

Preliminary Site Investigation and Limited Sampling, Port Hedland Airport



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Acronyms

Acronym	Description
6:2 FtS	6:2 Fluorotelomer Sulfonate
ACM	Asbestos Containing Material
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
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
PSI	Preliminary Site Investigation
PFAS	Per- and Poly- fluoro alkyl substances
PFHxS	Perfluorohexane Sulfonate
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctane Sulfonate
PSI	Preliminary Site Investigation
SAQP	Sampling Analysis and Quality Plan
TPH	Total Petroleum Hydrocarbons
TRH	Total Recoverable Hydrocarbons
UST	Underground Storage Tank

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 necessarily focussed towards areas historically used for Aviation Rescue and Fire Fighting (ARFF) and for other firefighting activities at the Port Hedland 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:

- Airservices conducted ARFF related services and training activities from 1995 to 2003. Prior to that, previous Commonwealth agencies (e.g. Department of Aviation prior to 1986, Department of Transport and Communication between 1986 and 1988 and the Civil Aviation Authority from 1988 to July 1995) were understood to provide ARFF services at the Airport. Between 2003 and 2013 firefighting services to the Airport were provided by the Department of Fire and Emergency Services. In 2013, Airservices recommenced ARFF services at the Airport but PFAS-bearing AFFF products had been retired from use by this date.
- Fuels and AFFF were used at the Former Fire Training Ground (FFTG) during training exercises until at least 2003. Limited investigations of this area (for hydrocarbon contaminants only) were undertaken within a wider environmental audit commissioned by Airservices in 1996.
- Further environmental investigations of the FFTG have been conducted by others more recently and it is understood that the FFTG has been classified by the then Department of Environment Regulation (DER) as *“possibly contaminated – investigation required”*. However, this parcel of land is associated with a surrendered lease area and the responsibility for the condition of this area is now with others.
- AFFF was variously stored at the former, temporary and current ARFF fire stations, potentially at the former mechanical workshop and potentially at other airport areas managed by third parties.
- PFAS compounds have previously been detected in soil and sediment at near the former and temporary ARFF Fire Station facilities and in waste water discharging from these areas (SKM 2011, QED 2013). No other PFAS related site investigations are known to have been undertaken in other airport areas.

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 APEC:

- APEC 1: The Former and Temporary ARFF Fire Station area; and
- APEC 3: The Former Maintenance Workshop.

In addition to APEC 1 and APEC 3 and because no prior investigations have been conducted in these areas, the following areas are also been included within the scope of planned site investigations for completeness:

- APEC 2: The Current ARFF Fire Station; and
- Surface water drainage features located along the northeast Airport boundary (because airport drainage features represent a potentially important PFAS contaminant transport pathway).

While the FFTG is considered a potential source of PFAS contamination it has not been investigated as an APEC in the context of this investigation as only Airservices related APECs were sampled

The results of the Limited 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 one location within APEC 2.
- PFAS impacts in groundwater were reported within all APECs at concentrations greater than the adopted human health assessment criteria. It is noted that three (3) licenced bores are located within a one kilometre radius of the Airport boundaries with potential abstraction for industrial purposes.
- PFAS impacts in groundwater were also reported above the adopted ecological assessment criteria at all APECs.
- PFAS impacts in surface water were reported greater than the drinking water guidelines in both samples.
- TRH and BTEXN were not reported at concentrations either greater than the LOR or adopted assessment criteria in soil, sediment, groundwater or surface water samples.

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

- The data gaps determined in the SAQP (AECOM 2017b) have been assessed and closed:
 - **Data Gap 1:** PFAS impacts are marginally present in soil and sediment in the areas investigated.
 - **Data Gap 2:** PFAS impacts are present in groundwater and surface water in the areas investigated.
 - **Data Gap 3:** PFAS impacts are present at the Site boundary in surface water and present in groundwater at the APEC boundaries.
- The updated CSM indicates that SPR linkages remain “*possible*” to “*probable*” 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) with limited sampling at Port Hedland Airport, Western Australia, herein referred to as the Site (**Figure 1a**). The PSI works were designed to identify areas that have been potentially impacted by Aqueous Film Forming Foams (AFFF) which contain per- and poly- fluoro alkyl substances (PFAS).

The scope of this investigation is therefore limited to potential 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 Port Hedland Airport (the Site). It does not consider AFFF usage or potential PFAS sources related to others, including aircraft hangers, the Former Fire Training Ground (FFTG), etc.

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) (**Figures 1b and 1c**).

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 the limited sampling as reported herein.

1.1 Background

Airservices operations at the Site have been or continue to be provided from subleased areas of the Site including the following facilities (**Figure 1b**):

- Air navigation facilities
- Former maintenance workshop
- Fire Station (current)
- Former Fire Station and Temporary Fire Station
- Former Fire Training Ground

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, hangers and for operational and fire training purposes at ARFF areas. Firefighting services are understood to have been established at the Site from approximately 1968 and have since been provided by various agencies as follows:

- Department of Aviation prior to 1986.
- Department of Transport and Communication (successor to Department of Aviation) between 1986 and 1988.
- Civil Aviation Authority (CAA) from 1988 to July 1995.
- Airservices from 1995 to 2003.
- Department of Fire and Emergency Services (DFES) between 2003 and 2013.¹
- Airservices from 2013 to present.

¹ Services were provided by DFES during this time period from a remote location.

Airservices (and predecessors) operated the Former Fire Station and the FFTG until 2003, when a decline in air traffic schedules removed the requirement for permanent ARFF services. PFAS-bearing AFFF was therefore used at Port Hedland Airport, during training and during testing and maintenance of firefighting equipment, until at least 2003. In 2013, Airservices recommenced their ARFF role at the Site but PFAS-containing AFFF products had ceased being used. Airservices transitioned to a PFAS-free foam (Solberg RF6) in 2010. It is not known what type of product was used by others between 2003 and 2013.

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.

Limited investigations of Former Fire Station and the FFTG (for hydrocarbon contaminants only) were undertaken within a wider environmental audit commissioned by Airservices in 1996. Additional environmental investigations of the FFTG have been conducted by others more recently and it is understood that the FFTG has been classified by the DER as *“possibly contaminated – investigation required”*. However, the responsibility for the condition of this area is now with others under the terms of the lease surrender. AFFF was variously stored at the former, temporary and current ARFF fire stations, potentially at the former mechanical workshop and potentially at other airport areas managed by third parties. PFAS compounds have previously been detected in soil and sediment at near the former and temporary ARFF Fire Station facilities and in waste water discharging from these areas (SKM 2011, QED 2013). No other PFAS related site investigations are known to have been undertaken in other airport areas.

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 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 and Surface Water
 - **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 APEC with AFFF related sources of contamination and identify key receptors and potential contaminant transport pathways including:
 - APEC 1: The Former and Temporary ARFF Fire Station area
 - APEC 3: The Former Maintenance Workshop;

In addition to APEC 1 and APEC 3 and because no prior investigations have been conducted in these areas, the following areas are also been included within the scope of planned site investigations for completeness:

- APEC 2: The Current ARFF Fire Station; and
- Surface water drainage features located along the northeast Airport boundary (because airport drainage features represent a potentially important PFAS contaminant transport pathway).
- 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 **Figure 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:

- Development of the PSI and SAQP to conduct a targeted PFAS and hydrocarbon contamination investigation;
- 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 21 locations to a minimum depth of 1.5 metres below ground level (m bgl) prior to the commencement of any mechanical drilling activities;
- Supervision of drilling works undertaken by South Western Drilling (SWD) followed by the completion of 21 soils bores, of which 13 were converted to monitoring wells;
- Soil logging of the geological profile at each location;
- Development of all 13 wells using a submersible down-hole pump conducted by SWD;
- Gauging round of all groundwater monitoring wells conducted by AECOM;
- Collection of soil (45), sediment (4), surface water (2) and groundwater (20) samples.
- Surveying of all bores for location and elevation conducted by Veris; and
- Completion of this PSI with Limited Investigation 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** below.

Table 1 Completed Works and Sample Plan Deviation

APEC	Rationale (as per SAQP, 2017b)	Deviation from SAQP (AECOM, 2017b)	Completed works (June/ July 2017)
APEC 1: Former and Temporary ARFF Fire Station area (~0.56 Ha)	- Advancement of 11 soil bores with associated soil sampling at intervals of 0.0-0.1 m bgl to 0.1-0.5m bgl - Conversion of four soil bore locations to monitoring wells - Collection and analysis of groundwater samples	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 a maximum depth 5.5 m bgl) to provide better vertical delineation of the soil profile and a better understanding of soil condition near the water table. Sampling of two existing bores in good condition was added to the scope to take advantage of existing infrastructure.	11 soil bore locations (SB16-26) sampled across various depths dependent on the geology encountered: 0.1, 0.5, 0.8, 1.0, 1.4, 1.5, 1.6, 2.5 and 3.3, 3.5 m bgl. Collection of six groundwater samples from newly installed and existing monitoring wells (2 – MW04 and MW05).
APEC 2: Current ARFF Fire Station (~0.76 Ha)	- Advancement of three soil bores with associated soil sampling - Conversion of all three soil bore locations to monitoring wells - Collection and analysis of groundwater samples - Sampling of two existing bores in good condition	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. An additional three soil bores and groundwater monitoring wells were included in the scope as part of the diesel spill investigation. It is noted that three additional soil bores and converted monitoring wells were also installed in APEC 2 as part of a separate diesel spill investigation.	Six soil bore locations sampled across various depths dependent on the geology encountered: 0.1, 0.5, 0.8, 1.0, 1.4, 1.5, 1.6, 2.5 and 3.3, 3.5 m bgl Six soil bores converted to groundwater monitoring wells. Collection of groundwater samples from nine monitoring wells (3 of which were existing; MW01, MW02 and MW03).
APEC 3: Former Maintenance Workshop (~0.10 Ha)	- Advancement of four soil bores with associated soil sampling at intervals of 0.0-0.1 m bgl to 0.1-0.5m bgl - Conversion of three soil bores to monitoring wells and subsequent groundwater sampling (following well development) - Collection and analysis of groundwater samples - Sampling of one existing groundwater bore	Soil samples were collected at higher frequency than specified in the SAQP (AECOM, 2017b) (0.0 - 0.1 m bgl 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 existing bores were sampled with 3 additional installed to make up the 5 proposed groundwater sample locations.	Four soil bore locations were sampled across various depths dependent on the geology encountered: 0.1, 0.5, 0.8, 1.0, 1.4, 1.5, 1.6, 2.5 and 3.3, 3.5 m bgl Three soil bores converted to groundwater monitoring wells. Collection of groundwater samples from five monitoring wells (2 of which were existing).
Airport Boundary	Collection of two surface water samples and five sediment samples from stormwater channels that discharge from the Airport northeast boundaries, additional sediment and/or surface water from drainage features.	SED05 (and associated surface water sample) unable to be collected due to construction activities. Surface water samples not collected at SED02 and SED03 due to dry conditions.	SED01 – SED04 collected in dry drainage features taken from the north, central (workshop area) and south-east locations. SW01 and SW04 collected in the northern section of the stormwater channels and south-eastern section of the stormwater channels, respectively.

2.0 Site Identification

The Site is located in the Pilbara Region approximately 1,300km north of Perth, Western Australia (**Figure 1a**). The Site includes over 900 hectares of land situated between the settlements of Port Hedland and South Hedland. The Site is designated as an *Alternate Use* and *Restricted Use International Airport* (WTP&PB, 2011) where aircraft unable to land at Perth Airport or other destinations due to weather or other incidents, can land and be refuelled at Port Hedland.

The airport was owned by the Commonwealth of Australia prior to 1983, after which time the Town of Port Hedland became the owner of the Site. Port Hedland International Airport (PHIA) Group of Companies entered into a lease for the Site in 2015. Site details are summarised in **Table 2** below.

Table 2 Site Details

Item	Description
Site Owner	Town of Port Hedland
Site Occupiers	Port Hedland International Airport (PHIA) Group of Companies
Site Address	Great Northern Highway, Port Hedland, WA 6721
Local Government Authority	Town of Port Hedland
Current Zoning	Airport
Current Land Use	Operational Airport, commercial facilities, terminals, fire station and training facilities
Proposed Land Use	No change
Site Elevation	7.5 to 9.0 m Australian Height Datum
Site Area	Approximately 9,000,000 m ² or 900 hectares (Airport Estate)
Site Location	Figure 1a
Site Layout	Figure 1b

2.1 Certificate of Title

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

- The Airservices areas of interest are predominately situated on Lot 9007 and Lot 9008 on Plan 404824. However, the Site is made up of approximately 128 different lots as indicated in **Figure 1b**
- The Site is owned by The Town of Port Hedland.

The Site is subject to Western Australian legislation, including legislation pertaining to the assessment and management of land contamination. The Certificate of Title associated with Lot 9007, in which Airservices have operated, does not record any historical or current potentially contaminating land uses.

2.2 Land Use

2.2.1 Current Land Use

The Site is used for international airport purposes, including the following primary facilities/functions:

- Runways and taxiways
- Air Navigational Facilities (ANF) including communications transmitters, radar, range finding and distance measuring equipment and an air traffic control tower
- Terminal facilities, airport management and commercial facilities
- Surrounding carparks, vacant and landscaped areas.
- Maintenance buildings and aircraft hangars, including those associated with the major commercial airline operators Qantas and Virgin, as well as the local flight operators Polar Aviation and Golden Eagle
- Cargo handling and storage areas
- Fuel depot (operated by Air BP)
- ARFF Fire Station
- Water storage and pumping facilities
- Royal Flying Doctors Service Base and Administration
- Weather station

Historically, the FFTG was located remote from other airport facilities to the southwest of the runways. The portion of the lease related to the FFTG was surrendered in 2012, following its decommissioning.

2.3 Surrounding Land Use

Land uses surrounding the Site are summarised in **Table 3**.

Table 3 Surrounding Land Use Summary

Direction	Description
North	To the north of the Site boundary is the Great Northern Highway/Wilson Street and Wallwork Road. Within 1km to the north east of the Site boundary lies the salt flat evaporation ponds. The Taylor Inlet flood plain lies to the northwest.
East	The Great Northern Highway wraps around the eastern boundary of the Airport. Tourist and FIFO worker accommodations are located near the terminal facilities and to the east, as well as a BP Service Station.
South	The town of South Hedland is located approximately 2km to the south west of the Site boundary. Two rail lines are located to the south: a siding and the Port Hedland Goldsworthy Railway, owned and operated by BHP Billiton is located to south and winds to the north along the Site's eastern boundary.
West	West of the Site boundary is Wallwork Road and the town of Wedgefield.

3.0 Environmental Setting

3.1 Topography

Whilst the topography of the areas investigated is generally flat, the elevation across the Site rises inland from the coastal northern boundary. In the northwest the Site lies at approximately 4 m Australian Height Datum (AHD) and rises to approximately 11 m AHD towards southern boundaries. Overall therefore the Site slopes gently towards the tidal flats and Port Headland Harbour.

3.2 Climate

The Bureau of Meteorology weather station 004032 is located at the Site and has been operational since 1942. Records from this station indicate:

- Average annual rainfall of approximately 319 mm, with January to March typically the wetter months (>40 mm per month)
- Average monthly temperature maximum from 1948 to 2016 of between 27.2°C and 36.8°C with January to April being the warmest months
- Average monthly temperature minimum from 1948 to 2016 of between 12.4°C and 25.6°C with June to September being the coldest months

3.3 Geology

The Geological Survey of Western Australia (Hickman et. al., 1981) indicates that the Site is located within an area of Quaternary deposits of the Cenozoic era, which consist of alluvial floodplain deposits, aligned with former and current drainage channels and floodplains.

The Pilbara fractured rock aquifer consists of Precambrian granite-greenstone terrain overlain by surficial sediments in river valleys. The major aquifers within these rocks typically consist of quartz veins and chert layers (DoW, 2016).

3.3.1 Local Soils

Regional topsoils are classified as red/brown silty sand although some clayey soils can be encountered at depth. The 1:50,000 Environmental Geology Map of Port Hedland suggest local soils were formed through the reworking of earlier sand dune deposits and in response to river catchment and floodplain flooding events.

In general the silty sand soils consist of unsorted to poorly sorted, fine to coarse, sub-angular to sub-rounded iron stained quartz grains, with minor amounts of feldspar and limonite and Pre-Cambrian rock fragments. Local geological information was obtained from the Government of Western Australia, Department of Water (DoW) bore logs (70910741 and 70910746) located as indicated in **Appendix C-Figure C2**.

3.3.2 Acid Sulfate Soils

The Australian Soil Resource Information System website (CSIRO, 2006) indicates that the study area is classed as having an extremely low probability of Acid Sulfate Soil (ASS) occurrence. The surrounding area of Port Hedland, located to the north of the airport, is classed as high probability, as the occurrence of ASS is typically associated with the lower-lying sections of coastal floodplains, rivers and creeks, where surface elevations are less than 5 m AHD.

3.3.3 Site Specific Geology

The lithology previously encountered at the Site was described as comprising loose, red/orange to red/brown sand with increasing clay content with depth (see **Section 4.8**). Lithology encountered during the Limited Investigation is summarised in **Section 11.0**.

3.4 Hydrogeology

The DoW online Hydrogeological Atlas indicates that groundwater in the region is hosted in fractured rock and alluvial aquifers.

The water table is generally within 5 to 10 metres below the surface, but may be significantly deeper in granitic or greenstone hills. Groundwater ranges from fresh to brackish towards the coast. Bore yields vary, particularly in rock-hosted aquifers, where aquifer response depends largely on the degree of intersection of fractures (DoW, 2016).

Alluvial aquifers coincide with the Yule, Turner and De Grey Rivers. Potable water for the region is sourced from groundwater of the De Grey River and Yule River alluvial aquifers, located approximately 40 km west of the Airport at their closest. The Turner River system is closer than these systems and flows towards the coast, passing the Site at a distance of approximately 5 km east of the Airport.

3.4.1 Site Specific Hydrogeology

Groundwater beneath the Site forms part of the Pilbara fractured rock aquifer and has been reported to flow in a north easterly direction towards the Port Hedland salt evaporation ponds (2 km northeast of Site) and the coastline (approximately 12 km northeast of Site) (WTP&PB, 2011 and SKM, 2011).

Prior site investigations intercepted a perched ground water table at an approximate depth of 2.0 m bgl. Conversely, historical investigations conducted near the airport terminal and runways by SGS in 2009 were advanced to a maximum depth of 4.5 m bgl and did not encounter groundwater (WTP&PB, 2011).

This inconsistency in the presence of shallow groundwater may reflect seasonal (rainfall) variability and shallow aquifer response to prolonged periods of drought followed by periods of cyclonic rainfall. However, it is also likely that shallow or perched groundwater units at the Site are discontinuous due to the presence of extensive clay lenses/deposits within the predominant, more permeable silty sand soils.

3.4.2 Near-Airport Groundwater Use

A groundwater bore search was performed on the DoW water register of licenced extraction bores, which indicates three licenced bores exist within a one kilometre radius of the Airport boundaries, as summarised in **Table 4**. All three licenses suggest that water abstraction is for industrial purposes. The depth and construction details of the bores were not immediately available from the DoW database.

Table 4 Summary of Licenced Bores

Licence	Registered Owner	Allocation
██████	██████████	100,000 kL
██████	██████████	3,640 kL
██████	██████████	1,000,000 kL

A separate search for groundwater bores on the DoW, Water Information Reporting Database (for registered groundwater bores) also returned the result of three (3) bores being located within a 1 km radius of the Site (refer to **Appendix C**).

Based on the hydrogeological atlas, groundwater of the region is expected to lie at 5 to 10 m bgl and is expected to be brackish, with total dissolved solids concentrations of between 1000 – 3000 mg/L. This salinity range would render local groundwater unsuitable for potable uses, but viable for irrigation and dust suppression purposes.

3.5 Site and Regional Hydrology

There is evidence of ephemeral surface water features throughout the region. Beyond the north eastern boundary of the Great Northern Highway (approximately 1km offsite) there are unnamed ephemeral tidal creeks that discharge to drainage diversion channels around the salt-works and evaporation ponds. Further east (approximately 3 km off Site) is Beebingarra Creek, which similarly discharges into salt-works diversion channels.

Taylor Inlet located to the northwest is the closest coastline feature and is fringed with tidal mangrove flats. Taylor Inlet hosts Port Hedland Harbour, which supports numerous iron ore export facilities.

Rainfall and consequent river flows are mainly associated with cyclonic events during the wet season. Although regional river and creek systems flow infrequently, weather patterns dictate that they can discharge large volumes of runoff into the harbour and coastal environments over relatively short periods. Despite these patterns of discharge, the airport is not susceptible to the theoretical 100 year Annual Recurrence Interval (ARI) stormflow (WTP&PB, 2011).

Stormwater drainage systems are largely absent throughout the Site with buildings and paved areas draining directly onto unpaved surrounds. Topography and seasonal rainfall are however expected to produce sporadic surface water flows from the northern parts of the Airport that flow to the north and northeast via diversion channels around the nearby salt-works before discharging to coastal environs. The runway and taxiways may drain via swale drains to the south and west, connecting with stormwater drainage features of the Great Northern Highway. But these patterns are not easily discernible from the information and available reports reviewed in preparing this PSI report.

4.0 Site History

Lots 9007 and 9008 incorporate the majority of the Airport Estate, but Airservices previously provided their operational functions primarily within Lot 9007 and Lot 435, which are shown on **Figure 1b**. The historical site information presented below is limited to these Lots. It is recognised that prior to the Site being operated as a commercial airport, the Royal Australian Air Force (RAAF) occupied the Site as discussed further in **Section 4.4** below.

As described in **Section 1.1** Airservices provided ARFF operations at the Site between 1995 and 2003 and then recommenced ARFF operations in 2013. Prior to 1995 CAA provided firefighting and emergency services and in the intervening 2003 to 2013 period, the Department of Fire and Emergency Services (DFES) were responsible for airport incident/accident response.

Airservices currently operates from the following on-site facilities and locations:

- Air traffic service communications facilities (Lot 9007)
- Former maintenance workshop (Lot 9007)
- Fire Station (Lot 9007)

The Former Fire Training Ground (Lot 435) lease was surrendered in 2012 and the responsibility for contamination passed to the lessor as a term of the surrender.

4.1 Ownership of Airservices Operation Lots

The Certificate of Title information presented in **Appendix A** shows the airport was owned by the Commonwealth of Australia until 1983 when it was transferred to the Town of Port Hedland. The ownership history of the two Lots where Airservices have provided services is provided in **Table 3**.

Table 5 Summary of Title Information and Site Ownership History

Certificate of Title	Survey Information	Date	Site Owner
Lot 9007 on Deposited Plan 404824			
Vol. 1072, Fol. 164	Forest Location 11	12 September, 1940	The Commonwealth of Australia
Vol. 1115, Fol. 841,		11 January, 1949	The Commonwealth of Australia
Vol. 1276, Fol. 142		17 September, 1963	The Commonwealth of Australia
Vol. 1657, Fol. 119	Lot 11 on Deposited Plan 144237	2 December, 1983	Shire of Port Hedland
Vol. 2874, Fol. 672	Lot 9007 on Deposited Plan 404824	3 June, 2015	Town of Port Hedland
Lot 435 on Deposited Plan 404824			
Vol. 1512, Fol. 515	Lots 2443 and Lot 2444	25 August, 1978	The Commonwealth of Australia
Vol. 1591, Fol. 684		19 May, 1981	The Commonwealth of Australia
Vol. 2027, Fol. 995	Lot 2443 and portion of Lot 2444	10 January, 1995	Town of Port Hedland
Vol. 2212, Fol. 731	Lots 2443 and 2444 on Deposited Plan 212197	28 May, 2001	Town of Port Hedland
Vol. 2874, Fol. 668	Lot 435 on Deposited Plan 404824	3 June, 2015	Town of Port Hedland

4.2 Lease Information

The lease information relating to operational Airservices sites is provided in **Table 6**. The current operating lease agreement (H978767) encompasses services provided from Lot 9007. The lease associated with the FFTG, previously located on Lot 435 was surrendered in 2012.

Table 6 Lease Information for Airservices Australia

Facility	Airservices Lease	Lot and DP	Certificate of Title
Current Airservices Leasehold Agreements (unrelated to ARFF activities)			
Air Traffic Service Communication Facilities	H978767 (Commenced 2001)	Lot 9007 on Deposited Plan 404824	Volume 2874, Folio 672
Current Airservices Leasehold Agreements (related to ARFF activities)			
Fire Station	H978767 (Commenced 2001)	Lot 9007 on Deposited Plan 404824	Volume 2874, Folio 672
Former Airservices Leasehold Agreements and/or Locations of Historical ARFF Activity			
Former ARFF Fire Station and Temporary Fire Station	H978767 (Commenced 2001)	Lot 9007 on Deposited Plan 404824	Volume 2874, Folio 672
Former Maintenance Workshop			
Former Fire Training Ground	H979869 (Commenced 2001, surrendered 2012)	Lot 435 on Deposited Plan 404824	Volume 2874, Folio 668

4.3 Dangerous Goods

A freedom of information request pertaining to dangerous goods storage registered to Port Hedland Airport was submitted to the Western Australia Department of Mines and Petroleum (DMP). Although the records document significant fuel storage details, documentation received from the DMP includes no records pertaining to the storage of PFAS bearing substances.

4.4 Unexploded Ordnance

The RAAF reportedly stored high explosive ordnance on the Airport during their occupation of the site and undertook 'live training'. Anti-aircraft weaponry was also likely used during 1942 Japanese air raids. WTP&PB (2011) reported that parts of the Site were bombed in two attacks in July 1942. UXO surveys have been conducted and have concluded that the Site poses minimal risk with regards to possible unexploded ordnance contamination. It was previously concluded *"that there may be a slightly higher than minimal risk of actual ordnance related contamination, particularly in close proximity to the current and former WWII runways."*

4.5 Contaminated Sites

An information request was lodged with the Western Australian (WA) Department of Environment Regulation (DER) and identified that Parcel 65130 (within Lot 9007 on Deposited Plan 40824) was classified as *"possibly contaminated – investigation required"* on 18 July 2013 under the *Contaminated Site Act, 2003*. The nature and extent of contamination is cited as:

"Hydrocarbons, such as from aviation fuel, are present in soils at a depth of approximately 2 metres below ground level in the central portion of the site."

This classification was associated with an aviation fuel depot that was located in the area for approximately 35 years. Hydrocarbon impacted soils were identified during the removal of redundant fuel storage infrastructure in 2012.

In February 2016, the FFTG located at Lot 435 on Plan 404825 was classified as '*Possibly contaminated - Investigation required*' and further classified as "*contaminated – remediation required*" in June 2017 by the DER. This area is now located within the newly developed 'Kingsford Business Park' to the southwest of the Airport and not part of the area being investigated. The former use of the FFTG and the storage and use of petroleum hydrocarbons and AFFF products has resulted in the classification being due to:

- petroleum hydrocarbons (from kerosene or aviation fuels) in soil and groundwater
- fragments of asbestos containing materials
- metals (zinc, copper and lead)
- organochlorine pesticides (chlordane)
- PFAS.

Although previously associated with ARFF operations, the responsibility for the condition of this property was transferred to the Town of Port Hedland in the process of lease agreement termination. DER classification letters relating to the site are included in **Appendix D** for information.

4.6 Airport Environment Site Register

No environmental or contaminated sites register was available from Port Hedland Airport.

4.7 Historical Aerial Photographs

The information summarised below in **Table 7** was derived from the review of historical aerial photographs of the Airport and surrounding areas. The aerial photographs are presented in **Appendix E**.

Table 7 Aerial Photograph Review

Photograph	Description
June 1949 Black and White Appendix E1	Former ARFF Fire Station, Former Fire Training Ground (FFTG) and Former Maintenance Workshop - The area appears as undeveloped grass. Terminals - A bitumen apron and approximately 4 buildings are visible within the current terminal area. Airside runways - The north - south and east – west runways and taxiways are present.
September 1964 Black and White Appendix E2	Former ARFF Fire Station and FFTG - No significant changes from the 1949 aerial photograph were noted. Former Maintenance Workshop - Workshop buildings are present in the location of the former workshop Terminals - An apron to the south of two rectangular buildings is visible within the current terminal area - A small circular structure that may have been an AST is present to the north. Airside runways - The runways and taxiways were visible and appear to have been resurfaced with bitumen - An exposed dirt track leading from the east of the current terminal area leading to a cleared circular radio receiver is present - Approximately six exposed dirt tracks along the western boundary are visible.
May 1968 Black and White Appendix E3	Former ARFF Fire Station, FFTG and Former Maintenance Workshop No significant changes from the 1964 aerial photograph were noted. Terminals - Expansions of the terminal area are visible. Airside runways - No significant changes from the 1964 aerial photograph were noted.
September 1971 Black and White Appendix E4	Former ARFF Fire Station - No significant changes from the 1968 aerial photograph were noted. FFTG and Former Maintenance Workshop - No significant changes from the 1968 aerial photograph were noted. Terminals - The waste water evaporation pond is present to the north of the terminal precinct - A maintenance workshop building is present where the current airport and ARFF maintenance workshop areas are located Airside runways - No significant changes from the 1968 aerial photograph were noted.

