p.m.

Sundry Document F901497

NO DUPLICATE ISSUED

REGISTER
VOL.BOOK
FOL.

Corr. 2909/1987

3063

616

WESTERN



AUSTRALIA



CANCELLED

Crown Land Record

The undermentioned land shown on the sketch in the First Schedule hereto is land of the Crown subject to the interests, easements, encumbrances and notices shown in the Second Schedule hereto.

616
FOL.3063
VOL.

Dated 13th June, 1995

CHIEF EXECUTIVE OFFICER

LAND REFERRED TO

De Witt Location 216 & 217 on Land Administration Diagram 88164

FIRST SCHEDULE

Page 1 (of 2 pages)

Cancelled

CANCELLED

PERSONS ARE CAUTIONED AGAINST ALTERING OR ADDING TO THIS RECORD OR ANY NOTIFICATION HEREON

05901/3/92-4M-S/9499

FOR ENCUMBRANCES AND OTHER MATTERS AFFECTING THE LAND SEE SECOND SCHEDULE

SECOND SCHEDULE						
NOTE: ENTRIES MAY BE AFFECTED BY SUBSEQUENT ENDORSEMENTS						
PARTICULARS	INSTRUMENT		REGISTERED	TIME	SEAL	CERT. OFFICER
	NATURE	NUMBER				
Reserve No 40457 for the purpose of "Air Traffic Control Tower" and vested in <u>Civil Aviation Authority</u> .	Sundry	F901497				
Reserve amended to exclude that portion of Location 216 now comprised in Locations 319 and 320 on Diagram 91850. In Gov Gaz 13.6.95.	Sundry	F901497		15.30		
Cancelled: Location 319 to CLR 3103/645 Location 320 included in CLR 3103/646 Balance to CLR 3063/617.	Sundry	F901497		13.49		

VOL. 3063 FOL. 616

Sundry Document F901497

Corr. 2909/1987

Vol Fol
3063 616

NO DUPLICATE ISSUED

REGISTER

VOL.

3063

BOOK

FOL.

617

WESTERN



AUSTRALIA



DP36621 1450124

Crown Land Record CANCELLED

The undermentioned land shown on the sketch in the First Schedule hereto is land of the Crown subject to the interests, easements, encumbrances and notices shown in the Second Schedule hereto.

617
FOL.3063
VOL.

Dated 13th June, 1995

CHIEF EXECUTIVE OFFICER

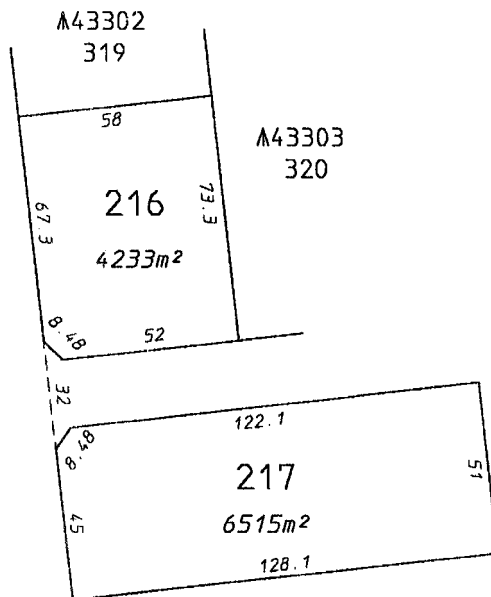


LAND REFERRED TO

De Witt Location 216 & 217 on Land Administration Diagram 88164

FIRST SCHEDULE

CANCELLED



COMPILED FROM CS DIA. 91850

SCALE 1:2000

P.P. NICKOL BAY SW & BH65 (10) 6.6

Shire of Roebourne

KT

FOR ENCUMBRANCES AND OTHER MATTERS AFFECTING THE LAND SEE SECOND SCHEDULE

PERSONS ARE CAUTIONED AGAINST ALTERING OR ADDING TO THIS RECORD OR ANY NOTIFICATION HEREON

SECOND SCHEDULE						
NOTE: ENTRIES MAY BE AFFECTED BY SUBSEQUENT ENDORSEMENTS						
PARTICULARS	INSTRUMENT		REGISTERED	TIME	SEAL	CERT. OFFICER
	NATURE	NUMBER				
Reserve NO. 40457 for the purpose of "Air Traffic Control Tower" and vested in Civil Aviation Authority.	Sundry	F901497				
Management Order revoked.	Revocation	I205839	15.8.2002	13.26		
Reserve No. 40457 purpose changed to Aeronautical Navigational Aids and Communications, Satellite Ground Station, Telecommunications and Fire Station.	Change of Purpose	I205840	15.8.2002	13.26		
Reserve No. 40457 amended to comprise Karratha Lot 4923 on DP 36621 in lieu of De Witt Location 216 and to also comprise De Witt Location 217 on DP 188164.	Amendment of Reserve	I470401	6.5.2003	10.05		
Cancelled: De Witt Location 217 to Vol. 3127 Fol. 185 and Karratha Lot 4923 to Vol. 3131 Fol. 350.	Application	I205838	15.8.2002	13.26		

VOL. 3063 FOL. 617

WESTERN



AUSTRALIA

REGISTER NUMBER 217/DP188164	
DUPLICATE EDITION N/A	DATE DUPLICATE ISSUED N/A

RECORD OF QUALIFIED CERTIFICATE
OF
CROWN LAND TITLE

VOLUME
LR3127FOLIO
185

UNDER THE TRANSFER OF LAND ACT 1893
AND THE LAND ADMINISTRATION ACT 1997

NO DUPLICATE CREATED

The undermentioned land is Crown land in the name of the STATE of WESTERN AUSTRALIA, subject to the interests and Status Orders shown in the first schedule which are in turn subject to the limitations, interests, encumbrances and notifications shown in the second schedule.

REGISTRAR OF TITLES

**LAND DESCRIPTION:**

LOT 217 ON DEPOSITED PLAN 188164

STATUS ORDER AND PRIMARY INTEREST HOLDER:
(FIRST SCHEDULE)

STATUS ORDER/INTEREST: RESERVE UNDER MANAGEMENT ORDER

PRIMARY INTEREST HOLDER: AIRSERVICES AUSTRALIA OF 4/2 BRINDABELLA CIRCUIT, CANBERRA AIRPORT, PIALIGO, AUSTRALIAN CAPITAL TERRITORY

(XE J846870) REGISTERED 25 JULY 2006

LIMITATIONS, INTERESTS, ENCUMBRANCES AND NOTIFICATIONS:
(SECOND SCHEDULE)

1. PART RESERVE 40457 FOR THE PURPOSE OF AERONAUTICAL NAVIGATIONAL AIDS AND COMMUNICATIONS, SATELLITE GROUND STATION, TELECOMMUNICATIONS AND FIRE STATION
J846869 CHANGE OF RESERVE PURPOSE. PURPOSE CHANGED TO AERONAUTICAL NAVIGATIONAL AIDS & COMMUNICATIONS, SATELLITE GROUND STATION, TELECOMMUNICATIONS, FIRE STATION & STORAGE OF EQUIPMENT
REGISTERED 25.7.2006.
J846870 MANAGEMENT ORDER. CONTAINS CONDITIONS TO BE OBSERVED.
REGISTERED 25.7.2006.
2. L417095 MEMORIAL. CONTAMINATED SITES ACT 2003 REGISTERED 2.9.2010.

- Warning: (1) A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required.
Lot as described in the land description may be a lot or location.
- (2) The land and interests etc. shown hereon may be affected by interests etc. that can be, but are not, shown on the register.
- (3) The interests etc. shown hereon may have a different priority than shown.

-----END OF CERTIFICATE OF CROWN LAND TITLE-----

STATEMENTS:

The statements set out below are not intended to be nor should they be relied on as substitutes for inspection of the land and the relevant documents or for local government, legal, surveying or other professional advice.

END OF PAGE 1 - CONTINUED OVER

ORIGINAL CERTIFICATE OF CROWN LAND TITLE
QUALIFIED

REGISTER NUMBER: 217/DP188164

VOLUME/FOLIO: LR3127-185

PAGE 2

SKETCH OF LAND: DP188164.
PREVIOUS TITLE: LR3063-617.
PROPERTY STREET ADDRESS: NO STREET ADDRESS INFORMATION AVAILABLE.
LOCAL GOVERNMENT AREA: CITY OF KARRATHA.
RESPONSIBLE AGENCY: DEPARTMENT OF LANDS (SLSD).

NOTE 1: A000001A CORRESPONDENCE FILE 02909-1987-01RO.
NOTE 2: LAND PARCEL IDENTIFIER OF DE WITT LOCATION 217 (OR THE PART THEREOF) ON
SUPERSEDED PAPER CERTIFICATE OF TITLE CHANGED TO LOT 217 ON DEPOSITED
PLAN 188164 ON 25-AUG-04 TO ENABLE ISSUE OF A DIGITAL CERTIFICATE OF
TITLE.
NOTE 3: THE ABOVE NOTE MAY NOT BE SHOWN ON THE SUPERSEDED PAPER CERTIFICATE
OF TITLE OR ON THE CURRENT EDITION OF DUPLICATE CERTIFICATE OF TITLE.

WESTERN



AUSTRALIA

REGISTER NUMBER 4923/DP36621	
DUPLICATE EDITION N/A	DATE DUPLICATE ISSUED N/A

RECORD OF QUALIFIED CERTIFICATE
OF
CROWN LAND TITLE

VOLUME
LR3131FOLIO
350

UNDER THE TRANSFER OF LAND ACT 1893
AND THE LAND ADMINISTRATION ACT 1997

NO DUPLICATE CREATED

The undermentioned land is Crown land in the name of the STATE of WESTERN AUSTRALIA, subject to the interests and Status Orders shown in the first schedule which are in turn subject to the limitations, interests, encumbrances and notifications shown in the second schedule.

REGISTRAR OF TITLES

**LAND DESCRIPTION:**

LOT 4923 ON DEPOSITED PLAN 36621

STATUS ORDER AND PRIMARY INTEREST HOLDER:
(FIRST SCHEDULE)

STATUS ORDER/INTEREST: RESERVE UNDER MANAGEMENT ORDER

PRIMARY INTEREST HOLDER: AIRSERVICES AUSTRALIA OF 4/2 BRINDABELLA CIRCUIT, CANBERRA AIRPORT, PIALIGO, AUSTRALIAN CAPITAL TERRITORY

(XE J846870) REGISTERED 25 JULY 2006

LIMITATIONS, INTERESTS, ENCUMBRANCES AND NOTIFICATIONS:
(SECOND SCHEDULE)

- PART RESERVE 40457 FOR THE PURPOSE OF AERONAUTICAL NAVIGATIONAL AIDS AND COMMUNICATIONS, SATELLITE GROUND STATION, TELECOMMUNICATIONS AND FIRE STATION
J846869 CHANGE OF RESERVE PURPOSE. PURPOSE CHANGED TO AERONAUTICAL NAVIGATIONAL AIDS & COMMUNICATIONS, SATELLITE GROUND STATION, TELECOMMUNICATIONS, FIRE STATION & STORAGE OF EQUIPMENT
REGISTERED 25.7.2006.
J846870 MANAGEMENT ORDER. CONTAINS CONDITIONS TO BE OBSERVED.
REGISTERED 25.7.2006.
- L417095 MEMORIAL. CONTAMINATED SITES ACT 2003 REGISTERED 2.9.2010.

- Warning: (1) A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required.
Lot as described in the land description may be a lot or location.
(2) The land and interests etc. shown hereon may be affected by interests etc. that can be, but are not, shown on the register.
(3) The interests etc. shown hereon may have a different priority than shown.

-----END OF CERTIFICATE OF CROWN LAND TITLE-----

STATEMENTS:

The statements set out below are not intended to be nor should they be relied on as substitutes for inspection of the land and the relevant documents or for local government, legal, surveying or other professional advice.

END OF PAGE 1 - CONTINUED OVER

ORIGINAL CERTIFICATE OF CROWN LAND TITLE
QUALIFIED

REGISTER NUMBER: 4923/DP36621

VOLUME/FOLIO: LR3131-350

PAGE 2

SKETCH OF LAND: DP36621.
PREVIOUS TITLE: LR3063-617.
PROPERTY STREET ADDRESS: LOT 4923 NORMAN RD, GAP RIDGE.
LOCAL GOVERNMENT AREA: CITY OF KARRATHA.
RESPONSIBLE AGENCY: DEPARTMENT OF LANDS (SLSD).

NOTE 1: A000001A CORRESPONDENCE FILE 02909-1987-01RO.

NOTE 2: LAND PARCEL IDENTIFIER OF KARRATHA TOWN LOT/LOT 4923 ON SUPERSEDED
PAPER CERTIFICATE OF CROWN LAND TITLE CHANGED TO LOT 4923 ON
DEPOSITED PLAN 36621 ON 28-SEP-04 TO ENABLE ISSUE OF A DIGITAL
CERTIFICATE OF TITLE.

NOTE 3: THE ABOVE NOTE MAY NOT BE SHOWN ON THE SUPERSEDED PAPER CERTIFICATE
OF TITLE.

Appendix B

Site Visit Photo Log

PHOTOGRAPHIC LOG

PHOTOGRAPHIC LOG			
Site Name: Karratha Airport		Site Location: Karratha Airport ARFF Fire Station	Project No: 60509115
Plate No. 1	Date: 28/07/2016		
Direction Photo Taken: Looking North East			
Description: The ARFF Fire station tender bay, triple interceptor and Solberg foam storage area.			

Plate No. 2	Date: 28/07/2016	
Direction Photo Taken: Looking South		
Description: The front apron of the ARFF Fire Station surface water drain is located in front of the fire tender bays and drains to the grass to the south.		

PHOTOGRAPHIC LOG

Site Name: Karratha Airport		Site Location: Karratha Airport ARFF Fire Station	Project No: 60509115
Plate No. 3	Date: 28/07/2016		
Direction Photo Taken: North east			
Description: Four ASTs containing water were observed. These were reportedly used as back up water supply for the Fire Station.			

Plate No. 4	Date: 28/07/2016	
Direction Photo Taken: North		
Description: The Powerhouse and former Airservices Mechanical Workshop building (APEC 2) located to the north of the Fire Station.		

PHOTOGRAPHIC LOG

PHOTOGRAPHIC LOG			
Site Name: Karratha Airport		Site Location: ARFF Maintenance Workshop Area	Project No: 60509115
Plate No. 5	Date: 28/07/2016		
Direction Photo Taken: North East			
Description: Within the mechanical workshop building and along the north eastern corner, AFFF was stored in banded 1000 L plastic IBCs.			

Plate No. 6	Date: 28/07/2016
Direction Photo Taken: West	
Description: The ATC and administration buildings to the west of the Fire Station were observed.	



PHOTOGRAPHIC LOG

PHOTOGRAPHIC LOG			
Site Name: Karratha Airport		Site Location: Former Fire Training Ground (FFTG)	Project No: 60509115
Plate No. 7	Date: 28/07/2016		
Direction Photo Taken: North east			
Description: The Former Fire Training Ground with steel mock plane on a cracked concrete bund.			

Plate No. 8	Date: 28/07/2016	
Direction Photo Taken: North east		
Description: Within the Former Fire Training Ground an area of burnt car bodies and a smoke hut which previously contained used water and dry chemical fire extinguishers.		

PHOTOGRAPHIC LOG

Site Name: Karratha Airport		Site Location: Storm water drainage evaporation pond	Project No: 60509115
Plate No. 9	Date: 28/07/2016		
Direction Photo Taken: North			
Description: The storm water drainage evaporation pond along the northern boundary.			

Plate No. 10	Date: 28/07/2016	
Direction Photo Taken: West – Former Fire Training Ground		
Description: Soil stockpiles along the western boundary of the Former Fire Training Ground.		

PHOTOGRAPHIC LOG

Site Name: Karratha Airport		Site Location: Terminal Building	Project No: 60509115
Plate No. 11	Date: 28/07/2016		
Direction Photo Taken: North			
Description: Looking west from the ARFF Fire Station to the Terminal Building with a bitumen apron.			
Plate No. 12	Date: 28/07/2016		
Direction Photo Taken: West – Helicopter Hangars			
Description: The Woodside helicopter hangar along the north western boundary contained a water fire suppression system.			

PHOTOGRAPHIC LOG

PHOTOGRAPHIC LOG			
Site Name: Karratha Airport		Site Location: Woodside Apron	Project No: 60509115
Plate No. 13	Date: 28/07/2016		
Direction Photo Taken: South – Helicopter Hangers			
Description: AFFF refueling fire extinguisher on Woodside apron.			
Plate No. 14	Date: 28/07/2016		
Direction Photo Taken: South – Helicopter Hangers			
Description: The Bristow Hangar to the south of the Woodside hangar and a blue fire extinguisher containing AFFF on the concrete apron refueling area.			

Appendix C

Bore Information

AECOM does not warrant the accuracy or completeness of information displayed in this map and any person using it does so at their own risk. AECOM shall bear no responsibility or liability for any errors, faults, defects, or omissions in the information.



PROJECT ID 60509115
CREATED BY 
APPROVED BY 
LAST MODIFIED 24 NOV 2016


www.aecom.com


DATUM GDA 1994, PROJECTION MGA ZONE 50
0 100 200 300 400
metres
1:17,000 (when printed at A3)

- LEGEND**
-  Licensed Bores
 -  Licensed Drawdown Properties
 -  500m Buffer
 -  1km Buffer
 -  Airport Related Operations Boundary
 -  Cadastral Boundary

Data sources:
Nearmap Imagery (19/04/2016)

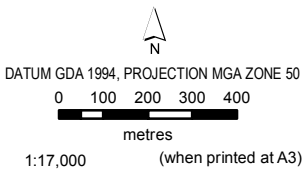
Base Data: (c) Based on information provided by and with the permission of the Western Australian Land Information Authority trading as Landgate (2010).

Licensed Bores	
AIRSERVICES AUSTRALIA	Appendix C1
PRELIMINARY SITE INVESTIGATION AT KARRATHA AIRPORT	

AECOM does not warrant the accuracy or completeness of information displayed in this map and any person using it does so at their own risk. AECOM shall bear no responsibility or liability for any errors, faults, defects, or omissions in the information.



PROJECT ID 60509115
CREATED BY 
APPROVED BY 
LAST MODIFIED 24 NOV 2016
AECOM
www.aecom.com



- LEGEND**
-  Registered Bores
 -  500m Buffer
 -  1km Buffer
 -  Airport Related Operations Boundary
 -  Cadastral Boundary

Data sources:
Nearmap Imagery (19/04/2016)
Base Data: (c) Based on information provided by and
with the permission of the Western Australian Land
Information Authority trading as Landgate (2010).

Registered Bores

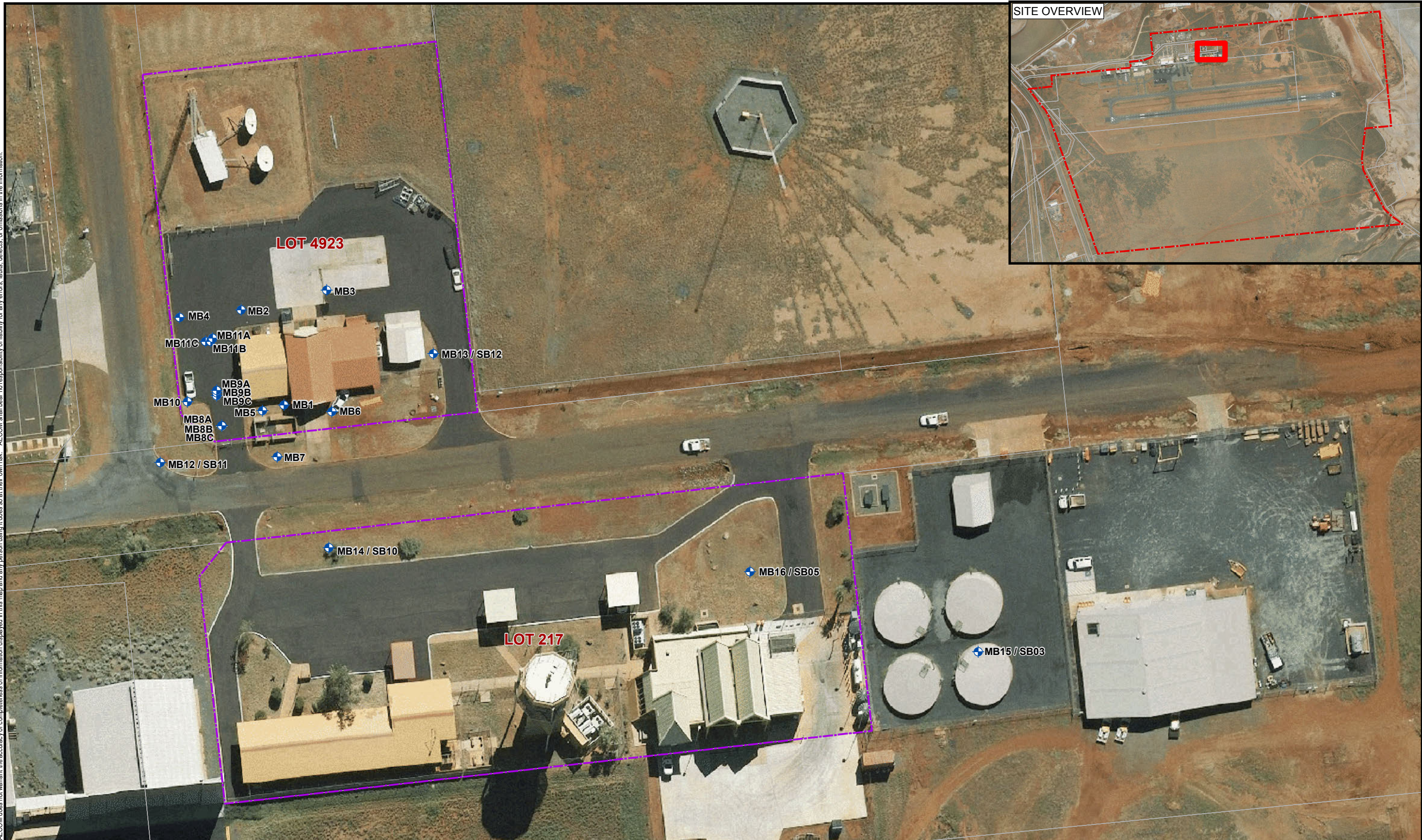
AIRSERVICES AUSTRALIA

*PRELIMINARY SITE INVESTIGATION AT
KARRATHA AIRPORT*

Appendix

C2

AECOM does not warrant the accuracy or completeness of information displayed in this map and any person using it does so at their own risk. AECOM shall bear no responsibility or liability for any errors, faults, defects, or omissions in the information.



PROJECT ID 60509115

CREATED BY 

APPROVED BY 

LAST MODIFIED 24 NOV 2016


www.aecom.com


N

DATUM GDA 1994, PROJECTION MGA ZONE 50

010203040

metres

1:700 (when printed at A3)

- LEGEND**
-  Monitoring Well
 -  Airservices Lot Boundary
 -  Airport Estate Boundary
 -  Cadastral Boundary

Data sources:
Landgate Imagery (04/07/2015)

Base Data: (c) Based on information provided by and with the permission of the Western Australian Land Information Authority trading as Landgate (2010).

Onsite Bore Network	
AIRSERVICES AUSTRALIA	Appendix C-3
PRELIMINARY SITE INVESTIGATION AT KARRATHA AIRPORT	

Appendix D

Contaminated Sites Information



Your ref 60509115
Our ref DMO 9489
Enquiries Registrar
Phone 1300 762982
Fax
Email

5 4 7 16
led by 8 88
No:
tion:

AECOM
GPO Box B59
Perth WA 6849

Dear Sir/Madam

BASIC SUMMARY OF RECORDS REQUEST

Thank you for your Basic Summary of Records request for the site consisting of the following parcel(s) of land:

- LOT 300 ON PLAN 41931 as shown on certificate of title LR3142/717 known as 300 Bayly Av, Gap Ridge WA 6714

which Department of Environment Regulation (DER) received on 14/07/2016.

A search of DER's records of known and suspected contaminated sites was undertaken however, our records indicate that as of 02/08/2016 this site has not been reported to DER as a known or suspected contaminated site either prior to or after the commencement of the *Contaminated Sites Act 2003*.

For general enquiries, please contact the Registrar on 1300 762 982.

Yours sincerely

CONTAMINATED SITES
Delegated Officer under section 91
of the *Contaminated Sites Act 2003*

02/08/2016

Enc. Receipt Number DER51793



Government of **Western Australia**
Department of **Environment and Conservation**

Your ref:
Our ref: DEC4283
Enquiries: Registrar
Phone: 1300 762982
Fax:
Email:

Airservices Australia
GPO Box 367
Canberra ACT 2601

Dear Sir/Madam

New legislation is in place to record and manage contaminated sites in Western Australia, in order to protect people's health and the environment. Please note that contamination does not necessarily mean that an area is unsafe to live or work in – for example, it may be limited to groundwater, and only becomes an issue to be managed if a groundwater bore was being considered.

The *Contaminated Sites Act 2003*, which came into effect on 1 December 2006, requires the Department of Environment and Conservation (DEC) to classify sites reported to it and inform a number of people, including owners and occupiers, so they can make informed decisions about the site.

Set out below in this letter is the formal notice of a classification of a known or suspected contaminated site in which you have an interest. The notice explains why the site received the classification, any restrictions on the use of the site, and how you can appeal the classification if you believe it is incorrect. In some cases, this notice may include a list of lots in addition to the one in which you have an interest.

Also attached is a copy of the brochure *Contaminated sites: New laws for Western Australia*, which has more information about the new Act. If you have any queries, please contact DEC's Contaminated Sites Section on 1300 762 982.

NOTICE OF A CLASSIFICATION OF A KNOWN OR SUSPECTED CONTAMINATED SITE GIVEN UNDER SECTION 15 OF THE *CONTAMINATED SITES ACT 2003*

The site detailed below, consisting of 1 parcel(s) of land, was reported to the CEO of DEC as a known or suspected contaminated site and has been classified under the Act:

- Parcel 34112 = Approximate Spatial Representation of Lot 4923 on plan 36621 as shown on certificate of title LR3131/350 known as 4923 Norman Road, Gap Ridge WA 6714 and Lot 217 on plan 188164 as shown on certificate of title LR3127/185 known as 217 Goodard St, Gap Ridge WA 6714 (the site)

This notification is being sent to you in accordance with section 15(1) of the Act on the grounds that you, as the recipient, are one or more of the following:

- (a) owner of the site;
- (b) occupier of the site;

DIRECTOR GENERAL AND ENVIRONMENTAL SERVICES DIVISIONS: The Atrium, 168 St Georges Terrace, Perth, Western Australia 6000

Phone: (08) 6467 5000 Fax: (08) 6467 5562 TTY: 1880 555 630

PARKS AND CONSERVATION SERVICES DIVISIONS: Executive: Corner of Australia II Drive and Hackett Drive, Crawley, Western Australia 6009

Phone: (08) 9442 0300 Fax: (08) 9386 1578 Operations: 17 Dick Perry Avenue, Technology Park, Kensington, Western Australia 6151

Phone: (08) 9219 8000 Fax: (08) 9334 0498 TTY: 9334 0546

POSTAL ADDRESS FOR ALL DIVISIONS: Locked Bag 104, Bentley Delivery Centre, Western Australia 6983

www.dec.wa.gov.au

wa.gov.au

XDEC01001

- (c) relevant public authority;
- (d) person in the CEO's opinion there is particular reason to notify;
- (e) person who made the report under section 11 or 12; and
- (f) person in the CEO's opinion who may be responsible for remediation of the site classified as *contaminated – remediation required*.

Site Classification

The site is classified as the following category:

Category of site classification: Possibly contaminated - investigation required

Date of site classification: 09/08/2010

Reasons for classification: This site was reported to the Department of Environment and Conservation (DEC) as per reporting obligations under section 11 of the 'Contaminated Sites Act 2003', which commenced on 1 December 2006. The site classification is based on information submitted to DEC by February 2010.

This site was historically used as a Aviation and Rescue Fire Fighting Facility (ARFFF) and a Air Traffic Control Tower Facility (ATCTF) as part of Karratha's airport operations, for approximately 16 years from 1987 to 2003, a land use that has the potential to cause contamination, as specified in the guideline 'Potentially Contaminating Activities, Industries and Landuses' (Department of Environment, 2004).

Site investigations were undertaken between 2003 and 2009 to assess the possibility for re-establishment of an ARFFF and ATCTF.

An Underground Storage Tank (UST), located on the central portion of the site, was decommissioned in December 2000, following identified losses of diesel. Soil samples collected from the excavation walls and floor detected petroleum hydrocarbons present. Due to the need for structural integrity of nearby buildings, the UST pit was backfilled without remedial works.

A soil investigation, carried out in 2006, found that hydrocarbons (such as from diesel and oil) were present in soils at concentrations exceeding Ecological Investigation Levels and potentially Health-based Investigation Levels for commercial and industrial sites, as published in 'Assessment Levels for Soil, Sediment and Water' (DEC, 2010). The hydrocarbon-impacted soils were found at a depth of approximately 2.2 to 2.6 metres below ground level in the vicinity of the former UST (central portion of the site). No remedial works have been carried out on these hydrocarbon-impacted soils.

A 2006 groundwater investigation found ethyl-benzene and xylenes in groundwater at concentrations exceeding Australian Drinking Water Guidelines, as published in 'Assessment Levels for Soil, Sediment and Water' (Department of Environment and Conservation, 2010) and exceeding criteria published in 'Contaminated Sites Reporting Guideline for Chemicals in Groundwater' (Department of Health, 2006) which is the relevant assessment level for the use of groundwater for garden irrigation and other non-potable uses. Hydrocarbons (such as diesel and oil) were also found in groundwater at concentrations exceeding Dutch Intervention Values (Netherlands Ministry for Housing, Spatial Planning and Environment, 2000). The lateral extent of the dissolved-phase hydrocarbon plume has not been delineated.

The hydrocarbon-impacted soils may be acting as an ongoing source to the hydrocarbon plume detected on-site. Further investigations are required to determine the extent of the groundwater hydrocarbon plume and assess the risks posed by hydrocarbon impact at the site.

As there are grounds to indicate possible contamination of the site and groundwater has not been fully investigated, and a risk assessment to determine the risk to human health, the environment, or any environmental value has not been carried out, the site is classified as 'possibly contaminated - investigation required'.

DEC, in consultation with the Department of Health, has classified this site based on the information available to DEC at the time of classification. It is acknowledged that the contamination status of the site may have changed since the information was collated and/or submitted to DEC, and as such, the usefulness of this information may be limited.

In accordance with Department of Health advice, if groundwater is being or is proposed to be abstracted, DEC recommends that analytical testing should be carried out to determine whether the groundwater is suitable for its intended use.

The nature and extent of contamination and any restrictions on the use of the land, if applicable, are listed in Attachment A.

Information in relation to the classification of the site will be available to the public through a request for a summary of records on written application and payment of a prescribed fee from the Reported Sites Register.

In some instances DEC has had to classify sites based on historical information. It should be noted that a site may be re-classified at any stage to better reflect the current status when additional information becomes available, for example where a new investigation or remediation report completed in accordance with DEC's *Contaminated Sites Management Series* of guidelines, is submitted to DEC. The current site classification is the classification most recently conferred on the site.

Memorials

In accordance with section 58(1) of the Act, DEC will lodge a memorial against the Certificate(s) of Title relating to the site, with Landgate, which will record the site classification. The parcel(s) that do not have a registration number or certificate of title will not have a memorial lodged against them until a certificate of title has been created. Confirmation of the lodgement of the memorial(s) will be forwarded to the following people once completed:

- (a) each owner,
- (b) the Western Australian Planning Commission;
- (c) the CEO of the Department of Health;
- (d) the Local Government Authority;
- (e) the relevant scheme authority.

Given that memorial(s) will be lodged against the site, the Western Australian Planning Commission (WAPC) may not approve the subdivision of the land under Section 135 of the *Planning and Development Act 2005*, or the amalgamation of that land with any other land without seeking, and taking into account, the advice of DEC as to the suitability of the land for subdivision or amalgamation. Furthermore, a responsible authority (e.g. Local Government Authorities) may not grant approval under a scheme for any proposed development of the land without seeking, and taking into account, advice from DEC as to the suitability of the proposed development.

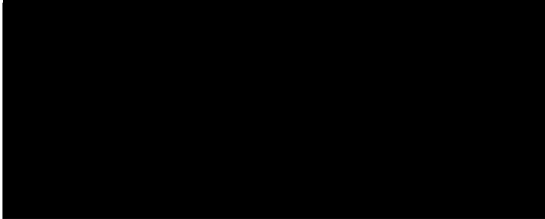
Appealing the site classification

All site classifications given by DEC are appealable. However, only certain people can lodge a valid appeal depending on the classification category as detailed in the attached Fact Sheet. Appeals need to be lodged in writing with the Contaminated Sites Committee at Level 22, The

Forrest Centre, 221 St Georges Terrace, Perth WA 6000, within 45 days of being given this notification. The appeal should set out the appellant's relationship to the Site, and must include the grounds and facts upon which it is based.

For further information on all aspects of site classification, please refer to the *Site Classifications – What do they Mean?* Fact Sheet (enclosed) and *Site Classification Scheme 2006* (guideline) which are available from DEC's website www.dec.wa.gov.au/contaminatedsites or by contacting the Registrar on 1300 762 982.

Yours sincerely



CONTAMINATED SITES BRANCH
Delegated Officer under section 91
of the *Contaminated Sites Act 2003*

10/08/2010

Enc. Attachment A – Nature and Extent and Restrictions on Use.

Rights of Appeal under the *Contaminated Sites Act 2003* Fact Sheet
Site Classifications – “What do they mean” Fact Sheet

ATTACHMENT A – Nature and Extent and Restrictions on Use

- Parcel 34112 = Approximate Spatial Representation of Lot 4923 on plan 36621 as shown on certificate of title LR3131/350 known as 4923 Norman Road, Gap Ridge WA 6714 and Lot 217 on plan 188164 as shown on certificate of title LR3127/185 known as 217 Goodard St, Gap Ridge WA 6714

Nature and Extent: Soil beneath the site is impacted by petroleum hydrocarbons. Groundwater beneath the site is impacted by petroleum hydrocarbons.

Restriction on Use: Please refer to Reasons for Classification for further information on the contamination present at the site.



LEGEND

- /// Road Centrelines
- Cadastre



Scale 1:2146

(Approximate when reproduced at A4)

Geocentric Datum Australia 1994

Note: the data in this map have not been projected. This may result in geometric distortion or measurement inaccuracies.

Prepared by:

Prepared for:

Date: 10/08/2010 12:02:18 PM

Information derived from this map should be confirmed with the data custodian acknowledged by the agency acronym in the legend.



Department of
Environment and Conservation

Our environment, our future

WA Crown Copyright 2002



Government of **Western Australia**
Department of **Environment and Conservation**

Your ref:
Our ref: DEC 4283
Enquiries: [REDACTED]
Phone: 9333 7598
Fax: 9333 7575
Email: [REDACTED]

[REDACTED]
Airservices Australia
GPO Box 367
Canberra ACT 2601

Dear Sir/Madam,

**4923 Norman Rd and 217 Goodard St, Gap Ridge 6714
(Karratha Airport, Aviation and Rescue Fire Fighting & Air Traffic Control Tower
Facilities)**

The above site was classified '*Possibly contaminated - investigation required*' under the *Contaminated Sites Act 2003* (the Act) on 9 August 2010.

As a result of additional information submitted to the Department of Environment and Conservation (DEC) in relation to the contamination status of the Site, DEC has reviewed the classification of the Site.

The classification of the Site remains '*Possibly contaminated - investigation required*' however the reasons for this classification have been updated. These changes are reflected in the Basic Summary of Records (BSR), of which a copy is attached for your information.

Please contact Chek Cher, Environmental Officer of the Contaminated Sites Branch, on 9333 7598 if you have any queries or require any further information.

Yours Sincerely,

[REDACTED]

**Contaminated Sites Branch
Department of Environment and Conservation**

19 January 2011

DIRECTOR GENERAL AND ENVIRONMENTAL SERVICES DIVISIONS: The Atrium, 168 St Georges Terrace, Perth, Western Australia 6000
Phone: (08) 6467 5000 Fax: (08) 6467 5562

PARKS AND CONSERVATION SERVICES DIVISIONS: Executive: Corner of Australia II Drive and Hackett Drive, Crawley, Western Australia 6009
Phone: (08) 9442 0300 Fax: (08) 9386 1578 Operations: 17 Dick Perry Avenue, Technology Park, Kensington, Western Australia 6151
Phone: (08) 9219 8000 Fax: (08) 9334 0498

POSTAL ADDRESS FOR ALL DIVISIONS: Locked Bag 104, Bentley Delivery Centre, Western Australia 6983
www.dec.wa.gov.au
wa.gov.au



Contaminated Sites Act 2003
Basic Summary of Records Search Response

Report Generated at: 9:33:18AM, 19/01/2011

Receipt No. -

This response relates to a search request received for:

4923 Norman Rd
Gap Ridge WA 6714

This parcel belongs to a site that contains 3 parcel(s).

According to Department of Environment and Conservation records, this land has been reported as a known or suspected contaminated site.

4923 Norman Rd
Gap Ridge WA 6714

Lot 4923 On Plan 36621

Classification: 18/01/2011 - Possibly contaminated - investigation required

Nature and Extent of Contamination:

Soil beneath the site is impacted by total petroleum hydrocarbons.

Groundwater beneath the site is impacted by hydrocarbons (such as from petrol, diesel and oil), Perfluorooctane Sulphonate (PFOS) and Perfluorooctanoic Acid (PFOA).

Restrictions on Use:

Due to the nature and extent of groundwater contamination identified to date, the abstraction of groundwater for any use is not recommended.

Reason for Classification:

This site was reported to the Department of Environment and Conservation (DEC) as per reporting obligations under section 11 of the 'Contaminated Sites Act 2003', which commenced on 1 December 2006. The site classification is based on information submitted to DEC by November 2010.

This site was historically used as an Aviation and Rescue Fire Fighting Facility (ARFFF) and an Air Traffic Control Tower Facility (ATCTF) as part of Karratha's airport operations, for approximately 16 years from 1987 to 2003. This included activities such as fuel storage, a land use that has the potential to cause contamination, as specified in the guideline 'Potentially Contaminating Activities, Industries and Landuses' (Department of Environment, 2004).

Site investigations were undertaken between 2003 and 2010 to assess the possibility for re-establishment of an ARFFF and ATCTF.

An Underground Storage Tank (UST), located on the central portion of the site was decommissioned in December 2000, following identified losses of diesel. Soil samples collected from the excavation walls and floor detected petroleum hydrocarbons (such as

Disclaimer

This Summary of Records has been prepared by Department of Environment and Conservation (DEC) as a requirement of the *Contaminated Sites Act 2003*. DEC makes every effort to ensure the accuracy, currency and reliability of this information at the time it was prepared, however advises that due to the ability of contamination to potentially change in nature and extent over time, circumstances may have changed since the information was originally provided. Users must exercise their own skill and care when interpreting the information contained within this Summary of Records and, where applicable, obtain independent professional advice appropriate to their circumstances. In no event will DEC, its agents or employees be held responsible for any loss or damage arising from any use of or reliance on this information. Additionally, the Summary of Records must not be reproduced or supplied to third parties except in full and unabridged form.



Contaminated Sites Act 2003 Basic Summary of Records Search Response

Report Generated at: 9:33:18AM, 19/01/2011

from diesel). Due to the need for structural integrity of nearby buildings, the UST pit was backfilled without remedial works.

A soil investigation, carried out in 2010, found that total petroleum hydrocarbons were present in soils at concentrations exceeding Ecological Investigation Levels and Health-based Investigation Levels for commercial and industrial sites, as published in 'Assessment Levels for Soil, Sediment and Water' (DEC, 2010). The hydrocarbon-impacted soils extended from the surface to three metres below ground level in the vicinity of the Above Ground Storage Tank (AST) and former UST (central portion of the site). No remedial works have been carried out on these hydrocarbon-impacted soils. These identified hydrocarbon-impacted soils may be acting as an ongoing source of dissolved-phase hydrocarbons in groundwater.

A 2006 groundwater investigation found ethyl-benzene and xylenes in groundwater at concentrations exceeding Australian Drinking Water Guidelines, as published in 'Assessment Levels for Soil, Sediment and Water' (DEC, 2010) and exceeding criteria published in 'Contaminated Sites Reporting Guideline for Chemicals in Groundwater' (Department of Health, 2006) which is the relevant assessment level for the use of groundwater for garden irrigation and other non-potable uses. Hydrocarbons (such as diesel and oil) were also found in groundwater at concentrations exceeding Dutch Intervention Values (Netherlands Ministry for Housing, Spatial Planning and Environment, 2000). A groundwater investigation, carried out in 2010, appears to have delineated the lateral extent of the dissolved-phase hydrocarbon plume. The dissolved-phase hydrocarbon plume does not appear to be migrating off-site.

The 2010 groundwater investigation also found perfluorinated chemicals used in certain fire-fighting foams, such as Perfluorooctanoic Acid (PFOA) and Perfluorooctane Sulphonate (PFOS) in groundwater at concentrations exceeding the criteria published in 'Soil Screening Levels for Perfluorooctanoic Acid (PFOA) and Perfluorooctyl Sulfonate (PFOS)' (United States Environmental Protection Agency, 20 November 2009) and 'Guidance on the Water Supply (Water Quality) Regulations 2000 specific to PFOS (perfluorooctane sulphonate) and PFOA (perfluorooctanoic acid) concentrations in drinking water' (United Kingdom Drinking Water Inspectorate, October 2009). These are the current relevant assessment levels for the use of groundwater for potable uses. Further groundwater investigations are required to delineate the lateral extent of the PFOS and PFOA plume and assess the relevant risks associated with these substances.

Due to the nature and extent of groundwater contamination identified to date, the abstraction of groundwater for any purpose is not recommended.

As there are grounds to indicate possible contamination of the site and groundwater has not been fully investigated, the site is classified as 'possibly contaminated - investigation required'.

When the results of further soil and groundwater investigations are submitted to DEC, these will be reviewed, and the site may be re-classified.

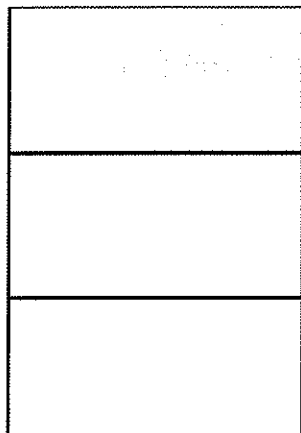
DEC, in consultation with the Department of Health, has classified this site based on the information available to DEC at the time of classification. It is acknowledged that the contamination status of the site may have changed since the information was collated and/or submitted to DEC, and as such, the usefulness of this information may be limited.

Disclaimer

This Summary of Records has been prepared by Department of Environment and Conservation (DEC) as a requirement of the *Contaminated Sites Act 2003*. DEC makes every effort to ensure the accuracy, currency and reliability of this information at the time it was prepared, however advises that due to the ability of contamination to potentially change in nature and extent over time, circumstances may have changed since the information was originally provided. Users must exercise their own skill and care when interpreting the information contained within this Summary of Records and, where applicable, obtain independent professional advice appropriate to their circumstances. In no event will DEC, its agents or employees be held responsible for any loss or damage arising from any use of or reliance on this information. Additionally, the Summary of Records must not be reproduced or supplied to third parties except in full and unabridged form.

**Contaminated Sites Act 2003**
Basic Summary of Records Search Response

Report Generated at: 9:33:18AM, 19/01/2011



Under the Contaminated Sites Act 2003, this site has been classified as "possibly contaminated - investigation required". For further information on the contamination status of this site, please contact the Contaminated Sites section of the Department of Environment & Conservation.

Type of Regulatory Notice: Nil**Date Issued:** Nil

No other information relating to this parcel.

Disclaimer

This Summary of Records has been prepared by Department of Environment and Conservation (DEC) as a requirement of the *Contaminated Sites Act 2003*. DEC makes every effort to ensure the accuracy, currency and reliability of this information at the time it was prepared, however advises that due to the ability of contamination to potentially change in nature and extent over time, circumstances may have changed since the information was originally provided. Users must exercise their own skill and care when interpreting the information contained within this Summary of Records and, where applicable, obtain independent professional advice appropriate to their circumstances. In no event will DEC, its agents or employees be held responsible for any loss or damage arising from any use of or reliance on this information. Additionally, the Summary of Records must not be reproduced or supplied to third parties except in full and unabridged form.

Karratha Airport - 4923 Norman Rd & 217 Goodard St, Gap Ridge



LEGEND

-  Road Centrelines
-  Cadastre



Scale 1:2136

(Approximate when reproduced at A4)

Geocentric Datum Australia 1994

Note: the data in this map have not been projected. This may result in geometric distortion or measurement inaccuracies.

Prepared by:
Prepared for:
Date: 19/01/2011 9:35:50 AM

Information derived from this map should be confirmed with the data custodian acknowledged by the agency acronym in the legend.



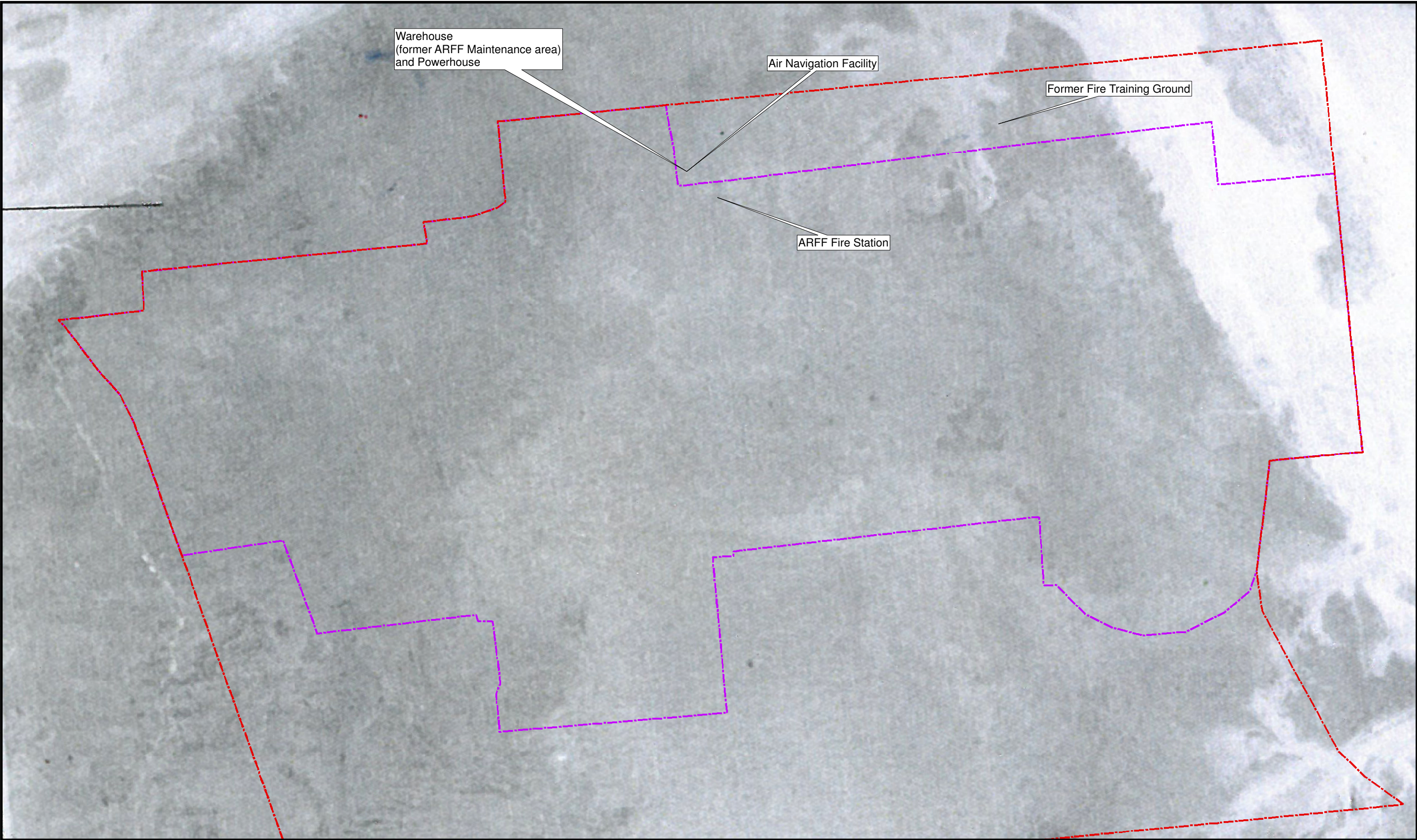
Department of
Environment and Conservation

Our environment, our future
WA Crown Copyright 2002

Appendix E

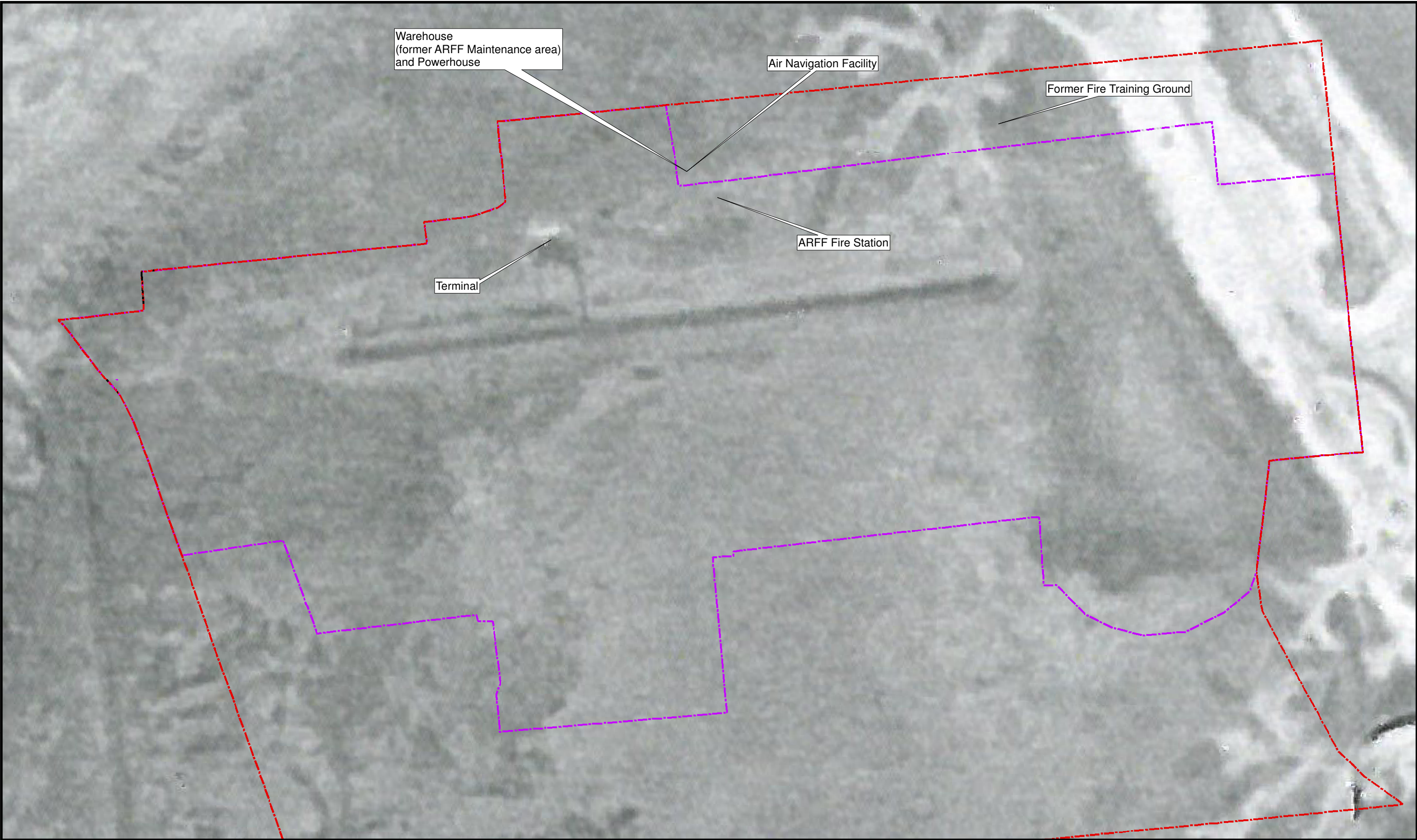
Aerial Photographs

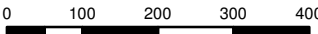
AECOM does not warrant the accuracy or completeness of information displayed in this map and any person using it does so at their own risk. AECOM shall bear no responsibility or liability for any errors, faults, defects, or omissions in the information.



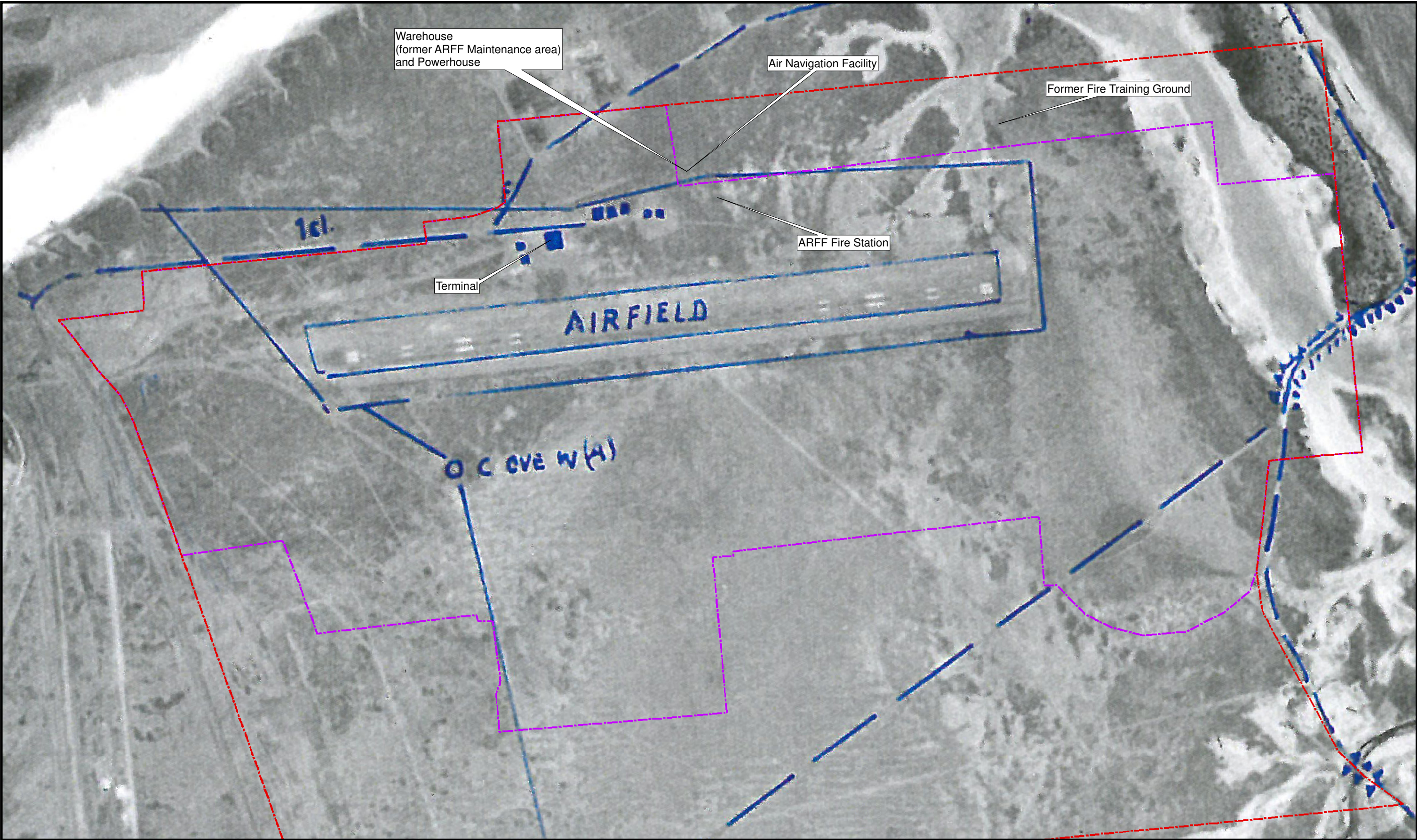
PROJECT ID 60543717 CREATED BY  APPROVED BY  LAST MODIFIED 02 FEB 2018  www.aecom.com		LEGEND  Airport Estate Boundary  Airport Related Operations Boundary	Historical Imagery 06/09/1957	
 DATUM GDA 1994, PROJECTION MGA ZONE 50 0 100 200 300 400 metres 1:10,000 (when printed at A3)		Data sources: Landgate Imagery Base Data: (c) Based on information provided by and with the permission of the Western Australian Land Information Authority trading as Landgate (2010). AIRSERVICES AUSTRALIA PRELIMINARY SITE INVESTIGATION AND LIMITED SAMPLING, KARRATHA AIRPORT		Appendix E-1

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PROJECT ID 60543717 CREATED BY  APPROVED BY  LAST MODIFIED 02 FEB 2018		 www.aecom.com	LEGEND  Airport Estate Boundary  Airport Related Operations Boundary		Historical Imagery 18/05/1968	
 DATUM GDA 1994, PROJECTION MGA ZONE 50  metres 1:10,000 (when printed at A3)		Data sources: Landgate Imagery Base Data: (c) Based on information provided by and with the permission of the Western Australian Land Information Authority trading as Landgate (2010).		AIRSERVICES AUSTRALIA PRELIMINARY SITE INVESTIGATION AND LIMITED SAMPLING, KARRATHA AIRPORT	Appendix E-2	

AECOM does not warrant the accuracy or completeness of information displayed in this map and any person using it does so at their own risk. AECOM shall bear no responsibility or liability for any errors, faults, defects, or omissions in the information.

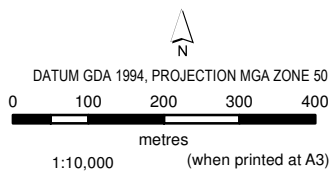


PROJECT ID 60543717
CREATED BY [Redacted]
APPROVED BY [Redacted]
LAST MODIFIED 02 FEB 2018



LEGEND

- Airport Estate Boundary
- Airport Related Operations Boundary



Data sources:
Landgate Imagery
Base Data: (c) Based on information provided by and with the permission of the Western Australian Land Information Authority trading as Landgate (2010).

Historical Imagery
10/09/1971

AIRSERVICES AUSTRALIA

PRELIMINARY SITE INVESTIGATION AND
LIMITED SAMPLING, KARRATHA AIRPORT

Appendix

E-3

AECOM does not warrant the accuracy or completeness of information displayed in this map and any person using it does so at their own risk. AECOM shall bear no responsibility or liability for any errors, faults, defects, or omissions in the information.



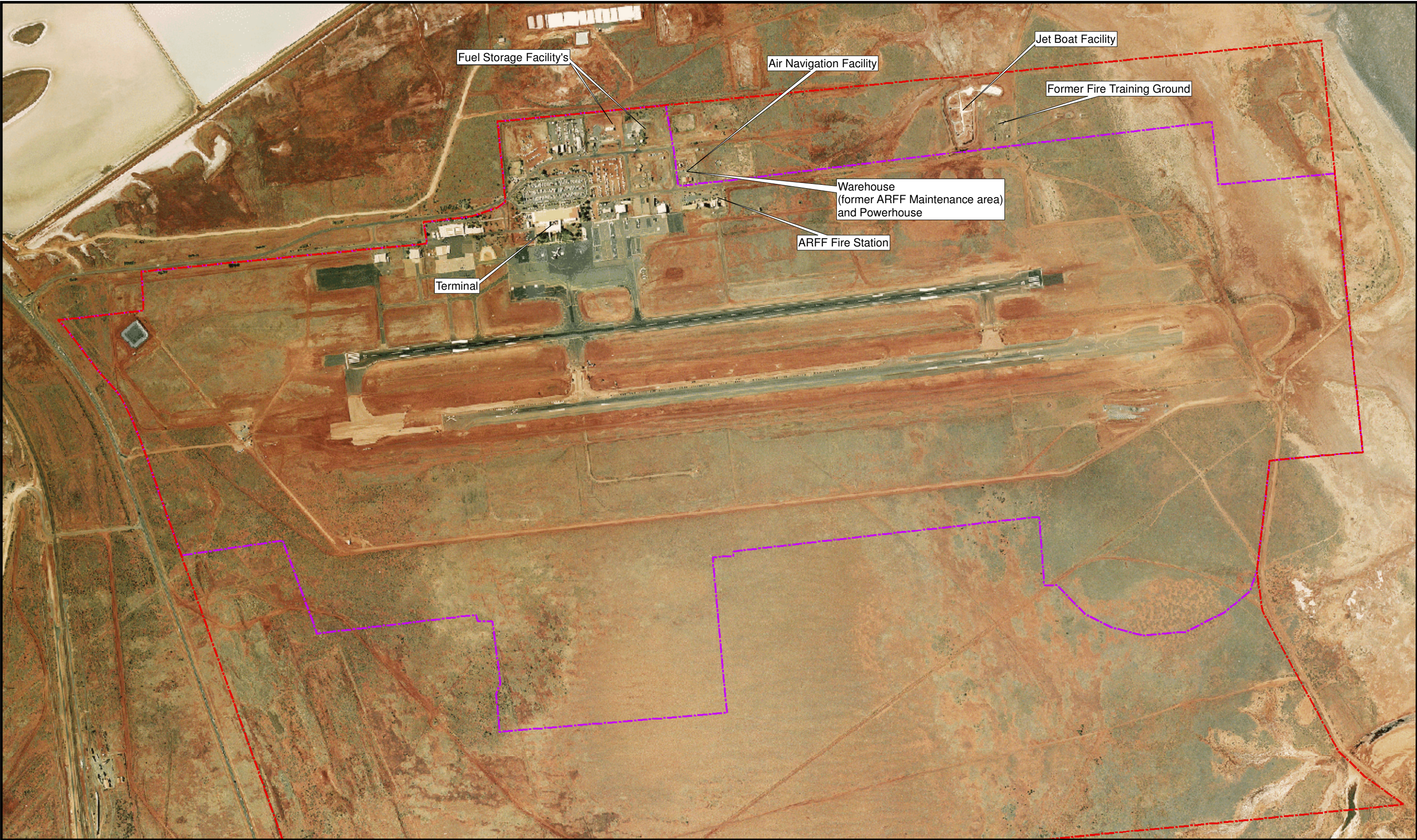
PROJECT ID 60543717 CREATED BY [Redacted] APPROVED BY [Redacted] LAST MODIFIED 02 FEB 2018 AECOM www.aecom.com	LEGEND --- Airport Estate Boundary --- Airport Related Operations Boundary	Historical Imagery 05/07/1980	
DATUM GDA 1994, PROJECTION MGA ZONE 50 0 100 200 300 400 metres 1:10,000 (when printed at A3)	Data sources: Landgate Imagery Base Data: (c) Based on information provided by and with the permission of the Western Australian Land Information Authority trading as Landgate (2010).	AIRSERVICES AUSTRALIA <i>PRELIMINARY SITE INVESTIGATION AND LIMITED SAMPLING, KARRATHA AIRPORT</i>	Appendix E-4

AECOM does not warrant the accuracy or completeness of information displayed in this map and any person using it does so at their own risk. AECOM shall bear no responsibility or liability for any errors, faults, defects, or omissions in the information.



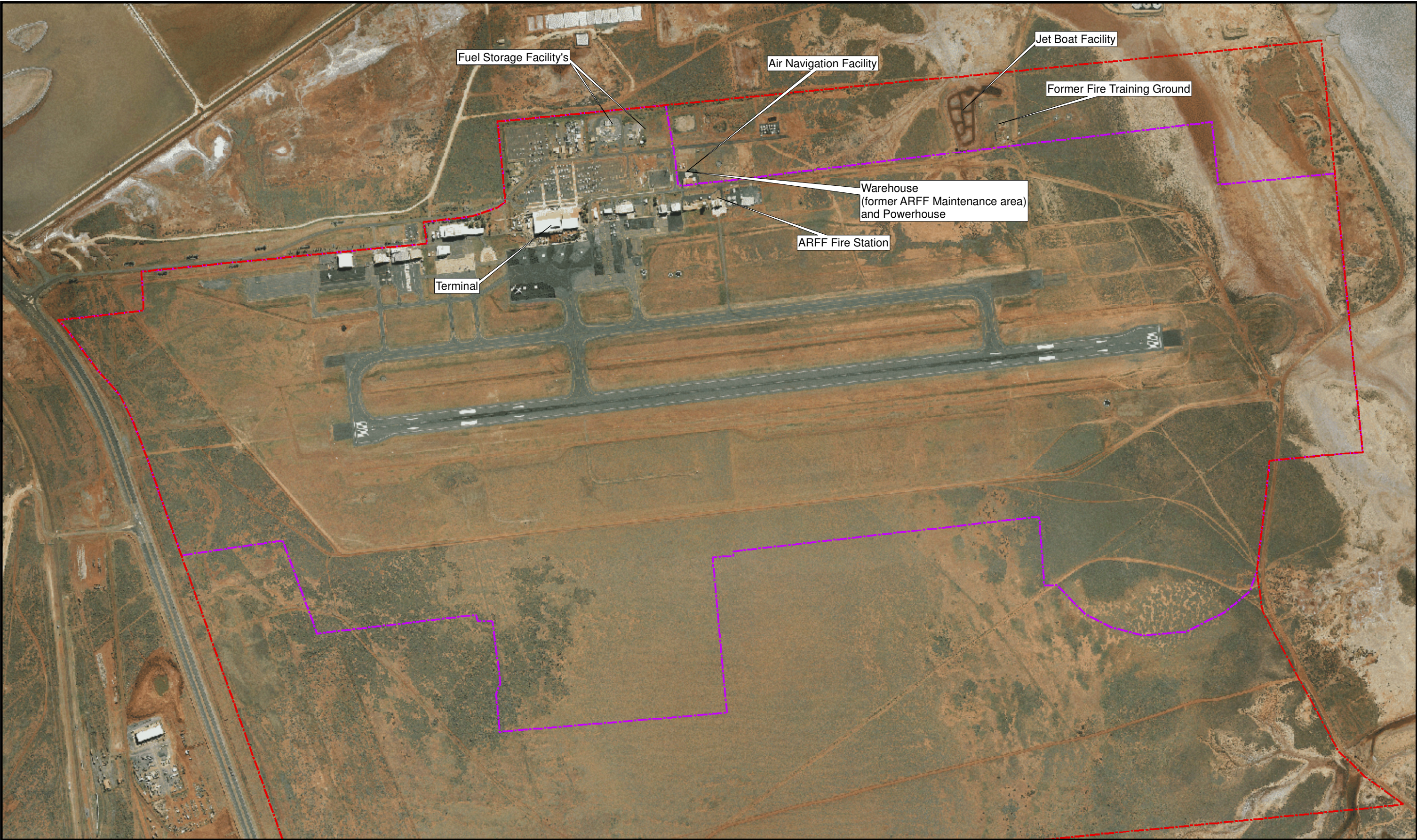
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AECOM does not warrant the accuracy or completeness of information displayed in this map and any person using it does so at their own risk. AECOM shall bear no responsibility or liability for any errors, faults, defects, or omissions in the information.



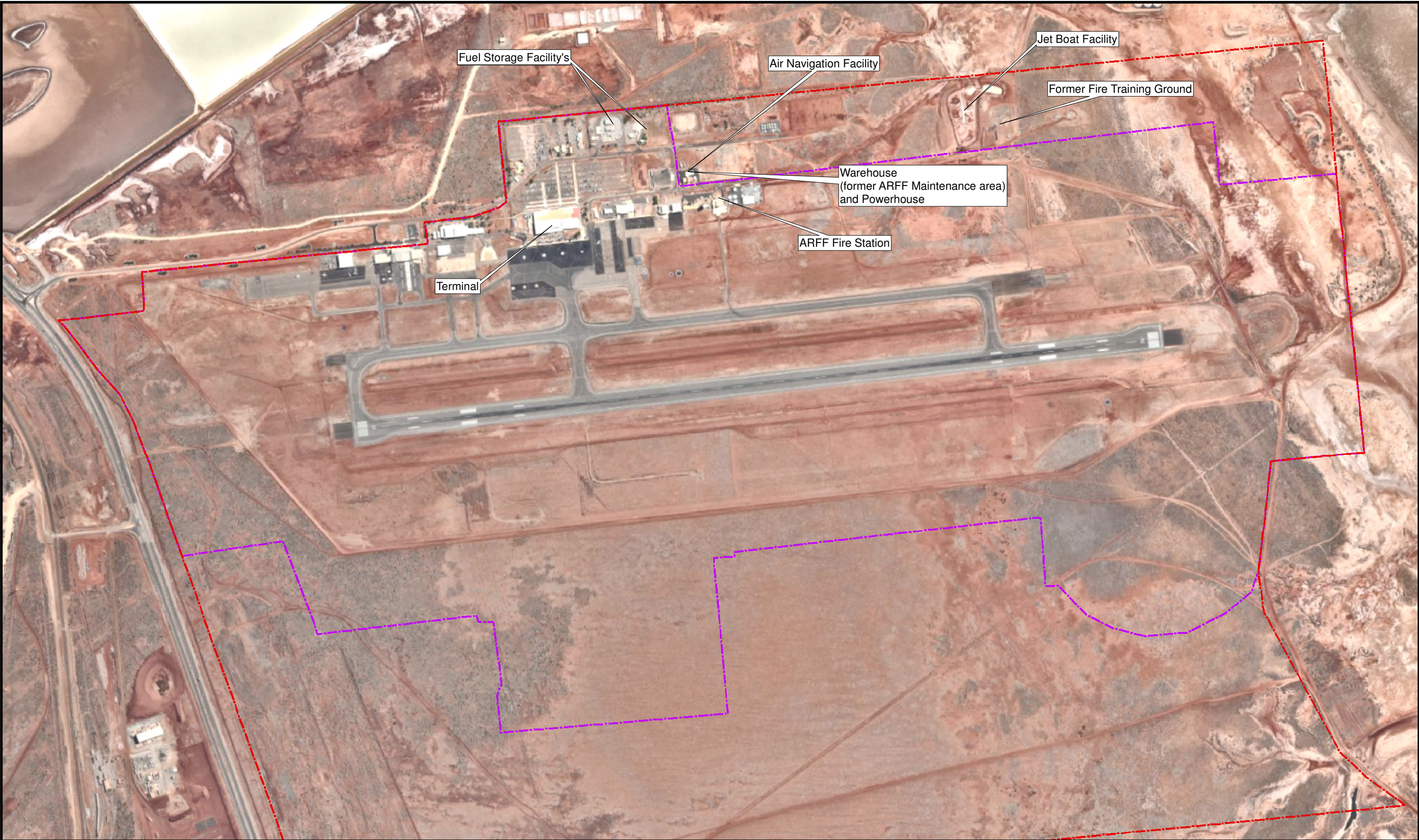
PROJECT ID 60543717 CREATED BY [Redacted] APPROVED BY [Redacted] LAST MODIFIED 02 FEB 2018 AECOM www.aecom.com	LEGEND Airport Estate Boundary Airport Related Operations Boundary	Historical Imagery 07/11/2008	
DATUM GDA 1994, PROJECTION MGA ZONE 50 0 100 200 300 400 metres 1:10,000 (when printed at A3)	Data sources: Landgate Imagery Base Data: (c) Based on information provided by and with the permission of the Western Australian Land Information Authority trading as Landgate (2010).	AIRSERVICES AUSTRALIA <i>PRELIMINARY SITE INVESTIGATION AND LIMITED SAMPLING, KARRATHA AIRPORT</i>	Appendix E-6

AECOM does not warrant the accuracy or completeness of information displayed in this map and any person using it does so at their own risk. AECOM shall bear no responsibility or liability for any errors, faults, defects, or omissions in the information.



PROJECT ID 60543717 CREATED BY [Redacted] APPROVED BY [Redacted] LAST MODIFIED 02 FEB 2018 AECOM www.aecom.com	LEGEND Airport Estate Boundary Airport Related Operations Boundary	Historical Imagery 04/07/2015	
DATUM GDA 1994, PROJECTION MGA ZONE 50 0 100 200 300 400 metres 1:10,000 (when printed at A3)	Data sources: Landgate Imagery Base Data: (c) Based on information provided by and with the permission of the Western Australian Land Information Authority trading as Landgate (2010).	AIRSERVICES AUSTRALIA <i>PRELIMINARY SITE INVESTIGATION AND LIMITED SAMPLING, KARRATHA AIRPORT</i>	Appendix E-7

AECOM does not warrant the accuracy or completeness of information displayed in this map and any person using it does so at their own risk. AECOM shall bear no responsibility or liability for any errors, faults, defects, or omissions in the information.

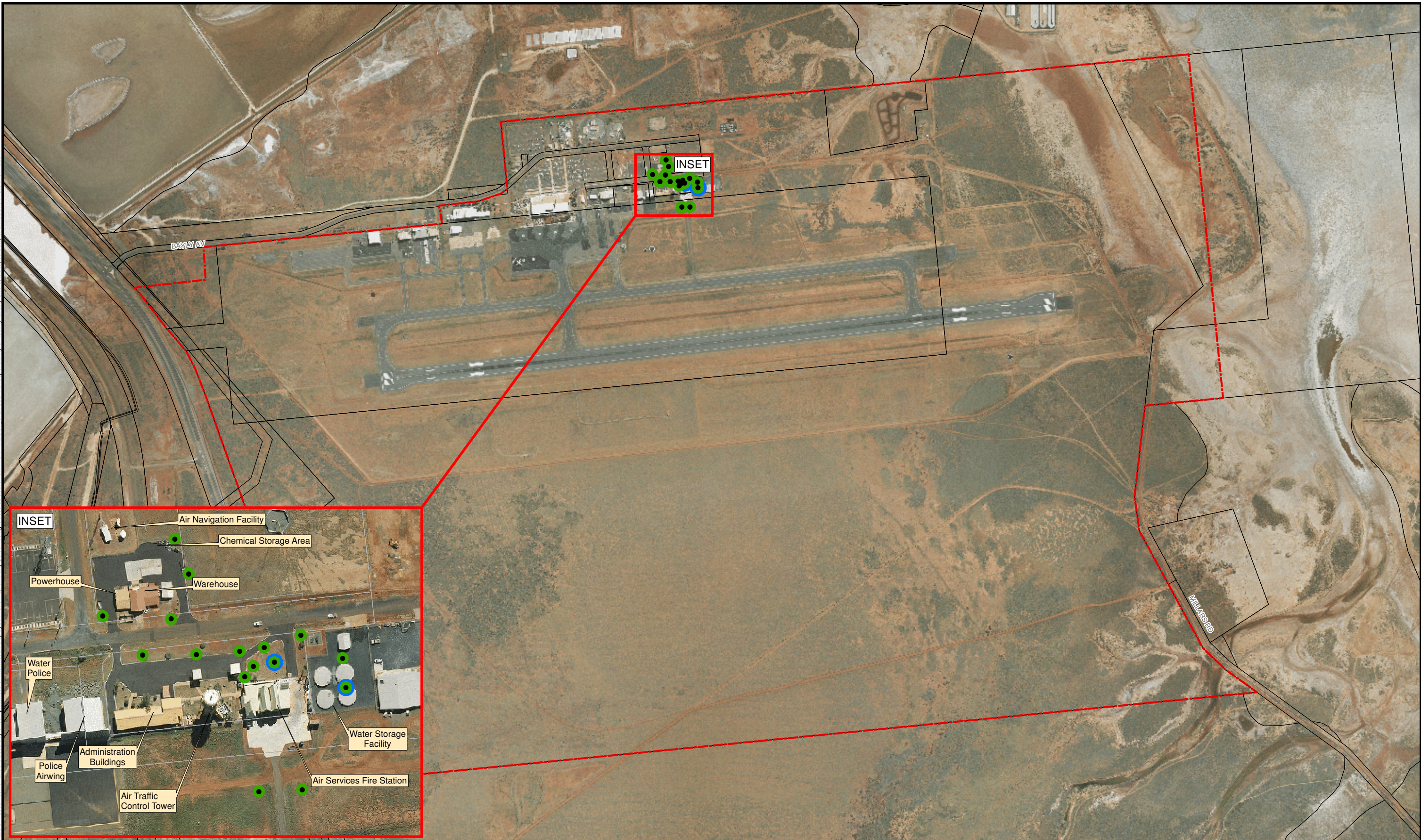


PROJECT ID 60543717 CREATED BY  APPROVED BY  LAST MODIFIED 02 FEB 2018		 www.aecom.com	LEGEND  Airport Estate Boundary  Airport Related Operations Boundary	Historical Imagery 19/04/2016		
 DATUM GDA 1994, PROJECTION MGA ZONE 50 0 100 200 300 400 metres 1:10,000 (when printed at A3)				Data sources: Nearmap Imagery Base Data: (c) Based on information provided by and with the permission of the Western Australian Land Information Authority trading as Landgate (2010).	AIRSERVICES AUSTRALIA PRELIMINARY SITE INVESTIGATION AND LIMITED SAMPLING, KARRATHA AIRPORT	Appendix E-8

Appendix F

Historical Site Sampling

AECOM does not warrant the accuracy or completeness of information displayed in this map and any person using it does so at their own risk. AECOM shall bear no responsibility or liability for any errors, faults, defects, or omissions in the information.



PROJECT ID 60509115
CREATED BY [Redacted]
APPROVED BY [Redacted]
LAST MODIFIED 23 SEP 2016
AECOM
www.aecom.com

DATUM GDA 1994, PROJECTION MGA ZONE 50
0 100 200 300 400
metres
1:12,000 (when printed at A3)

LEGEND
[Red dashed line] Airport Estate Boundary
[Black line] Cadastral Boundary
[Green dot] Sampling Locations
[Green dot] PFOS or PFOA Detected in Soil
[Blue dot] PFOS or PFOA Detected in Groundwater

Data sources:
Landgate Imagery (04/07/2015)
Base Data: (c) Based on information provided by and with the permission of the Western Australian Land Information Authority trading as Landgate (2010).

Historical PFOS and PFOA Impacts in Soil and Groundwater

AIRSERVICES AUSTRALIA
*PRELIMINARY SITE INVESTIGATION,
SERVICES FOR AVIATION RESCUE FIRE
FIGHTING (ARFF) FACILITIES AT KARRATHA
AIRPORT*

**Appendix
F-1**

Appendix G

Subsurface Utility Clearance Report & Survey Data

REPORT DOCUMENT

Subsurface Utility
Clearance Report
Karratha
21665-02 REV0
Aecom

12th June 2017

Job Number	Client
21655-02	AECOM
Site Address	Karratha Airport
Client Contact	[REDACTED]
Client Contact Number	[REDACTED]
Client Email Address	[REDACTED]
Author	[REDACTED]
Author Contact Number	[REDACTED]
Author Email	[REDACTED]

Agreed Scope Of Work

To undertake a sub surface clearance for the avoidance of utilities prior to sample testing and monitoring well installation.

Locating Executive Summary

Subsurface utility locating:-

We have combined several different technologies and methods to achieve the desired outcomes and have utilised remote detection methods including; ground penetrating radar (GPR) and Electromagnetic Locating (EML) equipment to avoid possible identified subsurface utility targets.

Where accessible we have utilised EML direct connection and induction clamp methods to provide the most accurate form of electronic locating. Targeted ground induction techniques have also been used across the area where applicable.

Systematic Passive Radio and Power searches have been conducted to detect emitted signals generated by cables and other metallic services marking out all possible utilities within a 3m circumference of the proposed location .

Locale pits that are accessible have been opened and the services traced from these locations.

We have attempted to trace non-metallic conduits by inserting traceable flexi rods at known access points, if no access point was available then the GPR has been used to attempt to identify the service position.

No sewer pits have been lifted and no tracing rods inserted into these system (Generally the Water Corp DBYD will have the relevant asset information)

Passive GPR has been undertaken in a tight grid formation around each sample or well location the results with GPR have been limited due to geophysical conditions affecting the penetration of the radar limiting range of depth and service detection.

Service Validation

Where access and ground conditions have allowed we would recommend undertaking verification tasks by non-destructive digging including; vacuum excavation potholing equipment and hand clearances.

Project Overview and Recommendations

We have attempted to provide a full comprehensive clearance of the below ground assets and other features, but due to geophysical and equipment limitation we would strongly recommend that all identified services are potholed and validated to AS5488-2013 QL-A

No utility plans provided other than the DBYDs on day 1 so limited prior knowledge and blind searching reducing the risk only, due to this factor we would suggest any works are undertaken with extreme caution. Some limited plans provided on the second day we have checked our results against the proposed locations.

Check our results against any records services plans or known site configurations

Not all pits are accessible

We would recommend undertaking a full sub surface mapping task to further reduce the risk attempting to in filling and enhance our locator's findings.

Hand clearance to an adequate depth and hand auger where possible

DBYDs Enquiry



Job No 12461803

Phone: 1100
www.1100.com.au

Caller Details

Contact: [REDACTED]
Company: Veris
Address: 7A Rothschild Place
Midvale WA 6056

Caller Id: 1688586
Mobile: [REDACTED]
Email: [REDACTED]
Phone: [REDACTED]
Fax: Not Supplied

Dig Site and Enquiry Details

WARNING: The map below only displays the location of the proposed dig site and does not display any asset owners' pipe or cables. The area highlighted has been used only to identify the participating asset owners, who will send information to you directly.



User Reference: Karratha
Working on Behalf of: Other
Enquiry Date: 11/06/2017
Start Date: 14/06/2017
End Date: 14/07/2017
Address: Bayley Avenue
Gap Ridge WA 6714
Job Purpose: Excavation
Onsite Activity: Mechanical Excavation
Location of Workplace: Both
Location in Road: CarriageWay, Footpath, Nature Strip

- Check that the location of the dig site is correct. If not you must submit a new enquiry.
- Should the scope of works change, or plan validity dates expire, you must submit a new enquiry.
- Do NOT dig without plans. Safe excavation is your responsibility. If you do not understand the plans or how to proceed safely, please contact the relevant asset owners.

Notes/Description of Works:
Not Supplied

Your Responsibilities and Duty of Care

- If plans are not received within 2 working days, contact the asset owners directly & quote their Sequence No.
- ALWAYS perform an onsite inspection for the presence of assets. Should you require an onsite location, contact the asset owners directly. Please remember, plans do not detail the exact location of assets.
- Pothole to establish the exact location of all underground assets using a hand shovel, before using heavy machinery.
- Ensure you adhere to any State legislative requirements regarding Duty of Care and safe digging requirements.
- If you damage an underground asset you MUST advise the asset owner immediately.
- By using this service, you agree to Privacy Policy and the terms and disclaimers set out at www.1100.com.au
- For more information on safe excavation practices, visit www.1100.com.au

Asset Owner Details

The assets owners listed below have been requested to contact you with information about their asset locations within 2 working days. Additional time should be allowed for information issued by post. It is **your responsibility** to identify the presence of any underground assets in and around your proposed dig site. Please be aware, that not all asset owners are registered with the Dial Before You Dig service, so it is **your responsibility** to identify and contact any asset owners not listed here directly.

** Asset owners highlighted with asterisks ** require that you visit their offices to collect plans.

Asset owners highlighted with a hash require that you call them to discuss your enquiry or to obtain plans.

Seq. No.	Authority Name	Phone	Status
61884684	Horizon Power	0863101601	NOTIFIED
61884682	Telstra, WA	1800653935	NOTIFIED
61884683	Water Corporation WA	0894248115	NOTIFIED

END OF UTILITIES LIST

Lodge Your Free Enquiry Online – 24 Hours a Day, Seven Days a Week



Job No 12461805

Phone: 1100
www.1100.com.au

Caller Details

Contact: [REDACTED]
Company: Veris
Address: 7A Rothschild Place
Midvale WA 6056

Caller Id: 1688586
Mobile: [REDACTED]
Email: [REDACTED]
Phone: [REDACTED]
Fax: Not Supplied

Dig Site and Enquiry Details

WARNING: The map below only displays the location of the proposed dig site and does not display any asset owners' pipe or cables. The area highlighted has been used only to identify the participating asset owners, who will send information to you directly.



User Reference: Karratha
Working on Behalf of: Other
Enquiry Date: 11/06/2017
Start Date: 14/06/2017
End Date: 14/07/2017
Address: bur
karratha WA 6714
Job Purpose: Excavation
Onsite Activity: Mechanical Excavation
Location of Workplace: Both
Location in Road: CarriageWay, Footpath, Nature Strip

- Check that the location of the dig site is correct. If not you must submit a new enquiry.
- Should the scope of works change, or plan validity dates expire, you must submit a new enquiry.
- Do NOT dig without plans. Safe excavation is your responsibility. If you do not understand the plans or how to proceed safely, please contact the relevant asset owners.

Notes/Description of Works:
- CONTINUED FROM JOB: 12461803 -

Your Responsibilities and Duty of Care

- If plans are not received within 2 working days, contact the asset owners directly & quote their Sequence No.
- ALWAYS perform an onsite inspection for the presence of assets. Should you require an onsite location, contact the asset owners directly. Please remember, plans do not detail the exact location of assets.
- Pothole to establish the exact location of all underground assets using a hand shovel, before using heavy machinery.
- Ensure you adhere to any State legislative requirements regarding Duty of Care and safe digging requirements.
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- By using this service, you agree to Privacy Policy and the terms and disclaimers set out at www.1100.com.au
- For more information on safe excavation practices, visit www.1100.com.au

Asset Owner Details

The assets owners listed below have been requested to contact you with information about their asset locations within 2 working days. Additional time should be allowed for information issued by post. It is **your responsibility** to identify the presence of any underground assets in and around your proposed dig site. Please be aware, that not all asset owners are registered with the Dial Before You Dig service, so it is **your responsibility** to identify and contact any asset owners not listed here directly.

** Asset owners highlighted with asterisks ** require that you visit their offices to collect plans.

Asset owners highlighted with a hash require that you call them to discuss your enquiry or to obtain plans.

Seq. No.	Authority Name	Phone	Status
61884692	Horizon Power	0863101601	NOTIFIED
61884690	Telstra, WA	1800653935	NOTIFIED
61884691	Water Corporation WA	0894248115	NOTIFIED

END OF UTILITIES LIST

Lodge Your Free Enquiry Online – 24 Hours a Day, Seven Days a Week

Reviewed By	Enquiry Date	Other site drawings
[REDACTED]	11-Jun-2017	

Subsurface Locating Photos

SB01



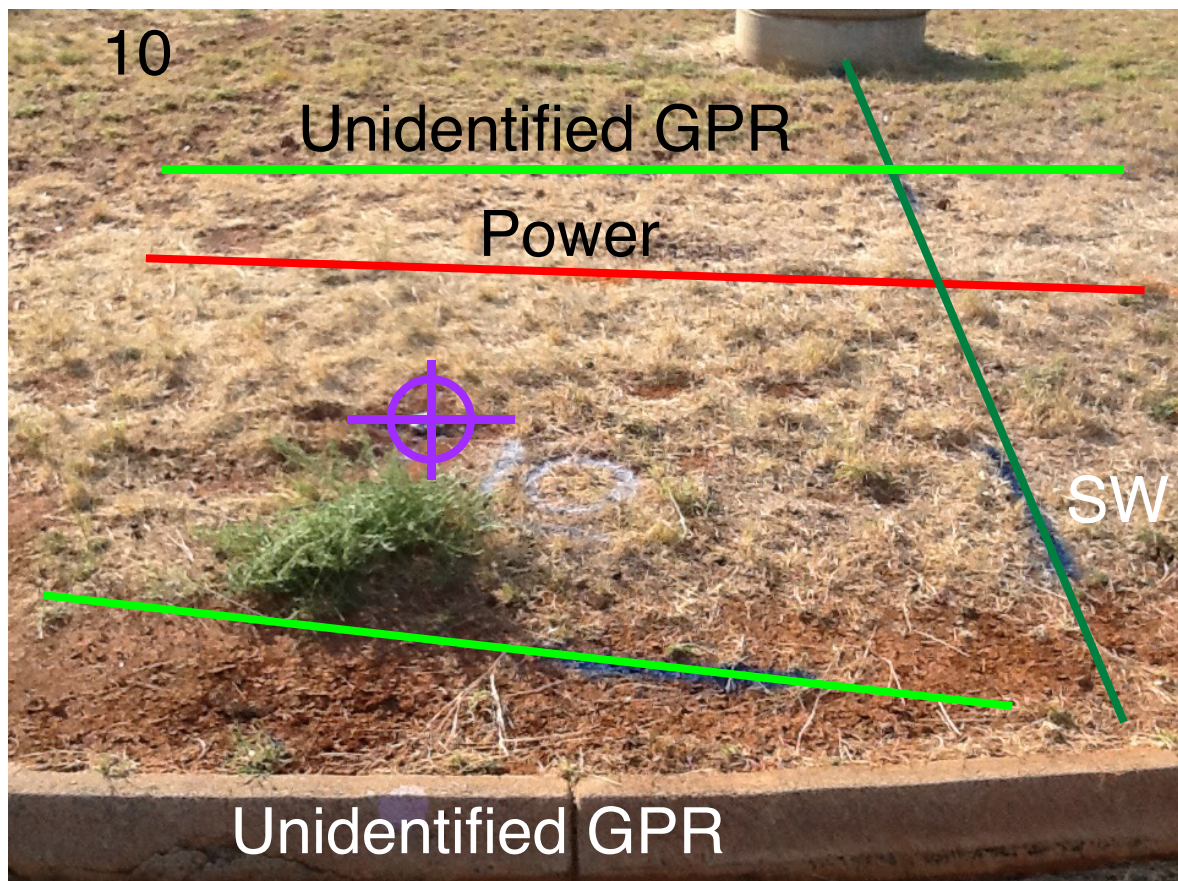
SB02



Subsurface Locating Photos



Subsurface Locating Photos



Subsurface Locating Photos

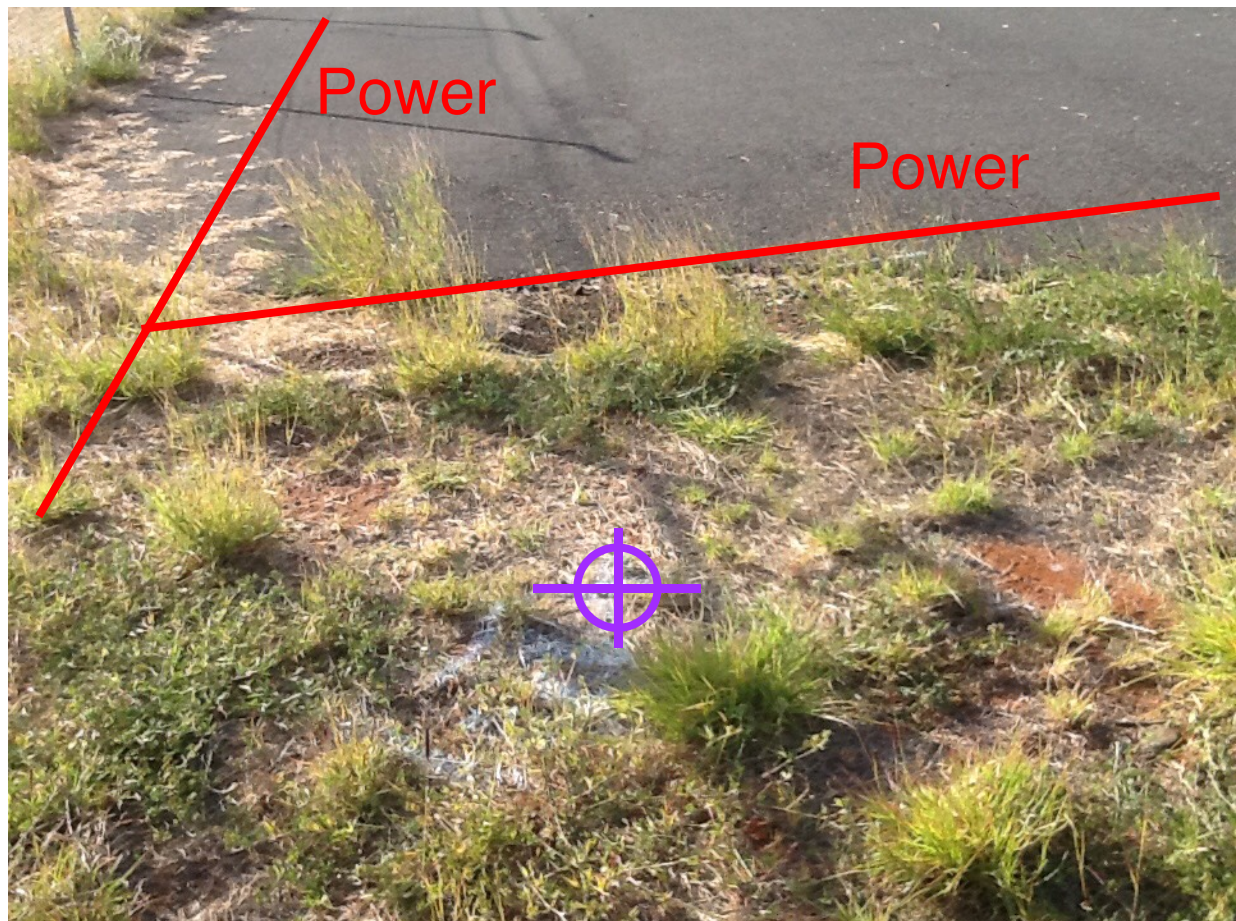
SB11



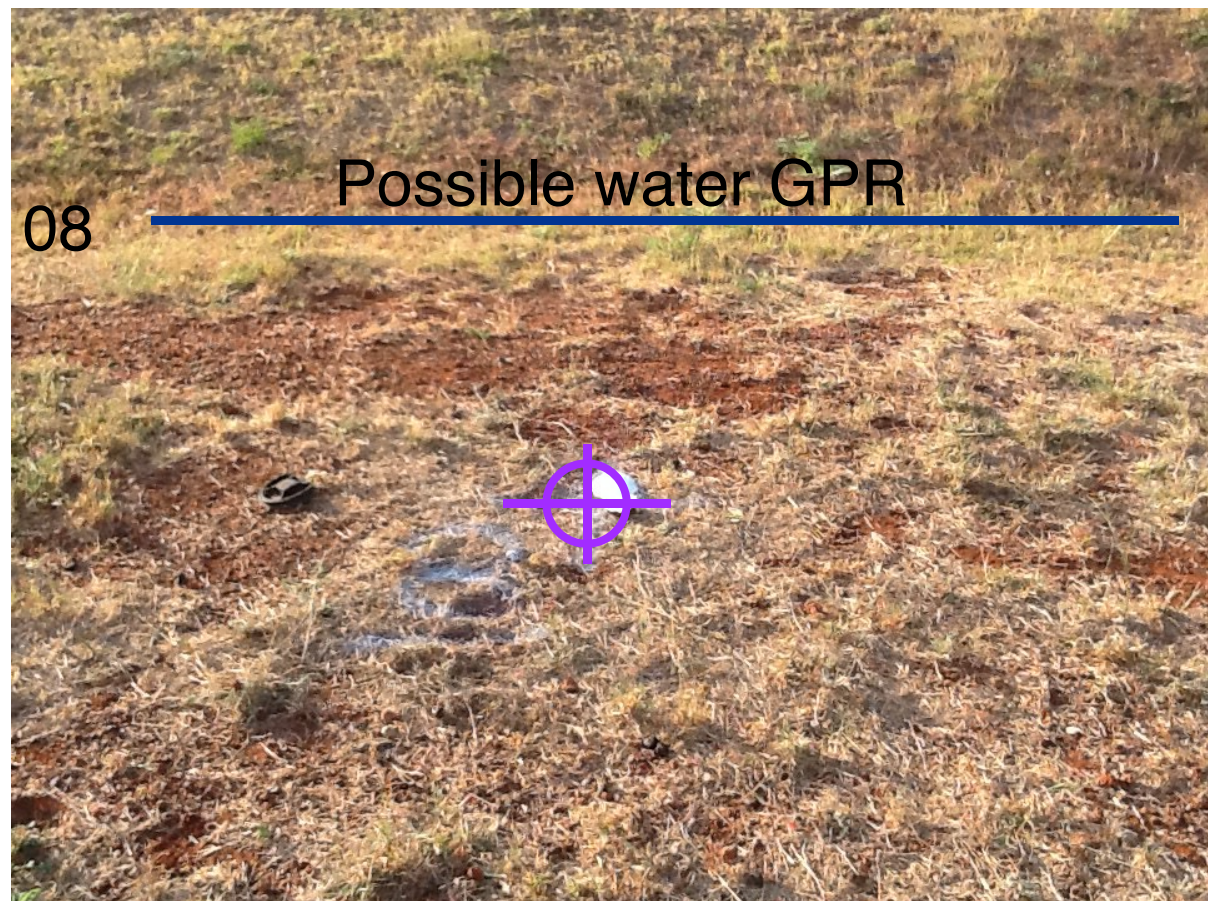
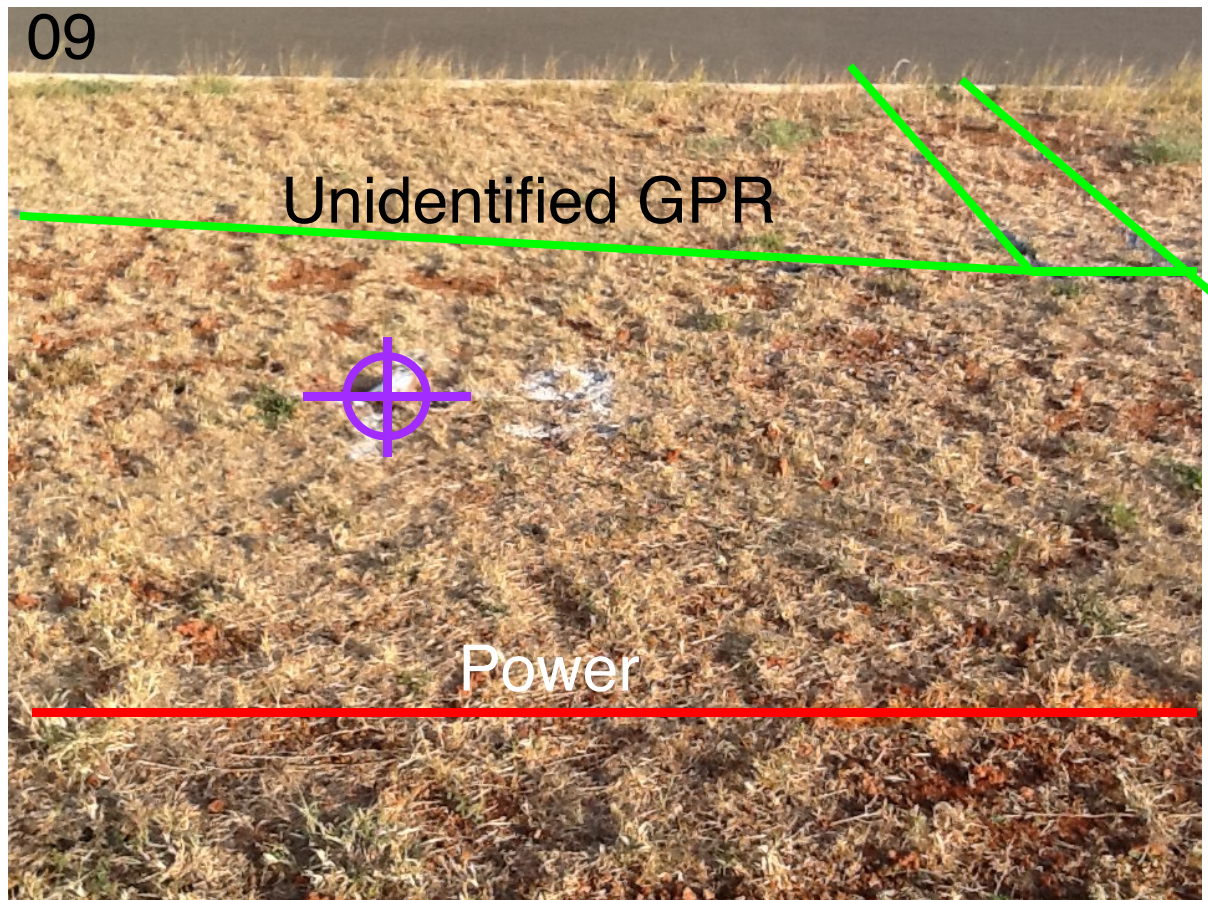
MW14



Subsurface Locating Photos



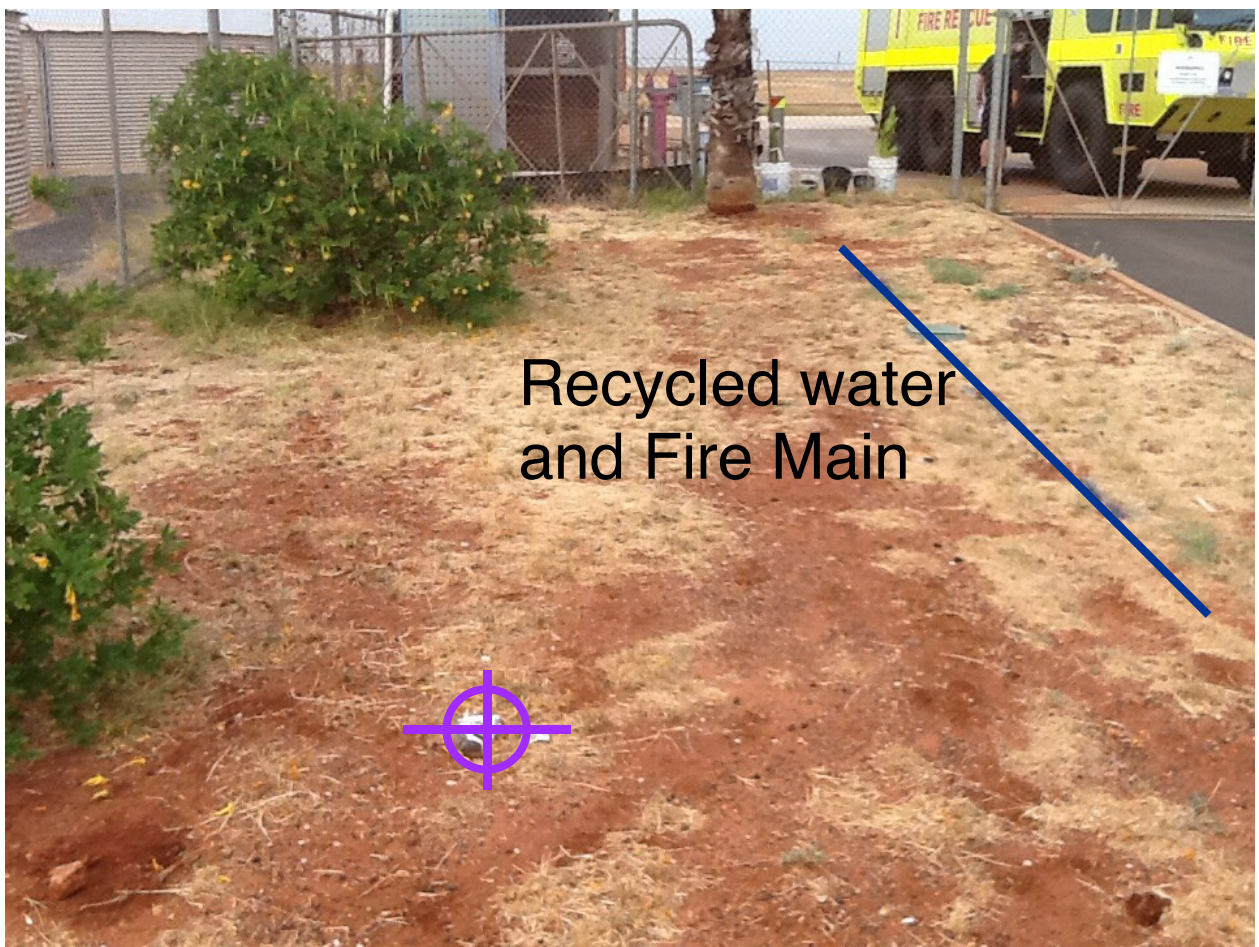
Subsurface Locating Photos



Subsurface Locating Photos

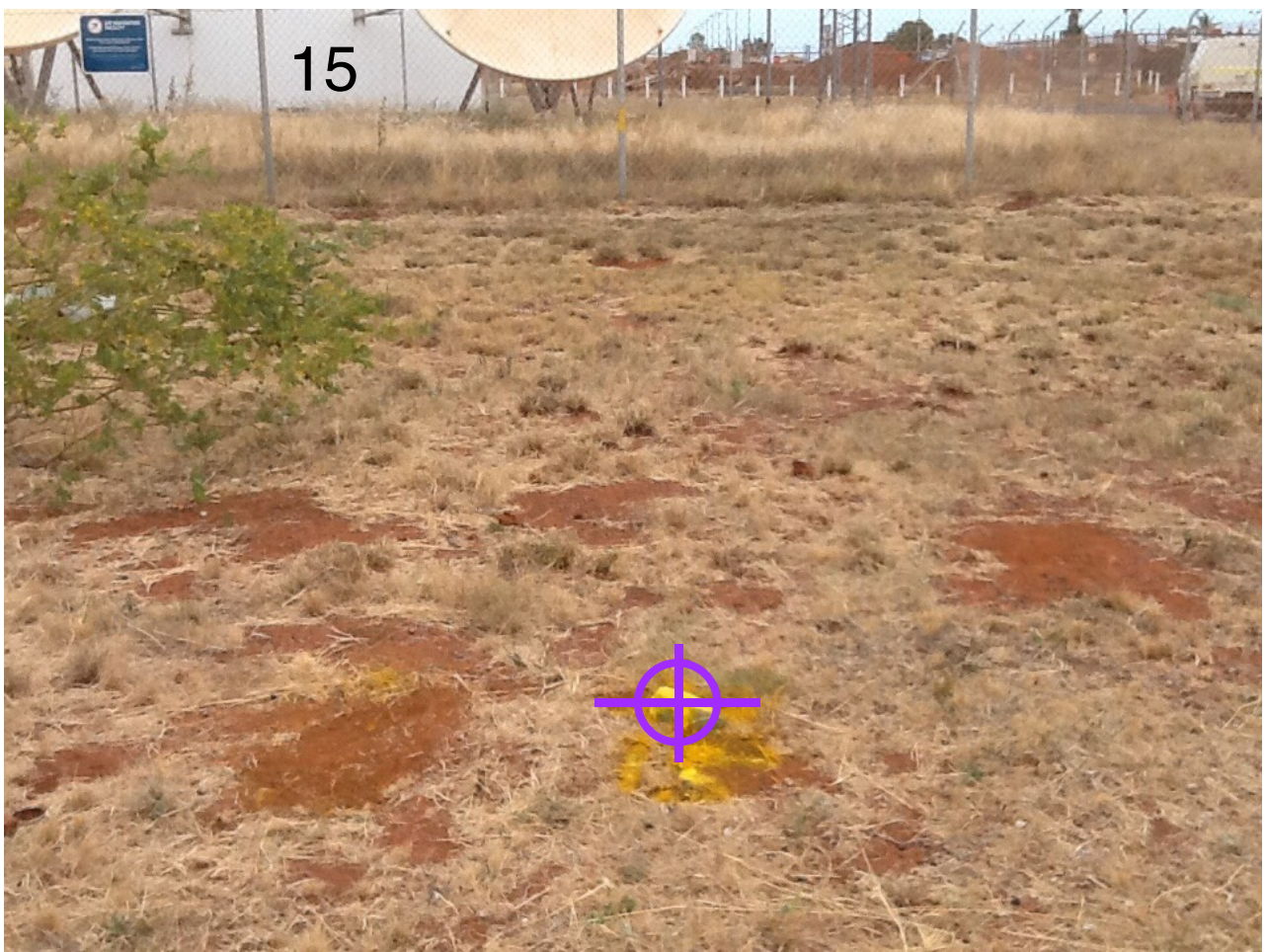


Subsurface Locating Photos



Recycled water
and Fire Main

Subsurface Locating Photos



References

- **Australian Standard_ Classification of Subsurface Utility Information (SUI) AS5488-2013**

A classification reflecting the precision and accuracy of utility location and attribute information.

Service Location Quality Level: A classification reflecting the precision and accuracy of utility location and attribute information.

Quality Level D (QL-D) – the lowest of the four quality levels providing the gathering of information such as DBYD or any existing site plans showing the indicative position of the utility The attribute information of a subsurface utility can be compiled from any or a combination of the following: Existing records; cursory site inspection; anecdotal evidence.

Quality Level C (QL-C) – a surface feature correlation or an interpretation of the approximate location and attributes of a subsurface utility asset using a combination of existing records (and/or anecdotal evidence) and a site survey of visible evidence.

Quality Level B (QL-B) – provides relative subsurface feature location in three dimensions. The minimum requirement for quality level B is relative spatial position. The location of subsurface features is found by electronic detection (EML only) and measured in terms of relative spatial positioning with a maximum horizontal tolerance of +/- 300 mm and maximum vertical tolerance of +/- 500 mm.. Electronic detection is not recommended for obtaining accurate depth information due to the potential for interference from other adjacent services or due to geological conditions.

Quality Level A (QL-A) – the highest quality level and consists of positive identification of a subsurface utility at a point to an absolute spatial position in three dimensions. It is the only quality level that defines the subsurface utility as “validated”. The location of points surveyed on surface and subsurface features measure in terms of absolute spatial positioning with a maximum horizontal and vertical tolerance of +/- 50mm.

Depth Accuracy

Ground penetrating radar (GPR) depths

Operator interpretation, providing depth of cover or depth to crown of the target utility.

Electromagnetic locator depths

Electromagnetic calculations given by the locator device, providing a depth to the centre of the target utility's magnetic field. (Typically centre of pipe or the centre of ducting rod.)

The accuracy of the above methods for obtaining depths can vary due to a number of affecting factors including; Interfering magnetic fields, ground conditions, close proximity to other assets, complexity and configuration of infrastructure installation.

- **Utility Providers Code of Practice For WA 2015**
- **DBYD Best Practice Guide Technical June 2015**
- **DBYD The Essential First Step Brochure**
- **Radiodetection ABC XYZ**
- **The Essential guide To Utility Surveys (TSA UK)**

Perth

Level 12, 3 Hasler Road
Locked Bag 9
Osborne Park WA 6017
Australia

T 08 9317 0600

F 08 9317 0611

mail@Veris.com.au

Veris.com.au

The logo for 'veris' is displayed in a red-outlined box. The word 'veris' is in a bold, lowercase, sans-serif font.

Document: 21655-S3
Surveyed: 
Date: 30/06/2017
Method: 

Well ID	Easting	Northing	Top of Well Cover	Ground Level	Top of Well Liner
MW-01	476542.3923	7710111.971	5.979	5.926	5.864
MW-02	476579.6294	7710151.45	5.464	5.445	5.344
MW-03	476538.0411	7710148.437	5.952	5.849	5.855
MW-04	476469.9991	7710153.058	5.925	5.841	5.810
MW-05	476411.9966	7710175.955	6.131	6.068	6.027
MW-06	476409.5566	7710209.94	6.142	6.142	6.078
MW-07	476431.3652	7710250.539	5.809	5.725	5.719
MW-08	476451.8285	7710220.609	6.268	6.272	6.150
MW-09	477366.7512	7710350.09	4.98	4.939	4.860
MW-10	477321.3878	7710353.467	5.223	5.182	5.138
MW-11	477286.1441	7710384.199	5.7	5.042	5.519
MW-12	477363.3295	7710393.989	5.525	4.802	5.311
MW-13	477336.4934	7710476.023	5.975	5.313	5.774
MW-14	476521.6093	7710144.138	5.981	5.986	5.951
MW-15	476491.9333	7710396.247	6.383	5.684	6.204
MW-16	476438.0857	7710177.425	6.283	6.276	6.172
MW-17	476407.7657	7710165.097	6.134	6.045	6.073
MW-18	476457.8067	7710189.958	6.249	6.216	6.182
MW-19A	476416.4021	7710187.586	6.153	6.189	6.057
MW-19B	476416.1154	7710187.089	6.162	6.189	6.005
MW-19C	476416.0192	7710187.718	6.157	6.189	6.040
MW-20	476422.1424	7710193.443	6.245	6.245	6.168
MW-21	476437.8945	7710197.425	6.225	6.194	6.192

Karratha Airport Monitoring Well Survey 30 June 2017
Horizontal Datum MGA94 Zone 50
Vertical Datum AHD

Appendix H

Calibration Certificates



AES

ACTIVE ENVIRONMENTAL SOLUTIONS

Calibration Report

MiniRAE 3000 - VOC

Customer:

Contact:

Manufacturer: RAE Systems

Instrument: MiniRAE 3000

Model: PGM-7320

Serial #: 592-907903

Item	Test	Pass	Comments
Battery	Li Ion	✓	4.2v/3300mAH rechargeable Lithium-Ion battery pack
Charger	Charger, Power supply	✓	
	Cradle, travel charger	✓	
Filter	Filter, fitting, etc	✓	
Alarms	Alarm Mode	✓	Auto Reset
	Buzzer & Light	✓	Both On
Datalogger	Datalog	✓	Cleared
	Interval	✓	60 secs
	Data Selection	✓	Minimum, Average, Maximum
	Datalog Type	✓	Auto
Display	Operation	✓	
Switches	Operation	✓	
PCB	Operation - Main	✓	
Connectors	Charging port	✓	
Firmware	Version	✓	2.14
Monitor	Operation mode	✓	Hygiene mode
	User mode	✓	Advanced
	Time	✓	24 hour
	Pump Duty Cycle	✓	100%
	Pump Speed	✓	High
	Pump Flow Rate	✓	>400 ml/min
	Temperature	✓	Degree Celsius
	Real Time Protocol	✓	P2P (cable)
	Power on Zero	✓	Off
	Lamp ID	✓	10.6 eV
Monitor housing	Condition	✓	Clean
Case	Rubber boot	✓	Yellow
			Alarms
			Sensors
			High
			Low
			STEL
			TWA
			VOC
			100 ppm
			50 ppm
			25 ppm
			10 ppm

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

Sensor	Lamp ID	Span Gas	Concentration	Cyl. No.	CF	Zero	Span
VOC		Isobutylene	100 ppm	W0137773-1	1	0.0 ppm	100.0 ppm

Calibrated by: [REDACTED]

Calibration Date: 07-Jun-17

Next Due: 07-Jul-17

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AES

ACTIVE ENVIRONMENTAL SOLUTIONS

Calibration Report

Multi-Parameter Water Quality Instrument

Customer: Aecom

Contact: [REDACTED]

Manufacturer: YSI

Instrument: Professional Plus with Quatro cable

Serial #: 14J101920

Cable length: 1m

Item	Test	Pass	Comments
Battery	2 x Alkaline C-cells	✓	Voltage reading above 2.9V
	Battery Saver	✓	Automatically turns off after 60 minutes if not used
Connections	Condition	✓	Good, clean
Cable	Condition	✓	Clean, no tears
Display	Operation	✓	
Firmware	Version	✓	4.0.0
Keypad	Operational	✓	
Display	Screen	✓	
Unit	Condition, seals and O-rings	✓	
Monitor housing	Condition	✓	
pH			
Condition		✓	Good, clean
pH millivolts for pH7 calibration range 0 mV ± 50 mV		✓	
pH 4 mV range + 165 to + 180 from 7 buffer mV value		✓	146.80 mV
pH slope		✓	55 to 60 mV/pH, ideal 59mV
Response time < 90 seconds		✓	
Calibrated and conforms to manufacturer's specifications		✓	
ORP			
Condition		✓	Good, clean
Response time < 90 seconds		✓	
within ± 80mv of reference Zobell Reading		✓	
Calibrated and conforms to manufacturer's specifications		✓	variance range ± 20mV 2 mV
Conductivity			
Condition		✓	Good, clean
Temperature		✓	°C
Conductivity cell constant 5.0 ± 1.0 in GLP file		✓	
Clean sensor reads less than 3 uS/cm in dry air		✓	
Calibrated and conforms to manufacturer's specifications		✓	µS/cm
Dissolved Oxygen			
Condition		✓	Good, clean
DO sensor in use		✓	Galvanic
1.25 mil PE membrane (yellow membrane):		✓	
DO Sensor Value		✓	(min 4.31 uA - max 8.00 uA) Avg 6.15 uA
Calibrated and conforms to manufacturer's specifications		✓	ppm

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

Parameter	Standards	Reference	Calibration Point	Span	Units	Instrument Readings		
						Before	After	Units
Temperature	Center 370 Thermometer	Room Temp	20	-0.3	°C	NA	19.7	°C
pH	pH 7.00	NF1971	7.01	-2.10	mV	6.97	7.03	pH
pH	pH 4.00	NF1636	4.00	144.70	mV	4	4.00	pH
Conductivity	2760 µS/cm at 25°C	NF2056	2760	GLP	5.06	2759	2760	µS/cm
ORP (Reference check only)	Zobell A & B	NG1334/1335	241	241	mV	223.5	238.8	mV
Zero Dissolved Oxygen	NaSO3 in distilled water	1504192304	0.0	NA	NA	0.2	0.0	%
100% Dissolved Oxygen	100% Air Saturation	Air	100.0	4.17	uA	101.3	101.1	%

Calibrated by: [REDACTED]

Calibration Date: 09-Jun-17

Next Due: 09-Jul-17

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AES

ACTIVE ENVIRONMENTAL SOLUTIONS

Calibration Report

QRAE II

Customer:

Contact:

Manufacturer: RAE Systems

Instrument: QRAE II

Model: PGM-2400

Serial #: 181-214510

Item	Test	Pass	Comments
Battery	Li Ion	✓	Fully charged
Charger	Charger, Power supply	✓	
	Cradle, travel charger	✓	
Filter	Filter, fitting, etc	✓	
Display	Operation	✓	
Switches	Operation	✓	
PCB	Operation - Main	✓	
Connectors	Charging port	✓	
Firmware	Version	✓	V.3.62
Datalogger	Clear datalog	✓	
	Datalog Period	✓	60 secs
	Data Type	✓	Average
	Memory Full Type	✓	Stops datalogging when memory is full
Monitor	Alarm Mode	✓	Auto reset, light & buzzer
	Date and time	✓	Up-to-date
	Backlight mode	✓	Auto turn on
	Average method	✓	TWA
	Temperature	✓	Celsius
	Secure beep option	✓	Off
	Startup Mode	✓	Fast mode
	Pump Flow Rate	✓	>200 ml/min
	LEL measurement gas	✓	Methane
	LEL display unit	✓	%LEL
	Power on zero	✓	Disable
Monitor housing	Condition	✓	
Case	Condition	✓	Clean

Alarms				
Sensors	High	Low	STEL	TWA
O2	23.5%	19.5%	NA	NA
LEL	20%	10%	NA	NA
CO	200 ppm	35 ppm	100 ppm	35 ppm
H2S	20 ppm	10 ppm	15 ppm	10 ppm

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

Sensor	Serial #	Span Gas	Concentration	Cyl. No.	CF	Zero	Span
O2		Oxygen	20.9%	Fresh Air		20.9%	20.9%
O2		Oxygen	18.0%	WO137772-1		NA	18.0%
LEL		2.5% Methane	50%	WO137772-1		0%	50%
H2S		Hydrogen Sulfide	10 ppm	WO137772-1		0.0 ppm	10.0 ppm
CO		Carbon Monoxide	50 ppm	WO137772-1		0.0 ppm	50 ppm

Calibrated by: [REDACTED]

Calibration Date: 07-Jun-17

Next Due: 07-Jul-17

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Appendix I

Bore Logs

MONITORING WELL MW01

AECOM, Level 6, 3 Forrest Place,
PERTH, WA, 6000

Phone 61 8 6208 0000
Fax 61 8 6208 0999

Drilling Contractor: [REDACTED]

Logged By: [REDACTED]

Checked By: [REDACTED]

Date Started: **22-6-17**

Date Finished: **22-6-17**

Bore Size: **150 mm**

Total Depth: **4.50 m**

Casing Size: **mm**

Project Reference: **PSI with Limited Investigation at Karratha Airport**

Project No.: **60543717**

Relative Level: **m TOC**

Coordinates: **7710111.97 mN
476542.39 mE**

Permit No: **N/A**

Client: **Airservices Australia**

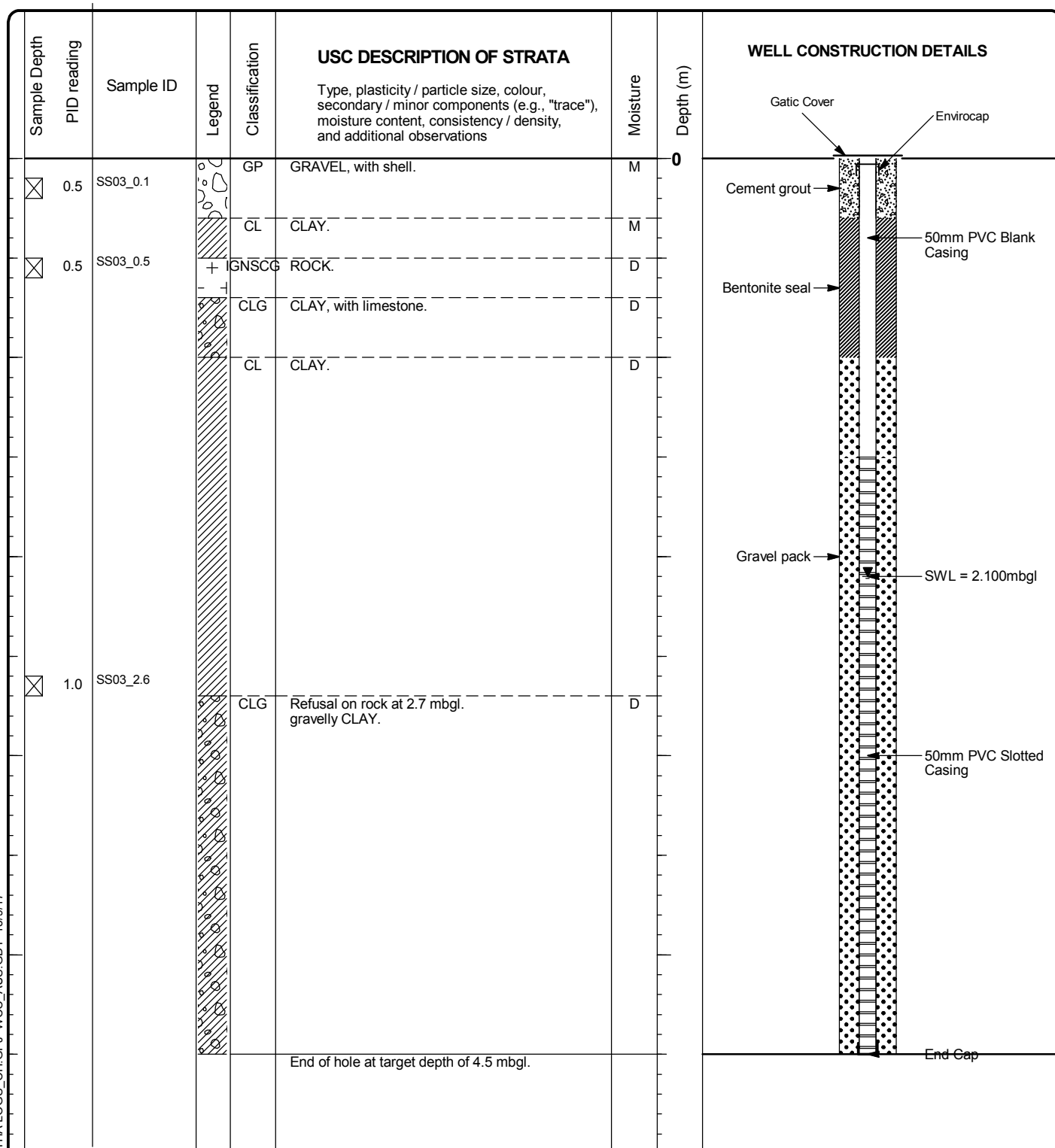
Location: **Karratha Airport, Western Australia**

PSI with Limited Investigation at Karratha Airport

Drill Model: **Geoprobe** Drill Type: **Hand Auger/Push Tube/Hollow Stem Auger**

Drill Fluid: **None**

WELL_MELB_2_KARRATHA LOGS_CH.GPJ WCC_AUS.GDT 13/9/17



Remarks: Soil bore SB03 converted to monitoring well MW01.
FS

MONITORING WELL MW010

AECOM, Level 6, 3 Forrest Place,
PERTH, WA, 6000

Phone 61 8 6208 0000
Fax 61 8 6208 0999

Drilling Contractor: XXXXXXXXXX

Logged By: XXXXXXXXXX

Checked By: XXXXXXXXXX

Date Started: **23-6-17**

Date Finished: **23-6-17**

Bore Size: **150 mm**

Total Depth: **4.50 m**

Casing Size: **mm**

Project Reference: **PSI with Limited Investigation at Karratha Airport**

Project No.: **60543717**

Relative Level: **m TOC**

Coordinates: **7710353.47 mN**

477321.39 mE

Permit No: **N/A**

Client: **Airservices Australia**

Location: **Karratha Airport, Western Australia**

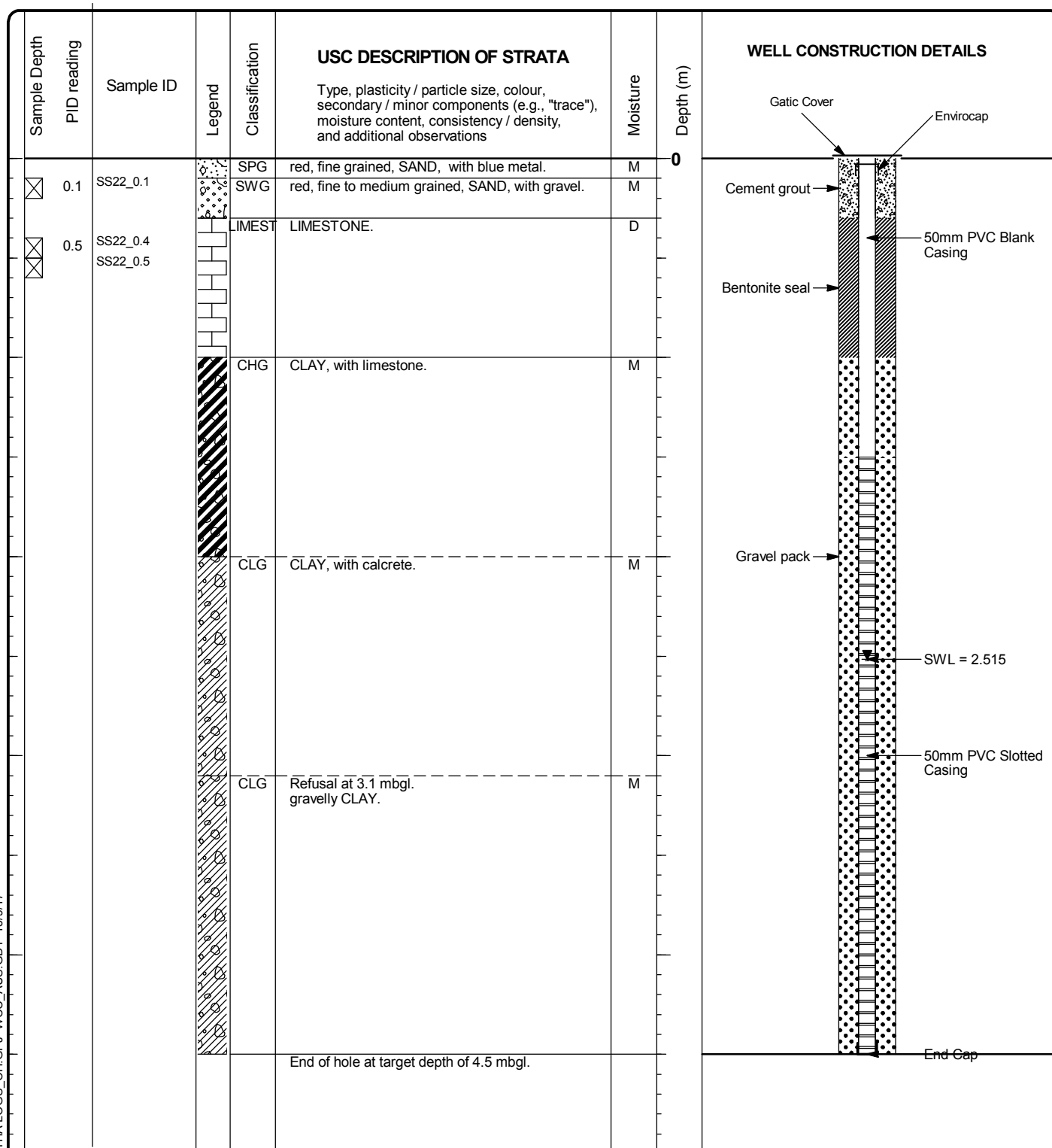
PSI with Limited Investigation at Karratha Airport

Drill Model: **Geoprobe**

Drill Type: **Hand Auger/Push Tube/Hollow Stem Auger**

Drill Fluid: **None**

WELL_MELB_2_KARRATHA LOGS_CH.GPJ WCC_AUS.GDT 13/9/17



Remarks: Soil bore SB22 converted to monitoring well MW010.
FFTG

MONITORING WELL MW011

AECOM, Level 6, 3 Forrest Place,
PERTH, WA, 6000

Phone 61 8 6208 0000
Fax 61 8 6208 0999

Drilling Contractor: XXXXXXXXXX

Logged By: XXXXXXXXXX

Checked By: XXXXXXXXXX

Date Started: **23-6-17**

Date Finished: **23-6-17**

Bore Size: **150 mm**

Total Depth: **4.50 m**

Casing Size: **mm**

Project Reference: **PSI with Limited Investigation at Karratha Airport**

Project No.: **60543717**

Relative Level: **m TOC**

Coordinates: **7710384.20 mN**

477286.14 mE

Permit No: **N/A**

Client: **Airservices Australia**

Location: **Karratha Airport, Western Australia**

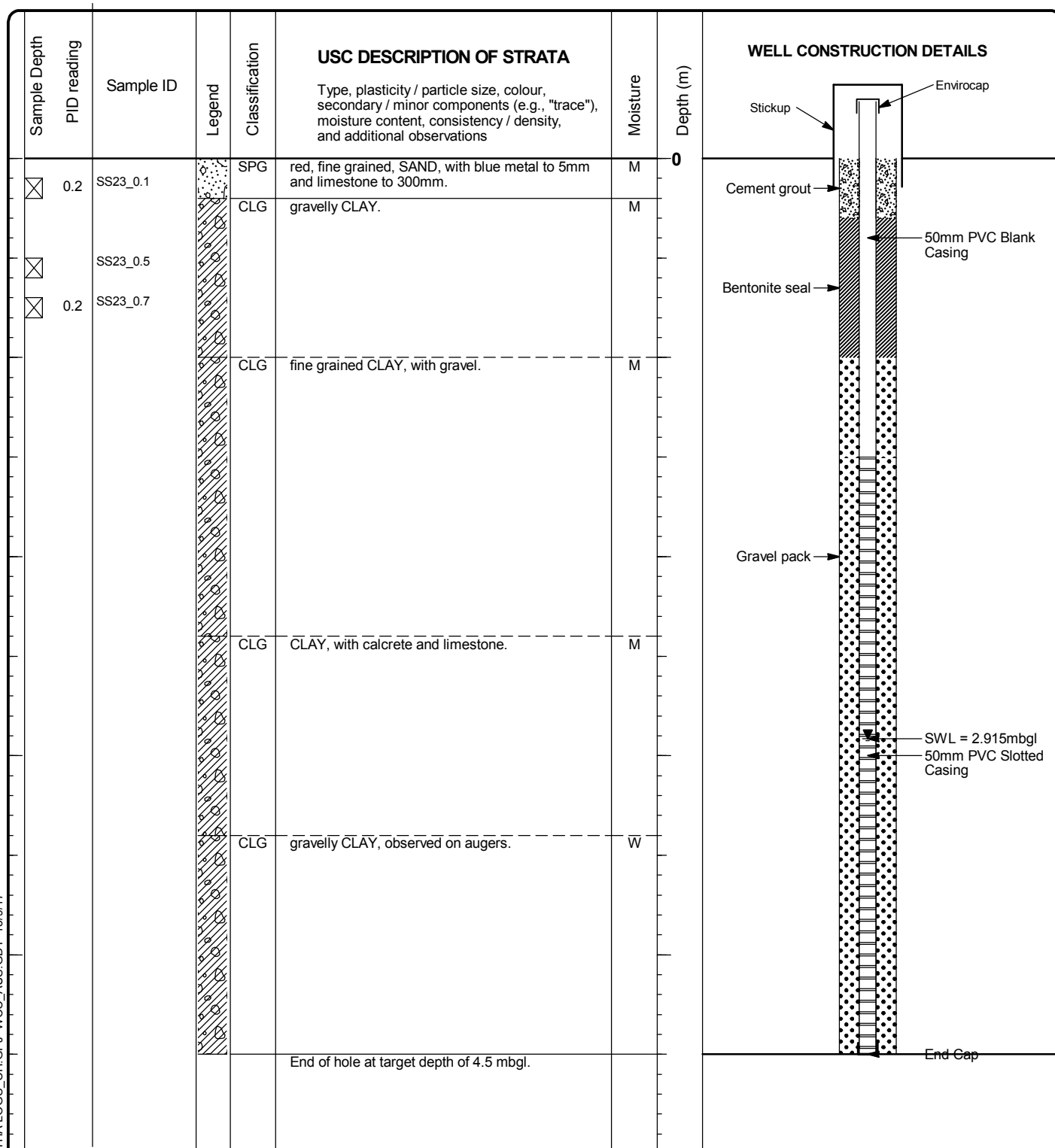
PSI with Limited Investigation at Karratha Airport