Photograph	Description
July 1980 Black and White Appendix E5	Former ARFF Fire Station • A shed to the south the former ARFF Fire Station is visible, suggested to be the AFFF storage shed • The ATC building to the south west is present • A rectangular shed to the west of the former ARFF Fire Station. FFTG • The FFTG area is visible including a dark object in the centre of the drill pad. This is presumed to be the mock fuselage • The water stand in the west of the FFTG is visible. FFTG and Former Maintenance Workshop • No significant changes from the 1971 aerial photograph were noted. Terminals • The airport and ARFF maintenance buildings were noted to the north east of the airside terminal apron area • The Air BP Fuel Farm is visible along the eastern boundary of the precinct area • The terminal apron appears to have been extended to the north west • The Polar and Bristow Hangars are present along the terminal apron area to the north west • The Golden Eagle building is visible to the north east of the terminal building. Airside runways • Instrumentation and exposed dirt roads lead to the south west of the western end of the runway • The satellite ground station is present.
June 1995 Colour Appendix E6	Former ARFF Fire Station and FFTG and Former Maintenance Workshop • No significant changes to the ARFF area were noted from the 1980 aerial photograph FFTG • The FFTG area has no significant changes from the 1980 aerial photograph • A rectangular shaped object thought to be a bus is present along the southern boundary of the FFTG • There are three exposed development areas directly to the west of the FFTG • There is one exposed development area to the east of the FFTG • The water stand in the west of the FFTG is visible. Terminals • Extensions to the Terminal Building are noted • A Taxiway from the north south runway extending to the RFDS is visible • The Air BP AST adjacent to the north apron area is noted as opposite the current RFDS hangar area. Airside Precinct • The runway areas appears to have been resurfaced • Several dirt access tracks throughout the area were visible.

Photograph	Description
October 2001 Colour Appendix E7	Former ARFF Fire Station, FFTG and Former Maintenance Workshop - No significant changes were noted from the 1995 aerial photograph. Terminals - A hangar building is visible along the eastern area of the terminal apron - East of the Air BP Fuel Farm areas of exposed soils are present. Airside runways - No significant changes to the airside runways from the 1995 aerial photograph were noted.
November 2009 Colour Appendix E8	Former ARFF Fire Station, FFTG and Former Maintenance Workshop - No significant changes were noted from the 2001 aerial photograph. Terminals - To the far east of the Air BP Fuel Farm, a horseshoe shaped development is visible and presumed to be the FIFO worker camp area - To the west of the ARFF maintenance workshop removal of adjacent workshops were noted Airside runways - No significant changes were noted from the 2001 aerial photograph.
August 2015 Colour Appendix E9	Former Maintenance Workshop - No significant changes were noted from the 2009 aerial photograph. Former and Current ARFF Fire Station - The former ARFF Fire Station has been removed - The temporary ARFF Fire Station was visible to the south of the former ARFF Fire Station area - The current ARFF Fire Station was visible to the north west of the former ARFF Fire Station area FFTG - The mock fuselage, smokehouse and car/ bus wrecks are removed with only the water stand to the west and the concrete pad remaining. Terminals - North of the Terminal building, an additional square carpark is present directly to the south of the waste water evaporation pond - A white exposed flat area interpreted to be a carpark is noted to the north of the RFDS hangar area - A white rectangular building is visible to the north of the white exposed area. The nature of this building could not be determined - The FIFO camp to the east of the Air BP Fuel Farm appears to have been completed - Area of exposed disturbed soils is noted east of the terminal apron and is interpreted to be an area where soil stockpiles were placed. Airside runways - An additional taxiway to the south east runway area.
April 2016 Colour Appendix E10	Current ARFF Fire Station, FFTG, Former Maintenance Workshop, Terminals, Airside runways No significant changes from the 2015 aerial photograph.

4.8 Previous Environmental Reports

AECOM are aware of the following environmental investigation reports completed for the Site:

- CMPS&F, February 1996. *Environmental Audit, Rescue and Fire Fighting Service, Port Hedland*. (CMPS&F, 1996)
- OTEK Australia (OTEK), September 2003. *Environmental Site Assessment Report, Port Hedland Airport* (OTEK, 2003)
- Sinclair Knight Mertz (SKM), August 2011. *Environmental Site Assessment, Proposed Aviation Rescue and Fire Fighting Facility – Port Hedland International Airport* (SKM, 2011)
- QED Environmental Services (QED), December 2013. *Industrial Waste Water Quality Assessment, Port Hedland Airport Fire Station, Great Northern Highway* (QED, 2013)

Table 8 below summarises key aspects and findings made within these reports. An interpretation of the location of investigation/sampling points from these reports is provided in **Appendix F - Figure F1**. In addition to the above reports, *Appendix II - Port Hedland International Airport Master Plan* prepared by Whelans Town Planning and Parsons Brinckerhoff (July 2011) as presented in the *AIRBIZ, Port Hedland International Airport Master Plan* (March 2012) has also been reviewed and referred to throughout this PSI.

Table 8 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	Five soil samples – hydrocarbon impacts noted.	TPH and BTEX.	An environmental audit was conducted on the Rescue and Fire Fighting Service facilities at the Site on 9th February 1996 to ascertain potential environmental issues associated with work practices. Limited soil and groundwater sampling was performed at the FFTG (referred to as the 'drill ground'). Bore logs indicated that the soil consisted of sands with increasing clay content with depth. A total of five (5) soil samples were collected from depths ranging from 1 m to 5 m bgl and were analysed for Total Petroleum Hydrocarbons (TPH) and Benzene, Toluene, Ethylbenzene and Xylenes (BTEX) content. One groundwater sample was also collected and analysed. CMPS&F concluded that the main areas of environmental risk were associated with the storage of fuels and environmental impacts arising from the firefighting exercises conducted at the FFTG. It was noted that the drill ground was impacted by hydrocarbons, but at levels below criteria applicable to industrial land use. CMPS&F did not evaluate the Site for AFFF and/or PFAS impacts.
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.
SKM – Environmental Site Assessment	2011	Former ARFF fire station	30 soil samples/sediment - Concentrations of TPH, elevated metals, OCPs, PFOS and PFOA were detected.	TPH, PAH, BTEX, heavy metals, OCPs, PCBs, PFOS and PFOA	SKM was commissioned to complete an assessment of the former ARFF fire station and to evaluate several proposed locations for a replacement fire station. A total of thirty (30) soil samples were analysed for TPH, BTEX, heavy metals, and Polycyclic Aromatic Hydrocarbons (PAHs). A total of fifteen (15) soil samples were analysed for Polychlorinated Biphenyls PCBs, Organochlorine Pesticides (OCPs), Organophosphorus pesticides (OPPs) and six (6) soil samples for PFOS, PFOA and 6:2 Fluorotelomer Sulfonate FTS (6:2 FtS). Groundwater quality was not assessed. Bore logs indicated that encountered soils consisted of sands with clay content increasing with depth, with soils exhibiting low to medium plasticity and being red/brown in colour (consistent with previous reports). Concentrations of TPH, elevated metals, OCPs, PFOS and PFOA were detected. BTEX, PAH, PCBs and OPPs were not detected. PFOS concentrations in soil were reported over the range of 0.005 mg/kg and 0.47 mg/kg. SKM (2011) concluded the presence of elevated TPH concentrations in surface soils was unlikely to pose a risk to current and future Site occupants or the environment if left undisturbed. However, if excavations were to be undertaken in the vicinity of the areas investigated, consideration should be given to the remediation and/or management of these soils. There were no recommendations with regards to PFOS or PFOA concentrations reported, although it is recognised that these concentrations would not represent a risk to human health under the current land use.
QED – Industrial Waste Water Quality Assessment	2013	ARFF Fire Station	Waste water sampling from an oil/water separator at the fire station	PAH, TRH, BTEX, heavy metals and surfactants (MBAS, PFOA AND PFOS)	QED (2013) performed industrial waste water sampling from the oil/water separator at the fire station to determine whether the quality of water treated onsite could ultimately be discharged into local sewage treatment systems. The sample was analysed for physiochemical parameters, PAHs, TPH, TRH, BTEX, heavy metals and surfactants (MBAS, PFOA and PFOS). Concentrations of TPH, TRH and metals were detected, but remained below the Water Corporation Acceptance Criteria for Industrial Waste guidelines (Version 20/10/08). Concentrations of PFOS (2.14 µg/L) and PFOA (0.18 µg/L) were also detected; however, no similar guidelines were available for these chemicals at the time.

4.8.1 CMPS&F - Environmental Audit, 1996

An audit was undertaken of Airservices' ARFF facilities at the Site on 9 February 1996 to ascertain potential environmental issues associated with work practices.

Limited soil and groundwater sampling was performed at the FFTG (referred to as the 'drill ground'). Bore logs indicated that the soil consisted of sands with increasing clay content with depth. A total of five (5) soil samples were collected from depths ranging from 1 m to 5 m bgl and were analysed for Total Petroleum Hydrocarbons (TPH) and Benzene, Toluene, Ethylbenzene and Xylenes (BTEX) content. One groundwater sample was also collected and analysed.

CMPS&F concluded that the main areas of environmental risk were associated with the storage of fuels and environmental impacts arising from the firefighting exercises conducted at the FFTG. It was noted that the drill ground was impacted by hydrocarbons, but at levels below criteria applicable to industrial land use.

CMPS&F did not evaluate the Site for AFFF and/or PFAS impacts.

4.8.2 OTEK - Environmental Site Assessment Report, 2003

On 22 August 2003, OTEK advanced eight (8) soil borings in the vicinity of the FFTG to a maximum depth of 2 m bgl using a rotary air blast drill rig. Groundwater was collected on the same day at MW-1 (previously installed by CMPS&F [1996]). Soil and groundwater samples were analysed for hydrocarbon content.

Bore logs indicated that the soil was sandy, consisting of loose, dry sands of a red/orange colour.

TPH impact existed in five (5) of the eight (8) sampling locations above WA Department of Environment Health Investigation Levels for commercial/ industrial land. The TPH results were highest in the areas of the main concrete pad (SB-1 and SB-5) and the fuel drum storage area adjacent to the loading bay (SB-2).

Groundwater was encountered at approximately 2.5 m to 3 m bgl in the existing groundwater monitoring well, and was found to be black in colour with a strong odour. TPH was reported above the limit of reporting in groundwater samples; BTEX compounds were not detected above analytical detection limits.

No evaluation for AFFF and/or PFAS impacts was undertaken.

4.8.3 SKM - Environmental Site Assessment, 2011

SKM was commissioned to complete an assessment of the former ARFF fire station and to evaluate several proposed locations for a replacement fire station.

A total of thirty (30) soil samples were analysed for TPH, BTEX, heavy metals, and Polycyclic Aromatic Hydrocarbons (PAHs). A total of fifteen (15) soil samples were analysed for Polychlorinated Biphenyls PCBs, Organochlorine Pesticides (OCPs), Organophosphorus pesticides (OPPs) and six (6) soil samples for PFOS, PFOA and 6:2 Fluorotelomer Sulfonate FTS (6:2 FtS). Groundwater quality was not assessed.

Bore logs indicated that encountered soils consisted of sands with clay content increasing with depth, with soils exhibiting low to medium plasticity and being red/brown in colour (consistent with previous reports). Concentrations of TPH, elevated metals, OCPs, PFOS and PFOA were detected. BTEX, PAH, PCBs and OPPs were not detected. PFOS concentrations in soil were reported over the range of 0.005 mg/kg and 0.47 mg/kg.

SKM (2011) concluded the presence of elevated TPH concentrations in surface soils was unlikely to pose a risk to current and future Site occupants or the environment if left undisturbed. However, if excavations were to be undertaken in the vicinity of the areas investigated, consideration should be given to the remediation and/or management of these soils. There were no recommendations with regards to PFOS or PFOA concentrations reported, although it is recognised that these concentrations would not represent a risk to human health under the current land use.

4.8.4 QED- Industrial Waste Water Quality Assessment, 2013

QED (2013) performed industrial waste water sampling from the oil/water separator at the fire station to determine whether the quality of water treated onsite could ultimately be discharged into local sewage treatment systems. The sample was analysed for physiochemical parameters, PAHs, TPH, TRH, BTEX, heavy metals and surfactants (MBAS, PFOA and PFOS). Concentrations of TPH, TRH and metals were detected, but remained below the Water Corporation *Acceptance Criteria for Industrial Waste* guidelines (Version 20/10/08). Concentrations of PFOS (2.14 µg/L) and PFOA (0.18 µg/L) were also detected; however, no similar guidelines were available for these chemicals at the time.

4.9 Historical AFFF Use

Based on information provided by Airservices and on-site interviews, it is understood that the following PFAS-containing AFFF products were stored and used in ARFF operations over the 15-year period from 1988 to 2003:

- 3M Light Water™ AFFF (PFOS based surfactant) FC-206CF 6%
- ANSUL Ansulite 6% AFFF (Formula 1559-22 ICAO-B)

It is noted that between 2003 and 2013 no emergency response incidents were reported to have occurred. When Airservices resumed ARFF operations in 2013 replacement firefighting foams, including Solberg Re-Healing Foam (RF), which does not contain PFAS, were used. It is noted, although not confirmed, that redundant stocks of AFFF may have remained at the vacant fire station from 2003 until sometime after Airservices returned in 2013.

Based on a review of available information, PFAS-bearing AFFF was likely used in the following activities at Port Hedland Airport:

- Firefighting training
- Fuel spill incident response
- Maintenance and testing of firefighting equipment, including washing and testing of fire tenders and draining/drying of hoses used to discharge AFFF
- Potential releases and/or spillages to ground from stored materials, infrastructure and during decanting of AFFF from Intermediate Bulk Containers (IBCs) and Above Ground Storage Tanks (ASTs) to the fire-tenders.

ARFF operations have or continue to be delivered from the areas described in further detail in **Sections 4.9.1 to 4.9.6** below. Preliminary Site inspection findings indicated that other airport occupants may have also stored and discharged AFFF concentrate at other parts of the Site and it has not been conclusively established whether DFES conducted training or responded to any incidents causing AFFF release during their 2003-2013 tenure of emergency response services.

4.9.1 Former Maintenance Workshop

The former maintenance workshop was used by ARFF for repair and maintenance of mobile fire-fighting equipment prior to the withdrawal of ARFF in 2003. It is possible that small quantities of AFFF concentrate were infrequently released during scheduled repair and maintenance works.

Vehicle degreasing and washing was performed on a wash down pad located adjacent to the workshop, which consisted of a bunded concrete pad draining into an interceptor. The interceptor was reported to be regularly emptied. Waste kerosene wash and oil was collected into a 200-litre drum outside the wash down area for offsite disposal. Stormwater was reported to drain to soak wells (CMPS&F, 1996); however, the Port Hedland Airport Master Plan (2012) indicates that a stormwater retention basin is located to the northeast of the workshop area where surface water overland flow may pond during periods of high rainfall.

The mechanical workshop has historically stored (CMPS&F, 1996):

- Up to 200 litres at a time of oils and lubes on wooden pallets
- Small quantities of paints, solvents and degreasers (<20 litres) in a fire proof cabinet
- Up to 100 litres at a time of radiator corrosion inhibitor
- Approximately 20 litres at a time of kerosene stored in a parts wash bath
- Up to 200 litres at a time of waste oil stored in a drum container
- Gas cylinders for oxyacetylene welding.

The building remains on Site and is currently used for general storage by the Town of Port Hedland.

4.9.2 Former Fire Training Ground (FFTG)

The FFTG has not been used by Airservices since 2003 (Plates 7 and 8, Appendix B). The area is located to the west of the fire station and now lies within the 'Kingsford Business Park'.

The area was historically used for smoke training and firefighting exercises and incorporated vehicles and a large mock up (aircraft body) situated on a concrete burn-pad where AFFF solution was directed. A fuel storage area (for the storage of kerosene) and a smoke hut were also present on site. It was previously reported that a maximum of ten 200 litre drums (2,000 litres in total) of kerosene may have been stored at the FFTG at any one time. (CMPS&F, 1996)

Firefighting exercises were historically conducted on fires contained within a sunken pit constructed of an open steel container (approximate dimensions of 5 m x 4 m) to the north of the fuel storage area, which was disused by 1994 (CMPS&F, 1996).

The only infrastructure associated with this area that remains are the water tanks and concrete pad. All other infrastructure has been removed. Firefighting training was centralised from regional WA airports to the Perth Airport from approximately 2008.

4.9.3 Former Fire Station

The former fire station dates back to the late 1960's, when the airport began commercial operations and was dismantled and removed between 2011 and 2013 (Plates 2, 3 and 4, Appendix B). Historically, the fire station consisted of administration buildings, storage areas, amenities, water tank and a garage for the fire tender. A foam storage shed was located at the rear of the building near an above ground storage tank (AST) and bowser used for fuel storage and dispensing. Volumes of flammable liquids stored at the former fire station were restricted to 2,500 litres within the AST, which stood on level concrete pad (CMPS&F, 1996).

Other chemicals stored in the storage shed included (CMPS&F, 1996):

5 - 10 x 200 litre AFFF drums

20 - 40 kg dry Purple-K chemical containers

Training and testing of AFFF equipment occurred on the apron of the former fire station and the original concrete of the former facilities remains as observed from the historical aerial photograph sequence. The old AFFF storage shed and associated filling pad where fire-tenders were parked during re-filling remain in their original location to this day. The concrete apron where the diesel AST once stood is located immediately north of the former fire station and it is not known when this AST was removed. An oil water separator is also present within the concrete apron of the former fire station.

4.9.4 Temporary Fire Station

A temporary fire station was used from 2013 until early 2015 when the current fire station was commissioned (Plates 5 and 6, Appendix B). This temporary facility was located within the approximate footprint of the former fire station. It is understood that only Solberg Re-healing RF6 foams were used at both the temporary facility and the current fire station.

4.9.5 Current Fire Station

The current ARFF fire station is located to the northwest of the former and temporary fire stations (Plate 1, Appendix B). The current facilities include administration buildings, a waste water triple interceptor, ASTs for the storage of diesel and for Solberg foams, a water tower and mock training sea containers.

4.10 Fire Suppression Activities

A single firefighting incident, where ARFF responded and discharged AFFF was recorded at the Site (refer to **Table 9**). The incident log was provided during AECOM Site interviews and covers the 1997 to 2003 reporting period. A copy of the incident report is provided in **Appendix G**.

Table 9 AFFF Incident Usage

Airservices Incident #	Incident Location	Airport Area	Incident Details	Date	Approx. Volume of AFFF concentrate Applied (L)
10	Bay 1 Main Apron	Airport Terminal	An amount of fuel from the spill of an aircraft fuel vent on the apron	04/11/1997	10

5.0 Site Inspection and Stakeholder Engagement

A questionnaire was sent to both the Airport operators and Airservices ARFF representatives prior to on-site meetings. The questionnaire was intended to prompt the identification of potential activities that could have contributed to AFFF releases. On 29 July 2016, [REDACTED] from AECOM and [REDACTED] of Airservices (via teleconference) met with the following Port Hedland Airport representatives:

- [REDACTED] (Compliance and Operations Manager)

Interviews were also conducted with the following Airservices staff of the Port Hedland ARFF service:

- [REDACTED] (Acting Fire Station Manager)
- [REDACTED] (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 also undertaken. A photo log of the Site inspection is provided in **Appendix B**. The areas of the Site that were inspected are shown in the attached **Figures 1b** and **1c** and included the following:

- Current ARFF Fire Station (ARFF Fire Station)
- Former ARFF Fire Station site and remaining former AFFF storage shed
- FFTG located off-site approximately 700 metres south west of the present ARFF Fire Station
- Former airport and ARFF maintenance shed (Terminal Precinct)
- Terminal Buildings and hangar areas (Terminal Precinct)
- Air BP Fuel Farm and AST tank near the RFDS Hangar (Terminal Precinct).

5.1 Observations, Interviews and Anecdotal Information

Observations and anecdotal information generated from the Port Hedland site inspection and meetings are summarised in **Table 10** below. The information provided in 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.

It was determined that the following Airservices facilities are not considered to have PFAS generating potential:

- Air Traffic Service Communication Facilities, including:
 - VHF Omni Range
 - Distance Measuring Equipment
 - Satellite Ground Station
 - Transmitter.

Table 10 Summary of Observations and Anecdotal Information

Observed Anecdotal Information		
Plate #	Area	Detail
1	ARFF Fire Station	The ARFF fire station tender bay, triple interceptor and Solberg foam storage area.
2		AFFF storage shed, located close to the Former Fire Station.
3 & 4		The vacant lot and bitumen surrounds, near where the Former Fire Station used to be located to in front of the Air Traffic Control building.
5		A red building that was used as a temporary fire station from 2013 - 2015
6		The former aircraft control tower was located southeast of the current Fire Station.
7		FFTG was located approximately 700 m south west of the current ARFF fire station.
8	FFTG	At the FFTG, there are 16 groundwater monitoring bores, a concrete pad (former burn pad) and an AST that contained water.
9	Air BP Fuel Farm	Current BP Fuel farming the far north eastern corner of the terminal area (Photo shows to the north of the freight hangar).
10	Terminals	A large soil stockpile of unknown origin lies at the Airside Gate entrance opposite the terminal apron area.
11		Polar Airlines hangar and Royal Flying Doctors to the north of the terminal apron. Both hangers contained blue branded foam fire extinguishers and water fire suppression systems. (Details regarding the fire suppression system are unknown).
12		An Air BP Kerosene fuel pump and AST opposite the RFDS hangar. In front of these a steel container stating foam was stored there. The nature of the fire suppression foam was not identified.
13		To the north east of the terminal airfreight hangar, and Golden Eagle hangar.
14		A steel maintenance shed reportedly used to maintain fire trucks lies to the north east of the terminal buildings.
15		The waste water treatment evaporation pond to the north of the terminal area.
16		Three soil stockpiles of unknown origin, lie south of waste water treatment evaporation pond.

Port Hedland Airport Representatives Comments		
#	Area	Detail
1	Airport wide	The airport has been operational since the 1940s.
		The commonwealth transferred ownership of the Airport in 1983 to City of Port Hedland.
2		Groundwater is not used onsite and all water is obtained from town supply.
3	FFTG	The area around and including the FFTG was subdivided in 2015. Documentation for the area was not provided nor considered relevant; given Airservices no longer hold responsibility for the area.
4	ARFF Fire Station	Firefighting training has previously been conducted by ARFF and DFES and it was not known if AFFF had been used or stored on airport locations between 2003 and 2013, although DFES were based offsite during this period.
5		
6	Terminals	Waste water at the airport is directed to the northern waste water evaporation pond located to the north of the terminal building.
7		Details of potential fire suppression systems installed at hangars and the Air BP Fuel Farm were unknown.
8		There was bulk movement of spoil during upgrades to the apron works in front of the Bay 4 freight terminal area and these soils were placed adjacent to the eastern gate.
9	Terminals and Airside	The north eastern and western areas of the airport are affected by cyclonic weather patterns and the stormwater is directed to surface water drainage channels.

ARFF Station Representatives Comments		
#	Area	Detail
1	ARFF Fire Station	The current ARFF Fire Station was constructed in 2015 and is located northwest of the former fire station. The former fire station was used between 1968 and 2003 and removed between 2010 and 2013. DFES managed ARFF services from an offsite location.
2		There was no ARFF at Port Hedland between 2003 and 2013. A temporary fire station was established south of the current fire station in 2013 when ARFF returned.
3		A shed located to the west of the former fire station was used as an AFFF store. This was where AFFF was decanted from 200L litre drums into the fire tenders at the front of the shed. The shed remains onsite and a photo was presented showing the AFFF drums on unsealed ground surfaces in the area of the shed.

ARFF Station Representatives Comments		
#	Area	Detail
4	FFTG	Fire training activities involving the use of AFFF occurred at the FFTG. Monthly training was conducted at the FFTG, with between 20 L to 100 L of AFFF concentrate discharged depending on the training scenario. This is thought to have occurred between 1980 and 2001.
5		There was no drainage interceptor system at the former fire station. A triple interceptor was installed in 2013 at the temporary facility.
6		Testing of fire-tender foam systems occurred at the former fire station at 6-monthly intervals and foam was often released over a large area of the paved station aprons.
7		The FFTG had an old bus, car wrecks, smoke hut and large mock up fuselage on a concrete pad when it was in use. These have since been removed and only a water tank and the concrete pad remain. (Refer photograph Appendix B).
8		The FFTG ceased being used in 2001 due to hydrocarbon impacts from kerosene and other waste aviation fuels used in the controlled burns.
9	Terminals	A former ARFF maintenance shed was located to the northeast of the terminal building where monthly and quarterly maintenance of fire tenders would occur. The shed was co-located with other airport maintenance sheds; but only the former ARFF maintenance shed now remains.
10	Fuel Farm	There may be AFFF stored at the Air BP Fuel Farm in 20 L drums.

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 11** below.

Table 11 Summary of Data Quality Objectives

	Data Gap 1: Presence/Absence/Extent of PFAS Impacts in Soil and/or Sediment	Data Gap 2: Presence/Absence/Extent of PFAS Impacts in Shallow Groundwater	Data Gap 3: Presence/Absence of PFAS Impacts at Airport 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 Port Hedland Airport Resources: Intrusive site investigation resources: surface and shallow depth soil samples may be collected by hand-auger or small drill rig.	Problem Statement: Confirmation of presence or absence of PFAS impacts within shallow groundwater. No groundwater monitoring wells (MW) are known to exist at any APEC Decision Makers/Stakeholders: AECOM, Airservices and Port Hedland Airport Resources: Intrusive site investigation resources. Installation of shallow groundwater monitoring wells will require a small drilling rig.	Problem Statement: Confirmation of the presence or absence of PFAS impacts at inferred APEC or at overall Airport Site boundaries – in order to identify potential risks posed to off-site receptors. Decision Makers/Stakeholders: AECOM, Airservices and Port Hedland 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 may be inferred to be present)?</i>	<i>Have PFAS impacts migrated beyond specific APEC or Airport Site boundaries? To what extent do surface water pathways cause direct off-site discharge of AFFF derived contaminants?</i>
Step 3 Decision Inputs	Conducted soil and sediment sampling program within and close to APECs. APEC 1: Former (and Temporary Fire Station) - Advancement of 11 soil bores with associated soil sampling APEC 2: Current ARFF Fire Station - Advancement of six soil bores with associated soil sampling APEC 3: Former Maintenance Workshop - Advancement of four soil bores with associated soil sampling with three locations being converted into groundwater monitoring wells - Three sediment samples were collected at drainage basin and channel located northeast of APEC 3	Installed groundwater monitoring wells at selected locations and conduct groundwater monitoring event. APEC 1: Former (and Temporary Fire Station) - Conversion of four of eleven soil bore locations to MW - Collection and analysis of groundwater samples from new and existing monitoring wells APEC 2: Current ARFF Fire Station - Conversion of all six soil bore locations to monitoring wells - Collection and analysis of groundwater samples - Sampling of existing monitoring wells in good condition APEC 3: Former Maintenance Workshop - Conversion of three out of five soil bore locations to MW - Collection and analysis of groundwater samples - Sampling of one existing groundwater bore	Collection of surface water and sediment sample from stormwater channels that discharge from the Airport northeast boundaries.
Step 4 Study Boundaries	Spatial: Within or at APEC / Airport boundaries as shown in attached Figure 1c. Temporal: Timely consultation with Port Hedland Airport and Airservices to allow access to proposed sampling locations. Constraints: Approvals from Port Hedland 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 1c. Temporal: Timely consultation with Port Hedland Airport and Airservices to allow access to proposed locations. Constraints: Approvals from Port Hedland Airport, Airservices and other site users/stakeholders and potential conflicts between investigation locations and critical services.	Spatial: At or beyond Airport boundaries as shown in Figure 1c. Temporal: Timely consultation with Port Hedland 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 will be assessed against SAC (refer Section 5). The initial soil quality studies proposed by this SAQP are designed to confirm presence or absence of PFAS only.	Groundwater analytical data will be assessed against the GAC (refer Section 5). The initial groundwater quality studies proposed by the SAQP are 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 GAC (refer Section 5 below).
Step 6 Decision Error Limitation	The potential for significant decision errors will be minimised via a robust QA/QC program in accordance with NEPM guideline requirements. Standard operating procedures will be followed to ensure accurate and representative data acquisition. Data quality indicators (DQIs) will be applied to assess the usability of data based on precision, accuracy, representativeness, comparability and completeness. The acceptable limit on decision error is 100% compliance with the applied DQIs. If any of the DQIs are not met, further assessment will be necessary to evaluate the significance of any non-conformance and any necessary corrective actions.		
Step 7 Design Optimisation	Soil and sediment sampling locations have been selected on the basis of accessibility and proximity to potential or suspected PFAS impacted areas.	Proposed monitoring well locations were selected to confirm the presence or absence of PFAS impacts in groundwater, with MW locations selected on the basis that groundwater flow is anticipated to be to the northeast.	Sampling locations will be refined based on site observations and the ability to safely access sampling locations.

7.0 Areas of Potential Environmental Concern

As a result of the combined information searches, Site inspections and interviews detailed herein, six (6) key Areas of Potential Environmental Concern (APEC) have been identified at the Site as summarised in **Table 12**. Four of the six APEC are related to ARFF operations, with APECs 4 through 6 not being the responsibility of Airservices and were therefore not sampled as part of this investigation.