Drill Model: **Geoprobe**

Drill Type: **Hand Auger/Push Tube/Hollow Stem Auger**

Drill Fluid: **None**

WELL_MELB_2_KARRATHA LOGS_CH.GPJ WCC_AUS.GDT 13/9/17



Remarks: Soil bore SB23 converted to monitoring well MW011.
FFTG

MONITORING WELL MW012

AECOM, Level 6, 3 Forrest Place,
PERTH, WA, 6000

Phone 61 8 6208 0000
Fax 61 8 6208 0999

Drilling Contractor: XXXXXXXXXX

Logged By: XXXXXXXXXX

Checked By: XXXXXXXXXX

Date Started: **23-6-17**

Date Finished: **23-6-17**

Bore Size: **150 mm**

Total Depth: **4.50 m**

Casing Size: **mm**

Project Reference: **PSI with Limited Investigation at Karratha Airport**

Project No.: **60543717**

Relative Level: **m TOC**

Coordinates: **7710393.99 mN**

477363.33 mE

Permit No: **N/A**

Client: **Airservices Australia**

Location: **Karratha Airport, Western Australia**

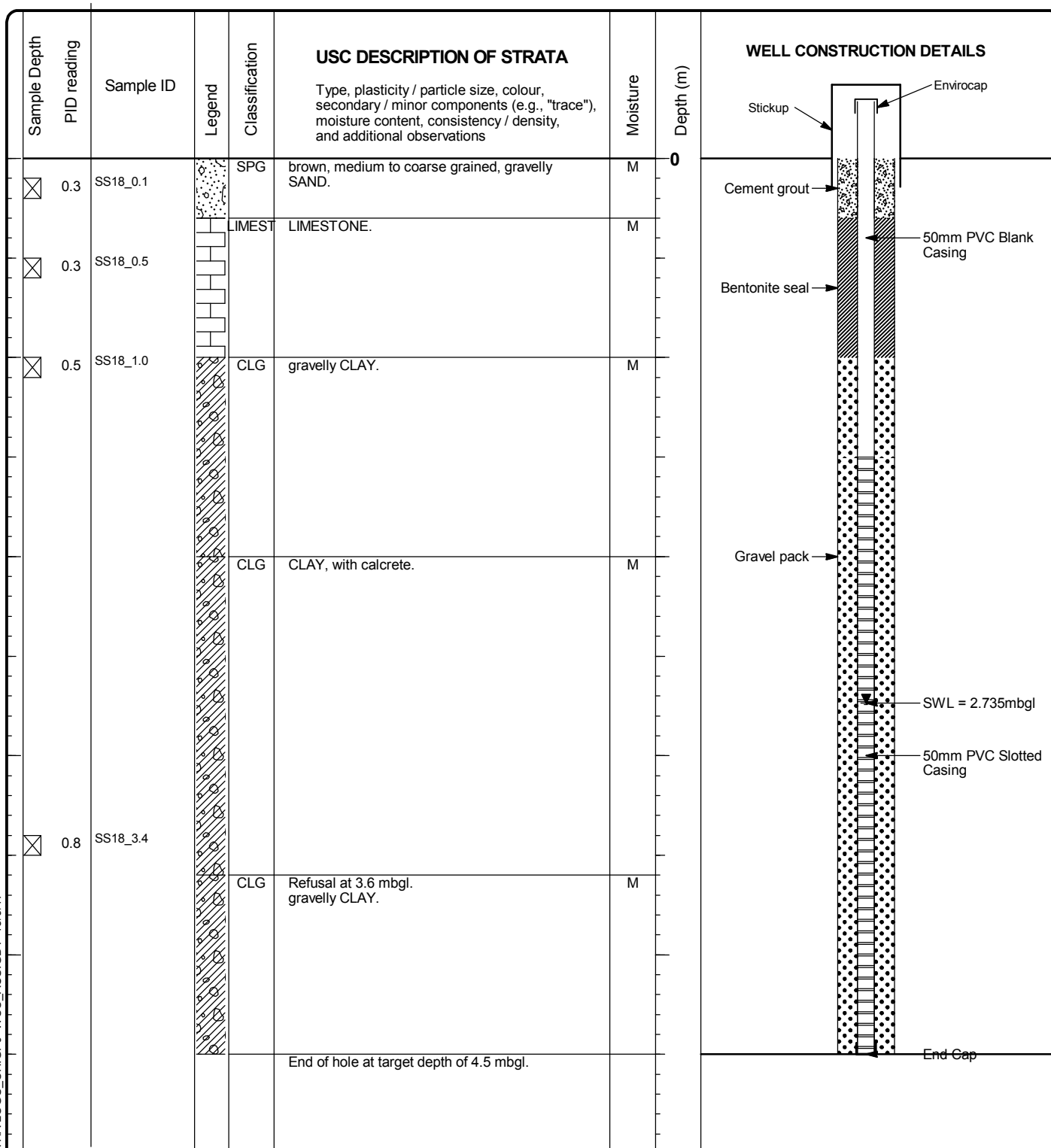
PSI with Limited Investigation at Karratha Airport

Drill Model: **Geoprobe**

Drill Type: **Hand Auger/Push Tube/Hollow Stem Auger**

Drill Fluid: **None**

WELL_MELB_2_KARRATHA LOGS_CH.GPJ WCC_AUS.GDT 13/9/17



Remarks: Soil bore SB18 converted to monitoring well MW012.
FFTG

MONITORING WELL MW013

AECOM, Level 6, 3 Forrest Place,
PERTH, WA, 6000

Phone 61 8 6208 0000
Fax 61 8 6208 0999

Drilling Contractor: XXXXXXXXXX

Logged By: XXXXXXXXXX

Checked By: XXXXXXXXXX

Date Started: **23-6-17**

Date Finished: **23-6-17**

Bore Size: **150 mm**

Total Depth: **4.50 m**

Casing Size: **mm**

Project Reference: **PSI with Limited Investigation at Karratha Airport**

Project No.: **60543717**

Relative Level: **m TOC**

Coordinates: **7710476.02 mN**

477336.49 mE

Permit No: **N/A**

Client: **Airservices Australia**

Location: **Karratha Airport, Western Australia**

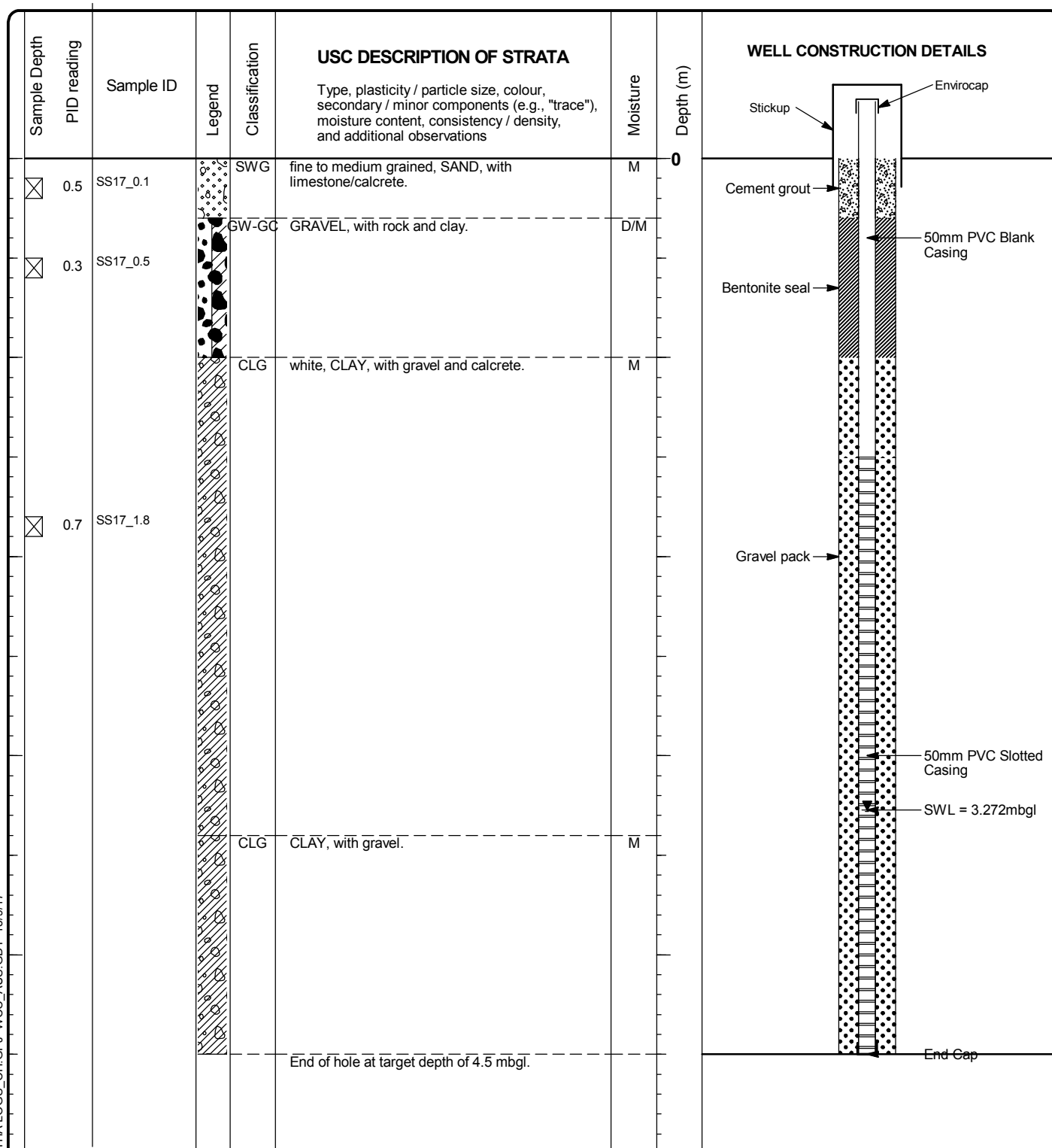
PSI with Limited Investigation at Karratha Airport

Drill Model: **Geoprobe**

Drill Type: **Hand Auger/Push Tube/Hollow Stem Auger**

Drill Fluid: **None**

WELL_MELB_2_KARRATHA LOGS_CH.GPJ WCC_AUS.GDT 13/9/17



Remarks: Soil bore SB17 converted to monitoring well MW013.
BDY

Permit No: N/A

Remarks: Soil bore SB26 converted to monitoring well MW015.
BDY

MONITORING WELL MW02

AECOM, Level 6, 3 Forrest Place,
PERTH, WA, 6000

Phone 61 8 6208 0000
Fax 61 8 6208 0999

Drilling Contractor: XXXXXXXXXX

Logged By: XXXXXXXXXX

Checked By: XXXXXXXXXX

Date Started: **21-6-17**

Date Finished: **21-6-17**

Bore Size: **150 mm**

Total Depth: **4.50 m**

Casing Size: **mm**

Project Reference: **PSI with Limited Investigation at Karratha Airport**

Project No.: **60543717**

Relative Level: **m TOC**

Coordinates: **7710151.45 mN**

476579.63 mE

Permit No: **N/A**

Client: **Airservices Australia**

Location: **Karratha Airport, Western Australia**

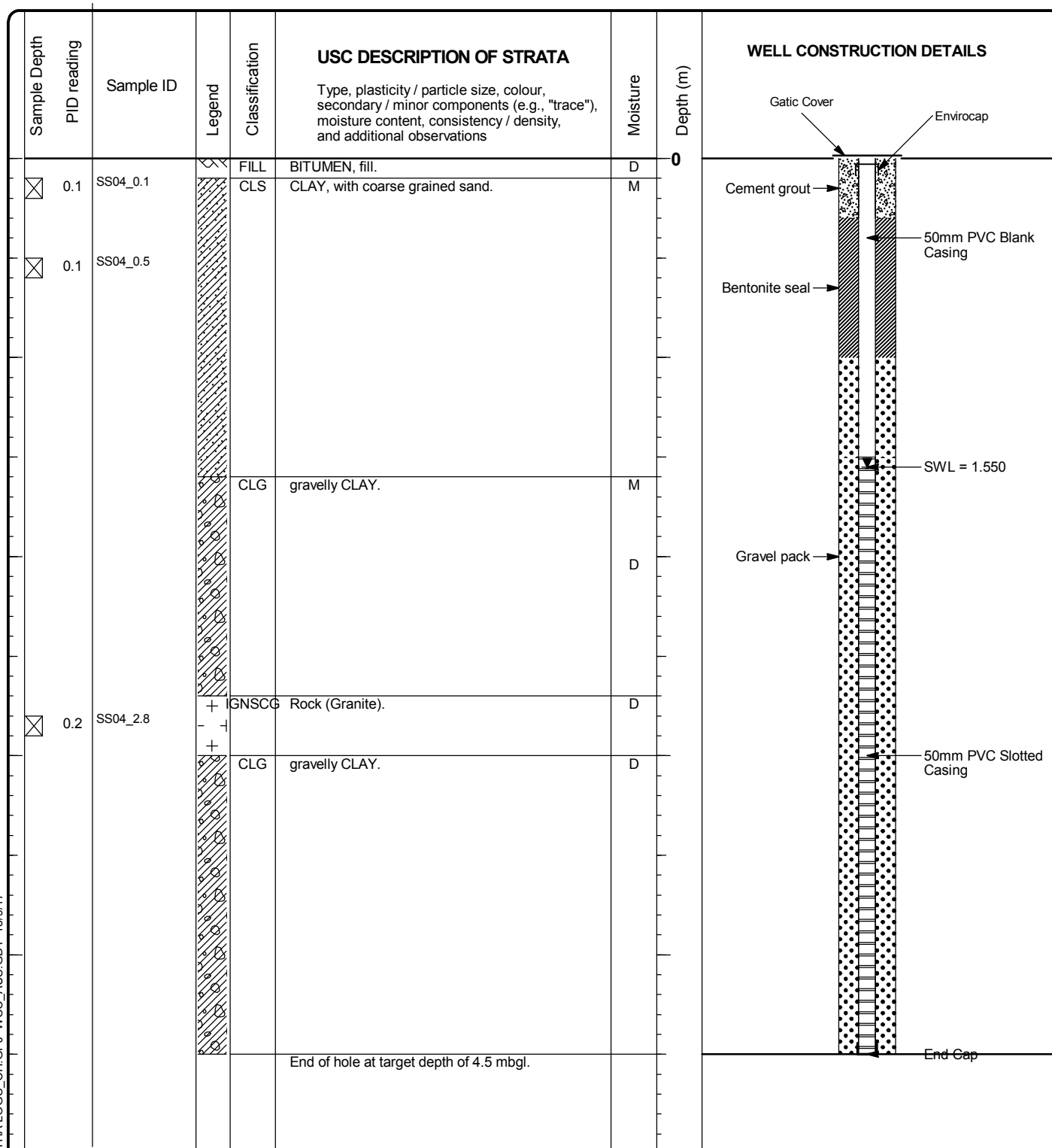
PSI with Limited Investigation at Karratha Airport

Drill Model: **Geoprobe**

Drill Type: **Hand Auger/Push Tube/Hollow Stem Auger**

Drill Fluid: **None**

WELL_MELB_2_KARRATHA LOGS_CH.GPJ WCC_AUS.GDT 13/9/17



Remarks: Soil bore SB04 converted to monitoring well MW02.
FS

MONITORING WELL MW03

AECOM, Level 6, 3 Forrest Place,
PERTH, WA, 6000

Phone 61 8 6208 0000
Fax 61 8 6208 0999

Drilling Contractor: XXXXXXXXXX

Logged By: XXXXXXXXXX

Checked By: XXXXXXXXXX

Date Started: **21-6-17**

Date Finished: **21-6-17**

Bore Size: **150 mm**

Total Depth: **4.50 m**

Casing Size: **mm**

Project Reference: **PSI with Limited Investigation at Karratha Airport**

Project No.: **60543717**

Relative Level: **m TOC**

Coordinates: **7710148.44 mN**

476538.04 mE

Permit No: **N/A**

Client: **Airservices Australia**

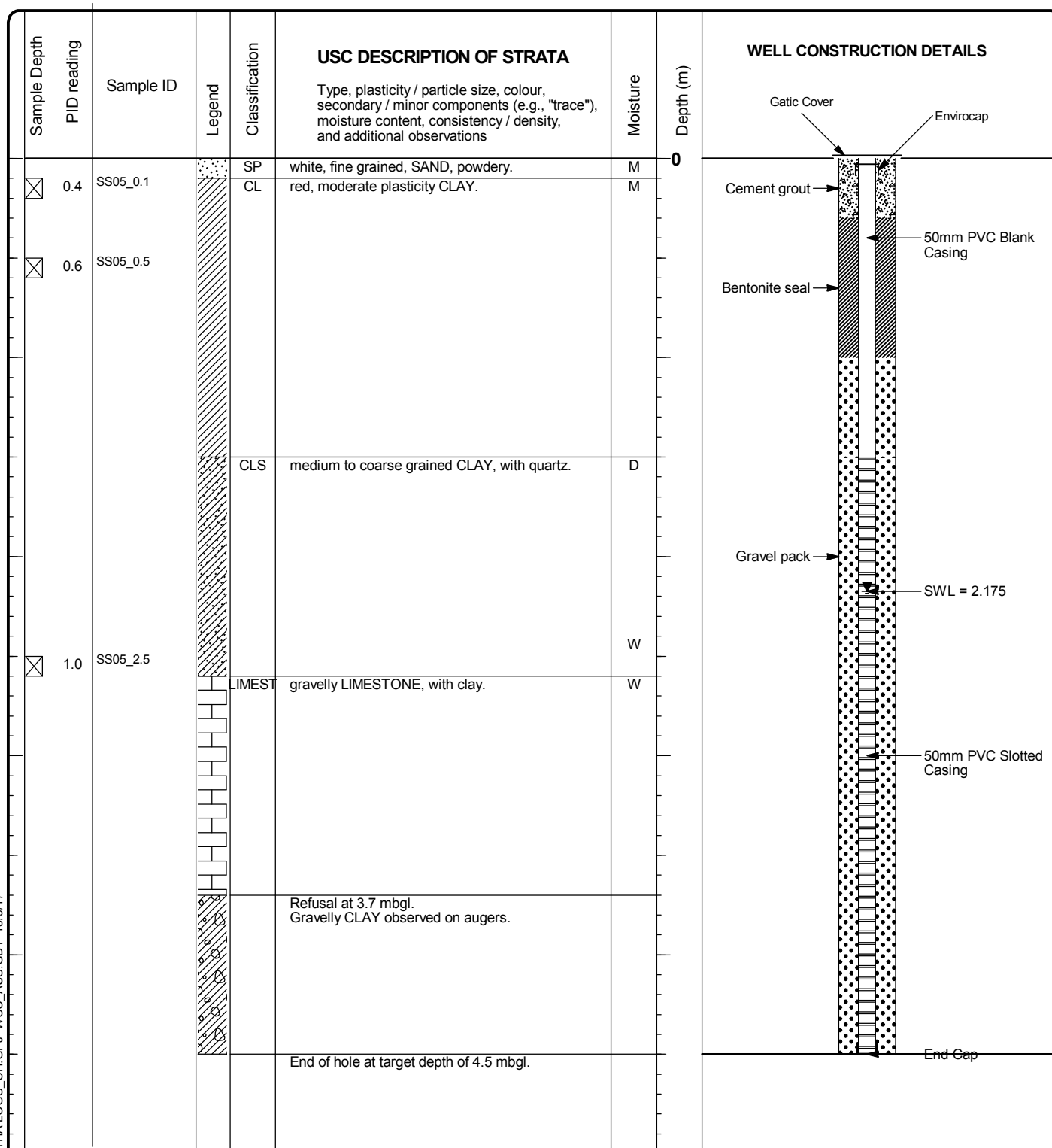
Location: **Karratha Airport, Western Australia**

PSI with Limited Investigation at Karratha Airport

Drill Model: **Geoprobe** Drill Type: **Hand Auger/Push Tube/Hollow Stem Auger**

Drill Fluid: **None**

WELL_MELB_2_KARRATHA LOGS_CH.GPJ WCC_AUS.GDT 13/9/17



Remarks: Soil bore SB05 converted to monitoring well MW03.
FS

MONITORING WELL MW04

AECOM, Level 6, 3 Forrest Place,
PERTH, WA, 6000

Phone 61 8 6208 0000
Fax 61 8 6208 0999

Drilling Contractor: XXXXXXXXXX

Logged By: XXXXXXXXXX

Checked By: XXXXXXXXXX

Date Started: **21-6-17**

Date Finished: **21-6-17**

Bore Size: **150 mm**

Total Depth: **4.50 m**

Casing Size: **mm**

Project Reference: **PSI with Limited Investigation at Karratha Airport**

Project No.: **60543717**

Relative Level: **m TOC**

Coordinates: **7710153.06 mN**

476470.00 mE

Permit No: **N/A**

Client: **Airservices Australia**

Location: **Karratha Airport, Western Australia**

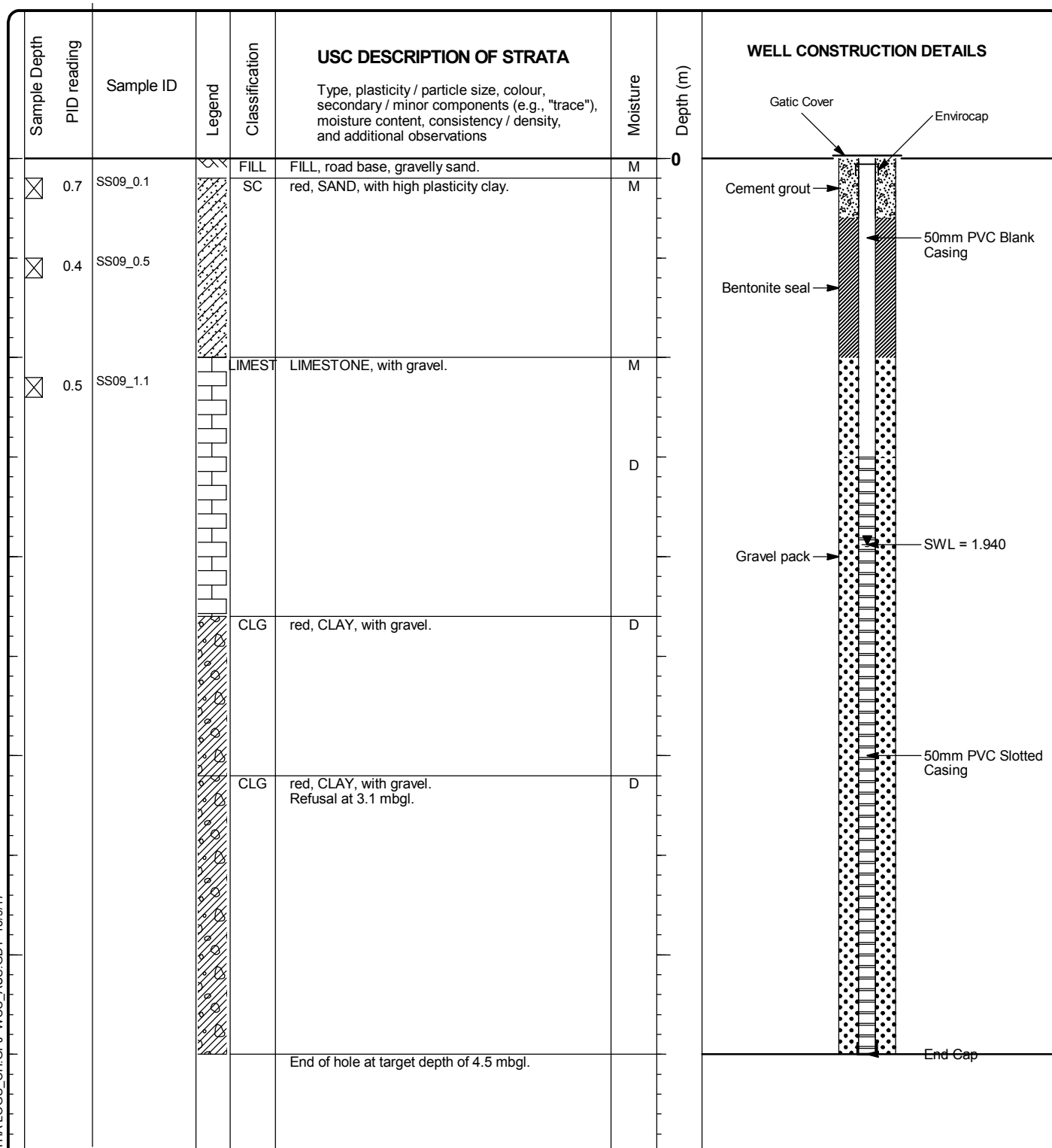
PSI with Limited Investigation at Karratha Airport

Drill Model: **Geoprobe**

Drill Type: **Hand Auger/Push Tube/Hollow Stem Auger**

Drill Fluid: **None**

WELL_MELB_2_KARRATHA LOGS_CH.GPJ WCC_AUS.GDT 13/9/17



Remarks: Soil bore SB09 converted to monitoring well MW04.
FS

MONITORING WELL MW05

AECOM, Level 6, 3 Forrest Place,
PERTH, WA, 6000

Phone 61 8 6208 0000
Fax 61 8 6208 0999

Drilling Contractor: [REDACTED]

Logged By: [REDACTED]

Checked By: [REDACTED]

Date Started: 21-6-17

Date Finished: 21-6-17

Bore Size: 150 mm

Total Depth: 4.50 m

Casing Size: mm

Project Reference: **PSI with Limited Investigation at Karratha Airport**

Project No.: 60543717

Relative Level: m TOC

Coordinates: 7710175.96 mN

476412.00 mE

Permit No: N/A

Client: **Airservices Australia**

Location: **Karratha Airport, Western Australia**

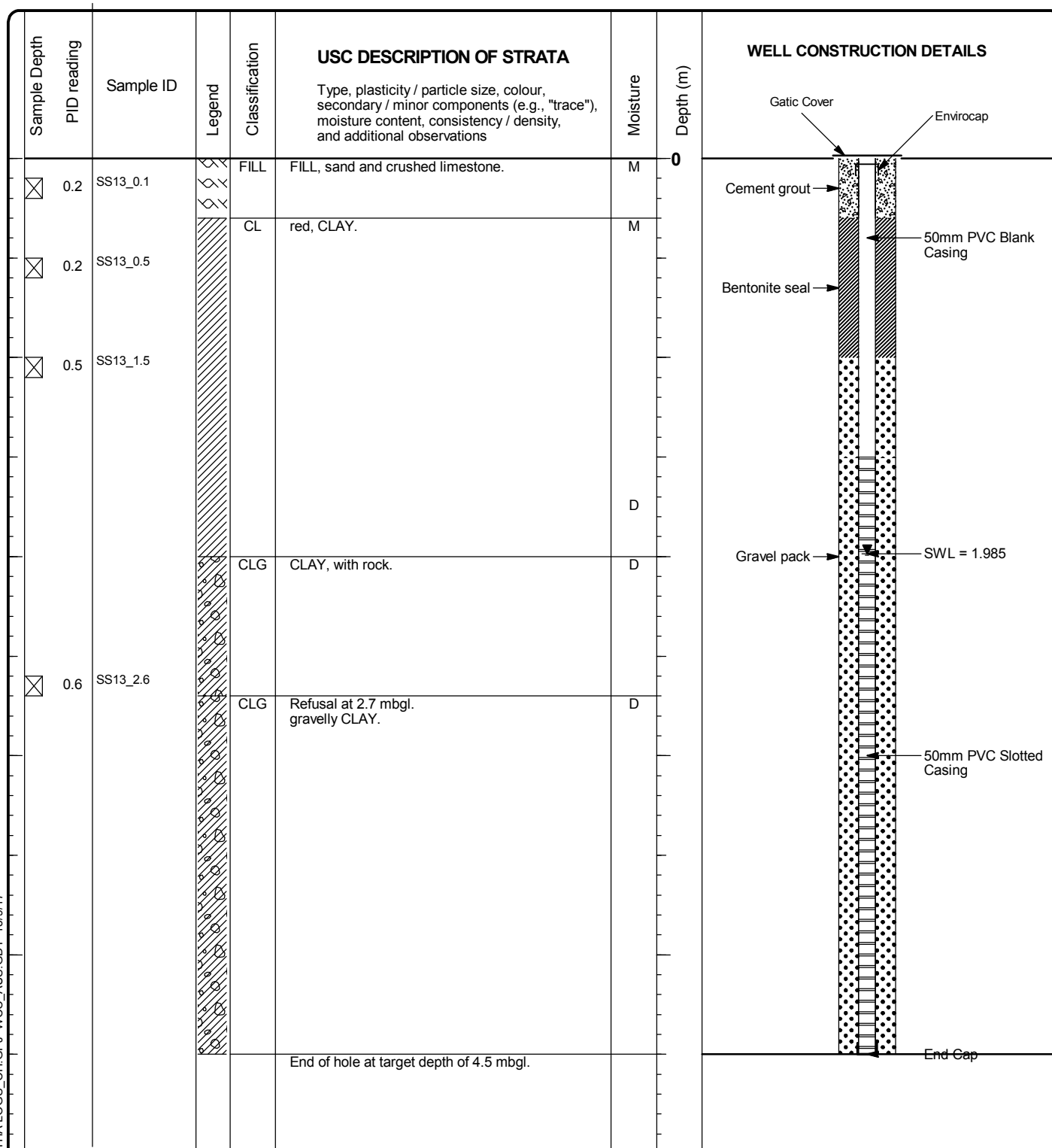
PSI with Limited Investigation at Karratha Airport

Drill Model: Geoprobe

Drill Type: Hand Auger/Push Tube/Hollow Stem Auger

Drill Fluid: None

WELL_MELB_2_KARRATHA LOGS_CH.GPJ WCC_AUS.GDT 13/9/17



Remarks: Soil bore SB13 converted to monitoring well MW05.
WKSP

MONITORING WELL MW06

AECOM, Level 6, 3 Forrest Place,
PERTH, WA, 6000

Phone 61 8 6208 0000
Fax 61 8 6208 0999

Drilling Contractor: XXXXXXXXXX

Logged By: XXXXXXXXXX

Checked By: XXXXXXXXXX

Date Started: **21-6-17**

Date Finished: **21-6-17**

Bore Size: **150 mm**

Total Depth: **4.50 m**

Casing Size: **mm**

Project Reference: **PSI with Limited Investigation at Karratha Airport**

Project No.: **60543717**

Relative Level: **m TOC**

Coordinates: **7710209.94 mN**

476409.56 mE

Permit No: **N/A**

Client: **Airservices Australia**

Location: **Karratha Airport, Western Australia**

PSI with Limited Investigation at Karratha Airport

Drill Model: **Geoprobe**

Drill Type: **Hand Auger/Push Tube/Hollow Stem Auger**

Drill Fluid: **None**

WELL_MELB_2_KARRATHA LOGS_CH.GPJ WCC_AUS.GDT 13/9/17

Sample Depth	PID reading	Sample ID	Legend	Classification	USC DESCRIPTION OF STRATA Type, plasticity / particle size, colour, secondary / minor components (e.g., "trace"), moisture content, consistency / density, and additional observations	Moisture	Depth (m)	WELL CONSTRUCTION DETAILS
							0	
0.3		SS12_0.1		FILL GP	BITUMEN, fill. GRAVEL.	D D		
0.3		SS12_0.5		CL	CLAY.	M		
				CLG	CLAY, with rock.	D		
0.5		SS12_1.5						
0.8		SS12_1.8		CLG	gravelly CLAY.	D		
				GNSCG	Rock/Clay. Refusal at 3.0 mbgl.	D		
1.2				CLG	gravelly CLAY.	D		
					End of hole at target depth of 4.5 mbgl.			

Remarks: Soil bore SB12 converted to monitoring well MW06.
WKSP

MONITORING WELL MW07

AECOM, Level 6, 3 Forrest Place,
PERTH, WA, 6000

Phone 61 8 6208 0000
Fax 61 8 6208 0999

Drilling Contractor: XXXXXXXXXX

Logged By: XXXXXXXXXX

Checked By: XXXXXXXXXX

Date Started: **22-6-17**

Date Finished: **22-6-17**

Bore Size: **150 mm**

Total Depth: **4.50 m**

Casing Size: **mm**

Project Reference: **PSI with Limited Investigation at Karratha Airport**

Project No.: **60543717**

Relative Level: **m TOC**

Coordinates: **7710250.54 mN**

476431.37 mE

Permit No: **N/A**

Client: **Airservices Australia**

Location: **Karratha Airport, Western Australia**

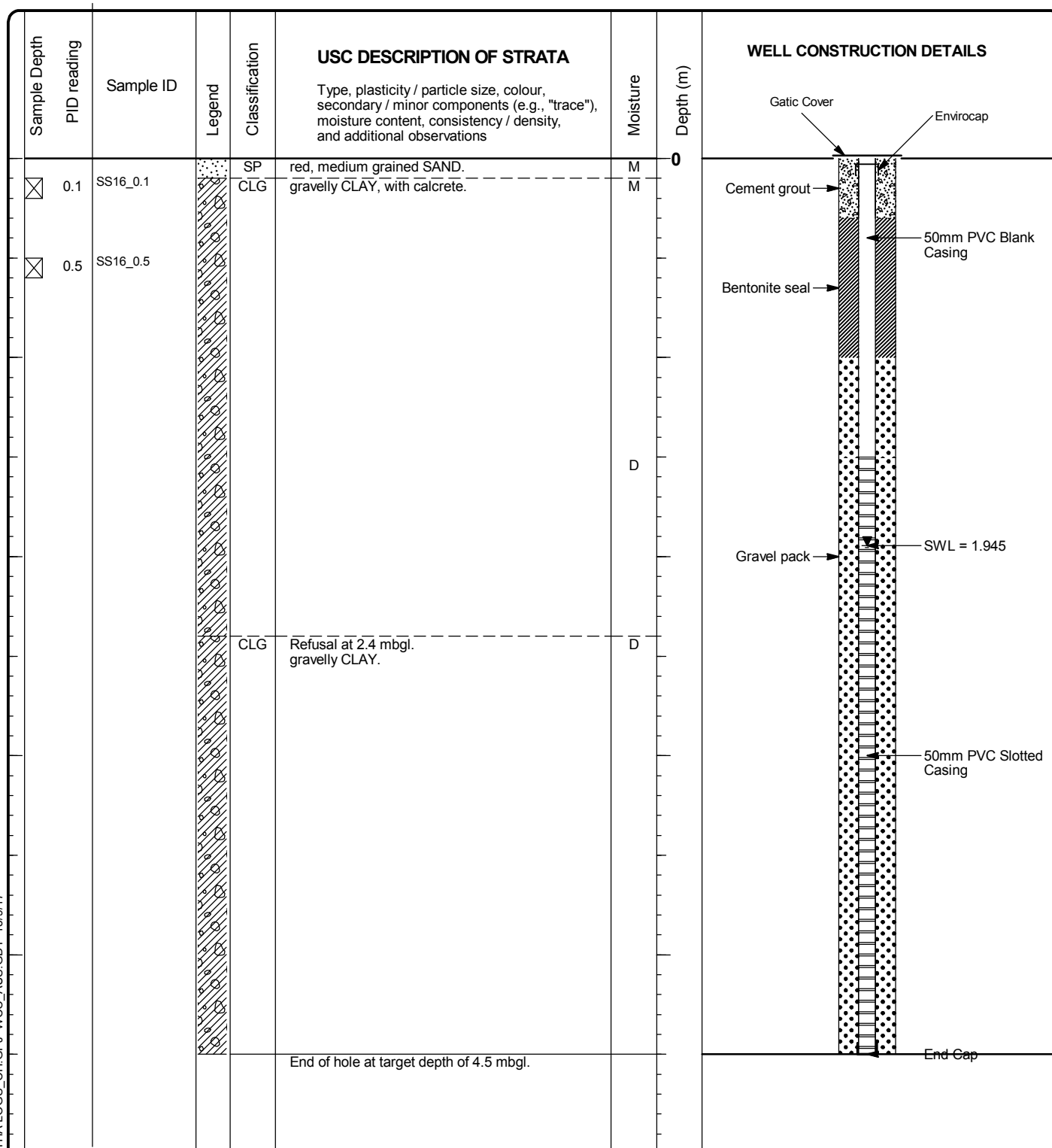
PSI with Limited Investigation at Karratha Airport

Drill Model: **Geoprobe**

Drill Type: **Hand Auger/Push Tube/Hollow Stem Auger**

Drill Fluid: **None**

WELL_MELB_2_KARRATHA LOGS_CH.GPJ WCC_AUS.GDT 13/9/17



Remarks: Soil bore SB16 converted to monitoring well MW07.
WKSP

MONITORING WELL MW08

AECOM, Level 6, 3 Forrest Place,
PERTH, WA, 6000

Phone 61 8 6208 0000
Fax 61 8 6208 0999

Drilling Contractor: XXXXXXXXXX

Logged By: XXXXXXXXXX

Checked By: XXXXXXXXXX

Date Started: **22-6-17**

Date Finished: **22-6-17**

Bore Size: **150 mm**

Total Depth: **4.50 m**

Casing Size: **mm**

Project Reference: **PSI with Limited Investigation at Karratha Airport**

Project No.: **60543717**

Relative Level: **m TOC**

Coordinates: **7710220.61 mN
476451.83 mE**

Permit No: **N/A**

Client: **Airservices Australia**

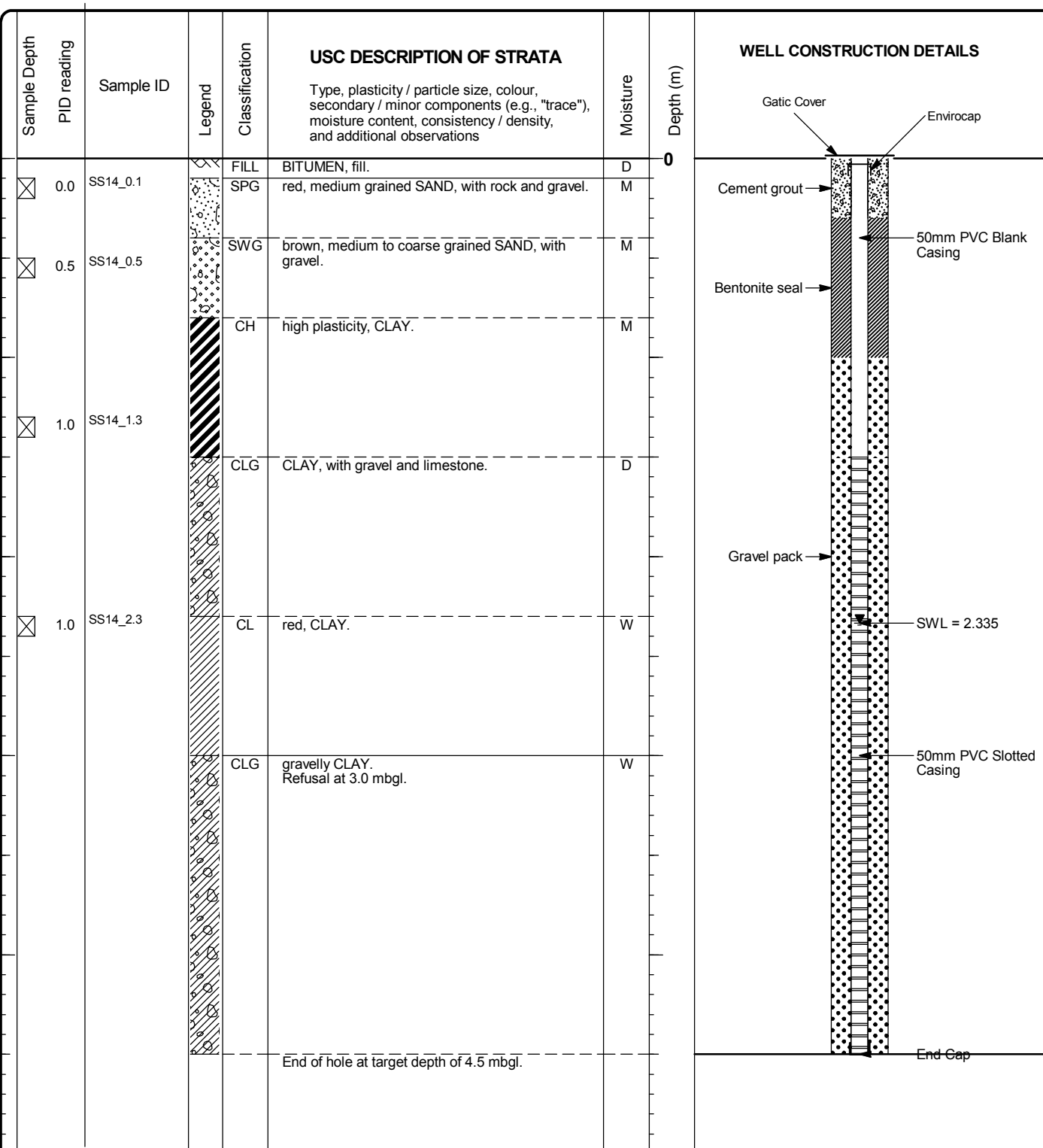
Location: **Karratha Airport, Western Australia**

PSI with Limited Investigation at Karratha Airport

Drill Model: **Geoprobe**

Drill Type: **Hand Auger/Push Tube/Hollow Stem Auger**

Drill Fluid: **None**



Remarks: Soil bore SB14 converted to monitoring well MW08.
WKSP

MONITORING WELL MW09

AECOM, Level 6, 3 Forrest Place,
PERTH, WA, 6000

Phone 61 8 6208 0000
Fax 61 8 6208 0999

Drilling Contractor: XXXXXXXXXX

Logged By: XXXXXXXXXX

Checked By: XXXXXXXXXX

Date Started: **23-6-17**

Date Finished: **23-6-17**

Bore Size: **150 mm**

Total Depth: **3.50 m**

Casing Size: **mm**

Project Reference: **PSI with Limited Investigation at Karratha Airport**

Project No.: **60543717**

Relative Level: **m TOC**

Coordinates: **7710350.09 mN**

477366.75 mE

Permit No: **N/A**

Client: **Airservices Australia**

Location: **Karratha Airport, Western Australia**

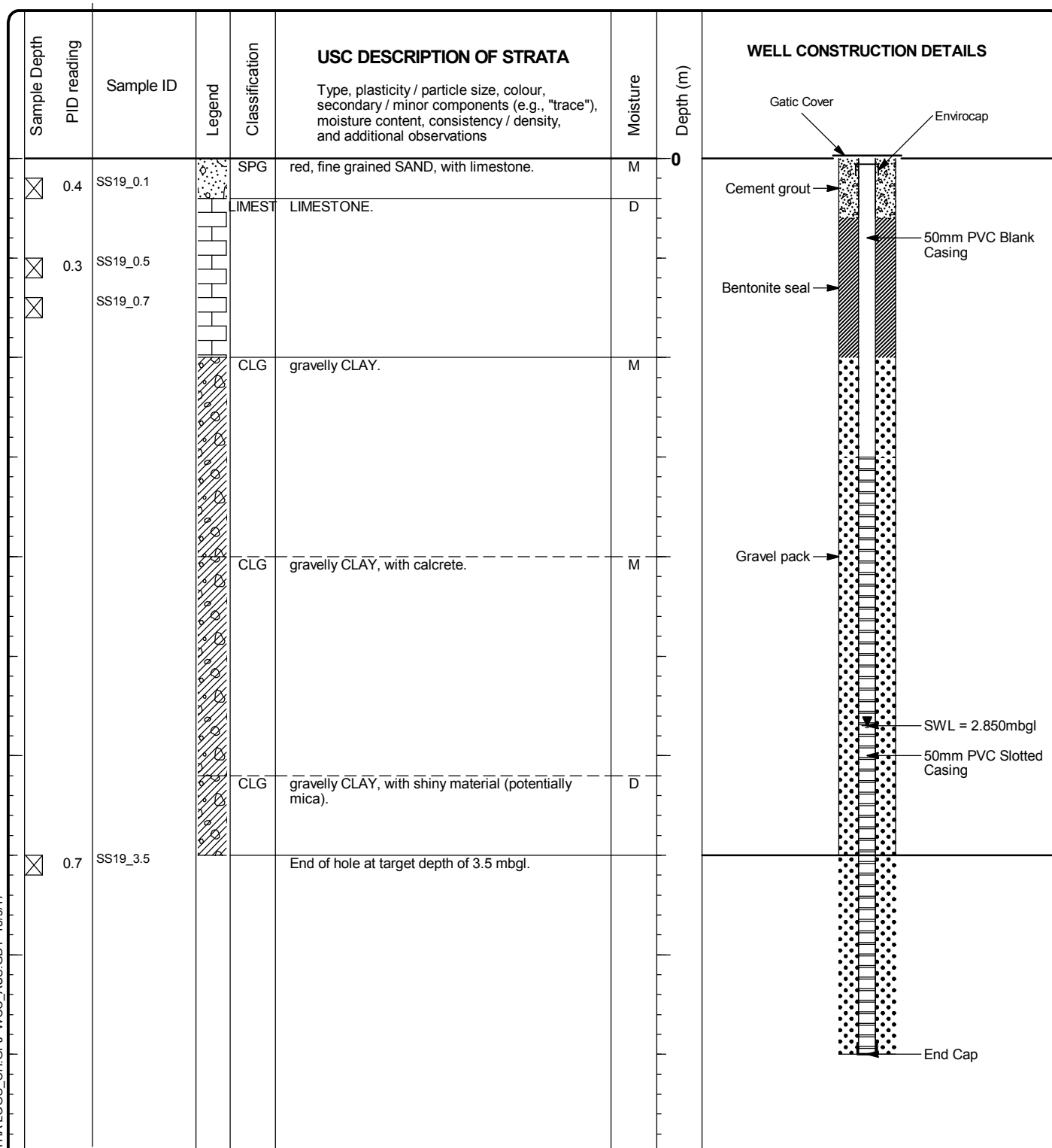
PSI with Limited Investigation at Karratha Airport

Drill Model: **Geoprobe**

Drill Type: **Hand Auger/Push Tube/Hollow Stem Auger**

Drill Fluid: **None**

WELL_MELB_2_KARRATHA LOGS_CH.GPJ WCC_AUS.GDT 13/9/17



Remarks: Soil bore SB19 converted to monitoring well MW09.
FFTG

SOIL BOREHOLE SB01

AECOM Lvl 6, 3 Forrest Place
Perth WA 6000

Phone 08-9326 0100
Fax 08-9326 0296

Project Reference: **PSI with Limited Investigation at Karratha Airport**

Client: **Airservices Australia**
Location: **Karratha Airport, Western Australia**

Drilling Contractor: **[REDACTED]**

Project No.: **60543717**

Logged By: **[REDACTED]**
Checked By: **[REDACTED]**
Date Started: **22-6-17**
Date Finished: **22-6-17**

Bore Size: **150 mm**
Total Depth: **2.70 m**
Casing Size: **mm**

Relative Level: **mRL**
Coordinates: **7710088.75 mN**
476510.65 mE
Permit No: **N/A**

Drill Type: **Hand Auger/Push Tube**
Drill Model: **Geoprobe**
Drill Fluid: **None**

Method	Casing	Penetration			Ground Water Data and Comments	Depth (m)	Graphic Log	Classification	USC DESCRIPTION OF STRATA Type, plasticity / particle size, colour, secondary / minor components (e.g., "trace"), additional observations	Moisture Condition	Consistency	Relative Density	Sample Interval PID (ppm)	Sample ID
		S	M	HR										
						0		GP CLG	GRAVEL, with shell. CLAY, with limestone.	M M			☒ 0.5	SS01_0.1
						1							☒ 0.1	SS01_0.5
						2				D			☒ 0.2	SS01_1.5
						3			End of hole at 2.7 mbgl due to refusal.					
						4								
FS														

Drill Type: **Hand Auger/Push Tube**
Drill Model: **Geoprobe**
Drill Fluid: **None**

SOIL BOREHOLE SB08

AECOM Lvl 6, 3 Forrest Place
Perth WA 6000

Phone 08-9326 0100
Fax 08-9326 0296

Project Reference: **PSI with Limited Investigation at Karratha Airport**

Client: **Airservices Australia**
Location: **Karratha Airport, Western Australia**

Drilling Contractor: **[REDACTED]**

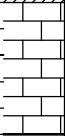
Project No.: **60543717**

Logged By: **[REDACTED]**
Checked By: **[REDACTED]**
Date Started: **21-6-17**
Date Finished: **21-6-17**

Bore Size: **150 mm**
Total Depth: **1.30 m**
Casing Size: **mm**

Relative Level: **mRL**
Coordinates: **7710157.28 mN**
476498.49 mE
Permit No: **N/A**

Drill Type: **Hand Auger/Push Tube**
Drill Model: **Geoprobe**
Drill Fluid: **None**

Method	Casing	Penetration			Ground Water Data and Comments	Depth (m)	Graphic Log	Classification	USC DESCRIPTION OF STRATA Type, plasticity / particle size, colour, secondary / minor components (e.g., "trace"), additional observations	Moisture Condition	Consistency Relative Density	Sample Interval PID (ppm)	Sample ID
		S	M	HR									
						0		FILL	FILL.	M			
								SP CL	white, fine grained, SAND, powdery. red, moderate plasticity CLAY.	M M		0.3	SS08_0.1
												0.3	SS08_0.5
						1		LIMEST	LIMESTONE, with clay and gravel.	D			
									End of hole at 1.3mbgl, pushtube became stuck in rock.				
						2							
						3						0.6	SS08_2.5
						4							

FS

SOIL BOREHOLE SB11

AECOM Lvl 6, 3 Forrest Place
Perth WA 6000

Phone 08-9326 0100
Fax 08-9326 0296

Project Reference: **PSI with Limited Investigation at Karratha Airport**

Client: **Airservices Australia**
Location: **Karratha Airport, Western Australia**

Drilling Contractor: **[REDACTED]**

Project No.: **60543717**

Logged By: **[REDACTED]**
Checked By: **[REDACTED]**
Date Started: **22-6-17**
Date Finished: **22-6-17**

Bore Size: **150 mm**
Total Depth: **4.50 m**
Casing Size: **mm**

Relative Level: **mRL**
Coordinates: **7710200.00 mN**
476467.45 mE
Permit No: **N/A**

Drill Type: **Hand Auger/Push Tube**
Drill Model: **Geoprobe**
Drill Fluid: **None**

Method	Casing	Penetration			Ground Water Data and Comments	Depth (m)	Graphic Log	Classification	USC DESCRIPTION OF STRATA Type, plasticity / particle size, colour, secondary / minor components (e.g., "trace"), additional observations	Moisture Condition	Consistency	Relative Density	Sample Interval PID (ppm)	Sample ID
		S	M	H/R										
						0		FILL	BITUMEN, fill.	D				
								SWG	red, medium to coarse grained SAND, with rock.	M			0.1	SS11_0.1
								SWG	brown, medium to coarse grained, SAND, with gravel.	M			0.3	SS11_0.5
						1		CLG	CLAY, with bands of rock.	M				
						2				D				
						3								
								CLG	Refusal at 3.1 mbgl. gravelly CLAY.	D				
						4								
									End of hole at target depth of 4.5 mbgl.					

APEC 2

SOIL BOREHOLE SB15

AECOM Lvl 6, 3 Forrest Place Perth WA 6000		Phone 08-9326 0100 Fax 08-9326 0296		Project Reference: PSI with Limited Investigation at Karratha Airport		Client: Airservices Australia	
Drilling Contractor: [REDACTED]				Project No.: 60543717		Location: Karratha Airport, Western Australia	
Logged By: [REDACTED]		Bore Size: 150 mm		Relative Level: mRL		Drill Type: Hand Auger/Push Tube	
Checked By: [REDACTED]		Total Depth: 2.60 m		Coordinates: 7710227.55 mN		Drill Model: Geoprobe	
Date Started: 22-6-17		Casing Size: mm		476451.41 mE		Drill Fluid: None	
Date Finished: 22-6-17				Permit No: N/A			

Method	Casing	Penetration			Ground Water Data and Comments	Depth (m)	Graphic Log	Classification	USC DESCRIPTION OF STRATA Type, plasticity / particle size, colour, secondary / minor components (e.g., "trace"), additional observations	Moisture Condition	Consistency	Relative Density	Sample Interval PID (ppm)	Sample ID
		S	M	HR										
						0		SPG	medium grained SAND, with gravel.	M			☒ 0.5	SS15_0.1
						1		CLG	CLAY, with calcrete.	D			☒ 0.6	SS15_0.5
						2							☒ 0.8	SS15_1.4
						3			End of hole at 2.6 mbgl due to refusal.					
						4								

APEC 2 - off site

SOIL BOREHOLE SB20

AECOM Lvl 6, 3 Forrest Place
Perth WA 6000

Phone 08-9326 0100
Fax 08-9326 0296

Project Reference: **PSI with Limited Investigation at Karratha Airport**

Client: **Airservices Australia**
Location: **Karratha Airport, Western Australia**

Drilling Contractor: **[REDACTED]**

Project No.: **60543717**

Logged By: **[REDACTED]**
Checked By: **[REDACTED]**
Date Started: **23-6-17**
Date Finished: **23-6-17**

Bore Size: **150 mm**
Total Depth: **3.00 m**
Casing Size: **mm**

Relative Level: **mRL**
Coordinates: **7710309.43 mN**
477349.18 mE
Permit No: **N/A**

Drill Type: **Hand Auger/Push Tube**
Drill Model: **Geoprobe**
Drill Fluid: **None**

Method	Casing	Penetration			Ground Water Data and Comments	Depth (m)	Graphic Log	Classification	USC DESCRIPTION OF STRATA Type, plasticity / particle size, colour, secondary / minor components (e.g., "trace"), additional observations	Moisture Condition	Consistency	Relative Density	Sample Interval PID (ppm)	Sample ID
		S	M	H R										
						0		SWG	red, fine grained SAND, with gravel.	M			☒ 0.1	SS20_0.1
								IGNSCG	LIMESTONE.	D				
								CLG	CLAY, with gravel.	M			☒ 0.5	SS20_0.5
													☒ 0.5	SS20_0.7
						1				D				
						2								
						3		CLG	CLAY, with limestone.	D				
									End of hole at target depth of 3.5 mbgl.					
						4								

FFTG

SOIL BOREHOLE SB21

AECOM Lvl 6, 3 Forrest Place
Perth WA 6000

Phone 08-9326 0100
Fax 08-9326 0296

Project Reference: **PSI with Limited Investigation at Karratha Airport**

Client: **Airservices Australia**
Location: **Karratha Airport, Western Australia**

Drilling Contractor: **[REDACTED]**

Project No.: **60543717**

Logged By: **[REDACTED]**
Checked By: **[REDACTED]**
Date Started: **23-6-17**
Date Finished: **23-6-17**

Bore Size: **150 mm**
Total Depth: **3.00 m**
Casing Size: **mm**

Relative Level: **mRL**
Coordinates: **7710341.89 mN**
477325.07 mE
Permit No: **N/A**

Drill Type: **Hand Auger/Push Tube**
Drill Model: **Geoprobe**
Drill Fluid: **None**

Method	Casing	Penetration			Ground Water Data and Comments	Depth (m)	Graphic Log	Classification	USC DESCRIPTION OF STRATA Type, plasticity / particle size, colour, secondary / minor components (e.g., "trace"), additional observations	Moisture Condition	Consistency	Relative Density	Sample Interval PID (ppm)	Sample ID
		S	M	HR										
						0			brown, fine grained SAND, with blue metal.	M				
								SWG	red, fine to medium grained SAND, with gravel.	M			0.5	SS21_0.1
								LIMEST	LIMESTONE.	D				
													0.7	SS21_0.5
								GP-GC	GRAVEL, with red clay.	M				
													0.5	SS21_0.8
						1								
								GC	Clayey GRAVEL, with limestone.	M				
						2				D				
						3			End of hole at 3.0 mbgl due to refusal.					
						4								

FFTG

SOIL BOREHOLE SB24

AECOM Lvl 6, 3 Forrest Place
Perth WA 6000

Phone 08-9326 0100
Fax 08-9326 0296

Project Reference: **PSI with Limited Investigation at Karratha Airport**

Client: **Airservices Australia**
Location: **Karratha Airport, Western Australia**

Drilling Contractor: **[REDACTED]**

Project No.: **60543717**

Logged By: **[REDACTED]**
Checked By: **[REDACTED]**
Date Started: **23-6-17**
Date Finished: **23-6-17**

Bore Size: **150 mm**
Total Depth: **2.90 m**
Casing Size: **mm**

Relative Level: **mRL**
Coordinates: **7710328.52 mN**
477271.33 mE
Permit No: **N/A**

Drill Type: **Hand Auger/Push Tube**
Drill Model: **Geoprobe**
Drill Fluid: **None**

Method	Casing	Penetration			Ground Water Data and Comments	Depth (m)	Graphic Log	Classification	USC DESCRIPTION OF STRATA Type, plasticity / particle size, colour, secondary / minor components (e.g., "trace"), additional observations	Moisture Condition	Consistency Relative Density	Sample Interval PID (ppm)	Sample ID
		S	M	HR									
						0		SWG	red, fine grained SAND, with blue metal to 5mm, limestone clasts up to 300mm.	M		☒ 0.5	SS24_0.1
								LIMEST	LIMESTONE.	D		☒ 0.5	SS24_0.5
						1		CLG	gravelly CLAY, with weathered limestone.	M			
						2		CLG	white, gravelly CLAY, with calcrete.	M			
								IGNSCG	Rock layer.	D			
						3			End of hole at 2.9 mbgl due to refusal on rock.				
						4							

FFTG

SOIL BOREHOLE SB25

AECOM Lvl 6, 3 Forrest Place Perth WA 6000		Phone 08-9326 0100 Fax 08-9326 0296	Project Reference: PSI with Limited Investigation at Karratha Airport	Client: Airservices Australia
Drilling Contractor: [REDACTED]			Project No.: 60543717	Location: Karratha Airport, Western Australia
Logged By: [REDACTED]	Bore Size: 150 mm	Relative Level: mRL	Drill Type: Hand Auger/Push Tube	
Checked By: [REDACTED]	Total Depth: 4.50 m	Coordinates: 7710293.44 mN	Drill Model: Geoprobe	
Date Started: 23-6-17	Casing Size: mm	477308.46 mE	Drill Fluid: None	
Date Finished: 23-6-17		Permit No: N/A		

Method	Casing	Penetration			Ground Water Data and Comments	Depth (m)	Graphic Log	Classification	USC DESCRIPTION OF STRATA Type, plasticity / particle size, colour, secondary / minor components (e.g., "trace"), additional observations	Moisture Condition	Consistency	Relative Density	Sample Interval PID (ppm)	Sample ID
		S	M	HR										
						0		SWG	red, fine grained SAND, with white limestone clasts up to 300mm.	M			☒ 0.2	SS25_0.1
								IGNSCG	ROCK.	M				
						1		CLG	gravelly CLAY, with limestone clasts up to 100mm.	M			☒ 0.2	SS25_0.5
													☒ 0.8	SS25_0.8
						2		SWG	brown, fine grained SAND, with gravel.	M				
						3		CLG	CLAY, with gravel and limestone.	D				
						4		CLG	Refusal at 3.5mbgl. gravelly CLAY.	D				
									End of hole at target depth of 4.5 mbgl.					

FFTG

Appendix J

Field Groundwater Purging Data

FQM-5.14-F1 - NAPL AND GROUNDWATER LEVEL GAUGING RECORD

Project Name:	AirServices Australia - Karratha Airport GME	Project Location:	Karratha Airport, Western Australia	PM Name:	[REDACTED]
Project Number:	60543717	Client:	AirServices Australia	Fieldwork Staff Name:	

Confirm NAPL and groundwater levels by repeat measurements. All columns must be completed. If NAPL is not present in a well write 'ND' (Not Detected) in the relevant column.

FIELD DATA

Well ID	Date (dd/mm/yy)	Time (24hr:mm)	PID Reading (ppm)	Depth to LNAPL (mBTOC)	Depth to Groundwater (mBTOC)	LNAPL Thickness (m)	Depth to DNAPL (mBTOC)	Total Well Depth (mBTOC)	DNAPL Thickness (m)	Comments (well condition, odour, NAPL colour and viscosity)
MW101	29-6-17	14:00			2.100			4.435		12mm CATC
MW102	29-6-17	14:02			2.100			4.500		12mm CATC
MW103	29-6-17	14:04			2.175			4.760		STND CATC
MW104	29-6-17	14:12			1.940			4.230		12mm CATC
MW106	29-6-17	14:16			2.250			3.960		STND CATC
MW107	29-6-17	14:19			2.985			4.750		12mm CATC
MW105	29-6-17	14:34			2.712			5.000		STICK-UP
MW107	29-6-17	14:40			1.945			4.490		12mm CATC
MW108	29-6-17	14:48			2.330			2.445		STND CATC
MW108	29-6-17	14:53			2.335			4.500		12mm CATC
MW106	29-6-17	14:57			2.180			4.380		12mm CATC
MW105	29-6-17	15:01			1.985			4.650		12mm CATC
MW19A	29-6-17	15:14			2.090			4.200		STND CATC
MW19B	29-6-17	15:12			2.040			8.970		STND CATC
MW19C	29-6-17	15:13			2.800			13.300		STND CATC
MW20	29-6-17	15:17			2.235			4.47		STND CATC
MW21	29-6-17	15:24			2.310			3.62		STND CATC
MW22	29-6-17	15:44			1.550			4.77		12mm CATC
MW13	29-6-17	15:58			2.272			4.935		STICK-UP
MW11	29-6-17	16:03			2.915			4.980		STICK-UP

MEASUREMENT EQUIPMENT				NOTES/COMMENTS
Make & Model:	SOLINIST	Supplier:	AES	(PID) - photo ionisation detector; (ppm) - parts per million; (LNAPL) - light non-aqueous phase liquids; (DNAPL) - dense light non-aqueous phase liquid; (mBTOC) - metres below top of casing
Serial No.:	INT-TRACE PROBE	Calibration Report Provided?	✓	

Approval and Distribution	
Fieldwork Staff	Project Manager Signature
Date	Date
Distribution: Project Central File	

FQM-5.14-F1 - NAPL AND GROUNDWATER LEVEL GAUGING RECORD

Confirm NAPL and groundwater levels by repeat measurements. All columns must be completed. If NAPL is not present in a well write 'ND' (Not Detected) in the relevant column.