Table 12 Areas of Potential Environmental Concern

APEC	APEC Description	Known Issues	COPC
1	Former and Temporary ARFF Fire Stations	- Former fire station used between 1968 – 2003 - Historical AFFF use on apron during testing of equipment and tenders - Temporary fire station. Potential AFFF storage until Airservices return to the Airport in 2013 - Detection of PFAS in soils - Concrete loading pad area was used to fill AFFF and diesel fuel into tenders - Wash down area for tenders and equipment - Hose drying area - Historical storage of foam in the AFFF store - Former bowser and diesel AST. - Soil investigations have detected PFOS concentrations of between 0.005 and 0.47 mg/kg in the north, west and eastern borders of APEC 1 (SKM, 2011).	TPH, PFAS
2	ARFF Fire Station	Current Diesel and Solberg ASTs. PFAS containing AFFF unlikely to be stored but adjacent to APEC 1.	TPH, PFAS
3	Former Maintenance Workshop	- Historical washing and degreasing of tenders - No testing of tenders or direct spraying of AFFF in this location. But potential valve and line testing and minor AFFF releases during maintenance activities in this area.	TPH, PFAS
4	Former Fire Training Ground	Historical AFFF use from the 1980's to 2003. Potential impacts to soil and groundwater.	TPH, PFAS
5	Polar Airlines and Royal Flying Doctors Hangar	- ASTs containing petroleum hydrocarbons - Potential fire suppression systems containing AFFF.	TPH, PFAS
6	BP Fuel Depot		

8.0 Limited Intrusive 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 Contaminates 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 13** below:

Table 13 Field Work Activity Summary

Dates	Activities	Contractors / AECOM Personnel
14 and 15 June 2017	Services / utilities clearance was undertaken at all new soil bore and groundwater monitoring well locations using GPR (ground penetrating radar) and CAT (cable avoidance tool) methods.	[REDACTED]
16 and 19 June 2017	Supervision of the installation of 13 groundwater monitoring wells, including the collection of representative soil samples. The wells were advanced to the required depth using a hand auger and a Geoprobe® rig.	[REDACTED]
26 and 27 June 2017	Gauging and low-flow purging and sampling of 20 groundwater monitoring wells (13 new and seven existing) using a peristaltic pump.	[REDACTED]
28 June 2017	Surveying of newly installed groundwater monitoring wells to m AHD.	[REDACTED]

8.1 Health and Safety Planning

Prior to commencement of site works, a site-specific Health, Safety and Environment Plan (HSEP) was developed in accordance with AECOM and Airservices Australia policy. All works were undertaken by AECOM, and AECOM preferred subcontractors (Veris- subsurface clearance and surveying, South Western Drilling [SWD] – non-destructive digging [NDD]) 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 Port Hedland Airport completed the Airservices Australia Contractor General Induction Course, Port Hedland 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 Air Side.

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

8.2 Underground Services Identification (Subsurface Clearance)

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

Dial before you dig (DBYD) utility plans were obtained by AECOM from Horizon Power, Telstra, and WA Water Corporation.

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

Veris 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 H** for the Subsurface Utility Clearance Report provided by Veris.

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 SDW 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. The Geoprobe[®] was then used to progress the holes to depth.

8.4 Drilling Methodology

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

8.4.1 Advancement of Soil Bores

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 direct push tube could not be used at locations where the ground was hard or refusal encountered therefore hollow stem auger (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.

Groundwater monitoring wells were developed to remove any drilling water and fines caused during the installation process before sampling is undertaken. All water generated was contained within 205L sealed drums to be removed and disposed of off-site by a licensed waste disposal contractor.

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.

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

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

8.4.3 Decontamination and Waste Management

Hand auger, drilling equipment and 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. To avoid potential cross-contamination between drill locations, a pressure washer with Liquinox mixed with water was used to clean drilling equipment. 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 wells 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 I**. The specific depths for the soil samples collected are detailed on the soil bore logs in **Appendix J**.

8.6 Surface Water and Groundwater Sampling

Surface water grab samples, SW01 and SW04, were collected in conjunction with sediment sample SED01 and SED04, respectively.

Gauging of static water level (SWL) was completed on 26 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.

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

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

- Measurement of the depth to water prior to sampling;
- Identification of any non-aqueous phase liquid, if present, and measurement of thickness;
- Measurement of the depth to the base of the well following sampling;
- Groundwater purging of each well using a low flow 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 I**.
- Collection of groundwater samples directly into laboratory supplied and appropriately preserved bottles;
- Collection of groundwater samples and field QA/QC samples for laboratory analysis;
- 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.

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.

8.7 Groundwater Monitoring Well Elevation Surveying

All new and existing groundwater monitoring well locations were surveyed on 28 June 2017 by [REDACTED] a licenced surveying company for horizontal location and elevation to 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 is provided in **Appendix H**. Veris conducted the survey of 20 wells (including 7 existing and 13 new installed wells).

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 I**.

8.8.3 Sample Labelling

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

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

8.8.4 Sample Storage and Transport

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

8.9 Laboratory Analysis

8.9.1 Laboratory Selection

AECOM utilised the services of Australian Laboratory Group (ALS) based in 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 Water Analytical Suites

A summary of the laboratory analysis suite, methods and Limit of Reporting (LOR) is presented in **Table 14** (below) Based on the 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 15** (below).

Table 14 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 15 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

PFAS Group	Compound	CAS No.
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 (PFTTrDA)	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 below. Field Quality Control Data are provided in **Appendix L**.

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

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

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

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

9.2 Laboratory Analysis Plan

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

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

The performance of the 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 M**. Field Quality Assurance / Quality Control (QA/QC) data are included in **Appendix L**.

9.5 Soil and Sediment Data Validation

Validation of the soil data is discussed below:

- Soil samples were collected in laboratory supplied sample containers
- A field blank (SSQA02_160617, SSQA06_170617, SSQA010_180617 and SSQA024_190617) 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 SSQA010_180617 which reported a concentration greater the LOR for PFOS (0.7 µg/L). Note that this concentration is considered negligible as 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.
- One trip blank was analysed as part of the additional diesel spill investigation, with all concentrations reported at less than the LOR. It is noted that trip blanks were not required as part of the PFAS investigation.

- 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 3.7 °C in primary batch EP1706611, which is considered appropriate. The triplicate soil sample was received correctly preserved at the Eurofins laboratory (batch 551304) with ice at a temperature of 11.1 °C, with “*an attempt to chill evident*”. 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 3 field duplicates and 3 field triplicates (inter-laboratory duplicates) were collected for PFAS analysis meeting the frequency of one in forty nine primary samples (i.e. one of each). Field relative percentage differences (RPDs) for some compounds exceeded the relative DQIs including:
 - PFHpS
 - PFHxS
 - PFOS
 - PFOA
 - 8:2 FTS
 - FOSA
 - PFDS
 - PFHxA
 - PFUnA
- Method blanks were within control limits.
- Laboratory duplicates were within control limits.
- Lab control outliers were not reported.
- No surrogate outliers were reported.

No apparent anomalies between field observations and resultant data occurred.

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

Soil and sediment data are considered useable for the purposes of this investigation.

9.6 Surface and Groundwater Data Validation

Validation of the groundwater data is discussed below:

- Groundwater samples were collected in laboratory supplied sample containers
- A field blank (WQA01_260617 and WQA05_270617) and rinsate samples (WQA02_260617 and WQA08_270617) 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 concentrations reported greater than the LOR for PFAS, PFHxS, PFHxA and PFOS with the highest concentrations reported at 4.27 µg/L, 0.06 µg/L, 0.03 µg/L and 4.18 µg/L respectively. Note that the potential for cross contamination to have impacted on the results is 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.
- Method blanks were within control limits.
- Laboratory duplicates were within control limits.
- Laboratory control outliers were not reported.
- No surrogate outliers were reported.

No apparent anomalies between field observations and resultant data occurred.

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

Surface and groundwater data are considered useable for the purposes of this investigation.

10.0 Adopted Assessment Criteria

10.1 Overview

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

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

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

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

10.2 Human Health

10.2.1 Soil and Sediment

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

10.2.2 Groundwater

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

10.3 Ecological

10.3.1 Soil and Sediment

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

10.3.2 Groundwater

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

Table 16 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	--	--	--	--	DER (2017) Health Based Screening Level (Commercial and Industrial land use).
		--	--	680	--	--	--	Airservices (GHD, 2017) Commercial / Industrial land use – Based on FSANZ TDI 2017.
		--	--	240	90	240	900	Airservices (GHD, 2015) Human Health Screening Levels (HILs) – Industrial land use (direct contact only).
	Groundwater (µg/L)	5	5	50	5	--	--	DER (2017) Non-potable and Recreational Use Guideline.
		0.5	--	5	--	--	--	DER (2017) Drinking Water Guideline.
		0.07	--	0.56	--	--	--	DoH (2017) Drinking Water Guideline – Based on FSANZ (2017)
Ecological	Soil & Sediment (mg/kg)	--	--	3.73	4.71	3.73		Airservices (GHD, 2015) EILs – Commercial and Industrial land use at 60% protection, low reliability.
	Groundwater (µg/L)	2	2	632	2	--	--	DER (2017) Freshwater Guideline for Highly Disturbed Systems – 90% species protection.
		31	31	1824	31	--	--	DER (2017) Freshwater Guideline for Highly Disturbed Systems – 80% species protection.
		--	--	2900	6.66	2900	--	Airservices (GHD, 2015) EISLs – toxicity effects on aquatic organisms.

11.0 Results

11.1 Field Observations

11.1.1 Lithology

Table 17 below provides a summary of the subsurface conditions encountered at each APEC during the June 2017 limited investigation. Refer to **Appendix J** for the Bore logs. No visual and/or olfactory observations of potential contamination were reported in any of the soil bores.

Table 17 Summary of Lithology – June 2017

Depth intervals (m bgl)	Lithology
APEC 1 – Former ARFF station	
0 – 1.5	Brown coarse grained sand, wet at approximately 1.0-1.2 mbgl
1.5 – 2.0/4.0	Brown sandy gravel with some clay, moist to wet
2.0 – 4.0 (MW07 and MW08)	Clay with sand, dense, wet
APEC 2 – Current ARFF Station	
0 – 3.5	Red grading to brown, coarse grained sand, wet at approximately 1.5 mbgl
1.5 – 2.3 (MW10)	Coarse grained gravel, wet at 1.5 mbgl
2.0 – 5.5	Variable dense clay, with gravel
APEC 3 – Former Maintenance Workshop	
0 – 0.3	Road base
0.3 – 1.0	Red medium grained sand
1.0 – 3.5	Red clay with gravel
1.0 – 3.5 (MW3C)	Variable interbedded sand with clay, gravelly clay and gravel

11.1.2 Groundwater

Table 18 provides a summary of groundwater elevation and field groundwater chemistry observed during the GME. Refer to **Appendix K** for the field groundwater purging data, **Table T1** and **Table T2** (attached) for groundwater elevation and field chemistry data. **Figures 4a** and **4b** present the groundwater contours.

Table 18 Groundwater Field Observations

Field Observation	June 2017 GME
Groundwater Occurrence	Groundwater was encountered in all wells gauged.
Groundwater Depth and Elevation:	Groundwater depth: 0.68 mbtoc (MW22) – 2.011 mbtoc (MW02) Groundwater elevation: 5.624 m AHD (MW3B) –6.640m AHD (MW04)
Electrical Conductivity (EC):	538 μ S/cm (MW12) to 14, 647 μ S/cm (MW02)
Dissolved Oxygen (DO):	0.20 mg/L (MW02) to 4.18 mg/L (MW01)
pH:	6.44 (MW15) to 7.47 (MW03) (slightly acidic to circum-neutral)

Field Observation	June 2017 GME
Redox Potential:	-97 mV (MW22) to 154 mV (MW04) indicative of reducing conditions (i.e. lower than 150 mV)
Total Dissolved Solids (TDS)*:	350 mg/L (MW12) to 9, 521 mg/L (MW02) (fresh to brackish)

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

11.2 Analytical Results

11.2.1 Soil and Sediment

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

- **Table T3** Laboratory Analytical Results – PFAS Concentrations Detected in Soil and Sediment
- **Table T5** 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 3** Sediment Sampling Locations
- **Figure 5a** Soil Analytical Results - APEC 1 and APEC 2
- **Figure 5b** Soil Analytical Results - APEC 3
- **Figure 5c** Sediment Analytical Results

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

However, 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 1 comprising:

- SB18_0.1 (4.7 mg/kg).
- SB18_0.5 m (8.8 mg/kg).

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

11.2.1.1 Groundwater and Surface Water

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

- **Table T4** Laboratory Analytical Results – PFAS Concentrations Detected in Groundwater and Surface Water
- **Table T6** Hydrocarbon Concentrations Detected in Groundwater and Surface Water
- **Figures 2a** Sampling and Monitoring Well Locations – APEC 1 and 2
- **Figures 2b** Sampling and Monitoring Well Locations – APEC 3
- **Figure 4a** Groundwater Elevation and Interpreted Groundwater Flow Contours (June 2017) - APEC 1 and APEC 2
- **Figure 4b** Groundwater Elevation and Interpreted Groundwater Flow Contours (June 2017) - APEC 3
- **Figure 6a** Groundwater Analytical Results - APEC 1 and 2
- **Figure 6b** Groundwater Analytical Results - APEC 1 and APEC 2
- **Figure 6c** Surface Water Sample Analytical Results

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. PFAS impact was observed in both surface water samples analysed.

Petroleum hydrocarbons were reported at concentrations either less than the LOR or less than the assessment criteria in all monitoring wells. Petroleum hydrocarbons were reported at concentrations less than the LOR in all surface water samples.

11.2.1.2 Non-Potable / Recreational Criteria

- PFHxS concentrations were above the criteria for non-potable groundwater use (5 µg/L - DER, 2017) at all monitoring wells, with concentrations ranging up to 2,490 µg/L.
- PFOS + PFHxS (sum) concentrations were above the criteria for non-potable groundwater use (5 µg/L - DER, 2017) at all monitoring wells, with concentrations ranging up to 29,800 µg/L.
- PFOS concentrations were above the criteria for non-potable groundwater use (5 µg/L - DER, 2017) at the majority (17 of 20) of monitoring wells, with concentrations ranging up to 28,800 µg/L.
- PFOA concentrations were above the criteria for non-potable groundwater use (50 µg/L - DER, 2017) at seven monitoring wells, with concentrations ranging up to 153 µg/L.

11.2.1.3 Drinking Water Criteria

- PFOS + PFHxS (sum) concentrations were above the DoH/FSANZ criteria for potable groundwater use (0.07 µg/L - DoH, 2017) at all monitoring wells and within both surface water samples.
- PFOS + PFHxS (sum) concentrations were above the DER criteria for potable groundwater use (0.5 µg/L - DER, 2017) at all monitoring wells and in one surface water sample (SW01).
- PFOA concentrations were above the DoH/FSANZ criteria for potable groundwater use (0.56 µg/L - DoH, 2017) at 19 monitoring wells and in one surface water sample (SW01).
- PFOA concentrations were above the DER criteria for potable groundwater use (5 µg/L - DER, 2017) at 15 monitoring wells.

11.2.1.4 Ecological Guidelines

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

- PFHxS concentrations were above the criteria for highly disturbed freshwater ecosystems (90% species protection) (2 µg/L - DER, 2017) at all monitoring wells and one surface water sample (SW01), with some locations reported several orders of magnitude above the criteria.
- PFOS + PFHxS (sum) concentrations were above the criteria for highly disturbed freshwater ecosystems (90% and 80% species protection) (2 µg/L - DER, 2017) at all monitoring wells and one surface water sample (SW01), with some locations reported several orders of magnitude above the criteria.
- PFOS concentrations were above the criteria for highly disturbed freshwater ecosystems (90% species protection) (2 µg/L - DER, 2017) at the majority (18 of 20) monitoring wells and one surface water sample (SW01).
- PFOS concentrations were above the criteria for ecological protection derived by GHD (2015) (6.66 µg/L) in consideration of toxicological effects on aquatic organisms at the majority (17 of 20) monitoring wells and one surface water sample (SW01).

12.0 Updated Conceptual Site Model

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 sampling 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 20** (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.

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 below, with APECs 4 through 6 excluded as discussed above. AFFF related sources of contamination are therefore further examined below as:

1. ARFF Fire Station
2. Former and Temporary ARFF Station
3. Former Maintenance Workshop

12.2 Potential Receptors

Potential receptors to AFFF related contamination at the Port Hedland Airport are summarised in **Table 19**.

Table 19 Potential Receptors

Receptor(s)	Description
On-site workers / operators	Persons routinely working who may directly contact impacted surface soils.
On-site intrusive maintenance workers	There is a potential for maintenance worker exposure, particularly where works require ground-breaking or excavation activities.
Down-gradient users of non-potable groundwater or surface water	Users of potentially impacted groundwater or surface water may be exposed to AFFF or hydrocarbon related contaminants in surrounding properties. Off-site intrusive / excavation workers may also become exposed to affected groundwater.
Aquatic and terrestrial ecological receptors in the following environments.	Invertebrates and macro fauna may be directly exposed. Higher order species (predation) may lead to wider exposure within the following waterbodies: • Ephemeral creeks towards the north eastern boundary of the airport • Intertidal mudflats / plains and mangroves to the north • Taylor Inlet and Port Headland coastline and harbour

As indicated in **Section 3.4.2** information searches on DoW registers and databases indicated the presence of three (3) licenced bores within a one kilometre radius of the Airport boundaries. All three licenses suggest that water abstraction is for industrial purposes.

Although groundwater is abstracted for potable supply from aquifers hosted in alluvial deposits some 40 km west of Port Hedland, shallow groundwater in the vicinity of the Airport is expected to be of brackish to saline quality, rendering it unsuitable for potable uses, but potentially viable for irrigation and dust suppression purposes. The depth and construction details of the three bores identified within a kilometre of the Airport were not immediately available from DoW data sources.

12.3 Potential Transport Mechanisms and Exposure Pathways

Potential mechanisms of contamination transport through soil, groundwater, surface water and the environment include:

- Direct releases and/or spillages into the ground
- Leaching of contaminants from impacted soils to groundwater and surface water
- Lateral and vertical 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 identified contaminant sources and receptors include:

- Direct contact with impacted soils (including oral ingestion and dermal contact and possibly dust inhalation)
- Direct contact with groundwater or surface water (encountered or abstracted)
- Direct discharge or migration of contaminants into surface waters.

12.4 Source-Pathway-Receptor Linkages

A tabulated representation of the preliminary CSM describing potential SPR linkages and based on the findings of this PSI report is provided in **Table 20** which includes an assessment of the status of each identified SPR linkage for on-site and off-site receptors and an associated evaluation of 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 20 Conceptual Site Model - SPR Linkages

APEC 1 & 2 – Former and Temporary ARFF Fire Station and APEC 3– Former Maintenance Workshop							
Source	Transport Mechanisms	Exposure Pathway	Receptors	SPR Status	Data Gap	Discussion	Data Gap Status
Soils impacted from historical AFFF storage and use during equipment testing and maintenance activities at APEC 1 (former fire station) and APEC 3 (former maintenance workshop)	Direct contact with historically impacted soils	Ingestion, dermal contact and dust inhalation.	On-site intrusive maintenance workers	Probable	<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 and sediment samples. - PFAS concentrations in all soil samples were reported below the adopted assessment criteria at all locations, with the exception of PFOS in one location in APEC2. - PFAS concentrations variably increased and decreased with depth.	<u>Data gap considered closed based on the presence of PFAS in soil and/or sediment samples in APEC 1, 2, 3 and the site boundary.</u> <u>It is noted that the SPR linkages remain possible based on the data collected during the limited sampling.</u>
			On-site airport workers / operators	Possible			
			Ecological	Possible			
	Further migration in dissolved form and/or adsorbed to soil/sediment	Direct contact with impacted ground water (Ingestion and dermal contact)	On-site or off-site intrusive maintenance workers	Probable	<u>The presence/absence of PFAS impacts in groundwater and/or surface water.</u>	- PFAS was reported at concentration greater than the LOR in all groundwater and surface water samples - PFAS concentrations reported above one or more of the adopted assessment criteria in all samples.	<u>Data gap considered closed based on the presence of PFAS in groundwater and/or surface water samples in and adjacent to APEC 1, 2, 3 and the site boundary.</u> <u>It is noted that the SPR linkages remain possible based on the data collected during the limited sampling.</u>
	Vertical infiltration of contaminants or leaching of (soil-bound) contaminants into groundwater and lateral migration of soluble contaminants in the direction of groundwater flow.		On-site or off-site airport workers / operators	Possible			
			Ecological	Possible			
	Further migration within receiving catchments – in dissolved form and/or adsorbed to soil/sediment.	Direct contact with impacted surface water or stormwater (Ingestion and dermal contact)	On-site or off-site intrusive maintenance workers	Probable			
	Contaminants in storm water run-off via discharge to drainage (swale) systems and further migration within receiving catchments (including drainage basins) – in dissolved form and/or adsorbed to soil/sediment.		On-site or off-site airport workers / operators	Possible			
			Ecological	Possible			
	Ecological uptake into vegetation and/or fauna, which may introduce more complex contaminant transport vectors, when food-chain or fauna mobility factors are considered.	Ingestion via harvest of home-grown produce or animals or local flora and fauna (Ingestion and contact)	Harbour/ Bay	Possible			
			Ecological	Possible			

13.0 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 (APEC 4) during training exercises until at least 2003. Limited investigations of this area (for hydrocarbon contaminants only) were undertaken within a wider environmental audit commissioned by Airservices in 1996.
- Further environmental investigations of the FFTG (APEC 4) have been conducted by others more recently and it is understood that the Site has been classified by the DER as “*possibly contaminated – investigation required*”. However, this parcel of land is associated with a surrendered lease area and the responsibility for the condition of this area is now considered to lie with the lessor (Town of Port Hedland).
- The FFTG (APEC 4) has been excluded from further assessment based on the surrender of responsibility noted in the relinquishment of the lease on this parcel of land by Airservices. The fifth and sixth APECs (Polar Airlines, Golden Eagle and RFDS hangars and BP fuel depot) are also excluded from further CSM consideration, based on uncertainties over AFFF use in these areas and because they are not related to Airservices’ ARFF operations.
- AFFF was variously stored at the former, temporary and current ARFF fire stations, potentially at the former mechanical workshop and potentially at other airport areas managed by third parties.
- PFAS compounds have been detected in soil and sediment at the former and temporary ARFF Fire Station facilities (APEC 1) and in waste water discharging from these areas (SKM 2011, QED 2013). No other PFAS related site investigations are known to have been undertaken in other airport areas.

The results of the limited sampling indicated:

- PFAS impacts were not reported at concentrations greater than the adopted human health assessment criteria in the soil or sediment samples analysed.
- PFOS concentrations in soil were reported greater than the adopted ecological assessment criteria at one location within APEC 2.
- PFAS impacts in groundwater were reported within all APECs at concentrations greater than the adopted human health assessment criteria. It is noted that three (3) licenced bores are located within a one kilometre radius of the Airport boundaries with potential abstraction for industrial purposes.
- PFAS impacts in groundwater were also reported above the adopted ecological assessment criteria at all APECs.
- PFAS impacts in surface water were reported greater than the drinking water guidelines in both samples.
- TRH and BTEXN were not reported at concentrations either greater than the LOR or adopted assessment criteria in soil, sediment, groundwater or surface water samples.

13.2 Conclusions

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

- The data gaps determined in the SAQP (AECOM 2017b) have been assessed and closed:
 - **Data Gap 1:** PFAS impacts are marginally present in soil and sediment in the areas investigated. .
 - **Data Gap 2:** PFAS impacts are present in groundwater and surface water in the areas investigated.
 - **Data Gap 3:** PFAS impacts are present at the Site boundary in surface water and present in groundwater at the APEC boundaries.
- The updated CSM indicates that SPR linkages remain “*possible*” to “*probable*” based on the data collected during the limited sampling.

14.0 Key References

Airbiz, Port Hedland International Airport, Master Plan, March 2012.

Australian Water Resources Council (AWRC) 1988. Department of Primary Industries and Energy, Australian Water Resources Council, Water Management Series No. 13, Australian Government Publishing Service, Canberra, 1988.

Bureau of Meteorology (BOM), 2016. Summary Statistics for Port Hedland Airport Comparison. http://www.bom.gov.au/climate/averages/tables/cw_004032.shtml Accessed 9 June 2016.

CMPS&F, Environmental Audit, Rescue and Fire Fighting Service, Port Hedland, February 1996;

DER, (2016). Department of Environment Regulation, Contaminated Sites Database. <https://secure.dec.wa.gov.au/idelve/css/> Accessed 9 June 2016.

DoW, (2016). Department of Water, Hydrogeological Atlas <http://atlases.water.wa.gov.au/idelve/hydroatlas/> Accessed 9 June 2016.

DoW, (2016). Department of Water, The Water Register <http://atlases.water.wa.gov.au/ags/waterregister/> Accessed 9 June 2016.

Department of Water, Water Information Reporting <http://wir.water.wa.gov.au/SitePages/SiteExplorer.aspx> Accessed 9 June 2016.

Hickman, A.H., Gibson, D.L., 1981, Port Hedland-Bedout Island, Western Australia, 1:250 000 geological series map. Sheet SF/50-04 and part of sheet SE/50-16, 2nd edition. Bureau of Mineral Resources, Australia & Geological Survey of WA, Version 1.1, 3rd Edition, 2012.

OTEK, (2013) Environmental Site Assessment Report, Port Hedland Airport, 16 September 2003;

QED, (2013) Industrial Waste Water Quality Assessment, Port Hedland Airport Fire Station, Great Northern Highway, December 2013.

SKM, (2011) Environmental Site Assessment, Proposed Aviation Rescue and Fire Fighting Facility – Port Hedland International Airport, 19 August 2011.

Whelans Town Planning and Parsons Brinckerhoff (WTP&PB) 2011. Port Hedland International Airport, Master Plan., Revision 3.2, January 2011.