FIELD DATA

MEASUREMENT EQUIPMENT

NOTES/COMMENTS

NOTES/COMMENTS
(PID) - photo ionisation detector; (ppm) - parts per million; (LNAPL) - light non-aqueous phase liquids; (DNAPL) - dense light non-aqueous phase liquid; (mBTOC) - metres below top of casing

Approval and Distribution

Distribution: Project Central File

FQM-5.05-F1 – GROUNDWATER SAMPLING AND PURGING RECORD

Project Name:	AirServices Australia - Karratha Airport GME	Project Number:	G0543717	PM Name:		Sample Date:	30-6-17
Client:	AirServices Australia	Project Location:	Karratha Airport	Fieldwork Staff:		MW10	

GENERAL BORE INFORMATION		PARAMETER INFO.		DECONTAMINATION		SAMPLING METHOD:		HYDRASLEEVE INFO.		
Date of GW Level:	30-6-17	Bore Radius (mm):		Chem Kit Serial No.:	14101920	☒ Decontaminated	☒ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):	
Depth to GW (m-pvc):	2.525	Screen Interval (m):		Chem Kit Model:	951 PRO PLUS	☒ Dedicated	Intake depth:	3.0		Hydrasleeve Type:
Bore Depth (m-pvc):	4.500	Casing Radius (mm):	50	Corrected Redox:	Y / N	☒ Disposable	☐ Bailer	☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):		Cover Type (gatic/stick up):		(The correction to apply is probe dependent)		☐ Other (specify)	☒ Peristaltic Pump	☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):		Bore Locked (YES/NO):		Parameter method:	☐ Downhole	☒ Retrieved	☐ Other (specify)		Sampling Start Time:	Hydrasleeve out
		Key Type (if applicable):								Parameters
Calculated bore volume (L):		# purge volumes removed:		Total purged volume (L):						

WATER QUALITY PARAMETERS									
Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or μ S/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
0736	0.05	2.534	30%	2.66	45383	6.80	209.0	26.1	ODOURLESS, MOD TURBIDITY, BROWN
0738	0.40	2.532	30%	2.45	48353	6.66	211.9	27.0	"
0740	0.70	2.534	30%	2.19	52418	6.49	215.1	27.4	"
0742	1.00	2.536	30%	2.03	53901	6.41	216.1	27.4	"
0744	1.40	2.534	30%	1.93	54802	6.33	216.5	27.3	"
0746	1.95	2.536	30%	1.82	56100	6.36	217.0	27.4	"
0748	2.10	2.536	30%	1.30	56721	6.35	217.0	27.3	"
0750	2.40	2.534	30%	1.65	57371	6.36	216.9	27.4	"
0752	2.60	2.534	30%	1.67	57566	6.37	214.8	27.3	" + FOAMY/BOBBLY WHEN SAMPLING
		2.532 @ BOS							
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

ANALYTES SAMPLED FOR:		BOTTLES COLLECTED		QA/QC INFORMATION		FIELD COMMENTS	
Field Filtered:	Unfiltered:	2 AMBER		WQA01 = FB		Bore volume calculation, bore condition, fate of tubing, redox correction etc.	
		2 PURPLE VIALS		WQA02 = RINSATE			
		2 GREY PFOS		WQA03 = DUP			
				WQA04 = TRIP			
Approval and Distribution						1x EXTRA AMBER 1x EXTRA PFOS - MATRIX SPIKE	
Fieldwork	30-6-17	Checker Name and Signature	Date				
Project Manager Signature	Date	Distribution: Project Central File					

FQM-5.05-F1 – GROUNDWATER SAMPLING AND PURGING RECORD									
Project Name:	AirServices Australia - Karratha Airport GME	Project Number:	60543717	PM Name:	[REDACTED]	Sample Date:			
Client:	AirServices Australia	Project Location:	Karratha Airport	Fieldwork Staff:	[REDACTED]	MW11			
PARAMETER INFO.				DECONTAMINATION	SAMPLING METHOD:		HYDRASLEEVE INFO.		
							Hydrasleeve Size:	Monitoring sequence	

GENERAL BORE INFORMATION		PARAMETER INFO.	DECONTAMINATION	SAMPLING METHOD:	HYDRASLEEVE INFO.	
Date of GW Level: 30-6-17	Bore Radius (mm):	Chem Kit Serial No.: 143101920	☒ Decontaminated	☒ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 2.925	Screen Interval (m):	Chem Kit Model: 481 PRO PLUS	☒ Dedicated	Intake depth: 3.4	Hydrasleeve Type:	
Bore Depth (m-pvc): 4.980	Casing Radius (mm): 80	Corrected Redox: Y / N	☒ Disposable	☐ Bailor ☐ Hydrasleeve	Sampling Depth (m-pvc): 3.1	Gauging
Depth to Product (m-pvc):	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	Bore Locked (YES/NO):	Parameter method: ☐ Downhole ☒ Retrieved		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):					Parameters
Calculated bore volume (L):	# purge volumes removed:	Total purged volume (L):	WATER QUALITY PARAMETERS			

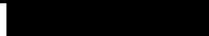
Calculated bore volume (L):		# purge volumes removed:	WATER QUALITY PARAMETERS						
Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
0821	0.10	2.949	30%	3.23	41548	6.95	173.9	28.3	ODOURLESS, MOD TURBIDITY, BROWN
0823	0.30	2.945	30%	2.49	58689	6.78	184.6	28.5	" "
0825	0.50	2.945	30%	2.29	59941	6.73	184.9	28.7	" "
0827	0.90	2.952	30%	2.20	61416	6.71	184.9	28.8	" "
0829	1.10	2.952	30%	2.05	64390	6.68	184.4	28.8	" "
0831	1.50	2.953	30%	1.99	68301	6.66	184.0	28.6	" "
0833	1.95	2.952	30%	1.91	73361	6.62	183.2	28.6	" "
		2.950 @ EOS							
									± 10% turbidity (if using a turbidity meter)
FIELD COMMENTS									

Acceptable Parameter Range:				FIELD COMMENTS	
ANALYTES SAMPLED FOR:		BOTTLES COLLECTED		QA/QC INFORMATION	
Field Filtered:	Unfiltered:	2 PURPLE VIALS			Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		1 AMBER			
		1 GREY PFGS			
Approval and Distribution					
Fieldwork		30-6-17		Checker Name and Signature	Date
Project Manager Signature		Date	Distribution: Project Central File		

Project Name:	AirServices Australia - Karratha Airport GME	Project Number:		PM Name:		Sample Date:	30-6-17
Client:	AirServices Australia	Project Location:	Karratha Airport	Fieldwork Staff:		MW 13	
PARAMETER INFO.			DECONTAMINATION		SAMPLING METHOD:		HYDRASLEEVE INFO.
							Monitoring sequence

GENERAL BORE INFORMATION		PARAMETER INFO.	DECONTAMINATION	SAMPLING METHOD:	HYDRASLEEVE INFO.	
Date of GW Level: 30-6-17	Bore Radius (mm):	Chem Kit Serial No.: 145	☒ Decontaminated	☒ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 3.276	Screen Interval (m):	Chem Kit Model: UST PROPLUS	☒ Dedicated	Intake depth: 3.8	Hydrasleeve Type:	
Bore Depth (m-pvc): 4.935	Casing Radius (mm): 50	Corrected Redox: Y / N	☒ Disposable	☐ Bailor ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc): =	Cover Type (ball/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☒ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m): =	Bore Locked (YES/NO):	Parameter method: ☐ Downhole ☒ Retrieved		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):					Parameters
Calculated bore volume (L):	# purge volumes removed:	Total purged volume (L):				

[illegible]

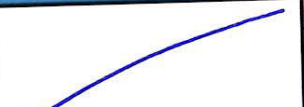
Acceptable Parameter Range:				FIELD COMMENTS	
ANALYTES SAMPLED FOR:		BOTTLES COLLECTED		QA/QC INFORMATION	
Field Filtered:	Unfiltered:	2 PURPLE VIALS			Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		1 AMBER			
		1 GREY DEOS			
Approval and Distribution					
Fieldwork S		30-6-17		Checker Name and Signature	Date
Project Manager Signature		Date	Distribution: Project Central File		

Project Name:	AirServices Australia - Karratha Airport GME	Project Number:	60543717	PM Name:	[REDACTED]	Sample Date:	30-6-17
Client:	AirServices Australia	Project Location:	Karratha Airport	Fieldwork Staff:	[REDACTED]	MW12	
PARAMETER INFO				DECONTAMINATION		HYDRASLEEVE INFO.	
				SAMPLING METHOD:		Monitoring sequence	

GENERAL BORE INFORMATION		PARAMETER INFO.	DECONTAMINATION	SAMPLING METHOD:	HYDRASLEEVE INFO.	
Date of GW Level: 30-6-17	Bore Radius (mm):	Chem Kit Serial No.: 148101920	☒ Decontaminated	☒ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 2.740	Screen Interval (m):	Chem Kit Model: 491 PRO PLUS	☒ Dedicated	Intake depth: 3.20m	Hydrasleeve Type:	
Bore Depth (m-pvc): 5.040	Casing Radius (mm): 50	Corrected Redox: Y / N	☒ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc): —	Cover Type (gatic stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m): —	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☒ Retrieved				Parameters
Calculated bore volume (L):	# purge volumes removed:	Total purged volume (L):				

WATER QUALITY PARAMETERS

[illegible]

Acceptable Parameter Range:				FIELD COMMENTS	
ANALYTES SAMPLED FOR:		BOTTLES COLLECTED		QA/QC INFORMATION	
Field Filtered:	Unfiltered:	2 PURPLE VIALS			Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		1 AMBER			
		1 GREY PFOS			
Approval and Distribution					
Fieldwork		30-6-17	Checker Name and Signature	Date	
Project Manager Signature		Date	Distribution: Project Central File		



Bore ID:

FQM-5.05-F1 – GROUNDWATER SAMPLING AND PURGING RECORD

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FQM-5.05-F1 – GROUNDWATER SAMPLING AND PURGING RECORD

Project Name:	AirServices Australia - Karratha Airport GME	Project Number:	60543717	PM Name:	[REDACTED]	Sample Date:	30-6-17
Client:	AirServices Australia	Project Location:	Karratha Airport	Fieldwork Staff:	[REDACTED]	MW02	

GENERAL BORE INFORMATION		PARAMETER INFO.		DECONTAMINATION		HYDRASLEEVE INFO.	
Date of GW Level:	30-6-17	Bore Radius (mm):		Chem Kit Serial No.:	145101920	Decontaminated:	☒
Depth to GW (m-pvc):	1.655	Screen Interval (m):		Chem Kit Model:	451 PRO +	Dedicated:	☒
Bore Depth (m-pvc):	4.470	Casing Radius (mm):	50	Corrected Redox:	Y / N	Disposable:	☒
Depth to Product (m-pvc):	—	Cover Type (gatic/stick up):		(The correction to apply is probe dependent)		Other (specify):	
Product Thickness (m):	—	Bore Locked (YES/NO):		Parameter method:	☐ Downhole ☒ Retrieved	Low Flow: Pump rate:	
Calculated bore volume (L):		# purge volumes removed:		Total purged volume (L):		Intake depth:	2.10

WATER QUALITY PARAMETERS										Odour, Colour, Turbidity	
Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C			
1014	0.10	1.685	50%	2.42	5767	7.81	70.8	28.7			MOD TURBIDITY, ODOURLESS, BROWN (LIGHT)
1016	0.90	1.682	50%	1.70	4835	7.68	73.1	29.0			MOD-HIGH TURBIDITY, ODOURLESS, BROWN
1018	1.50	1.682	50%	1.61	4636	7.60	73.3	29.2			"
1020	2.00	1.680	50%	1.55	4628	7.55	72.9	29.0			"
1022	2.50	1.680	50%	1.39	4615	7.52	72.8	28.9			"
1024	3.00	1.685	50%	1.38	4540	7.50	72.4	29.0			RED/ORANGE, HIGH TURBIDITY, ODOURLESS
PTGW = 1.655 m Bore @ 450S											
Acceptable Parameter Range:											
				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)		

ANALYTES SAMPLED FOR:		BOTTLES COLLECTED		QA/QC INFORMATION		FIELD COMMENTS	
Field Filtered:	Unfiltered:	2 PURPLE VIALS				Bore volume calculation, bore condition, fate of tubing, redox correction etc.	
		1 AMBER					
		1 GREY PDS					
Approval and Distribution							
Field [REDACTED]		Date: 30-6-17		Checker Name and Signature		Date	
Project Manager Signature		Date		Distribution: Project Central File			

30-6-17

MW 19A

WATER QUALITY PARAMETERS

Acceptable Parameter Range:

FIELD COMMENTS

FQM-5.05-F1 – GROUNDWATER SAMPLING AND PURGING RECORD

FQM-5.05-F1 – GROUNDWATER SAMPLING AND PURGING RECORD									
Project Name:		AirServices Australia - Karratha Airport GME	Project Number:		GOSL3717	PM Name:	[REDACTED]	Sample Date:	30-6-17
Client:		AirServices Australia	Project Location:		Karratha Airport	Fieldwork Staff:	[REDACTED]	MWI9B	
GENERAL BORE INFORMATION			PARAMETER INFO.		DECONTAMINATION	SAMPLING METHOD:		HYDRASLEEVE INFO.	
Date of GW Level:	30-6-17	Bore Radius (mm):		Chem Kit Serial No.:	☒ Decontaminated	☒ Low Flow: Pump rate:		Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	2.002	Screen Interval (m):		Chem Kit Model:	☒ Dedicated	Intake depth: 8.00m		Hydrasleeve Type:	
Bore Depth (m-pvc):	8.970	Casing Radius (mm):	50	Corrected Redox:	☒ Disposable	☐ Bailor	☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	=	Cover Type (radio/stick up):	(The correction to apply is probe dependent)		☐ Other (specify)	☒ Peristaltic Pump	☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	=	Bore Locked (YES/NO):	Parameter method:	☐ Downhole		☐ Other (specify)		Sampling Start Time:	Hydrasleeve out
		Key Type (if applicable):		☒ Retrieved					Parameters
Calculated bore volume (L):		# purge volumes removed:	Total purged volume (L):						
WATER QUALITY PARAMETERS									
Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
12.08	0.10	2.025	50%	0.67	98535	6.52	14.0	30.9	HIGH TURBIDITY, ODOURLESS, BROWN/RED
12.10	0.80	2.000	50%	0.46	94243	6.47	141.0	31.0	" "
12.12	1.20	2.120	50%	0.42	93912	6.46	139.1	31.0	" "
12.14	1.80	2.120	50%	0.49	92738	6.45	137.8	31.0	" "
12.16	2.10	2.125	50%	0.55	91760	6.44	137.7	31.0	" "
12.18	2.50	2.150	50%	0.59	90076	6.44	137.6	31.0	" "
		1.98 @ EOS							
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)
ANALYTES SAMPLED FOR:		BOTTLES COLLECTED			QA/QC INFORMATION		FIELD COMMENTS		
Field Filtered:	Unfiltered:	2 PURPLE VIALS 1 AMBER 1 GREY ADS			[Signature]		Bore volume calculation, bore condition, fate of tubing, redox correction etc.		
							3.5cm difference between markings on casing		
Approval and Distribution									
Fieldwork		Date: 30-6-17			Checker Name and Signature			Date	
Project Manager Signature		Date			Distribution: Project Central File				

30-6-17

MW19C

Total purged volume (L):

WATER QUALITY PARAMETERS

± 10% turbidity (if using a turbidity meter)

FIELD COMMENTS

FQM-5.05-F1 - GROUNDWATER SAMPLING AND PURGING RECORD

Project Name:	AirServices Australia - Karratha Airport GME	Project Number:	60543717	PM Name:	[REDACTED]	Sample Date:	30/6/17
Client:	AirServices Australia	Project Location:	Karratha Airport	Fieldwork Staff:	[REDACTED]	MW05	

GENERAL BORE INFORMATION		PARAMETER INFO.	DECONTAMINATION	SAMPLING METHOD:	HYDRASLEEVE INFO.	
Date of GW Level:	30/6/17	Chem Kit Serial No.: 145101920	☒ Decontaminated	☐ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc):	1.980	Chem Kit Model: 451	☒ Dedicated	Intake depth:	Hydrasleeve Type:	
Bore Depth (m-pvc):	4.650	Corrected Redox: Y / (N)	☒ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	NA	(The correction to apply is probe dependent)	☐ Other (specify)	☒ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	NA	Parameter method: ☐ Downhole ☒ Retrieved		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
Calculated bore volume (L):		Total purged volume (L):				Parameters

WATER QUALITY PARAMETERS										Odour, Colour, Turbidity
Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C		
1426	0.05	1.995	50%	4.90	810	7.99	82.6	26.6	TRANSPARENT/NO TURBIDITY, ODOURLESS, COLOURLESS	
1428	0.70	2.000	50%	4.38	803	8.01	86.1	26.4	"	"
1431	2.00	2.010	50%	4.53	802	7.98	89.4	26.2	"	"
1433	2.20	2.010	50%	4.46	801	7.98	90.7	26.6	"	"
1435	2.60	2.000	50%	4.46	803	7.98	92.0	26.9	"	"
1437	3.00	2.000	50%	4.53	804	7.95	92.7	26.7	"	"
1439	3.60	2.000	50%	4.61	805	7.93	94.1	26.6	"	"
		1.985 @ 50%								
Acceptable Parameter Range:										± 10% turbidity (if using a turbidity meter)
				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C		

ANALYTES SAMPLED FOR:		BOTTLES COLLECTED		QA/QC INFORMATION	FIELD COMMENTS
Field Filtered:	Unfiltered:	2 PURPLE VIALS		[REDACTED]	Bore volume calculation, bore condition, fate of tubing, redox correction etc. Start @ 14:22
		1 AMBER			
		1 GREY PPS			
Approval and Distribution					
Project Manager Signature		Date		Checker Name and Signature	Date
[REDACTED]		30-6-17			
Distribution: Project Central File					

FQM-5.05-F1 – GROUNDWATER SAMPLING AND PURGING RECORD

[illegible]

30-6-17

MW08

WATER QUALITY PARAMETERS

± 10% turbidity (if using a turbidity meter)

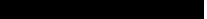
FIELD COMMENTS

Distribution: Project Central File

FQM-5.05-F1 – GROUNDWATER SAMPLING AND PURGING RECORD							
Project Name:	AirServices Australia - Karratha Airport GME	Project Number:	60543717	PM Name:	[REDACTED]	Sample Date:	30-6-17
Client:	AirServices Australia	Project Location:	Karratha Airport	Fieldwork Staff:	[REDACTED]	MW21	
PROJECT INFORMATION		PARAMETER INFO.		DECONTAMINATION		HYDRASLEEVE INFO.	
						Hydrasleeve Size:	Monitoring sequence followed (number in

GENERAL BORE INFORMATION		PARAMETER INFO.	DECONTAMINATION	SAMPLING METHOD:	HYDRASLEEVE INFO.	
Date of GW Level: 30-6-17	Bore Radius (mm):	Chem Kit Serial No.: 145101920	☒ Decontaminated	☒ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 2.31	Screen Interval (m):	Chem Kit Model: 451 PRO+	☒ Dedicated	Intake depth: 2.80m	Hydrasleeve Type:	
Bore Depth (m-pvc): 3.62	Casing Radius (mm): 50	Corrected Redox: Y / N	☒ Disposable	☐ Bailor ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc): -	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☒ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m): -	Bore Locked (YES/NO):	Parameter method: ☐ Downhole ☒ Retrieved		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):					Parameters
Calculated bore volume (L):	# purge volumes removed:	Total purged volume (L):	WATER QUALITY PARAMETERS			

Calculated bore volume (L):		# purge volumes removed:		Total purged volume (L):		WATER QUALITY PARAMETERS					
Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity		
1552	0.10	2.325	50%	3.28	1330	9.50	61.8	31.1	TRANSPARENT, ODOURLESS, COLOURLESS		
1554	0.50	2.322	50%	3.00	1323	8.39	68.9	31.0	"		
1556	1.20	2.315	50%	2.82	1322	8.33	73.1	30.9	"		
1558	1.60	2.321	50%	2.83	1318	8.31	74.7	30.9	"		
1600	2.00	2.324	50%	2.66	1310	8.32	75.0	31.0	"		
16.02	2.50	2.323	50%	2.79	1303	8.31	75.5	31.2	"		
		2.314 @ EGS									

ANALYTES SAMPLED FOR:		BOTTLES COLLECTED		QA/QC INFORMATION		FIELD COMMENTS
Field Filtered:	Unfiltered:	2	PURPLE VIALS			Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		1	AMBER			
		1	GREY PDS			
Approval and Distribution						
Fieldwork		30-6-17		Checker Name and Signature	Date	
Project Manager Signature		Date		Distribution: Project Central File		

FIELDWORK QUALITY MANUAL

Bore ID:

FQM-5.05-F1 – GROUNDWATER SAMPLING AND PURGING RECORD

Project Name:		AirServices Australia - Karratha Airport GME	Project Number:		60543717		PM Name:				Sample Date:		30-6-17		
Client:		AirServices Australia	Project Location:		Karratha Airport		Fieldwork Staff:				MW15				
GENERAL BORE INFORMATION					PARAMETER INFO.			DECONTAMINATION		SAMPLING METHOD:			HYDRASLEEVE INFO.		
Date of GW Level: 30-6-17					Chem Kit Serial No.: 14J101920			☒ Decontaminated		Low Flow: Pump rate:			Hydrasleeve Size:		
Depth to GW (m-pvc): 2.705					Chem Kit Model: YSI PR20 +			☒ Dedicated		Intake depth: 3.2			Hydrasleeve Type:		
Bore Depth (m-pvc): 5.000					Corrected Redox: Y / ①			☒ Disposable		☐ Bailor ☐ Hydrasleeve			Sampling Depth (m-pvc):		
Depth to Product (m-pvc):					(The correction to apply is probe dependent)			☐ Other (specify)		☒ Peristaltic Pump ☐ Waterra			Hydrasleeve Install time:		
Product Thickness (m):					Parameter method: ☐ Downhole ☒ Retrieved					☐ Other (specify)			Sampling Start Time:		
Calculated bore volume (L):					# purge volumes removed:			Total purged volume (L):					Monitoring sequence followed (number in order):		
WATER QUALITY PARAMETERS															
Time		Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or uS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity					
1702		0.05	2.720	50%	2.03	5218	8.06	65.3	30.1	MOD TURBIDITY, ODOURLESS, YELLOW-BROWN					
1704		0.50	2.715	50%	0.97	5284	7.92	71.2	30.2	"					
1706		0.95	2.723	50%	0.89	5371	7.83	73.9	30.4	"					
1708		1.50	2.723	50%	0.67	5415	7.79	74.2	30.4	"					
1710		1.95	2.721	50%	0.54	5444	7.77	73.6	30.6	"					
1712		2.10	2.721	50%	0.48	5456	7.75	72.9	30.6	"					
Acceptable Parameter Range:														± 10% ± 3% ± 0.05 ± 10 mV ± 0.2 °C	
ANALYTES SAMPLED FOR:					BOTTLES COLLECTED					QA/QC INFORMATION					
Field Filtered:		Unfiltered:			2 PURPLE VIALS 1 GREY PFS 1 AMBER										
Approval and Distribution															
Date: 30-6-17 Checker Name and Signature: _____ Date: _____															
Project Manager Signature: _____ Date: _____ Distribution: Project Central File															

FIELDWORK QUALITY MANUAL

FQM-5.05-F1 – GROUNDWATER SAMPLING AND PURGING RECORD

Bore ID:

Sample Date:

30-6-17

**AirServices Australia -
Karratha Airport GME**

Project Number:

60543717

PM Name:

AirServices Australia

Project Location:

Karratha Airport

Fieldwork Staff:

HYDRASLEEVE INFO.

Monitoring sequence followed (number in order):

GENERAL BORE INFORMATION

Date of GW Level:	30-6-17	Bore Radius (mm):	
Depth to GW (m-pvc):	1.950	Screen Interval (m):	
Bore Depth (m-pvc):	4.490	Casing Radius (mm):	50
Depth to Product (m-pvc):	=	Cover Type (gate/stick up):	
Product Thickness (m):	=	Bore Locked (YES/NO):	
		Use Type (if applicable):	

PARAMETER INFO.

Chem Kit Serial No.:
Chem Kit Model:
Corrected Redox: Y / M
(The correction to apply is probe dependent)
Parameter method: ☐ Downhole ☒ Retrieved

DECONTAMINATION

☒	Decontaminated
☒	Dedicated
☒	Disposable
☐	Other (specify)

SAMPLING METHOD:

☒ Low Flow: Pump rate: _____ Intake depth: 2.5

☐ Bailor ☐ Hydrasleeve

☒ Peristaltic Pump ☐ Waterra

☐ Other (specify) _____

Hydrasleeve Size:

Hydrosleeve Type:

Depth (m-pvc):

Sampling Depth (m):	1.0
Start time:	10:00

Hydrasleeve Installation

Sampling Start Time:

Calculated bore volume (L):

purge volumes removed:

Total purged volume (L):

L):

WATER QUALITY PARAMETERS

Odour, Colour, Turbidity

[illegible]

ANALYTES SAMPLED FOR:

Field Filtered:

Unfiltered:

2	PURPLE VIALS
1	AMBER
1	GREY PFOS

BOTTLES COLLECTED

Approval and Distribution

Checker Name and Signature

Date _____

30-6-17
Date

Date _____

Distribution: Project Central File

Project Manager Signature



FIELDWORK QUALITY MANUAL

FQM-5.05-F1 - GROUNDWATER SAMPLING AND PURGING RECORD

Bore ID:

Project Name:

AirServices Australia -
Karratha Airport GME

Project Number:

G0543717

PM Name:

Sample Date:

1-7-17

Client:

AirServices Australia

Project Location:

Karratha Airport

Fieldwork Staff:

MW17

GENERAL BORE INFORMATION

Date of GW Level: 1-7-17
Depth to GW (m-pvc): 1.99
Bore Depth (m-pvc): 4.75
Depth to Product (m-pvc): -
Product Thickness (m): -
Calculated bore volume (L): -
Bore Radius (mm): -
Screen Interval (m): -
Casing Radius (mm): 50
Cover Type (cable/stick up): -
Bore Locked (YES/NO): -
Key Type (if applicable): -
purge volumes removed: -

PARAMETER INFO.

Chem Kit Serial No.: 14J101920
Chem Kit Model: USI PRO +
Corrected Redox: Y / (N)
(The correction to apply is probe dependent)
Parameter method: ☐ Downhole
☒ Retrieved
Total purged volume (L): -

DECONTAMINATION

☒ Decontaminated
☒ Dedicated
☒ Disposable
☐ Other (specify)

SAMPLING METHOD:

Low Flow: Pump rate: -
Intake depth: 2.5
☐ Bailor ☐ Hydrasleeve
☒ Peristaltic Pump ☐ Waterra
☐ Other (specify)

HYDRASLEEVE INFO.

Hydrasleeve Size:

Hydrasleeve Type:

Sampling Depth (m-pvc):

Hydrasleeve Install time:

Sampling Start time:

Monitoring sequence
followed (number in
order):

Gauging

Hydrasleeve in

Hydrasleeve out

Parameters

WATER QUALITY PARAMETERS

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or uS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
0709	0.10	2.013	50%	6.30	853	8.34	91.8	24.7	TRANSPARENT, COLOURLESS, ODOURLESS
0711	0.50	2.014	50%	5.76	857	7.93	103.5	25.0	"
0713	1.00	2.014	50%	5.98	867	7.82	107.5	25.0	"
0715	1.50	2.010	50%	6.00	878	7.71	112.0	24.9	"
0717	2.00	2.014	50%	5.95	871	7.66	114.9	24.8	"
0719	2.40	2.010	50%	6.29	884	7.62	117.9	24.8	"
0721	2.70	2.010	50%	6.02	880	7.61	119.3	24.9	"
		2.000	@ EOS						

Acceptable Parameter Range:

± 10%

± 3%

± 0.05

± 10 mV

± 0.2 °C

± 10% turbidity (if using a turbidity meter)

ANALYTES SAMPLED FOR:

Field Filtered:

Unfiltered:

2 PURPLE VIALS
1 GREY PPOS
1 AMBER

BOTTLES COLLECTED

QA/QC INFORMATION

WQAP07 - FB
WQAP08 - RINSE

FIELD COMMENTS

Bore volume calculation, bore condition, fate of tubing, redox correction etc.

1-7-17
Date

Checker Name and Signature

Date

Project Manager Signature

Distribution: Project Central File

FQM-5.05-F1 – GROUNDWATER SAMPLING AND PURGING RECORD							
Project Name:	AirServices Australia - Karratha Airport GME	Project Number:	60543717	PM Name:	[REDACTED]	Sample Date:	1-7-17
Client:	AirServices Australia	Project Location:	Karratha Airport	Fieldwork Staff:	[REDACTED]	MW16	
		PARAMETER INFO		DECONTAMINATION		SAMPLING METHOD	
						HYDRASLEEVE INFO.	
						Monitoring sequence	

GENERAL BORE INFORMATION		PARAMETER INFO.	DECONTAMINATION	SAMPLING METHOD	HYDRASLEEVE INFO.	
Date of GW Level: 1-7-17	Bore Radius (mm):	Chem Kit Serial No.: 14510920	☒ Decontaminated	☒ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 2.255	Screen Interval (m):	Chem Kit Model: 451 PRO PLUS	☒ Dedicated	Intake depth: 2.8	Hydrasleeve Type:	
Bore Depth (m-pvc): 3.960	Casing Radius (mm): 50	Corrected Redox: Y / ☒ N	☒ Disposable	☐ Bailor ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc): -	Cover Type (gate/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☒ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m): -	Bore Locked (YES/ ☒ NO)	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☒ Retrieved				Parameters
Calculated bore volume (L):	# purge volumes removed:	Total purged volume (L):	WATER QUALITY PARAMETERS			

[illegible]

Acceptable Parameter Range:				FIELD COMMENTS	
ANALYTES SAMPLED FOR:		BOTTLES COLLECTED		QA/QC INFORMATION	
Field Filtered:	Unfiltered:	2 AMBER		1x EXTRA AMBER	Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		2 GREY PFS		1x EXTRA GREY PFS	
		2 PURPLE VIALS		MATRIX SPIKE	
Approval and Distribution					
Fieldw	1-7-17	Date		Checker Name and Signature	Date
Project Manager Signature		Date		Distribution: Project Central File	

FQM-5.05-F1 – GROUNDWATER SAMPLING AND PURGING RECORD

Project Name:	AirServices Australia - Karratha Airport GME	Project Number:		PM Name:		Sample Date:	1-7-17
Client:	AirServices Australia	Project Location:	Karratha Airport	Fieldwork Staff:		MW04	

GENERAL BORE INFORMATION				PARAMETER INFO.		DECONTAMINATION		SAMPLING METHOD:		HYDRASLEEVE INFO.			
Date of GW Level:	1-7-17	Bore Radius (mm):		Chem Kit Serial No.:	143101920	☒ Decontaminated	☒ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):				
Depth to GW (m-pvc):	1.955	Screen Interval (m):		Chem Kit Model:	4.8i PRO PLUS	☒ Dedicated	Intake depth:	2.5				Hydrasleeve Type:	
Bore Depth (m-pvc):	4.230	Casing Radius (mm):	50	Corrected Redox:	Y / N	☒ Disposable	☐ Bailor	☐ Hydrasleeve				Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc):	-	Cover Type (gator stick up):		(The correction to apply is probe dependent)		☐ Other (specify)	☒ Peristaltic Pump	☐ Waterra				Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m):	-	Bore Locked (YES/NO):	NO	Parameter method:	☐ Downhole	☒ Retrieved	☐ Other (specify)					Sampling Start Time:	Hydrasleeve out
Calculated bore volume (L):		# purge volumes removed:		Total purged volume (L):									

WATER QUALITY PARAMETERS									
Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
0803	0.05	1.961	50%	3.29	1687	8.22	90.2	28.3	LOW TURBIDITY, ODOURLESS, LIGHT RED/BROWN
0805	0.30	1.960	50%	2.25	1719	8.06	95.8	27.6	"
0807	0.50	1.959	60%	1.99	1714	7.98	97.8	28.2	"
0809	0.70	1.961	60%	2.01	1707	7.99	98.5	28.8	"
0811	1.00	1.961	60%	1.90	1716	7.97	99.0	29.1	"
0813	1.50	1.960	60%	1.74	1724	7.92	99.3	28.1	"
0815	1.80	1.960	60%	1.85	1710	7.89	99.5	28.4	"
		1.950 @ EOS							
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

ANALYTES SAMPLED FOR:		BOTTLES COLLECTED		QA/QC INFORMATION		FIELD COMMENTS	
Field Filtered:	Unfiltered:	2 PURPLE VIALS				Bore volume calculation, bore condition, fate of tubing, redox correction etc.	
		1 AMBER					
		1 GREY PFOS					
Approval and Distribution							
Project Manager Signature		Date		Checker Name and Signature		Date	
		Date		Distribution: Project Central File			

Project Name:	AirServices Australia - Karratha Airport GME	Project Number:	G0543717	PM Name:	[REDACTED]	Sample Date:	1-7-17
Client:	AirServices Australia	Project Location:	Karratha Airport	Fieldwork Staff:	[REDACTED]	MW14	

GENERAL BORE INFORMATION		PARAMETER INFO.	DECONTAMINATION	SAMPLING METHOD:	HYDRASLEEVE INFO.	
Date of GW Level: 1-7-17	Bore Radius (mm):	Chem Kit Serial No.: 143101920	☒ Decontaminated	☒ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 2.189	Screen Interval (m):	Chem Kit Model: 481 PRO PLUS	☒ Dedicated	Intake depth: 2.70	Hydrasleeve Type:	
Bore Depth (m-pvc): 4.500	Casing Radius (mm): 50	Corrected Redox: Y / (N)	☒ Disposable	☐ Bailer ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc): -	Cover Type (gate/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☒ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m): -	Bore Locked (YES/NO):	Parameter method: ☐ Downhole		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):	☒ Retrieved				Parameters
Calculated bore volume (L):	# purge volumes removed:	Total purged volume (L):				

WATER QUALITY PARAMETERS

WATER QUALITY PARAMETERS									
Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or μ S/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
0829	0.05	2.200	70%	1.67	6217	7.54	-162.1	28.1	TRANSPARENT, ODOURLESS, COLOURLESS
0831	0.10	2.200	75%	0.56	6367	7.33	-166.7	27.6	" "
0833	0.40	2.201	75%	0.80	6349	7.33	-172.3	28.7	" "
0835	0.60	2.2015	75%	0.19	6400	7.30	-175.3	29.0	" "
0837	1.00	2.219	75%	0.15	6404	7.27	-177.4	28.9	" "
0839	1.50	2.216	75%	0.15	7346	7.20	-169.5	29.1	" "
0841	1.70	2.205	75%	0.13	8218	7.15	-148.0	29.1	" "
		2.190 @ EOS							
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

ANALYTES SAMPLED FOR:				BOTTLES COLLECTED				QA/QC INFORMATION				FIELD COMMENTS			
Field Filtered:		Unfiltered:		2 PURPLE VIALS								Bore volume calculation, bore condition, fate of tubing, redox correction etc.			
				1 AMBER											
				1 GREY PHOS											
Approval and Distribution															
				1-7-17											
				Date		Checker Name and Signature				Date					
Project Manager Signature				Date		Distribution: Project Central File									

FQM-5.05-F1 – GROUNDWATER SAMPLING AND PURGING RECORD

Project Name:	AirServices Australia - Karratha Airport GME	Project Number:	60543717	PM Name:	[REDACTED]	Sample Date:	1-7-17
Client:	AirServices Australia	Project Location:	Karratha Airport	Fieldwork Staff:	[REDACTED]	MWD3	

GENERAL BORE INFORMATION		PARAMETER INFO.	DECONTAMINATION	SAMPLING METHOD:	HYDRASLEEVE INFO.	
Date of GW Level: 1-7-17	Bore Radius (mm):	Chem Kit Serial No.:	☐ Decontaminated	☒ Low Flow: Pump rate: Intake depth: 2.7	Hydrasleeve Size:	Monitoring sequence followed (number in order):
Depth to GW (m-pvc): 2.115	Screen Interval (m):	Chem Kit Model:	☐ Dedicated		Hydrasleeve Type:	
Bore Depth (m-pvc):	Casing Radius (mm):	Corrected Redox: Y / N	☐ Disposable	☐ Bailor ☐ Hydrasleeve	Sampling Depth (m-pvc):	Gauging
Depth to Product (m-pvc): -	Cover Type (gatic/stick up):	(The correction to apply is probe dependent)	☐ Other (specify)	☒ Peristaltic Pump ☐ Waterra	Hydrasleeve Install time:	Hydrasleeve in
Product Thickness (m): -	Bore Locked (YES/NO):	Parameter method: ☐ Downhole ☐ Retrieved		☐ Other (specify)	Sampling Start Time:	Hydrasleeve out
	Key Type (if applicable):					Parameters
Calculated bore volume (L):	# purge volumes removed:	Total purged volume (L):				

WATER QUALITY PARAMETERS

Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or μ S/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
0901	0.10	2.15	80%	1.92	6502	7.58	40.4	30.3	TRANSPARENT, COLOURLESS, ODOURLESS
0903	0.40	2.150	80%	1.32	6308	7.53	40.4	30.8	"
0905	0.60	2.150	80%	1.00	6529	7.46	39.1	30.9	"
0907	1.00	2.150	80%	0.87	6516	7.44	38.0	31.1	"
0909	1.20	2.149	80%	0.78	6516	7.42	36.8	31.1	LOW TURBIDITY, LIGHT YELLOW ^{cloudy} , ODOURLESS
0911	1.60		80%	0.79	6502	7.40	36.6	31.1	"
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)

ANALYTES SAMPLED FOR:		BOTTLES COLLECTED		QA/QC INFORMATION	FIELD COMMENTS
Field Filtered:	Unfiltered:	2			Bore volume calculation, bore condition, fate of tubing, redox correction etc.
		1			
		1			
Approval and Distribution					
		1-7-17 Date	Checker Name and Signature		Date
Project Manager Signature		Date	Distribution: Project Central File		

FQM-5.05-F1 – GROUNDWATER SAMPLING AND PURGING RECORD

Project Name:		AirServices Australia - Karratha Airport GME		Project Number:		60543717		PM Name:		[REDACTED]		Sample Date:		1-7-17	
Client:		AirServices Australia		Project Location:		Karratha Airport		Fieldwork Staff:		[REDACTED]		MWOI			
GENERAL BORE INFORMATION				PARAMETER INFO.				DECONTAMINATION		SAMPLING METHOD:		HYDRASLEEVE INFO.			
Date of GW Level:		1-7-17		Bore Radius (mm):				☒ Decontaminated		☒ Low Flow: Pump rate:		Hydrasleeve Size:		Monitoring sequence followed (number in order):	
Depth to GW (m-pvc):		2.11		Screen Interval (m):				☒ Dedicated		Intake depth: 2.0		Hydrasleeve Type:			
Bore Depth (m-pvc):		4.435		Casing Radius (mm):		50		☒ Disposable		☐ Bailor ☐ Hydrasleeve		Sampling Depth (m-pvc):		Gauging	
Depth to Product (m-pvc):		=		Cover Type (gatic/stick up):				☐ Other (specify)		☒ Peristaltic Pump ☐ Waterra		Hydrasleeve Install time:		Hydrasleeve in	
Product Thickness (m):		=		Bore Locked (YES/NO):		NO		Parameter method: ☐ Downhole ☒ Retrieved		☐ Other (specify)		Sampling Start Time:		Hydrasleeve out	
Calculated bore volume (L):				# purge volumes removed:				Total purged volume (L):						Parameters	
WATER QUALITY PARAMETERS															
Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (ppm or mg/L)	E.C. (mS/cm or µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity						
0939	0.05	2.13	80%	1.51	9466	7.37	60.4	30.1	ODOURLESS, LIGHT YELLOW, TRANSPARENT-LOW TURBIDITY						
0941	0.40	2.130	80%	0.61	9634	7.32	55.6	30.4	"						
0943	0.60	2.132	80%	0.30	9656	7.28	50.8	30.3	"						
0945	1.00	2.134	80%	0.21	9648	7.27	46.5	30.5	"						
0947	1.50	2.134	80%	0.19	9657	7.24	44.5	30.3	"						
0949	1.70	2.134	80%	0.18	9640	7.24	41.5	30.4	"						
		2.130	@ EOS												
Acceptable Parameter Range:				± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C	± 10% turbidity (if using a turbidity meter)						
ANALYTES SAMPLED FOR:		BOTTLES COLLECTED				QA/QC INFORMATION				FIELD COMMENTS					
Field Filtered:	Unfiltered:	3 AMBER				WQA09 - DUP WQA10 - TRIP				Bore volume calculation, bore condition, fate of tubing, redox correction etc.					
		3 GREY PEGS													
		6 PURPLE VIALS													
Approval and Distribution															
[REDACTED]		1-7-17		Date		Checker Name and Signature				Date					
Project Manager Signature		Date		Distribution: Project Central File											

Appendix K

Field Quality Control Data

Table K-1
Field QAQC Data - Water Samples

SDG	EP1707076	EP1707076	EP1707076	EP1707076	EP1707076	EP1707076	EP1707076
Sample ID	SEDQA03_010717	WQA01_300617	WQA07_010717	WQA02_300617	WQA08_010717	TBW571 (TB)	TBW573_080617
Sample Date	1/07/2017	30/06/2017	1/07/2017	30/06/2017	1/07/2017	8/06/2017	8/06/2017
Sample Type	Field Blank	Field Blank	Field Blank	Rinsate	Rinsate	Trip Blank	Trip Blank

Analyte Group	Analyte	Units	LOR							
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
Organic	Naphthalene	µg/L	5	<5	<5	<5	<5	<5	<5	<5
	4:2 FTS	ng/L	50	<50	<50	<50	<50	<50		
	PFBA	mg/L	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001		
Per- and Polyfluoroalkyl Subst	PFPeA	ng/L	20	50	<20	<20	<20	30		
	Sum of PFAS	µg/L	0.01	0.2	<0.01	<0.01	2.24	0.1		
	Sum of PFAS (WA DER List)	µg/L	0.01	0.2	<0.01	<0.01	2.15	0.1		
	Sum of PFHxS and PFOS	µg/L	0.01	0.15	<0.01	<0.01	1.97	0.07		
	10:2 FTS	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05		
	N-Methyl perfluorooctane sulfonamidoacetic acid (M	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	0.04	<0.02		
	PFHpS	µg/L	0.02	<0.02	<0.02	<0.02	0.05	<0.02		
Perfluorinated Compounds (PFCs)	PFHxS	µg/L	0.02	0.07	<0.02	<0.02	0.28	<0.02		
	N-Ethyl perfluorooctane sulfonamidoacetic acid (Et	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02		
	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	0.05	<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		
	PFTriDA	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		
	PFDoA	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	0.1	<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		
Surfactants	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		
	6:2 FTS	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05		
Total Recoverable Hydrocarbons	PFOA	µg/L	0.01	<0.01	<0.01	<0.01	0.03	<0.01		
	PFOS	µg/L	0.01	0.08	<0.01	<0.01	1.69	0.07		
	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		

Table K-2
Field QA/QC Data - Water Samples (Field Duplicates & Triplicates)

SDG		EP1707076	EP1707076	EP1707076	EP1707076	EP1707076	EP1707076	EP1707076	EP1707076	EP1707076	552886	EP1707076	552886	EP1707076	552886						
Sample ID		MW010_300617	WQ403_300617	RPD	MW06_300617	WQ405_300617	RPD	MW01_010717	WQ409_010717	RPD	MW010_300617	WQ404_300617	RPD	MW06_300617	WQ406_300617	RPD	MW01_010717	WQ4010_010717	RPD		
Sampled Date		30/06/2017	30/06/2017		30/06/2017	30/06/2017		1/07/2017	1/07/2017		30/06/2017	30/06/2017		30/06/2017	30/06/2017		1/07/2017	1/07/2017			
Analyte Group	Analyte	Units	LOR																		
Per- and Polyfluoroalkyl Subst	Sum of PFAS	µg/L	0.01	16800	11200	40	53.9	39.6	31	480	387	21	16800			53.9		480			
	Sum of PFAS (WA DER List)	µg/L	0.01	15600	10400	40	52.7	38.3	32	428	362	17	15600			52.7		428			
	Sum of PFHxS and PFOS	µg/L	0.01	11100	8110	31	47.5	34.9	31	273	263	4	11100			47.5		273			
	10:2 FTS	µg/L	0.05 : 0.01 (Interlab)	<1	<0.05	0	<0.1	<0.05	0	<0.1	<0.05	0	<1	<10	0	<0.1	<0.01	0	<0.1	<5	0
	N-Methyl perfluorooctane sulfonamidoacetic acid (M	µg/L	0.02 : 0.05 (Interlab)	<1	<0.05	0	<0.1	<0.02	0	<0.1	<0.05	0	<1	<10	0	<0.1	<0.05	0	<0.1	<5	0
	PFPeS	µg/L	0.02 : 0.01 (Interlab)	694	609	13	0.87	0.81	7	37.3	17.7	71	694	520	29	0.87	0.46	62	37.3	210	140
	PFHpS	µg/L	0.02 : 0.01 (Interlab)	452	140	105	0.41	0.36	13	15	7.3	69	452	280	47	0.41	0.25	48	15	86	141
	PFHxS	µg/L	0.02 : 0.01 (Interlab)	5570	3330	50	19.4	7.51	88	89.8	82.3	9	5570	2600	73	19.4	5.1	117	89.8	950	165
	N-Ethyl perfluorooctane sulfonamidoacetic acid (Et	µg/L	0.02 : 0.05 (Interlab)	<1	<0.05	0	<0.1	<0.02	0	<0.1	<0.05	0	<1	<10	0	<0.1	<0.05	0	<0.1	<5	0
	C6-C10 fraction	µg/L	20	<20	0	<20	<20	0	<20	0	<20	0	<20	<20	0	<20	0	<20	<20	0	0
Total Recoverable Hydrocarbons	C6-C10 fraction (minus BTEX)(F1)	µg/L	20	<20	0	<20	<20	0	<20	0	<20	0	<20	<20	0	<20	0	<20	<20	0	0
	>C10-C16 fraction	µg/L	100 : 50 (Interlab)	100	110	10	<100	<100	0	<100	<100	0	100	<50	0	<100	<50	0	<100	<50	0
	>C10-C16 (minus Naphthalene)(F2)	µg/L	100 : 50 (Interlab)	100	110	10	<100	<100	0	<100	<100	0	100	<50	0	<100	<50	0	<100	<50	0
	>C16-C34 fraction	µg/L	100	220	200	10	<100	<100	0	<100	<100	0	220	<100	0	<100	<100	0	<100	<100	0
	>C34-C40 fraction	µg/L	100	<100	<100	0	<100	<100	0	<100	<100	0	<100	<100	0	<100	<100	0	<100	<100	0
	>C10-C40 fraction (sum)	µg/L	100	320	310	3	<100	<100	0	<100	<100	0	320	<100	0	<100	<100	0	<100	<100	0
	Benzene	µg/L	1	<1	0	<1	<1	0	<1	0	<1	0	<1	<1	0	<1	<1	0	<1	<1	0
	Toluene	µg/L	2 : 1 (Interlab)	<2	<2	0	<2	<2	0	<2	<2	0	<2	<1	0	<2	<1	0	<2	<1	0
	Ethylbenzene	µg/L	2 : 1 (Interlab)	<2	<2	0	<2	<2	0	<2	<2	0	<2	<1	0	<2	<1	0	<2	<1	0
	m,p-Xylene	µg/L	2	<2	0	<2	<2	0	<2	<2	0	<2	<2	<2	0	<2	<2	0	<2	<2	0
BTEXN	o-Xylene	µg/L	2 : 1 (Interlab)	<2	<2	0	<2	<2	0	<2	<2	0	<2	<1	0	<2	<1	0	<2	<1	0
	Total Xylenes	µg/L	2 : 3 (Interlab)	<2	<2	0	<2	<2	0	<2	<2	0	<2	<3	0	<2	<3	0	<2	<3	0
	Total BTEX	µg/L	1	<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0
	Naphthalene	µg/L	5 : 10 (Interlab)	<5	<5	0	<5	<5	0	<5	<5	0	<5	<10	0	<5	<10	0	<5	<10	0
	6:2 FTS	µg/L	0.05	548	341	47	0.1	<0.05	67	4.3	2.18	65	548	320	53	0.1	<0.05	0	4.3	34	155
	PFOA	µg/L	0.01	391	206	62	0.58	0.48	19	16	7.37	74	391	220	56	0.58	0.32	58	16	75	130
	PFOS	µg/L	0.01	5560	4780	15	28.1	27.4	3	183	181	1	5560	3600	43	28.1	22	24	183	1900	165
	4:2 FTS	mg/L	50 : 10 (Interlab)	11200	4420	87	<100	<50	0	<100	<50	0	11200	<10000	0	<100	<10	0	<100	<5000	0
	PFBA	mg/L	0.0001 : 5e-005 (Interlab)	0.206	0.142	37	0.0011	<0.0001	167	0.0135	0.0056	83	0.206	0.2	3	0.0011	0.00012	161	0.0135	0.077	140
	PFPeA	mg/L	20 : 10 (Interlab)	316000	339000	7	160	310	64	21600	10200	72	316000	260000	19	160	240	40	21600	140000	147
Organic	8:2 FTS	µg/L	0.05 : 0.01 (Interlab)	4.9	3.18	43	<0.1	<0.05	0	0.3	0.16	61	4.9	<10	0	<0.1	0.02	0	0.3	<5	0
	N-Me-FOSE	µg/L	0.05	<2.5	<0.12	0	<0.25	<0.05	0	<0.25	<0.12	0	<2.5	<10	0	<0.25	<0.05	0	<0.25	<5	0
	N-Me-FOSE	µg/L	0.05	<2.5	<0.12	0	<0.25	<0.05	0	<0.25	<0.12	0	<2.5	<10	0	<0.25	<0.05	0	<0.25	<5	0
	FOSE	µg/L	0.02 : 0.05 (Interlab)	<1	0.5	0	<0.1	0.06	0	0.53	0.17	103	<1	<10	0	<0.1	<0.05	0	0.53	<5	0
	PFBS	µg/L	0.02 : 0.01 (Interlab)	946	266	112	0.86	0.67	25	44.3	21.1	71	946	550	53	0.86	0.42	69	44.3	230	135
	PFDS	µg/L	0.02 : 0.01 (Interlab)	<1	<0.05	0	<0.1	<0.02	0	<0.1	<0.05	0	<1	<10	0	<0.1	<0.01	0	<0.1	<5	0
	PFTeDA	µg/L	0.05 : 0.01 (Interlab)	<2.5	<0.12	0	<0.25	<0.05	0	<0.25	<0.12	0	<2.5	<10	0	<0.25	<0.01	0	<0.25	<5	0
	PFTfDA	µg/L	0.02 : 0.01 (Interlab)	<1	<0.05	0	<0.1	<0.02	0	<0.1	<0.05	0	<1	<10	0	<0.1	<0.01	0	<0.1	<5	0
	N-Et-FOSE	µg/L	0.05	<2.5	<0.12	0	<0.25	<0.05	0	<0.25	<0.12	0	<2.5	<10	0	<0.25	<0.05	0	<0.25	<5	0
	PFDoA	µg/L	0.02 : 0.01 (Interlab)	<1	<0.05	0	<0.1	<0.02	0	<0.1	<0.05	0	<1	<10	0	<0.1	<0.01	0	<0.1	<5	0
Perfluorinated Compounds (PFCs)	N-Et-FOSE	µg/L	0.05	<2.5	<0.12	0	<0.25	<0.05	0	<0.25	<0.12	0	<2.5	<10	0	<0.25	<0.05	0	<0.25	<5	0
	PFDoA	µg/L	0.02 : 0.01 (Interlab)	<1	<0.05	0	<0.1	<0.02	0	<0.1	<0.05	0	<1	<10	0	<0.1	<0.01	0	<0.1	<5	0
	PFHpA	µg/L	0.02 : 0.01 (Interlab)	193	110	55	0.21	0.23	9	10.1	4.72	73	193	130	39	0.21	0.14	40	10.1	46	128
	PFHxA	µg/L	0.02 : 0.01 (Interlab)	1870	910	69	2.15	1.74	21	44.7	47.6	6	1870	1300	36	2.15	1.5	36	44.7	690	176
	N-Et-FOSE	µg/L	0.05	<2.5	<0.12	0	<0.25	<0.05	0	<0.25	<0.12	0	<2.5	<10	0	<0.25	<0.05	0	<0.25	<5	0
	PFDoA	µg/L	0.02 : 0.01 (Interlab)	<1	<0.05	0	<0.1	<0.02	0	<0.1	<0.05	0	<1	<10	0	<0.1	<0.01	0	<0.1	<5	0
	PFNA	µg/L	0.02 : 0.01 (Interlab)	1.6	0.92	54	<0.1	0.02	0	0.15	<0.05	100	1.6	<10	0	<0.1	<0.01	0	0.15	<5	0
	PFUnA	µg/L	0.02 : 0.01 (Interlab)	<1	<0.05	0	<0.1	<0.02	0	<0.1	<0.05	0	<1	<10	0	<0.1	<0.01	0	<0.1	<5	0

*RPDs have only been considered where a concentration is greater than 1 times the EQL

**High RPDs are in bold (Acceptable RPDs for each EQL multiplier range are: 30 (1-10 x EQL); 30 (10-20 x EQL); 30 (> 20 x EQL))

***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory

Table K-3
Field QAQC Data - Soil Samples

SDG	EP1707039	EP1707039	EP1707039
Field ID	SSQA01_210617	SSQA06_220617	SSQA011_230617
Sampled_Date/Time	21/06/2017 15:00	22/06/2017 15:00	23/06/2017 15:00
Sample Type	Field_B	Field_B	Field_B

Chem_Gr	ChemNam	Units	EQL			
Organic	4:2 FTS	ng/L	50	<50	<50	<50
	PFBA	mg/L	0.0001	<0.0001	<0.0001	<0.0001
	PFPeA	ng/L	20	<20	<20	<20
Per- and P	Sum of PF	µg/L	0.01	<0.01	<0.01	0.06
	Sum of PF	µg/L	0.01	<0.01	<0.01	0.06
	Sum of PF	µg/L	0.01	<0.01	<0.01	0.06
	10:2 FTS	µg/L	0.05	<0.05	<0.05	<0.05
	N-Methyl p	µg/L	0.02	<0.02	<0.02	<0.02
	PFPeS	µg/L	0.02	<0.02	<0.02	<0.02
	PFHpS	µg/L	0.02	<0.02	<0.02	<0.02
	PFHxS	µg/L	0.02	<0.02	<0.02	0.03
	N-Ethyl pe	µg/L	0.02	<0.02	<0.02	<0.02
Perfluorina	8:2 FTS	µg/L	0.05	<0.05	<0.05	<0.05
	N-Me-FOS	µg/L	0.05	<0.05	<0.05	<0.05
	N-Me-FOS	µg/L	0.05	<0.05	<0.05	<0.05
	FOSA	µg/L	0.02	<0.02	<0.02	<0.02
	PFBS	µg/L	0.02	<0.02	<0.02	<0.02
	PFDS	µg/L	0.02	<0.02	<0.02	<0.02
	PFTeDA	µg/L	0.05	<0.05	<0.05	<0.05
	PFTrDA	µg/L	0.02	<0.02	<0.02	<0.02
	N-Et-FOS	µg/L	0.05	<0.05	<0.05	<0.05
	PFDCa	µg/L	0.02	<0.02	<0.02	<0.02
	PFHpA	µg/L	0.02	<0.02	<0.02	<0.02
	PFHxA	µg/L	0.02	<0.02	<0.02	<0.02
	N-Et-FOS	µg/L	0.05	<0.05	<0.05	<0.05
	PFDoA	µg/L	0.02	<0.02	<0.02	<0.02
	PFNA	µg/L	0.02	<0.02	<0.02	<0.02
	PFUnA	µg/L	0.02	<0.02	<0.02	<0.02
Surfactant	6:2 FTS	µg/L	0.05	<0.05	<0.05	<0.05
	PFOA	µg/L	0.01	<0.01	<0.01	<0.01
	PFOS	µg/L	0.01	<0.01	<0.01	0.03

Table K-4
Field QA/QC Data - Soil Samples (Field Duplicates & Triplicates)

Field QA/QC Data - Soil Samples (Field Duplicates & Triplicates)																																														
		SDG	EP1707039				EP1707039				EP1707039				EP1707039				EP1707039				EP1707039				552888				EP1707039				552888				EP1707039				552888			
		Field ID	SS15_0.1_220617	SSQA08_220617	RPD	SS17_0.1_230617	SSQA013_230617	RPD	SS23_0.1_230617	SSQA015_230617	RPD	SS24_0.1_230617	SSQA017_230617	RPD	SS17_0.1_230617	SSQA014_230617	RPD	SS17_0.1_230617	SSQA014_230617	RPD	SS23_0.1_230617	SSQA016_230617	RPD	SS23_0.1_230617	SSQA016_230617	RPD	SS24_0.1_230617	SSQA018_230617	RPD	SS24_0.1_230617	SSQA018_230617	RPD														
		Sampled	22/06/2017 15:00	22/06/2017 15:00		23/06/2017 15:00	23/06/2017 15:00		23/06/2017 15:00	23/06/2017 15:00		23/06/2017 15:00	23/06/2017 15:00		23/06/2017 15:00	23/06/2017 15:00		23/06/2017 15:00	23/06/2017 15:00		23/06/2017 15:00	23/06/2017 15:00		23/06/2017 15:00	23/06/2017 15:00		23/06/2017 15:00	23/06/2017 15:00		23/06/2017 15:00	23/06/2017 15:00															
Chem. Gr	ChemName	Units	EQL																																											
Per- and P	Sum of PF	mg/kg	0.0002	0.276	0.525	62	0.006	0.0048	22	0.0264	0.0445	51	0.212	0.156	30	0.006						0.0264							0.212																	
	Sum of PF	mg/kg	0.0002	0.274	0.522	62	0.006	0.0048	22	0.026	0.0428	49	0.205	0.151	30	0.006						0.026							0.205																	
	Sum of PF	mg/kg	0.0002	0.271	0.519	63	0.006	0.0048	22	0.026	0.0402	43	0.203	0.15	30	0.006						0.026							0.203																	
	10:2 FTS	mg/kg	0.0005 : 0	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.005	0	<0.0005	<0.005	0	<0.0005	<0.005	0	<0.0005	<0.005	0	<0.0005	<0.005	0													
	N-Methyl p	mg/kg	0.0002 : 0	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.01	0	<0.0002	<0.01	0	<0.0002	<0.01	0	<0.0002	<0.01	0	<0.0002	<0.01	0	<0.0002	<0.01	0													
	PFPeS	mg/kg	0.0002 : 0	0.0005	0.0006	18	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.005	0	<0.0002	<0.005	0	<0.0002	<0.005	0	<0.0002	<0.005	0													
	PFHpS	mg/kg	0.0002 : 0	0.001	0.0008	22	<0.0002	<0.0002	0	<0.0002	<0.0002	0	0.0027	0.0018	40	<0.0002	<0.005	0	<0.0002	<0.005	0	<0.0002	<0.005	0	<0.0002	<0.005	0	0.0027	<0.005	<0.0002	<0.005	0														
	PFHxS	mg/kg	0.0002 : 0	0.003	0.003	0	0.0003	0.0003	0	0.0003	0.0007	80	0.0036	0.0025	36	0.0003	<0.005	0	0.0003	<0.005	0	0.0003	<0.005	0	0.0003	<0.005	0	0.0036	<0.005	<0.0002	<0.005	0														
	N-Ethyl pe	mg/kg	0.0002 : 0	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.01	0	<0.0002	<0.01	0	<0.0002	<0.01	0	<0.0002	<0.01	0	<0.0002	<0.01	0	<0.0002	<0.01	0													
	Physico-Ch	Moisture C %		1	4.4	5.1	15	7.6	7.6	0	2.3	2.3	0	3.5	3.7	6	7.6	7.1	7	2.3	1.3	56	3.5	2.5																						
Surfactant	6:2 FTS	mg/kg	0.0005 : 0	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.01	0	<0.0005	<0.01	0	<0.0005	<0.01	0	<0.0005	<0.01	0	<0.0005	<0.01	0	<0.0005	<0.01	0													
	PFOA	mg/kg	0.0002 : 0	0.0014	0.0014	0	<0.0002	<0.0002	0	<0.0002	0.0003	40	0.0015	0.0011	31	<0.0002	<0.005	0	<0.0002	<0.005	0	<0.0002	<0.005	0	<0.0002	<0.005	0	0.0015	<0.005	<0.0002	<0.005	0														
	PFOS	mg/kg	0.0002 : 0	0.268	0.516	63	0.0057	0.0045	24	0.0257	0.0395	42	0.199	0.147	30	0.0057	0.0053	7	0.0257	0.0069	115	0.199	0.12																							
Organic	4:2 FTS	mg/kg	0.0005 : 0	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.005	0	<0.0005	<0.005	0	<0.0005	<0.005	0	<0.0005	<0.005	0	<0.0005	<0.005	0													
	PFBA	mg/kg	0.001 : 0	<0.001	<0.001	0	<0.001	<0.001	0	<0.001	<0.001	0	<0.001	<0.001	0	<0.001	<0.001	0	<0.001	<0.005	0	<0.001	<0.005	0	<0.001	<0.005	0	<0.001	<0.005	0	<0.001	<0.005	0													
	PFPeA	mg/kg	0.0002 : 0	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.005	0	<0.0002	<0.005	0	<0.0002	<0.005	0	<0.0002	<0.005	0													
Perfluorine	8:2 FTS	mg/kg	0.0005 : 0	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	0.0015	100	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.005	0	<0.0005	<0.005	0	<0.0005	<0.005	0	<0.0005	<0.005	0	<0.0005	<0.005	0													
	N-Me-FOS	mg/kg	0.0005 : 0	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.005	0	<0.0005	<0.005	0	<0.0005	<0.005	0	<0.0005	<0.005	0	<0.0005	<0.005	0													
	N-Me-FOS	mg/kg	0.0005 : 0	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.005	0	<0.0005	<0.005	0	<0.0005	<0.005	0	<0.0005	<0.005	0	<0.0005	<0.005	0													
	FOSA	mg/kg	0.0002 : 0	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.0004	67	0.0004	0.0003	29	<0.0002	<0.005	0	<0.0002	<0.005	0	<0.0002	<0.005	0	<0.0002	<0.005	0	<0.0002	<0.005	0	<0.0002	<0.005	0													
	PFBS	mg/kg	0.0002 : 0	0.0003	0.0007	80	<0.0002	<0.0002	0	<0.0002	<0.0002	0	0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.005	0	<0.0002	<0.005	0	<0.0002	<0.005	0	<0.0002	<0.005	0	0.0002	<0.005	0													
	PFDS	mg/kg	0.0002 : 0	0.0007	0.0007	0	<0.0002	<0.0002	0	0.0004	0.0006	40	<0.0002	<0.0002	0	<0.0002	<0.005	0	0.0004	<0.005	0	0.0004	<0.005	0	<0.0002	<0.005	0	<0.0002	<0.005	0	<0.0002	<0.005	0													
	PFTeDA	mg/kg	0.0005 : 0	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.005	0	<0.0005	<0.005	0	<0.0005	<0.005	0	<0.0005	<0.005	0													
	PFTIDA	mg/kg	0.0002 : 0	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.005	0	<0.0002	<0.005	0	<0.0002	<0.005	0	<0.0002	<0.005	0	<0.0002	<0.005	0													
	N-Et-FOS	mg/kg	0.0005 : 0	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.005	0	<0.0005	<0.005	0	<0.0005	<0.005	0	<0.0005	<0.005	0													
	PFDA	mg/kg	0.0002 : 0	<0.0002	0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.005	0	<0.0002	<0.005	0	<0.0002	<0.005	0	<0.0002	<0.005	0	<0.0002	<0.005	0													
	PFHpA	mg/kg	0.0002 : 0	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.005	0	<0.0002	<0.005	0	<0.0002	<0.005	0	<0.0002	<0.005	0	<0.0002	<0.005	0													
	PFHxA	mg/kg	0.0002 : 0	0.0008	0.0014	55	<0.0002	<0.0002	0	<0.0002	<0.0003	40	0.0007	0.0006	15	<0.0002	<0.005	0	<0.0002	<0.005	0	<0.0002	<0.005	0	<0.0002	<0.005	0	<0.0002	<0.005	0	0.0007	<0.005	0													
	N-Et-FOS	mg/kg	0.0005 : 0	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.005	0	<0.0005	<0.005	0	<0.0005	<0.005	0	<0.0005	<0.005	0	<0.0005	<0.005	0													
	PFDoA	mg/kg	0.0002 : 0	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.005	0	<0.0002	<0.005	0	<0.0002	<0.005	0	<0.0002	<0.005	0	<0.0002	<0.005	0													
	PFNA	mg/kg	0.0002 : 0	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.0002	0	0.0002	0.0004	67	0.0034	0.0027	23	<0.0002	<0.005	0	<0.0002	<0.005	0	<0.0002	<0.005	0	<0.0002	<0.005	0	0.0034	<0.005	0													
	PFUnA	mg/kg	0.0002 : 0	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.005	0	<0.0002	<0.005	0	<0.0002	<0.005	0	<0.0002	<0.005	0	<0.0002	<0.005	0													

*RPDs have only been considered where a concentration is greater than 1 times the EQL.

**High RPDs are in bold (Acceptable RPDs for each EQL multiplier range are: 30 (1-10 x EQL); 30 (10-20 x EQL); 30 (> 20 x EQL))

***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory

Table K-5
Field QAQC Data - Sediment Sample (Field Duplicates)

SDG	EP1707076	EP1707076		EP1707076	EP1707076
Sample ID	SED01_010717	SEDQA01_010717	RPD	SED01_010717	SEDQA02_010717
Sample Date	1/07/2017	1/07/2017		1/07/2017	1/07/2017

Analyte Group	Analyte	Units	LOR						
Per- and Polyfluoroalkyl Subst	Sum of PFAS	mg/kg	0.0002	2.21	2.51	13	2.21	2.92	28
	Sum of PFAS (WA DER List)	mg/kg	0.0002	2.16	2.42	11	2.16	2.86	28
	Sum of PFHxS and PFOS	mg/kg	0.0002	1.98	2.16	9	1.98	2.66	29
	10:2 FTS	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.0005	0
	N-Methyl perfluorooctane sulfonamidoacetic acid (M	mg/kg	0.0002	<0.0005	<0.0005	0	<0.0005	<0.0005	0
	PFPeS	mg/kg	0.0002	0.0247	0.044	56	0.0247	0.0327	28
	PFHpS	mg/kg	0.0002	0.026	0.0417	46	0.026	0.0273	5
	PFHxS	mg/kg	0.0002	0.174	0.299	53	0.174	0.22	23
	N-Ethyl perfluorooctane sulfonamidoacetic acid (Et	mg/kg	0.0002	<0.0005	<0.0005	0	<0.0005	<0.0005	0
Total Recoverable Hydrocarbons	C6-C10 fraction	mg/kg	10	<10	<10	0	<10	<10	0
	C6-C10 fraction (minus BTEX)(F1)	mg/kg	10	<10	<10	0	<10	<10	0
	>C10-C16 fraction	mg/kg	50	<50	<50	0	<50	<50	0
	>C10-C16 (minus Naphthalene)(F2)	mg/kg	50	<50	<50	0	<50	<50	0
	>C16-C34 fraction	mg/kg	100	<100	<100	0	<100	<100	0
	>C34-C40 fraction	mg/kg	100	<100	<100	0	<100	<100	0
	>C10-C40 fraction (sum)	mg/kg	50	<50	<50	0	<50	<50	0
BTEXN	Benzene	mg/kg	0.2	<0.2	<0.2	0	<0.2	<0.2	0
	Toluene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0
	Ethylbenzene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0
	m&p-Xylene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0
	o-Xylene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0
	Total Xylenes	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0
	Total BTEX	mg/kg	0.2	<0.2	<0.2	0	<0.2	<0.2	0
	Naphthalene	mg/kg	1	<1	<1	0	<1	<1	0
Physico-Chemical Parameters	Moisture Content	%	1	30	23.2	26	30	24	22
Surfactants	6:2 FTS	mg/kg	0.0005	0.0253	0.0432	52	0.0253	0.0313	21
	PFOA	mg/kg	0.0002	0.0219	0.0348	46	0.0219	0.0247	12
	PFOS	mg/kg	0.0002	1.81	1.86	3	1.81	2.44	30
Organic	4:2 FTS	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.0005	0
	PFBA	mg/kg	0.001	<0.001	<0.001	0	<0.001	<0.001	0
	PFPeA	mg/kg	0.0002	0.0073	0.0143	65	0.0073	0.008	9
Perfluorinated Compounds (PFCs)	8:2 FTS	mg/kg	0.0005	0.0227	0.0478	71	0.0227	0.0474	70
	N-Me-FOSA	mg/kg	0.0005	<0.0012	<0.0012	0	<0.0012	<0.0012	0
	N-Me-FOSE	mg/kg	0.0005	<0.0012	<0.0012	0	<0.0012	<0.0012	0
	FOSA	mg/kg	0.0002	<0.0005	<0.0005	0	<0.0005	<0.0005	0
	PFBS	mg/kg	0.0002	0.0249	0.03	19	0.0249	0.0214	15
	PFDS	mg/kg	0.0002	<0.0005	<0.0005	0	<0.0005	<0.0005	0
	PFTeDA	mg/kg	0.0005	<0.0012	<0.0012	0	<0.0012	<0.0012	0
	PFTTrDA	mg/kg	0.0002	<0.0005	<0.0005	0	<0.0005	0.0005	0
	N-Et-FOSA	mg/kg	0.0005	<0.0012	<0.0012	0	<0.0012	<0.0012	0
	PFDCa	mg/kg	0.0002	<0.0005	<0.0005	0	<0.0005	<0.0005	0
	PFHpA	mg/kg	0.0002	0.0072	0.0124	53	0.0072	0.0096	29
	PFHxA	mg/kg	0.0002	0.0639	0.0802	23	0.0639	0.0566	12
	N-Et-FOSE	mg/kg	0.0005	<0.0012	<0.0012	0	<0.0012	<0.0012	0
	PFDoA	mg/kg	0.0002	<0.0005	<0.0005	0	<0.0005	<0.0005	0
	PFNA	mg/kg	0.0002	<0.0005	0.0017	0	<0.0005	0.0017	0
	PFUnA	mg/kg	0.0002	<0.0005	<0.0005	0	<0.0005	<0.0005	0

*RPDs have only been considered where a concentration is greater than 1 times the EQL.