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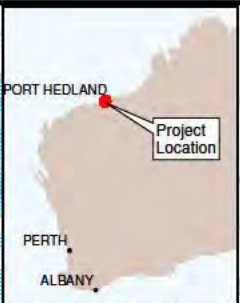
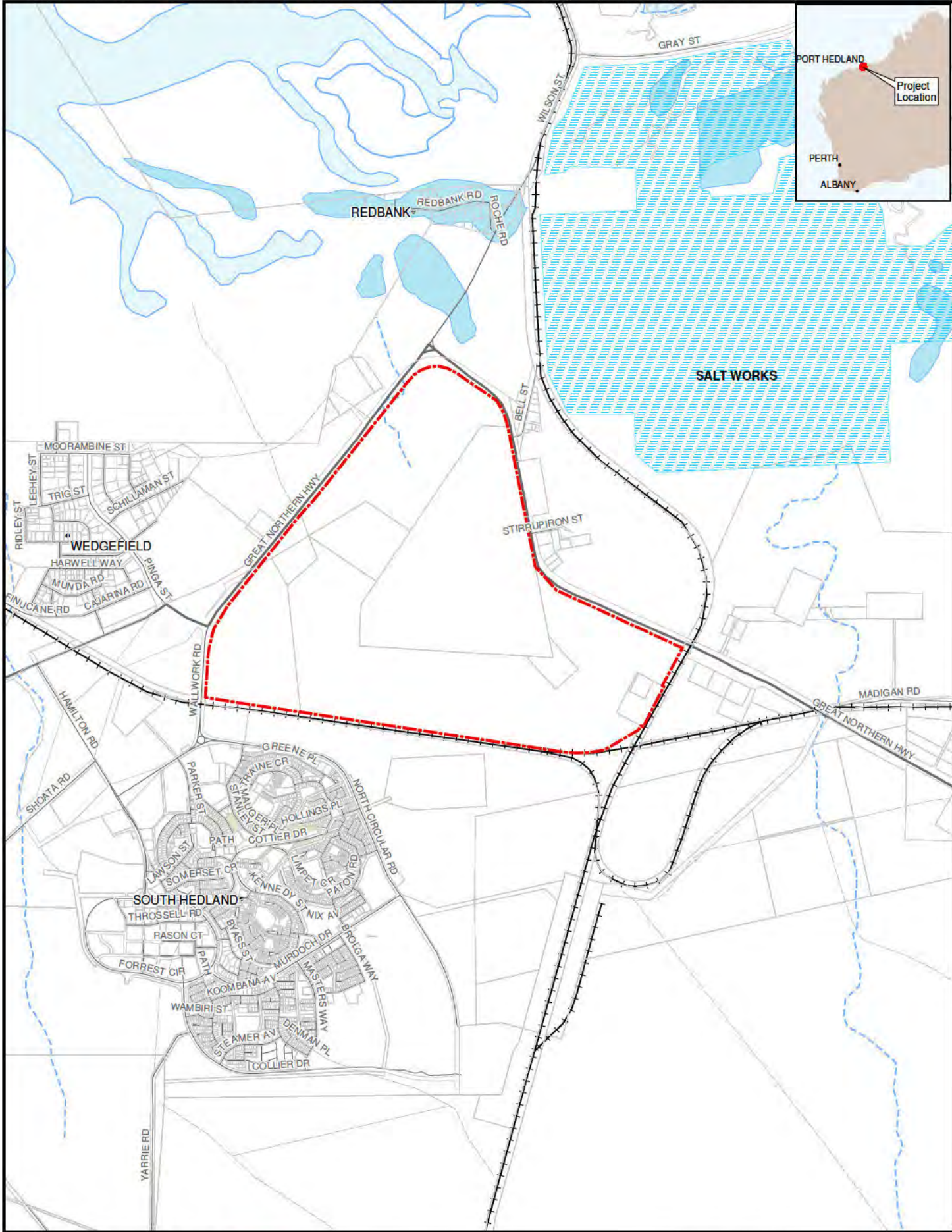
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Figures



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DATUM GDA 1994, PROJECTION MGA ZONE 50
0 200 400 600 800 metres
1:50,000 when printed at A4

LEGEND

Airport Estate Boundary	Highway
Cadastral Boundary	Major Road
Parks	Minor Road
Pondage Areas	Track
Lakes	Railways
Watercourses	

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

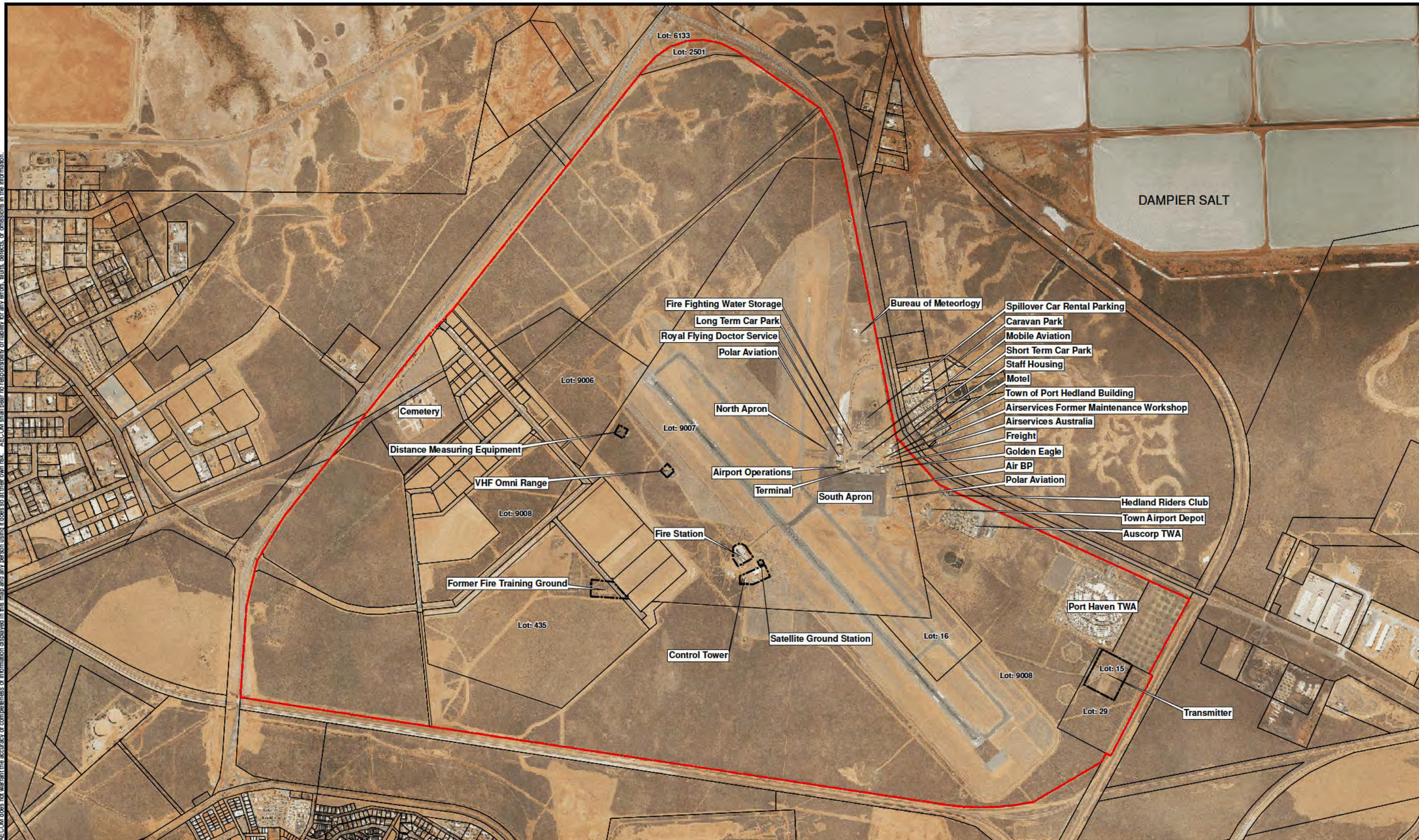
Site Location

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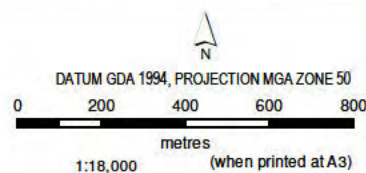
PRELIMINARY SITE INVESTIGATION AND LIMITED SAMPLING, PORT HEDLAND AIRPORT

Figure 1

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LEGEND
[Red line] Airport Estate Boundary
[Black line] Cadastral Boundary

Site Layout

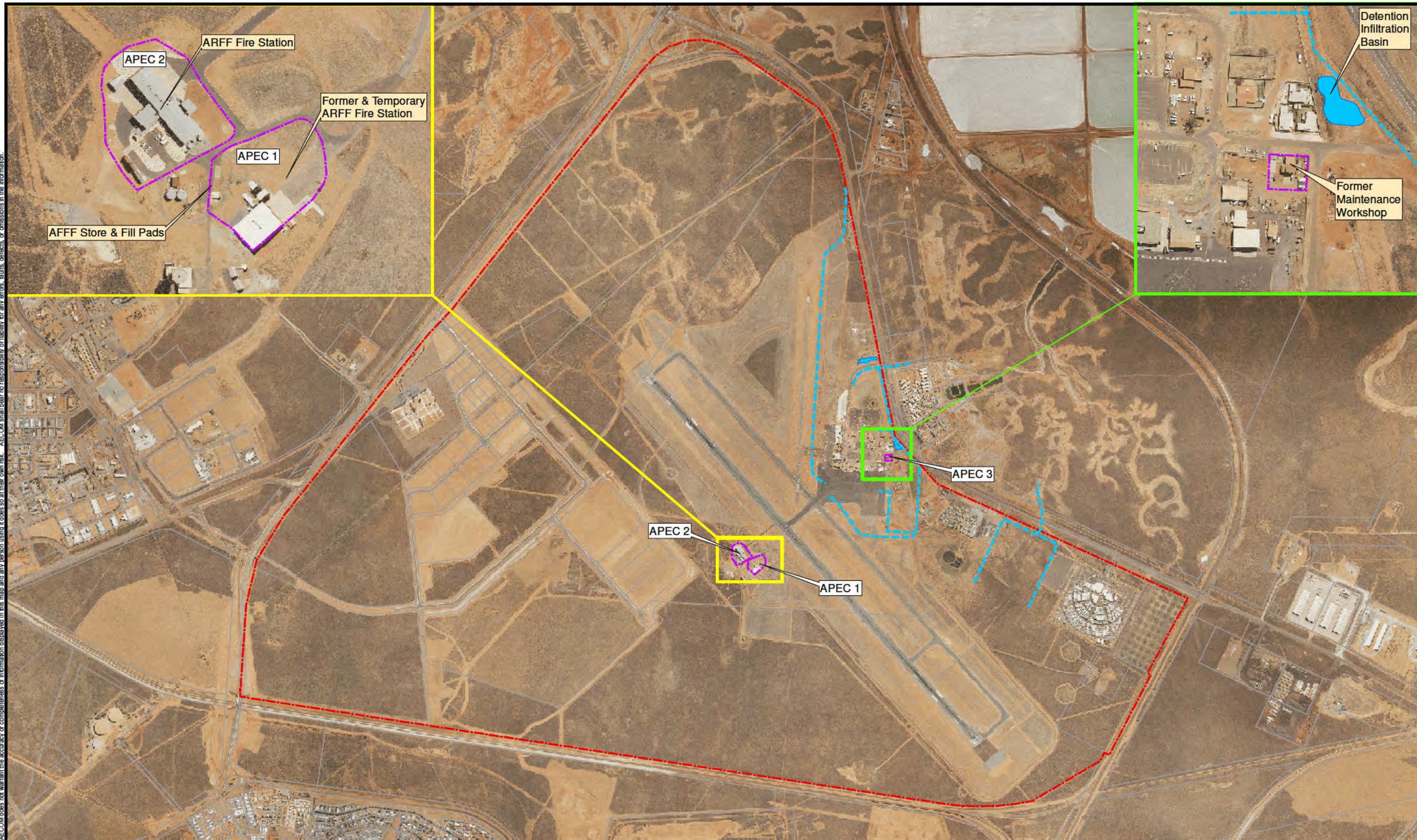
AIRSERVICES AUSTRALIA

PRELIMINARY SITE INVESTIGATION AND
LIMITED SAMPLING, PORT HEDLAND
AIR PORT

Figure
1b

Data sources:
Landgate Imagery (27/06/2015)
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0 200 400 600 800
metres
1:18,000 (when printed at A3)

LEGEND
Areas of Potential Concern
Airport Estate Boundary
Cadastral Boundary
'Living Stream' Swale Drainage
Detention Infiltration Basin

Data sources:
Detention Infiltration Basins, 'Living Stream' Swale
Drainage - Parsons Brinckerhoff, Whiteman Town Planning
(Master Plan - Precinct 1)

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

Investigated Areas of Potential Environmental Concern

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Figure
1c

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DATUM GDA 1994, PROJECTION MGA ZONE 50
0 10 20 30 40
metres
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- LEGEND**
- Monitoring Well (AECOM, 2017)
 - Existing Monitoring Well
 - Soil Bore
 - Areas of Potential Concern
 - Airport Estate Boundary

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.

Data sources:
Landgate Imagery (27/08/2015)
Base Data: (c) Based on information provided by and with the permission of the Western Australian Land Information Authority trading as Landgate (2010).

Soil Bore and Monitoring Well Locations - APEC 1 and 2

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Figure 2a

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N

DATUM GDA 1994, PROJECTION MGA ZONE 50

02468

metres

1:300 (when printed at A3)

LEGEND

- Monitoring Well (AECOM, 2017)
- Existing Monitoring Well
- Soil Bore
- Areas of Potential Concern
- Airport Estate Boundary

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.

Data sources:
Landgate Imagery (27/08/2015)
Base Data: (c) Based on information provided by and with the permission of the Western Australian Land Information Authority trading as Landgate (2010).

Soil Bore and Monitoring Well Locations - APEC 3

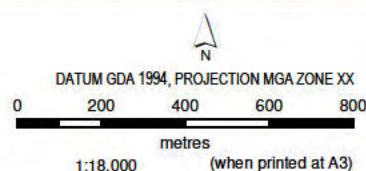
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Figure
2b

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LEGEND
S Sediment Sample Location
Detention Infiltration Basin
Airport Estate Boundary
Cadastral Boundary

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.

Data sources:
Detention Infiltration Basins, 'Living Stream' Swale
Drainage - Parsons Brinckerhoff/Whitsons Town Planning
(Master Plan - Precinct 1)
Base Data: (c) Based on information provided by and
with the permission of the Western Australian Land
Information Authority trading as Landgate (2010).

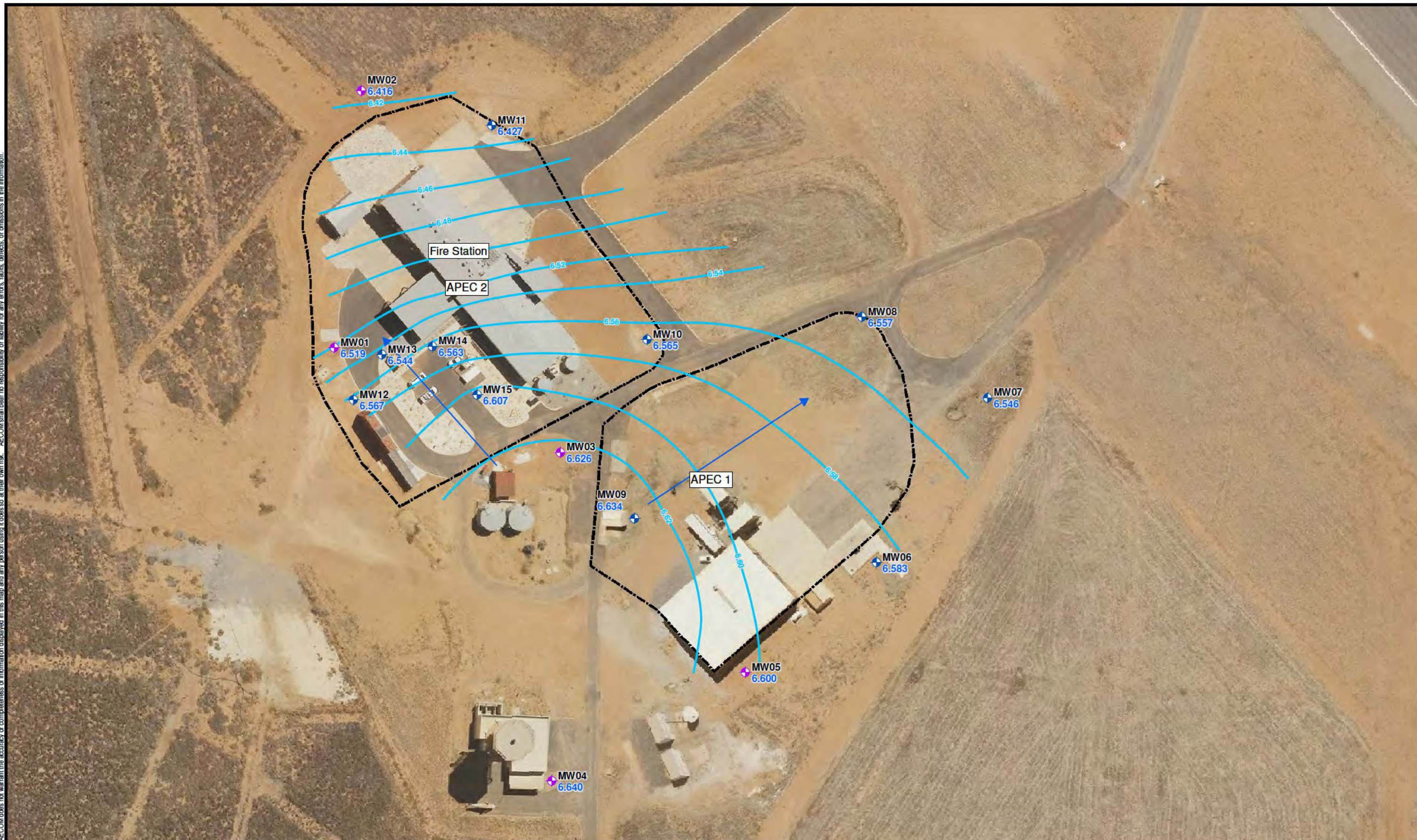
Sediment Sampling Locations

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PRELIMINARY SITE INVESTIGATION AND
LIMITED SAMPLING, PORT HEDLAND
AIRPORT

Figure
3

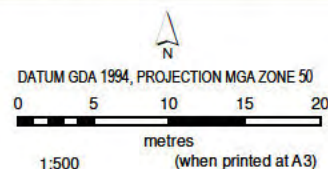
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- LEGEND**
- 0.846 Groundwater Elevation (m AHD)
 - Monitoring Well (AECOM, 2017)
 - Existing Monitoring Well
 - S Sediment Sample Location
 - Inferred Flow Direction
 - Interpolated Groundwater Contours (m AHD)
 - Detention Infiltration Basin
 - Airport Estate Boundary
 - Areas of Interest

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.

Data sources:
Landgate Imagery (27/08/2015)
Base Data: (c) Based on information provided by and with the permission of the Western Australian Land Information Authority trading as Landgate (2010).

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

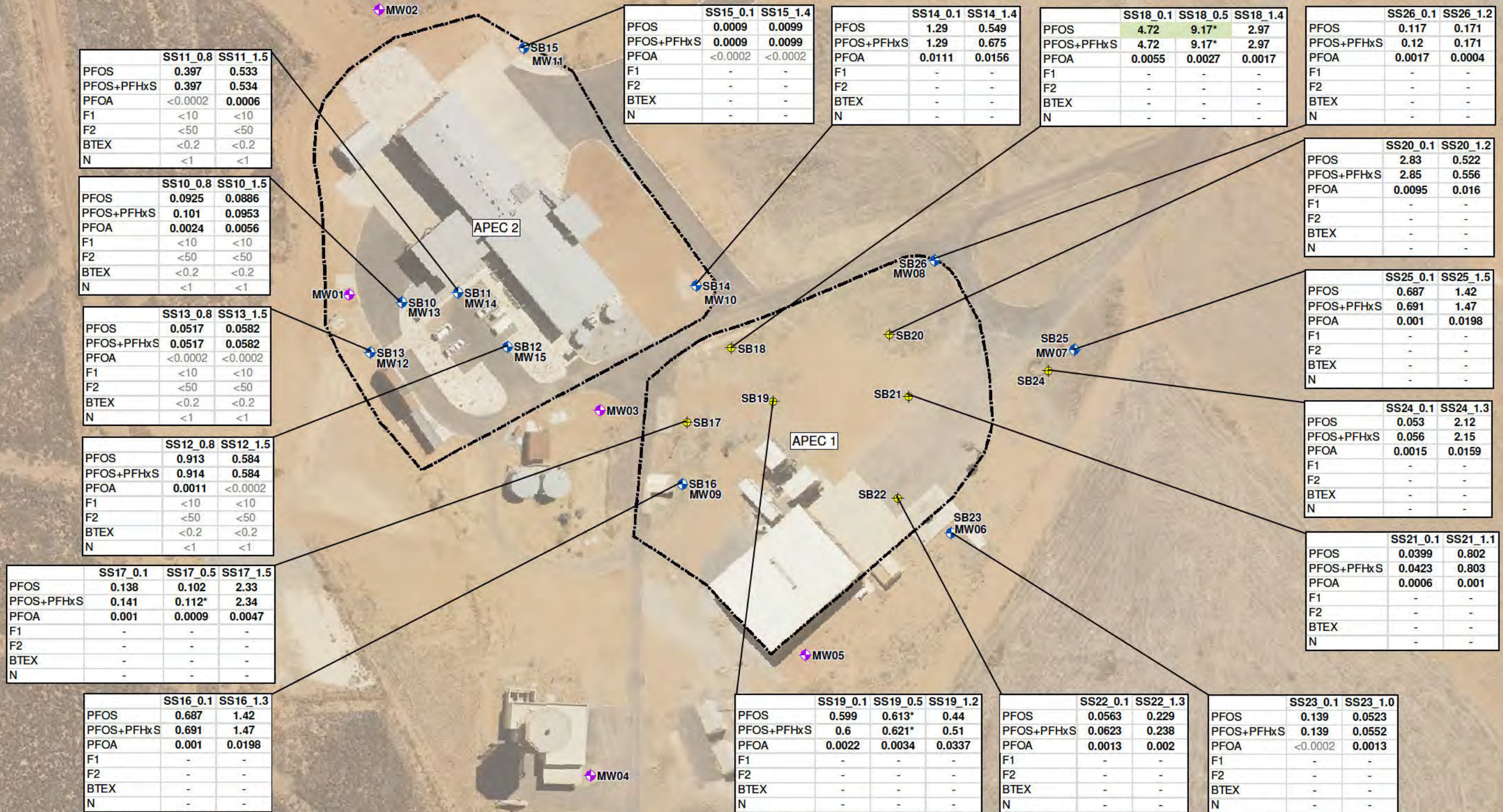
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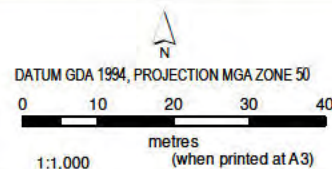
Figure

4b

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LEGEND
Monitoring Well (AECOM, 2017)
Existing Monitoring Well
Soil Bore
Areas of Potential Concern

Data sources:
Landgate Imagery (27/06/2015)

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
LOR = Limit of Reporting
all units are in mg/kg
- = not analysed
* = duplicate sample value adopted for conservatism
** = triplicate sample value adopted for conservatism
#1 Quantification of linear and branched isomers has been conducted as a single total response using the relative response factor for the corresponding linear/branched standard.

WA DER (2017) Interim Guideline on the Assessment and Management of PFAS.
Health Based Screening Level - Commercial and Industrial Landuse
Airservices (GHD) (2017) Derivation of PFAS Soil and Water Criteria - Health Based Screening Criteria (HBSC) - Commercial / Industrial Landuse - 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
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 Sample Analytical Results APEC 1 and 2

AIRSERVICES AUSTRALIA

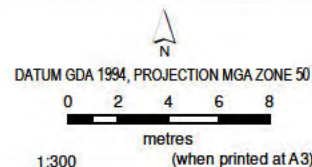
PRELIMINARY SITE INVESTIGATION AND LIMITED SAMPLING, PORT HEDLAND AIRPORT

Figure
5a

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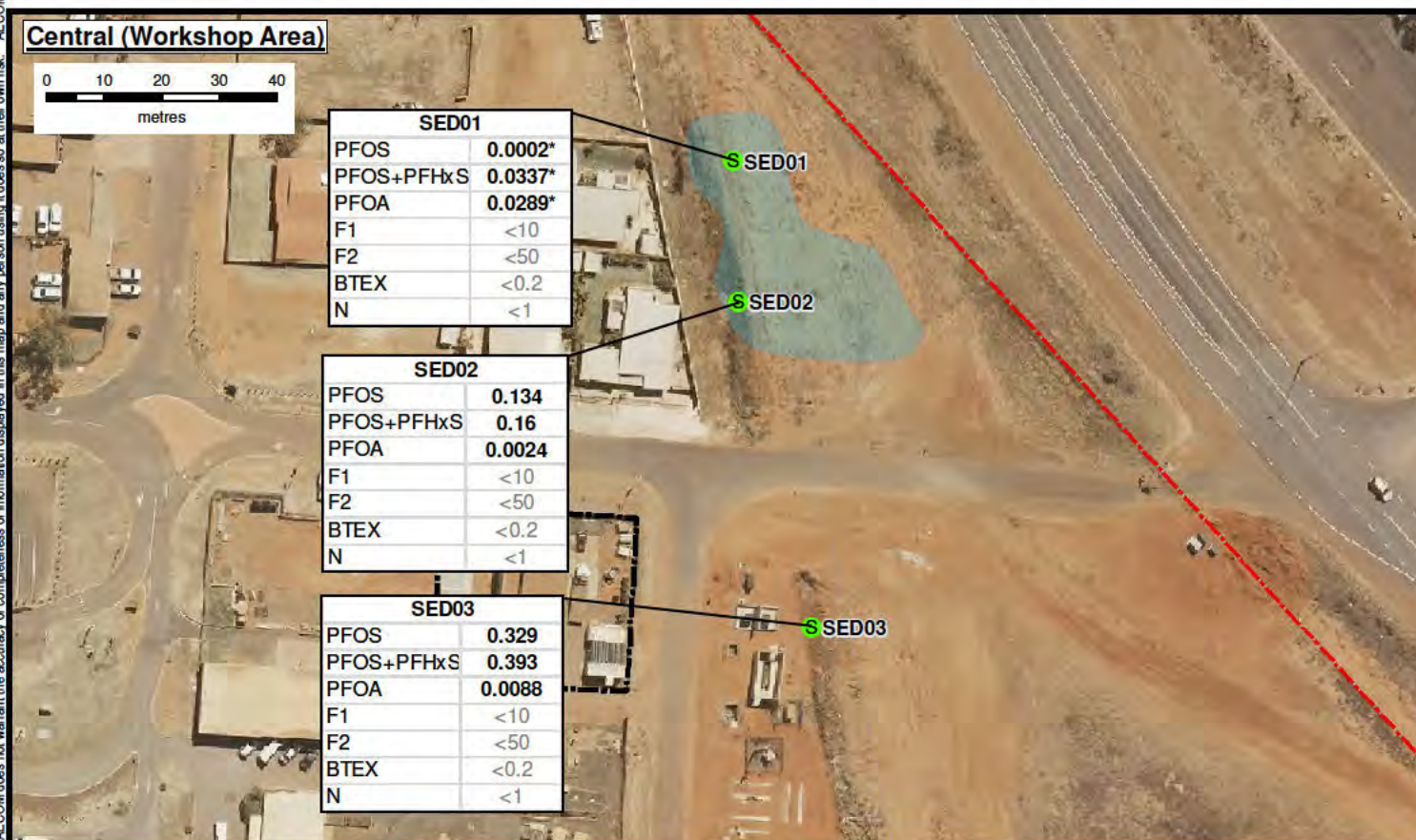
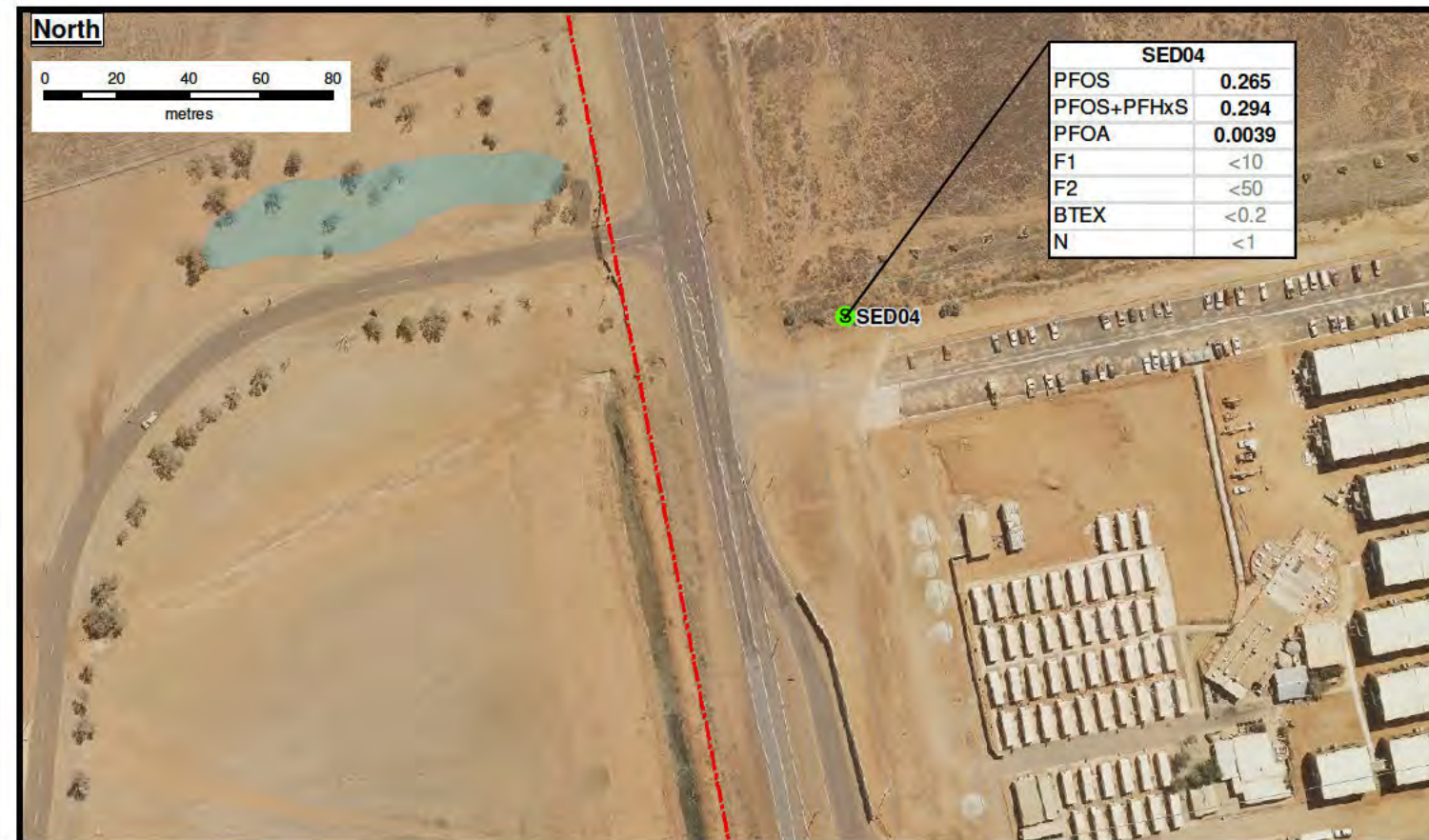
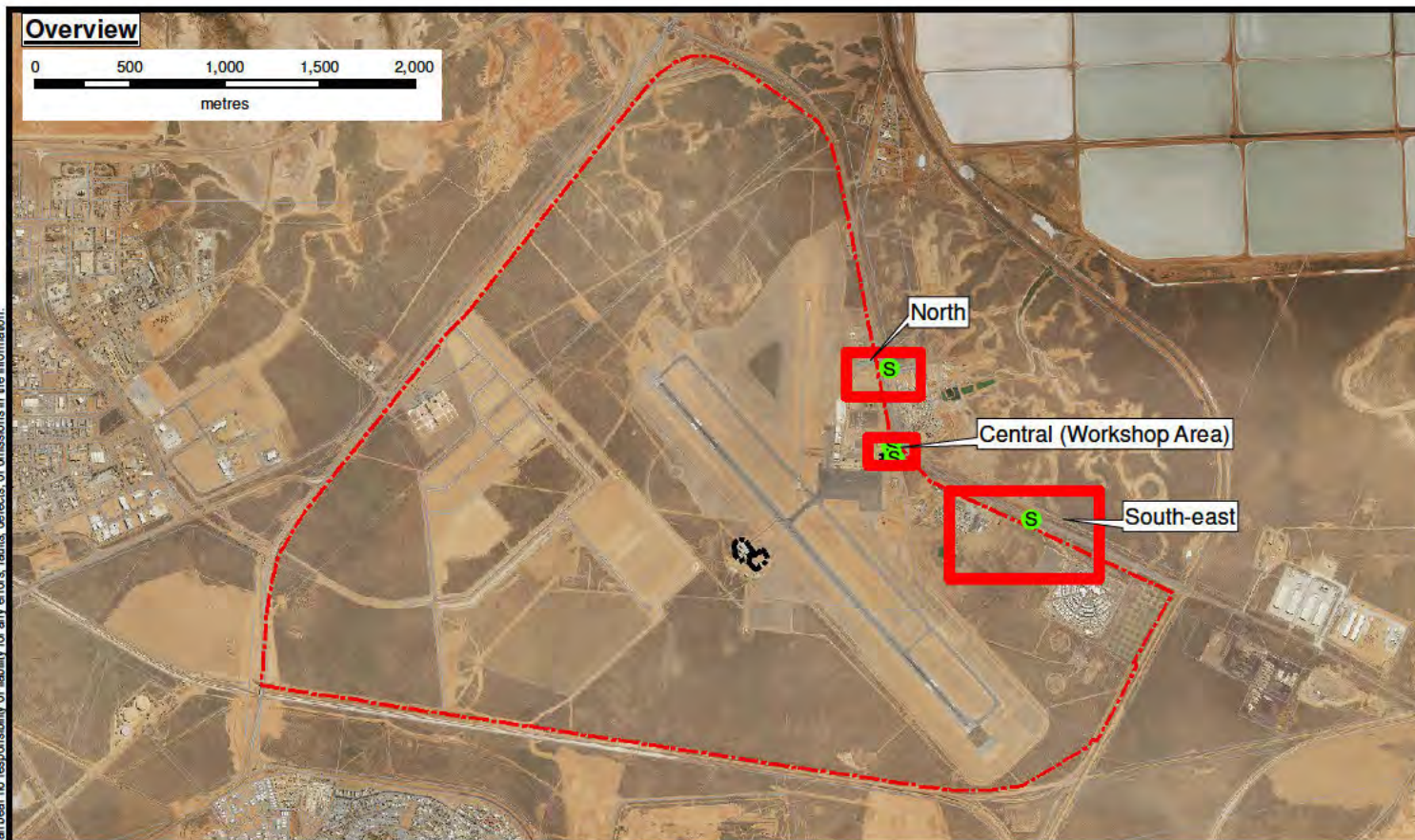


LEGEND

- Monitoring Well (AECOM, 2017)
- Existing Monitoring Well
- Soil Bore

Data sources:
Landgate Imagery (27/06/2015)
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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DATUM GDA 1994, PROJECTION MGA ZONE 50

Data sources:
Landgate Imagery (27/08/2015)

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

LEGEND

- S Sediment Sample Location
- Detention Infiltration Basin
- Airport Estate Boundary
- Areas of Potential Concern
- 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
LOR = Limit of Reporting
all units are in mg/kg
- = not analysed
* = duplicate sample value adopted for conservatism
** = triplicate sample value adopted for conservatism
#1 Quantification of linear and branched isomers has been conducted as a single total response using the relative response factor for the corresponding linear/branched standard.

WA DER (2017) Interim Guideline on the Assessment and Management of PFAS.
Health Based Screening Level - Commercial and Industrial Landuse
Airservices (GHD) (2017) Derivation of PFAS Soil and Water Criteria - Health Based Screening Criteria (HBSC) - Commercial / Industrial Landuse - 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
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 Sample Analytical Results

AIRSERVICES AUSTRALIA

PRELIMINARY SITE INVESTIGATION AND LIMITED SAMPLING, PORT HEDLAND AIRPORT

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MW02	
PFOS	1.45
PFOS+PFHxS	55
PFOA	1.5
F1	<20
F2	<100
BTEX	<1
N	<5

MW14	
PFOS	2490
PFOS+PFHxS	4610*
PFOA	144
F1	<20
F2	<100
BTEX	<1
N	<5

MW13	
PFOS	1350
PFOS+PFHxS	3680
PFOA	131
F1	<20
F2	160
BTEX	<1
N	<5

MW01	
PFOS	548
PFOS+PFHxS	628
PFOA	8.22
F1	<20
F2	<100
BTEX	<1
N	<5

MW12	
PFOS	101
PFOS+PFHxS	114
PFOA	0.99
F1	<20
F2	<100
BTEX	<1
N	<5

MW15	
PFOS	7180
PFOS+PFHxS	7250
PFOA	10.4
F1	<20
F2	<100
BTEX	<1
N	<5

MW03	
PFOS	28,800
PFOS+PFHxS	29,800
PFOA	97
F1	<20
F2	<100
BTEX	<1
N	<5

MW09	
PFOS	300
PFOS+PFHxS	790
PFOA	68.6
F1	<20
F2	<100
BTEX	<1
N	<5

MW11	
PFOS	1.7
PFOS+PFHxS	71
PFOA	2.01
F1	<20
F2	<100
BTEX	<1
N	<5

MW10	
PFOS	2740
PFOS+PFHxS	3660
PFOA	132
F1	<20
F2	<100
BTEX	<1
N	<5

MW08	
PFOS	437
PFOS+PFHxS	1020
PFOA	36.1
F1	<20
F2	<100
BTEX	<1
N	<5

MW07	
PFOS	3410
PFOS+PFHxS	5600
PFOA	153
F1	<20
F2	<100
BTEX	<1
N	<5

MW06	
PFOS	512
PFOS+PFHxS	1600
PFOA	36
F1	<20
F2	<100
BTEX	<1
N	<5

MW05	
PFOS	1630
PFOS+PFHxS	2610
PFOA	47.9
F1	<20
F2	<100
BTEX	<1
N	<5

MW04	
PFOS	152
PFOS+PFHxS	334
PFOA	7.28
F1	<20
F2	<100
BTEX	<1
N	<5

APEC 2

APEC 1

PROJECT ID 60543717

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Monitoring Well (AECOM, 2017)

Existing Monitoring Well

Areas of Potential Concern

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 value adopted

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 Sample Analytical Results

APEC 1 and 2

AIRSERVICES AUSTRALIA

PRELIMINARY SITE INVESTIGATION AND LIMITED SAMPLING, PORT HEDLAND AIRPORT

Figure 6a

DATUM GDA 1994, PROJECTION MGA ZONE 50

0 10 20 30 40

metres

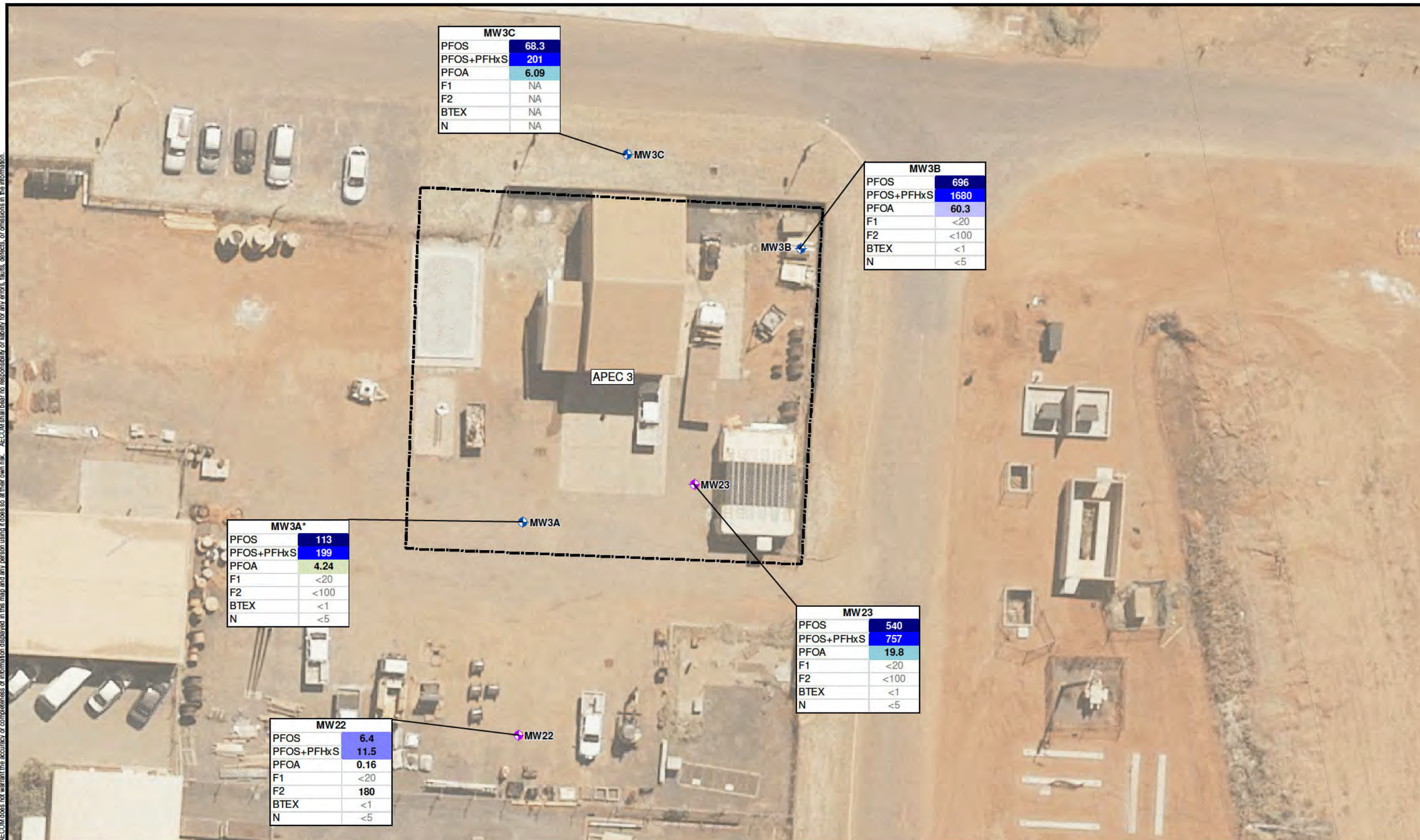
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(when printed at A3)

Map Document: \\AUPER1\FP001.au.aecomnet.com\Projects\60543717\Tech Work Area\4.99 GIS\02_MXD\PSI_LIPHA_Port_Hedland_Airport_Aug2017\60543717_Fig 6a_GWSampling_APEC1_2_v2_A3L.mxd

A3 size

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DATUM GDA 1994, PROJECTION MGA ZONE 50
0 2 4 6 8
metres
1:300 (when printed at A3)

LEGEND

- Monitoring Well (AECOM, 2017)
- Existing Monitoring Well

Data sources:
Landgate Imagery (27/06/2015)

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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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.

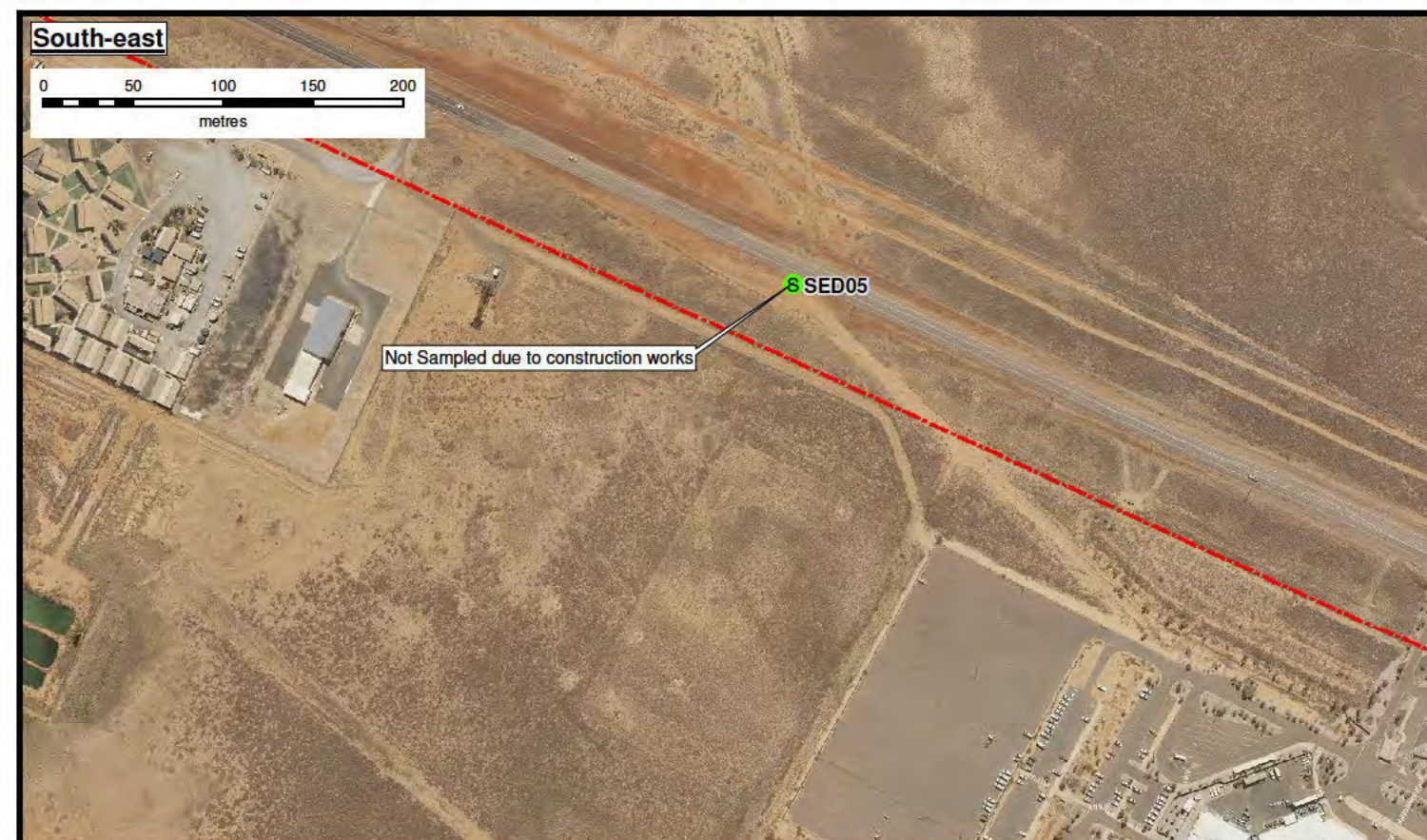
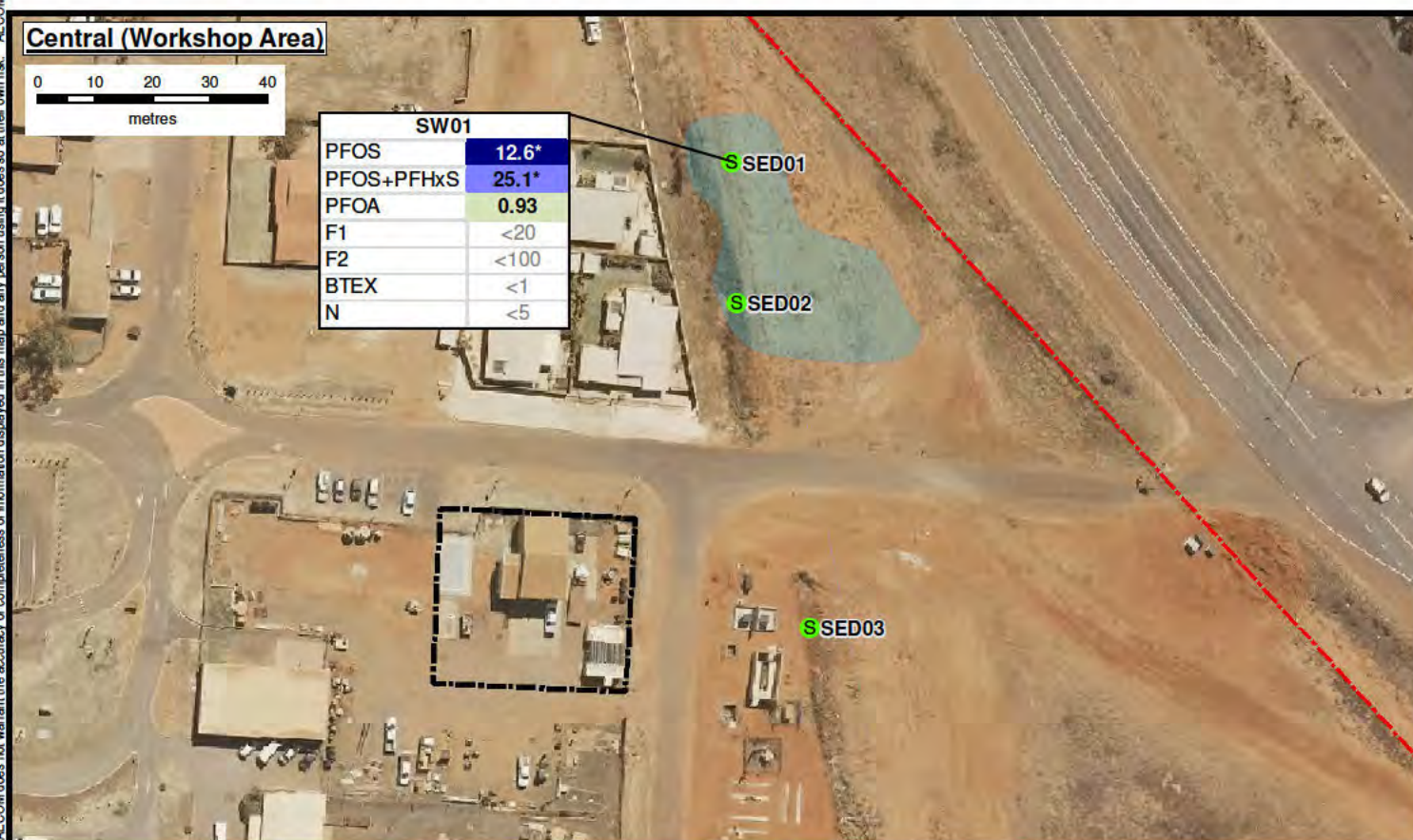
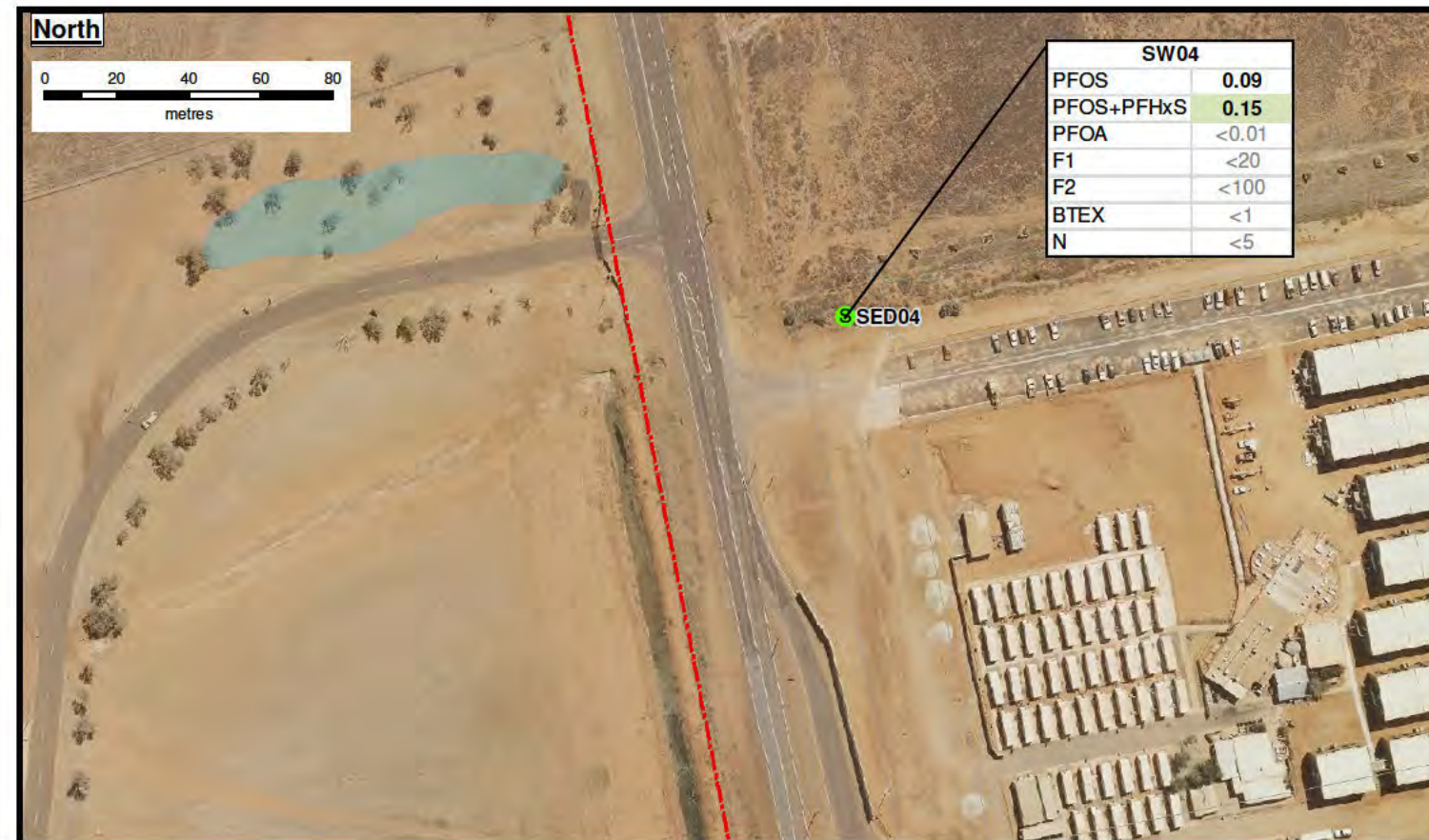
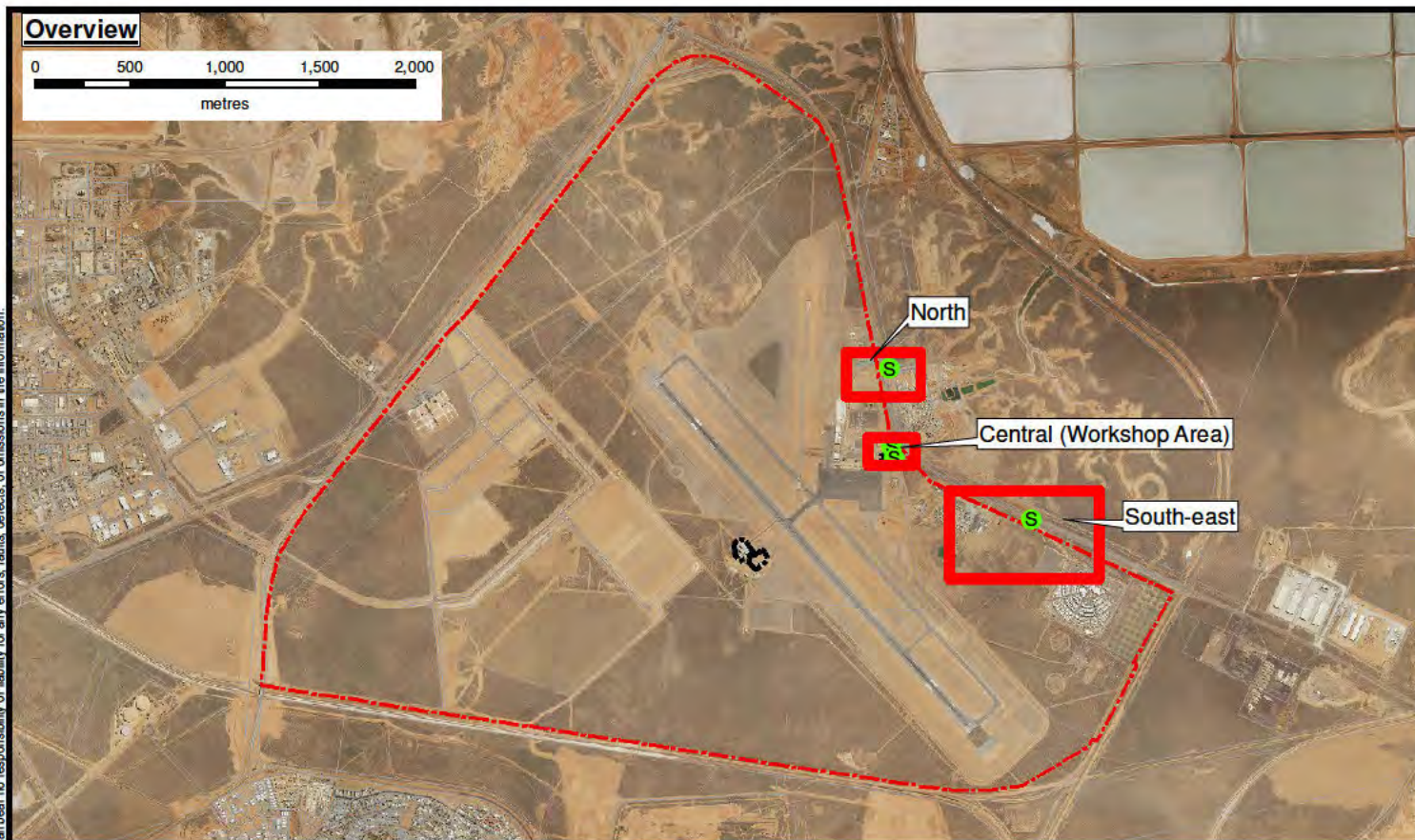
Groundwater Sample Analytical Results APEC 3

AIRSERVICES AUSTRALIA

PRELIMINARY SITE INVESTIGATION AND LIMITED SAMPLING, PORT HEDLAND AIRPORT

Figure
6b

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PROJECT ID 60543717
CREATED BY [Redacted]
APPROVED BY [Redacted]
LAST MODIFIED 15 DEC 2017

AECOM
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DATUM GDA 1994, PROJECTION MGA ZONE 50

Data sources:
Landgate Imagery (27/08/2015)

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

LEGEND

- S Sediment Sample Location
- Detention Infiltration Basin
- Airport Estate Boundary
- Areas of Potential Concern
- 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 value adopted

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.

Surfacewater Sample Analytical Results

AIRSERVICES AUSTRALIA

PRELIMINARY SITE INVESTIGATION AND LIMITED SAMPLING, PORT HEDLAND AIRPORT

Figure
6c

Tables

Table T1: MW Register and Gauging Data

	Monitoring Well	Date	Top of Casing Elevation (mAHD)	Well Depth (m)	Depth to Water (mbtoc)	Groundwater Elevation (mAHD)	Easting	Northing	Ground Level (mAHD)
Fire Station (FS)	MW01	26/06/2017	8.199	5.780	1.680	6.519	669671.640	7745369.833	8.250
	MW02	26/06/2017	8.427	4.465	2.011	6.416	669679.245	7745441.954	7.861
	MW03	26/06/2017	8.041	4.040	1.415	6.626	669735.147	7745340.468	8.111
	MW10	26/06/2017	8.135	3.990	1.570	6.565	669759.441	7745372.104	8.211
	MW11	26/06/2017	8.112	3.980	1.685	6.427	669715.849	7745432.273	8.218
	MW12	26/06/2017	7.832	4.000	1.265	6.567	669676.989	7745355.178	7.904
	MW13	26/06/2017	8.299	4.000	1.755	6.544	669684.984	7745367.870	8.368
	MW14	26/06/2017	8.123	4.000	1.560	6.563	669699.172	7745370.300	8.205
	MW15	26/06/2017	8.225	3.980	1.618	6.607	669711.733	7745356.622	8.246
Former Fire Station (FFS)	MW04	26/06/2017	8.514	5.950	1.874	6.640	669732.735	7745248.074	8.529
	MW05	26/06/2017	8.393	4.420	1.793	6.600	669787.162	7745278.631	7.861
	MW06	26/06/2017	7.948	3.990	1.365	6.583	669823.931	7745309.504	7.968
	MW07	26/06/2017	7.901	3.980	1.355	6.546	669855.140	7745355.821	7.943
	MW08	26/06/2017	7.745	3.980	1.188	6.557	669819.844	7745378.456	7.794
	MW09	26/06/2017	7.976	3.990	1.342	6.634	669755.928	7745321.880	7.990
Former Workshop (FWKSP)	MW22	27/06/2017	6.553	5.500	0.680	5.873	670448.582	7745840.305	6.586
	MW23	27/06/2017	6.639	3.870	0.821	5.818	670463.415	7745861.426	6.675
	MW3A	27/06/2017	6.645	3.510	0.790	5.855	670448.941	7745858.250	6.672
	MW3B	27/06/2017	6.639	3.570	1.015	5.624	670472.335	7745881.258	6.741
	MW3C	27/06/2017	6.740	3.520	0.885	5.855	670457.747	7745889.217	6.765

Legend

mAHD = meters Australian Height Datum

m = metres

mbtoc = metres below top of casing

Monitoring Well Survey Completed on 28 June 2017

Horizontal Datum

Vertical Datum AHD

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

Table T2: Groundwater Field Chemistry

	Location	Sample Date	Purge Volume	Dissolved Oxygen	pH	Electrical conductivity	Total Dissolved Solids	Redox Potential (Field)	Temperature	Comments
			L	mg/L	pH Units	µS/cm	mg/L	mV	°C	
Fire Station (FS)	MW01	27/06/2017	2.0	0.84	7.18	1,495	972	84	29.0	Moderate-High Turbidity, Red/Brown, Odourless
	MW02	27/06/2017	2.5	0.20	7.04	14,647	9,521	22	29.6	Moderate Turbidity, Odourless
	MW03	26/06/2017	1.5	1.52	7.47	1,737	1,129	103	28.6	Grey/Brown, moderate Turbidity, Odourless, Foamy/ Bubbly when sampling
	MW10	26/06/2017	1.5	2.21	7.32	882	573	102	29.7	Yellow-Light Brown, Odourless, Low turbidity, some bubbles/foaming when sampling
	MW11	27/06/2017	2.0	1.6	7.34	2,370	1,541	86	29.4	Red/Orange, High Turbidity, Odourless
	MW12	27/06/2017	2.2	0.91	7.18	538	350	79	29.1	Moderate Turbidity, Odourless, Light Brown
	MW13	27/06/2017	2.2	0.31	6.97	4,714	3,064	89	30.0	Brown/Red, Odourless, High Turbidity
	MW14	27/06/2017	2.0	1.11	6.8	3,710	2,412	95	28.5	High Turbidity, Red-Brown, Odourless
	MW15	27/06/2017	2.0	1.76	6.44	939	610	108	28.5	Moderately Turbidity, Odourless, Light Brown-Yellow
Former Fire Station (FFS)	MW04	26/06/2017	2.0	3.09	7.24	631	410	154	28.7	Yellow-Brown, Silty/High Turbidity, Odourless
	MW05	26/06/2017	1.5	2.88	7.07	5,167	3,359	129	27.5	Light Brown, Odourless, Low Turbidity
	MW06	26/06/2017	2.6	3.27	7.03	5,880	3,822	83	27.5	Transparent, Light yellow-brown, odourless
	MW07	27/06/2017	2.0	0.33	7.15	7,028	4,568	90	27.6	Moderate Turbidity, Odourless, Brown/Red
	MW08	26/06/2017	1.6	0.21	6.83	3,032	1,971	101	30.1	Pale yellow, odourless, Low Turbidity
	MW09	26/06/2017	1.6	0.98	7.07	1,197	778	48	27.9	Light Yellow-Brown, Odourless, Moderate Turbidity
Former Workshop (FWKSP)	MW22	27/06/2017	2.5	0.28	7.38	5,135	3,338	-97	28.1	No Turbidity/Transparent, Odourless, Light Brown/Colourless
	MW23	27/06/2017	1.7	2.61	7.45	4,089	2,658	123	23.7	Odourless, No Turbidity/ Transparent, Colourless
	MW3A	27/06/2017	1.9	0.53	7.43	3,150	2,048	105	23.2	No Turbidity/Transparent, Colourless
	MW3B	27/06/2017	2.0	0.48	6.95	5,320	3,458	-36	25.4	No Turbidity/Transparent, Odourless, Colourless
	MW3C	27/06/2017	2.0	0.3	6.99	8,868	5,764	-94	25.5	Transparent, Colourless, Odourless

Legend
°C = degrees Celsius
µS/cm = microsiemens per centimetre
mg/L = milligrams per litre
mV = millivolts
*TDS is calculated as EC x 0.65
It is noted that the APEC boundaries were broadly identified based on historical land use activities and are not directly correlated with the current Airservices lease areas.