**High RPDs are in bold (Acceptable RPDs for each EQL multiplier range are: 30 (1-10 x EQL); 30 (10-20 x EQL); 30 (> 20 x EQL))

***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory

Appendix L

Laboratory Documentation



CON NOTE: TOLL
IPEC

AECOM

CHAIN OF CUSTODY		TURNAROUND REQUIREMENTS : Standard TAT (List due date):		FOR LABORATORY USE ONLY (Circle)	
CLIENT: AECOM Services Pty Ltd		Project Number: 60543717.2.3		Custody Seal Intact?	
OFFICE: Level 8, 3 Forrest Place, Perth, WA, 6000		QUOTE NO.: EN/094/16		Free ice / frozen ice bricks present upon receipt?	
PROJECT: Kariakia Airport Limited Investigation		CONTACT PH: [REDACTED]		Random Sample Temperature on Receipt?	
Purchase Order NO.: 60543717.2.3		SAMPLER M: [REDACTED]		Other comment:	
PROJECT MANAGER: [REDACTED]		EDD FORMAT (or default): Endat		RECEIVED BY:	
SAMPLER: [REDACTED]		DATE/TIME:		DATE/TIME:	
Email Reports to: [REDACTED]		DATE/TIME:		DATE/TIME:	
Email Invoices to (will default to PM if no other addresses are listed): AECOM Accounts		DATE/TIME:		DATE/TIME:	

PLEASE FORWARD THE FOLLOWING SAMPLES TO EUROFINS LABORATORIES: SSQA014_230617, SQA016_230617, SQA018_230617 and SSQA07_220617 for analysis of ER231 (DER recommended PFAS suite)

LAB ID	Area	SAMPLE ID	DATE	TIME	MATRIX	TOTAL BOTTLES	EP231 (DER recommended PFAS suite)	S-4 TPN/ TRN (C-436 or 435/ ATEN) plus F2, F2	S-16/ W-16 TPN/ TRN (C-436 or 435/ ATEN) plus F2, F2	ON HOLD	Comments
1	APEC 1/2 - Offsets	SS06_0.1_210617	21.06.17		S						
2	APEC 1/2 - Offsets	SS06_0.5_210617	21.06.17		S						
3	APEC 1/2 - Offsets	SS06_1.1_210617	21.06.17		S						
4	APEC 1	SS06_0.1_210617	21.06.17		S						
5	APEC 1	SS06_0.5_210617	21.06.17		S						
6	APEC 1	SS06_1.1_210617	21.06.17		S						
7	APEC 1	SS06_0.1_210617	21.06.17		S						
8	APEC 1	SS06_0.5_210617	21.06.17		S						
9	APEC 1	SS06_1.1_210617	21.06.17		S						
10	APEC 1	SS06_0.1_210617	21.06.17		S						
11	APEC 1	SS06_0.5_210617	21.06.17		S						
12	APEC 1	SS06_1.1_210617	21.06.17		S						
13	APEC 1	SS06_0.1_210617	21.06.17		S						
14	APEC 1	SS06_0.5_210617	21.06.17		S						
15	APEC 1	SS06_1.1_210617	21.06.17		S						
16	APEC 1	SS06_0.1_210617	21.06.17		S						
17	APEC 1	SS06_0.5_210617	21.06.17		S						
18	APEC 1	SS06_1.1_210617	21.06.17		S						
19	APEC 1	SS06_0.1_210617	21.06.17		S						
20	APEC 1	SS06_0.5_210617	21.06.17		S						
21	APEC 1	SS06_1.1_210617	21.06.17		S						
22	APEC 1	SS06_0.1_210617	21.06.17		S						
23	APEC 1	SS06_0.5_210617	21.06.17		S						
24	APEC 1	SS06_1.1_210617	21.06.17		S						
25	APEC 1	SS06_0.1_210617	21.06.17		S						
26	APEC 1	SS06_0.5_210617	21.06.17		S						
27	APEC 1	SS06_1.1_210617	21.06.17		S						
28	APEC 1	SS06_0.1_210617	21.06.17		S						
29	APEC 1	SS06_0.5_210617	21.06.17		S						
30	APEC 1	SS06_1.1_210617	21.06.17		S						
31	APEC 1	SS06_0.1_210617	21.06.17		S						
32	APEC 1	SS06_0.5_210617	21.06.17		S						
33	APEC 1	SS06_1.1_210617	21.06.17		S						
34	APEC 1	SS06_0.1_210617	21.06.17		S						
35	APEC 1	SS06_0.5_210617	21.06.17		S						
36	APEC 1	SS06_1.1_210617	21.06.17		S						
37	APEC 1	SS06_0.1_210617	21.06.17		S						
38	APEC 1	SS06_0.5_210617	21.06.17		S						
39	APEC 1	SS06_1.1_210617	21.06.17		S						
40	APEC 1	SS06_0.1_210617	21.06.17		S						
41	APEC 1	SS06_0.5_210617	21.06.17		S						
42	APEC 1	SS06_1.1_210617	21.06.17		S						
43	APEC 1	SS06_0.1_210617	21.06.17		S						
44	APEC 1	SS06_0.5_210617	21.06.17		S						
45	APEC 1	SS06_1.1_210617	21.06.17		S						
46	APEC 1	SS06_0.1_210617	21.06.17		S						
47	APEC 1	SS06_0.5_210617	21.06.17		S						
48	APEC 1	SS06_1.1_210617	21.06.17		S						
49	APEC 1	SS06_0.1_210617	21.06.17		S						
50	APEC 1	SS06_0.5_210617	21.06.17		S						
51	APEC 1	SS06_1.1_210617	21.06.17		S						
52	APEC 1	SS06_0.1_210617	21.06.17		S						
53	APEC 1	SS06_0.5_210617	21.06.17		S						
54	APEC 1	SS06_1.1_210617	21.06.17		S						
55	APEC 1	SS06_0.1_210617	21.06.17		S						
56	APEC 1	SS06_0.5_210617	21.06.17		S						
57	APEC 1	SS06_1.1_210617	21.06.17		S						
58	APEC 1	SS06_0.1_210617	21.06.17		S						
59	APEC 1	SS06_0.5_210617	21.06.17		S						
60	APEC 1	SS06_1.1_210617	21.06.17		S						
61	APEC 1	SS06_0.1_210617	21.06.17		S						
62	APEC 1	SS06_0.5_210617	21.06.17		S						
63	APEC 1	SS06_1.1_210617	21.06.17		S						
64	APEC 1	SS06_0.1_210617	21.06.17		S						
65	APEC 1	SS06_0.5_210617	21.06.17		S						
66	APEC 1	SS06_1.1_210617	21.06.17		S						
67	APEC 1	SS06_0.1_210617	21.06.17		S						
68	APEC 1	SS06_0.5_210617	21.06.17		S						
69	APEC 1	SS06_1.1_210617	21.06.17		S						
70	APEC 1	SS06_0.1_210617	21.06.17		S						
71	APEC 1	SS06_0.5_210617	21.06.17		S						
72	APEC 1	SS06_1.1_210617	21.06.17		S						
73	APEC 1	SS06_0.1_210617	21.06.17		S						
74	APEC 1	SS06_0.5_210617	21.06.17		S						
75	APEC 1	SS06_1.1_210617	21.06.17		S						
76	APEC 1	SS06_0.1_210617	21.06.17		S						
77	APEC 1	SS06_0.5_210617	21.06.17		S						
78	APEC 1	SS06_1.1_210617	21.06.17		S						
79	APEC 1	SS06_0.1_210617	21.06.17		S						
80	APEC 1	SS06_0.5_210617	21.06.17		S						
81	APEC 1	SS06_1.1_210617	21.06.17		S						
82	APEC 1	SS06_0.1_210617	21.06.17		S						
83	APEC 1	SS06_0.5_210617	21.06.17		S						
84	APEC 1	SS06_1.1_210617	21.06.17		S						
85	APEC 1	SS06_0.1_210617	21.06.17		S						
86	APEC 1	SS06_0.5_210617	21.06.17		S						
87	APEC 1	SS06_1.1_210617	21.06.17		S						
88	APEC 1	SS06_0.1_210617	21.06.17		S						
89	APEC 1	SS06_0.5_210617	21.06.17		S						
90	APEC 1	SS06_1.1_210617	21.06.17		S						
91	APEC 1	SS06_0.1_210617	21.06.17		S						
92	APEC 1	SS06_0.5_210617	21.06.17		S						
93	APEC 1	SS06_1.1_210617	21.06.17		S						
94	APEC 1	SS06_0.1_210617	21.06.17		S						
95	APEC 1	SS06_0.5_210617	21.06.17		S						
96	APEC 1	SS06_1.1_210617	21.06.17		S						
97	APEC 1	SS06_0.1_210617	21.06.17		S						
98	APEC 1	SS06_0.5_210617	21.06.17		S						
99	APEC 1	SS06_1.1_210617	21.06.17		S						
100	APEC 1	SS06_0.1_210617	21.06.17		S						
101	APEC 1	SS06_0.5_210617	21.06.17		S						
102	APEC 1	SS06_1.1_210617	21.06.17		S						
103	APEC 1	SS06_0.1_210617	21.06.17		S						
104	APEC 1	SS06_0.5_210617	21.06.17		S						
105	APEC 1	SS06_1.1_210617	21.06.17		S						
106	APEC 1	SS06_0.1_210617	21.06.17		S						
107	APEC 1	SS06_0.5_210617	21.06.17		S						
108	APEC 1	SS06_1.1_210617	21.06.17		S						
109	APEC 1	SS06_0.1_210617	21.06.17		S						
110	APEC 1	SS06_0.5_210617	21.06.17		S						
111	APEC 1	SS06_1.1_210617	21.06.17		S						
112	APEC 1	SS06_0.1_210617	21.06.17		S						
113	APEC 1	SS06_0.5_210617	21.06.17		S						
114	APEC 1	SS06_1.1_210617	21.06.17		S						
115	APEC 1	SS06_0.1_210617	21.06.17		S						
116	APEC 1	SS06_0.5_210617	21.06.17		S						
117	APEC 1	SS06_1.1_210617	21.06.17		S						
118	APEC 1	SS06_0.1_210617	21.06.17		S						
119	APEC 1	SS06_0.5_210617	21.06.17		S						
120	APEC 1	SS06_1.1_210617	21.06.17		S						
121	APEC 1	SS06_0.1_210617	21.06.17		S						
122	APEC 1	SS06_0.5_210617	21.06.17		S						
123	APEC 1	SS06_1.1_210617	21.06.17		S						
124	APEC 1	SS06_0.1_210617	21.06.17		S						
125	APEC 1	SS06_0.5_210617	21.06.17		S						
126	APEC 1	SS06_1.1_210617	21.06.17		S						
127	APEC 1	SS06_0.1_210617	21.06.17		S						
128	APEC 1	SS06_0.5_210617	21.06.17		S						
129	APEC 1	SS06_1.1_210617	21.06.17		S						
130	APEC 1	SS06_0.1_210617	21.06.17		S						
131	APEC 1	SS06_0.5_210617	21.06.17		S						
132	APEC 1	SS06_1.1_210617	21.06.17		S						
133	APEC 1	SS06_0.1_210617	21.06.17		S						
134											



CON NOTE: TOLL
IPEC

AECOM

CHAIN OF CUSTODY		TURNAROUND REQUIREMENTS : Standard TAT (List due date):		FOR LABORATORY USE ONLY (Circle)	
CLIENT: AECOM Services Pty Ltd.		Project Number: 60543717.2.3		Custody Seal Intact?	
OFFICE: Level 6, 3 Forrest Place, Perth, WA, 8006		ALS QUOTE NO:		Free ice / frozen ice bricks present upon receipt?	
PROJECT: Kenetia Airport Limited Investigation		QUOTE NO: EN / 004 / 16		Random Sample Temperature on Receipt:	
Purchase Order NO: 60543717.2.3		COUNTRY OF ORIGIN: Australia		Other comment:	
PROJECT MANAGER: [REDACTED]		CONTACT PH: [REDACTED]		COC SEQUENCE NUMBER (Circle): 1	
SAMPLER: [REDACTED]		SAMPLER MO: [REDACTED]		COC: 1	
COC Emailed to ALS? YES		EDD FORMAT (or default): E-wet		RELINQUISHED BY: [REDACTED]	
Email Reports to: [REDACTED]		DATE/TIME: [REDACTED]			
Email Invoice to (will default to PM if no other addresses are listed): AECOM Accounts					

PLEASE FORWARD THE FOLLOWING SAMPLES TO EUROFINS LABORATORIES: SSQA014_230617, SQA016_230617, SQA018_230617 and SSQA07_220617 for analysis of ER231 (DER recommended PFAS suite)

LAB ID	Area	SAMPLE ID	DATE	TIME	MATRIX	TOTAL BOTTLES	EP231 (DER recommended PFAS suite)	S-4 TPH/ TRH (C6 - C10 w/ H2 STEAM plus PL 12)	S-18/ W-18 TPH/ TRH (C6 - C10 w/ H2 STEAM plus PL 12, F2)	ON HOLD	Comments
1	APEC 1/2 - Off-site	SS09_0.1_210517	21.05.17		S		X				
2	APEC 1/2 - Off-site	SS09_0.5_210517	21.05.17		S				X		
3	APEC 1/2 - Off-site	SS09_1.1_210517	21.05.17		S		X				
4	APEC 1	SS09_0.1_210517	21.05.17		S		X				
5	APEC 1	SS09_0.5_210517	21.05.17		S				X		
6	APEC 1	SS09_2.5_210517	21.05.17		S		X				
7	APEC 1	SS05_0.1_210517	21.05.17		S		X				
8	APEC 1	SS05_0.5_210517	21.05.17		S				X		
9	APEC 1	SS05_2.5_210517	21.05.17		S		X				
10	APEC 1	SS04_0.1_210517	21.05.17		S		X				
11	APEC 1	SS04_0.5_210517	21.05.17		S				X		
12	APEC 1	SS04_2.5_210517	21.05.17		S		X				
13	APEC 1	SS03_0.1_210517	21.05.17		S		X				
14	APEC 1	SS03_0.5_220517	22.05.17		S				X		
15	APEC 1	SS03_2.5_220517	22.05.17		S		X				
16	APEC 1	SS02_0.1_220517	22.05.17		S		X				
17	APEC 1	SS02_0.5_220517	22.05.17		S				X		
18	APEC 1	SS02_2.5_220517	22.05.17		S		X				
19	APEC 1	SS01_0.1_220517	22.05.17		S		X				
20	APEC 1	SS01_0.5_220517	22.05.17		S				X		
21	APEC 1	SS01_2.5_220517	22.05.17		S		X				
22	QAQC	SSQA07_210617	21.05.17		S				X		
23	QAQC	SSQA09_210617	21.05.17		S				X		
24	QAQC	SSQA04_210617	21.05.17		S				X		
25	QAQC	SSQA03_210617	21.05.17		S				X		
26	APEC 2	SS12_0.1_210517	21.05.17		S		X				
27	APEC 2	SS12_0.5_210517	21.05.17		S				X		
28	APEC 2	SS12_2.5_210517	21.05.17		S		X				
29	APEC 2	SS12_0.1_210517	21.05.17		S		X				
30	APEC 2	SS12_0.5_210517	21.05.17		S				X		
31	APEC 2	SS12_2.5_210517	21.05.17		S		X				
32	APEC 2	SS13_0.1_210517	21.05.17		S		X				
33	APEC 2	SS13_0.5_210517	21.05.17		S				X		
34	APEC 2	SS13_2.5_210517	21.05.17		S		X				
35	APEC 2	SS14_0.1_220517	22.05.17		S		X				
36	APEC 2	SS14_0.5_220517	22.05.17		S				X		
37	APEC 2	SS14_2.5_220517	22.05.17		S		X				
38	APEC 2	SS11_0.1_220517	22.05.17		S		X				
39	APEC 2	SS11_0.5_220517	22.05.17		S				X		
40	QAQC	SSQA07_220617	22.05.17		S				X		
41	QAQC	SSQA09_220617	22.05.17		S				X		
42	QAQC	SSQA03_220617	22.05.17		S				X		
43	APEC 2 - Off-site	SS15_0.1_220617	22.05.17		S		X				
44	APEC 2 - Off-site	SS15_0.5_220617	22.05.17		S				X		
45	APEC 2 - Off-site	SS15_2.5_220617	22.05.17		S		X				
46	APEC 2 - Off-site	SS16_0.1_220617	22.05.17		S		X				
47	APEC 2 - Off-site	SS16_0.5_220617	22.05.17		S				X		
48	WWTP	SS26_0.1_220517	22.05.17		S		X				
49	WWTP	SS26_0.5_220517	22.05.17		S				X		
50	WWTP	SS26_2.5_220517	22.05.17		S		X				
51	APEC 3	SS25_0.1_230617	23.05.17		S		X				
52	APEC 3	SS25_0.5_230617	23.05.17		S				X		
53	APEC 3	SS25_2.5_230617	23.05.17		S		X				
54	APEC 3	SS20_0.1_230617	23.05.17		S		X				
55	APEC 3	SS20_0.5_230617	23.05.17		S				X		
56	APEC 3	SS20_2.5_230617	23.05.17		S		X				
57	APEC 3	SS21_0.1_230617	23.05.17		S		X				
58	APEC 3	SS21_0.5_230617	23.05.17		S				X		
59	APEC 3	SS21_2.5_230617	23.05.17		S		X				
60	APEC 3	SS22_0.1_230617	23.05.17		S		X				
61	APEC 3	SS22_0.5_230617	23.05.17		S				X		
62	APEC 3	SS22_2.5_230617	23.05.17		S		X				
63	APEC 3	SS19_0.1_230617	23.05.17		S		X				Has out of sample jars - please do used for TCO, unless being removed from lot
64	APEC 3	SS19_0.5_230617	23.05.17		S				X		
65	APEC 3	SS19_2.5_230617	23.05.17		S		X				
66	APEC 3	SS18_0.1_230617	23.05.17		S		X				
67	APEC 3	SS18_0.5_230617	23.05.17		S				X		
68	APEC 3	SS18_2.5_230617	23.05.17		S		X				
69	APEC 3	SS17_0.1_230617	23.05.17		S		X				Has out of sample jars - please do used for TCO, unless being removed from lot
70	APEC 3	SS17_0.5_230617	23.05.17		S				X		
71	APEC 3	SS17_2.5_230617	23.05.17		S		X				
72	APEC 3	SS23_0.1_230617	23.05.17		S		X				Has out of sample jars - please do used for TCO, unless being removed from lot
73	APEC 3	SS23_0.5_230617	23.05.17		S				X		
74	APEC 3	SS23_2.5_230617	23.05.17		S		X				
75	QAQC	SSQA07_230617	23.05.17		S				X		
76	QAQC	SSQA09_230617	23.05.17		S				X		
77	QAQC	SSQA03_230617	23.05.17		S				X		
78	QAQC	SSQA01_230617	23.05.17		S				X		
79	QAQC	SSQA05_230617	23.05.17		S				X		
80	QAQC	SSQA06_230617	23.05.17		S				X		
81	QAQC	SSQA08_230617	23.05.17		S				X		
82	QAQC	SSQA02_230617	23.05.17		S				X		
83	QAQC	SSQA04_230617	23.05.17		S				X		
84	QAQC	SSQA05_230617	23.05.17		S				X		
85	QAQC	SSQA06_230617	23.05.17		S				X		
86	QAQC	SSQA07_230617	23.05.17		S				X		
87	QAQC	SSQA08_230617	23.05.17		S				X		
88	QAQC	SSQA09_230617	23.05.17		S				X		
89	QAQC	SSQA01_230617	23.05.17		S				X		
90	QAQC	SSQA02_230617	23.05.17		S				X		
91	QAQC	SSQA03_230617	23.05.17		S				X		
92	QAQC	SSQA04_230617	23.05.17		S				X		
93	QAQC	SSQA05_230617	23.05.17		S				X		
94	QAQC	SSQA06_230617	23.05.17		S				X		
95	QAQC	SSQA07_230617	23.05.17		S				X		
96	QAQC	SSQA08_230617	23.05.17		S				X		
97	QAQC	SSQA09_230617	23.05.17		S				X		
98	QAQC	SSQA01_230617	23.05.17		S				X		
99	QAQC	SSQA02_230617	23.05.17		S				X		
100	QAQC	SSQA03_230617	23.05.17		S				X		
101	QAQC	SSQA04_230617	23.05.17		S				X		
102	QAQC	SSQA05_230617	23.05.17		S				X		
103	QAQC	SSQA06_230617	23.05.17		S				X		
104	QAQC	SSQA07_230617	23.05.17		S				X		
105	QAQC	SSQA08_230617	23.05.17		S				X		
106	QAQC	SSQA09_230617	23.05.17		S				X		
107	QAQC	SSQA01_230617	23.05.17		S				X		
108	QAQC	SSQA02_230617	23.05.17		S				X		
109	QAQC	SSQA03_230617	23.05.17		S				X		
110	QAQC	SSQA04_230617	23.05.17		S				X		
111	QAQC	SSQA05_230617	23.05.17		S				X		
112	QAQC	SSQA06_230617	23.05.17		S				X		
113	QAQC	SSQA07_230617	23.05.17		S				X		
114	QAQC	SSQA08_230617	23.05.17		S				X		
115	QAQC	SSQA09_230617	23.05.17		S				X		
116	QAQC	SSQA01_230617	23.05.17		S				X		
117	QAQC	SSQA02_230617	23.05.17		S				X		
118	QAQC	SSQA03_230617	23.05.17		S				X		
119	QAQC	SSQA04_230617	23.05.17		S				X		
120	QAQC	SSQA05_230617	23.05.17		S				X		
121	QAQC	SSQA06_230617	23.05.17		S				X		
122	QAQC	SSQA07_230617	23.05.17		S				X		
123	QAQC	SSQA08_230617	23.05.17		S				X		
124	QAQC	SSQA09_230617	23.05.17		S				X		
125	QAQC	SSQA01_230617	23.05.17		S				X		
126	QAQC	SSQA02_230617	23.05.17		S				X		
127	QAQC	SSQA03_230617	23.05.17		S				X		
128	QAQC	SSQA04_230617	23.05.17		S				X		
129	QAQC	SSQA05_230617	23.05.17		S				X		
130	QAQC	SSQA06_230617	23.05.17		S				X		
131	QAQC	SSQA07_230617	23.05.17		S				X		
132	QAQC	SSQA08_230617	23.05.17		S				X		
133	QAQC	SSQA09_230617	23.05.17		S				X		
134	QAQC	SSQA01_230617	23.05.17		S				X		
135	QAQC	SSQA02_230617	23.05.17								

**SAMPLE RECEIPT NOTIFICATION (SRN)****Work Order : EP1707039**

Client	: AECOM Australia Pty Ltd	Laboratory	: Environmental Division Perth
Contact	: [REDACTED]	Contact	: [REDACTED]
Address	: LEVEL 6 3 FORREST PLACE PERTH WA, AUSTRALIA 6849	Address	: 10 Hod Way Malaga WA Australia 6090
E-mail	: [REDACTED]	E-mail	: [REDACTED]
Telephone	: ----	Telephone	: +61-8-9209 7655
Facsimile	: ----	Facsimile	: +61-8-9209 7600
Project	: 60543717.2.3 Karratha Airport Limited Investigation	Page	: 1 of 6
Order number	: 60543717.2.3	Quote number	: EP2017AECOMAU0004 (EP/541/17)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: [REDACTED]		

Dates

Date Samples Received	: 03-Jul-2017 11:58	Issue Date	: 04-Jul-2017
Client Requested Due Date	: 14-Jul-2017	Scheduled Reporting Date	: 14-Jul-2017

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 7	Temperature	: 10.3 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 87 / 59

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 see scanned COC for sample discrepancies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (SamplesPerth@alsenviro.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (14 days), Solid (60 days) from date of completion of Work Order.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**



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
TRH - Semivolatile Fraction : EP071		
SS03_0.1_220617 APEC 1	- HDPE Soil Jar	- Soil Glass Jar - Unpreserved
TRH Volatiles/BTEX : EP080		
SS03_0.1_220617 APEC 1	- HDPE Soil Jar	- Soil Glass Jar - Unpreserved

Any sample identifications that cannot be displayed entirely in the analysis summary table will be listed below.

EP1707039-001	: [21-Jun-2017]	: SS09_0.1_210617 - APEC 1/2 - Off-site
EP1707039-003	: [21-Jun-2017]	: SS09_1.1_210617 - APEC 1/2 - Off-site
EP1707039-004	: [21-Jun-2017]	: SS08_0.1_210617 - APEC 1
EP1707039-006	: [21-Jun-2017]	: SS08_2.5_210617 - APEC 1
EP1707039-007	: [21-Jun-2017]	: SS05_0.1_210617 - APEC 1
EP1707039-009	: [21-Jun-2017]	: SS05_2.5_210617 - APEC 1
EP1707039-010	: [21-Jun-2017]	: SS04_0.1_210617 - APEC 1
EP1707039-012	: [21-Jun-2017]	: SS04_2.8_210617 - APEC 1
EP1707039-013	: [22-Jun-2017]	: SS02_0.1_220617 - APEC 1
EP1707039-014	: [22-Jun-2017]	: SS02_0.5_220617 - APEC 1
EP1707039-015	: [22-Jun-2017]	: SS02_1.5_220617 - APEC 1
EP1707039-016	: [22-Jun-2017]	: SS03_0.1_220617 - APEC 1
EP1707039-018	: [22-Jun-2017]	: SS03_2.6_220617 - APEC 1
EP1707039-019	: [22-Jun-2017]	: SS01_0.1_220617 - APEC 1
EP1707039-021	: [22-Jun-2017]	: SS01_1.5_220617 - APEC 1
EP1707039-026	: [21-Jun-2017]	: SS12_0.1_210617 - APEC 2
EP1707039-027	: [21-Jun-2017]	: SS12_0.5_210617 - APEC 2
EP1707039-029	: [21-Jun-2017]	: SS12_1.8_210617 - APEC 2
EP1707039-030	: [21-Jun-2017]	: SS13_0.1_210617 - APEC 2
EP1707039-031	: [21-Jun-2017]	: SS13_0.5_210617 - APEC 2
EP1707039-033	: [21-Jun-2017]	: SS13_2.6_210617 - APEC 2
EP1707039-034	: [22-Jun-2017]	: SS14_0.1_220617 - APEC 2
EP1707039-037	: [22-Jun-2017]	: SS11_0.1_220617 - APEC 2
EP1707039-038	: [22-Jun-2017]	: SS11_0.5_220617 - APEC 2
EP1707039-039	: [22-Jun-2017]	: SSQA08_220617 - QAQC
EP1707039-042	: [22-Jun-2017]	: SS15_0.1_220617 - APEC 2 - Off-site
EP1707039-043	: [22-Jun-2017]	: SS15_0.5_220617 - APEC 2 - Off-site
EP1707039-044	: [22-Jun-2017]	: SS15_1.4_220617 - APEC 2 - Off-site
EP1707039-045	: [22-Jun-2017]	: SS16_0.1_220617 - APEC 2 - Off-site
EP1707039-046	: [22-Jun-2017]	: SS16_0.5_220617 - APEC 2 - Off-site
EP1707039-047	: [22-Jun-2017]	: SS26_0.1_220617 - WWTP
EP1707039-050	: [22-Jun-2017]	: SS26_1.0_220617 - WWTP
EP1707039-051	: [23-Jun-2017]	: SS25_0.1_230617 - APEC 3
EP1707039-053	: [23-Jun-2017]	: SS25_0.8_230617 - APEC 3
EP1707039-054	: [23-Jun-2017]	: SS20_0.1_230617 - APEC 3
EP1707039-056	: [23-Jun-2017]	: SS20_0.7_230617 - APEC 3
EP1707039-057	: [23-Jun-2017]	: SS21_0.1_230617 - APEC 3
EP1707039-059	: [23-Jun-2017]	: SS21_0.8_230617 - APEC 3
EP1707039-060	: [23-Jun-2017]	: SS22_0.1_230617 - APEC 3
EP1707039-062	: [23-Jun-2017]	: SS22_0.5_230617 - APEC 3
EP1707039-063	: [23-Jun-2017]	: SS19_0.1_230617 - APEC 3
EP1707039-065	: [23-Jun-2017]	: SS19_0.7_230617 - APEC 3
EP1707039-066	: [23-Jun-2017]	: SS19_3.5_230617 - APEC 3
EP1707039-067	: [23-Jun-2017]	: SS18_0.1_230617 - APEC 3
EP1707039-069	: [23-Jun-2017]	: SS18_1.0_230617 - APEC 3
EP1707039-070	: [23-Jun-2017]	: SS18_3.4_230617 - APEC 3
EP1707039-071	: [23-Jun-2017]	: SS17_0.1_230617 - APEC 3
EP1707039-073	: [23-Jun-2017]	: SS17_1.8_230617 - APEC 3
EP1707039-074	: [23-Jun-2017]	: SS23_0.1_230617 - APEC 3
EP1707039-075	: [23-Jun-2017]	: SS23_0.5_230617 - APEC 3
EP1707039-077	: [23-Jun-2017]	: SS24_0.1_230617 - APEC 3



EP1707039-078	: [23-Jun-2017]	: SS24_0.5_230617 - APEC 3
EP1707039-079	: [23-Jun-2017]	: SSQA013_230617 - QAQC
EP1707039-080	: [23-Jun-2017]	: SQA015_230617 - QAQC
EP1707039-081	: [23-Jun-2017]	: SQA017_230617 - QAQC
EP1707039-082	: [22-Jun-2017]	: SS14_2.3_220617 - APEC 2
EP1707039-083	: [21-Jun-2017]	: SSQA01_210617 - QAQC
EP1707039-084	: [22-Jun-2017]	: SSQA06_220617 - QAQC
EP1707039-085	: [23-Jun-2017]	: SSQA011_230617 - QAQC

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
EP1707039-001	21-Jun-2017 00:00	SS09_0.1_210617 APE...		✓	✓	
EP1707039-002	21-Jun-2017 00:00	SS09_0.5_210617 APE...	✓			
EP1707039-003	21-Jun-2017 00:00	SS09_1.1_210617 APE...		✓	✓	
EP1707039-004	21-Jun-2017 00:00	SS08_0.1_210617 APE...		✓	✓	
EP1707039-005	21-Jun-2017 00:00	SS08_0.5_210617 APE...	✓			
EP1707039-006	21-Jun-2017 00:00	SS08_2.5_210617 APE...		✓	✓	
EP1707039-007	21-Jun-2017 00:00	SS05_0.1_210617 APE...		✓	✓	
EP1707039-008	21-Jun-2017 00:00	SS05_0.5_210617 APE...	✓			
EP1707039-009	21-Jun-2017 00:00	SS05_2.5_210617 APE...		✓	✓	
EP1707039-010	21-Jun-2017 00:00	SS04_0.1_210617 APE...		✓	✓	
EP1707039-011	21-Jun-2017 00:00	SS04_0.5_210617 APE...	✓			
EP1707039-012	21-Jun-2017 00:00	SS04_2.8_210617 APE...		✓	✓	
EP1707039-013	22-Jun-2017 00:00	SS02_0.1_220617 APE...		✓	✓	
EP1707039-014	22-Jun-2017 00:00	SS02_0.5_220617 APE...		✓		✓
EP1707039-015	22-Jun-2017 00:00	SS02_1.5_220617 APE...		✓	✓	
EP1707039-016	22-Jun-2017 00:00	SS03_0.1_220617 APE...		✓	✓	✓
EP1707039-017	22-Jun-2017 00:00	SS03_0.5_220617 APE...	✓			
EP1707039-018	22-Jun-2017 00:00	SS03_2.6_220617 APE...		✓	✓	
EP1707039-019	22-Jun-2017 00:00	SS01_0.1_220617 APE...		✓	✓	✓
EP1707039-020	22-Jun-2017 00:00	SS01_0.5_220617 APE...	✓			
EP1707039-021	22-Jun-2017 00:00	SS01_1.5_220617 APE...		✓	✓	
EP1707039-022	21-Jun-2017 00:00	SSQA02_210617 QAQC	✓			
EP1707039-023	21-Jun-2017 00:00	SSQA03_210617 QAQC	✓			
EP1707039-024	21-Jun-2017 00:00	SSQA04_210617 QAQC	✓			
EP1707039-025	21-Jun-2017 00:00	SSQA05_210617 QAQC	✓			
EP1707039-026	21-Jun-2017 00:00	SS12_0.1_210617 APE...		✓	✓	
EP1707039-027	21-Jun-2017 00:00	SS12_0.5_210617 APE...		✓		✓
EP1707039-028	21-Jun-2017 00:00	SS12_1.5_210617 APE...	✓			
EP1707039-029	21-Jun-2017 00:00	SS12_1.8_210617 APE...		✓	✓	
EP1707039-030	21-Jun-2017 00:00	SS13_0.1_210617 APE...		✓	✓	
EP1707039-031	21-Jun-2017 00:00	SS13_0.5_210617 APE...		✓		✓
EP1707039-032	21-Jun-2017 00:00	SS13_1.0_210617 APE...	✓			



			(On Hold) SOIL No analysis requested	SOIL - EA055-103 Moisture Content	SOIL - EP231X (solids) PFAS - Full Suite (28 analytes)	SOIL - S-04 TRH/BTEXN
EP1707039-033	21-Jun-2017 00:00	SS13_2.6_210617 APE...		✓	✓	
EP1707039-034	22-Jun-2017 00:00	SS14_0.1_220617 APE...		✓	✓	
EP1707039-035	22-Jun-2017 00:00	SS14_0.5_220617 APE...	✓			
EP1707039-036	22-Jun-2017 00:00	SS14_1.3_220617 APE...	✓			
EP1707039-037	22-Jun-2017 00:00	SS11_0.1_220617 APE...		✓	✓	
EP1707039-038	22-Jun-2017 00:00	SS11_0.5_220617 APE...		✓	✓	✓
EP1707039-039	22-Jun-2017 00:00	SSQA08_220617 QAQC		✓	✓	
EP1707039-040	22-Jun-2017 00:00	SSQA09_220617 QAQC	✓			
EP1707039-041	22-Jun-2017 00:00	SSQA10_220617 QAQC	✓			
EP1707039-042	22-Jun-2017 00:00	SS15_0.1_220617 APE...		✓	✓	
EP1707039-043	22-Jun-2017 00:00	SS15_0.5_220617 APE...		✓		✓
EP1707039-044	22-Jun-2017 00:00	SS15_1.4_220617 APE...		✓	✓	
EP1707039-045	22-Jun-2017 00:00	SS16_0.1_220617 APE...		✓	✓	
EP1707039-046	22-Jun-2017 00:00	SS16_0.5_220617 APE...		✓	✓	
EP1707039-047	22-Jun-2017 00:00	SS26_0.1_220617 WWTP		✓	✓	
EP1707039-048	22-Jun-2017 00:00	SS26_0.2_220617 WWTP	✓			
EP1707039-049	22-Jun-2017 00:00	SS26_0.5_220617 WWTP	✓			
EP1707039-050	22-Jun-2017 00:00	SS26_1.0_220617 WWTP		✓	✓	
EP1707039-051	23-Jun-2017 00:00	SS25_0.1_230617 APE...		✓	✓	
EP1707039-052	23-Jun-2017 00:00	SS25_0.5_230617 APE...	✓			
EP1707039-053	23-Jun-2017 00:00	SS25_0.8_230617 APE...		✓	✓	
EP1707039-054	23-Jun-2017 00:00	SS20_0.1_230617 APE...		✓	✓	✓
EP1707039-055	23-Jun-2017 00:00	SS20_0.5_230617 APE...	✓			
EP1707039-056	23-Jun-2017 00:00	SS20_0.7_230617 APE...		✓	✓	
EP1707039-057	23-Jun-2017 00:00	SS21_0.1_230617 APE...		✓	✓	✓
EP1707039-058	23-Jun-2017 00:00	SS21_0.5_230617 APE...	✓			
EP1707039-059	23-Jun-2017 00:00	SS21_0.8_230617 APE...		✓	✓	✓
EP1707039-060	23-Jun-2017 00:00	SS22_0.1_230617 APE...		✓	✓	✓
EP1707039-061	23-Jun-2017 00:00	SS22_0.4_230617 APE...	✓			
EP1707039-062	23-Jun-2017 00:00	SS22_0.5_230617 APE...		✓	✓	✓
EP1707039-063	23-Jun-2017 00:00	SS19_0.1_230617 APE...		✓	✓	
EP1707039-064	23-Jun-2017 00:00	SS19_0.5_230617 APE...	✓			
EP1707039-065	23-Jun-2017 00:00	SS19_0.7_230617 APE...		✓	✓	
EP1707039-066	23-Jun-2017 00:00	SS19_3.5_230617 APE...		✓	✓	
EP1707039-067	23-Jun-2017 00:00	SS18_0.1_230617 APE...		✓	✓	
EP1707039-068	23-Jun-2017 00:00	SS18_0.5_230617 APE...	✓			
EP1707039-069	23-Jun-2017 00:00	SS18_1.0_230617 APE...		✓	✓	
EP1707039-070	23-Jun-2017 00:00	SS18_3.4_230617 APE...		✓	✓	
EP1707039-071	23-Jun-2017 00:00	SS17_0.1_230617 APE...		✓	✓	
EP1707039-072	23-Jun-2017 00:00	SS17_1.5_230617 APE...	✓			
EP1707039-073	23-Jun-2017 00:00	SS17_1.8_230617 APE...		✓	✓	



			(On Hold) SOIL No analysis requested	SOIL - EA055-103 Moisture Content	SOIL - EP231X (solids) PFAS - Full Suite (28 analytes)	SOIL - S-04 TRH/BTEXN
EP1707039-074	23-Jun-2017 00:00	SS23_0.1_230617 APE...		✓	✓	
EP1707039-075	23-Jun-2017 00:00	SS23_0.5_230617 APE...		✓		✓
EP1707039-076	23-Jun-2017 00:00	SS23_0.7_230617 APE...	✓			
EP1707039-077	23-Jun-2017 00:00	SS24_0.1_230617 APE...		✓	✓	
EP1707039-078	23-Jun-2017 00:00	SS24_0.5_230617 APE...		✓	✓	
EP1707039-079	23-Jun-2017 00:00	SSQA013_230617 QAQC		✓	✓	
EP1707039-080	23-Jun-2017 00:00	SQA015_230617 QAQC		✓	✓	
EP1707039-081	23-Jun-2017 00:00	SQA017_230617 QAQC		✓	✓	
EP1707039-082	22-Jun-2017 00:00	SS14_2.3_220617 APE...		✓	✓	
EP1707039-087	08-Jun-2017 00:00	TBS 290 QAQC	✓			

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)
EP1707039-083	21-Jun-2017 00:00	SSQA01_210617 QAQC		✓
EP1707039-084	22-Jun-2017 00:00	SSQA06_220617 QAQC		✓
EP1707039-085	23-Jun-2017 00:00	SSQA011_230617 QAQC		✓
EP1707039-086	21-Jun-2017 00:00	TBS 390 QAQC	✓	

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 AP_CustomerService.ANZ@aecom.com

- *AU Certificate of Analysis - NATA (COA)
- *AU Certificate of Analysis - NATA (With MU) (COA_MU)
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)
- Chain of Custody (CoC) (COC)
- EDI Format - ENMRG (ENMRG)
- EDI Format - ESDAT (ESDAT)
- EDI Format - XTab (XTAB)

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- *AU Certificate of Analysis - NATA (COA)
- *AU Certificate of Analysis - NATA (With MU) (COA_MU)
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)
- Chain of Custody (CoC) (COC)
- EDI Format - ENMRG (ENMRG)
- EDI Format - ESDAT (ESDAT)
- EDI Format - XTab (XTAB)

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CERTIFICATE OF ANALYSIS

Work Order : **EP1707039**
Client : **AECOM Australia Pty Ltd**
Contact : [REDACTED]
Address : LEVEL 6 3 FORREST PLACE
 PERTH WA, AUSTRALIA 6849

Telephone : ----
Project : 60543717.2.3 Karratha Airport Limited Investigation
Order number : 60543717.2.3
C-O-C number : ----
Sampler : [REDACTED]
Site : ----
Quote number : EP/541/17
No. of samples received : 87
No. of samples analysed : 59

Page : 1 of 37
Laboratory : Environmental Division Perth
Contact : [REDACTED]
Address : 10 Hod Way Malaga WA Australia 6090

Telephone : +61-8-9209 7655
Date Samples Received : 03-Jul-2017 11:58
Date Analysis Commenced : 05-Jul-2017
Issue Date : 19-Jul-2017 10:03



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 LAB TECH	Perth Organics, Malaga, WA
[REDACTED]	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
[REDACTED]	Organic Coordinator	Sydney Organics, Smithfield, NSW
[REDACTED]	Laboratory Manager	Perth Inorganics, Malaga, WA
[REDACTED]	Senior Chemist Volatiles	Sydney Organics, Smithfield, NSW
[REDACTED]	Client Services - Technical Manager	Perth Organics, Malaga, WA



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.

- PFAS analysis conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231: Particular samples required dilution due to the presence of high level contaminants. LOR values have been adjusted accordingly.



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Client sample ID

				SS09_0.1_210617 APEC 1/2 - Off-site	SS09_1.1_210617 APEC 1/2 - Off-site	SS08_0.1_210617 APEC 1	SS08_2.5_210617 APEC 1	SS05_0.1_210617 APEC 1
Client sampling date / time				21-Jun-2017 00:00	21-Jun-2017 00:00	21-Jun-2017 00:00	21-Jun-2017 00:00	21-Jun-2017 00:00
Compound	CAS Number	LOR	Unit	EP1707039-001	EP1707039-003	EP1707039-004	EP1707039-006	EP1707039-007
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1	%	8.3	8.4	13.0	17.3	5.0
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	0.0138	0.0129	0.138	0.0175	0.0148
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	0.0049	0.0261	0.114	0.0175	0.0088
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	0.0196	0.204	0.263	0.0530	0.0468
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	0.0025	0.0203	0.0128	0.0005	0.0085
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	1.06	0.0840	0.193	0.0205	1.42
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	0.0048	<0.0002	0.0004	<0.0002	0.0014
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.009	<0.001	0.004
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	0.0053	0.0043	0.0459	0.0054	0.0086
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	0.0135	0.0263	0.175	0.0247	0.0237
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	0.0009	0.0110	0.0176	0.0032	0.0031
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	0.0052	0.0610	0.0301	0.0028	0.0155
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	0.0002	<0.0002	0.0002	<0.0002	0.0011
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	0.0003	<0.0002	<0.0002	<0.0002	0.0005
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 (PFTTrDA)	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	0.0004	<0.0002	<0.0002	<0.0002	0.0003
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Client sample ID

				SS09_0.1_210617 APEC 1/2 - Off-site	SS09_1.1_210617 APEC 1/2 - Off-site	SS08_0.1_210617 APEC 1	SS08_2.5_210617 APEC 1	SS05_0.1_210617 APEC 1
Client sampling date / time				21-Jun-2017 00:00	21-Jun-2017 00:00	21-Jun-2017 00:00	21-Jun-2017 00:00	21-Jun-2017 00:00
Compound	CAS Number	LOR	Unit	EP1707039-001	EP1707039-003	EP1707039-004	EP1707039-006	EP1707039-007
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	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
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	0.0014
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	0.0013
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	1.13	0.450	0.999	0.145	1.56
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	1.08	0.288	0.456	0.0735	1.47
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	1.12	0.404	0.872	0.127	1.54
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	103	93.4	102	104	101



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Client sample ID

				SS05_2.5_210617 APEC 1	SS04_0.1_210617 APEC 1	SS04_2.8_210617 APEC 1	SS02_0.1_220617 APEC 1	SS02_0.5_220617 APEC 1
Client sampling date / time				21-Jun-2017 00:00	21-Jun-2017 00:00	21-Jun-2017 00:00	22-Jun-2017 00:00	22-Jun-2017 00:00
Compound	CAS Number	LOR	Unit	EP1707039-009	EP1707039-010	EP1707039-012	EP1707039-013	EP1707039-014
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1	%	15.3	12.2	11.7	3.4	9.8
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	----	----	----	----	<10
C10 - C14 Fraction	----	50	mg/kg	----	----	----	----	<50
C15 - C28 Fraction	----	100	mg/kg	----	----	----	----	<100
C29 - C36 Fraction	----	100	mg/kg	----	----	----	----	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg	----	----	----	----	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	----	----	----	----	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	----	----	----	----	<10
>C10 - C16 Fraction	----	50	mg/kg	----	----	----	----	<50
>C16 - C34 Fraction	----	100	mg/kg	----	----	----	----	<100
>C34 - C40 Fraction	----	100	mg/kg	----	----	----	----	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	----	----	----	----	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	----	----	----	----	<50
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	----	----	----	----	<0.2
Toluene	108-88-3	0.5	mg/kg	----	----	----	----	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	----	----	----	----	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	----	----	----	----	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	----	----	----	----	<0.5
^ Sum of BTEX	----	0.2	mg/kg	----	----	----	----	<0.2
^ Total Xylenes	1330-20-7	0.5	mg/kg	----	----	----	----	<0.5
Naphthalene	91-20-3	1	mg/kg	----	----	----	----	<1
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	0.0008	0.0011	<0.0002	<0.0002	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	0.0009	0.0008	0.0002	0.0002	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	0.0048	0.0040	0.0013	0.0034	----



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Client sample ID

				SS05_2.5_210617 APEC 1	SS04_0.1_210617 APEC 1	SS04_2.8_210617 APEC 1	SS02_0.1_220617 APEC 1	SS02_0.5_220617 APEC 1
Client sampling date / time				21-Jun-2017 00:00	21-Jun-2017 00:00	21-Jun-2017 00:00	22-Jun-2017 00:00	22-Jun-2017 00:00
Compound	CAS Number	LOR	Unit	EP1707039-009	EP1707039-010	EP1707039-012	EP1707039-013	EP1707039-014
				Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued								
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	0.0004	0.0010	<0.0002	0.0006	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0477	0.0490	0.0077	0.931	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	0.0004	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.003	<0.001	<0.001	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	0.0005	0.0016	<0.0002	0.0003	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	0.0017	0.0025	0.0005	0.0005	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	0.0004	0.0005	<0.0002	0.0005	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	0.0010	0.0015	0.0004	0.0016	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.0023	<0.0002	0.0007	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	0.0019	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<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	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<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	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	0.0006	<0.0002	<0.0002	0.0022	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<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	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<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	----



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Client sample ID

				SS05_2.5_210617 APEC 1	SS04_0.1_210617 APEC 1	SS04_2.8_210617 APEC 1	SS02_0.1_220617 APEC 1	SS02_0.5_220617 APEC 1
Client sampling date / time				21-Jun-2017 00:00	21-Jun-2017 00:00	21-Jun-2017 00:00	22-Jun-2017 00:00	22-Jun-2017 00:00
Compound	CAS Number	LOR	Unit	EP1707039-009	EP1707039-010	EP1707039-012	EP1707039-013	EP1707039-014
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
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	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	0.0007	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	0.0008	<0.0005	0.0007	0.121	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	----
EP231P: PFAS Sums								
Sum of PFAS	----	0.0002	mg/kg	0.0596	0.0673	0.0108	1.06	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	0.0525	0.0530	0.0090	0.934	----
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	0.0577	0.0632	0.0106	1.06	----
EP080S: TPH(V)/BTEX Surrogates								
1,2-Dichloroethane-D4	17060-07-0	0.2	%	----	----	----	----	90.9
Toluene-D8	2037-26-5	0.2	%	----	----	----	----	90.6
4-Bromofluorobenzene	460-00-4	0.2	%	----	----	----	----	91.3
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	99.1	99.3	88.4	107	----



Analytical Results

Sub-Matrix: SOIL
(Matrix: SOIL)

Client sample ID

				SS02_1.5_220617 APEC 1	SS03_0.1_220617 APEC 1	SS03_2.6_220617 APEC 1	SS01_0.1_220617 APEC 1	SS01_1.5_220617 APEC 1
Client sampling date / time				22-Jun-2017 00:00	22-Jun-2017 00:00	22-Jun-2017 00:00	22-Jun-2017 00:00	22-Jun-2017 00:00
Compound	CAS Number	LOR	Unit	EP1707039-015	EP1707039-016	EP1707039-018	EP1707039-019	EP1707039-021
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1	%	11.3	4.0	15.6	5.6	11.2
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	----	<10	----	<10	----
C10 - C14 Fraction	----	50	mg/kg	----	<50	----	<50	----
C15 - C28 Fraction	----	100	mg/kg	----	<100	----	<100	----
C29 - C36 Fraction	----	100	mg/kg	----	<100	----	<100	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg	----	<50	----	<50	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	----	<10	----	<10	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	----	<10	----	<10	----
>C10 - C16 Fraction	----	50	mg/kg	----	<50	----	<50	----
>C16 - C34 Fraction	----	100	mg/kg	----	<100	----	<100	----
>C34 - C40 Fraction	----	100	mg/kg	----	<100	----	<100	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	----	<50	----	<50	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	----	<50	----	<50	----
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	----	<0.2	----	<0.2	----
Toluene	108-88-3	0.5	mg/kg	----	<0.5	----	<0.5	----
Ethylbenzene	100-41-4	0.5	mg/kg	----	<0.5	----	<0.5	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	----	<0.5	----	<0.5	----
ortho-Xylene	95-47-6	0.5	mg/kg	----	<0.5	----	<0.5	----
^ Sum of BTEX	----	0.2	mg/kg	----	<0.2	----	<0.2	----
^ Total Xylenes	1330-20-7	0.5	mg/kg	----	<0.5	----	<0.5	----
Naphthalene	91-20-3	1	mg/kg	----	<1	----	<1	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.0012	0.0137	<0.0002	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.0016	0.0155	<0.0002	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	0.0030	0.0151	0.0621	0.0028	0.0028



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Client sample ID

				SS02_1.5_220617 APEC 1	SS03_0.1_220617 APEC 1	SS03_2.6_220617 APEC 1	SS01_0.1_220617 APEC 1	SS01_1.5_220617 APEC 1
Client sampling date / time				22-Jun-2017 00:00	22-Jun-2017 00:00	22-Jun-2017 00:00	22-Jun-2017 00:00	22-Jun-2017 00:00
Compound	CAS Number	LOR	Unit	EP1707039-015	EP1707039-016	EP1707039-018	EP1707039-019	EP1707039-021
				Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued								
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	0.0004	0.0023	0.0084	0.0003	0.0003
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	3.90	1.84	0.129	0.628	0.586
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.0029	<0.0002	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.004	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.0024	0.0085	<0.0002	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	0.0005	0.0053	0.0343	0.0006	0.0005
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.0006	0.0055	0.0002	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	0.0004	0.0032	0.0138	0.0008	0.0004
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	0.0012	0.0005	<0.0002	<0.0002	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	0.0002	0.0020	<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	0.0034	<0.0002	0.0012	<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



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Client sample ID

				SS02_1.5_220617 APEC 1	SS03_0.1_220617 APEC 1	SS03_2.6_220617 APEC 1	SS01_0.1_220617 APEC 1	SS01_1.5_220617 APEC 1
Client sampling date / time				22-Jun-2017 00:00	22-Jun-2017 00:00	22-Jun-2017 00:00	22-Jun-2017 00:00	22-Jun-2017 00:00
Compound	CAS Number	LOR	Unit	EP1707039-015	EP1707039-016	EP1707039-018	EP1707039-019	EP1707039-021
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	0.0007	0.0020	0.0078	<0.0005	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	0.0052	0.0161	<0.0005	<0.0005	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.0007	<0.0005	<0.0005	<0.0005
EP231P: PFAS Sums								
Sum of PFAS	----	0.0002	mg/kg	3.91	1.90	0.303	0.634	0.590
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	3.90	1.86	0.191	0.631	0.589
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	3.91	1.88	0.279	0.632	0.590
EP080S: TPH(V)/BTEX Surrogates								
1,2-Dichloroethane-D4	17060-07-0	0.2	%	----	111	----	85.4	----
Toluene-D8	2037-26-5	0.2	%	----	105	----	87.0	----
4-Bromofluorobenzene	460-00-4	0.2	%	----	96.8	----	87.2	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	90.6	101	96.8	102	90.2



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Client sample ID

				SS12_0.1_210617 APEC 2	SS12_0.5_210617 APEC 2	SS12_1.8_210617 APEC 2	SS13_0.1_210617 APEC 2	SS13_0.5_210617 APEC 2
Client sampling date / time				21-Jun-2017 00:00	21-Jun-2017 00:00	21-Jun-2017 00:00	21-Jun-2017 00:00	21-Jun-2017 00:00
Compound	CAS Number	LOR	Unit	EP1707039-026	EP1707039-027	EP1707039-029	EP1707039-030	EP1707039-031
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1	%	10.4	10.9	15.8	3.9	7.6
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	----	<10	----	----	<10
C10 - C14 Fraction	----	50	mg/kg	----	<50	----	----	<50
C15 - C28 Fraction	----	100	mg/kg	----	<100	----	----	<100
C29 - C36 Fraction	----	100	mg/kg	----	<100	----	----	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg	----	<50	----	----	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	----	<10	----	----	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	----	<10	----	----	<10
>C10 - C16 Fraction	----	50	mg/kg	----	<50	----	----	<50
>C16 - C34 Fraction	----	100	mg/kg	----	<100	----	----	<100
>C34 - C40 Fraction	----	100	mg/kg	----	<100	----	----	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	----	<50	----	----	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	----	<50	----	----	<50
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	----	<0.2	----	----	<0.2
Toluene	108-88-3	0.5	mg/kg	----	<0.5	----	----	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	----	<0.5	----	----	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	----	<0.5	----	----	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	----	<0.5	----	----	<0.5
^ Sum of BTEX	----	0.2	mg/kg	----	<0.2	----	----	<0.2
^ Total Xylenes	1330-20-7	0.5	mg/kg	----	<0.5	----	----	<0.5
Naphthalene	91-20-3	1	mg/kg	----	<1	----	----	<1
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	----	0.0003	<0.0002	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	0.0002	----	0.0005	<0.0002	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	0.0021	----	0.0048	0.0004	----



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Client sample ID

				SS12_0.1_210617 APEC 2	SS12_0.5_210617 APEC 2	SS12_1.8_210617 APEC 2	SS13_0.1_210617 APEC 2	SS13_0.5_210617 APEC 2
Client sampling date / time				21-Jun-2017 00:00	21-Jun-2017 00:00	21-Jun-2017 00:00	21-Jun-2017 00:00	21-Jun-2017 00:00
Compound	CAS Number	LOR	Unit	EP1707039-026	EP1707039-027	EP1707039-029	EP1707039-030	EP1707039-031
				Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued								
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	0.0003	----	0.0003	<0.0002	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.169	----	0.0437	0.0559	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	0.0002	----	<0.0002	0.0002	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	----	<0.001	<0.001	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	----	0.0003	<0.0002	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	0.0003	----	0.0013	0.0002	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	----	<0.0002	<0.0002	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	0.0003	----	0.0006	<0.0002	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	0.0010	----	<0.0002	<0.0002	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	0.0007	----	<0.0002	0.0002	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	----	<0.0002	<0.0002	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	----	<0.0002	<0.0002	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	----	<0.0002	<0.0002	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	----	<0.0005	<0.0005	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	----	<0.0002	<0.0002	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	----	<0.0005	<0.0005	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	----	<0.0005	<0.0005	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0005	----	<0.0005	<0.0005	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	----	<0.0005	<0.0005	----



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Client sample ID

				SS12_0.1_210617 APEC 2	SS12_0.5_210617 APEC 2	SS12_1.8_210617 APEC 2	SS13_0.1_210617 APEC 2	SS13_0.5_210617 APEC 2
Client sampling date / time				21-Jun-2017 00:00	21-Jun-2017 00:00	21-Jun-2017 00:00	21-Jun-2017 00:00	21-Jun-2017 00:00
Compound	CAS Number	LOR	Unit	EP1707039-026	EP1707039-027	EP1707039-029	EP1707039-030	EP1707039-031
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	----	<0.0002	<0.0002	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	----	<0.0002	<0.0002	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	----	<0.0005	<0.0005	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	----	<0.0005	<0.0005	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	----	<0.0005	<0.0005	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	----	<0.0005	<0.0005	----
EP231P: PFAS Sums								
Sum of PFAS	----	0.0002	mg/kg	0.174	----	0.0518	0.0569	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	0.171	----	0.0485	0.0563	----
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	0.172	----	0.0510	0.0565	----
EP080S: TPH(V)/BTEX Surrogates								
1,2-Dichloroethane-D4	17060-07-0	0.2	%	----	85.3	----	----	86.8
Toluene-D8	2037-26-5	0.2	%	----	83.8	----	----	86.4
4-Bromofluorobenzene	460-00-4	0.2	%	----	86.0	----	----	88.1
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	95.7	----	90.8	98.2	----



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Client sample ID

				SS13_2.6_210617 APEC 2	SS14_0.1_220617 APEC 2	SS11_0.1_220617 APEC 2	SS11_0.5_220617 APEC 2	SSQA08_220617 QAQC
Client sampling date / time				21-Jun-2017 00:00	22-Jun-2017 00:00	22-Jun-2017 00:00	22-Jun-2017 00:00	22-Jun-2017 00:00
Compound	CAS Number	LOR	Unit	EP1707039-033	EP1707039-034	EP1707039-037	EP1707039-038	EP1707039-039
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1	%	14.9	7.9	9.9	4.0	5.1
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	----	----	----	<10	----
C10 - C14 Fraction	----	50	mg/kg	----	----	----	<50	----
C15 - C28 Fraction	----	100	mg/kg	----	----	----	<100	----
C29 - C36 Fraction	----	100	mg/kg	----	----	----	<100	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg	----	----	----	<50	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	----	----	----	<10	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	----	----	----	<10	----
>C10 - C16 Fraction	----	50	mg/kg	----	----	----	<50	----
>C16 - C34 Fraction	----	100	mg/kg	----	----	----	<100	----
>C34 - C40 Fraction	----	100	mg/kg	----	----	----	<100	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	----	----	----	<50	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	----	----	----	<50	----
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	----	----	----	<0.2	----
Toluene	108-88-3	0.5	mg/kg	----	----	----	<0.5	----
Ethylbenzene	100-41-4	0.5	mg/kg	----	----	----	<0.5	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	----	----	----	<0.5	----
ortho-Xylene	95-47-6	0.5	mg/kg	----	----	----	<0.5	----
^ Sum of BTEX	----	0.2	mg/kg	----	----	----	<0.2	----
^ Total Xylenes	1330-20-7	0.5	mg/kg	----	----	----	<0.5	----
Naphthalene	91-20-3	1	mg/kg	----	----	----	<1	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0108	0.0016	0.0007
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0216	0.0046	0.0006
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.0033	0.186	0.0335	0.0030



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Client sample ID

				SS13_2.6_210617 APEC 2	SS14_0.1_220617 APEC 2	SS11_0.1_220617 APEC 2	SS11_0.5_220617 APEC 2	SSQA08_220617 QAQC
Client sampling date / time				21-Jun-2017 00:00	22-Jun-2017 00:00	22-Jun-2017 00:00	22-Jun-2017 00:00	22-Jun-2017 00:00
Compound	CAS Number	LOR	Unit	EP1707039-033	EP1707039-034	EP1707039-037	EP1707039-038	EP1707039-039
				Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued								
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.0008	0.0154	0.0037	0.0008
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0004	0.0602	0.500	0.0768	0.516
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0015	<0.0002	0.0007
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	0.0054	0.0015	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.0003	0.0292	0.0068	0.0014
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0140	0.0030	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.0011	0.0414	0.0082	0.0014
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0005	<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



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Client sample ID

				SS13_2.6_210617 APEC 2	SS14_0.1_220617 APEC 2	SS11_0.1_220617 APEC 2	SS11_0.5_220617 APEC 2	SSQA08_220617 QAQC
Client sampling date / time				21-Jun-2017 00:00	22-Jun-2017 00:00	22-Jun-2017 00:00	22-Jun-2017 00:00	22-Jun-2017 00:00
Compound	CAS Number	LOR	Unit	EP1707039-033	EP1707039-034	EP1707039-037	EP1707039-038	EP1707039-039
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231P: PFAS Sums								
Sum of PFAS	----	0.0002	mg/kg	0.0004	0.0657	0.826	0.140	0.525
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	0.0004	0.0635	0.686	0.110	0.519
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	0.0004	0.0649	0.787	0.131	0.522
EP080S: TPH(V)/BTEX Surrogates								
1,2-Dichloroethane-D4	17060-07-0	0.2	%	----	----	----	88.5	----
Toluene-D8	2037-26-5	0.2	%	----	----	----	84.6	----
4-Bromofluorobenzene	460-00-4	0.2	%	----	----	----	87.6	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	98.7	104	102	89.7	103



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Client sample ID

				SS15_0.1_220617 APEC 2 - Off-site	SS15_0.5_220617 APEC 2 - Off-site	SS15_1.4_220617 APEC 2 - Off-site	SS16_0.1_220617 APEC 2 - Off-site	SS16_0.5_220617 APEC 2 - Off-site
Client sampling date / time				22-Jun-2017 00:00	22-Jun-2017 00:00	22-Jun-2017 00:00	22-Jun-2017 00:00	22-Jun-2017 00:00
Compound	CAS Number	LOR	Unit	EP1707039-042	EP1707039-043	EP1707039-044	EP1707039-045	EP1707039-046
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1	%	4.4	8.6	10.2	3.4	9.0
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	----	<10	----	----	----
C10 - C14 Fraction	----	50	mg/kg	----	<50	----	----	----
C15 - C28 Fraction	----	100	mg/kg	----	<100	----	----	----
C29 - C36 Fraction	----	100	mg/kg	----	<100	----	----	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg	----	<50	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	----	<10	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	----	<10	----	----	----
>C10 - C16 Fraction	----	50	mg/kg	----	<50	----	----	----
>C16 - C34 Fraction	----	100	mg/kg	----	<100	----	----	----
>C34 - C40 Fraction	----	100	mg/kg	----	<100	----	----	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	----	<50	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	----	<50	----	----	----
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	----	<0.2	----	----	----
Toluene	108-88-3	0.5	mg/kg	----	<0.5	----	----	----
Ethylbenzene	100-41-4	0.5	mg/kg	----	<0.5	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	----	<0.5	----	----	----
ortho-Xylene	95-47-6	0.5	mg/kg	----	<0.5	----	----	----
^ Sum of BTEX	----	0.2	mg/kg	----	<0.2	----	----	----
^ Total Xylenes	1330-20-7	0.5	mg/kg	----	<0.5	----	----	----
Naphthalene	91-20-3	1	mg/kg	----	<1	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	0.0003	----	0.0021	0.0013	0.0036
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	0.0005	----	0.0078	0.0014	0.0071
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	0.0030	----	0.0823	0.0106	0.0513



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Client sample ID

				SS15_0.1_220617 APEC 2 - Off-site	SS15_0.5_220617 APEC 2 - Off-site	SS15_1.4_220617 APEC 2 - Off-site	SS16_0.1_220617 APEC 2 - Off-site	SS16_0.5_220617 APEC 2 - Off-site
Client sampling date / time				22-Jun-2017 00:00	22-Jun-2017 00:00	22-Jun-2017 00:00	22-Jun-2017 00:00	22-Jun-2017 00:00
Compound	CAS Number	LOR	Unit	EP1707039-042	EP1707039-043	EP1707039-044	EP1707039-045	EP1707039-046
				Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued								
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	0.0010	----	0.0040	0.0024	0.0045
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.268	----	0.0402	0.299	0.0753
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	0.0007	----	<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
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	----	0.0008	0.0005	0.0012
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	0.0008	----	0.0053	0.0020	0.0065
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	----	0.0013	0.0003	0.0010
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	0.0014	----	0.0051	0.0028	0.0051
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<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
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<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
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<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
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<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
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<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
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	----	<0.0005	<0.0005	<0.0005



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Client sample ID

				SS15_0.1_220617 APEC 2 - Off-site	SS15_0.5_220617 APEC 2 - Off-site	SS15_1.4_220617 APEC 2 - Off-site	SS16_0.1_220617 APEC 2 - Off-site	SS16_0.5_220617 APEC 2 - Off-site
Client sampling date / time				22-Jun-2017 00:00	22-Jun-2017 00:00	22-Jun-2017 00:00	22-Jun-2017 00:00	22-Jun-2017 00:00
Compound	CAS Number	LOR	Unit	EP1707039-042	EP1707039-043	EP1707039-044	EP1707039-045	EP1707039-046
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	----	<0.0002	<0.0002	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	----	<0.0002	<0.0002	<0.0002
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
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<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
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	----	<0.0005	<0.0005	<0.0005
EP231P: PFAS Sums								
Sum of PFAS	----	0.0002	mg/kg	0.276	----	0.149	0.320	0.156
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	0.271	----	0.122	0.310	0.127
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	0.274	----	0.137	0.316	0.144
EP080S: TPH(V)/BTEX Surrogates								
1,2-Dichloroethane-D4	17060-07-0	0.2	%	----	88.3	----	----	----
Toluene-D8	2037-26-5	0.2	%	----	86.0	----	----	----
4-Bromofluorobenzene	460-00-4	0.2	%	----	84.9	----	----	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	93.1	----	100	89.9	98.2



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Client sample ID

				SS26_0.1_220617 WWTP	SS26_1.0_220617 WWTP	SS25_0.1_230617 APEC 3	SS25_0.8_230617 APEC 3	SS20_0.1_230617 APEC 3
Client sampling date / time				22-Jun-2017 00:00	22-Jun-2017 00:00	23-Jun-2017 00:00	23-Jun-2017 00:00	23-Jun-2017 00:00
Compound	CAS Number	LOR	Unit	EP1707039-047	EP1707039-050	EP1707039-051	EP1707039-053	EP1707039-054
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1	%	6.0	9.0	3.4	13.2	2.4
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	----	----	----	----	<10
C10 - C14 Fraction	----	50	mg/kg	----	----	----	----	<50
C15 - C28 Fraction	----	100	mg/kg	----	----	----	----	<100
C29 - C36 Fraction	----	100	mg/kg	----	----	----	----	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg	----	----	----	----	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	----	----	----	----	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	----	----	----	----	<10
>C10 - C16 Fraction	----	50	mg/kg	----	----	----	----	<50
>C16 - C34 Fraction	----	100	mg/kg	----	----	----	----	<100
>C34 - C40 Fraction	----	100	mg/kg	----	----	----	----	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	----	----	----	----	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	----	----	----	----	<50
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	----	----	----	----	<0.2
Toluene	108-88-3	0.5	mg/kg	----	----	----	----	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	----	----	----	----	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	----	----	----	----	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	----	----	----	----	<0.5
^ Sum of BTEX	----	0.2	mg/kg	----	----	----	----	<0.2
^ Total Xylenes	1330-20-7	0.5	mg/kg	----	----	----	----	<0.5
Naphthalene	91-20-3	1	mg/kg	----	----	----	----	<1
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	0.0002	<0.0002	<0.0005	<0.0002	0.0006
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	0.0003	<0.0002	<0.0005	<0.0002	0.0007
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	0.0017	<0.0002	0.0008	0.0020	0.0035



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Client sample ID

				SS26_0.1_220617 WWTP	SS26_1.0_220617 WWTP	SS25_0.1_230617 APEC 3	SS25_0.8_230617 APEC 3	SS20_0.1_230617 APEC 3
Client sampling date / time				22-Jun-2017 00:00	22-Jun-2017 00:00	23-Jun-2017 00:00	23-Jun-2017 00:00	23-Jun-2017 00:00
Compound	CAS Number	LOR	Unit	EP1707039-047	EP1707039-050	EP1707039-051	EP1707039-053	EP1707039-054
				Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued								
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0005	0.0020	<0.0005
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0010	0.0011	0.537	0.0235	1.57
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0018	<0.0002	<0.0005
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	<0.0005	<0.0002	<0.0005
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	0.0003	<0.0002	<0.0005	<0.0002	0.0014
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0005	0.0012	0.0007
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0005	<0.0002	0.0006
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0012	<0.0005	<0.0012
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0005	<0.0002	0.0009
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	<0.0012	<0.0005	<0.0012
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0012	<0.0005	<0.0012
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0012	<0.0005	<0.0012
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0012	<0.0005	<0.0012



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Client sample ID

				SS26_0.1_220617 WWTP	SS26_1.0_220617 WWTP	SS25_0.1_230617 APEC 3	SS25_0.8_230617 APEC 3	SS20_0.1_230617 APEC 3
Client sampling date / time				22-Jun-2017 00:00	22-Jun-2017 00:00	23-Jun-2017 00:00	23-Jun-2017 00:00	23-Jun-2017 00:00
Compound	CAS Number	LOR	Unit	EP1707039-047	EP1707039-050	EP1707039-051	EP1707039-053	EP1707039-054
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0005	<0.0002	<0.0005
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	0.0010	<0.0005	0.0026
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	0.0035	0.0011	0.541	0.0287	1.58
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	0.0027	0.0011	0.538	0.0255	1.57
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	0.0032	0.0011	0.539	0.0267	1.58
EP080S: TPH(V)/BTEX Surrogates								
1,2-Dichloroethane-D4	17060-07-0	0.2	%	----	----	----	----	109
Toluene-D8	2037-26-5	0.2	%	----	----	----	----	104
4-Bromofluorobenzene	460-00-4	0.2	%	----	----	----	----	89.8
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	97.6	99.9	83.4	104	104



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Client sample ID

				SS20_0.7_230617 APEC 3	SS21_0.1_230617 APEC 3	SS21_0.8_230617 APEC 3	SS22_0.1_230617 APEC 3	SS22_0.5_230617 APEC 3
Client sampling date / time				23-Jun-2017 00:00	23-Jun-2017 00:00	23-Jun-2017 00:00	23-Jun-2017 00:00	23-Jun-2017 00:00
Compound	CAS Number	LOR	Unit	EP1707039-056	EP1707039-057	EP1707039-059	EP1707039-060	EP1707039-062
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1	%	10.2	4.1	7.5	3.4	4.4
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	----	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg	----	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg	----	<100	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg	----	<100	<100	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg	----	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	----	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	----	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg	----	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg	----	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	mg/kg	----	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	----	<50	<50	<50	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	----	<50	<50	<50	<50
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	----	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg	----	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	----	<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
ortho-Xylene	95-47-6	0.5	mg/kg	----	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg	----	<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
Naphthalene	91-20-3	1	mg/kg	----	<1	<1	<1	<1
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	0.0262	0.0016	0.0076	0.0057	0.0131
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	0.0387	0.0014	0.0108	0.0057	0.0120
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	0.426	0.0103	0.135	0.0611	0.0926



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Client sample ID

				SS20_0.7_230617 APEC 3	SS21_0.1_230617 APEC 3	SS21_0.8_230617 APEC 3	SS22_0.1_230617 APEC 3	SS22_0.5_230617 APEC 3
Client sampling date / time				23-Jun-2017 00:00	23-Jun-2017 00:00	23-Jun-2017 00:00	23-Jun-2017 00:00	23-Jun-2017 00:00
Compound	CAS Number	LOR	Unit	EP1707039-056	EP1707039-057	EP1707039-059	EP1707039-060	EP1707039-062
				Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued								
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	0.0574	0.0010	0.0189	0.0062	0.0073
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.450	1.72	9.75	4.48	5.35
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0005	0.0095	<0.0050	0.0264	<0.0050
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	<0.005	<0.005	<0.005
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	0.0048	0.0005	<0.0050	<0.0050	<0.0050
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	0.0536	0.0095	0.0811	0.0466	0.0900
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	0.0117	0.0015	0.0178	<0.0050	0.0094
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	0.0391	0.0048	0.0784	0.0331	0.0424
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0005	<0.0005	<0.0050	<0.0050	<0.0050
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0005	0.0032	<0.0050	0.0052	<0.0050
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0005	<0.0005	<0.0050	<0.0050	<0.0050
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0005	<0.0005	<0.0050	<0.0050	<0.0050
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0005	<0.0005	<0.0050	<0.0050	<0.0050
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0012	<0.0012	<0.0125	<0.0125	<0.0125
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0005	0.0267	<0.0050	0.0714	0.0199
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0012	<0.0012	<0.0125	<0.0125	<0.0125
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0012	<0.0012	<0.0125	<0.0125	<0.0125
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0012	<0.0012	<0.0125	<0.0125	<0.0125
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0012	<0.0012	<0.0125	<0.0125	<0.0125