Table T3 Laboratory Analytical Results- PFAS Concentrations Detected in Soil and Sediment

				Fire Station (FS)													
				MW10		MW11		MW12		MW13		MW14		MW15			
Location				SS14 0.1 170617	SS14 1.4 170617	SS15 0.1 170617	SS15 1.4 170617	SS13 0.8 160617	SS13 1.5 160617	SS10 0.8 160617	SS10 1.5 160617	SS11 0.8 160617	SS11 1.5 160617	SS12 0.8 160617	SS12 1.5 160617		
Sample ID				0.1	1.4	0.1	1.4	0.8	1.5	0.8	1.5	0.8	1.5	0.8	1.5		
Sample Depth				17/06/2017	17/06/2017	17/06/2017	17/06/2017	16/06/2017	16/06/2017	16/06/2017	16/06/2017	16/06/2017	16/06/2017	16/06/2017	16/06/2017		
Sample Type				Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary		
Lab Report No.				EP1706611	EP1706611	EP1706611	EP1706611	EP1706611	EP1706611	EP1706611	EP1706611	EP1706611	EP1706611	EP1706611	EP1706611		
				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	Unit	LOR															
Per- and Polyfluoroalkyl	Sum of PFAS	mg/kg	0.0002					1.55	0.843	0.0009	0.0099	0.0517	0.0584	0.112	0.11	0.397	0.538
	Sum of PFAS (WA DER List)	mg/kg	0.0002					1.52	0.832	0.0009	0.0099	0.0517	0.0582	0.105	0.102	0.397	0.534
	Sum of PFHxS and PFOS	mg/kg	0.0002			81	100	1.29	0.675	0.0009	0.0099	0.0517	0.0582	0.101	0.0953	0.397	0.534
	10:2 FTS	mg/kg	0.0005					<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
	N-Methyl perfluorooctane sulfonamidoacetic acid (M	mg/kg	0.0002					<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	PFPeS	mg/kg	0.0002					<0.0005	0.0082	<0.0002	<0.0002	<0.0002	0.0011	0.0007	<0.0002	<0.0002	<0.0002
	PFHpS	mg/kg	0.0002					0.004	0.0022	<0.0002	<0.0002	<0.0002	0.0059	0.0083	<0.0002	0.0039	0.0031
	PFHxS	mg/kg	0.0002				100	<0.0005	0.126	<0.0002	<0.0002	<0.0002	0.0088	0.0067	<0.0002	0.0006	0.0007
Surfactants	N-Ethyl perfluorooctane sulfonamidoacetic acid (Et	mg/kg	0.0002					<0.0005	<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	<0.0005	<0.0005
	PFOA	mg/kg	0.0002	3.73	240	680	1000	0.0111	0.0156	<0.0002	<0.0002	<0.0002	0.0024	0.0056	<0.0002	0.0006	0.0011
	PFOS	mg/kg	0.0002	4.71	90			1.29	0.549	0.0009	0.0099	0.0517	0.0582	0.0925	0.0886	0.397	0.533
Organic	4:2 FTS	mg/kg	0.0005					<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
	PFBA	mg/kg	0.001					0.003	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	PFPeA	mg/kg	0.0002					<0.0005	0.0106	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	8:2 FTS	mg/kg	0.0005	3.73	240			<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorinated Compounds (PFCS)	N-Me-FOSA	mg/kg	0.0005					<0.0012	<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					<0.0012	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
	FOSA	mg/kg	0.0002					0.024	0.0004	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0055	0.0004
	PFBS	mg/kg	0.0002					<0.0005	0.0046	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	PFDS	mg/kg	0.0002					<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.004	<0.0002
	PFTeDA	mg/kg	0.0005					<0.0012	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
	PFTtDA	mg/kg	0.0002					<0.0005	<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					<0.0012	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
	PFDoA	mg/kg	0.0002					0.0063	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0003	<0.0002
	PFHpA	mg/kg	0.0002					0.0209	0.0091	<0.0002	<0.0002	<0.0002	0.0003	<0.0002	<0.0002	<0.0002	<0.0002
	PFHxA	mg/kg	0.0002					0.192	0.115	<0.0002	<0.0002	<0.0002	0.0014	0.0006	<0.0002	0.0003	<0.0002
	N-Et-FOSE	mg/kg	0.0005					<0.0012	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
	PFDoA	mg/kg	0.0002					0.0007	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	PFNA	mg/kg	0.0002					<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0002	0.0002	<0.0002
	PFLnA	mg/kg	0.0002					<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	Moisture Content	%	1					2.4	20.7	3.8	10.5	6.2	13.3	4.8	9.3	5.9	17.5
																6.2	16.4

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 inear/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

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

Table T3 Laboratory Analytical Results- PFAS Concentrations Detected in Soil and Sediment

				Former Fire Station (FFS)														
				MW06		MW07		MW08		MW09		SB17						
Location	Sample ID	Sample Depth	Sample Date	Sample Type	Lab Report No.	SS23 0.1 170617	SS23 1.0 170617	SS25 0.1 170617	SS25 1.5 170617	SS26 0.1 170617	SS26 1.2 170617	SS16 0.1 170617	SS16 1.3 170617	SS17 0.1 180617	SS17 0.5 180617	SSQA012 180617	SSQA013 180617	SS17 1.5 180617
						0.1	1	0.1	1.5	0.1	1.2	0.1	1.3	0.1	0.5	0.5	0.5	1.5
						17/06/2017	17/06/2017	17/06/2017	17/06/2017	17/06/2017	17/06/2017	17/06/2017	17/06/2017	18/06/2017	18/06/2017	18/06/2017	18/06/2017	18/06/2017
						Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Duplicate	Triplicate	Primary
						EP1706611	EP1706611	EP1706611	EP1706611	EP1706611	EP1706611	EP1706611	EP1706611	EP1706611	EP1706611	EP1706611	551304	EP1706611

Data Comments

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

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 (HISLs)- 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

It is noted that the APEC boundaries were broadly identified based on historical land use activities and are not directly correlated with the c

Table T3 Laboratory Analytical Results- PFAS Concentrations Detected in Soil and Sediment

				Former Fire Station (FFS)																			
				Former Fire Station (FFS)				Former Fire Station (FFS)															
Location				SB18				SB19				SB20				SB21				SB24			
Sample ID	SS18 0.1 180617	SS18 0.5 180617	SSQA018 180617	SSQA019 180617	SS18 1.4 180617	SS19 0.1 180617	SS19 0.5 180617	SSQA020 180617	SSQA021 180617	SS19 1.2 180617	SS20 0.1 180617	SS20 1.2 180617	SS21 0.1 180617	SS21 1.1 180617	SS24 0.1 180617	SS24 1.3 180617							
Sample Depth	0.1	0.5	0.5	0.5	1.4	0.1	0.5	0.5	0.5	1.2	0.1	1.2	0.1	1.1	0.1	1.3							
Sample Date	18/06/2017	18/06/2017	18/06/2017	18/06/2017	18/06/2017	18/06/2017	18/06/2017	18/06/2017	18/06/2017	18/06/2017	18/06/2017	18/06/2017	18/06/2017	18/06/2017	18/06/2017	18/06/2017							
Sample Type	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Duplicate	Triplicate	Primary	Primary	Primary	Primary	Primary	Primary	Primary							
Lab Report No.	EP1706611	EP1706611	EP1706611	551304	EP1706611	EP1706611	EP1706611	EP1706611	551304	EP1706611	EP1706611	EP1706611	EP1706611	EP1706611	EP1706611	EP1706611							

Data Comments

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

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 (HISLs)- 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

It is noted that the APEC boundaries were broadly identified based on historical land use activities and are not directly correlated with the c

Table T3 Laboratory Analytical Results- PFAS Concentrations Detected in Soil and Sediment

				Former Workshop (FWKSP)																	Boundary (BDY)		
Location				MW22		MW3A		MW3B		MW3C		SS3D		SED01		SED02	SED03	SED04					
Sample ID				SS22 0.1 180617	SS22 1.3 180617	SS3A 0.1 190617	SS3A 0.8 190617	SS3B 0.1 190617	SS3B 1.0 190617	SS3C 0.1 190617	SS3C 0.9 190617	SS3D 0.1 190617	SS3D 1.0 190617	SED01 280617	SEDQA01 280617	SEDQA02 280617	SED02 280617	SED03 280617	SED04 280617				
Sample Depth				0.1	1.3	0.1	0.8	0.1	1	0.1	0.9	0.1	1	-	-	-	-	-	-				
Sample Date				18/06/2017	18/06/2017	19/06/2017	19/06/2017	19/06/2017	19/06/2017	19/06/2017	19/06/2017	19/06/2017	19/06/2017	28/06/2017	28/06/2017	28/06/2017	28/06/2017	28/06/2017	28/06/2017				
Sample Type				Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Duplicate	Triplicate	Primary	Primary	Primary				
Lab Report No.				EP1706611	EP1706611	EP1706611	EP1706611	EP1706611	EP1706611	EP1706611	EP1706611	EP1706611	EP1706611	EP1707075	EP1707075	EP1707075	EP1707075	EP1707075					
				ASA (GHD) 2015. EISLs - Comm / Ind 60% species protection level	ASA (GHD) 2015. HISLs- Industrial (direct Contact)	ASA (GHD) 2017. HBSC Comm / Ind (after FSANZ TDI)	WA DER - 2017. Health Based Screening Levels Comm / Ind																
Analyte	Unit	LOR																					
Per- and Polyfluoroalkyl Substances	Sum of PFAS	mg/kg	0.0002					0.0762	0.246	2.01	1.59	0.0413	1.49	0.928	0.244	0.0452	0.641	-	-	-	-	-	
	Sum of PFAS (WA DER List)	mg/kg	0.0002					0.0696	0.243	1.96	1.54	0.0407	1.48	0.924	0.236	0.0437	0.633	0.023	0.0349	0.0302	0.168	0.414	0.305
	Sum of PFHxS and PFOS	mg/kg	0.0002			81	100	0.0623	0.238	1.94	1.52	0.0407	1.47	0.918	0.224	0.0434	0.628	0.0219	0.0337	0.0291	0.16	0.393	0.294
	10:2 FTS	mg/kg	0.0005					<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
	N-Methyl perfluorooctane sulfonamidoacetic acid (M	mg/kg	0.0002					<0.0002	<0.0002	0.0011	0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	-	-	-	-	-	-
	PFPeS	mg/kg	0.0002					0.0019	0.0008	0.0053	0.0057	<0.0002	0.0023	0.0012	0.0038	<0.0002	0.0007	-	-	-	-	-	-
	PFHpS	mg/kg	0.0002					0.0007	0.0013	0.0056	0.0058	<0.0002	0.0026	0.0043	0.0002	0.0064	-	-	-	-	-	-	
	PFHxS	mg/kg	0.0002				100	0.006	0.0092	0.0226	0.0237	0.0008	0.0098	0.0098	0.0183	0.0016	0.0092	0.0045	0.0048	0.0045	0.0261	0.0641	0.0294
Surfactants	N-Ethyl perfluorooctane sulfonamidoacetic acid (Et	mg/kg	0.0002					<0.0002	<0.0002	0.0014	0.0016	<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	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Organic Perfluorinated Compounds (PFCA)	PFOA	mg/kg	0.0002	3.73	240	680	1000	0.0013	0.002	0.0041	0.0042	<0.0002	0.0079	0.0028	0.003	0.0003	0.0036	<0.0002	0.0002	0.0002	0.0024	0.0088	0.0039
	PFOS	mg/kg	0.0002	4.71	90			0.0563	0.229	1.92	1.5	0.0399	1.46	0.908	0.206	0.0418	0.619	0.0174	0.0289	0.0246	0.134	0.329	0.265
	4:2 FTS	mg/kg	0.0005					<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
	PFBA	mg/kg	0.001					<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	PFPeA	mg/kg	0.0002					0.0008	<0.0002	0.0021	0.002	<0.0002	0.0007	0.0003	0.0006	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005
	6:2 FTS	mg/kg	0.0005	3.73	240			<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
	N-Me-FOSA	mg/kg	0.0005					<0.0005	<0.0005	0.0006	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	0.0006	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	-	-	-	-	-	-
	FOSA	mg/kg	0.0002					0.0007	<0.0002	0.0157	0.0156	0.0003	0.0006	<0.0002	0.0007	<0.0002	0.0002	-	-	-	-	-	-
	PFBS	mg/kg	0.0002					0.0011	0.0002	0.0017	0.0018	<0.0002	0.0012	0.0007	0.0016	<0.0002	<0.0002	0.0005	0.0004	0.0003	0.0016	0.0029	0.002
	PFTeDA	mg/kg	0.0005					<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	-	-	-	-	-	-
	PFTdA	mg/kg	0.0002					<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	-	-	-	-	-	-
	N-Et-FOSA	mg/kg	0.0005					<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	-	-	-	-	-	-
	PFDA	mg/kg	0.0002					<0.0002	<0.0002	0.0003	0.0003	<0.0002	0.0003	<0.0002	<0.0002	<0.0002	<0.0002	-	-	-	-	-	-
	PFHpA	mg/kg	0.0002					0.0004	0.0004	0.0009	0.001	<0.0002	0.0005	0.0003	0.0011	<0.0002	0.0002	<0.0002	<0.0002	<0.0002	<0.0005	0.0018	<0.0005
	PFHxA	mg/kg	0.0002					0.0037	0.0023	0.0111	0.0117	<0.0002	0.0038	0.002	0.0056	<0.0002	0.0007	0.0006	0.0006	0.0006	0.0036	0.0078	0.0046
	N-Et-FOSE	mg/kg	0.0005					<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	-	-	-	-	-	-
	PFDoA	mg/kg	0.0002					<0.0002	<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	0.0004	<0.0002	<0.0002	<0.0002	0.0003	<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	<0.0002	<0.0002	-	-	-	-	-	-	
Moisture Content				%	1			4.3	17.6	5.5	10.6	8.3	9.8	4.8	10	4.8	9.2	14.4	-	-	12.9	15.9	30.8

Data Comments

#1. Quantification of linear and branched isomers has been conducted as a single total response using the relative response factor for the 1
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 (HiSLs)- 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

It is noted that the APEC boundaries were broadly identified based on historical land use activities and are not directly correlated with the c

Table T4: Laboratory Analytical Results- PFAS Concentrations Detected in Groundwater and Surface Water

									Fire Station (FS)										
									Location	MW01	MW02	MW10	MW11	MW12	MW13	MW14			MW15
									Sample Type	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Duplicate	Triplicate	Primary
									Sample ID	MW01_270617	MW02_270617	MW010_260617	MW011_270617	MW012_270617	MW013_270617	MW014_270617	WQA07_270617	WQA08_270617	MW015_270617
									Sample Date	27/06/17	27/06/17	26/06/17	27/06/17	27/06/17	27/06/17	27/06/17	27/06/17	27/06/17	27/06/17
									Lab Report No.	EP1707075	EP1707075	EP1707075	EP1707075	EP1707075	EP1707075	EP1707075	EP1707075	552887	EP1707075
Per- and Polyfluoroalkyl	Analyte	Unit	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)										
	Sum of PFAS (WA DER List)	µg/L	0.01							646	70.9	4650	88.4	121	3980	4970	4050	-	7270
	Sum of PFHxS and PFOS	µg/L	0.01	0.07	0.5	5	2	31		628	55	3660	71	114	3680	4610	3690	2700	7250
	10 2 FTS	µg/L	0.05							<0.1	<0.05	<1	<0.1	<0.1	<0.1	<0.1	<0.05	<5	<1
	PFPeS	µg/L	0.01							-	-	-	-	-	-	-	-	51	-
	PFHpS	µg/L	0.01							-	-	-	-	-	-	-	-	54	-
Surfactants	PFHxS	µg/L	0.02			5	2	31		80.1	53.6	924	69.3	12.6	2330	2490	1860	1400	68.2
	6 2 FTS	µg/L	0.05						NA	<0.1	<0.05	1.6	<0.1	<0.1	0.13	0.1	0.12	<5	<1
	PFOA	µg/L	0.01	0.56	5	50	632	1,824	2900	8.22	1.5	132	2.01	0.99	131	144	126	80	10.4
	PFOS	µg/L	0.01			5	2	31	6.66	548	1.45	2740	1.7	101	1350	2120	1830	1300	7180
Organic	4 2 FTS	ng/L	50							<100	<50	<1000	<100	<100	<100	<100	<50	<5000	<1000
	PFBA	µg/L	1E-04							<0.0005	<0.0002	0.0376	<0.0005	0.0015	0.0077	0.0113	0.0256	0.0061	<0.005
Perfluorinated Compounds (PFCs)	PFPeA	µg/L	20							610	1040	79,900	920	1190	13,100	15,500	26,400	14,000	<1000
	8 2 FTS	µg/L	0.05						2900	<0.1	<0.05	<1	<0.1	<0.1	<0.1	<0.1	<0.05	<5	<1
	N-Me-FOSA	µg/L	0.05							-	-	-	-	-	-	-	-	<5	-
	N-Me-FOSE	µg/L	0.05							-	-	-	-	-	-	-	-	<5	-
	FOSA	µg/L	0.05							-	-	-	-	-	-	-	-	<5	-
	PFBS	µg/L	0.02							2.52	5.04	74.6	5.36	1.14	47.4	52.3	53.5	30	1.3
	PFDS	µg/L	0.01							-	-	-	-	-	-	-	-	<5	-
	PFTeDA	µg/L	0.01							-	-	-	-	-	-	-	-	<5	-
	PFTrDA	µg/L	0.01							-	-	-	-	-	-	-	-	<5	-
	N-Et-FOSA	µg/L	0.05							-	-	-	-	-	-	-	-	<5	-
	PFDoA	µg/L	0.01							-	-	-	-	-	-	-	-	<5	-
	PFHpA	µg/L	0.02							0.97	0.77	72.6	1.09	0.22	12.4	17.3	13.4	17	<1
	PFHxA	µg/L	0.02							5.8	7.54	584	8.04	2.29	89.1	122	116	89	10.2
	N-Et-FOSE	µg/L	0.05							-	-	-	-	-	-	-	-	<5	-
	PFDoA	µg/L	0.01							-	-	-	-	-	-	-	-	<5	-
	PFNA	µg/L	0.01							-	-	-	-	-	-	-	-	<5	-
	PFUnA	µg/L	0.01							-	-	-	-	-	-	-	-	<5	-

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
FS - Fire Station
FFS - Former Fire Station
WKSP - Workshop
SW04 collected at site boundary
It is noted that the APEC boundaries were broadly identified based on historical land use activities and are not directly correlated with the current Airservices lease areas.

Table T4: Laboratory Analytical Results- PFAS Concentrations Detected in Groundwater and Surface Water

									Former Fire Station (FFS)										
									Location	MW03	MW04	MW05	MW06	MW07			MW08	MW09	
									Sample Type	Primary	Primary	Primary	Primary	Primary	Duplicate	TriPLICATE	Primary	Primary	
									Sample ID	MW03_260617	MW04_260617	MW05_260617	MW06_260617	MW07_270617	WQA09_270617	WQA010_270617	MW08_260617	MW09_260617	
									Sample Date	26/06/17	26/06/17	26/06/17	26/06/17	27/06/17	27/06/17	27/06/17	26/06/17	26/06/17	
									Lab Report No.	EP1707075	EP1707075	EP1707075	EP1707075	EP1707075	EP1707075	552887	EP1707075	EP1707075	
									Airservices (GHD) (2015)										
	Analyte	Unit	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	EISLs (toxicity effects on aquatic organisms)										
Per- and Polyfluoroalkyl	Sum of PFAS (WA DER List)	µg/L	0.01							30,400	365	3020	1930	7140	6420	-	1200	1090	
	Sum of PFHxS and PFOS	µg/L	0.01	0.07	0.5	5	2	31		29,800	334	2610	1600	5600	4920	3900	1020	790	
	10 2 FTS	µg/L	0.05							<10	<0.1	<1	<0.1	<1	<0.05	<5	<0.1	<0.1	
	PFPeS	µg/L	0.01							-	-	-	-	-	-	220	-	-	
	PFHpS	µg/L	0.01							-	-	-	-	-	-	71	-	-	
	PFHxS	µg/L	0.02			5	2	31		990	182	979	1090	2190	2070	1600	579	490	
Surfactants	6 2 FTS	µg/L	0.05						NA	<10	0.19	<1	<0.1	<1	0.2	<5	0.66	0.82	
	PFOA	µg/L	0.01	0.56	5	50	632	1,824	2900	97	7.28	47.9	36	153	118	92	36.1	68.6	
	PFOS	µg/L	0.01			5	2	31	6.66	28,800	152	1630	512	3410	2850	2300	437	300	
Organic	4 2 FTS	ng/L	50							<10,000	<100	<1000	<100	<1000	<50	<5000	<100	<100	
	PFBA	µg/L	1E-04							0.086	0.001	0.0142	0.0116	0.0422	0.0567	0.046	0.0054	0.0085	
	PFPeA	µg/L	20							<10,000	1060	30,000	19,800	122,000	132,000	98,000	12,700	29,100	
	8 2 FTS	µg/L	0.05						2900	<10	<0.1	<1	<0.1	<1	0.06	<5	<0.1	0.12	
Perfluorinated Compounds (PFCs)	N-Me-FOSA	µg/L	0.05							-	-	-	-	-	-	<5	-	-	
	N-Me-FOSE	µg/L	0.05							-	-	-	-	-	-	<5	-	-	
	FOSA	µg/L	0.05							-	-	-	-	-	-	<5	-	-	
	PFBS	µg/L	0.02							83	5.81	118	81.3	316	328	200	24	42.9	
	PFDS	µg/L	0.01							-	-	-	-	-	-	<5	-	-	
	PFTeDA	µg/L	0.01							-	-	-	-	-	-	<5	-	-	
	PFTrDA	µg/L	0.01							-	-	-	-	-	-	<5	-	-	
	N-Et-FOSA	µg/L	0.05							-	-	-	-	-	-	<5	-	-	
	PFDoA	µg/L	0.01							-	-	-	-	-	-	<5	-	-	
	PFHpA	µg/L	0.02							23	2.96	14.7	12.3	68.7	57.8	48	9.21	17	
	PFHxA	µg/L	0.02							370	12.4	184	169	839	804	690	91.8	136	
	N-Et-FOSE	µg/L	0.05							-	-	-	-	-	-	<5	-	-	
	PFDoA	µg/L	0.01							-	-	-	-	-	-	<5	-	-	
	PFNA	µg/L	0.01							-	-	-	-	-	-	<5	-	-	
	PFUnA	µg/L	0.01							-	-	-	-	-	-	<5	-	-	

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
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FS - Fire Station
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SW04 collected at site boundary
It is noted that the APEC boundaries were broadly identified based on historical land use activities and are not directly correlated with the current Airservices lease areas.

Table T4: Laboratory Analytical Results- PFAS Concentrations Detected in Groundwater and Surface Water

									Former Workshop (FWKSP)								Surface Water			
									Location	MW22	MW23	MW3A		MW3B	MW3C	SW01		SW04		
									Sample Type	Primary	Primary	Primary	Duplicate	Triplicate	Primary	Primary	Primary	Primary		
									Sample ID	1-MW22_270617	1-MW23_270617	MW3A_270617	WQA03_270717	WQA04_270617	MW3B_270617	MW3C_270617	SW01_280617	SWQA01_280617	SWQA02_280617	SW04_280617
									Sample Date	27/06/17	27/06/17	27/06/17	27/06/17	27/06/17	27/06/17	27/06/17	28/06/17	28/06/17	28/06/17	28/06/17
									Lab Report No.	EP1707075	EP1707075	EP1707075	EP1707075	552887	EP1707075	EP1707075	EP1707075	EP1707075	EP1707075	EP1707075
	Analyte	Unit	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 Polyfluoroalkyl	Sum of PFAS (WA DER List)	µg/L	0.01							12.8	906	252	205	-	2200	258	35.3	36	36.8	0.15
	Sum of PFHxS and PFOS	µg/L	0.01	0.07	0.5	5	2	31		11.5	757	199	163	106	1680	201	23.9	25.1	25.9	0.15
	10 2 FTS	µg/L	0.05							<0.05	<0.1	<0.1	<0.05	<0.2	<0.1	<0.1	<0.05	<0.05	<0.05	<0.05
	PFPeS	µg/L	0.01							-	-	-	-	7.6	-	-	-	-	-	-
	PFHpS	µg/L	0.01							-	-	-	-	1.9	-	-	-	-	-	-
Surfactants	PFHxS	µg/L	0.02			5	2	31		5.08	217	85.9	60.4	39	983	133	11.4	12.5	13.1	0.06
	6 2 FTS	µg/L	0.05						NA	<0.05	0.11	<0.1	0.06	<0.2	<0.1	<0.1	<0.05	<0.05	<0.05	<0.05
	PFOA	µg/L	0.01	0.56	5	50	632	1,824	2900	0.16	19.8	4.24	3.15	2.1	60.3	6.09	0.93	0.88	0.9	<0.01
	PFOS	µg/L	0.01			5	2	31	6.66	6.4	540	113	103	67	696	68.3	12.5	12.6	12.8	0.09
Organic	4 2 FTS	ng/L	50							<50	<100	<100	<50	<200	<100	<100	<50	<50	<50	<50
	PFBA	µg/L	1E-04							<0.0002	0.0072	0.0038	0.0025	0.0016	0.0188	0.0025	0.0004	0.0004	0.0004	<0.0001
	PFPeA	µg/L	20							<50	12,500	4740	4170	3700	40,400	3540	1050	990	990	<20
Perfluorinated Compounds (PFCs)	8 2 FTS	µg/L	0.05						2900	<0.05	<0.1	<0.1	<0.05	<0.2	<0.1	<0.1	<0.05	<0.05	<0.05	<0.05
	N-Me-FOSA	µg/L	0.05							-	-	-	-	<0.2	-	-	-	-	-	-
	N-Me-FOSE	µg/L	0.05							-	-	-	-	<0.2	-	-	-	-	-	-
	FOSA	µg/L	0.05							-	-	-	-	<0.2	-	-	-	-	-	-
	PFBS	µg/L	0.02							0.68	24.3	12.9	11.5	6.9	134	15.3	3.08	2.91	2.92	<0.02
	PFDS	µg/L	0.01							-	-	-	-	<0.2	-	-	-	-	-	-
	PFTeDA	µg/L	0.01							-	-	-	-	<0.2	-	-	-	-	-	-
	PFTrDA	µg/L	0.01							-	-	-	-	<0.2	-	-	-	-	-	-
	N-Et-FOSA	µg/L	0.05							-	-	-	-	<0.2	-	-	-	-	-	-
	PFDCa	µg/L	0.01							-	-	-	-	<0.2	-	-	-	-	-	-
	PFHpA	µg/L	0.02							0.06	8.11	1.85	1.42	1.1	23.4	2.72	0.73	0.67	0.7	<0.02
	PFHxA	µg/L	0.02							0.42	76.6	25.5	19.1	17	242	27	5.25	5.04	5.03	<0.02
	N-Et-FOSE	µg/L	0.05							-	-	-	-	<0.2	-	-	-	-	-	-
	PFDoA	µg/L	0.01							-	-	-	-	<0.2	-	-	-	-	-	-
	PFNA	µg/L	0.01							-	-	-	-	<0.2	-	-	-	-	-	-
	PFUnA	µg/L	0.01							-	-	-	-	<0.2	-	-	-	-	-	-

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
FS - Fire Station
FFS - Former Fire Station
WKSP - Workshop
SW04 collected at site boundary
It is noted that the APEC boundaries were broadly identified based on historical land use activities and are not directly correlated with the current Airservices lease areas.