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Client sample ID

				SS20_0.7_230617 APEC 3	SS21_0.1_230617 APEC 3	SS21_0.8_230617 APEC 3	SS22_0.1_230617 APEC 3	SS22_0.5_230617 APEC 3
Client sampling date / time				23-Jun-2017 00:00	23-Jun-2017 00:00	23-Jun-2017 00:00	23-Jun-2017 00:00	23-Jun-2017 00:00
Compound	CAS Number	LOR	Unit	EP1707039-056	EP1707039-057	EP1707039-059	EP1707039-060	EP1707039-062
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0005	<0.0005	<0.0050	<0.0050	<0.0050
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0005	<0.0005	<0.0050	<0.0050	<0.0050
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	<0.0050	<0.0050	<0.0050
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	0.0148	0.0027	0.0832	0.0114	0.0272
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.301	0.0081	0.524	0.459
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.0022	<0.0050	<0.0050	<0.0050
EP231P: PFAS Sums								
Sum of PFAS	----	0.0002	mg/kg	1.12	2.10	10.2	5.28	6.12
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	0.876	1.73	9.88	4.54	5.44
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	1.03	2.05	10.2	5.16	6.08
EP080S: TPH(V)/BTEX Surrogates								
1,2-Dichloroethane-D4	17060-07-0	0.2	%	----	97.3	89.4	101	84.2
Toluene-D8	2037-26-5	0.2	%	----	97.2	96.5	95.9	94.1
4-Bromofluorobenzene	460-00-4	0.2	%	----	96.3	99.9	94.9	99.9
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	98.9	84.4	86.4	86.9	89.0



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Client sample ID

				SS19_0.1_230617 APEC 3	SS19_0.7_230617 APEC 3	SS19_3.5_230617 APEC 3	SS18_0.1_230617 APEC 3	SS18_1.0_230617 APEC 3
Client sampling date / time				23-Jun-2017 00:00	23-Jun-2017 00:00	23-Jun-2017 00:00	23-Jun-2017 00:00	23-Jun-2017 00:00
Compound	CAS Number	LOR	Unit	EP1707039-063	EP1707039-065	EP1707039-066	EP1707039-067	EP1707039-069
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1	%	7.9	9.5	17.5	3.3	8.0
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0005	0.0032	0.0078	<0.0002	0.0016
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	0.0006	0.0076	0.0136	<0.0002	0.0024
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	0.0189	0.0878	0.0780	0.0024	0.0430
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	0.0167	0.0112	0.0089	0.0005	0.0080
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.760	0.0521	0.0822	0.212	0.0179
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0005	<0.0002	<0.0002	0.0074	<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	0.0016	0.0037	<0.0002	0.0011
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	0.0021	0.0109	0.0277	0.0007	0.0038
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0005	0.0020	0.0030	<0.0002	0.0006
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	0.0080	0.0163	0.0104	0.0013	0.0083
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0005	<0.0002	<0.0002	0.0008	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0005	<0.0002	<0.0002	0.0007	<0.0002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0005	<0.0002	<0.0002	0.0005	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.0002	mg/kg	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0012	<0.0005	<0.0005	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0005	<0.0002	<0.0002	0.0003	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0012	<0.0005	<0.0005	<0.0005	<0.0005



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Client sample ID

				SS19_0.1_230617 APEC 3	SS19_0.7_230617 APEC 3	SS19_3.5_230617 APEC 3	SS18_0.1_230617 APEC 3	SS18_1.0_230617 APEC 3
Client sampling date / time				23-Jun-2017 00:00	23-Jun-2017 00:00	23-Jun-2017 00:00	23-Jun-2017 00:00	23-Jun-2017 00:00
Compound	CAS Number	LOR	Unit	EP1707039-063	EP1707039-065	EP1707039-066	EP1707039-067	EP1707039-069
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0012	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0012	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0012	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0005	<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	0.0012	<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	0.806	0.193	0.236	0.227	0.0867
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	0.779	0.140	0.160	0.214	0.0609
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	0.789	0.174	0.214	0.216	0.0763
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	86.7	104	104	102	102



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Client sample ID

				SS18_3.4_230617 APEC 3	SS17_0.1_230617 APEC 3	SS17_1.8_230617 APEC 3	SS23_0.1_230617 APEC 3	SS23_0.5_230617 APEC 3
Client sampling date / time				23-Jun-2017 00:00	23-Jun-2017 00:00	23-Jun-2017 00:00	23-Jun-2017 00:00	23-Jun-2017 00:00
Compound	CAS Number	LOR	Unit	EP1707039-070	EP1707039-071	EP1707039-073	EP1707039-074	EP1707039-075
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1	%	18.7	7.6	10.2	2.3	6.8
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	----	----	----	----	<10
C10 - C14 Fraction	----	50	mg/kg	----	----	----	----	<50
C15 - C28 Fraction	----	100	mg/kg	----	----	----	----	<100
C29 - C36 Fraction	----	100	mg/kg	----	----	----	----	120
^ C10 - C36 Fraction (sum)	----	50	mg/kg	----	----	----	----	120
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	----	----	----	----	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	----	----	----	----	<10
>C10 - C16 Fraction	----	50	mg/kg	----	----	----	----	<50
>C16 - C34 Fraction	----	100	mg/kg	----	----	----	----	180
>C34 - C40 Fraction	----	100	mg/kg	----	----	----	----	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	----	----	----	----	180
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	----	----	----	----	<50
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	----	----	----	----	<0.2
Toluene	108-88-3	0.5	mg/kg	----	----	----	----	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	----	----	----	----	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	----	----	----	----	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	----	----	----	----	<0.5
^ Sum of BTEX	----	0.2	mg/kg	----	----	----	----	<0.2
^ Total Xylenes	1330-20-7	0.5	mg/kg	----	----	----	----	<0.5
Naphthalene	91-20-3	1	mg/kg	----	----	----	----	<1
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	0.0054	<0.0002	0.0005	<0.0002	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	0.0019	<0.0002	0.0002	<0.0002	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	0.0118	0.0003	0.0007	0.0003	----



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Client sample ID

				SS18_3.4_230617 APEC 3	SS17_0.1_230617 APEC 3	SS17_1.8_230617 APEC 3	SS23_0.1_230617 APEC 3	SS23_0.5_230617 APEC 3
Client sampling date / time				23-Jun-2017 00:00	23-Jun-2017 00:00	23-Jun-2017 00:00	23-Jun-2017 00:00	23-Jun-2017 00:00
Compound	CAS Number	LOR	Unit	EP1707039-070	EP1707039-071	EP1707039-073	EP1707039-074	EP1707039-075
				Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued								
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	0.0004	<0.0002	<0.0002	<0.0002	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0008	0.0057	<0.0002	0.0257	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	0.0004	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	<0.001	<0.001	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	0.0007	<0.0002	<0.0002	<0.0002	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	0.0063	<0.0002	<0.0002	<0.0002	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	0.0005	<0.0002	<0.0002	<0.0002	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	0.0007	<0.0002	<0.0002	<0.0002	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<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	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<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	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<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	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<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	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<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	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	----



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Client sample ID

				SS18_3.4_230617 APEC 3	SS17_0.1_230617 APEC 3	SS17_1.8_230617 APEC 3	SS23_0.1_230617 APEC 3	SS23_0.5_230617 APEC 3
Client sampling date / time				23-Jun-2017 00:00	23-Jun-2017 00:00	23-Jun-2017 00:00	23-Jun-2017 00:00	23-Jun-2017 00:00
Compound	CAS Number	LOR	Unit	EP1707039-070	EP1707039-071	EP1707039-073	EP1707039-074	EP1707039-075
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
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	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<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	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	----
EP231P: PFAS Sums								
Sum of PFAS	----	0.0002	mg/kg	0.0285	0.0060	0.0014	0.0264	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	0.0126	0.0060	0.0007	0.0260	----
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	0.0262	0.0060	0.0012	0.0260	----
EP080S: TPH(V)/BTEX Surrogates								
1,2-Dichloroethane-D4	17060-07-0	0.2	%	----	----	----	----	99.2
Toluene-D8	2037-26-5	0.2	%	----	----	----	----	95.4
4-Bromofluorobenzene	460-00-4	0.2	%	----	----	----	----	92.3
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	103	109	106	105	----



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Client sample ID

				SS24_0.1_230617 APEC 3	SS24_0.5_230617 APEC 3	SSQA013_230617 QAQC	SQA015_230617 QAQC	SQA017_230617 QAQC
Client sampling date / time				23-Jun-2017 00:00	23-Jun-2017 00:00	23-Jun-2017 00:00	23-Jun-2017 00:00	23-Jun-2017 00:00
Compound	CAS Number	LOR	Unit	EP1707039-077	EP1707039-078	EP1707039-079	EP1707039-080	EP1707039-081
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1	%	3.5	14.0	7.6	2.3	3.7
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	0.0002	0.0136	<0.0002	<0.0002	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.0043	<0.0002	<0.0002	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	0.0036	0.0913	0.0003	0.0007	0.0025
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	0.0027	0.0119	<0.0002	<0.0002	0.0018
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.199	0.583	0.0045	0.0395	0.147
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	0.0006	<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	0.0028	<0.0002	<0.0002	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	0.0007	0.0153	<0.0002	0.0003	0.0006
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.0018	<0.0002	<0.0002	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	0.0015	0.0108	<0.0002	0.0003	0.0011
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	0.0034	0.0007	<0.0002	0.0004	0.0027
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	0.0003	<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 (PFTTrDA)	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	0.0004	<0.0002	<0.0002	0.0004	0.0003
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Client sample ID

				SS24_0.1_230617 APEC 3	SS24_0.5_230617 APEC 3	SSQA013_230617 QAQC	SQA015_230617 QAQC	SQA017_230617 QAQC
Client sampling date / time				23-Jun-2017 00:00	23-Jun-2017 00:00	23-Jun-2017 00:00	23-Jun-2017 00:00	23-Jun-2017 00:00
Compound	CAS Number	LOR	Unit	EP1707039-077	EP1707039-078	EP1707039-079	EP1707039-080	EP1707039-081
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	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
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	0.0433	<0.0005	0.0005	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.0094	<0.0005	0.0015	<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	0.212	0.788	0.0048	0.0445	0.156
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	0.203	0.674	0.0048	0.0402	0.150
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	0.205	0.771	0.0048	0.0428	0.151
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	101	103	109	102	108



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Client sample ID

				SS14_2.3_220617 APEC 2	----	----	----	----
Client sampling date / time				22-Jun-2017 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	EP1707039-082	-----	-----	-----	-----
Result				----	----	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1	%	17.3	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	0.0024	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	0.0009	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	0.0097	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	0.0006	----	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0361	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	0.0005	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	0.0056	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	0.0005	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	0.0018	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	----	----	----	----



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Client sample ID

				SS14_2.3_220617 APEC 2	----	----	----	----
Client sampling date / time				22-Jun-2017 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	EP1707039-082	-----	-----	-----	-----
Result				----	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	----	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0005	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	0.0006	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	----	----	----	----
EP231P: PFAS Sums								
Sum of PFAS	----	0.0002	mg/kg	0.0587	----	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	0.0458	----	----	----	----
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	0.0572	----	----	----	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	102	----	----	----	----



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Client sample ID

				SSQA01_210617 QAQC	SSQA06_220617 QAQC	SSQA011_230617 QAQC	----	----
Client sampling date / time				21-Jun-2017 00:00	22-Jun-2017 00:00	23-Jun-2017 00:00	----	----
Compound	CAS Number	LOR	Unit	EP1707039-083	EP1707039-084	EP1707039-085	-----	-----
				Result	Result	Result	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.03	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.03	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	<0.02	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	<0.1	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	<0.01	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	<0.05	----	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	<0.02	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	<0.05	----	----



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Client sample ID

				SSQA01_210617 QAQC	SSQA06_220617 QAQC	SSQA011_230617 QAQC	----	----
Client sampling date / time				21-Jun-2017 00:00	22-Jun-2017 00:00	23-Jun-2017 00:00	----	----
Compound	CAS Number	LOR	Unit	EP1707039-083	EP1707039-084	EP1707039-085	-----	-----
				Result	Result	Result	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	<0.02	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	<0.02	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	<0.05	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<0.05	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	<0.05	----	----
EP231P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.06	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	<0.01	0.06	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	<0.01	0.06	----	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	106	104	95.3	----	----



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	63	132
Toluene-D8	2037-26-5	66	125
4-Bromofluorobenzene	460-00-4	60	124
EP231S: PFAS Surrogate			
13C4-PFOS	----	70	130

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	130

QUALITY CONTROL REPORT

Work Order	: EP1707039	Page	: 1 of 25
Client	: AECOM Australia Pty Ltd	Laboratory	: Environmental Division Perth
Contact	: [REDACTED]	Contact	: [REDACTED]
Address	: LEVEL 6 3 FORREST PLACE PERTH WA, AUSTRALIA 6849	Address	: 10 Hod Way Malaga WA Australia 6090
Telephone	: ----	Telephone	: +61-8-9209 7655
Project	: 60543717.2.3 Karratha Airport Limited Investigation	Date Samples Received	: 03-Jul-2017
Order number	: 60543717.2.3	Date Analysis Commenced	: 05-Jul-2017
C-O-C number	: ----	Issue Date	: 19-Jul-2017
Sampler	: [REDACTED]		
Site	: ----		
Quote number	: EP/541/17		
No. of samples received	: 87		
No. of samples analysed	: 59		



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 LAB TECH	Perth Organics, Malaga, WA
[REDACTED]	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
[REDACTED]	Organic Coordinator	Sydney Organics, Smithfield, NSW
[REDACTED]	Laboratory Manager	Perth Inorganics, Malaga, WA
[REDACTED]	Senior Chemist Volatiles	Sydney Organics, Smithfield, NSW
[REDACTED]	Client Services - Technical Manager	Perth Organics, Malaga, WA



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**

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: 980451)									
EP1707039-014	SS02_0.5_220617 APEC 1	EA055: Moisture Content	----	1	%	9.8	9.0	9.00	No Limit
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 983016)									
EP1707039-004	SS08_0.1_210617 APEC 1	EA055: Moisture Content	----	1	%	13.0	13.0	0.00	0% - 50%
EP1707039-021	SS01_1.5_220617 APEC 1	EA055: Moisture Content	----	1	%	11.2	11.0	1.30	0% - 50%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 983017)									
EP1707039-044	SS15_1.4_220617 APEC 2 - Off-site	EA055: Moisture Content	----	1	%	10.2	10.8	5.05	0% - 50%
EP1707039-060	SS22_0.1_230617 APEC 3	EA055: Moisture Content	----	1	%	3.4	3.4	0.00	No Limit
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 983018)									
EP1707039-073	SS17_1.8_230617 APEC 3	EA055: Moisture Content	----	1	%	10.2	9.6	5.88	0% - 50%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 985275)									
ES1716683-001	Anonymous	EA055: Moisture Content	----	1	%	44.9	42.4	5.73	0% - 20%
ES1716711-004	Anonymous	EA055: Moisture Content	----	1	%	21.1	18.4	13.9	0% - 20%
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 980752)									
EP1707109-003	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
EP1707109-001	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
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 980755)									
EP1707109-003	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 981441)									
EP1707039-016	SS03_0.1_220617 APEC 1	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	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: 981441) - continued									
EP1707039-016	SS03_0.1_220617 APEC 1	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
EP1707076-025	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
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 981504)									
EP1707039-016	SS03_0.1_220617 APEC 1	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EP1707076-025	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 980752)									
EP1707109-003	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
EP1707109-001	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
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 980755)									
EP1707109-003	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: 981441)									
EP1707039-016	SS03_0.1_220617 APEC 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
EP1707076-025	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
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 981504)									
EP1707039-016	SS03_0.1_220617 APEC 1	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EP1707076-025	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EP080: BTEXN (QC Lot: 980755)									
EP1707109-003	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	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
			106-42-3						
		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: 981504)									
EP1707039-016	SS03_0.1_220617 APEC 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



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: 981504) - continued									
EP1707039-016	SS03_0.1_220617 APEC 1	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
EP1707076-025	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
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 982305)									
EP1707039-001	SS09_0.1_210617 APEC 1/2 - Off-site	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	0.0138	0.0158	13.5	0% - 20%
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	0.0049	0.0054	9.84	0% - 20%
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	0.0196	0.0195	0.00	0% - 20%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	0.0025	0.0027	7.25	0% - 50%
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	1.06	1.12	5.01	0% - 20%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	0.0048	0.0046	3.97	0% - 20%
EP1707039-016	SS03_0.1_220617 APEC 1	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	0.0012	0.0011	10.5	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	0.0016	0.0015	10.7	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	0.0151	0.0131	14.2	0% - 20%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	0.0023	0.0019	18.9	0% - 50%
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	1.84	1.76	4.44	0% - 20%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	0.0029	0.0028	0.00	0% - 50%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 982306)									
EP1707039-038	SS11_0.5_220617 APEC 2	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	0.0016	0.0020	21.6	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	0.0046	0.0052	12.8	0% - 20%
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	0.0335	0.0384	13.6	0% - 20%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	0.0037	0.0042	11.6	0% - 20%
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0768	0.0633	19.3	0% - 20%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
EP1707039-056	SS20_0.7_230617 APEC 3	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	0.0262	0.0240	8.66	0% - 20%
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	0.0387	0.0412	6.41	0% - 20%
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	0.426	0.424	0.419	0% - 20%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	0.0574	0.0599	4.17	0% - 20%
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.450	0.440	2.23	0% - 20%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0005	<0.0005	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 982315)									
EP1707039-070	SS18_3.4_230617 APEC 3	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	0.0054	0.0048	11.4	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 (%)
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 982315) - continued									
EP1707039-070	SS18_3.4_230617 APEC 3	EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	0.0019	0.0016	15.2	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	0.0118	0.0104	12.1	0% - 20%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	0.0004	0.0003	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0008	0.0006	21.8	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: 986756)									
EB1713716-001	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	0.0003	0.0003	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	0.0036	0.0034	6.53	0% - 50%
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: 982305)									
EP1707039-001	SS09_0.1_210617 APEC 1/2 - Off-site	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	0.0053	0.0060	12.0	0% - 20%
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	0.0135	0.0147	8.74	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	0.0009	0.0010	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	0.0052	0.0059	12.5	0% - 20%
		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	0.0003	0.0003	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 (PFTTrDA)	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
EP1707039-016	SS03_0.1_220617 APEC 1	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	0.0024	0.0022	8.27	0% - 50%
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	0.0053	0.0050	6.61	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	0.0006	0.0006	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	0.0032	0.0028	11.7	0% - 50%
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	0.0005	0.0004	27.3	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	0.0020	0.0017	14.9	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 (PFTTrDA)	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: 982306)									
EP1707039-038	SS11_0.5_220617 APEC 2	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	0.0015	0.0016	7.70	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	0.0068	0.0079	14.0	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	0.0030	0.0034	12.2	0% - 50%



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: 982306) - continued									
EP1707039-038	SS11_0.5_220617 APEC 2	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	0.0082	0.0091	11.4	0% - 20%
		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
EP1707039-056	SS20_0.7_230617 APEC 3	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	0.0048	0.0047	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	0.0536	0.0558	3.97	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	0.0117	0.0117	0.00	0% - 20%
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	0.0391	0.0414	5.81	0% - 20%
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0012	<0.0012	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: 982315)							
EP1707039-070	SS18_3.4_230617 APEC 3	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	0.0007	0.0006	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	0.0063	0.0058	6.80	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	0.0005	0.0004	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	0.0007	0.0006	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: 986756)									
EB1713716-001	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



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: 986756) - continued									
EB1713716-001	Anonymous	EP231X: Perfluorotridecanoic acid (PFTTrDA)	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: 982305)									
EP1707039-001	SS09_0.1_210617 APEC 1/2 - Off-site	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	0.0004	0.0003	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
EP1707039-016	SS03_0.1_220617 APEC 1	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	0.0034	0.0032	5.64	0% - 50%
		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: 982306)									
EP1707039-038	SS11_0.5_220617 APEC 2	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



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: 982306) - continued									
EP1707039-038	SS11_0.5_220617 APEC 2	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
EP1707039-056	SS20_0.7_230617 APEC 3	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0012	<0.0012	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0012	<0.0012	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0012	<0.0012	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0012	<0.0012	0.00	No Limit
		EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 982315)							
EP1707039-070	SS18_3.4_230617 APEC 3	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: 986756)									
EB1713716-001	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



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: 986756) - continued									
EB1713716-001	Anonymous	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: 982305)									
EP1707039-001	SS09_0.1_210617 APEC 1/2 - Off-site	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
EP1707039-016	SS03_0.1_220617 APEC 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	0.0020	0.0015	24.1	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	0.0161	0.0152	5.98	0% - 20%
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	0.0007	<0.0005	28.5	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 982306)									
EP1707039-038	SS11_0.5_220617 APEC 2	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
EP1707039-056	SS20_0.7_230617 APEC 3	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	0.0148	0.0167	12.0	0% - 20%
		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: 982315)									
EP1707039-070	SS18_3.4_230617 APEC 3	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	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: 982315) - continued									
EP1707039-070	SS18_3.4_230617 APEC 3	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: 986756)									
EB1713716-001	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
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: 982342)									
EP1707039-083	SSQA01_210617 QAQC	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
EP1707076-037	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	27.4	23.2	16.6	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.67	0.75	10.4	0% - 20%
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.81	0.92	12.1	0% - 20%
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	7.51	8.75	15.2	0% - 20%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	0.36	0.42	14.7	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: 982342)									
EP1707039-083	SSQA01_210617 QAQC	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 (PFTTrDA)	72629-94-8	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 (%)
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 982342) - continued									
EP1707039-083	SSQA01_210617 QAQC	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
EP1707076-037	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.48	0.55	13.2	0% - 20%
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.31	0.35	13.3	0% - 50%
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	1.74	1.93	10.1	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.23	0.26	15.0	0% - 50%
		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: 982342)							
EP1707039-083	SSQA01_210617 QAQC	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
		EP1707076-037	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	0.06	0.08
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: 982342)									

Page : 12 of 25
 Work Order : EP1707039
 Client : AECOM Australia Pty Ltd
 Project : 60543717.2.3 Karratha Airport Limited Investigation



Sub-Matrix: **WATER**

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 (%)
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 982342) - continued									
EP1707039-083	SSQA01_210617 QAQC	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
EP1707076-037	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 982342)									
EP1707039-083	SSQA01_210617 QAQC	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.00	No Limit
EP1707076-037	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	39.6	37.2	6.14	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**

Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result			LCS	Low
EP080/071: Total Petroleum Hydrocarbons (QCLot: 980752)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	1192 mg/kg	97.0	70	120
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	2699 mg/kg	98.0	69	117
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	437 mg/kg	90.6	59	113
EP080/071: Total Petroleum Hydrocarbons (QCLot: 980755)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	32 mg/kg	88.6	66	122
EP080/071: Total Petroleum Hydrocarbons (QCLot: 981441)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	200 mg/kg	99.1	75	129
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	300 mg/kg	101	77	131
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	200 mg/kg	104	71	129
EP080/071: Total Petroleum Hydrocarbons (QCLot: 981504)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	108	68	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 980752)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	1913 mg/kg	96.2	71	117
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	2245 mg/kg	94.6	65	119
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	151 mg/kg	98.8	42	124
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 980755)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	37 mg/kg	89.3	66	122
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 981441)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	250 mg/kg	98.8	77	125
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	350 mg/kg	108	74	138
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	150 mg/kg	93.1	63	131
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 981504)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	104	68	128
EP080: BTEXN (QCLot: 980755)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	2 mg/kg	102	72	122
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	2 mg/kg	94.9	75	119
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	2 mg/kg	94.6	73	121
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	4 mg/kg	98.6	74	122
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	2 mg/kg	94.3	75	121
EP080: Naphthalene	91-20-3	1	mg/kg	<1	2 mg/kg	84.8	64	126
EP080: BTEXN (QCLot: 981504)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	101	62	116



Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP080: BTEXN (QCLot: 981504) - continued								
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	99.8	67	121
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	101	65	117
EP080: meta- & para-Xylene	108-38-3	0.5	mg/kg	<0.5	2 mg/kg	102	66	118
	106-42-3							
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	104	68	120
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	107	63	119
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 982305)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	67.5	57	121
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	78.0	55	125
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	80.0	52	126
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	71.3	54	123
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	99.3	55	127
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	93.2	54	125
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 982306)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	69.7	57	121
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	72.6	55	125
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	83.3	52	126
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	76.2	54	123
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	125	55	127
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	95.4	54	125
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 982315)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	120	57	121
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	68.9	55	125
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	87.0	52	126
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	87.5	54	123
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	114	55	127
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	91.6	54	125
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 986756)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	69.4	57	121
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	79.4	55	125
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	74.9	52	126
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	74.8	54	123
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	87.8	55	127
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	92.5	54	125
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 982305)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	84.7	52	128
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	68.3	54	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	94.4	58	127



Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 982305) - continued								
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	91.9	57	128
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	103	60	134
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	122	63	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	110	55	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	65.6	62	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	79.4	53	134
EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	65.2	49	129
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	79.6	59	129
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 982306)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	107	52	128
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	71.1	54	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	69.0	58	127
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	85.7	57	128
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	105	60	134
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	106	63	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	116	55	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	124	62	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	120	53	134
EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	75.8	49	129
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	93.9	59	129
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 982315)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	90.9	52	128
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	65.6	54	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	96.3	58	127
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	80.0	57	128
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	103	60	134
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	124	63	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	126	55	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	125	62	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	128	53	134
EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	110	49	129
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	95.6	59	129
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 986756)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	97.9	52	128
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	73.4	54	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	81.6	58	127
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	82.4	57	128
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	90.2	60	134



Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 986756) - continued								
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	118	63	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	106	55	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	112	62	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	83.3	53	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	66.9	49	129
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	85.0	59	129
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 982305)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	68.3	52	132
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	109	65	126
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	83.6	64	126
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	118	63	124
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	81.4	58	125
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	104	61	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	123	55	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 982306)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	122	52	132
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	96.3	65	126
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	91.9	64	126
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	110	63	124
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	84.2	58	125
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	118	61	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	90.6	55	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 982315)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	81.9	52	132
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	80.2	65	126
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	64.4	64	126
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	65.4	63	124
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	67.2	58	125



Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 982315) - continued								
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	119	61	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	97.5	55	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 986756)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	84.0	52	132
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	88.6	65	126
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	74.2	64	126
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	74.6	63	124
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	71.6	58	125
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	122	61	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	116	55	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 982305)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	67.3	54	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	78.3	61	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	89.5	62	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	113	60	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 982306)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	66.3	54	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	101	61	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	112	62	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	120	60	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 982315)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	71.2	54	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	94.0	61	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	88.6	62	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	124	60	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 986756)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	88.1	54	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	104	61	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	119	62	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	89.6	60	130

Sub-Matrix: **WATER**

Sub-Matrix: WATER	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report		
		Spike	Spike Recovery (%)	Recovery Limits (%)



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report			
Method: Compound	CAS Number	LOR	Unit		Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 982342)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.5 µg/L	127	70	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.5 µg/L	128	70	130
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.5 µg/L	109	70	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.5 µg/L	130	70	130
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.5 µg/L	125	70	130
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.5 µg/L	108	70	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 982342)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	2.5 µg/L	97.5	70	130
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.5 µg/L	125	70	130
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.5 µg/L	127	70	130
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.5 µg/L	124	70	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.5 µg/L	130	70	130
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.5 µg/L	129	70	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.5 µg/L	111	70	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.5 µg/L	123	70	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.5 µg/L	123	70	130
EP231X: Perfluorotridecanoic acid (PFTriDA)	72629-94-8	0.02	µg/L	<0.02	0.5 µg/L	94.0	70	130
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	1.25 µg/L	84.8	70	150
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 982342)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.5 µg/L	108	70	130
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	1.25 µg/L	97.9	70	150
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	1.25 µg/L	106	70	150
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.05	1.25 µg/L	105	70	150
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	1.25 µg/L	80.0	70	150
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.5 µg/L	93.4	70	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.5 µg/L	104	70	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 982342)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.5 µg/L	128	70	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.5 µg/L	124	70	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.5 µg/L	96.8	70	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.5 µg/L	104	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				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: 980752)							
EP1707109-002	Anonymous	EP071: C10 - C14 Fraction	----	1192 mg/kg	98.7	65	126
		EP071: C15 - C28 Fraction	----	2699 mg/kg	98.7	62	124
		EP071: C29 - C36 Fraction	----	437 mg/kg	89.4	65	131
EP080/071: Total Petroleum Hydrocarbons (QCLot: 980755)							
EP1707109-002	Anonymous	EP080: C6 - C9 Fraction	----	24 mg/kg	84.5	69	135
EP080/071: Total Petroleum Hydrocarbons (QCLot: 981441)							
EP1707039-016	SS03_0.1_220617 APEC 1	EP071: C10 - C14 Fraction	----	523 mg/kg	94.9	73	137
		EP071: C15 - C28 Fraction	----	2319 mg/kg	107	53	131
		EP071: C29 - C36 Fraction	----	1714 mg/kg	122	52	132
EP080/071: Total Petroleum Hydrocarbons (QCLot: 981504)							
EP1707039-016	SS03_0.1_220617 APEC 1	EP080: C6 - C9 Fraction	----	32.5 mg/kg	106	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 980752)							
EP1707109-002	Anonymous	EP071: >C10 - C16 Fraction	----	1913 mg/kg	97.6	65	126
		EP071: >C16 - C34 Fraction	----	2245 mg/kg	94.9	62	124
		EP071: >C34 - C40 Fraction	----	151 mg/kg	96.7	65	131
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 980755)							
EP1707109-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	29 mg/kg	84.3	69	135
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 981441)							
EP1707039-016	SS03_0.1_220617 APEC 1	EP071: >C10 - C16 Fraction	----	860 mg/kg	100	73	137
		EP071: >C16 - C34 Fraction	----	3223 mg/kg	106	53	131
		EP071: >C34 - C40 Fraction	----	1058 mg/kg	112	52	132
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 981504)							
EP1707039-016	SS03_0.1_220617 APEC 1	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	107	70	130
EP080: BTEXN (QCLot: 980755)							
EP1707109-002	Anonymous	EP080: Benzene	71-43-2	2 mg/kg	98.4	76	118
		EP080: Toluene	108-88-3	2 mg/kg	95.0	67	112
EP080: BTEXN (QCLot: 981504)							
EP1707039-016	SS03_0.1_220617 APEC 1	EP080: Benzene	71-43-2	2.5 mg/kg	94.7	70	130
		EP080: Toluene	108-88-3	2.5 mg/kg	97.0	70	130
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	98.1	70	130
		EP080: meta- & para-Xylene	108-38-3	2.5 mg/kg	99.0	70	130
			106-42-3				
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	99.1	70	130
		EP080: Naphthalene	91-20-3	2.5 mg/kg	104	70	130



Sub-Matrix: **SOIL**

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: 982305)							
EP1707039-001	SS09_0.1_210617 APEC 1/2 - Off-site	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	# Not Determined	50	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	96.1	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	68.2	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	61.8	50	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 982306)							
EP1707039-038	SS11_0.5_220617 APEC 2	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	63.5	50	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	92.9	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	97.2	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	91.2	50	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 982315)							
EP1707039-070	SS18_3.4_230617 APEC 3	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	102	50	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	67.2	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	86.0	50	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	122	50	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	97.5	50	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 986756)							
EB1713716-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	53.7	50	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	60.6	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	88.3	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	69.0	50	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	107	50	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	78.5	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 982305)							
EP1707039-001	SS09_0.1_210617 APEC 1/2 - Off-site	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	107	30	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	128	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	# Not Determined	50	130



Sub-Matrix: **SOIL**

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: 982305) - continued							
EP1707039-001	SS09_0.1_210617 APEC 1/2 - Off-site	EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	92.9	50	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	84.7	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	121	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	120	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	86.6	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	61.1	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	61.8	30	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	42.8	30	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 982306)							
EP1707039-038	SS11_0.5_220617 APEC 2	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	82.8	30	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	123	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	# Not Determined	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	63.6	50	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	# Not Determined	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	102	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	122	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	106	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	55.4	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	45.0	30	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	38.7	30	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 982315)							
EP1707039-070	SS18_3.4_230617 APEC 3	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	114	30	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	78.7	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	# Not Determined	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	75.0	50	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	115	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	119	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	115	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	129	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	126	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	93.6	30	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	68.1	30	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 986756)							
EB1713716-001	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	71.0	30	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	60.9	50	130



Sub-Matrix: **SOIL**

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: 986756) - continued							
EB1713716-001	Anonymous	EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	59.5	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	78.5	50	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	110	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	122	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	120	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	115	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	92.0	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	77.9	30	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	88.1	30	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 982305)							
EP1707039-001	SS09_0.1_210617 APEC 1/2 - Off-site	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	69.4	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	95.0	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	69.6	30	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.00312 mg/kg	112	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	50.1	30	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	74.6	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	113	30	130
		EP231C: Perfluoroalkyl Sulfonamides (QCLot: 982306)					
EP1707039-038	SS11_0.5_220617 APEC 2	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	84.2	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	107	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	43.5	30	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.00312 mg/kg	102	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	52.1	30	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	122	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	97.9	30	130
		EP231C: Perfluoroalkyl Sulfonamides (QCLot: 982315)					
EP1707039-070	SS18_3.4_230617 APEC 3	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	100	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	125	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
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 986756) - continued							
EB1713716-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	85.5	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	103	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	116	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	113	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
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 982342)							
EP1707039-083	SSQA01_210617 QAQC	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.5 µg/L	126	50	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.5 µg/L	123	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.5 µg/L	122	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.5 µg/L	114	50	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.5 µg/L	116	50	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.5 µg/L	118	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 982342)							
EP1707039-083	SSQA01_210617 QAQC	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	2.5 µg/L	108	50	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.5 µg/L	121	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.5 µg/L	124	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.5 µg/L	121	50	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.5 µg/L	119	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.5 µg/L	126	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.5 µg/L	128	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.5 µg/L	122	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.5 µg/L	115	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.5 µg/L	127	50	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	1.25 µg/L	140	50	150
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 982342)							
EP1707039-083	SSQA01_210617 QAQC	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.5 µg/L	122	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	1.25 µg/L	120	50	150
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	1.25 µg/L	122	50	150
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	1.25 µg/L	126	50	150
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	1.25 µg/L	117	50	150
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.5 µg/L	120	50	130

Page : 25 of 25
 Work Order : EP1707039
 Client : AECOM Australia Pty Ltd
 Project : 60543717.2.3 Karratha Airport Limited Investigation



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: 982342) - continued							
EP1707039-083	SSQA01_210617 QAQC	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.5 µg/L	119	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 982342)							
EP1707039-083	SSQA01_210617 QAQC	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.5 µg/L	123	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.5 µg/L	95.8	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.5 µg/L	122	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.5 µg/L	92.6	50	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EP1707039	Page	: 1 of 14
Client	: AECOM Australia Pty Ltd	Laboratory	: Environmental Division Perth
Contact	: [REDACTED]	Telephone	: +61-8-9209 7655
Project	: 60543717.2.3 Karratha Airport Limited Investigation	Date Samples Received	: 03-Jul-2017
Site	: ----	Issue Date	: 19-Jul-2017
Sampler	: [REDACTED]	No. of samples received	: 87
Order number	: 60543717.2.3	No. of samples analysed	: 59

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

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- Quality Control Sample Frequency Outliers exist - please see following pages for full details.

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EP231A: Perfluoroalkyl Sulfonic Acids	EP1707039--001	SS09_0.1_210617 APEC 1/2	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	EP1707039--001	SS09_0.1_210617 APEC 1/2	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	EP1707039--038	SS11_0.5_220617 APEC 2	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	EP1707039--070	SS18_3.4_230617 APEC 3	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	EP1707039--001	SS09_0.1_210617 APEC 1/2	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	EP1707039--038	SS11_0.5_220617 APEC 2	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	EP1707039--001	SS09_0.1_210617 APEC 1/2	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	EP1707039--038	SS11_0.5_220617 APEC 2	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	EP1707039--070	SS18_3.4_230617 APEC 3	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	EP1707039--038	SS11_0.5_220617 APEC 2	Perfluorooctanoic acid (PFOA)	335-67-1	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

Matrix: SOIL

Method	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA055: Moisture Content (Dried @ 105-110°C)						

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content (Dried @ 105-110°C)								
HDPE Soil Jar (EA055)		21-Jun-2017	----	----	----	06-Jul-2017	05-Jul-2017	✖
SS09_0.1_210617 - APEC 1/2 - Off-site,								
SS08_0.1_210617 - APEC 1,								
SS05_0.1_210617 - APEC 1,								
SS04_0.1_210617 - APEC 1,								
SS12_0.1_210617 - APEC 2,								
SS13_0.1_210617 - APEC 2,								
HDPE Soil Jar (EA055)								



Matrix: **SOIL**

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content (Dried @ 105-110°C) - Continued								
SS02_0.1_220617 - APEC 1, SS03_0.1_220617 - APEC 1, SS01_0.1_220617 - APEC 1, SS14_0.1_220617 - APEC 2, SS11_0.5_220617 - APEC 2, SS15_1.4_220617 - APEC 2 - Off-site, SS16_0.5_220617 - APEC 2 - Off-site,	SS02_1.5_220617 - APEC 1, SS03_2.6_220617 - APEC 1, SS01_1.5_220617 - APEC 1, SS11_0.1_220617 - APEC 2, SS15_0.1_220617 - APEC 2 - Off-site, SS16_0.1_220617 - APEC 2 - Off-site, SS14_2.3_220617 - APEC 2	22-Jun-2017	----	----	----	06-Jul-2017	06-Jul-2017	✓
HDPE Soil Jar (EA055) SS25_0.1_230617 - APEC 3, SS21_0.1_230617 - APEC 3, SS19_3.5_230617 - APEC 3, SS18_3.4_230617 - APEC 3	SS20_0.1_230617 - APEC 3, SS19_0.1_230617 - APEC 3, SS18_0.1_230617 - APEC 3,	23-Jun-2017	----	----	----	06-Jul-2017	07-Jul-2017	✓
Soil Glass Jar - Unpreserved (EA055) SS12_0.5_210617 - APEC 2,	SS13_0.5_210617 - APEC 2	21-Jun-2017	----	----	----	05-Jul-2017	05-Jul-2017	✓
Soil Glass Jar - Unpreserved (EA055) SS02_0.5_220617 - APEC 1		22-Jun-2017	----	----	----	05-Jul-2017	06-Jul-2017	✓
Soil Glass Jar - Unpreserved (EA055) SSQA08_220617 - QAQC		22-Jun-2017	----	----	----	07-Jul-2017	06-Jul-2017	✗
Soil Glass Jar - Unpreserved (EA055) SS15_0.5_220617 - APEC 2 - Off-site		22-Jun-2017	----	----	----	05-Jul-2017	06-Jul-2017	✓
Soil Glass Jar - Unpreserved (EA055) SS26_0.1_220617 - WWTP,	SS26_1.0_220617 - WWTP	22-Jun-2017	----	----	----	06-Jul-2017	06-Jul-2017	✓
Soil Glass Jar - Unpreserved (EA055) SS23_0.5_230617 - APEC 3		23-Jun-2017	----	----	----	05-Jul-2017	07-Jul-2017	✓
Soil Glass Jar - Unpreserved (EA055) SS25_0.8_230617 - APEC 3, SS21_0.8_230617 - APEC 3, SS22_0.5_230617 - APEC 3, SS18_1.0_230617 - APEC 3, SS17_1.8_230617 - APEC 3, SS24_0.1_230617 - APEC 3, SSQA013_230617 - QAQC, SQA017_230617 - QAQC	SS20_0.7_230617 - APEC 3, SS22_0.1_230617 - APEC 3, SS19_0.7_230617 - APEC 3, SS17_0.1_230617 - APEC 3, SS23_0.1_230617 - APEC 3, SS24_0.5_230617 - APEC 3, SQA015_230617 - QAQC,	23-Jun-2017	----	----	----	06-Jul-2017	07-Jul-2017	✓



Matrix: **SOIL**

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Petroleum Hydrocarbons							
HDPE Soil Jar (EP080) SS03_0.1_220617 - APEC 1	22-Jun-2017	05-Jul-2017	06-Jul-2017	✓	06-Jul-2017	06-Jul-2017	✓
HDPE Soil Jar (EP071) SS03_0.1_220617 - APEC 1	22-Jun-2017	06-Jul-2017	06-Jul-2017	✓	07-Jul-2017	15-Aug-2017	✓
Soil Glass Jar - Unpreserved (EP080) SS12_0.5_210617 - APEC 2, SS13_0.5_210617 - APEC 2	21-Jun-2017	05-Jul-2017	05-Jul-2017	✓	05-Jul-2017	05-Jul-2017	✓
Soil Glass Jar - Unpreserved (EP071) SS12_0.5_210617 - APEC 2, SS13_0.5_210617 - APEC 2	21-Jun-2017	05-Jul-2017	05-Jul-2017	✓	06-Jul-2017	14-Aug-2017	✓
Soil Glass Jar - Unpreserved (EP080) SS02_0.5_220617 - APEC 1, SS11_0.5_220617 - APEC 2, SS15_0.5_220617 - APEC 2 - Off-site	22-Jun-2017	05-Jul-2017	06-Jul-2017	✓	05-Jul-2017	06-Jul-2017	✓
Soil Glass Jar - Unpreserved (EP071) SS02_0.5_220617 - APEC 1, SS11_0.5_220617 - APEC 2, SS15_0.5_220617 - APEC 2 - Off-site	22-Jun-2017	05-Jul-2017	06-Jul-2017	✓	06-Jul-2017	14-Aug-2017	✓
Soil Glass Jar - Unpreserved (EP080) SS20_0.1_230617 - APEC 3, SS22_0.1_230617 - APEC 3, SS23_0.5_230617 - APEC 3	23-Jun-2017	05-Jul-2017	07-Jul-2017	✓	05-Jul-2017	07-Jul-2017	✓
Soil Glass Jar - Unpreserved (EP071) SS20_0.1_230617 - APEC 3, SS21_0.8_230617 - APEC 3, SS22_0.1_230617 - APEC 3, SS23_0.5_230617 - APEC 3	23-Jun-2017	05-Jul-2017	07-Jul-2017	✓	06-Jul-2017	14-Aug-2017	✓
Soil Glass Jar - Unpreserved (EP071) SS21_0.8_230617 - APEC 3, SS22_0.5_230617 - APEC 3	23-Jun-2017	06-Jul-2017	07-Jul-2017	✓	07-Jul-2017	15-Aug-2017	✓



Matrix: **SOIL**

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
HDPE Soil Jar (EP080) SS03_0.1_220617 - APEC 1	22-Jun-2017	05-Jul-2017	06-Jul-2017	✓	06-Jul-2017	06-Jul-2017	✓
HDPE Soil Jar (EP071) SS03_0.1_220617 - APEC 1	22-Jun-2017	06-Jul-2017	06-Jul-2017	✓	07-Jul-2017	15-Aug-2017	✓
Soil Glass Jar - Unpreserved (EP080) SS12_0.5_210617 - APEC 2, SS13_0.5_210617 - APEC 2	21-Jun-2017	05-Jul-2017	05-Jul-2017	✓	05-Jul-2017	05-Jul-2017	✓
Soil Glass Jar - Unpreserved (EP071) SS12_0.5_210617 - APEC 2, SS13_0.5_210617 - APEC 2	21-Jun-2017	05-Jul-2017	05-Jul-2017	✓	06-Jul-2017	14-Aug-2017	✓
Soil Glass Jar - Unpreserved (EP080) SS02_0.5_220617 - APEC 1, SS11_0.5_220617 - APEC 2,	22-Jun-2017	05-Jul-2017	06-Jul-2017	✓	05-Jul-2017	06-Jul-2017	✓
SS15_0.5_220617 - APEC 2 - Off-site							
Soil Glass Jar - Unpreserved (EP071) SS02_0.5_220617 - APEC 1, SS11_0.5_220617 - APEC 2,	22-Jun-2017	05-Jul-2017	06-Jul-2017	✓	06-Jul-2017	14-Aug-2017	✓
SS15_0.5_220617 - APEC 2 - Off-site							
Soil Glass Jar - Unpreserved (EP080) SS20_0.1_230617 - APEC 3, SS22_0.1_230617 - APEC 3,	23-Jun-2017	05-Jul-2017	07-Jul-2017	✓	05-Jul-2017	07-Jul-2017	✓
SS23_0.5_230617 - APEC 3,							
Soil Glass Jar - Unpreserved (EP071) SS20_0.1_230617 - APEC 3, SS21_0.8_230617 - APEC 3, SS22_0.5_230617 - APEC 3,	23-Jun-2017	05-Jul-2017	07-Jul-2017	✓	06-Jul-2017	14-Aug-2017	✓
SS23_0.5_230617 - APEC 3,							
Soil Glass Jar - Unpreserved (EP071) SS21_0.8_230617 - APEC 3, SS22_0.5_230617 - APEC 3	23-Jun-2017	06-Jul-2017	07-Jul-2017	✓	07-Jul-2017	15-Aug-2017	✓
EP080: BTEXN							
HDPE Soil Jar (EP080) SS03_0.1_220617 - APEC 1	22-Jun-2017	05-Jul-2017	06-Jul-2017	✓	06-Jul-2017	06-Jul-2017	✓
Soil Glass Jar - Unpreserved (EP080) SS12_0.5_210617 - APEC 2, SS13_0.5_210617 - APEC 2	21-Jun-2017	05-Jul-2017	05-Jul-2017	✓	05-Jul-2017	05-Jul-2017	✓
Soil Glass Jar - Unpreserved (EP080) SS02_0.5_220617 - APEC 1, SS11_0.5_220617 - APEC 2,	22-Jun-2017	05-Jul-2017	06-Jul-2017	✓	05-Jul-2017	06-Jul-2017	✓
SS15_0.5_220617 - APEC 2 - Off-site							
Soil Glass Jar - Unpreserved (EP080) SS20_0.1_230617 - APEC 3, SS22_0.1_230617 - APEC 3,	23-Jun-2017	05-Jul-2017	07-Jul-2017	✓	05-Jul-2017	07-Jul-2017	✓
SS23_0.5_230617 - APEC 3							
Soil Glass Jar - Unpreserved (EP080) SS21_0.8_230617 - APEC 3, SS22_0.5_230617 - APEC 3	23-Jun-2017	05-Jul-2017	07-Jul-2017	✓	06-Jul-2017	07-Jul-2017	✓



Matrix: **SOIL**

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

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE Soil Jar (EP231X) SS09_0.1_210617 - APEC 1/2 - Off-site, SS08_0.1_210617 - APEC 1, SS05_0.1_210617 - APEC 1, SS04_0.1_210617 - APEC 1, SS12_0.1_210617 - APEC 2, SS13_0.1_210617 - APEC 2,	SS09_1.1_210617 - APEC 1/2 - Off-site, SS08_2.5_210617 - APEC 1, SS05_2.5_210617 - APEC 1, SS04_2.8_210617 - APEC 1, SS12_1.8_210617 - APEC 2, SS13_2.6_210617 - APEC 2	21-Jun-2017	10-Jul-2017	18-Dec-2017	✔	10-Jul-2017	19-Aug-2017	✔
HDPE Soil Jar (EP231X) SS02_0.1_220617 - APEC 1, SS03_0.1_220617 - APEC 1, SS01_0.1_220617 - APEC 1, SS14_0.1_220617 - APEC 2, SS14_2.3_220617 - APEC 2	SS02_1.5_220617 - APEC 1, SS03_2.6_220617 - APEC 1, SS01_1.5_220617 - APEC 1, SS11_0.1_220617 - APEC 2,	22-Jun-2017	10-Jul-2017	19-Dec-2017	✔	10-Jul-2017	19-Aug-2017	✔
HDPE Soil Jar (EP231X) SS11_0.5_220617 - APEC 2, SS15_1.4_220617 - APEC 2 - Off-site, SS16_0.5_220617 - APEC 2 - Off-site	SS15_0.1_220617 - APEC 2 - Off-site, SS16_0.1_220617 - APEC 2 - Off-site,	22-Jun-2017	13-Jul-2017	19-Dec-2017	✔	13-Jul-2017	22-Aug-2017	✔
HDPE Soil Jar (EP231X) SS18_3.4_230617 - APEC 3		23-Jun-2017	10-Jul-2017	20-Dec-2017	✔	10-Jul-2017	19-Aug-2017	✔
HDPE Soil Jar (EP231X) SS25_0.1_230617 - APEC 3, SS21_0.1_230617 - APEC 3, SS19_3.5_230617 - APEC 3,	SS20_0.1_230617 - APEC 3, SS19_0.1_230617 - APEC 3, SS18_0.1_230617 - APEC 3	23-Jun-2017	13-Jul-2017	20-Dec-2017	✔	13-Jul-2017	22-Aug-2017	✔
Soil Glass Jar - Unpreserved (EP231X) SSQA08_220617 - QAQC		22-Jun-2017	11-Jul-2017	19-Dec-2017	✔	11-Jul-2017	20-Aug-2017	✔
Soil Glass Jar - Unpreserved (EP231X) SS26_0.1_220617 - WWTP,	SS26_1.0_220617 - WWTP	22-Jun-2017	13-Jul-2017	19-Dec-2017	✔	13-Jul-2017	22-Aug-2017	✔
Soil Glass Jar - Unpreserved (EP231X) SS17_0.1_230617 - APEC 3, SS23_0.1_230617 - APEC 3, SS24_0.5_230617 - APEC 3, SQA015_230617 - QAQC,	SS17_1.8_230617 - APEC 3, SS24_0.1_230617 - APEC 3, SSQA013_230617 - QAQC, SQA017_230617 - QAQC	23-Jun-2017	10-Jul-2017	20-Dec-2017	✔	10-Jul-2017	19-Aug-2017	✔
Soil Glass Jar - Unpreserved (EP231X) SS25_0.8_230617 - APEC 3, SS21_0.8_230617 - APEC 3, SS22_0.5_230617 - APEC 3, SS18_1.0_230617 - APEC 3	SS20_0.7_230617 - APEC 3, SS22_0.1_230617 - APEC 3, SS19_0.7_230617 - APEC 3,	23-Jun-2017	13-Jul-2017	20-Dec-2017	✔	13-Jul-2017	22-Aug-2017	✔



Matrix: **SOIL**

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

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE Soil Jar (EP231X) SS09_0.1_210617 - APEC 1/2 - Off-site, SS08_0.1_210617 - APEC 1, SS05_0.1_210617 - APEC 1, SS04_0.1_210617 - APEC 1, SS12_0.1_210617 - APEC 2, SS13_0.1_210617 - APEC 2,	SS09_1.1_210617 - APEC 1/2 - Off-site, SS08_2.5_210617 - APEC 1, SS05_2.5_210617 - APEC 1, SS04_2.8_210617 - APEC 1, SS12_1.8_210617 - APEC 2, SS13_2.6_210617 - APEC 2	21-Jun-2017	10-Jul-2017	18-Dec-2017	✔	10-Jul-2017	19-Aug-2017	✔
HDPE Soil Jar (EP231X) SS02_0.1_220617 - APEC 1, SS03_0.1_220617 - APEC 1, SS01_0.1_220617 - APEC 1, SS14_0.1_220617 - APEC 2, SS14_2.3_220617 - APEC 2	SS02_1.5_220617 - APEC 1, SS03_2.6_220617 - APEC 1, SS01_1.5_220617 - APEC 1, SS11_0.1_220617 - APEC 2,	22-Jun-2017	10-Jul-2017	19-Dec-2017	✔	10-Jul-2017	19-Aug-2017	✔
HDPE Soil Jar (EP231X) SS11_0.5_220617 - APEC 2, SS15_1.4_220617 - APEC 2 - Off-site, SS16_0.5_220617 - APEC 2 - Off-site	SS15_0.1_220617 - APEC 2 - Off-site, SS16_0.1_220617 - APEC 2 - Off-site,	22-Jun-2017	13-Jul-2017	19-Dec-2017	✔	13-Jul-2017	22-Aug-2017	✔
HDPE Soil Jar (EP231X) SS18_3.4_230617 - APEC 3		23-Jun-2017	10-Jul-2017	20-Dec-2017	✔	10-Jul-2017	19-Aug-2017	✔
HDPE Soil Jar (EP231X) SS25_0.1_230617 - APEC 3, SS21_0.1_230617 - APEC 3, SS19_3.5_230617 - APEC 3,	SS20_0.1_230617 - APEC 3, SS19_0.1_230617 - APEC 3, SS18_0.1_230617 - APEC 3	23-Jun-2017	13-Jul-2017	20-Dec-2017	✔	13-Jul-2017	22-Aug-2017	✔
Soil Glass Jar - Unpreserved (EP231X) SSQA08_220617 - QAQC		22-Jun-2017	11-Jul-2017	19-Dec-2017	✔	11-Jul-2017	20-Aug-2017	✔
Soil Glass Jar - Unpreserved (EP231X) SS26_0.1_220617 - WWTP,	SS26_1.0_220617 - WWTP	22-Jun-2017	13-Jul-2017	19-Dec-2017	✔	13-Jul-2017	22-Aug-2017	✔
Soil Glass Jar - Unpreserved (EP231X) SS17_0.1_230617 - APEC 3, SS23_0.1_230617 - APEC 3, SS24_0.5_230617 - APEC 3, SQA015_230617 - QAQC,	SS17_1.8_230617 - APEC 3, SS24_0.1_230617 - APEC 3, SSQA013_230617 - QAQC, SQA017_230617 - QAQC	23-Jun-2017	10-Jul-2017	20-Dec-2017	✔	10-Jul-2017	19-Aug-2017	✔
Soil Glass Jar - Unpreserved (EP231X) SS25_0.8_230617 - APEC 3, SS21_0.8_230617 - APEC 3, SS22_0.5_230617 - APEC 3, SS18_1.0_230617 - APEC 3	SS20_0.7_230617 - APEC 3, SS22_0.1_230617 - APEC 3, SS19_0.7_230617 - APEC 3,	23-Jun-2017	13-Jul-2017	20-Dec-2017	✔	13-Jul-2017	22-Aug-2017	✔



Matrix: **SOIL**

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

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EP231C: Perfluoroalkyl Sulfonamides								
HDPE Soil Jar (EP231X) SS09_0.1_210617 - APEC 1/2 - Off-site, SS08_0.1_210617 - APEC 1, SS05_0.1_210617 - APEC 1, SS04_0.1_210617 - APEC 1, SS12_0.1_210617 - APEC 2, SS13_0.1_210617 - APEC 2,	SS09_1.1_210617 - APEC 1/2 - Off-site, SS08_2.5_210617 - APEC 1, SS05_2.5_210617 - APEC 1, SS04_2.8_210617 - APEC 1, SS12_1.8_210617 - APEC 2, SS13_2.6_210617 - APEC 2	21-Jun-2017	10-Jul-2017	18-Dec-2017	✓	10-Jul-2017	19-Aug-2017	✓
HDPE Soil Jar (EP231X) SS02_0.1_220617 - APEC 1, SS03_0.1_220617 - APEC 1, SS01_0.1_220617 - APEC 1, SS14_0.1_220617 - APEC 2, SS14_2.3_220617 - APEC 2	SS02_1.5_220617 - APEC 1, SS03_2.6_220617 - APEC 1, SS01_1.5_220617 - APEC 1, SS11_0.1_220617 - APEC 2,	22-Jun-2017	10-Jul-2017	19-Dec-2017	✓	10-Jul-2017	19-Aug-2017	✓
HDPE Soil Jar (EP231X) SS11_0.5_220617 - APEC 2, SS15_1.4_220617 - APEC 2 - Off-site, SS16_0.5_220617 - APEC 2 - Off-site	SS15_0.1_220617 - APEC 2 - Off-site, SS16_0.1_220617 - APEC 2 - Off-site,	22-Jun-2017	13-Jul-2017	19-Dec-2017	✓	13-Jul-2017	22-Aug-2017	✓
HDPE Soil Jar (EP231X) SS18_3.4_230617 - APEC 3		23-Jun-2017	10-Jul-2017	20-Dec-2017	✓	10-Jul-2017	19-Aug-2017	✓
HDPE Soil Jar (EP231X) SS25_0.1_230617 - APEC 3, SS21_0.1_230617 - APEC 3, SS19_3.5_230617 - APEC 3,	SS20_0.1_230617 - APEC 3, SS19_0.1_230617 - APEC 3, SS18_0.1_230617 - APEC 3	23-Jun-2017	13-Jul-2017	20-Dec-2017	✓	13-Jul-2017	22-Aug-2017	✓
Soil Glass Jar - Unpreserved (EP231X) SSQA08_220617 - QAQC		22-Jun-2017	11-Jul-2017	19-Dec-2017	✓	11-Jul-2017	20-Aug-2017	✓
Soil Glass Jar - Unpreserved (EP231X) SS26_0.1_220617 - WWTP,	SS26_1.0_220617 - WWTP	22-Jun-2017	13-Jul-2017	19-Dec-2017	✓	13-Jul-2017	22-Aug-2017	✓
Soil Glass Jar - Unpreserved (EP231X) SS17_0.1_230617 - APEC 3, SS23_0.1_230617 - APEC 3, SS24_0.5_230617 - APEC 3, SQA015_230617 - QAQC,	SS17_1.8_230617 - APEC 3, SS24_0.1_230617 - APEC 3, SSQA013_230617 - QAQC, SQA017_230617 - QAQC	23-Jun-2017	10-Jul-2017	20-Dec-2017	✓	10-Jul-2017	19-Aug-2017	✓
Soil Glass Jar - Unpreserved (EP231X) SS25_0.8_230617 - APEC 3, SS21_0.8_230617 - APEC 3, SS22_0.5_230617 - APEC 3, SS18_1.0_230617 - APEC 3	SS20_0.7_230617 - APEC 3, SS22_0.1_230617 - APEC 3, SS19_0.7_230617 - APEC 3,	23-Jun-2017	13-Jul-2017	20-Dec-2017	✓	13-Jul-2017	22-Aug-2017	✓



Matrix: **SOIL**

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE Soil Jar (EP231X) SS09_0.1_210617 - APEC 1/2 - Off-site, SS08_0.1_210617 - APEC 1, SS05_0.1_210617 - APEC 1, SS04_0.1_210617 - APEC 1, SS12_0.1_210617 - APEC 2, SS13_0.1_210617 - APEC 2,	SS09_1.1_210617 - APEC 1/2 - Off-site, SS08_2.5_210617 - APEC 1, SS05_2.5_210617 - APEC 1, SS04_2.8_210617 - APEC 1, SS12_1.8_210617 - APEC 2, SS13_2.6_210617 - APEC 2	21-Jun-2017	10-Jul-2017	18-Dec-2017	✓	10-Jul-2017	19-Aug-2017	✓
HDPE Soil Jar (EP231X) SS02_0.1_220617 - APEC 1, SS03_0.1_220617 - APEC 1, SS01_0.1_220617 - APEC 1, SS14_0.1_220617 - APEC 2, SS14_2.3_220617 - APEC 2	SS02_1.5_220617 - APEC 1, SS03_2.6_220617 - APEC 1, SS01_1.5_220617 - APEC 1, SS11_0.1_220617 - APEC 2,	22-Jun-2017	10-Jul-2017	19-Dec-2017	✓	10-Jul-2017	19-Aug-2017	✓
HDPE Soil Jar (EP231X) SS11_0.5_220617 - APEC 2, SS15_1.4_220617 - APEC 2 - Off-site, SS16_0.5_220617 - APEC 2 - Off-site	SS15_0.1_220617 - APEC 2 - Off-site, SS16_0.1_220617 - APEC 2 - Off-site,	22-Jun-2017	13-Jul-2017	19-Dec-2017	✓	13-Jul-2017	22-Aug-2017	✓
HDPE Soil Jar (EP231X) SS18_3.4_230617 - APEC 3		23-Jun-2017	10-Jul-2017	20-Dec-2017	✓	10-Jul-2017	19-Aug-2017	✓
HDPE Soil Jar (EP231X) SS25_0.1_230617 - APEC 3, SS21_0.1_230617 - APEC 3, SS19_3.5_230617 - APEC 3,	SS20_0.1_230617 - APEC 3, SS19_0.1_230617 - APEC 3, SS18_0.1_230617 - APEC 3	23-Jun-2017	13-Jul-2017	20-Dec-2017	✓	13-Jul-2017	22-Aug-2017	✓
Soil Glass Jar - Unpreserved (EP231X) SSQA08_220617 - QAQC		22-Jun-2017	11-Jul-2017	19-Dec-2017	✓	11-Jul-2017	20-Aug-2017	✓
Soil Glass Jar - Unpreserved (EP231X) SS26_0.1_220617 - WWTP,	SS26_1.0_220617 - WWTP	22-Jun-2017	13-Jul-2017	19-Dec-2017	✓	13-Jul-2017	22-Aug-2017	✓
Soil Glass Jar - Unpreserved (EP231X) SS17_0.1_230617 - APEC 3, SS23_0.1_230617 - APEC 3, SS24_0.5_230617 - APEC 3, SQA015_230617 - QAQC,	SS17_1.8_230617 - APEC 3, SS24_0.1_230617 - APEC 3, SSQA013_230617 - QAQC, SQA017_230617 - QAQC	23-Jun-2017	10-Jul-2017	20-Dec-2017	✓	10-Jul-2017	19-Aug-2017	✓
Soil Glass Jar - Unpreserved (EP231X) SS25_0.8_230617 - APEC 3, SS21_0.8_230617 - APEC 3, SS22_0.5_230617 - APEC 3, SS18_1.0_230617 - APEC 3	SS20_0.7_230617 - APEC 3, SS22_0.1_230617 - APEC 3, SS19_0.7_230617 - APEC 3,	23-Jun-2017	13-Jul-2017	20-Dec-2017	✓	13-Jul-2017	22-Aug-2017	✓



Matrix: **SOIL**

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

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231P: PFAS Sums								
HDPE Soil Jar (EP231X) SS09_0.1_210617 - APEC 1/2 - Off-site, SS08_0.1_210617 - APEC 1, SS05_0.1_210617 - APEC 1, SS04_0.1_210617 - APEC 1, SS12_0.1_210617 - APEC 2, SS13_0.1_210617 - APEC 2,	SS09_1.1_210617 - APEC 1/2 - Off-site, SS08_2.5_210617 - APEC 1, SS05_2.5_210617 - APEC 1, SS04_2.8_210617 - APEC 1, SS12_1.8_210617 - APEC 2, SS13_2.6_210617 - APEC 2	21-Jun-2017	10-Jul-2017	18-Dec-2017	✓	10-Jul-2017	19-Aug-2017	✓
HDPE Soil Jar (EP231X) SS02_0.1_220617 - APEC 1, SS03_0.1_220617 - APEC 1, SS01_0.1_220617 - APEC 1, SS14_0.1_220617 - APEC 2, SS14_2.3_220617 - APEC 2	SS02_1.5_220617 - APEC 1, SS03_2.6_220617 - APEC 1, SS01_1.5_220617 - APEC 1, SS11_0.1_220617 - APEC 2,	22-Jun-2017	10-Jul-2017	19-Dec-2017	✓	10-Jul-2017	19-Aug-2017	✓
HDPE Soil Jar (EP231X) SS11_0.5_220617 - APEC 2, SS15_1.4_220617 - APEC 2 - Off-site, SS16_0.5_220617 - APEC 2 - Off-site	SS15_0.1_220617 - APEC 2 - Off-site, SS16_0.1_220617 - APEC 2 - Off-site,	22-Jun-2017	13-Jul-2017	19-Dec-2017	✓	13-Jul-2017	22-Aug-2017	✓
HDPE Soil Jar (EP231X) SS18_3.4_230617 - APEC 3		23-Jun-2017	10-Jul-2017	20-Dec-2017	✓	10-Jul-2017	19-Aug-2017	✓
HDPE Soil Jar (EP231X) SS25_0.1_230617 - APEC 3, SS21_0.1_230617 - APEC 3, SS19_3.5_230617 - APEC 3,	SS20_0.1_230617 - APEC 3, SS19_0.1_230617 - APEC 3, SS18_0.1_230617 - APEC 3	23-Jun-2017	13-Jul-2017	20-Dec-2017	✓	13-Jul-2017	22-Aug-2017	✓
Soil Glass Jar - Unpreserved (EP231X) SSQA08_220617 - QAQC		22-Jun-2017	11-Jul-2017	19-Dec-2017	✓	11-Jul-2017	20-Aug-2017	✓
Soil Glass Jar - Unpreserved (EP231X) SS26_0.1_220617 - WWTP,	SS26_1.0_220617 - WWTP	22-Jun-2017	13-Jul-2017	19-Dec-2017	✓	13-Jul-2017	22-Aug-2017	✓
Soil Glass Jar - Unpreserved (EP231X) SS17_0.1_230617 - APEC 3, SS23_0.1_230617 - APEC 3, SS24_0.5_230617 - APEC 3, SQA015_230617 - QAQC,	SS17_1.8_230617 - APEC 3, SS24_0.1_230617 - APEC 3, SSQA013_230617 - QAQC, SQA017_230617 - QAQC	23-Jun-2017	10-Jul-2017	20-Dec-2017	✓	10-Jul-2017	19-Aug-2017	✓
Soil Glass Jar - Unpreserved (EP231X) SS25_0.8_230617 - APEC 3, SS21_0.8_230617 - APEC 3, SS22_0.5_230617 - APEC 3, SS18_1.0_230617 - APEC 3	SS20_0.7_230617 - APEC 3, SS22_0.1_230617 - APEC 3, SS19_0.7_230617 - APEC 3,	23-Jun-2017	13-Jul-2017	20-Dec-2017	✓	13-Jul-2017	22-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



Matrix: **WATER**

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

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X) SSQA01_210617 - QAQC	21-Jun-2017	----	----	----	09-Jul-2017	18-Dec-2017	✓
HDPE (no PTFE) (EP231X) SSQA06_220617 - QAQC	22-Jun-2017	----	----	----	09-Jul-2017	19-Dec-2017	✓
HDPE (no PTFE) (EP231X) SSQA011_230617 - QAQC	23-Jun-2017	----	----	----	09-Jul-2017	20-Dec-2017	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X) SSQA01_210617 - QAQC	21-Jun-2017	----	----	----	09-Jul-2017	18-Dec-2017	✓
HDPE (no PTFE) (EP231X) SSQA06_220617 - QAQC	22-Jun-2017	----	----	----	09-Jul-2017	19-Dec-2017	✓
HDPE (no PTFE) (EP231X) SSQA011_230617 - QAQC	23-Jun-2017	----	----	----	09-Jul-2017	20-Dec-2017	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X) SSQA01_210617 - QAQC	21-Jun-2017	----	----	----	09-Jul-2017	18-Dec-2017	✓
HDPE (no PTFE) (EP231X) SSQA06_220617 - QAQC	22-Jun-2017	----	----	----	09-Jul-2017	19-Dec-2017	✓
HDPE (no PTFE) (EP231X) SSQA011_230617 - QAQC	23-Jun-2017	----	----	----	09-Jul-2017	20-Dec-2017	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X) SSQA01_210617 - QAQC	21-Jun-2017	----	----	----	09-Jul-2017	18-Dec-2017	✓
HDPE (no PTFE) (EP231X) SSQA06_220617 - QAQC	22-Jun-2017	----	----	----	09-Jul-2017	19-Dec-2017	✓
HDPE (no PTFE) (EP231X) SSQA011_230617 - QAQC	23-Jun-2017	----	----	----	09-Jul-2017	20-Dec-2017	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X) SSQA01_210617 - QAQC	21-Jun-2017	----	----	----	09-Jul-2017	18-Dec-2017	✓
HDPE (no PTFE) (EP231X) SSQA06_220617 - QAQC	22-Jun-2017	----	----	----	09-Jul-2017	19-Dec-2017	✓
HDPE (no PTFE) (EP231X) SSQA011_230617 - QAQC	23-Jun-2017	----	----	----	09-Jul-2017	20-Dec-2017	✓



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	1	9	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	6	57	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	18	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	5.26	10.00	✗	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	4	57	7.02	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	4	57	7.02	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	4	57	7.02	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	5.26	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	14	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	14	7.14	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.
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, Na ₂ SO ₄ 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.



CON NOTE: TOLL
IPEC

AECOM

CHAIN OF CUSTODY

CLIENT: AECOM Services Pty Ltd
OFFICE: Level 6, 3 Forrest Place, Perth, WA, 6000

PROJECT: Karratha Airport Limited Investigation

Purchase Order NO: 60543717.2.3

PROJECT MANAGER

SAMPLER

COC Emailed to ALS? YES

Email Reports to:

Email Invoice to (will default to PM if no other addresses are listed): AECOM Accounts

Project Number: 60543717.2.3

QUOTE NO: EN / 604 / 16

CONTACT PH

SAMPLER MO

EDD FORMAT (or default): Esdat

TURNAROUND REQUIREMENTS : Standard TAT (List due date)

ALS QUOTE NO:

COUNTRY OF ORIGIN: Australia

RELINQUISHED BY:

DATE/TIME:

COC SEQUENCE NUMBER (Circle)

COC:

OF:

RELINQUISHED BY:

DATE/TIME:

FOR LABORATORY USE ONLY (Circle)

Custody Seal Intact?

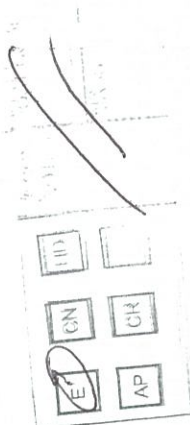
Free ice / frozen ice bricks present upon receipt?

Random Sample Temperature on Receipt

PLEASE FORWARD THE FOLLOWING SAMPLES TO EUROFINS LABORATORIES: SSQA014_230617, SQA016_230617, SQA018_230617 and SSQA07_220617 for analysis of ER231 (DER recommended PFAS suite)

LAB ID	Area	SAMPLE ID	DATE	TIME	MATRIX	TOTAL BOTTLES	EP231 (DER recommended PFAS suite)	S-4 TPH/ TRH (C6 - C10 w/ 400 STEIN plus F1, F2)	S-18/ W-38 TPH/ TRH (C6 - C10 w/ 400 STEIN plus F1, F2)	ON HOLD	Comments
1	APEC 1/2 - Off-site	SS009_0.1_210617	21.06.17		S		X				
2	APEC 1/2 - Off-site	SS009_0.5_210617	21.06.17		S					X	
3	APEC 1/2 - Off-site	SS009_1.1_210617	21.06.17		S		X				
4	APEC 1	SS008_0.1_210617	21.06.17		S		X				
5	APEC 1	SS008_0.5_210617	21.06.17		S					X	
6	APEC 1	SS008_2.5_210617	21.06.17		S		X				
7	APEC 1	SS005_0.1_210617	21.06.17		S		X				
8	APEC 1	SS005_0.5_210617	21.06.17		S					X	
9	APEC 1	SS005_2.5_210617	21.06.17		S		X				
10	APEC 1	SS004_0.1_210617	21.06.17		S		X				
11	APEC 1	SS004_0.5_210617	21.06.17		S					X	
12	APEC 1	SS004_2.5_210617	21.06.17		S		X				
13	APEC 1	SS002_0.1_220617	22.06.17		S		X				
14	APEC 1	SS002_0.5_220617	22.06.17		S					X	
15	APEC 1	SS002_1.5_220617	22.06.17		S		X				
16	APEC 1	SS003_0.1_220617	22.06.17		S		X				
17	APEC 1	SS003_0.5_220617	22.06.17		S					X	
18	APEC 1	SS003_2.5_220617	22.06.17		S		X				
19	APEC 1	SS001_0.1_220617	22.06.17		S		X				
20	APEC 1	SS001_0.5_220617	22.06.17		S					X	
21	APEC 1	SS001_1.5_220617	22.06.17		S		X				
22	QAQC	SSQA02_210617	21.06.17		S					X	
23	QAQC	SSQA03_210617	21.06.17		S					X	
24	QAQC	SSQA04_210617	21.06.17		S					X	
25	QAQC	SSQA05_210617	21.06.17		S					X	
26	APEC 2	SS112_0.1_210617	21.06.17		S		X				
27	APEC 2	SS112_0.5_210617	21.06.17		S					X	
28	APEC 2	SS112_1.5_210617	21.06.17		S					X	
29	APEC 2	SS112_1.8_210617	21.06.17		S		X				
30	APEC 2	SS113_0.1_210617	21.06.17		S		X				
31	APEC 2	SS113_0.5_210617	21.06.17		S					X	
32	APEC 2	SS113_1.0_210617	21.06.17		S					X	
33	APEC 2	SS113_2.5_210617	21.06.17		S		X				
34	APEC 2	SS114_0.1_220617	22.06.17		S		X				
35	APEC 2	SS114_0.5_220617	22.06.17		S					X	
36	APEC 2	SS114_1.3_220617	22.06.17		S					X	
37	APEC 2	SS114_2.3_220617	22.06.17		S		X				
38	APEC 2	SS111_0.1_220617	22.06.17		S		X				
39	APEC 2	SS111_0.5_220617	22.06.17		S		X				
40	QAQC	SSQA07_220617	22.06.17		S		X				
41	QAQC	SSQA08_220617	22.06.17		S		X				
42	QAQC	SSQA09_220617	22.06.17		S					X	
43	QAQC	SSQA10_220617	22.06.17		S					X	
44	APEC 2 - Off-site	SS115_0.1_220617	22.06.17		S		X				
45	APEC 2 - Off-site	SS115_0.5_220617	22.06.17		S					X	
46	APEC 2 - Off-site	SS116_1.4_220617	22.06.17		S		X				
47	APEC 2 - Off-site	SS116_6.1_220617	22.06.17		S		X				
48	APEC 2 - Off-site	SS116_6.5_220617	22.06.17		S		X				
49	WWTP	SS226_0.1_220617	22.06.17		S		X				
50	WWTP	SS226_0.2_220617	22.06.17		S					X	
51	WWTP	SS226_0.5_220617	22.06.17		S					X	
52	WWTP	SS226_1.0_220617	22.06.17		S		X				
53	APEC 3	SS225_0.1_220617	23.06.17		S		X				
54	APEC 3	SS225_0.5_220617	23.06.17		S					X	
55	APEC 3	SS225_0.8_220617	23.06.17		S		X				
56	APEC 3	SS226_0.1_220617	23.06.17		S		X				
57	APEC 3	SS220_0.5_220617	23.06.17		S					X	
58	APEC 3	SS220_0.7_220617	23.06.17		S		X				
59	APEC 3	SS221_0.1_220617	23.06.17		S		X				
60	APEC 3	SS221_0.5_220617	23.06.17		S					X	
61	APEC 3	SS221_0.8_220617	23.06.17		S		X				
62	APEC 3	SS222_0.1_220617	23.06.17		S		X				
63	APEC 3	SS222_0.4_220617	23.06.17		S					X	
64	APEC 3	SS222_0.5_220617	23.06.17		S		X				Run out of sample gas - please see report for PFAS - carbon being removed from kit
65	APEC 3	SS119_0.1_220617	23.06.17		S		X				
66	APEC 3	SS119_0.5_220617	23.06.17		S					X	
67	APEC 3	SS119_0.7_220617	23.06.17		S		X				
68	APEC 3	SS119_3.5_220617	23.06.17		S					X	
69	APEC 3	SS118_0.1_220617	23.06.17		S		X				
70	APEC 3	SS118_0.5_220617	23.06.17		S					X	
71	APEC 3	SS118_1.0_220617	23.06.17		S		X				
72	APEC 3	SS118_3.4_220617	23.06.17		S		X				
73	APEC 3	SS117_0.1_220617	23.06.17		S		X				Run out of sample gas - please see report for PFAS - carbon being removed from kit
74	APEC 3	SS117_1.5_220617	23.06.17		S					X	
75	APEC 3	SS117_1.8_220617	23.06.17		S		X				Run out of sample gas - please see report for PFAS - carbon being removed from kit
76	APEC 3	SS223_0.1_220617	23.06.17		S		X				Run out of sample gas - please see report for PFAS - carbon being removed from kit
77	APEC 3	SS223_0.5_220617	23.06.17		S					X	
78	APEC 3	SS223_0.7_220617	23.06.17		S					X	
79	APEC 3	SS224_0.1_220617	23.06.17		S		X				Run out of sample gas - please see report for PFAS - carbon being removed from kit
80	APEC 3	SS224_0.5_220617	23.06.17		S		X				Run out of sample gas - please see report for PFAS - carbon being removed from kit
81	QAQC	SSQA013_220617	23.06.17		S		X				Run out of sample gas - please see report for PFAS - carbon being removed from kit
82	QAQC	SSQA014_220617	23.06.17		S		X				Run out of sample gas - please see report for PFAS - carbon being removed from kit
83	QAQC	SSQA015_220617	23.06.17		S		X				Run out of sample gas - please see report for PFAS - carbon being removed from kit
84	QAQC	SSQA016_220617	23.06.17		S		X				Run out of sample gas - please see report for PFAS - carbon being removed from kit
85	QAQC	SSQA017_220617	23.06.17		S		X				Run out of sample gas - please see report for PFAS - carbon being removed from kit
86	QAQC	SSQA018_220617	23.06.17		S		X				Run out of sample gas - please see report for PFAS - carbon being removed from kit
87	QAQC	SSQA019_220617	23.06.17		S		X				Run out of sample gas - please see report for PFAS - carbon being removed from kit
88	QAQC	SSQA020_220617	23.06.17		S		X				Run out of sample gas - please see report for PFAS - carbon being removed from kit
89	QAQC	SSQA021_220617	23.06.17		S		X				Run out of sample gas - please see report for PFAS - carbon being removed from kit
90	QAQC	SSQA022_220617	23.06.17		S		X				Run out of sample gas - please see report for PFAS - carbon being removed from kit
91	QAQC	SSQA023_220617	23.06.17		S		X				Run out of sample gas - please see report for PFAS - carbon being removed from kit
92	QAQC	SSQA024_220617	23.06.17		S		X				Run out of sample gas - please see report for PFAS - carbon being removed from kit
93	QAQC	SSQA025_220617	23.06.17		S		X				Run out of sample gas - please see report for PFAS - carbon being removed from kit
94	QAQC	SSQA026_220617	23.06.17		S		X				Run out of sample gas - please see report for PFAS - carbon being removed from kit
95	QAQC	SSQA027_220617	23.06.17		S		X				Run out of sample gas - please see report for PFAS - carbon being removed from kit
96	QAQC	SSQA028_220617	23.06.17		S		X				Run out of sample gas - please see report for PFAS - carbon being removed from kit
97	QAQC	SSQA029_220617	23.06.17		S		X				Run out of sample gas - please see report for PFAS - carbon being removed from kit
98	QAQC	SSQA030_220617	23.06.17		S		X				Run out of sample gas - please see report for PFAS - carbon being removed from kit
99	QAQC	SSQA031_220617	23.06.17		S		X				Run out of sample gas - please see report for PFAS - carbon being removed from kit
100	QAQC	SSQA032_220617	23.06.17		S		X				Run out of sample gas - please see report for PFAS - carbon being removed from kit
101	QAQC	SSQA033_220617	23.06.17		S		X				Run out of sample gas - please see report for PFAS - carbon being removed from kit
102	QAQC	SSQA034_220617	23.06.17		S		X				Run out of sample gas - please see report for PFAS - carbon being removed from kit
103	QAQC	SSQA035_220617	23.06.17		S		X				Run out of sample gas - please see report for PFAS - carbon being removed from kit
104	QAQC	SSQA036_220617	23.06.17		S		X				Run out of sample gas - please see report for PFAS - carbon being removed from kit
105	QAQC	SSQA037_220617	23.06.17		S		X				Run out of sample gas - please see report for PFAS - carbon being removed from kit
106	QAQC	SSQA038_220617	23.06.17		S		X				Run out of sample gas - please see report for PFAS - carbon being removed from kit
107	QAQC	SSQA039_220617	23.06.17		S		X				Run out of sample gas - please see report for PFAS - carbon being removed from kit
108	QAQC	SSQA040_220617	23.06.17		S		X				Run out of sample gas - please see report for PFAS - carbon being removed from kit
109	QAQC	SSQA041_220617	23.06.17		S		X				Run out of sample gas - please see report for PFAS - carbon being removed from kit
110	QAQC	SSQA042_220617	23.06.17		S		X				Run out of sample gas - please see report for PFAS - carbon being removed from kit
111	QAQC	SSQA043_220617	23.06.17		S		X				Run out of sample gas - please see report for PFAS - carbon being removed from kit
112	QAQC	SSQA044_220617	23.06.17		S		X				Run out of sample gas - please see report for PFAS - carbon being removed from kit
113	QAQC	SSQA045_220617	23.06.17		S		X				Run out of sample gas - please see report for PFAS - carbon being removed from kit
114	QAQC	SSQA046_220617	23.06.17		S		X				Run out of sample gas - please see report for PFAS - carbon being removed from kit
115	QAQC	SSQA047_220617	23.06.17		S		X				Run out of sample gas - please see report for PFAS - carbon being removed from kit
116	QAQC	SSQA048_220617	23.06.17		S		X				Run out of sample gas - please see report for PFAS - carbon being removed from kit
117	QAQC	SSQA049_220617	23.06.17		S		X				Run out of sample gas - please see report for PFAS - carbon being removed from kit
118	QAQC	SSQA050_220617	23.06.17		S		X				Run out of sample gas - please see report for PFAS - carbon being removed from kit
119	QAQC	SSQA051_220617	23.06.17		S		X				Run out of sample gas - please see report for PFAS - carbon being removed from kit
120	QAQC	SSQA052_220617	23.06.17		S		X				Run out of sample gas - please see report for PFAS - carbon being removed from kit
121	QAQC	SSQA053_220617	23.06.17		S		X				Run out of sample gas - please see report for PFAS - carbon being removed from kit
122	QAQC	SSQA054_220617	23.06.17		S		X				Run out of sample gas - please see report for PFAS - carbon being removed from kit
123	QAQC	SSQA055_220617	23.06.17		S		X				Run out of sample gas - please see report for PFAS - carbon being removed from kit
124	QAQC	SSQA056_220617	23.06.17		S		X				Run out of sample gas - please see report for PFAS - carbon being removed from kit
125	QAQC	SSQA057_220617	23.06.17		S		X				Run out of sample gas - please see report for PFAS - carbon being removed from kit
126	QAQC	SSQA058_220617	23.06.17		S		X				Run out of sample gas - please see report for PFAS - carbon being removed from kit
127	QAQC	SSQA059_220617	23.06.17		S		X				Run out of sample gas - please see report for PFAS - carbon being removed from kit
128	QAQC	SSQA060_220617	23.06.17		S		X				Run out of sample

18.6
10.2
10.4
10.4



NO SEAL
ILE
COURIER

107.

4 JUL '17 11:36

6.5
5.3
6.6
- 0.3
5.83

Sample Receipt Advice

Company name: **AECOM Aust Pty Ltd Perth**
Contact name: **[REDACTED]**
Project name: **KARRATHA AIRPORT LIMITED INVESTIGATION_GME**
Project ID: **60543717.2.3**
COC number: **Not provided**
Turn around time: **5 Day**
Date/Time received: **Jul 5, 2017 9:00 AM**
Eurofins | mgt reference: **552888**

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 : 10.4 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] on Phone : or by e.mail: **[REDACTED]**

Results will be delivered electronically via e.mail to **[REDACTED]**

Certificate of Analysis

AECOM Aust Pty Ltd Perth
Level 4, 3 Forrest Place
Perth
WA 6000



NATA Accredited
Accreditation Number 1261
Site Number 20794

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:

Report 552888-S
Project name KARRATHA AIRPORT LIMITED INVESTIGATION_GME
Project ID 60543717.2.3
Received Date Jul 05, 2017

Client Sample ID			SSQA014_230 617	SSQA016_230 617	SSQA018_230 617	SSQA07_2306 17
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins mgt Sample No.			B17-JI03947	B17-JI03948	B17-JI03949	B17-JI03950
Date Sampled			Jun 23, 2017	Jun 23, 2017	Jun 23, 2017	Jun 22, 2017
Test/Reference	LOR	Unit				
Perfluoroalkyl carboxylic acids (PFCAs)						
Perfluorobutanoic acid (PFBA)	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoropentanoic acid (PFPeA)	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorohexanoic acid (PFHxA)	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoroheptanoic acid (PFHpA)	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorooctanoic acid (PFOA)	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorononanoic acid (PFNA)	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorodecanoic acid (PFDA)	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoroundecanoic acid (PFUnA)	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorododecanoic acid (PFDoA)	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorotridecanoic acid (PFTrDA)	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorotetradecanoic acid (PFTeDA)	5	ug/kg	< 5	< 5	< 5	< 5
13C4-PFBA (surr.)	1	%	24	23	37	44
13C5-PFPeA (surr.)	1	%	133	132	134	120
13C5-PFHxA (surr.)	1	%	108	106	102	100
13C4-PFHpA (surr.)	1	%	110	110	110	105
13C8-PFOA (surr.)	1	%	134	132	131	127
13C5-PFNA (surr.)	1	%	132	131	130	129
13C6-PFDA (surr.)	1	%	127	125	120	112
13C2-PFUnDA (surr.)	1	%	148	153	144	148
13C2-PFDoDA (surr.)	1	%	142	142	140	140
13C2-PFTeDA (surr.)	1	%	146	144	138	140
Perfluoroalkane sulfonamides (PFASAs)						
Perfluorooctane sulfonamide (FOSA)	5	ug/kg	< 5	< 5	< 5	< 5
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	5	ug/kg	< 5	< 5	< 5	< 5
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	5	ug/kg	< 5	< 5	< 5	< 5
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	5	ug/kg	< 5	< 5	< 5	< 5
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	5	ug/kg	< 5	< 5	< 5	< 5
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	10	ug/kg	< 10	< 10	< 10	< 10
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	10	ug/kg	< 10	< 10	< 10	< 10
13C8-FOSA (surr.)	1	%	155	147	142	150
D3-N-MeFOSA (surr.)	1	%	122	125	120	119
D5-N-EtFOSA (surr.)	1	%	65	77	55	59

Client Sample ID			SSQA014_230617	SSQA016_230617	SSQA018_230617	SSQA07_230617
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins mgt Sample No.			B17-JI03947	B17-JI03948	B17-JI03949	B17-JI03950
Date Sampled			Jun 23, 2017	Jun 23, 2017	Jun 23, 2017	Jun 22, 2017
Test/Reference	LOR	Unit				
Perfluoroalkane sulfonamides (PFASAs)						
D7-N-MeFOSE (surr.)	1	%	Q09INT	Q09INT	Q09INT	Q09INT
D9-N-EtFOSE (surr.)	1	%	108	108	106	107
D5-N-EtFOSAA (surr.)	1	%	169	173	169	169
D3-N-MeFOSAA (surr.)	1	%	173	180	184	172
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSAAs)						
Perfluorobutanesulfonic acid (PFBS)	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoropentanesulfonic acid (PFPeS)	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorohexanesulfonic acid (PFHxS)	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoroheptanesulfonic acid (PFHpS)	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorooctanesulfonic acid (PFOS) ^{N11}	5	ug/kg	5.3	N096.9	N09120	N09430
Perfluorodecanesulfonic acid (PFDS)	5	ug/kg	< 5	< 5	< 5	< 5
13C3-PFBS (surr.)	1	%	98	97	97	94
18O2-PFHxS (surr.)	1	%	128	127	125	120
13C8-PFOS (surr.)	1	%	115	117	112	96
n:2 Fluorotelomer sulfonic acids						
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	5	ug/kg	< 5	< 5	< 5	< 5
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	10	ug/kg	< 10	< 10	< 10	< 10
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	5	ug/kg	< 5	< 5	< 5	< 5
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)	5	ug/kg	< 5	< 5	< 5	< 5
13C2-4:2 FTS (surr.)	1	%	73	70	69	68
13C2-6:2 FTS (surr.)	1	%	88	82	83	79
13C2-8:2 FTS (surr.)	1	%	112	119	112	117
% Moisture	1	%	7.1	1.3	2.5	3.8

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
Per- and Polyfluorinated Alkyl Substances (PFASs)			
Perfluoroalkyl carboxylic acids (PFCAs)	Brisbane	Jul 06, 2017	180 Day
- Method: LTM-ORG-2100 Per- and Polyfluorinated Alkyl Substances by LC-MS/MS			
Perfluoroalkane sulfonamides (PFASAs)	Brisbane	Jul 06, 2017	180 Day
- Method: LTM-ORG-2100 Per- and Polyfluorinated Alkyl Substances by LC-MS/MS			
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSAs)	Brisbane	Jul 06, 2017	180 Day
- Method: LTM-ORG-2100 Per- and Polyfluorinated Alkyl Substances by LC-MS/MS			
n:2 Fluorotelomer sulfonic acids	Brisbane	Jul 06, 2017	180 Day
- Method: LTM-ORG-2100 Per- and Polyfluorinated Alkyl Substances by LC-MS/MS			
% Moisture	Brisbane	Jul 05, 2017	14 Day
- Method: LTM-GEN-7080 Moisture			

Company Name: AECOM Aust Pty Ltd Perth
Address: Level 4, 3 Forrest Place
Perth
WA 6000

Project Name: KARRATHA AIRPORT LIMITED INVESTIGATION_GME
Project ID: 60543717.2.3

Order No.: 60543717.2.3
Report #: 552888
Phone: 08 6208 0000
Fax:

Received: Jul 5, 2017 9:00 AM
Due: Jul 12, 2017
Priority: 5 Day
Contact Name: [REDACTED]

Eurofins | mgt Analytical Services Manager : [REDACTED]

Sample Detail						Moisture Set	Per- and Polyfluorinated Alkyl Substances (PFASs)
Melbourne Laboratory - NATA Site # 1254 & 14271							
Sydney Laboratory - NATA Site # 18217							
Brisbane Laboratory - NATA Site # 20794						X	X
Perth Laboratory - NATA Site # 18217							
External Laboratory							
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID		
1	SSQA014_230617	Jun 23, 2017		Soil	B17-JI03947	X	X
2	SSQA016_230617	Jun 23, 2017		Soil	B17-JI03948	X	X
3	SSQA018_230617	Jun 23, 2017		Soil	B17-JI03949	X	X
4	SSQA07_230617	Jun 22, 2017		Soil	B17-JI03950	X	X
Test Counts						4	4

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							
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 (PFTTrDA)	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 (PFASs)							
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	
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							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	%	101			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	79			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	86			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	105			50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	85			50-150	Pass	
Perfluorononanoic acid (PFNA)	%	93			50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	79			50-150	Pass	
Perfluoroundecanoic acid (PFUnA)	%	77			50-150	Pass	
Perfluorododecanoic acid (PFDoA)	%	95			50-150	Pass	
Perfluorotridecanoic acid (PFTTrDA)	%	93			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	96			50-150	Pass	
LCS - % Recovery							
Perfluoroalkane sulfonamides (PFASAs)							

Test				Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Perfluorooctane sulfonamide (FOSA)				%	75			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)				%	90			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)				%	132			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)				%	131			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)				%	111			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)				%	80			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)				%	103			50-150	Pass	
LCS - % Recovery										
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSAs)										
Perfluorobutanesulfonic acid (PFBS)				%	89			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)				%	83			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)				%	77			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)				%	89			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)				%	92			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)				%	91			50-150	Pass	
LCS - % Recovery										
n:2 Fluorotelomer sulfonic acids										
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)				%	93			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)				%	96			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)				%	116			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)				%	139			50-150	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1				Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery										
Perfluoroalkyl carboxylic acids (PFCAs)					Result 1					
Perfluorobutanoic acid (PFBA)	S17-JI02478	NCP	%	104				50-150	Pass	
Perfluoropentanoic acid (PFPeA)	S17-JI02478	NCP	%	87				50-150	Pass	
Perfluorohexanoic acid (PFHxA)	S17-JI02478	NCP	%	96				50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	S17-JI02478	NCP	%	110				50-150	Pass	
Perfluorooctanoic acid (PFOA)	S17-JI02478	NCP	%	89				50-150	Pass	
Perfluorononanoic acid (PFNA)	S17-JI02478	NCP	%	99				50-150	Pass	
Perfluorodecanoic acid (PFDA)	S17-JI02478	NCP	%	84				50-150	Pass	
Perfluoroundecanoic acid (PFUnA)	S17-JI02478	NCP	%	83				50-150	Pass	
Perfluorododecanoic acid (PFDoA)	S17-JI02478	NCP	%	108				50-150	Pass	
Perfluorotridecanoic acid (PFTTrDA)	S17-JI02478	NCP	%	110				50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	S17-JI02478	NCP	%	105				50-150	Pass	
Spike - % Recovery										
Perfluoroalkane sulfonamides (PFASAs)					Result 1					
Perfluorooctane sulfonamide (FOSA)	S17-JI02478	NCP	%	81				50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	S17-JI02478	NCP	%	92				50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	S17-JI02478	NCP	%	134				50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	S17-JI02478	NCP	%	140				50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	S17-JI02478	NCP	%	96				50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	S17-JI02478	NCP	%	91				50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	S17-JI02478	NCP	%	109				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)	S17-JI02478	NCP	%	91			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	S17-JI02478	NCP	%	84			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	S17-JI02478	NCP	%	85			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	S17-JI02478	NCP	%	82			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	S17-JI02478	NCP	%	93			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	S17-JI02478	NCP	%	106			50-150	Pass	
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids				Result 1					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	S17-JI02478	NCP	%	96			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	S17-JI02478	NCP	%	92			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	S17-JI02478	NCP	%	119			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)	S17-JI02478	NCP	%	104			50-150	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1	Result 2	RPD			
Perfluorobutanoic acid (PFBA)	B17-JI02932	NCP	ug/kg	< 0.0005	< 0.0005	<1	30%	Pass	
Perfluorohexanoic acid (PFHxA)	B17-JI02932	NCP	ug/kg	6.6	5.8	14	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	B17-JI02932	NCP	ug/kg	1.1	1.2	4.0	30%	Pass	
Perfluorooctanoic acid (PFOA)	B17-JI02932	NCP	ug/kg	5.9	5.3	10	30%	Pass	
Perfluorononanoic acid (PFNA)	B17-JI02932	NCP	ug/kg	2.0	2.2	8.0	30%	Pass	
Perfluorodecanoic acid (PFDA)	B17-JI02932	NCP	ug/kg	20	18	6.0	30%	Pass	
Perfluoroundecanoic acid (PFUnA)	B17-JI02932	NCP	ug/kg	< 0.0005	< 0.0005	<1	30%	Pass	
Perfluorododecanoic acid (PFDoA)	B17-JI02932	NCP	ug/kg	14	12	15	30%	Pass	
Perfluorotridecanoic acid (PFTrDA)	B17-JI02932	NCP	ug/kg	0.71	0.80	11	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	B17-JI02932	NCP	ug/kg	2.3	1.9	19	30%	Pass	
Duplicate									
Perfluoroalkane sulfonamides (PFASAs)				Result 1	Result 2	RPD			
Perfluorooctane sulfonamide (FOSA)	B17-JI02932	NCP	ug/kg	< 0.001	< 0.001	<1	30%	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	B17-JI02932	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	B17-JI02932	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	B17-JI02932	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	B17-JI02932	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	B17-JI02932	NCP	ug/kg	2.3	1.7	33	30%	Fail	Q15
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	B17-JI02932	NCP	ug/kg	< 0.001	< 0.001	<1	30%	Pass	

Duplicate								
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFASs)				Result 1	Result 2	RPD		
Perfluoropentanesulfonic acid (PFPeS)	B17-JI02932	NCP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluorohexanesulfonic acid (PFHxS)	B17-JI02932	NCP	ug/kg	0.49	0.58	17	30%	Pass
Perfluoroheptanesulfonic acid (PFHpS)	B17-JI02932	NCP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluorooctanesulfonic acid (PFOS)	B17-JI02932	NCP	ug/kg	25	23	7.0	30%	Pass
Perfluorodecanesulfonic acid (PFDS)	B17-JI02932	NCP	ug/kg	< 0.0005	< 0.0005	<1	30%	Pass
Duplicate								
n:2 Fluorotelomer sulfonic acids				Result 1	Result 2	RPD		
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	B17-JI02932	NCP	ug/kg	< 0.0005	< 0.0005	<1	30%	Pass
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	B17-JI02932	NCP	ug/kg	1.9	1.5	23	30%	Pass
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	B17-JI02932	NCP	ug/kg	2.8	2.6	7.0	30%	Pass
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)	B17-JI02932	NCP	ug/kg	5.3	< 5	15	30%	Pass
Duplicate								
				Result 1	Result 2	RPD		
% Moisture	B17-Jn12587	NCP	%	6.9	7.1	2.0	30%	Pass

Comments

Some surrogate recoveries were recorded in excess of the QC limit designated in QSM 5.1 of 50-150%. Since no positive results were reported for any PFAS compounds for any of the Samples in this case no data was affected.

Sample Integrity

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

Qualifier Codes/Comments

Code	Description
N09	Quantification of linear and branched isomers has been conducted as a single total response using the relative response factor for the corresponding linear/branched standard. 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).
N11	
Q09	The Surrogate recovery is outside of the recommended acceptance criteria due to matrix interference. Acceptance criteria were met for all other QC
Q15	The RPD reported passes Eurofins mgt's QC - Acceptance Criteria as defined in the Internal Quality Control Review and Glossary page of this report.

Authorised By

	Analytical Services Manager
	Senior Analyst-Metal (QLD)
	Senior Analyst-Inorganic (QLD)
	Senior Analyst-Organic (QLD)



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](#).

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

Company Name: AECOM Aust Pty Ltd Perth
Address: Level 4, 3 Forrest Place
Perth
WA 6000

Project Name: KARRATHA AIRPORT LIMITED INVESTIGATION_GME
Project ID: 60543717.2.3

Order No.: 60543717.2.3
Report #: 552888
Phone: 08 6208 0000
Fax:

Received: Jul 5, 2017 9:00 AM
Due: Jul 12, 2017
Priority: 5 Day
Contact Name: [REDACTED]

Eurofins | mgt Analytical Services Manager: [REDACTED]

Sample Detail						Moisture Set	Per- and Polyfluorinated Alkyl Substances (PFASs)
Melbourne Laboratory - NATA Site # 1254 & 14271							
Sydney Laboratory - NATA Site # 18217							
Brisbane Laboratory - NATA Site # 20794						X	X
Perth Laboratory - NATA Site # 18217							
External Laboratory							
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID		
1	SSQA014_230617	Jun 23, 2017		Soil	B17-JI03947	X	X
2	SSQA016_230617	Jun 23, 2017		Soil	B17-JI03948	X	X
3	SSQA018_230617	Jun 23, 2017		Soil	B17-JI03949	X	X
4	SSQA07_230617	Jun 22, 2017		Soil	B17-JI03950	X	X
Test Counts						4	4



CON NOTE: TOLL
IPEC 8961537900

AECOM

CHAIN OF CUSTODY

CLIENT: AECOM Services Pty Ltd.	TURNAROUND REQUIREMENTS:	Standard TAT (List due date):	FOR LABORATORY USE ONLY (Circle)
OFFICE: Level 6, 3 Forrest Place, Perth, WA, 6000	Project Number: 60543717		Custody Seal Intact?
PROJECT: Karratha Airport Limited Investigation - GME	ALS QUOTE NO.:	COC SEQUENCE NUMBER (Circle)	Free ice / frozen ice bricks present upon receipt?
Purchase Order NO.: 60543717	QUOTE NO.: EN / 004 / 16	COC: 1	Random Sample Temperature on Receipt?
PROJECT MANAGER:	COUNTRY OF ORIGIN: Australia	OF: 1	Other comment:
SAMPLER:	CONTACT PH:	RELINQUISHED BY:	
	SAMPLER MO:		
COC Emailed to ALS? YES	EDD FORMAT (or default): Esdat	DATE/TIME:	
Email Reports to:			
Email Invoice to:			

PLEASE FORWARD THE FOLLOWING SAMPLES TO EUROFINS LABORATORIES: WQA04_300617, WQA06_300617, and WQA010_010717 (TRIPLICATE MW01) for analysis of ER231 (DER recommended PFAS suite)

LAB ID	Area	SAMPLE ID	DATE	TIME	MATRIX	TOTAL BOTTLES	EP231 (DER recommended PFAS suite)	W-4 TPH/ TRH (C6 - C36 or 40)/ BTEXN plus F1, F2	S-18/ W-18 TPH/ TRH (C6 - C36 or 40)/ BTEXN plus F1, F2	ON HOLD	Comments
1	APEC 3	MW010_300617	30.06.17		Groundwater	6	X	X			1 EXTRA AMBER & 1 PLASTIC GREY (PFOS)
2	APEC 3	MW011_300617	30.06.17		Groundwater	4	X	X			
3	APEC 3	MW013_300617	30.06.17		Groundwater	4	X	X			
4	APEC 3	MW012_300617	30.06.17		Groundwater	4	X	X			
5	APEC 3	MW09_300617	30.06.17		Groundwater	4	X	X			
6	APEC 1 - OFFSITE TO EAST	MW02_300617	30.06.17		Groundwater	4	X	X			
7	APEC 2	MW19A_300617	30.06.17		Groundwater	6	X	X			1 EXTRA AMBER & 1 PLASTIC GREY (PFOS)
8	APEC 2	MW19B_300617	30.06.17		Groundwater	4	X	X			
9	APEC 2	MW19C_300617	30.06.17		Groundwater	4	X	X			
10	APEC 2	MW06_300617	30.06.17		Groundwater	4	X	X			
11	APEC 2	MW05_300617	30.06.17		Groundwater	4	X	X			
12	APEC 2	MW020_300617	30.06.17		Groundwater	4	X	X			
13	APEC 2	MW08_300617	30.06.17		Groundwater	4	X	X			
14	APEC 2	MW021_300617	30.06.17		Groundwater	4	X	X			
15	APEC 2	MW018_300617	30.06.17		Groundwater	4	X	X			
16	OFFSITE TO NORTH NEAR WWTP	MW015_300617	30.06.17		Groundwater	4	X	X			
17	APEC 2 OFFSITE TO NORTH	MW07_300617	30.06.17		Groundwater	4	X	X			
18	APEC 2 OFFSITE TO SOUTH	MW017_010717	01.07.17		Groundwater	4	X	X			
19	APEC 2 OFFSITE TO SOUTH	MW016_010717	01.07.17		Groundwater	6	X	X			1 EXTRA AMBER & 1 PLASTIC GREY (PFOS)
20	APEC 2 OFFSITE TO SOUTH	MW04_010717	01.07.17		Groundwater	4	X	X			
21	APEC 1	MW014_010717	01.07.17		Groundwater	4	X	X			
22	APEC 1	MW03_010717	01.07.17		Groundwater	4	X	X			
23	APEC 1	MW01_010717	01.07.17		Groundwater	4	X	X			
24	APEC 3	SED01_010717	01.07.17		Sediment	1	X	X			
25	APEC 3	SED02_010717	01.07.17		Sediment	1	X	X			
26	APEC 3	SED03_010717	01.07.17		Sediment	1	X	X			
27	APEC 1	SED04_010717	01.07.17		Sediment	1	X	X			
28	OFFSITE NEAR WWTP TO NORTH	SED05_300617	30.06.17		Sediment	1	X	X			
29	APEC 1	SED06_010717	01.07.17		Sediment	1	X	X			
30	OFFSITE TO WEST	SED07_010717	01.07.17		Sediment	2	X	X			
31	QAQC	SEDQA01_010717	01.07.17		Sediment	1	X	X			
32	QAQC	SEDQA02_010717	01.07.17		Sediment	1	X	X			
33	QAQC	SEDQA03_010717	01.07.17		Water	4	X	X			
34	QAQC	WQA01_300617	30.06.17		Groundwater	4	X	X			
35	QAQC	WQA02_300617	30.06.17		Groundwater	4	X	X			
36	QAQC	WQA03_300617	30.06.17		Groundwater	4	X	X			
37	QAQC	WQA04_300617	30.06.17		Groundwater	4	X	X			FORWARD TO EUROFINS
38	QAQC	WQA05_300617	30.06.17		Groundwater	4	X	X			FORWARD TO EUROFINS
39	QAQC	WQA06_300617	30.06.17		Groundwater	4	X	X			
40	QAQC	WQA07_010717	01.07.17		Groundwater	4	X	X			
41	QAQC	WQA08_010717	01.07.17		Groundwater	4	X	X			
42	QAQC	WQA09_010717	01.07.17		Groundwater	4	X	X			
43	QAQC	WQA010_010717	01.07.17		Groundwater	4	X	X			
44	QAQC	TBW571 (TB)	08.06.17		Groundwater	1	X	X			
45	QAQC	TBW573_080617	08.06.17		Water	1	X	X			

Environmental Division
Perth
Work Order Reference
EP1707076



**SAMPLE RECEIPT NOTIFICATION (SRN)****Work Order : EP1707076**

Client	: AECOM Australia Pty Ltd	Laboratory	: Environmental Division Perth
Contact	: [REDACTED]	Contact	: [REDACTED]
Address	: LEVEL 6 3 FORREST PLACE PERTH WA, AUSTRALIA 6849	Address	: 10 Hod Way Malaga WA Australia 6090
E-mail	: [REDACTED]	E-mail	: [REDACTED]
Telephone	: ----	Telephone	: +61-8-9209 7655
Facsimile	: ----	Facsimile	: +61-8-9209 7600
Project	: Karratha Airport Limited Investigation - GME	Page	: 1 of 4
Order number	: 60543717	Quote number	: EP2017AECOMAU0004 (EP/541/17)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: [REDACTED]		

Dates

Date Samples Received	: 04-Jul-2017 08:40	Issue Date	: 04-Jul-2017
Client Requested Due Date	: 12-Jul-2017	Scheduled Reporting Date	: 12-Jul-2017

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 2	Temperature	: 0.3 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 42 / 42

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 see scanned COC for sample discrepancies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (SamplesPerth@alsenviro.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (14 days), Solid (60 days) from date of completion of Work Order.
- **VOC analysis will be conducted by ALS Environmental, Melbourne, NATA accreditation No. 825, Site No. 13778.**
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **Volatiles and semi-volatiles in soil analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **pH analysis should be conducted within 6 hours of sampling.**



Sample Container(s)/Preservation Non-Compliances

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

- No sample container / preservation non-compliance exists.

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Client sampling date / time	Client sample ID	SOIL - EA055-103 Moisture Content	SOIL - EP231X (solids) PFAS - Full Suite (28 analytes)	SOIL - S-04 TRH/BTEXN
EP1707076-024	01-Jul-2017 00:00	SED01_010717	✓	✓	✓
EP1707076-025	01-Jul-2017 00:00	SED02_010717	✓	✓	✓
EP1707076-026	01-Jul-2017 00:00	SED03_010717	✓	✓	✓
EP1707076-027	01-Jul-2017 00:00	SED04_010717	✓	✓	✓
EP1707076-028	30-Jun-2017 00:00	SED05_300617	✓	✓	✓
EP1707076-029	01-Jul-2017 00:00	SED06_010717	✓	✓	✓
EP1707076-030	01-Jul-2017 00:00	SED07_010717	✓	✓	✓
EP1707076-031	01-Jul-2017 00:00	SEDQA01_010717	✓	✓	✓
EP1707076-032	01-Jul-2017 00:00	SEDQA02_010717	✓	✓	✓

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
EP1707076-001	30-Jun-2017 00:00	MW010_300617	✓	✓	
EP1707076-002	30-Jun-2017 00:00	MW011_300617	✓	✓	
EP1707076-003	30-Jun-2017 00:00	MW013_300617	✓	✓	
EP1707076-004	30-Jun-2017 00:00	MW012_300617	✓	✓	
EP1707076-005	30-Jun-2017 00:00	MW09_300617	✓	✓	
EP1707076-006	30-Jun-2017 00:00	MW02_300617	✓	✓	
EP1707076-007	30-Jun-2017 00:00	MW19A_300617	✓	✓	
EP1707076-008	30-Jun-2017 00:00	MW19B_300617	✓	✓	
EP1707076-009	30-Jun-2017 00:00	MW19C_300617	✓	✓	
EP1707076-010	30-Jun-2017 00:00	MW06_300617	✓	✓	
EP1707076-011	30-Jun-2017 00:00	MW05_300617	✓	✓	
EP1707076-012	30-Jun-2017 00:00	MW020_300617	✓	✓	
EP1707076-013	30-Jun-2017 00:00	MW08_300617	✓	✓	
EP1707076-014	30-Jun-2017 00:00	MW021_300617	✓	✓	



			WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - W-04 TRH/BTEXN	WATER - W-18 TRH(C6 - C9)/BTEXN
EP1707076-015	30-Jun-2017 00:00	MW018_300617	✓	✓	
EP1707076-016	30-Jun-2017 00:00	MW015_300617	✓	✓	
EP1707076-017	30-Jun-2017 00:00	MW07_300617	✓	✓	
EP1707076-018	01-Jul-2017 00:00	MW017_010717	✓	✓	
EP1707076-019	01-Jul-2017 00:00	MW016_010717	✓	✓	
EP1707076-020	01-Jul-2017 00:00	MW04_010717	✓	✓	
EP1707076-021	01-Jul-2017 00:00	MW014_010717	✓	✓	
EP1707076-022	01-Jul-2017 00:00	MW03_010717	✓	✓	
EP1707076-023	01-Jul-2017 00:00	MW01_010717	✓	✓	
EP1707076-033	01-Jul-2017 00:00	SEDQA03_010717	✓	✓	
EP1707076-034	30-Jun-2017 00:00	WQA01_300617	✓	✓	
EP1707076-035	30-Jun-2017 00:00	WQA02_300617	✓	✓	
EP1707076-036	30-Jun-2017 00:00	WQA03_300617	✓	✓	
EP1707076-037	30-Jun-2017 00:00	WQA05_300617	✓	✓	
EP1707076-038	01-Jul-2017 00:00	WQA07_010717	✓	✓	
EP1707076-039	01-Jul-2017 00:00	WQA08_010717	✓	✓	
EP1707076-040	01-Jul-2017 00:00	WQA09_010717	✓	✓	
EP1707076-041	08-Jun-2017 00:00	TBW571 (TB)			✓
EP1707076-042	08-Jun-2017 00:00	TBW573_080617			✓

Proactive Holding Time Report

The following table summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory.

Matrix: **WATER**

Evaluation: ✗ = Holding time breach ; ✓ = Within holding time.

Method	Client Sample ID(s)	Container	Due for extraction	Due for analysis	Samples Received		Instructions Received	
					Date	Evaluation	Date	Evaluation
EP080: TRH Volatiles/BTEX								
TBW571 (TB)	Amber VOC Vial - Sulfuric Acid		22-Jun-2017	22-Jun-2017	04-Jul-2017	✗	----	----
TBW573_080617	Amber VOC Vial - Sulfuric Acid		22-Jun-2017	22-Jun-2017	04-Jul-2017	✗	----	----



Requested Deliverables

ACCOUNTS PAYABLE

- A4 - AU Tax Invoice (INV)

Email AP_CustomerService.ANZ@aecom.com

- *AU Certificate of Analysis - NATA (COA)
- *AU Certificate of Analysis - NATA (With MU) (COA_MU)
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)
- Chain of Custody (CoC) (COC)
- EDI Format - ENMRG (ENMRG)
- EDI Format - ESDAT (ESDAT)
- EDI Format - XTab (XTAB)

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- *AU Certificate of Analysis - NATA (COA)
- *AU Certificate of Analysis - NATA (With MU) (COA_MU)
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)
- Chain of Custody (CoC) (COC)
- EDI Format - ENMRG (ENMRG)
- EDI Format - ESDAT (ESDAT)
- EDI Format - XTab (XTAB)

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CERTIFICATE OF ANALYSIS

Work Order : **EP1707076**
Client : **AECOM Australia Pty Ltd**
Contact : [REDACTED]
Address : LEVEL 6 3 FORREST PLACE
 PERTH WA, AUSTRALIA 6849

Telephone : ----
Project : Karratha Airport Limited Investigation - GME
Order number : 60543717
C-O-C number : ----
Sampler : [REDACTED]
Site : ----
Quote number : EP/541/17
No. of samples received : 42
No. of samples analysed : 42

Page : 1 of 30
Laboratory : Environmental Division Perth
Contact : [REDACTED]
Address : 10 Hod Way Malaga WA Australia 6090

Telephone : +61-8-9209 7655
Date Samples Received : 04-Jul-2017 08:40
Date Analysis Commenced : 05-Jul-2017
Issue Date : 13-Jul-2017 13:34



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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
[REDACTED]	Organic Chemist	Sydney Organics, Smithfield, NSW
[REDACTED]	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
[REDACTED]	Organic Coordinator	Sydney Organics, Smithfield, NSW
[REDACTED]	Organic Chemist	Perth Organics, Malaga, WA
[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.

- VOC conducted by ALS Melbourne, NATA accreditation no. 825, site no 13778
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Volatiles and semi-volatiles in soil conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231: Particular samples required dilution due to the presence of high level contaminants. LOR values have been adjusted accordingly.
- EP231: Particular samples required dilution due high conductivity . LOR values have been adjusted accordingly.



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SED01_010717	SED02_010717	SED03_010717	SED04_010717	SED05_300617
Client sampling date / time					01-Jul-2017 00:00	01-Jul-2017 00:00	01-Jul-2017 00:00	01-Jul-2017 00:00	30-Jun-2017 00:00
Compound	CAS Number	LOR	Unit		EP1707076-024	EP1707076-025	EP1707076-026	EP1707076-027	EP1707076-028
					Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1	%		30.0	30.5	20.2	13.1	6.0
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		0.0249	0.0556	<0.0005	<0.0005	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg		0.0247	0.0673	0.0014	0.0008	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg		0.174	1.34	0.0356	0.0109	0.0004
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg		0.0260	0.246	0.0125	<0.0005	<0.0002



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SED01_010717	SED02_010717	SED03_010717	SED04_010717	SED05_300617
Client sampling date / time					01-Jul-2017 00:00	01-Jul-2017 00:00	01-Jul-2017 00:00	01-Jul-2017 00:00	30-Jun-2017 00:00
Compound	CAS Number	LOR	Unit		EP1707076-024	EP1707076-025	EP1707076-026	EP1707076-027	EP1707076-028
				Result	Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	1.81	3.95	0.524	0.0939	0.0034	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<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	0.0073	0.0268	<0.0005	<0.0005	<0.0002	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	0.0639	0.148	0.0023	0.0030	<0.0002	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	0.0072	0.0276	0.0012	0.0012	<0.0002	
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	0.0219	0.140	0.0076	0.0020	<0.0002	
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0005	0.0052	<0.0005	<0.0005	<0.0002	
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.0002	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0012	<0.0012	<0.0012	<0.0012	<0.0005	
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0012	<0.0012	<0.0012	<0.0012	<0.0005	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0012	<0.0012	<0.0012	<0.0012	<0.0005	
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0012	<0.0012	<0.0012	<0.0012	<0.0005	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0012	<0.0012	<0.0012	<0.0012	<0.0005	
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SED01_010717	SED02_010717	SED03_010717	SED04_010717	SED05_300617
Client sampling date / time					01-Jul-2017 00:00	01-Jul-2017 00:00	01-Jul-2017 00:00	01-Jul-2017 00:00	30-Jun-2017 00:00
Compound	CAS Number	LOR	Unit		EP1707076-024	EP1707076-025	EP1707076-026	EP1707076-027	EP1707076-028
				Result	Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<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		0.0253	0.111	0.0015	<0.0005	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		0.0227	0.0022	<0.0005	0.0038	<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		2.21	6.12	0.586	0.116	0.0038
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		1.98	5.29	0.560	0.105	0.0038
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		2.16	5.80	0.572	0.115	0.0038
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	0.2	%		86.6	83.2	86.9	88.8	92.9
Toluene-D8	2037-26-5	0.2	%		90.8	89.1	87.7	91.4	93.6
4-Bromofluorobenzene	460-00-4	0.2	%		94.4	94.8	92.3	95.1	97.3
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		97.3	98.6	97.3	94.7	97.2



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SED06_010717	SED07_010717	SEDQA01_010717	SEDQA02_010717	----
Client sampling date / time					01-Jul-2017 00:00	01-Jul-2017 00:00	01-Jul-2017 00:00	01-Jul-2017 00:00	----
Compound	CAS Number	LOR	Unit		EP1707076-029	EP1707076-030	EP1707076-031	EP1707076-032	-----
				Result	Result	Result	Result	Result	----
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1	%		10.9	8.5	23.2	24.0	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	<10	----
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	<50	----
C15 - C28 Fraction	----	100	mg/kg		<100	<100	<100	<100	----
C29 - C36 Fraction	----	100	mg/kg		<100	<100	<100	<100	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	<50	<50	<50	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	----
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	<50	<50	----
>C16 - C34 Fraction	----	100	mg/kg		<100	<100	<100	<100	----
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	<100	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		<50	<50	<50	<50	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	<50	<50	----
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	----
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Ethylbenzene	100-41-4	0.5	mg/kg		<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	----
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
^ Sum of BTEX	----	0.2	mg/kg		<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	----
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg		0.0005	<0.0002	0.0300	0.0214	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg		0.0007	<0.0002	0.0440	0.0327	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg		0.0190	0.0003	0.299	0.220	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg		0.0005	<0.0002	0.0417	0.0273	----



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SED06_010717	SED07_010717	SEDQA01_010717	SEDQA02_010717	----
Client sampling date / time					01-Jul-2017 00:00	01-Jul-2017 00:00	01-Jul-2017 00:00	01-Jul-2017 00:00	----
Compound	CAS Number	LOR	Unit		EP1707076-029	EP1707076-030	EP1707076-031	EP1707076-032	-----
					Result	Result	Result	Result	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg		0.0351	0.0017	1.86	2.44	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg		0.0020	<0.0002	<0.0005	<0.0005	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg		<0.001	<0.001	<0.001	<0.001	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg		0.0004	<0.0002	0.0143	0.0080	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg		0.0016	<0.0002	0.0802	0.0566	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg		0.0009	<0.0002	0.0124	0.0096	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg		0.0018	<0.0002	0.0348	0.0247	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg		0.0004	<0.0002	0.0017	0.0017	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg		0.0003	<0.0002	<0.0005	<0.0005	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0005	<0.0005	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		0.0004	<0.0002	<0.0005	<0.0005	----
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.0002	mg/kg		0.0003	<0.0002	<0.0005	0.0005	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg		0.0006	<0.0005	<0.0012	<0.0012	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg		0.0023	<0.0002	<0.0005	<0.0005	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0005	<0.0005	<0.0012	<0.0012	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0012	<0.0012	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0012	<0.0012	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0012	<0.0012	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0005	<0.0005	----



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SED06_010717	SED07_010717	SEDQA01_010717	SEDQA02_010717	----
Client sampling date / time					01-Jul-2017 00:00	01-Jul-2017 00:00	01-Jul-2017 00:00	01-Jul-2017 00:00	----
Compound	CAS Number	LOR	Unit		EP1707076-029	EP1707076-030	EP1707076-031	EP1707076-032	-----
				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	<0.0005	----
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	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	<0.0005	0.0432	0.0313	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		0.0025	<0.0005	0.0478	0.0474	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		0.0013	<0.0005	<0.0005	<0.0005	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		0.0706	0.0020	2.51	2.92	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		0.0541	0.0020	2.16	2.66	----
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		0.0618	0.0020	2.42	2.86	----
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	0.2	%		98.4	97.8	87.4	96.8	----
Toluene-D8	2037-26-5	0.2	%		88.2	94.0	93.1	88.7	----
4-Bromofluorobenzene	460-00-4	0.2	%		91.1	94.7	97.1	91.8	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		95.4	92.8	96.5	97.9	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MW010_300617	MW011_300617	MW013_300617	MW012_300617	MW09_300617
Client sampling date / time					30-Jun-2017 00:00	30-Jun-2017 00:00	30-Jun-2017 00:00	30-Jun-2017 00:00	30-Jun-2017 00:00
Compound	CAS Number	LOR	Unit		EP1707076-001	EP1707076-002	EP1707076-003	EP1707076-004	EP1707076-005
					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		260	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L		310	<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		220	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L		320	<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		946	395	2.98	48.7	24.5
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		694	269	2.50	36.0	17.1
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		5570	2840	11.0	159	307
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		452	176	0.10	3.00	9.22
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		5560	1600	0.12	1.86	113

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MW010_300617	MW011_300617	MW013_300617	MW012_300617	MW09_300617
Client sampling date / time				30-Jun-2017 00:00	30-Jun-2017 00:00	30-Jun-2017 00:00	30-Jun-2017 00:00	30-Jun-2017 00:00	
Compound	CAS Number	LOR	Unit	EP1707076-001	EP1707076-002	EP1707076-003	EP1707076-004	EP1707076-005	
				Result	Result	Result	Result	Result	
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<1.00	<1.00	<0.05	<0.05	<0.10	
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	206	80.5	<0.2	7.3	2.8	
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	316	141	0.58	11.6	5.35	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	1870	877	2.61	53.8	37.7	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	193	86.3	0.28	4.40	2.97	
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	391	195	0.14	4.36	8.12	
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	1.60	<1.00	<0.05	<0.05	<0.10	
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<1.00	<1.00	<0.05	<0.05	<0.10	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<1.00	<1.00	<0.05	<0.05	<0.10	
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<1.00	<1.00	<0.05	<0.05	<0.10	
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<1.00	<1.00	<0.05	<0.05	<0.10	
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<2.50	<2.50	<0.12	<0.12	<0.25	
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<1.00	<1.00	<0.05	<0.05	<0.10	
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<2.50	<2.50	<0.12	<0.12	<0.25	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<2.50	<2.50	<0.12	<0.12	<0.25	
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<2.50	<2.50	<0.12	<0.12	<0.25	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<2.50	<2.50	<0.12	<0.12	<0.25	
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<1.00	<1.00	<0.05	<0.05	<0.10	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<1.00	<1.00	<0.05	<0.05	<0.10	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MW010_300617	MW011_300617	MW013_300617	MW012_300617	MW09_300617
Client sampling date / time					30-Jun-2017 00:00	30-Jun-2017 00:00	30-Jun-2017 00:00	30-Jun-2017 00:00	30-Jun-2017 00:00
Compound	CAS Number	LOR	Unit		EP1707076-001	EP1707076-002	EP1707076-003	EP1707076-004	EP1707076-005
				Result	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		11.2	7.70	<0.05	<0.05	<0.10
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		548	292	<0.05	0.76	0.67
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		4.90	<1.00	<0.05	<0.05	<0.10
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<1.00	<1.00	<0.05	<0.05	<0.10
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		16800	6960	20.3	331	528
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		11100	4440	11.1	161	420
Sum of PFAS (WA DER List)	----	0.01	µg/L		15600	6510	17.7	292	502
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%		109	104	85.0	88.4	86.8
Toluene-D8	2037-26-5	2	%		94.9	124	112	102	112
4-Bromofluorobenzene	460-00-4	2	%		108	126	113	104	116
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		111	112	91.6	93.0	119



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MW02_300617	MW19A_300617	MW19B_300617	MW19C_300617	MW06_300617
Client sampling date / time					30-Jun-2017 00:00	30-Jun-2017 00:00	30-Jun-2017 00:00	30-Jun-2017 00:00	30-Jun-2017 00:00
Compound	CAS Number	LOR	Unit		EP1707076-006	EP1707076-007	EP1707076-008	EP1707076-009	EP1707076-010
					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		4.33	<0.05	0.20	<0.05	0.86
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		2.98	0.09	0.16	<0.05	0.87
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		44.4	1.10	0.98	<0.05	19.4
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		1.63	0.28	0.06	<0.05	0.41
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		47.5	11.9	1.15	<0.05	28.1

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MW02_300617	MW19A_300617	MW19B_300617	MW19C_300617	MW06_300617
Client sampling date / time				30-Jun-2017 00:00	30-Jun-2017 00:00	30-Jun-2017 00:00	30-Jun-2017 00:00	30-Jun-2017 00:00	
Compound	CAS Number	LOR	Unit	EP1707076-006	EP1707076-007	EP1707076-008	EP1707076-009	EP1707076-010	
				Result	Result	Result	Result	Result	
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	0.12	<0.05	<0.05	<0.05	<0.10	
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	1.0	<0.2	<0.2	<0.2	1.1	
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	2.23	<0.05	<0.05	<0.05	0.16	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	10.4	0.12	0.20	<0.05	2.15	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	1.67	<0.05	<0.05	<0.05	0.21	
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	3.99	0.12	0.06	<0.05	0.58	
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	0.13	<0.05	<0.05	<0.05	<0.10	
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	0.05	<0.05	<0.05	<0.05	<0.10	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.05	<0.05	<0.05	<0.10	
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.05	<0.05	<0.05	<0.10	
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.05	<0.05	<0.05	<0.10	
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.12	<0.12	<0.12	<0.25	
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	2.02	<0.05	<0.05	<0.05	<0.10	
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.12	<0.12	<0.12	<0.25	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.12	<0.12	<0.12	<0.25	
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.05	<0.12	<0.12	<0.12	<0.25	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.12	<0.12	<0.12	<0.25	
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.05	<0.05	<0.05	<0.10	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.05	<0.05	<0.05	<0.10	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									



Analytical Results

Sub-Matrix: **WATER**
 (Matrix: **WATER**)

Client sample ID

				MW02_300617	MW19A_300617	MW19B_300617	MW19C_300617	MW06_300617
Client sampling date / time				30-Jun-2017 00:00	30-Jun-2017 00:00	30-Jun-2017 00:00	30-Jun-2017 00:00	30-Jun-2017 00:00
Compound	CAS Number	LOR	Unit	EP1707076-006	EP1707076-007	EP1707076-008	EP1707076-009	EP1707076-010
				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	<0.10
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	1.92	<0.05	<0.05	<0.05	0.10
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	1.79	<0.05	<0.05	<0.05	<0.10
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.10
EP231P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	126	13.6	2.81	<0.05	53.9
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	91.9	13.0	2.13	<0.05	47.5
Sum of PFAS (WA DER List)	----	0.01	µg/L	119	13.2	2.59	<0.05	52.7
EP080S: TPH(V)/BTEX Surrogates								
1,2-Dichloroethane-D4	17060-07-0	2	%	77.3	83.3	86.4	91.6	77.9
Toluene-D8	2037-26-5	2	%	93.6	93.8	99.5	123	95.4
4-Bromofluorobenzene	460-00-4	2	%	107	101	101	126	101
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	119	86.5	93.4	92.5	114



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MW05_300617	MW020_300617	MW08_300617	MW021_300617	MW018_300617
Client sampling date / time					30-Jun-2017 00:00	30-Jun-2017 00:00	30-Jun-2017 00:00	30-Jun-2017 00:00	30-Jun-2017 00:00
Compound	CAS Number	LOR	Unit		EP1707076-011	EP1707076-012	EP1707076-013	EP1707076-014	EP1707076-015
					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		<0.05	0.10	3.58	0.14	25.3
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.05	0.10	2.80	0.12	21.6
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.05	0.56	13.8	0.62	296
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.05	<0.05	1.68	0.10	11.7
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		0.08	0.80	30.3	5.94	299

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MW05_300617	MW020_300617	MW08_300617	MW021_300617	MW018_300617
Client sampling date / time				30-Jun-2017 00:00	30-Jun-2017 00:00	30-Jun-2017 00:00	30-Jun-2017 00:00	30-Jun-2017 00:00	
Compound	CAS Number	LOR	Unit	EP1707076-011	EP1707076-012	EP1707076-013	EP1707076-014	EP1707076-015	
				Result	Result	Result	Result	Result	
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.05	<0.05	<0.05	<0.05	0.23	
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.2	<0.2	1.3	<0.2	2.9	
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.05	<0.05	1.36	<0.05	12.4	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.05	0.09	5.68	0.14	58.7	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.05	<0.05	0.72	<0.05	8.36	
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.05	<0.05	1.46	0.06	25.0	
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.05	<0.05	<0.05	<0.05	0.22	
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.05	<0.05	<0.05	<0.05	0.10	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.05	<0.05	<0.05	<0.05	<0.10	
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.05	<0.05	<0.05	<0.05	<0.10	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.05	<0.05	<0.05	<0.05	<0.10	
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.12	<0.12	<0.12	<0.12	<0.25	
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.05	<0.05	<0.05	<0.05	1.42	
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.12	<0.12	<0.12	<0.12	<0.25	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.12	<0.12	<0.12	<0.12	<0.25	
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.12	<0.12	<0.12	<0.12	<0.25	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.12	<0.12	<0.12	<0.12	<0.25	
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.05	<0.05	<0.05	<0.05	<0.10	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.05	<0.05	<0.05	<0.05	<0.10	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									



Analytical Results

Sub-Matrix: **WATER**
 (Matrix: **WATER**)

Client sample ID

				MW05_300617	MW020_300617	MW08_300617	MW021_300617	MW018_300617
Client sampling date / time				30-Jun-2017 00:00	30-Jun-2017 00:00	30-Jun-2017 00:00	30-Jun-2017 00:00	30-Jun-2017 00:00
Compound	CAS Number	LOR	Unit	EP1707076-011	EP1707076-012	EP1707076-013	EP1707076-014	EP1707076-015
				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	<0.10
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	1.66	<0.05	<0.10
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	1.44
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.10
EP231P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	0.08	1.65	64.3	7.12	764
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	0.08	1.36	44.1	6.56	595
Sum of PFAS (WA DER List)	----	0.01	µg/L	0.08	1.55	59.9	6.90	729
EP080S: TPH(V)/BTEX Surrogates								
1,2-Dichloroethane-D4	17060-07-0	2	%	73.8	78.8	74.5	81.4	82.8
Toluene-D8	2037-26-5	2	%	91.9	93.6	89.4	90.0	100
4-Bromofluorobenzene	460-00-4	2	%	100	104	102	99.4	101
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	87.8	81.1	82.4	92.9	116



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MW015_300617	MW07_300617	MW017_010717	MW016_010717	MW04_010717
Client sampling date / time					30-Jun-2017 00:00	30-Jun-2017 00:00	01-Jul-2017 00:00	01-Jul-2017 00:00	01-Jul-2017 00:00
Compound	CAS Number	LOR	Unit		EP1707076-016	EP1707076-017	EP1707076-018	EP1707076-019	EP1707076-020
					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		0.58	4.90	<0.05	0.30	0.44
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		0.44	4.41	<0.05	0.30	0.42
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		2.28	27.7	<0.05	1.26	2.46
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		0.13	1.42	<0.05	0.08	0.20
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		1.06	43.5	0.08	3.06	9.00

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MW015_300617	MW07_300617	MW017_010717	MW016_010717	MW04_010717
Client sampling date / time				30-Jun-2017 00:00	30-Jun-2017 00:00	01-Jul-2017 00:00	01-Jul-2017 00:00	01-Jul-2017 00:00	
Compound	CAS Number	LOR	Unit	EP1707076-016	EP1707076-017	EP1707076-018	EP1707076-019	EP1707076-020	
				Result	Result	Result	Result	Result	
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	0.5	1.2	<0.2	1.1	0.8	
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.22	1.62	<0.05	0.16	0.21	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.54	6.64	<0.05	0.36	0.55	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.08	0.92	<0.05	0.08	0.10	
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.15	1.40	<0.05	0.13	0.22	
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.12	<0.12	<0.12	<0.12	<0.12	
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.12	<0.12	<0.12	<0.12	<0.12	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.12	<0.12	<0.12	<0.12	<0.12	
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.12	<0.12	<0.12	<0.12	<0.12	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.12	<0.12	<0.12	<0.12	<0.12	
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MW015_300617	MW07_300617	MW017_010717	MW016_010717	MW04_010717
Client sampling date / time					30-Jun-2017 00:00	30-Jun-2017 00:00	01-Jul-2017 00:00	01-Jul-2017 00:00	01-Jul-2017 00:00
Compound	CAS Number	LOR	Unit		EP1707076-016	EP1707076-017	EP1707076-018	EP1707076-019	EP1707076-020
				Result	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	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		5.98	93.7	0.08	6.83	14.4
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		3.34	71.2	0.08	4.32	11.5
Sum of PFAS (WA DER List)	----	0.01	µg/L		5.41	87.9	0.08	6.45	13.8
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%		76.5	73.8	78.0	76.4	74.5
Toluene-D8	2037-26-5	2	%		98.4	90.0	79.7	95.7	89.5
4-Bromofluorobenzene	460-00-4	2	%		108	102	93.2	106	102
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		76.4	87.6	77.0	84.3	82.8



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MW014_010717	MW03_010717	MW01_010717	SEDQA03_010717	WQA01_300617
Client sampling date / time					01-Jul-2017 00:00	01-Jul-2017 00:00	01-Jul-2017 00:00	01-Jul-2017 00:00	30-Jun-2017 00:00
Compound	CAS Number	LOR	Unit		EP1707076-021	EP1707076-022	EP1707076-023	EP1707076-033	EP1707076-034
					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		36.8	6.36	44.3	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		34.3	6.34	37.3	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		163	36.1	89.8	0.07	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		6.65	1.77	15.0	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		251	66.2	183	0.08	<0.01

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MW014_010717	MW03_010717	MW01_010717	SEDQA03_010717	WQA01_300617
Client sampling date / time				01-Jul-2017 00:00	01-Jul-2017 00:00	01-Jul-2017 00:00	01-Jul-2017 00:00	30-Jun-2017 00:00	
Compound	CAS Number	LOR	Unit	EP1707076-021	EP1707076-022	EP1707076-023	EP1707076-033	EP1707076-034	
				Result	Result	Result	Result	Result	
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.10	<0.02	<0.10	<0.02	<0.02	
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	6.0	<0.1	13.5	<0.1	<0.1	
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	9.99	2.55	21.6	0.05	<0.02	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	59.1	8.79	44.7	<0.02	<0.02	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	8.81	1.88	10.1	<0.02	<0.02	
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	16.8	3.84	16.0	<0.01	<0.01	
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	0.23	0.09	0.15	<0.02	<0.02	
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.10	0.02	<0.10	<0.02	<0.02	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.10	<0.02	<0.10	<0.02	<0.02	
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.10	<0.02	<0.10	<0.02	<0.02	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.10	<0.02	<0.10	<0.02	<0.02	
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.25	<0.05	<0.25	<0.05	<0.05	
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	1.44	1.87	0.53	<0.02	<0.02	
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.25	<0.05	<0.25	<0.05	<0.05	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.25	<0.05	<0.25	<0.05	<0.05	
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.25	<0.05	<0.25	<0.05	<0.05	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.25	<0.05	<0.25	<0.05	<0.05	
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.10	<0.02	<0.10	<0.02	<0.02	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.10	<0.02	<0.10	<0.02	<0.02	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									



Analytical Results

Sub-Matrix: **WATER**
 (Matrix: **WATER**)