Table T5: Laboratory Analytical Results- Hydrocarbon Concentrations Detected in Soils and Sediment

				Fire Station (FS)													
				Location		MW12		MW13		MW13		MW14		MW14		MW15	
				Sample ID		SS13 0.8 160617	SS13 1.5 160617	SS10 0.8 160617	SSQA03 160617	SS10 1.5 160617	SS10 3.5 160617	SS11 0.8 160617	SS11 1.5 160617	SS11 4.5 160617	SS12 0.8 160617	SS12 1.5 160617	
				Sample Date		16/06/2017	16/06/2017	16/06/2017	16/06/2017	16/06/2017	16/06/2017	16/06/2017	16/06/2017	16/06/2017	16/06/2017	16/06/2017	
				Sample Depth		0.8	1.5	0.8	0.8	1.5	3.5	0.8	0.5	4.5	0.8	1.5	
				Sample Type		Primary	Primary	Primary	Duplicate	Primary	Primary	Primary	Primary	Primary	Primary	Primary	
				Lap Report No.		EP1706554	EP1706554	EP1706554	EP1706554	EP1706554	EP1706554	EP1706554	EP1706554	EP1706554	EP1706554	EP1706554	
				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				Unit	LOR	0-1m	1-2m	2-4m									
TPH	C6-C9 fraction			mg/kg	10					<10	<10	<10	<10	<10	<10	<10	<10
	C10-C14 fraction			mg/kg	50					<50	<50	<50	<50	<50	<50	<50	<50
	C15-C28 fraction			mg/kg	100					<100	<100	<100	<100	<100	<100	<100	<100
	C29-C36 fraction			mg/kg	100					<100	<100	<100	<100	<100	<100	<100	<100
	C10-C36 frac ion (sum)			mg/kg	50					<50	<50	<50	<50	<50	<50	<50	<50
TRH	C6-C10 fraction			mg/kg	10					<10	<10	<10	<10	<10	<10	<10	<10
	C6-C10 fraction (minus BTEX)(F1)			mg/kg	10	260	370	630	26000	82000	<10	<10	<10	<10	<10	<10	<10
	>C10-C16 fraction			mg/kg	50					<50	<50	<50	<50	<50	<50	<50	<50
	>C10-C16 (minus Naph halene)(F2)			mg/kg	50	NL	NL	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	<50
BTEXN	Benzene			mg/kg	0.2	3	3	3	430	1100	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
	Toluene			mg/kg	0.5	NL	NL	NL	99000	120000	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Ethylbenzene			mg/kg	0.5	NL	NL	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	NL	NL	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 (VOC)			mg/kg	1	NL	NL	NL	11000	29000	<1	<1	<1	<1	<1	<1	<1

Table T5: Laboratory Analytical Results- Hydrocarbon Concentrations Detected in Soils and Sediment

									Former Workshop (FWKSP)						Boundary (BDY)	
				Location		SED01			SED02		SED03		SED04			
				Sample ID		SED01_ 280617	SEDQA01_ 280617	SEDQA02_ 280617	SED02_ 280617	SED03_ 280617	SED04_ 280617					
				Sample Date		28/06/2017		28/06/2017		28/06/2017		28/06/2017				
				Sample Depth												
				Sample Type		Primary		Duplicate		Triplicate		Primary				
				Lap Report No.		EP1707075		EP1707075		EP1707075		EP1707075				
				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	Unit	LOR	0-1m	1-2m	2-4m										
TPH	C6-C9 fraction	mg/kg	10						<10	<10	<10	<10	<10	<10		
	C10-C14 fraction	mg/kg	50						<50	<50	<50	<50	<50	<50		
	C15-C28 fraction	mg/kg	100						<100	<100	<100	<100	<100	<100		
	C29-C36 fraction	mg/kg	100						<100	<100	<100	<100	<100	<100		
	C10-C36 frac ion (sum)	mg/kg	50						<50	<50	<50	<50	<50	<50		
TRH	C6-C10 fraction	mg/kg	10						<10	<10	<10	<10	<10	<10		
	C6-C10 fraction (minus BTEX)(F1)	mg/kg	10	260	370	630	26000	82000	<10	<10	<10	<10	<10	<10		
	>C10-C16 fraction	mg/kg	50						<50	<50	<50	<50	<50	<50		
	>C10-C16 (minus Naph halene)(F2)	mg/kg	50	NL	NL	NL	20000	62000	<50	<50	<50	<50	<50	<50		
	>C16-C34 fraction	mg/kg	100				27000	85000	<100	<100	<100	<100	<100	<100		
	>C34-C40 fraction	mg/kg	100				38000	120000	<100	<100	<100	<100	<100	<100		
	>C10-C40 fraction (sum)	mg/kg	50						<50	<50	<50	<50	<50	<50		
BTEXN	Benzene	mg/kg	0.2	3	3	3	430	1100	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2		
	Toluene	mg/kg	0.5	NL	NL	NL	99000	120000	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
	Ethylbenzene	mg/kg	0.5	NL	NL	NL	27000	85000	<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		
	o-Xylene	mg/kg	0.5						<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
	Total Xylenes	mg/kg	0.5	230	NL	NL	81000	130000	<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		
	Naphthalene (VOC)	mg/kg	1	NL	NL	NL	11000	29000	<1	<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
It is noted that the APEC boundaries were broadly identified based on historical land use activities and are not directly correlated with the c

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 T6: Laboratory Analytical Results – Hydrocarbon Concentrations in Groundwater and Surface Water

							Fire Station (FS)											
							Location	MW01	MW02	MW03	MW10	MW11	MW12	MW13	MW14	MW14	MW14	MW15
							Sample Type	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Duplicate	Triplicate	Primary
							Sample ID	MW01 270617	MW02 270617	MW03 260617	MW010 260617	MW011 270617	MW012 270617	MW013 270617	MW014 270617	WQA07 270617	WQA08 270617	MW015 270617
							Sample Date	27/06/2017	27/06/2017	26/06/2017	26/06/2017	27/06/2017	27/06/2017	27/06/2017	27/06/2017	27/06/2017	27/06/2017	27/06/2017
							Lab Report No.	EP1707075	EP1707075	EP1707075	EP1707075	EP1707075	EP1707075	EP1707075	EP1707075	EP1707075	552887	EP1707075
							CRC Care 2011 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							
TPH	Analyte	Unit	LOR	2-4m								<20	<20	<20	<20	<20	<20	<20
	C6-C9 fraction	µg/L	20									<50	<50	<50	<50	70	<50	<50
	C10-C14 fraction	µg/L	50									<100	<100	<100	<100	390	<100	<100
	C15-C28 fraction	µg/L	100									<50	<50	<50	<50	<50	<100	<50
	C29-C36 fraction	µg/L	50									<50	<50	<50	<50	<50	<100	<50
TRH	C10-C36 fraction (sum)	µg/L	50									<50	<50	<50	<50	460	<50	<100
	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	<100	<100	160	<100	<100
	>C10-C16 (minus Naphthalene) (F2)	µg/L	100	NL	1000						NL	<100	<100	<100	<100	160	<100	<50
BTEXN	>C16-C34 fraction	µg/L	100		900							<100	<100	<100	<100	330	<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	490	<100	<100
	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	<2	<2	<2	<2
BTEXN	Ethylbenzene	µg/L	2	NL	3			NL				<2	<2	<2	<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	<2	<2	<2	<2	<2
	Total Xylenes	µg/L	2	NL	20			NL				<2	<2	<2	<2	<2	<2	<2
	Total BTEX	µg/L	1									<1	<1	<1	<1	<1	<1	<1
BTEXN	Naphthalene (VOC)	µg/L	5	NL			16	NL				<5	<5	<5	<5	<5	<5	<5

Legend
NEPM 2013 Table 1A(4) Comm/Ind HSL D GW for Vapour Intrusion, Sand
NEPM 2013 - GILs Freshwater
Airport Regulations 1997
WA DER 2014 Domestic Non-Potable Groundwater Use
CRC Care 2011 Table B2 GW HSL Int. Main. Worker (Shallow Trench), Sand

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

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

NL (Csat in µg/L) - The solubility concentration (Csat) is defined as the groundwater concentration at which the water cannot dissolve any more of an individual chemical based on a petroleum mixture. The soil vapour that is in equilibrium with the groundwater will be at its maximum. If he derived groundwater HSL exceeds Csol, 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 T6: Laboratory Analytical Results – Hydrocarbon Concentrations in Groundwater and Surface Water

				Former Fire Station (FFS)									
				Location	MW04	MW05	MW06	MW07	MW07	MW07	MW08	MW09	
				Sample Type	Primary	Primary	Primary	Primary	Duplicate	Triplicate	Primary	Primary	
				Sample ID	MW04_260617	MW05_260617	MW06_260617	MW07_270617	WQA09_270617	WQA010_270617	MW08_260617	MW09_260617	
				Sample Date	26/06/2017	26/06/2017	26/06/2017	27/06/2017	27/06/2017	27/06/2017	26/06/2017	26/06/2017	
				Lab Report No.	EP1707075	EP1707075	EP1707075	EP1707075	EP1707075	552887	EP1707075	EP1707075	
				CRC Care 2011 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					
TPH	C6-C9 fraction	µg/L	20					<20	<20	<20	<20	<20	<20
	C10-C14 fraction	µg/L	50					<50	<50	<50	<50	<50	<50
	C15-C28 fraction	µg/L	100					<100	<100	<100	<100	<100	<100
	C29-C36 fraction	µg/L	50					<50	<50	<50	<100	<50	<50
	C10-C36 fraction (sum)	µg/L	50					<50	<50	<50	<100	<50	<50
TRH	C6-C10 fraction	µg/L	20					<20	<20	<20	<20	<20	<20
	C6-C10 fraction (minus BTEX) (F1)	µg/L	20	NL				6000	<20	<20	<20	<20	<20
	>C10-C16 fraction	µg/L	100					<100	<100	<100	<50	<100	<100
	>C10-C16 (minus Naphthalene) (F2)	µg/L	100	NL	1000			NL	<100	<100	<50	<100	<100
	>C16-C34 fraction	µg/L	100		900			<100	<100	<100	<100	<100	<100
	>C34-C40 fraction	µg/L	100		900			<100	<100	<100	<100	<100	<100
	>C10-C40 fraction (sum)	µg/L	100					<100	<100	<100	-	<100	<100
BTEXN	Benzene	µg/L	1	NL	10	300	950	5000	<1	<1	<1	<1	<1
	Toluene	µg/L	2	NL	25			NL	<2	<2	<2	<2	<2
	Ethylbenzene	µg/L	2	NL	3			NL	<2	<2	<2	<2	<2
	m&p-Xylene	µg/L	2				200		<2	<2	<2	<2	<2
	o-Xylene	µg/L	2				350		<2	<2	<2	<2	<2
	Total Xylenes	µg/L	2	NL	20			NL	<2	<2	<2	<2	<2
	Total BTEX	µg/L	1						<1	<1	<1	<1	<1
	Naphthalene (VOC)	µg/L	5	NL			16	NL	<5	<5	<5	<5	<5

Legend
NEPM 2013 Table 1A(4) Comm/Ind HSL D GW for Vapour Intrusion, Sand
NEPM 2013 - GILs Freshwater
Airport Regulations 1997
WA DER 2014 Domestic Non-Potable Groundwater Use
CRC Care 2011 Table B2 GW HSL Int. Main. Worker (Shallow Trench), Sand

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

It is noted that the APEC boundaries were broadly identified based on historical land use activities and are not directly correlated with the current Airservices lea
NL (C_{sat} in µg/L) - The solubility concentration (C_{sat}) is defined as the groundwater concentration at which the water cannot dissolve any m
based on a petroleum mixture. The soil vapour hat is in equilibrium wi h the groundwater will be at its maximum. If the derived groundwater t
source concentration for a petroleum mixture could not exceed a level that would result in the maximum allowable vapour risk for he given sc
HSL is presented for these chemicals and he HSL is shown as NL (NEPM, 2013).

Table T6: Laboratory Analytical Results – Hydrocarbon Concentrations in Groundwater and Surface Water

				Former Workshop (FWKSP)										Boundary (BDY)		
				Location	MW22	MW23	MW3A	MW3A	MW3A	MW3B	SW01	SW01	SW01	SW04		
				Sample Type	Primary	Primary	Primary	Duplicate	Triplicate	Primary	Primary	Duplicate	Triplicate	Primary		
				Sample ID	A1-MW22 270617	A1-MW23 270617	MW3A 270617	WQA03 270717	WQA04 270617	MW3B 270617	SED01 280617	SEDQA01 280617	SEDQA02 280617	SED04 280617		
				Sample Date	27/06/2017	27/06/2017	27/06/2017	27/06/2017	27/06/2017	27/06/2017	28/06/2017	28/06/2017	28/06/2017	28/06/2017		
				Lab Report No.	EP1707075	EP1707075	EP1707075	EP1707075	552887	EP1707075	EP1707075	EP1707075	EP1707075	EP1707075		
				CRC Care 2011 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								
Analyte	Unit	LOR														
TPH	C6-C9 fraction	µg/L	20					<20	<20	<20	<20	<20	<20	<20	<20	
	C10-C14 fraction	µg/L	50					100	<50	<50	<50	<50	<50	<50	<50	
	C15-C28 fraction	µg/L	100					300	<100	160	160	<100	290	<100	<100	
	C29-C36 fraction	µg/L	50					<50	<50	<50	<50	<100	100	<50	<50	
	C10-C36 fraction (sum)	µg/L	50					400	<50	160	160	<100	390	<50	<50	
TRH	C6-C10 fraction	µg/L	20					<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	<20	
	>C10-C16 fraction	µg/L	100					180	<100	<100	<100	<50	<100	<100	<100	
	>C10-C16 (minus Naphthalene) (F2)	µg/L	100	NL	1000		NL	180	<100	<100	<100	<50	<100	<100	<100	
	>C16-C34 fraction	µg/L	100		900			240	<100	<100	180	160	<100	350	<100	
	>C34-C40 fraction	µg/L	100		900			<100	<100	<100	<100	<100	<100	<100	<100	
>C10-C40 fraction (sum)	µg/L	100					420	<100	180	160	-	350	<100	<100	<100	
BTEXN	Benzene	µg/L	1	NL	10	300	950	5000	<1	<1	<1	<1	<1	<1	<1	<1
	Toluene	µg/L	2	NL	25		NL	NL	<2	<2	<2	<2	<2	<2	<2	<2
	Ethylbenzene	µg/L	2	NL	3		NL	NL	<2	<2	<2	<2	<2	<2	<2	<2
	m&p-Xylene	µg/L	2				200		<2	<2	<2	<2	<2	<2	<2	<2
	o-Xylene	µg/L	2				350		<2	<2	<2	<2	<2	<2	<2	<2
	Total Xylenes	µg/L	2	NL	20		NL	NL	<2	<2	<2	<2	<2	<2	<2	<2
	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	

Legend
NEPM 2013 Table 1A(4) Comm/Ind HSL D GW for Vapour Intrusion, Sand
NEPM 2013 - G Ls Freshwater
Airport Regulations 1997
WA DER 2014 Domestic Non-Potable Groundwater Use
CRC Care 2011 Table B2 GW HSL Int. Main. Worker (Shallow Trench), Sand

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

It is noted that the APEC boundaries were broadly identified based on historical land use activities and are not directly correlated with the current Airservices lea
NL (Csat in µg/L) - The solubility concentration (Csat) is defined as he groundwater concentration at which the water cannot dissolve any m
based on a petroleum mixture. The soil vapour that is in equilibrium with he groundwater will be at its maximum. If the derived groundwater t
source concentration for a petroleum mixture could not exceed a level that would result in the maximum allowable vapour risk for the given sc
HSL is presented for these chemicals and the HSL is shown as NL (NEPM, 2013).

Appendix A

Certificates of Title

Transfer
Application 1889/1110
From Volume Folio

18752/40

INDEXED



REGISTER BOOK.

Vol. 1072 Fol. 164.

WESTERN AUSTRALIA.

Certificate of Title

under "The Transfer of Land Act, 1893" (56 Vic., 14, Sch. 5).

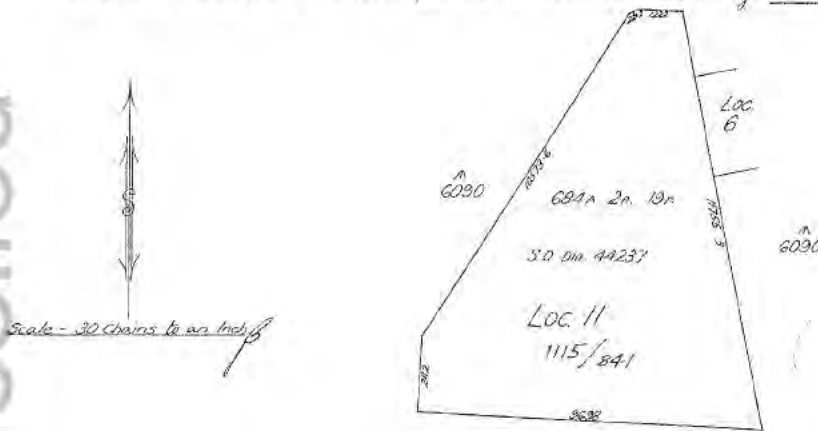
The Commonwealth of Australia is

CANCELLED

CT 1072 0164 F



now the proprietor of an estate in fee simple subject to the easements and encumbrances notified hereunder in ALL that piece of land delineated and coloured green on the map hereon, containing six hundred and eighty four acres two rods and nineteen perches or thereabouts, being Forrest Location 11.



Dated the twelfth day of September One thousand nine hundred and forty

Forrest

Application 65/1949

Totally cancelled.

Registered 11th January 1949 at 1101

Registrar of Titles.

Forrest

Included in 1115-841

CANCELLED

For encumbrances and other matters affecting the land see back.

EASEMENTS AND ENCUMBRANCES REFERRED TO.

Cancelled

CT 1072 0164 B



CERTIFICATE OF TITLE.

Registered Vol.

Fol.

Transfer
Application 64 1949
From Volume Folio
1072 164
Q G



REGISTER BOOK.

Vol. 1115

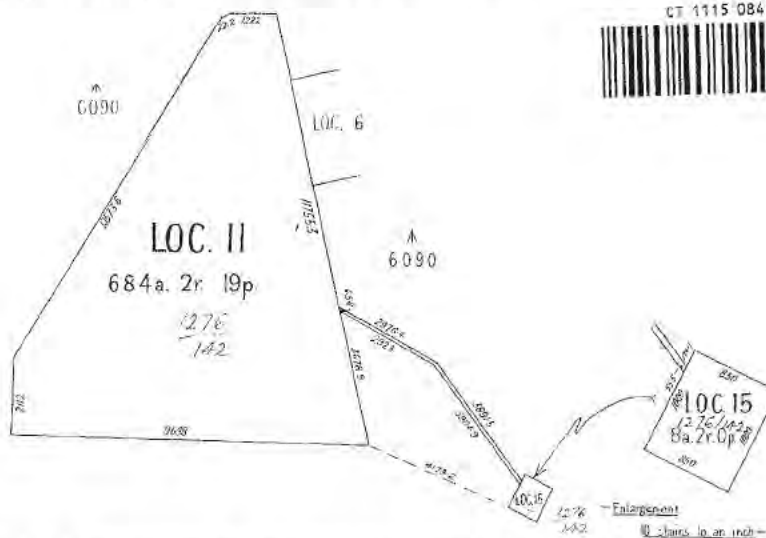
Fol. 841

Certificate of Title

under "The Transfer of Land Act, 1893" (58 Vic., 14, Sch. 5).

The Commonwealth of Australia, is now the proprietor of an estate in fee simple subject to the easements and encumbrances notified hereunder in all those pieces of land delineated and coloured green on the map hereon containing together six hundred and ninety-three acres and nineteen perches or thereabouts, being Forrest Locations 11 and 15.

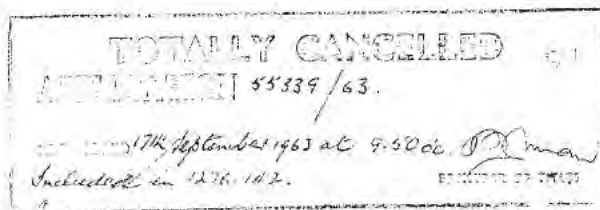
As to Forrest Location 15 only : Together with the right to enter into and upon the land coloured blue on the said map hereon and to erect, use, maintain, amend or repair an overhead electric transmission line or lines thereon.



Dated the eleventh day of January One thousand nine hundred and forty-nine

Registrar of Titles.

Application 55339/63. The above easement over that part of the land now comprised in Forrest Location 15 is hereby notified and distinguished in title for simple registration 17th September 1963 at 9.50cc.



For encumbrances and other matters affecting the land see back.

Cancelled

CT 1115 0841 B



CERTIFICATE OF TITLE.

Vol.

Fol.

44882/63 Application 55339/63 (17997)

Volume 1115 Folio 841
1252 726

100/92



WESTERN AUSTRALIA.

ORIGINAL
REGISTER BOOK.

INDEXED 77

Vol. 1276 Fol. N° 142

CT 1276 0142 F

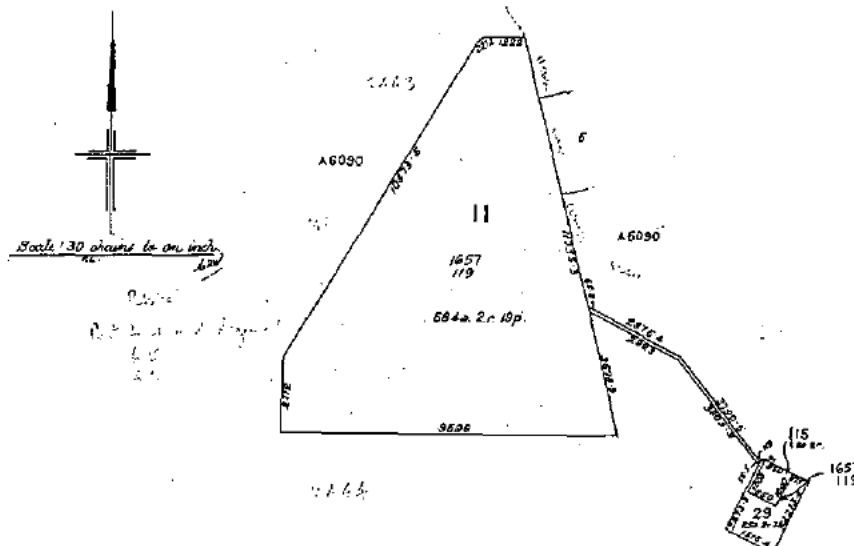


Certificate of Title

under "The Transfer of Land Act, 1893" (54 Vic. 14, 5 & 6).

The Commonwealth of Australia is now the proprietor of an estate in fee simple subject to the easements and encumbrances notified hereunder in all those pieces of land delineated and coloured green on the map hereon containing in the aggregate seven hundred and nineteen acres and fourteen perches or thereabouts, being Forrest Locations 11, 15 and 29.

As to Forrest Location 15 only : Together with the right to enter into and upon the land coloured blue on the said map hereon and to erect use, maintain, amend or repair an overhead electric transmission line or lines thereon.



Dated the seventeenth day of September One thousand nine hundred and sixty-three.

Transfer C 667413 The above right created by Application 64/1963 and modified by Application 55339/1963 are now merged and extinguished in the fee simple. Registered 2nd December 1983 at 3:32 p.m.



Registrar of Titles.

Estate below a depth of 12.19 metres and an estate in certain mineral and other reservation as set out in Transfer C 667413 to a depth of 12.19 metres also remains.

LAW 17/1983-41,308-100

For encumbrances and other matters affecting the land see back.

EASEMENTS AND ENCUMBRANCES REFERRED TO

TRANSFER C 667413.

Registered 2nd December 1983 at 3:36 p.m.

Limited to a depth of 12.19 metres and subject
to certain mineral and other
reservations.

To Vol 1657 Fol 119.



CT 1276 0142 B



CERTIFICATE OF TITLE

Vol. 1276

Fol.

Nº

142

LANDS	T.O.
Entered	Land Permit
X	Lease
	Name



WESTERN



AUSTRALIA



Crown Grant

1512 515

Elizabeth the Second, by the Grace of God, Queen of Australia and Her other Realms and Territories, Head of the Commonwealth. To all to whom these Presents shall come, GREETING: Know ye that We, of Our especial Grace, certain knowledge, and mere motion, have given and granted, and We do by these Presents, for Us, Our heirs and successors, in consideration of the payment of the sum of \$1425.00 and the fulfilment of the prescribed conditions to the satisfaction of Our Governor of Our State of Western Australia, Give and Grant unto

The Commonwealth of Australia

CANCELLED

(hereinafter called the Grantee), the natural surface and so much of the

land as is below the natural surface to a depth of 12.19 metres of ALL THAT Piece or Parcel of Land situate and being in the Town of Port Hedland-----, in Our said State, containing 556.5320 hectares----- more or less; and marked and distinguished in the Maps and Books of the Department of Lands and Surveys of Our said State as Port Hedland Lots 2443 and 2444

and as the same is delineated and coloured green in the plan drawn in the first schedule: TOGETHER with all Appurtenances thereunto belonging or in anywise appertaining: TO HAVE AND TO HOLD the said Piece or Parcel of Land to the depth aforesaid, and all and singular the Premises hereby granted, with their appurtenances, unto the Grantee, in fee simple: Yielding and Paying for the same to Us, Our heirs and successors, one peppercorn of yearly rent on the twenty-fifth day of March in each year, or so soon thereafter as the same shall be lawfully demanded: PROVIDED NEVERTHELESS that subject to section 141 of the Land Act, 1933, it shall (at any time within twenty-one years from the date of these Presents) be lawful for Us, Our heirs and successors, or for any person or persons acting in that behalf by Our or their authority, to resume and enter upon possession of any part of the said Piece or Parcel of Land, which it may at any time by Us, Our heirs and successors, be deemed necessary to resume for roads, tramways, railways, and railway stations, canals, bridges, towing paths, harbour or river improvement works, drainage or irrigation works, quarries, and generally for any other works or purposes of public use, utility or convenience, and for the purpose of exercising the power to search for minerals hereinafter reserved, and such Land so resumed to hold to Us, Our heirs and successors as of Our or their former estate without making to the Grantee, or any person claiming under him, any compensation in respect thereof; so, nevertheless, that no such resumption be made without compensation of any part of the said Piece or Parcel of Land upon which any expenditure or improvements shall have been made by the said Grantee, or any person claiming under him; and We do hereby save and reserve to Us, Our heirs and successors, all Mines of Gold, Silver, Copper, Tin, or other Metals, Ore and Minerals, or other substances containing Metals, and all Gems or Precious Stones and Coal or Mineral Oil, and all Phosphatic Substances in or under the said Piece or Parcel of land hereby granted, with full liberty at all times to search and dig for and carry away the same; and for that purpose to enter upon the said Piece or Parcel of land or any part thereof; and we do hereby save and reserve to Us, Our heirs and successors all petroleum (as defined in the Petroleum Act, 1967 and all amendments thereof for the time being in force) on or below the surface of the said Land with the right reserved to Us, Our heirs and successors and persons authorised by Us, Our heirs and successors to have access to the said land for the purpose of searching for and for the operations of obtaining petroleum in any part of the said land subject to and in accordance with the provisions contained in the Petroleum Act, 1967, and all the amendments thereof for the time being in force.

IN WITNESS whereof We have caused Our trusty and well-beloved HIS EXCELLENCY AIR CHIEF MARSHAL SIR WALLACE KYLE, Knight Grand Cross of the Most Honourable Order of the Bath, Knight Commander of the Royal Victorian Order, Commander of the Most Excellent Order of the British Empire, Companion of the Distinguished Service Order, Distinguished Flying Cross, Knight of Grace of the Most Venerable Order of the Hospital of St. John of Jerusalem, Governor in and over the State of Western Australia and its Dependencies in the Commonwealth of Australia, to affix to these Presents the Public Seal of the said State.

Sealed this 25th day of August, One thousand nine hundred and seventy-eight

Grant under the Land Act, 1933 as amended

Wallace Kyle

Governor

June Craig
Minister for Lands.

CERTIFICATE OF TITLE

UNDER THE "TRANSFER OF LAND ACT, 1893" AS AMENDED

The abovenamed Grantee is now the registered proprietor of an estate in fee simple in all the land described in this Grant subject to the easements and encumbrances shown in the Second Schedule hereto

DATED THE 28th DAY OF August 1978

Registrar of Titles

TOTALLY CANCELLED
APPLICATION C140976
Registered 19th May 1981 at 3.16 o'clock.
to Vol 1591 Fol 684:
(Includes closed road):



FOR ENCUMBRANCES AND OTHER MATTERS AFFECTING THE LAND SEE SECOND SCHEDULE

41436/974-AM-D/CH

Page 1 (of 2 pages)
1512 515
VOL. FOL.

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

Application C140976

WESTERN

AUSTRALIA

Volume 1512 Folio 515



1591 684

INCLUDES CLOSED ROAD
LAND ACT 1933**CERTIFICATE OF TITLE**

UNDER THE "TRANSFER OF LAND ACT, 1893" AS AMENDED

I certify that the person described in the First Schedule hereto is the registered proprietor of the undermentioned estate in the undermentioned land subject to the easements and encumbrances shown in the Second Schedule hereto.