Client sample ID

				MW014_010717	MW03_010717	MW01_010717	SEDQA03_010717	WQA01_300617
Client sampling date / time				01-Jul-2017 00:00	01-Jul-2017 00:00	01-Jul-2017 00:00	01-Jul-2017 00:00	30-Jun-2017 00:00
Compound	CAS Number	LOR	Unit	EP1707076-021	EP1707076-022	EP1707076-023	EP1707076-033	EP1707076-034
				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	<0.10	<0.05	<0.10	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	0.14	0.25	4.30	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	0.16	0.46	0.30	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.10	<0.05	<0.10	<0.05	<0.05
EP231P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	594	136	480	0.20	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	414	102	273	0.15	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L	552	126	428	0.20	<0.01
EP080S: TPH(V)/BTEX Surrogates								
1,2-Dichloroethane-D4	17060-07-0	2	%	89.8	92.2	87.7	86.9	87.5
Toluene-D8	2037-26-5	2	%	89.8	78.6	78.5	93.3	88.3
4-Bromofluorobenzene	460-00-4	2	%	101	100	95.2	105	111
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	94.9	94.7	93.1	109	106



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	WQA02_300617	WQA03_300617	WQA05_300617	WQA07_010717	WQA08_010717
Client sampling date / time					30-Jun-2017 00:00	30-Jun-2017 00:00	30-Jun-2017 00:00	01-Jul-2017 00:00	01-Jul-2017 00:00
Compound	CAS Number	LOR	Unit		EP1707076-035	EP1707076-036	EP1707076-037	EP1707076-038	EP1707076-039
					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	270	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	320	<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	110	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	200	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	310	<100	<100	<100
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	110	<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		0.05	266	0.67	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		0.04	609	0.81	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		0.28	3330	7.51	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		0.05	140	0.36	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		1.69	4780	27.4	<0.01	0.07

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	WQA02_300617	WQA03_300617	WQA05_300617	WQA07_010717	WQA08_010717
Client sampling date / time				30-Jun-2017 00:00	30-Jun-2017 00:00	30-Jun-2017 00:00	01-Jul-2017 00:00	01-Jul-2017 00:00	
Compound	CAS Number	LOR	Unit	EP1707076-035	EP1707076-036	EP1707076-037	EP1707076-038	EP1707076-039	
				Result	Result	Result	Result	Result	
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.05	<0.02	<0.02	<0.02	
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	142	<0.1	<0.1	<0.1	
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	339	0.31	<0.02	0.03	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.10	910	1.74	<0.02	<0.02	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	110	0.23	<0.02	<0.02	
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.03	206	0.48	<0.01	<0.01	
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.92	0.02	<0.02	<0.02	
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.05	<0.02	<0.02	<0.02	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.05	<0.02	<0.02	<0.02	
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.05	<0.02	<0.02	<0.02	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.05	<0.02	<0.02	<0.02	
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.12	<0.05	<0.05	<0.05	
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.50	0.06	<0.02	<0.02	
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.12	<0.05	<0.05	<0.05	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.12	<0.05	<0.05	<0.05	
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.05	<0.12	<0.05	<0.05	<0.05	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.12	<0.05	<0.05	<0.05	
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.05	<0.02	<0.02	<0.02	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.05	<0.02	<0.02	<0.02	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Client sample ID

				WQA02_300617	WQA03_300617	WQA05_300617	WQA07_010717	WQA08_010717
Client sampling date / time				30-Jun-2017 00:00	30-Jun-2017 00:00	30-Jun-2017 00:00	01-Jul-2017 00:00	01-Jul-2017 00:00
Compound	CAS Number	LOR	Unit	EP1707076-035	EP1707076-036	EP1707076-037	EP1707076-038	EP1707076-039
				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	4.42	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	341	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	3.18	<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	2.24	11200	39.6	<0.01	0.10
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	1.97	8110	34.9	<0.01	0.07
Sum of PFAS (WA DER List)	----	0.01	µg/L	2.15	10400	38.3	<0.01	0.10
EP080S: TPH(V)/BTEX Surrogates								
1,2-Dichloroethane-D4	17060-07-0	2	%	90.8	99.6	87.5	83.5	88.8
Toluene-D8	2037-26-5	2	%	94.1	99.8	87.0	86.8	92.2
4-Bromofluorobenzene	460-00-4	2	%	108	113	104	104	105
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	106	83.2	98.3	101	101



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	WQA09_010717	TBW571 (TB)	TBW573_080617	----	----
Client sampling date / time					01-Jul-2017 00:00	08-Jun-2017 00:00	08-Jun-2017 00:00	----	----
Compound	CAS Number	LOR	Unit		EP1707076-040	EP1707076-041	EP1707076-042	-----	-----
				Result	Result	Result	Result	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<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	<20	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<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	<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		21.1	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		17.7	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		82.3	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		7.30	----	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		181	----	----	----	----

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	WQA09_010717	TBW571 (TB)	TBW573_080617	----	----
Client sampling date / time					01-Jul-2017 00:00	08-Jun-2017 00:00	08-Jun-2017 00:00	----	----
Compound	CAS Number	LOR	Unit		EP1707076-040	EP1707076-041	EP1707076-042	-----	-----
				Result	Result	Result	----	----	
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.05	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		5.6	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		10.2	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		47.6	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		4.72	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		7.37	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.05	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.05	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.05	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.05	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.05	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.12	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		0.17	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.12	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.12	----	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L		<0.12	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.12	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.05	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	WQA09_010717	TBW571 (TB)	TBW573_080617	----	----
Client sampling date / time					01-Jul-2017 00:00	08-Jun-2017 00:00	08-Jun-2017 00:00	----	----
Compound	CAS Number	LOR	Unit		EP1707076-040	EP1707076-041	EP1707076-042	-----	-----
				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	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		2.18	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		0.16	----	----	----	----
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		387	----	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		263	----	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		362	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%		87.8	99.5	96.6	----	----
Toluene-D8	2037-26-5	2	%		93.3	95.4	85.7	----	----
4-Bromofluorobenzene	460-00-4	2	%		108	94.4	90.0	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		95.4	----	----	----	----



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	73	133
Toluene-D8	2037-26-5	74	132
4-Bromofluorobenzene	460-00-4	72	130
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

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EP1707076	Page	: 1 of 12
Client	: AECOM Australia Pty Ltd	Laboratory	: Environmental Division Perth
Contact	: [REDACTED]	Telephone	: +61-8-9209 7655
Project	: Karratha Airport Limited Investigation - GME	Date Samples Received	: 04-Jul-2017
Site	: ----	Issue Date	: 13-Jul-2017
Sampler	: [REDACTED]	No. of samples received	: 42
Order number	: 60543717	No. of samples analysed	: 42

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

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**



Outliers : 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	EP1707075--029	Anonymous	Perfluorooctane sulfonic acid (PFOS)	1763-23-1	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

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	EP1707076--006	MW02_300617	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	EP1707076--006	MW02_300617	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	EP1707076--006	MW02_300617	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	EP1707076--006	MW02_300617	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	EP1707076--006	MW02_300617	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	EP1707076--006	MW02_300617	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	EP1707076--006	MW02_300617	Perfluorooctanoic acid (PFOA)	335-67-1	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EP231C: Perfluoroalkyl Sulfonamides	EP1707076--006	MW02_300617	Perfluorooctane sulfonamide (FOSA)	754-91-6	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method		Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EP080/071: Total Petroleum Hydrocarbons							
Amber VOC Vial - Sulfuric Acid							
TBW571 (TB),	TBW573_080617	06-Jul-2017	22-Jun-2017	14	06-Jul-2017	22-Jun-2017	14



Matrix: **WATER**

Method Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions						
Amber VOC Vial - Sulfuric Acid TBW571 (TB), TBW573_080617	06-Jul-2017	22-Jun-2017	14	06-Jul-2017	22-Jun-2017	14
EP080: BTEXN						
Amber VOC Vial - Sulfuric Acid TBW571 (TB), TBW573_080617	06-Jul-2017	22-Jun-2017	14	06-Jul-2017	22-Jun-2017	14

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
TRH - Semivolatile Fraction	2	45	4.44	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
TRH - Semivolatile Fraction	1	45	2.22	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	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EA055: Moisture Content (Dried @ 105-110°C)								
Soil Glass Jar - Unpreserved (EA055)								
SED01_010717, SED02_010717, SED03_010717, SED04_010717, SED06_010717, SED07_010717, SEDQA01_010717, SEDQA02_010717	01-Jul-2017	----	----	----	07-Jul-2017	15-Jul-2017	✔	
Soil Glass Jar - Unpreserved (EA055)								
SED05_300617	30-Jun-2017	----	----	----	07-Jul-2017	14-Jul-2017	✔	



Matrix: **SOIL**

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Petroleum Hydrocarbons								
Soil Glass Jar - Unpreserved (EP080) SED01_010717, SED03_010717, SED06_010717, SEDQA01_010717,	SED02_010717, SED04_010717, SED07_010717, SEDQA02_010717	01-Jul-2017	05-Jul-2017	15-Jul-2017	✓	06-Jul-2017	15-Jul-2017	✓
Soil Glass Jar - Unpreserved (EP071) SED01_010717, SED03_010717, SED06_010717, SEDQA01_010717,	SED02_010717, SED04_010717, SED07_010717, SEDQA02_010717	01-Jul-2017	06-Jul-2017	15-Jul-2017	✓	07-Jul-2017	15-Aug-2017	✓
Soil Glass Jar - Unpreserved (EP080) SED05_300617		30-Jun-2017	05-Jul-2017	14-Jul-2017	✓	06-Jul-2017	14-Jul-2017	✓
Soil Glass Jar - Unpreserved (EP071) SED05_300617		30-Jun-2017	06-Jul-2017	14-Jul-2017	✓	07-Jul-2017	15-Aug-2017	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
Soil Glass Jar - Unpreserved (EP080) SED01_010717, SED03_010717, SED06_010717, SEDQA01_010717,	SED02_010717, SED04_010717, SED07_010717, SEDQA02_010717	01-Jul-2017	05-Jul-2017	15-Jul-2017	✓	06-Jul-2017	15-Jul-2017	✓
Soil Glass Jar - Unpreserved (EP071) SED01_010717, SED03_010717, SED06_010717, SEDQA01_010717,	SED02_010717, SED04_010717, SED07_010717, SEDQA02_010717	01-Jul-2017	06-Jul-2017	15-Jul-2017	✓	07-Jul-2017	15-Aug-2017	✓
Soil Glass Jar - Unpreserved (EP080) SED05_300617		30-Jun-2017	05-Jul-2017	14-Jul-2017	✓	06-Jul-2017	14-Jul-2017	✓
Soil Glass Jar - Unpreserved (EP071) SED05_300617		30-Jun-2017	06-Jul-2017	14-Jul-2017	✓	07-Jul-2017	15-Aug-2017	✓
EP080: BTEXN								
Soil Glass Jar - Unpreserved (EP080) SED01_010717, SED03_010717, SED06_010717, SEDQA01_010717,	SED02_010717, SED04_010717, SED07_010717, SEDQA02_010717	01-Jul-2017	05-Jul-2017	15-Jul-2017	✓	06-Jul-2017	15-Jul-2017	✓
Soil Glass Jar - Unpreserved (EP080) SED05_300617		30-Jun-2017	05-Jul-2017	14-Jul-2017	✓	06-Jul-2017	14-Jul-2017	✓



Matrix: **SOIL**

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231A: Perfluoroalkyl Sulfonic Acids								
Soil Glass Jar - Unpreserved (EP231X) SED01_010717, SED03_010717, SED06_010717, SEDQA01_010717,	SED02_010717, SED04_010717, SED07_010717, SEDQA02_010717	01-Jul-2017	10-Jul-2017	28-Dec-2017	✓	10-Jul-2017	19-Aug-2017	✓
Soil Glass Jar - Unpreserved (EP231X) SED05_300617		30-Jun-2017	10-Jul-2017	27-Dec-2017	✓	10-Jul-2017	19-Aug-2017	✓
EP231B: Perfluoroalkyl Carboxylic Acids								
Soil Glass Jar - Unpreserved (EP231X) SED01_010717, SED03_010717, SED06_010717, SEDQA01_010717,	SED02_010717, SED04_010717, SED07_010717, SEDQA02_010717	01-Jul-2017	10-Jul-2017	28-Dec-2017	✓	10-Jul-2017	19-Aug-2017	✓
Soil Glass Jar - Unpreserved (EP231X) SED05_300617		30-Jun-2017	10-Jul-2017	27-Dec-2017	✓	10-Jul-2017	19-Aug-2017	✓
EP231C: Perfluoroalkyl Sulfonamides								
Soil Glass Jar - Unpreserved (EP231X) SED01_010717, SED03_010717, SED06_010717, SEDQA01_010717,	SED02_010717, SED04_010717, SED07_010717, SEDQA02_010717	01-Jul-2017	10-Jul-2017	28-Dec-2017	✓	10-Jul-2017	19-Aug-2017	✓
Soil Glass Jar - Unpreserved (EP231X) SED05_300617		30-Jun-2017	10-Jul-2017	27-Dec-2017	✓	10-Jul-2017	19-Aug-2017	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
Soil Glass Jar - Unpreserved (EP231X) SED01_010717, SED03_010717, SED06_010717, SEDQA01_010717,	SED02_010717, SED04_010717, SED07_010717, SEDQA02_010717	01-Jul-2017	10-Jul-2017	28-Dec-2017	✓	10-Jul-2017	19-Aug-2017	✓
Soil Glass Jar - Unpreserved (EP231X) SED05_300617		30-Jun-2017	10-Jul-2017	27-Dec-2017	✓	10-Jul-2017	19-Aug-2017	✓
EP231P: PFAS Sums								
Soil Glass Jar - Unpreserved (EP231X) SED01_010717, SED03_010717, SED06_010717, SEDQA01_010717,	SED02_010717, SED04_010717, SED07_010717, SEDQA02_010717	01-Jul-2017	10-Jul-2017	28-Dec-2017	✓	10-Jul-2017	19-Aug-2017	✓
Soil Glass Jar - Unpreserved (EP231X) SED05_300617		30-Jun-2017	10-Jul-2017	27-Dec-2017	✓	10-Jul-2017	19-Aug-2017	✓

Matrix: **WATER**

Evaluation: * = Holding time breach ; ✓ = Within holding time.



Matrix: **WATER**

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

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Petroleum Hydrocarbons								
Amber Glass Bottle - Unpreserved (EP071) WQA07_010717, WQA09_010717	WQA08_010717,	01-Jul-2017	06-Jul-2017	08-Jul-2017	✓	06-Jul-2017	15-Aug-2017	✓
Amber Glass Bottle - Unpreserved (EP071) MW017_010717, MW04_010717, MW03_010717, SEDQA03_010717	MW016_010717, MW014_010717, MW01_010717,	01-Jul-2017	07-Jul-2017	08-Jul-2017	✓	10-Jul-2017	16-Aug-2017	✓
Amber Glass Bottle - Unpreserved (EP071) WQA02_300617, WQA05_300617	WQA03_300617,	30-Jun-2017	06-Jul-2017	07-Jul-2017	✓	06-Jul-2017	15-Aug-2017	✓
Amber Glass Bottle - Unpreserved (EP071) MW010_300617, MW013_300617, MW09_300617, MW19A_300617, MW19C_300617, MW05_300617, MW08_300617, MW018_300617, MW07_300617,	MW011_300617, MW012_300617, MW02_300617, MW19B_300617, MW06_300617, MW020_300617, MW021_300617, MW015_300617, WQA01_300617	30-Jun-2017	07-Jul-2017	07-Jul-2017	✓	10-Jul-2017	16-Aug-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080) MW017_010717, MW04_010717, MW03_010717, SEDQA03_010717, WQA08_010717,	MW016_010717, MW014_010717, MW01_010717, WQA07_010717, WQA09_010717	01-Jul-2017	07-Jul-2017	15-Jul-2017	✓	07-Jul-2017	15-Jul-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080) TBW571 (TB),	TBW573_080617	08-Jun-2017	06-Jul-2017	22-Jun-2017	✗	06-Jul-2017	22-Jun-2017	✗
Amber VOC Vial - Sulfuric Acid (EP080) MW010_300617, MW013_300617, MW09_300617, MW19A_300617, MW19C_300617, MW05_300617, MW08_300617, MW018_300617, MW07_300617, WQA02_300617, WQA05_300617	MW011_300617, MW012_300617, MW02_300617, MW19B_300617, MW06_300617, MW020_300617, MW021_300617, MW015_300617, WQA01_300617, WQA03_300617,	30-Jun-2017	07-Jul-2017	14-Jul-2017	✓	07-Jul-2017	14-Jul-2017	✓



Matrix: **WATER**

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

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
Amber Glass Bottle - Unpreserved (EP071) WQA07_010717, WQA09_010717	WQA08_010717,	01-Jul-2017	06-Jul-2017	08-Jul-2017	✓	06-Jul-2017	15-Aug-2017	✓
Amber Glass Bottle - Unpreserved (EP071) MW017_010717, MW04_010717, MW03_010717, SEDQA03_010717	MW016_010717, MW014_010717, MW01_010717,	01-Jul-2017	07-Jul-2017	08-Jul-2017	✓	10-Jul-2017	16-Aug-2017	✓
Amber Glass Bottle - Unpreserved (EP071) WQA02_300617, WQA05_300617	WQA03_300617,	30-Jun-2017	06-Jul-2017	07-Jul-2017	✓	06-Jul-2017	15-Aug-2017	✓
Amber Glass Bottle - Unpreserved (EP071) MW010_300617, MW013_300617, MW09_300617, MW19A_300617, MW19C_300617, MW05_300617, MW08_300617, MW018_300617, MW07_300617,	MW011_300617, MW012_300617, MW02_300617, MW19B_300617, MW06_300617, MW020_300617, MW021_300617, MW015_300617, WQA01_300617	30-Jun-2017	07-Jul-2017	07-Jul-2017	✓	10-Jul-2017	16-Aug-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080) MW017_010717, MW04_010717, MW03_010717, SEDQA03_010717, WQA08_010717,	MW016_010717, MW014_010717, MW01_010717, WQA07_010717, WQA09_010717	01-Jul-2017	07-Jul-2017	15-Jul-2017	✓	07-Jul-2017	15-Jul-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080) TBW571 (TB),	TBW573_080617	08-Jun-2017	06-Jul-2017	22-Jun-2017	✗	06-Jul-2017	22-Jun-2017	✗
Amber VOC Vial - Sulfuric Acid (EP080) MW010_300617, MW013_300617, MW09_300617, MW19A_300617, MW19C_300617, MW05_300617, MW08_300617, MW018_300617, MW07_300617, WQA02_300617, WQA05_300617	MW011_300617, MW012_300617, MW02_300617, MW19B_300617, MW06_300617, MW020_300617, MW021_300617, MW015_300617, WQA01_300617, WQA03_300617,	30-Jun-2017	07-Jul-2017	14-Jul-2017	✓	07-Jul-2017	14-Jul-2017	✓



Matrix: **WATER**

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

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080: BTEXN								
Amber VOC Vial - Sulfuric Acid (EP080)		01-Jul-2017	07-Jul-2017	15-Jul-2017	✓	07-Jul-2017	15-Jul-2017	✓
MW017_010717, MW04_010717, MW03_010717, SEDQA03_010717, WQA08_010717,	MW016_010717, MW014_010717, MW01_010717, WQA07_010717, WQA09_010717							
Amber VOC Vial - Sulfuric Acid (EP080)		08-Jun-2017	06-Jul-2017	22-Jun-2017	✗	06-Jul-2017	22-Jun-2017	✗
TBW571 (TB),	TBW573_080617							
Amber VOC Vial - Sulfuric Acid (EP080)		30-Jun-2017	07-Jul-2017	14-Jul-2017	✓	07-Jul-2017	14-Jul-2017	✓
MW010_300617, MW013_300617, MW09_300617, MW19A_300617, MW19C_300617, MW05_300617, MW08_300617, MW018_300617, MW07_300617, WQA02_300617, WQA05_300617	MW011_300617, MW012_300617, MW02_300617, MW19B_300617, MW06_300617, MW020_300617, MW021_300617, MW015_300617, WQA01_300617, WQA03_300617,							
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE (no PTFE) (EP231X)		01-Jul-2017	----	----	----	09-Jul-2017	28-Dec-2017	✓
MW017_010717, MW04_010717, MW03_010717, SEDQA03_010717, WQA08_010717,	MW016_010717, MW014_010717, MW01_010717, WQA07_010717, WQA09_010717							
HDPE (no PTFE) (EP231X)		30-Jun-2017	----	----	----	09-Jul-2017	27-Dec-2017	✓
MW010_300617, MW013_300617, MW09_300617, MW19A_300617, MW19C_300617, MW05_300617, MW08_300617, MW018_300617, MW07_300617, WQA02_300617, WQA05_300617	MW011_300617, MW012_300617, MW02_300617, MW19B_300617, MW06_300617, MW020_300617, MW021_300617, MW015_300617, WQA01_300617, WQA03_300617,							

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

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE (no PTFE) (EP231X) MW017_010717, MW04_010717, MW03_010717, SEDQA03_010717, WQA08_010717,	MW016_010717, MW014_010717, MW01_010717, WQA07_010717, WQA09_010717	01-Jul-2017	----	----	----	09-Jul-2017	28-Dec-2017	✓
HDPE (no PTFE) (EP231X) MW010_300617, MW013_300617, MW09_300617, MW19A_300617, MW19C_300617, MW05_300617, MW08_300617, MW018_300617, MW07_300617, WQA02_300617, WQA05_300617	MW011_300617, MW012_300617, MW02_300617, MW19B_300617, MW06_300617, MW020_300617, MW021_300617, MW015_300617, WQA01_300617, WQA03_300617,	30-Jun-2017	----	----	----	09-Jul-2017	27-Dec-2017	✓
EP231C: Perfluoroalkyl Sulfonamides								
HDPE (no PTFE) (EP231X) MW017_010717, MW04_010717, MW03_010717, SEDQA03_010717, WQA08_010717,	MW016_010717, MW014_010717, MW01_010717, WQA07_010717, WQA09_010717	01-Jul-2017	----	----	----	09-Jul-2017	28-Dec-2017	✓
HDPE (no PTFE) (EP231X) MW010_300617, MW013_300617, MW09_300617, MW19A_300617, MW19C_300617, MW05_300617, MW08_300617, MW018_300617, MW07_300617, WQA02_300617, WQA05_300617	MW011_300617, MW012_300617, MW02_300617, MW19B_300617, MW06_300617, MW020_300617, MW021_300617, MW015_300617, WQA01_300617, WQA03_300617,	30-Jun-2017	----	----	----	09-Jul-2017	27-Dec-2017	✓



Matrix: **WATER**

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

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE (no PTFE) (EP231X) MW017_010717, MW04_010717, MW03_010717, SEDQA03_010717, WQA08_010717,	MW016_010717, MW014_010717, MW01_010717, WQA07_010717, WQA09_010717	01-Jul-2017	----	----	----	09-Jul-2017	28-Dec-2017	✔
HDPE (no PTFE) (EP231X) MW010_300617, MW013_300617, MW09_300617, MW19A_300617, MW19C_300617, MW05_300617, MW08_300617, MW018_300617, MW07_300617, WQA02_300617, WQA05_300617	MW011_300617, MW012_300617, MW02_300617, MW19B_300617, MW06_300617, MW020_300617, MW021_300617, MW015_300617, WQA01_300617, WQA03_300617,	30-Jun-2017	----	----	----	09-Jul-2017	27-Dec-2017	✔
EP231P: PFAS Sums								
HDPE (no PTFE) (EP231X) MW017_010717, MW04_010717, MW03_010717, SEDQA03_010717, WQA08_010717,	MW016_010717, MW014_010717, MW01_010717, WQA07_010717, WQA09_010717	01-Jul-2017	----	----	----	09-Jul-2017	28-Dec-2017	✔
HDPE (no PTFE) (EP231X) MW010_300617, MW013_300617, MW09_300617, MW19A_300617, MW19C_300617, MW05_300617, MW08_300617, MW018_300617, MW07_300617, WQA02_300617, WQA05_300617	MW011_300617, MW012_300617, MW02_300617, MW19B_300617, MW06_300617, MW020_300617, MW021_300617, MW015_300617, WQA01_300617, WQA03_300617,	30-Jun-2017	----	----	----	09-Jul-2017	27-Dec-2017	✔



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Moisture Content	EA055	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	15	13.33	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	18	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	19	10.53	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	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	5.26	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	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	5.26	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	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	5.26	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	4	34	11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	45	4.44	10.00	✗	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	5	42	11.90	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	34	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	3	45	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	3	42	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	34	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	3	45	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	3	42	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	34	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	45	2.22	5.00	✗	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	3	42	7.14	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.

QUALITY CONTROL REPORT

Work Order	: EP1707076	Page	: 1 of 21
Client	: AECOM Australia Pty Ltd	Laboratory	: Environmental Division Perth
Contact	: [REDACTED]	Contact	: [REDACTED]
Address	: LEVEL 6 3 FORREST PLACE PERTH WA, AUSTRALIA 6849	Address	: 10 Hod Way Malaga WA Australia 6090
Telephone	: ----	Telephone	: +61-8-9209 7655
Project	: Karratha Airport Limited Investigation - GME	Date Samples Received	: 04-Jul-2017
Order number	: 60543717	Date Analysis Commenced	: 05-Jul-2017
C-O-C number	: ----	Issue Date	: 13-Jul-2017
Sampler	: [REDACTED]		
Site	: ----		
Quote number	: EP/541/17		
No. of samples received	: 42		
No. of samples analysed	: 42		



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]	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
[REDACTED]	Organic Coordinator	Sydney Organics, Smithfield, NSW
[REDACTED]	Organic Chemist	Perth Organics, Malaga, WA
[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**

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: 984406)									
EP1707075-031	Anonymous	EA055: Moisture Content	----	1	%	15.9	15.7	1.43	0% - 50%
EP1707076-031	SEDQA01_010717	EA055: Moisture Content	----	1	%	23.2	23.7	2.30	0% - 20%
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 981441)									
EP1707039-016	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
EP1707076-025	SED02_010717	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
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 981504)									
EP1707039-016	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EP1707076-025	SED02_010717	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 981441)									
EP1707039-016	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
EP1707076-025	SED02_010717	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
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 981504)									
EP1707039-016	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EP1707076-025	SED02_010717	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EP080: BTEXN (QC Lot: 981504)									
EP1707039-016	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	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: 981504) - continued									
EP1707039-016	Anonymous	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
		EP1707076-025	SED02_010717	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2
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	
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 982304)									
EP1707075-029	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	0.0005	0.0005	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	0.0003	0.0004	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	0.0045	0.0039	13.7	0% - 20%
		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	0.0174	0.0163	6.77	0% - 20%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
EP1707076-028	SED05_300617	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	0.0004	0.0004	24.8	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	0.0034	0.0037	10.2	0% - 50%
		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: 982304)									
EP1707075-029	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	0.0006	0.0006	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 (PFTTrDA)	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
		EP1707076-028	SED05_300617	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002
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: 982304) - continued									
EP1707076-028	SED05_300617	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 (PFTTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTTeDA)	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: 982304)									
EP1707075-029	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
EP1707076-028	SED05_300617	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: 982304)									
EP1707075-029	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: 982304) - continued									
EP1707075-029	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
EP1707076-028	SED05_300617	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
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: 980733)									
EP1707076-001	MW010_300617	EP071: C15 - C28 Fraction	----	100	µg/L	260	290	9.32	No Limit
		EP071: C10 - C14 Fraction	----	50	µg/L	50	60	0.00	No Limit
		EP071: C29 - C36 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
EP1707076-019	MW016_010717	EP071: C15 - C28 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
		EP071: C29 - C36 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 981178)									
EP1707076-041	TBW571 (TB)	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 982085)									
EP1707076-001	MW010_300617	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP1707076-011	MW05_300617	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 982086)									
EP1707075-024	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP1707076-022	MW03_010717	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 980733)									
EP1707076-001	MW010_300617	EP071: >C10 - C16 Fraction	----	100	µg/L	100	120	13.2	No Limit
		EP071: >C16 - C34 Fraction	----	100	µg/L	220	230	8.44	No Limit
		EP071: >C34 - C40 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
EP1707076-019	MW016_010717	EP071: >C10 - C16 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C16 - C34 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 981178)									
EP1707076-041	TBW571 (TB)	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: 982085)									



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 Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 982085) - continued									
EP1707076-001	MW010_300617	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP1707076-011	MW05_300617	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: 982086)									
EP1707075-024	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP1707076-022	MW03_010717	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 981178)									
EP1707076-041	TBW571 (TB)	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	2	µg/L	<2	<2	0.00	No Limit
			106-42-3						
		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: 982085)									
EP1707076-001	MW010_300617	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	2	µg/L	<2	<2	0.00	No Limit
			106-42-3						
		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
EP1707076-011	MW05_300617	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	2	µg/L	<2	<2	0.00	No Limit
			106-42-3						
		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: 982086)									
EP1707075-024	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	2	µg/L	<2	<2	0.00	No Limit
			106-42-3						
		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
EP1707076-022	MW03_010717	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



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: BTEXN (QC Lot: 982086) - continued									
EP1707076-022	MW03_010717	EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	<2	0.00	No Limit
			106-42-3						
		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: 982341)									
EP1707076-006	MW02_300617	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	47.5	52.1	9.32	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	4.33	3.95	9.18	0% - 20%
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	2.98	3.02	1.50	0% - 20%
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	44.4	39.8	11.1	0% - 20%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	1.63	1.52	6.72	0% - 20%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	0.12	0.13	9.45	No Limit
EP1707076-011	MW05_300617	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.08	0.06	22.2	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.05	<0.05	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 982342)									
EP1707039-083	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
EP1707076-037	WQA05_300617	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	27.4	23.2	16.6	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.67	0.75	10.4	0% - 20%
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.81	0.92	12.1	0% - 20%
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	7.51	8.75	15.2	0% - 20%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	0.36	0.42	14.7	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: 982341)									
EP1707076-006	MW02_300617	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	3.99	4.04	1.24	0% - 20%
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	2.23	2.14	4.44	0% - 20%
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	10.4	9.74	6.26	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	1.67	1.59	4.84	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	0.05	0.05	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 (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 982341) - continued									
EP1707076-006	MW02_300617	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	1.0	1.0	0.00	0% - 50%
EP1707076-011	MW05_300617	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.12	<0.12	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.2	<0.2	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 982342)									
EP1707039-083	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
EP1707076-037	WQA05_300617	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.48	0.55	13.2	0% - 20%
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.31	0.35	13.3	0% - 50%
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	1.74	1.93	10.1	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.23	0.26	15.0	0% - 50%
		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: 982341)									
EP1707076-006	MW02_300617	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	2.02	2.13	5.36	0% - 20%
		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**

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: 982341) - continued									
EP1707076-006	MW02_300617	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
EP1707076-011	MW05_300617	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.12	<0.12	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.12	<0.12	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.12	<0.12	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.12	<0.12	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 982342)									
EP1707039-083	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	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
EP1707076-037	WQA05_300617	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	0.06	0.08	29.4	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**

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: 982342) - continued									
EP1707076-037	WQA05_300617	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: 982341)									
EP1707076-006	MW02_300617	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	1.92	1.81	5.42	0% - 20%
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	1.79	1.73	3.07	0% - 20%
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP1707076-011	MW05_300617	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
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 982342)									
EP1707039-083	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
EP1707076-037	WQA05_300617	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

Page : 11 of 21
 Work Order : EP1707076
 Client : AECOM Australia Pty Ltd
 Project : Karratha Airport Limited Investigation - GME



Sub-Matrix: **WATER**

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 (%)
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 982342) - continued									
EP1707076-037	WQA05_300617	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: 982341)									
EP1707076-006	MW02_300617	EP231X: Sum of PFAS	----	0.01	µg/L	126	125	1.03	0% - 20%
EP1707076-011	MW05_300617	EP231X: Sum of PFAS	----	0.01	µg/L	0.08	0.06	28.6	No Limit
EP231P: PFAS Sums (QC Lot: 982342)									
EP1707039-083	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.00	No Limit
EP1707076-037	WQA05_300617	EP231X: Sum of PFAS	----	0.01	µg/L	39.6	37.2	6.14	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**

Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP080/071: Total Petroleum Hydrocarbons (QCLot: 981441)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	200 mg/kg	99.1	75	129
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	300 mg/kg	101	77	131
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	200 mg/kg	104	71	129
EP080/071: Total Petroleum Hydrocarbons (QCLot: 981504)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	108	68	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 981441)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	250 mg/kg	98.8	77	125
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	350 mg/kg	108	74	138
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	150 mg/kg	93.1	63	131
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 981504)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	104	68	128
EP080: BTEXN (QCLot: 981504)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	101	62	116
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	99.8	67	121
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	101	65	117
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	2 mg/kg	102	66	118
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	104	68	120
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	107	63	119
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 982304)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	93.8	57	121
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	79.6	55	125
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	115	52	126
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	78.2	54	123
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	92.1	55	127
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	91.8	54	125
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 982304)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	91.5	52	128
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	85.0	54	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	85.7	58	127
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	94.9	57	128
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	96.5	60	134
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	113	63	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	111	55	130



Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 982304) - continued								
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	125	62	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	102	53	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	110	49	129
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	94.6	59	129
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 982304)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	96.5	52	132
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	101	65	126
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	83.5	64	126
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	95.1	63	124
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	81.5	58	125
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	96.3	61	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	68.1	55	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 982304)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	95.3	54	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	99.6	61	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	116	62	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	108	60	130

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP080/071: Total Petroleum Hydrocarbons (QCLot: 980732)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	400 µg/L	69.3	35	95
EP071: C15 - C28 Fraction	----	100	µg/L	<100	400 µg/L	91.5	34	111
EP071: C29 - C36 Fraction	----	50	µg/L	<50	400 µg/L	57.3	34	105
EP080/071: Total Petroleum Hydrocarbons (QCLot: 980733)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	400 µg/L	61.3	35	95
EP071: C15 - C28 Fraction	----	100	µg/L	<100	400 µg/L	90.6	34	111
EP071: C29 - C36 Fraction	----	50	µg/L	<50	400 µg/L	69.2	34	105
EP080/071: Total Petroleum Hydrocarbons (QCLot: 980734)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	400 µg/L	66.7	35	95
EP071: C15 - C28 Fraction	----	100	µg/L	<100	400 µg/L	99.1	34	111
EP071: C29 - C36 Fraction	----	50	µg/L	<50	400 µg/L	88.3	34	105
EP080/071: Total Petroleum Hydrocarbons (QCLot: 981178)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	360 µg/L	89.8	67	127



Sub-Matrix: **WATER**

Method: Compound				Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
						LCS	Low	High
CAS Number	LOR	Unit						
EP080/071: Total Petroleum Hydrocarbons (QCLot: 982085)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	360 µg/L	88.0	67	127
EP080/071: Total Petroleum Hydrocarbons (QCLot: 982086)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	360 µg/L	99.0	67	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 980732)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	400 µg/L	74.9	37	99
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	600 µg/L	79.8	35	108
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	200 µg/L	24.7	11	117
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 980733)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	400 µg/L	67.8	37	99
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	600 µg/L	86.4	35	108
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	200 µg/L	44.8	11	117
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 980734)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	400 µg/L	71.2	37	99
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	600 µg/L	102	35	108
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	200 µg/L	61.3	11	117
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 981178)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	450 µg/L	89.7	65	125
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 982085)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	450 µg/L	86.0	65	125
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 982086)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	450 µg/L	98.4	65	125
EP080: BTEXN (QCLot: 981178)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	95.3	76	120
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	95.4	76	124
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	93.1	72	124
EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	40 µg/L	93.2	72	130
	106-42-3							
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	93.8	78	128
EP080: Naphthalene	91-20-3	5	µg/L	<5	5 µg/L	98.6	71	129
EP080: BTEXN (QCLot: 982085)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	86.1	76	120
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	109	76	124
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	103	72	124
EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	40 µg/L	106	72	130
	106-42-3							
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	107	78	128
EP080: Naphthalene	91-20-3	5	µg/L	<5	5 µg/L	97.6	71	129



Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result			Low	High
EP080: BTEXN (QCLot: 982086)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	102	76	120
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	96.6	76	124
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	109	72	124
EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	40 µg/L	112	72	130
	106-42-3							
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	118	78	128
EP080: Naphthalene	91-20-3	5	µg/L	<5	5 µg/L	114	71	129
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 982341)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.5 µg/L	99.8	70	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.5 µg/L	106	70	130
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.5 µg/L	120	70	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.5 µg/L	111	70	130
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.5 µg/L	115	70	130
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.5 µg/L	109	70	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 982342)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.5 µg/L	127	70	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.5 µg/L	128	70	130
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.5 µg/L	109	70	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.5 µg/L	130	70	130
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.5 µg/L	125	70	130
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.5 µg/L	108	70	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 982341)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	2.5 µg/L	84.7	70	130
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.5 µg/L	104	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	108	70	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.5 µg/L	113	70	130
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.5 µg/L	106	70	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.5 µg/L	107	70	130
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	105	70	130
EP231X: Perfluorotridecanoic acid (PFTriDA)	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	119	70	150
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 982342)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	2.5 µg/L	97.5	70	130
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.5 µg/L	125	70	130
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.5 µg/L	127	70	130
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.5 µg/L	124	70	130



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 982342) - continued								
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.5 µg/L	130	70	130
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.5 µg/L	129	70	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.5 µg/L	111	70	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.5 µg/L	123	70	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.5 µg/L	123	70	130
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.5 µg/L	94.0	70	130
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	1.25 µg/L	84.8	70	150
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 982341)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.5 µg/L	111	70	130
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	1.25 µg/L	103	70	150
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	1.25 µg/L	107	70	150
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.05	1.25 µg/L	109	70	150
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	1.25 µg/L	97.9	70	150
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.5 µg/L	103	70	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.5 µg/L	111	70	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 982342)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.5 µg/L	108	70	130
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	1.25 µg/L	97.9	70	150
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	1.25 µg/L	106	70	150
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.05	1.25 µg/L	105	70	150
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	1.25 µg/L	80.0	70	150
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.5 µg/L	93.4	70	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.5 µg/L	104	70	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 982341)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.5 µg/L	108	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	111	70	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.5 µg/L	107	70	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 982342)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.5 µg/L	128	70	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.5 µg/L	124	70	130



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 982342) - continued								
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.5 µg/L	96.8	70	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.5 µg/L	104	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**

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: 981441)							
EP1707039-016	Anonymous	EP071: C10 - C14 Fraction	----	523 mg/kg	94.9	73	137
		EP071: C15 - C28 Fraction	----	2319 mg/kg	107	53	131
		EP071: C29 - C36 Fraction	----	1714 mg/kg	122	52	132
EP080/071: Total Petroleum Hydrocarbons (QCLot: 981504)							
EP1707039-016	Anonymous	EP080: C6 - C9 Fraction	----	32.5 mg/kg	106	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 981441)							
EP1707039-016	Anonymous	EP071: >C10 - C16 Fraction	----	860 mg/kg	100	73	137
		EP071: >C16 - C34 Fraction	----	3223 mg/kg	106	53	131
		EP071: >C34 - C40 Fraction	----	1058 mg/kg	112	52	132
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 981504)							
EP1707039-016	Anonymous	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	107	70	130
EP080: BTEXN (QCLot: 981504)							
EP1707039-016	Anonymous	EP080: Benzene	71-43-2	2.5 mg/kg	94.7	70	130
		EP080: Toluene	108-88-3	2.5 mg/kg	97.0	70	130
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	98.1	70	130
		EP080: meta- & para-Xylene	108-38-3	2.5 mg/kg	99.0	70	130
			106-42-3				
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	99.1	70	130
	EP080: Naphthalene	91-20-3	2.5 mg/kg	104	70	130	
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 982304)							
EP1707075-029	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	89.5	50	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	108	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	85.8	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	96.8	50	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	# Not Determined	50	130



Sub-Matrix: **SOIL**

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: 982304) - continued							
EP1707075-029	Anonymous	EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	106	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 982304)							
EP1707075-029	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	117	30	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	90.8	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	111	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	110	50	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	120	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	127	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	122	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	116	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	98.9	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	118	30	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	102	30	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 982304)							
EP1707075-029	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	120	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	116	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	48.6	30	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.00312 mg/kg	118	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	50.4	30	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	106	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	102	30	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 982304)							
EP1707075-029	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	115	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	121	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	124	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	108	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: 980733)							
EP1707076-007	MW19A_300617	EP071: C10 - C14 Fraction	----	400 µg/L	73.8	45	122
		EP071: C15 - C28 Fraction	----	400 µg/L	100	55	143
		EP071: C29 - C36 Fraction	----	400 µg/L	79.8	54	128



Sub-Matrix: **WATER**

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: 981178)							
EP1707076-042	TBW573_080617	EP080: C6 - C9 Fraction	----	280 µg/L	78.1	43	125
EP080/071: Total Petroleum Hydrocarbons (QCLot: 982085)							
EP1707076-002	MW011_300617	EP080: C6 - C9 Fraction	----	280 µg/L	116	43	125
EP080/071: Total Petroleum Hydrocarbons (QCLot: 982086)							
EP1707075-025	Anonymous	EP080: C6 - C9 Fraction	----	280 µg/L	87.1	43	125
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 980733)							
EP1707076-007	MW19A_300617	EP071: >C10 - C16 Fraction	----	400 µg/L	79.0	45	122
		EP071: >C16 - C34 Fraction	----	600 µg/L	95.9	55	143
		EP071: >C34 - C40 Fraction	----	200 µg/L	59.8	54	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 981178)							
EP1707076-042	TBW573_080617	EP080: C6 - C10 Fraction	C6_C10	330 µg/L	76.6	44	122
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 982085)							
EP1707076-002	MW011_300617	EP080: C6 - C10 Fraction	C6_C10	330 µg/L	116	44	122
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 982086)							
EP1707075-025	Anonymous	EP080: C6 - C10 Fraction	C6_C10	330 µg/L	89.9	44	122
EP080: BTEXN (QCLot: 981178)							
EP1707076-042	TBW573_080617	EP080: Benzene	71-43-2	20 µg/L	103	68	130
		EP080: Toluene	108-88-3	20 µg/L	102	72	132
EP080: BTEXN (QCLot: 982085)							
EP1707076-002	MW011_300617	EP080: Benzene	71-43-2	20 µg/L	120	68	130
		EP080: Toluene	108-88-3	20 µg/L	131	72	132
EP080: BTEXN (QCLot: 982086)							
EP1707075-025	Anonymous	EP080: Benzene	71-43-2	20 µg/L	107	68	130
		EP080: Toluene	108-88-3	20 µg/L	105	72	132
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 982341)							
EP1707076-006	MW02_300617	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	105	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	74.6	50	130



Sub-Matrix: **WATER**

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: 982342)							
EP1707039-083	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.5 µg/L	126	50	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.5 µg/L	123	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.5 µg/L	122	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.5 µg/L	114	50	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.5 µg/L	116	50	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.5 µg/L	118	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 982341)							
EP1707076-006	MW02_300617	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	2.5 µg/L	77.2	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	91.8	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	67.6	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.5 µg/L	83.2	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.5 µg/L	52.0	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.5 µg/L	55.8	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.5 µg/L	97.0	50	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	1.25 µg/L	96.1	50	150
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 982342)							
EP1707039-083	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	2.5 µg/L	108	50	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.5 µg/L	121	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.5 µg/L	124	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.5 µg/L	121	50	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.5 µg/L	119	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.5 µg/L	126	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.5 µg/L	128	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.5 µg/L	122	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.5 µg/L	115	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.5 µg/L	127	50	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	1.25 µg/L	140	50	150
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 982341)							
EP1707076-006	MW02_300617	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.5 µg/L	# Not Determined	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	1.25 µg/L	70.4	50	150
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	1.25 µg/L	86.0	50	150



Sub-Matrix: **WATER**

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: 982341) - continued							
EP1707076-006	MW02_300617	EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	1.25 µg/L	67.1	50	150
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	1.25 µg/L	76.4	50	150
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.5 µg/L	62.0	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.5 µg/L	64.0	50	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 982342)							
EP1707039-083	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.5 µg/L	122	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	1.25 µg/L	120	50	150
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	1.25 µg/L	122	50	150
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	1.25 µg/L	126	50	150
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	1.25 µg/L	117	50	150
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.5 µg/L	120	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.5 µg/L	119	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 982341)							
EP1707076-006	MW02_300617	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.5 µg/L	111	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.5 µg/L	79.0	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.5 µg/L	66.6	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.5 µg/L	83.0	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 982342)							
EP1707039-083	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.5 µg/L	123	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.5 µg/L	95.8	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.5 µg/L	122	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.5 µg/L	92.6	50	130



CON NOTE: TOLL
IPEC 8961537900

AECOM

CHAIN OF CUSTODY

CLIENT: AECOM Services Pty Ltd.	TURNAROUND REQUIREMENTS:	Standard TAT (List due date):	FOR LABORATORY USE ONLY (Circle)
OFFICE: Level 6, 3 Forrest Place, Perth, WA, 6000			Custody Seal Intact?
PROJECT: Karratha Airport Limited Investigation - GME	Project Number: 60543717	ALS QUOTE NO.:	Free ice / frozen ice bricks present upon receipt?
Purchase Order NO.: 60543717	QUOTE NO.: EN / 004 / 16	COUNTRY OF ORIGIN: Australia	COC SEQUENCE NUMBER (Circle)
PROJECT MANAGER:	CONTACT PERSON:	COC:	Random Sample Temperature on Receipt:
SAMPLER:	SAMPLER M:	OF:	
COC Emailed to ALS? YES	EDD FORMAT (or default): Esdat	RELINQUISHED BY:	
Email Reports to:		DATE/TIME:	
Email Invoice to (will default to PM if no other addresses are listed): AECOM Accounts			

PLEASE FORWARD THE FOLLOWING SAMPLES TO EUROFINS LABORATORIES: WQA04_300617, WQA06_300617, and WQA010_010717 (TRIPLICATE MW01) for analysis of ER231 (DER recommended PFAS suite)

LAB ID	Area	SAMPLE ID	DATE	TIME	MATRIX	TOTAL BOTTLES	EP231 (DER recommended PFAS suite)	W-4 TPH/ TRH (C6 - C36 or 40)/ BTEXN plus F1, F2	S-18/ W-18 TPH/ TRH (C6 - C36 or 40)/ BTEXN plus F1, F2	ON HOLD	Comments
1	APEC 3	MW010_300617	30.06.17		Groundwater	6	X	X			1 EXTRA AMBER & 1 PLASTIC GREY (PFOS)
2	APEC 3	MW011_300617	30.06.17		Groundwater	4	X	X			
3	APEC 3	MW013_300617	30.06.17		Groundwater	4	X	X			
4	APEC 3	MW012_300617	30.06.17		Groundwater	4	X	X			
5	APEC 3	MW09_300617	30.06.17		Groundwater	4	X	X			
6	APEC 1 - OFFSITE TO EAST	MW02_300617	30.06.17		Groundwater	4	X	X			
7	APEC 2	MW19A_300617	30.06.17		Groundwater	6	X	X			1 EXTRA AMBER & 1 PLASTIC GREY (PFOS)
8	APEC 2	MW19B_300617	30.06.17		Groundwater	4	X	X			
9	APEC 2	MW19C_300617	30.06.17		Groundwater	4	X	X			
10	APEC 2	MW05_300617	30.06.17		Groundwater	4	X	X			
11	APEC 2	MW05_300617	30.06.17		Groundwater	4	X	X			
12	APEC 2	MW020_300617	30.06.17		Groundwater	4	X	X			
13	APEC 2	MW08_300617	30.06.17		Groundwater	4	X	X			
14	APEC 2	MW021_300617	30.06.17		Groundwater	4	X	X			
15	APEC 2	MW018_300617	30.06.17		Groundwater	4	X	X			
16	OFFSITE TO NORTH NEAR WWTP	MW015_300617	30.06.17		Groundwater	4	X	X			
17	APEC 2 OFFSITE TO NORTH	MW07_300617	30.06.17		Groundwater	4	X	X			
18	APEC 2 OFFSITE TO SOUTH	MW017_010717	01.07.17		Groundwater	4	X	X			
19	APEC 2 OFFSITE TO SOUTH	MW016_010717	01.07.17		Groundwater	6	X	X			1 EXTRA AMBER & 1 PLASTIC GREY (PFOS)
20	APEC 2 OFFSITE TO SOUTH	MW04_010717	01.07.17		Groundwater	4	X	X			
21	APEC 1	MW014_010717	01.07.17		Groundwater	4	X	X			
22	APEC 1	MW03_010717	01.07.17		Groundwater	4	X	X			
23	APEC 1	MW01_010717	01.07.17		Groundwater	4	X	X			
24	APEC 3	SED01_010717	01.07.17		Sediment	1	X	X			
25	APEC 3	SED02_010717	01.07.17		Sediment	1	X	X			
26	APEC 3	SED03_010717	01.07.17		Sediment	1	X	X			
27	APEC 1	SED04_010717	01.07.17		Sediment	1	X	X			
28	OFFSITE NEAR WWTP TO NORTH	SED05_300617	30.06.17		Sediment	1	X	X			
29	APEC 1	SED06_010717	01.07.17		Sediment	1	X	X			
30	OFFSITE TO WEST	SED07_010717	01.07.17		Sediment	2	X	X			
31	QAQC	SED0A01_010717	01.07.17		Sediment	1	X	X			
32	QAQC	SED0A02_010717	01.07.17		Sediment	1	X	X			
33	QAQC	SED0A03_010717	01.07.17		Water	4	X	X			
34	QAQC	WQA01_300617	30.06.17		Groundwater	4	X	X			
35	QAQC	WQA02_300617	30.06.17		Groundwater	4	X	X			
36	QAQC	WQA03_300617	30.06.17		Groundwater	4	X	X			
37	QAQC	WQA04_300617	30.06.17		Groundwater	4	X	X			FORWARD TO EUROFINS
38	QAQC	WQA05_300617	30.06.17		Groundwater	4	X	X			FORWARD TO EUROFINS
39	QAQC	WQA06_300617	30.06.17		Groundwater	4	X	X			
40	QAQC	WQA07_010717	01.07.17		Groundwater	4	X	X			
41	QAQC	WQA08_010717	01.07.17		Groundwater	4	X	X			
42	QAQC	WQA09_010717	01.07.17		Groundwater	4	X	X			
43	QAQC	WQA010_010717	01.07.17		Groundwater	4	X	X			FORWARD TO EUROFINS
44	QAQC	TBW571 (TB)	08.06.17		Groundwater	1		X			
45	QAQC	TBW573_080617	08.06.17		Water	1		X			

☒	CN	HD	# CON	POST CODE
AP	CR		NOTES	MAS

cam
5/7/17

11.6
a.2
10.4
/ 10.4

SEALED
NO ICE, BUT KEPT
REFRIGERATED
COURIER
127. 4 JUL '17 15:41

16.4
16.1
16.3

- 0.0

16.27

Sample Receipt Advice

Company name: **AECOM Aust Pty Ltd Perth**
Contact name: [REDACTED]
Project name: **KARRATHA AIRPORT LIMITED INVESTIGATION_GME**
Project ID: **60543717.2.3**
COC number: **Not provided**
Turn around time: **5 Day**
Date/Time received: **Jul 5, 2017 9:00 AM**
Eurofins | mgt reference: **552886**

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 : 10.4 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] on Phone : or by e.mail: [REDACTED]

Results will be delivered electronically via e.mail to [REDACTED].

Certificate of Analysis

AECOM Aust Pty Ltd Perth
Level 4, 3 Forrest Place
Perth
WA 6000



NATA Accredited
Accreditation Number 1261
Site Number 20794

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:

Report 552886-W
Project name KARRATHA AIRPORT LIMITED INVESTIGATION_GME
Project ID 60543717.2.3
Received Date Jul 05, 2017

Client Sample ID			WQA04_30061 7	WQA06_30061 7	WQA010_0107 17
Sample Matrix			Water	Water	Water
Eurofins mgt Sample No.			B17-JI03878	B17-JI03879	B17-JI03880
Date Sampled			Jun 30, 2017	Jun 30, 2017	Jul 01, 2017
Test/Reference	LOR	Unit			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions					
TRH C6-C9	0.02	mg/L	< 0.02	< 0.02	< 0.02
TRH C10-C14	0.05	mg/L	< 0.05	< 0.05	< 0.05
TRH C15-C28	0.1	mg/L	< 0.1	< 0.1	< 0.1
TRH C29-C36	0.1	mg/L	< 0.1	< 0.1	< 0.1
TRH C10-36 (Total)	0.1	mg/L	< 0.1	< 0.1	< 0.1
BTEX					
Benzene	0.001	mg/L	< 0.001	< 0.001	< 0.001
Toluene	0.001	mg/L	< 0.001	< 0.001	< 0.001
Ethylbenzene	0.001	mg/L	< 0.001	< 0.001	< 0.001
m&p-Xylenes	0.002	mg/L	< 0.002	< 0.002	< 0.002
o-Xylene	0.001	mg/L	< 0.001	< 0.001	< 0.001
Xylenes - Total	0.003	mg/L	< 0.003	< 0.003	< 0.003
4-Bromofluorobenzene (surr.)	1	%	99	99	98
Total Recoverable Hydrocarbons - 2013 NEPM Fractions					
Naphthalene ^{N02}	0.01	mg/L	< 0.01	< 0.01	< 0.01
TRH C6-C10 less BTEX (F1) ^{N04}	0.02	mg/L	< 0.02	< 0.02	< 0.02
TRH C6-C10	0.02	mg/L	< 0.02	< 0.02	< 0.02
TRH >C10-C16	0.05	mg/L	< 0.05	< 0.05	< 0.05
TRH >C10-C16 less Naphthalene (F2) ^{N01}	0.05	mg/L	< 0.05	< 0.05	< 0.05
TRH >C16-C34	0.1	mg/L	< 0.1	< 0.1	< 0.1
TRH >C34-C40	0.1	mg/L	< 0.1	< 0.1	< 0.1
Perfluoroalkyl carboxylic acids (PFCAs)					
Comments			G01		G01
Perfluorobutanoic acid (PFBA)	0.05	ug/L	200	0.12	77
Perfluoropentanoic acid (PFPeA)	0.01	ug/L	^{N09} 260	^{N09} 0.24	^{N09} 140
Perfluorohexanoic acid (PFHxA)	0.01	ug/L	^{N09} 1300	^{N09} 1.5	^{N09} 690
Perfluoroheptanoic acid (PFHpA)	0.01	ug/L	^{N09} 130	^{N09} 0.14	^{N09} 46
Perfluorooctanoic acid (PFOA)	0.01	ug/L	^{N09} 220	^{N09} 0.32	^{N09} 75
Perfluorononanoic acid (PFNA)	0.01	ug/L	< 10	< 0.01	< 5
Perfluorodecanoic acid (PFDA)	0.01	ug/L	< 10	< 0.01	< 5
Perfluoroundecanoic acid (PFUnA)	0.01	ug/L	< 10	< 0.01	< 5
Perfluorododecanoic acid (PFDoA)	0.01	ug/L	< 10	< 0.01	< 5
Perfluorotridecanoic acid (PFTeDA)	0.01	ug/L	< 10	< 0.01	< 5
Perfluorotetradecanoic acid (PFTeDA)	0.01	ug/L	< 10	< 0.01	< 5
13C4-PFBA (surr.)	1	%	67	91	41

Client Sample ID			WQA04_300617	WQA06_300617	WQA010_010717
Sample Matrix			Water	Water	Water
Eurofins mgt Sample No.			B17-JI03878	B17-JI03879	B17-JI03880
Date Sampled			Jun 30, 2017	Jun 30, 2017	Jul 01, 2017
Test/Reference	LOR	Unit			
Perfluoroalkyl carboxylic acids (PFCAs)					
13C5-PFPeA (surr.)	1	%	68	100	45
13C5-PFHxA (surr.)	1	%	66	92	52
13C4-PFHpA (surr.)	1	%	67	101	55
13C8-PFOA (surr.)	1	%	70	96	58
13C5-PFNA (surr.)	1	%	70	77	59
13C6-PFDA (surr.)	1	%	77	54	60
13C2-PFUnDA (surr.)	1	%	102	58	74
13C2-PFDoDA (surr.)	1	%	126	58	88
13C2-PFTeDA (surr.)	1	%	115	39	28
Perfluoroalkane sulfonamides (PFASAs)					
Comments			G01		G01
Perfluorooctane sulfonamide (FOSA)	0.05	ug/L	< 10	^{N09} < 0.05	< 5
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	0.05	ug/L	< 10	< 0.05	< 5
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	0.05	ug/L	< 10	< 0.05	< 5
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	0.05	ug/L	< 10	< 0.05	< 5
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	0.05	ug/L	< 10	< 0.05	< 5
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	0.05	ug/L	< 10	< 0.05	< 5
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	0.05	ug/L	< 10	< 0.05	< 5
13C8-FOSA (surr.)	1	%	118	54	111
D3-N-MeFOSA (surr.)	1	%	111	49	96
D5-N-EtFOSA (surr.)	1	%	119	40	82
D7-N-MeFOSE (surr.)	1	%	118	49	91
D9-N-EtFOSE (surr.)	1	%	127	41	86
D5-N-EtFOSAA (surr.)	1	%	82	56	67
D3-N-MeFOSAA (surr.)	1	%	81	59	64
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSAAs)					
Comments			G01		G01
Perfluorobutanesulfonic acid (PFBS)	0.01	ug/L	^{N09} 550	^{N09} 0.42	^{N09} 230
Perfluoropentanesulfonic acid (PFPeS)	0.01	ug/L	^{N09} 520	^{N09} 0.46	^{N09} 210
Perfluorohexanesulfonic acid (PFHxS)	0.01	ug/L	^{N09} 2600	^{N09} 5.1	^{N09} 950
Perfluoroheptanesulfonic acid (PFHpS)	0.01	ug/L	^{N09} 280	^{N09} 0.25	^{N09} 86
Perfluorooctanesulfonic acid (PFOS) ^{N11}	0.01	ug/L	^{N09} 3600	^{N09} 22	^{N09} 1900
Perfluorodecanesulfonic acid (PFDS)	0.01	ug/L	< 10	< 0.01	< 5
13C3-PFBS (surr.)	1	%	80	102	66
18O2-PFHxS (surr.)	1	%	74	84	68
13C8-PFOS (surr.)	1	%	91	48	73
n:2 Fluorotelomer sulfonic acids					
Comments			G01		G01
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	0.01	ug/L	< 10	< 0.01	< 5
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	0.05	ug/L	320	< 0.05	34
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	0.01	ug/L	< 10	0.02	< 5
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)	0.01	ug/L	< 10	< 0.01	< 5
13C2-4:2 FTS (surr.)	1	%	16	80	11
13C2-6:2 FTS (surr.)	1	%	20	65	13
13C2-8:2 FTS (surr.)	1	%	36	48	25

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 - Method: LTM-ORG-2010 TRH C6-C36	Melbourne	Jul 07, 2017	7 Day
Total Recoverable Hydrocarbons - 2013 NEPM Fractions - Method: TRH C6-C40 - LTM-ORG-2010	Brisbane	Jul 05, 2017	7 Day
Total Recoverable Hydrocarbons - 2013 NEPM Fractions - Method: TRH C6-C40 - LTM-ORG-2010	Melbourne	Jul 07, 2017	7 Day
BTEX and Naphthalene			
BTEX - Method: TRH C6-C40 - LTM-ORG-2010	Brisbane	Jul 05, 2017	14 Day
Per- and Polyfluorinated Alkyl Substances (PFASs) - Trace			
Perfluoroalkyl carboxylic acids (PFCAs) - Method: LTM-ORG-2100 Per- and Polyfluorinated Alkyl Substances by LC-MS/MS	Brisbane	Jul 10, 2017	14 Day
Perfluoroalkane sulfonamides (PFASAs) - Method: LTM-ORG-2100 Per- and Polyfluorinated Alkyl Substances by LC-MS/MS	Brisbane	Jul 10, 2017	14 Day
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSAs) - Method: LTM-ORG-2100 Per- and Polyfluorinated Alkyl Substances by LC-MS/MS	Brisbane	Jul 10, 2017	14 Day
n:2 Fluorotelomer sulfonic acids - Method: LTM-ORG-2100 Per- and Polyfluorinated Alkyl Substances by LC-MS/MS	Brisbane	Jul 10, 2017	14 Day

Company Name: AECOM Aust Pty Ltd Perth
Address: Level 4, 3 Forrest Place
Perth
WA 6000

Project Name: KARRATHA AIRPORT LIMITED INVESTIGATION_GME
Project ID: 60543717.2.3

Order No.: 60543717
Report #: 552886
Phone: 08 6208 0000
Fax:

Received: Jul 5, 2017 9:00 AM
Due: Jul 12, 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	
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 18217								
External Laboratory								
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID			
1	WQA04_300617	Jun 30, 2017		Water	B17-JI03878	X	X	X
2	WQA06_300617	Jun 30, 2017		Water	B17-JI03879	X	X	X
3	WQA010_010717	Jul 01, 2017		Water	B17-JI03880	X	X	X
Test Counts						3	3	3

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 (PFTriDA)	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 (PFSAAs)							
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 C6-C9	%	92			70-130	Pass	
TRH C10-C14	%	88			70-130	Pass	
LCS - % Recovery							
BTEX							
Benzene	%	99			70-130	Pass	
Toluene	%	101			70-130	Pass	
Ethylbenzene	%	96			70-130	Pass	
m&p-Xylenes	%	92			70-130	Pass	
Xylenes - Total	%	92			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
TRH C6-C10	%	95			70-130	Pass	
TRH >C10-C16	%	82			70-130	Pass	
LCS - % Recovery							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	%	105			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	96			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	102			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	101			50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	100			50-150	Pass	
Perfluorononanoic acid (PFNA)	%	103			50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	103			50-150	Pass	
Perfluoroundecanoic acid (PFUnA)	%	96			50-150	Pass	
Perfluorododecanoic acid (PFDoA)	%	95			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	%	64			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	95			50-150	Pass	
LCS - % Recovery							
Perfluoroalkane sulfonamides (PFASAs)							
Perfluorooctane sulfonamide (FOSA)	%	97			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	%	97			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	%	98			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	%	101			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	%	87			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	%	96			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	%	93			50-150	Pass	
LCS - % Recovery							
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSAs)							
Perfluorobutanesulfonic acid (PFBS)	%	104			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	%	104			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	%	103			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	%	106			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	%	99			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	%	54			50-150	Pass	
LCS - % Recovery							
n:2 Fluorotelomer sulfonic acids							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	%	99			50-150	Pass	

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)			%	86			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)			%	99			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)			%	53			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	B17-JI03917	NCP	%	82			70-130	Pass	
TRH C10-C14	M17-JI04793	NCP	%	93			70-130	Pass	
Spike - % Recovery									
BTEX				Result 1					
Benzene	B17-JI03917	NCP	%	92			70-130	Pass	
Toluene	B17-JI03917	NCP	%	96			70-130	Pass	
Ethylbenzene	B17-JI03917	NCP	%	89			70-130	Pass	
m&p-Xylenes	B17-JI03917	NCP	%	86			70-130	Pass	
o-Xylene	B17-JI03917	NCP	%	85			70-130	Pass	
Xylenes - Total	B17-JI03917	NCP	%	86			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
TRH C6-C10	B17-JI03917	NCP	%	83			70-130	Pass	
TRH >C10-C16	M17-JI04793	NCP	%	90			70-130	Pass	
Spike - % Recovery									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1					
Perfluorobutanoic acid (PFBA)	M17-JI03442	NCP	%	97			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	M17-JI03442	NCP	%	95			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	M17-JI03442	NCP	%	95			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	M17-JI03442	NCP	%	97			50-150	Pass	
Perfluorooctanoic acid (PFOA)	M17-JI03442	NCP	%	97			50-150	Pass	
Perfluorononanoic acid (PFNA)	M17-JI03442	NCP	%	98			50-150	Pass	
Perfluorodecanoic acid (PFDA)	M17-JI03442	NCP	%	104			50-150	Pass	
Perfluoroundecanoic acid (PFUnA)	M17-JI03442	NCP	%	91			50-150	Pass	
Perfluorododecanoic acid (PFDoA)	M17-JI03442	NCP	%	98			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	M17-JI03442	NCP	%	76			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	M17-JI03442	NCP	%	95			50-150	Pass	
Spike - % Recovery									
Perfluoroalkane sulfonamides (PFASAs)				Result 1					
Perfluorooctane sulfonamide (FOSA)	M17-JI03442	NCP	%	90			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	M17-JI03442	NCP	%	91			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	M17-JI03442	NCP	%	97			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	M17-JI03442	NCP	%	102			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	M17-JI03442	NCP	%	90			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	M17-JI03442	NCP	%	92			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	M17-JI03442	NCP	%	90			50-150	Pass	
Spike - % Recovery									
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSAs)				Result 1					
Perfluorobutanesulfonic acid (PFBS)	M17-JI03442	NCP	%	100			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Perfluoropentanesulfonic acid (PFPeS)	M17-JI03442	NCP	%	100			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	M17-JI03442	NCP	%	96			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	M17-JI03442	NCP	%	101			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	M17-JI03442	NCP	%	93			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	M17-JI03442	NCP	%	71			50-150	Pass	
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids				Result 1					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	M17-JI03442	NCP	%	95			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	M17-JI03442	NCP	%	91			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	M17-JI03442	NCP	%	87			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)	M17-JI03442	NCP	%	68			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	B17-JI03916	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
TRH C15-C28	M17-JI04550	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH C29-C36	M17-JI04550	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	B17-JI03916	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Toluene	B17-JI03916	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Ethylbenzene	B17-JI03916	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
m&p-Xylenes	B17-JI03916	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
o-Xylene	B17-JI03916	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Xylenes - Total	B17-JI03916	NCP	mg/L	< 0.003	< 0.003	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	B17-JI03916	NCP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
TRH C6-C10	B17-JI03916	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
TRH >C10-C16	M17-JI04550	NCP	mg/L	0.81	1.1	33	30%	Fail	Q15
TRH >C16-C34	M17-JI04550	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH >C34-C40	M17-JI04550	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
Duplicate									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1	Result 2	RPD			
Perfluorobutanoic acid (PFBA)	B17-JI09265	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	B17-JI09265	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorohexanoic acid (PFHxA)	B17-JI09265	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	B17-JI09265	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	B17-JI09265	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorononanoic acid (PFNA)	B17-JI09265	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorodecanoic acid (PFDA)	B17-JI09265	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnA)	B17-JI09265	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorododecanoic acid (PFDoA)	B17-JI09265	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotridecanoic acid (PFTTrDA)	B17-JI09265	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	B17-JI09265	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	

Duplicate								
Perfluoroalkane sulfonamides (PFASAs)				Result 1	Result 2	RPD		
Perfluorooctane sulfonamide (FOSA)	B17-JI09265	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	B17-JI09265	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	B17-JI09265	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	B17-JI09265	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	B17-JI09265	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	B17-JI09265	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	B17-JI09265	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)	B17-JI09265	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoropentanesulfonic acid (PFPeS)	B17-JI09265	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorohexanesulfonic acid (PFHxS)	B17-JI09265	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoroheptanesulfonic acid (PFHpS)	B17-JI09265	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorooctanesulfonic acid (PFOS)	B17-JI09265	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorodecanesulfonic acid (PFDS)	B17-JI09265	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)	B17-JI09265	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	B17-JI09265	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	B17-JI09265	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)	B17-JI09265	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass

Comments

Some surrogate recoveries were recorded in excess of the QC limit designated in QSM 5.1 of 50-150%. Since no positive results were reported for any PFAS compounds for any of the Samples in this case no data was affected.

Sample Integrity

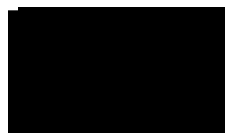
Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted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

Qualifier Codes/Comments

Code	Description
G01	The LORs have been raised due to matrix interference
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).
Q15	The RPD reported passes Eurofins mgt's QC - Acceptance Criteria as defined in the Internal Quality Control Review and Glossary page of this report.

Authorised By

	Analytical Services Manager
	Senior Analyst-Organic (VIC)
	Senior Analyst-Organic (QLD)
	Senior Analyst-Volatile (QLD)
	Senior Analyst-Organic (VIC)



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](#).

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