Dated 19th May, 1981

Limbrough
REGISTRAR OF TITLES

ESTATE AND LAND REFERRED TO

Estate in fee simple in Port Hedland Lots 2443 and 2444, delineated and coloured green on the map in the Third Schedule hereto, limited however to the natural surface and therefrom to a depth of 12.19 metres.

FIRST SCHEDULE (continued overleaf)

~~The Commonwealth of Australia~~

SECOND SCHEDULE (continued overleaf)

NIL

Limbrough
REGISTRAR OF TITLES

THIRD SCHEDULE

NOTE
ALL ABUTTALS ARE
FORREST LOCATIONS

SCALE 1:40000

TOTAL AREA 557.8425 ha

PUBLIC PLANS PORT HEDLAND REG. 65, 66

CUT 55, 56



NOTE: RULING THROUGH AND SEALING WITH THE OFFICE SEAL INDICATES THAT AN ENTRY NO LONGER HAS EFFECT. ENTRIES NOT RULED THROUGH MAY BE AFFECTED BY SUBSEQUENT ENDORSEMENTS.

72008/12/77-45M-S/2850

FIRST SCHEDULE (continued)NOTE: RULING THROUGH AND SEALING WITH THE OFFICE SEAL INDICATES THAT AN ENTRY NO LONGER HAS EFFECT.
ENTRIES NOT RULED THROUGH MAY BE AFFECTED BY SUBSEQUENT ENDORSEMENTS.

REGISTERED PROPRIETOR

INSTRUMENT NATURE	INSTRUMENT NUMBER		REGISTERED	TIME	SEAL	INITIALS
	NATURE	NUMBER				
Shire of Port Hedland of Civic Centre, McGregor Street, Port Hedland.	Transfer	0667413	2.12.83	3.36		
Portion (Sketch on Transfer) to Vol 2027 Fol 994:	Transfer	F776608	10.1.95	8.12		
Cancelled (balance) to Vol 2027 Fol 995:	Application	F776606	10.1.95	8.12		

SECOND SCHEDULE (continued)NOTE: RULING THROUGH AND SEALING WITH THE OFFICE SEAL INDICATES THAT AN ENTRY NO LONGER HAS EFFECT.
ENTRIES NOT RULED THROUGH MAY BE AFFECTED BY SUBSEQUENT ENDORSEMENTS.

INSTRUMENT		PARTICULARS	REGISTERED	TIME	SEAL	INITIALS	CANCELLATION	NUMBER	REGISTERED OR LODGED	SEAL	INITIALS
NATURE	NUMBER										
Transfer	0496888										

CERTIFICATE OF TITLE VOL. 1591 684

WESTERN



AUSTRALIA

REGISTER NUMBER	
N/A	
Duplicate Edition	DATE Duplicate ISSUED
N/A	N/A

RECORD OF CERTIFICATE OF TITLE
UNDER THE TRANSFER OF LAND ACT 1893

VOLUME
1657FOLIO
119

The person described in the first schedule is the registered proprietor of an estate in fee simple in the land described below subject to the reservations, conditions and depth limit contained in the original grant (if a grant issued) and to the limitations, interests, encumbrances and notifications shown in the second schedule.

R. G. Roberts

REGISTRAR OF TITLES

**THIS IS A MULTI-LOT TITLE****LAND DESCRIPTION:**

LOT 11 ON DEPOSITED PLAN 144237
LOT 15 ON DEPOSITED PLAN 161311
LOT 29 ON DEPOSITED PLAN 168193

**REGISTERED PROPRIETOR:
(FIRST SCHEDULE)**

SHIRE OF PORT HEDLAND OF CIVIC CENTRE, MCGREGOR STREET, PORT HEDLAND
(T C667413) REGISTERED 2 DECEMBER 1983

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

1. C667413 SUBJECT TO CERTAIN MINERAL AND OTHER RESERVATIONS AS SET OUT IN TRANSFER C667413. REGISTERED 2.12.1983.
2. *H842018 CAVEAT BY COMMONWEALTH OF AUSTRALIA AS TO PORTION OF FORREST LOCATION 11 ONLY. LODGED 16.8.2001.
3. *H978767 CAVEAT BY AIRSERVICES AUSTRALIA AS TO PORTION ONLY. LODGED 8.1.2002.
4. H979869 LEASE TO AIRSERVICES AUSTRALIA OF 25 CONSTITUTION AVENUE, CANBERRA CITY, AUSTRALIAN CAPITAL TERRITORY EXPIRES: SEE LEASE. AS TO PORTION ONLY. REGISTERED 9.1.2002.

Warning: A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required.
* Any entries preceded by an asterisk may not appear on the current edition of the duplicate certificate of title.
Lot as described in the land description may be a lot or location.

-----END OF CERTIFICATE OF 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: 1657-119 (11/DP144237) , 1657-119 (15/DP161311) , 1657-119 (29/DP168193).
PREVIOUS TITLE: 1276-142.
PROPERTY STREET ADDRESS: LOT 11 GREAT NORTHERN HWY, PORT HEDLAND (11/DP144237).
LOCAL GOVERNMENT AREA: TOWN OF PORT HEDLAND.

END OF PAGE 1 - CONTINUED OVER

RECORD OF CERTIFICATE OF TITLE

REGISTER NUMBER: N/A

VOLUME/FOLIO: 1657-119

PAGE 2

NOTE 1: K841107 LAND PARCEL IDENTIFIER OF FORREST LOCATIONS 11, 15 AND 29 CHANGED TO LOT 11 ON DEPOSITED PLAN 144237, LOT 15 ON DEPOSITED PLAN 161311 AND LOT 29 ON DEPOSITED PLAN 168193 ON 2.2.2009 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 OR ON THE CURRENT EDITION OF DUPLICATE CERTIFICATE OF TITLE.

ORIGINAL - NOT TO BE REMOVED FROM OFFICE OF

CT 1657 0119 F



Transfer C667413

WESTERN

AUSTRALIA

Volume 1276 Folio 142



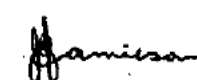
1657 119

CERTIFICATE OF TITLE

UNDER THE "TRANSFER OF LAND ACT, 1893" AS AMENDED

I certify that the person described in the First Schedule hereto is the registered proprietor of the undermentioned estate in the undermentioned land subject to the easements and encumbrances shown in the Second Schedule hereto.

Dated 2nd December, 1983


 REGISTRAR OF TITLES


ESTATE AND LAND REFERRED TO

Estate in fee simple in Forrest Locations 11, 15 and 29, delineated and coloured green on the map in the Third Schedule hereto, limited however to the natural surface and therefrom to a depth of 12.19 metres but subject to certain mineral and other reservations as set out in Transfer C667413.

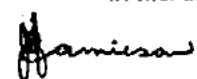
FIRST SCHEDULE (continued overleaf)

Shire of Port Hedland of Civic Centre, McGregor Street, Port Hedland.

SECOND SCHEDULE (continued overleaf)

~~1. C667413, Lodged 2.12.83 at 3.37 p.m.~~

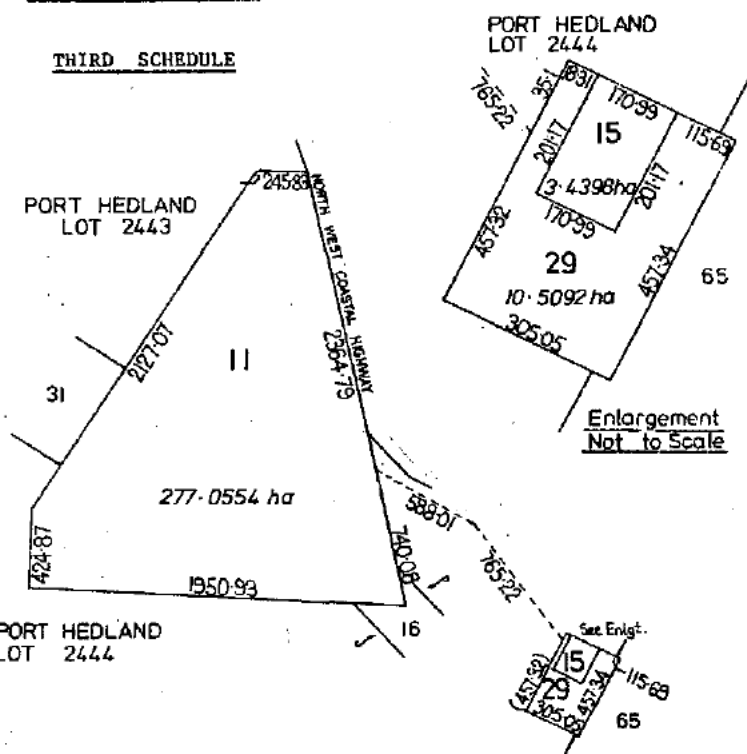
Withdrawn 6237609 25.7.96


 REGISTRAR OF TITLES

THIRD SCHEDULE

SCALE 1 : 30000
 TOTAL AREA = 291.0044 ha
 PUBLIC PLANS PORT HEDLAND
 REGIONAL 6.5 & 6.6

PORT HEDLAND
 LOT 2444



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

NOTE: RULING THROUGH AND SEALING WITH THE OFFICE SEAL INDICATES THAT AN ENTRY NO LONGER HAS EFFECT. ENTRIES NOT RULED THROUGH MAY BE AFFECTED BY SUBSEQUENT ENDORSEMENTS.

Superseded - Copy for Sketch Only

Page (of 2 pages) 1657 119

NOT RULING THROUGH AND SEALING WITH THE OFFICE SEAL INDICATES THAT AN EFFORT TO DETERMINE WHETHER THE
ENTRIES NOT RULING THROUGH MAY BE AFFECTED BY SUBSEQUENT DEVELOPMENTS

REGISTERED PROPRIETOR

[illegible]

NOTE: RULING THROUGH AND SEALING WITH THE OFFICE SEAL INDICATES THAT AN ENTRY NO LONGER HAS EFFECT.
ENTRIES NOT RULED THROUGH MAY BE AFFECTED BY SUBSEQUENT ENDORSEMENTS.

[illegible]

CERTIFICATE OF TITLE VOL. 1657 119

Application F776606
Volume 1591 Folio 684

WESTERN



AUSTRALIA

REGISTER BOOK
VOL. FOL.

CERTIFICATE OF TITLE

UNDER THE "TRANSFER OF LAND ACT, 1893" AS AMENDED

CT 2027 995

I certify that the person described in the First Schedule hereto is the registered proprietor of the undermentioned estate in the undermentioned land subject to the easements and encumbrances shown in the Second Schedule hereto.

G. Sack

REGISTRAR OF TITLES



CANCELLED

Dated 10th January, 1995

ESTATE AND LAND REFERRED TO

Estate in fee simple in Port Hedland Lot 2443 and portion of Port Hedland Lot 2444, delineated on the map in the Third Schedule hereto, limited however to the natural surface and therefrom to a depth of 12.19 metres.

FIRST SCHEDULE (continued overleaf)

Town of Port Hedland of Post Office Box 41, Port Hedland.

SECOND SCHEDULE (continued overleaf)

1. TRANSFER C496888. The right to enter upon the portion of the within land marked 'A' on the map in the margin for the purpose of exercising certain water pipeline rights as set out in the said Transfer is granted to Minister for Water Resources. Registered 14.2.83 at 11.16 hrs.

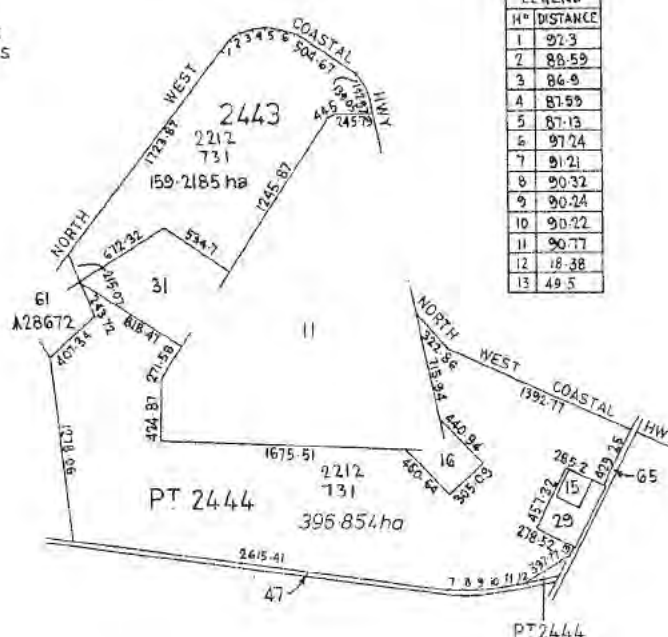
2. CAVEAT C667414. Lodged 2.12.83 at 3.37 p.m.
Withdrawn G237609 25.7.96

THIRD SCHEDULE



NOTE
ALL ABUTTALS ARE
FORREST LOCATIONS

SCALE 1:40000
TOTAL AREA 556.0725ha
R.B.



NOTE: ENTRIES MAY BE AFFECTED BY SUBSEQUENT ENDORSEMENTS.

267590/3/89-20M-L/4664

NOTE: ENTRIES MAY BE AFFECTED BY SUBSEQUENT ENDORSEMENTS

Cancelled to Vol. 2212 Fol. 731.
(Issued under Section 75).

Application

H760597

28.5.01	15.18
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NOTE: ENTRIES MAY BE AFFECTED BY SUBSEQUENT ENDORSEMENTS

INSTRUMENT		NUMBER
NATURE		

PARTICULARS

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153	22:40
154	22:45
155	

SEAL

CERT

CANCELLATION

NUMBER

REGISTERED

SEAL

CERT

WESTERN



AUSTRALIA

REGISTER NUMBER 435/DP404824	
DUPLICATE EDITION 2	DATE DUPLICATE ISSUED 6/5/2016

RECORD OF CERTIFICATE OF TITLE UNDER THE TRANSFER OF LAND ACT 1893

VOLUME
2874FOLIO
668

The person described in the first schedule is the registered proprietor of an estate in fee simple in the land described below subject to the reservations, conditions and depth limit contained in the original grant (if a grant issued) and to the limitations, interests, encumbrances and notifications shown in the second schedule.


 REGISTRAR OF TITLES


LAND DESCRIPTION:

LOT 435 ON DEPOSITED PLAN 404824

REGISTERED PROPRIETOR: (FIRST SCHEDULE)

TOWN OF PORT HEDLAND OF POST OFFICE BOX 41 , PORT HEDLAND
(AF N017521) REGISTERED 3 JUNE 2015

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

1. N017521 SUBJECT TO CERTAIN MINERAL AND OTHER RESERVATIONS AS SET OUT IN TRANSFER C667413. AS TO PORTION ONLY SEE DEPOSITED PLAN 404824 REGISTERED 3.6.2015.
2. M339587 LEASE TO BHP BILLITON MINERALS PTY LTD, MITSUI-ITOCU IRON PTY LTD, ITOCHU MINERALS & ENERGY OF AUSTRALIA PTY LTD, ALL OF CARE OF BHP BILLITON IRON ORE PTY LTD, LEVEL 17, 225 ST GEORGES TERRACE, PERTH EXPIRES: SEE LEASE. AS TO PORTION ONLY. REGISTERED 12.7.2013.
3. EASEMENT BURDEN CREATED UNDER SECTION 167 P. & D. ACT FOR DRAINAGE PURPOSES TO TOWN OF PORT HEDLAND - SEE DEPOSITED PLAN 404824 AS CREATED ON DEPOSITED PLAN 402661.
4. *N017522 NOTIFICATION CONTAINS FACTORS AFFECTING THE WITHIN LAND. LODGED 3.6.2015.
5. *N017523 NOTIFICATION CONTAINS FACTORS AFFECTING THE WITHIN LAND. LODGED 3.6.2015.
6. *N017524 NOTIFICATION CONTAINS FACTORS AFFECTING THE WITHIN LAND. LODGED 3.6.2015.
7. N273378 LEASE TO PHIA ASSET PTY LTD OF CARE OF COMPANY MATTERS PTY LIMITED LEVEL 12, 680 GEORGE STREET SYDNEY NSW 2000 AS TO PORTION ONLY OF VOLUME 2876 FOLIO 734, VOLUME 2874 FOLIO 672 AND VOLUME 2874 FOLIO 673. EXPIRES: SEE LEASE. REGISTERED 11.3.2016.
N273379 MORTGAGE OF LEASE N273378 TO NATIONAL AUSTRALIA BANK LTD REGISTERED 11.3.2016.
8. *N274034 MEMORIAL, CONTAMINATED SITES ACT 2003 REGISTERED 14.3.2016.

Warning: A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required.
* Any entries preceded by an asterisk may not appear on the current edition of the duplicate certificate of title.
Lot as described in the land description may be a lot or location.

END OF PAGE 1 - CONTINUED OVER

RECORD OF CERTIFICATE OF TITLE

REGISTER NUMBER: 435/DP404824

VOLUME/FOLIO: 2874-668

PAGE 2

-----END OF CERTIFICATE OF 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:	DP404824.
PREVIOUS TITLE:	2866-492, 2876-733.
PROPERTY STREET ADDRESS:	NO STREET ADDRESS INFORMATION AVAILABLE.
LOCAL GOVERNMENT AREA:	TOWN OF PORT HEDLAND.

WESTERN



AUSTRALIA

REGISTER NUMBER 9007/DP404824	
DUPLICATE EDITION 2	DATE DUPLICATE ISSUED 6/5/2016

RECORD OF CERTIFICATE OF TITLE UNDER THE TRANSFER OF LAND ACT 1893

VOLUME
2874FOLIO
672

The person described in the first schedule is the registered proprietor of an estate in fee simple in the land described below subject to the reservations, conditions and depth limit contained in the original grant (if a grant issued) and to the limitations, interests, encumbrances and notifications shown in the second schedule.


 REGISTRAR OF TITLES


LAND DESCRIPTION:

LOT 9007 ON DEPOSITED PLAN 404824

REGISTERED PROPRIETOR: (FIRST SCHEDULE)

TOWN OF PORT HEDLAND OF POST OFFICE BOX 41, PORT HEDLAND
(AF N017521) REGISTERED 3 JUNE 2015

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

1. C667413 SUBJECT TO CERTAIN MINERAL AND OTHER RESERVATIONS AS SET OUT IN TRANSFER C667413. REGISTERED 2.12.1983.
2. *H842018 CAVEAT BY COMMONWEALTH OF AUSTRALIA AS TO PORTION OF FORREST LOCATION 11 ONLY. LODGED 16.8.2001.
3. H979869 LEASE TO AIRSERVICES AUSTRALIA OF 25 CONSTITUTION AVENUE, CANBERRA CITY AUSTRALIAN CAPITAL TERRITORY EXPIRES: SEE LEASE. AS TO PORTION ONLY. REGISTERED 9.1.2002.
 - L724693 AS TO LEASE H979869 ONLY. EASEMENT BENEFIT FOR CABLE PURPOSES SEE H979869 AND DEPOSITED PLAN 68929. AS TO PORTION ONLY REGISTERED 2.9.2011.
 - M339586 PARTIAL SURRENDER OF LEASE H979869. AS TO PORTION ONLY. REGISTERED 12.7.2013.
4. M442601 LEASE TO B P AUSTRALIA PTY LTD OF LEVEL 17, 717 BOURKE STREET, DOCKLANDS, VICTORIA EXPIRES: SEE LEASE. AS TO PORTION ONLY REGISTERED 25.10.2013.
5. M783144 LEASE TO B P AUSTRALIA PTY LTD OF LEVEL 17, 717 BOURKE STREET, DOCKLANDS, VICTORIA EXPIRES: SEE LEASE. AS TO PORTION ONLY REGISTERED 1.10.2014.
6. M945548 LEASE TO AIRSERVICES AUSTRALIA OF 25 CONSTITUTION AVENUE, CANBERRA CITY AUSTRALIAN CAPITAL TERRITORY EXPIRES: SEE LEASE. AS TO PORTION ONLY. REGISTERED 20.3.2015.
7. *M976420 CAVEAT BY ESPLANADE PORT HEDLAND HOTEL LAND PTY LTD AS TO PORTION ONLY. LODGED 23.4.2015.
8. N273378 LEASE TO PHIA ASSET PTY LTD OF CARE OF COMPANY MATTERS PTY LIMITED LEVEL 12, 680 GEORGE STREET SYDNEY NSW 2000 AS TO PORTION ONLY OF VOLUME 2876 FOLIO 734, VOLUME 2874 FOLIO 672 AND VOLUME 2874 FOLIO 673. EXPIRES: SEE LEASE. REGISTERED 11.3.2016.
 - N273379 MORTGAGE OF LEASE N273378 TO NATIONAL AUSTRALIA BANK LTD

END OF PAGE 1 - CONTINUED OVER

RECORD OF CERTIFICATE OF TITLE

REGISTER NUMBER: 9007/DP404824

VOLUME/FOLIO: 2874-672

PAGE 2

N273380 REGISTERED 11.3.2016.
SUB-LEASE OF LEASE N273378 TO PHIA OPERATING COMPANY PTY LTD OF
CARE OF COMPANY MATTERS PTY LIMITED LEVEL 12, 680 GEORGE STREET
SYDNEY NSW 2000 AS TO PORTION ONLY OF VOLUME 2876 FOLIO 734, VOLUME
2874 FOLIO 672 AND VOLUME 2874 FOLIO 673. EXPIRES: SEE SUB LEASE.
REGISTERED 11.3.2016.

Warning: A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required.
* Any entries preceded by an asterisk may not appear on the current edition of the duplicate certificate of title.
Lot as described in the land description may be a lot or location.

-----END OF CERTIFICATE OF 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: DP404824.
PREVIOUS TITLE: 2866-492.
PROPERTY STREET ADDRESS: 30 WALDRON DR, PORT HEDLAND.
LOCAL GOVERNMENT AREA: TOWN OF PORT HEDLAND.

Appendix B

Site Inspection Photo Log

PHOTOGRAPHIC LOG

PHOTOGRAPHIC LOG			
Site Name: Port Hedland Airport		Site Location: Port Hedland ARFF Fire Station	Project No: 60509115
Plate No. 1	Date: 29/07/2016		
Direction Photo Taken: Looking north west			
Description: The ARFF Fire station tender bays, triple interceptor and Solberg foam storage area.			
Plate No. 2	Date: 29/07/2016		
Direction Photo Taken: Looking north			
Description: The storage shed where AFFF was stored and decanted within the vicinity of the Former Fire Station.			

PHOTOGRAPHIC LOG

PHOTOGRAPHIC LOG			
Site Name: Port Hedland Airport		Site Location: Former ARFF Fire Station Site	Project No: 60509115
Plate No. 3	Date: 29/07/2016		
Direction Photo Taken: South			
Description: The vacant lot and bitumen surrounds, where the Former Fire Station used to be located to in front of the present Air Traffic Control building.			
Plate No. 4	Date: 29/07/2016		
Direction Photo Taken: South west			
Description: The vacant lot and bitumen surrounds, near where the Former Fire Station used to be located.			

PHOTOGRAPHIC LOG

PHOTOGRAPHIC LOG			
Site Name: Port Hedland Airport		Site Location: 2013 Temporary Fire Station	Project No: 60509115
Plate No. 5	Date: 29/07/2016		
Direction Photo Taken: South West			
Description: A red building that was used as a temporary Fire Station dating from 2013.			
Plate No. 6	Date: 29/07/2016		
Direction Photo Taken: South West			
Description: The former Aircraft Control Tower located to the south east of the present ARFF Fire Station			

PHOTOGRAPHIC LOG

Site Name: Port Hedland Airport		Site Location: Former Fire Training Ground	Project No: 60509115
Plate No. 7	Date: 29/07/2016		
Direction Photo Taken: South west			
Description: The Former Fire Training ground located approximately 700m to the south west of the current ARFF Fire Station;			
Plate No. 8	Date: 29/07/2016		
Direction Photo Taken: South west			
Description: At the FFTG, there are 16 groundwater monitoring bores, a concrete pad (where a mock aircraft was previously located) and an AST that contained water.			

PHOTOGRAPHIC LOG

PHOTOGRAPHIC LOG			
Site Name: Port Hedland Airport		Site Location: Air BP Fuel Farm	
Project No: 60509115			
Plate No. 9	Date: 29/07/2016		
Direction Photo Taken: North East			
Description: BP Fuel farm in the far north eastern corner of the terminal area (Photo shows to the north of the freight hangar)			
Plate No. 10	Date: 29/07/2016		
Direction Photo Taken: North east			
Description: A large soil stockpile of unknown origin at the Airside Gate entrance opposite the terminal apron area.			

PHOTOGRAPHIC LOG

Site Name: Port Hedland Airport		Site Location: Polar Airlines and RFDS Hangar	Project No: 60509115
Plate No. 11	Date: 29/07/2016		
Direction Photo Taken: South east			
Description: Polar Airlines hangar and Royal Flying Doctors to the north of the terminal apron. Both hangars contained blue banded foam fire extinguishers and water fire suppression systems.			
Plate No. 12	Date: 29/07/2016		
Direction Photo Taken: South east			
Description: An Air BP Kerosene fuel pump and AST opposite the RFDS hangar. In front of these a steel container stating foam was stored there. The nature of the fire suppression foam was not identified.			

PHOTOGRAPHIC LOG

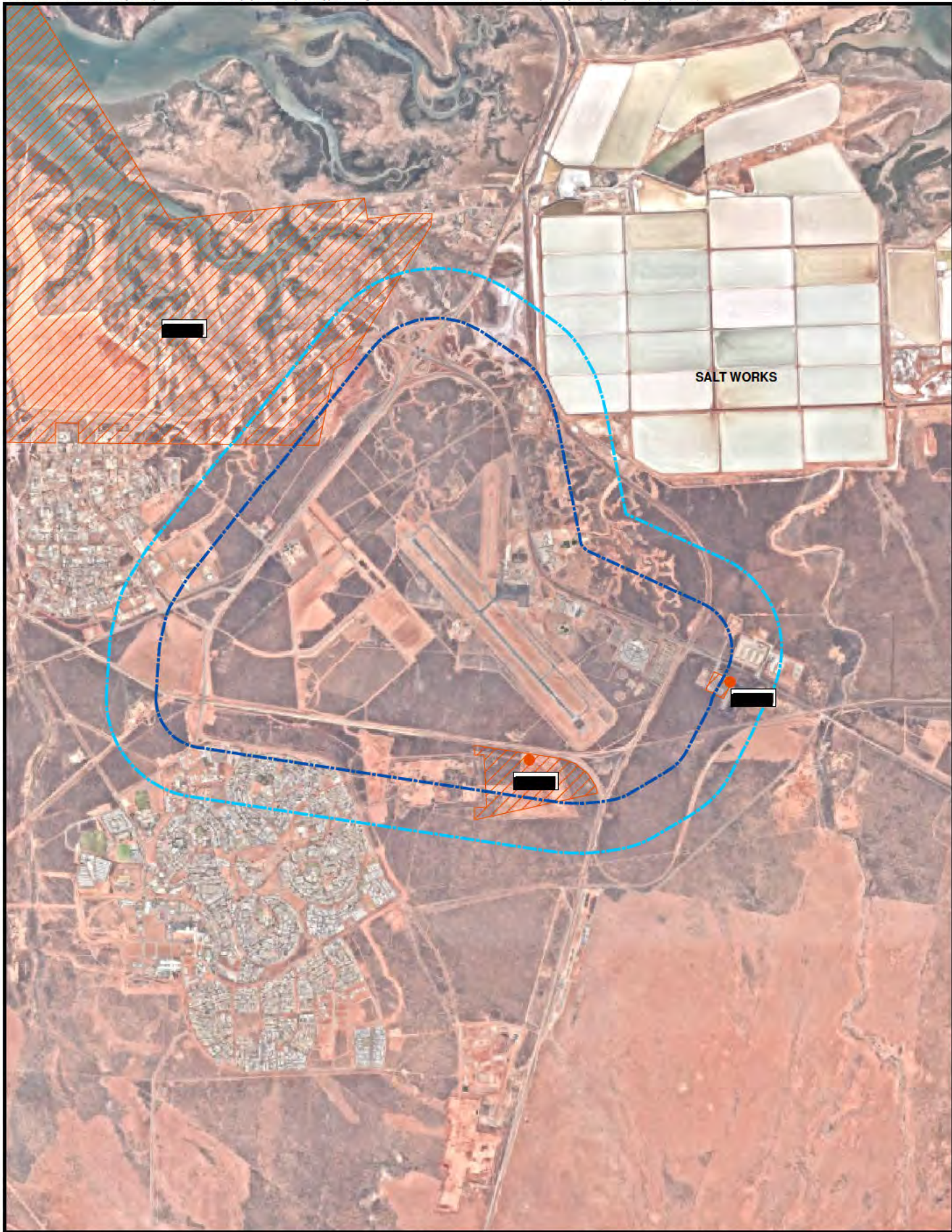
PHOTOGRAPHIC LOG			
Site Name: Port Hedland Airport		Site Location: Golden Airlines and Freight Hangars	Project No: 60509115
Plate No. 13	Date: 29/07/2016		
Direction Photo Taken: North east			
Description: North east of terminal airfreight hangar, and Golden Airways hangars.			
Plate No. 14	Date: 29/07/2016		
Direction Photo Taken: South west			
Description: The steel maintenance shed reportedly used to maintain fire trucks to the north east of the terminal buildings.			

PHOTOGRAPHIC LOG

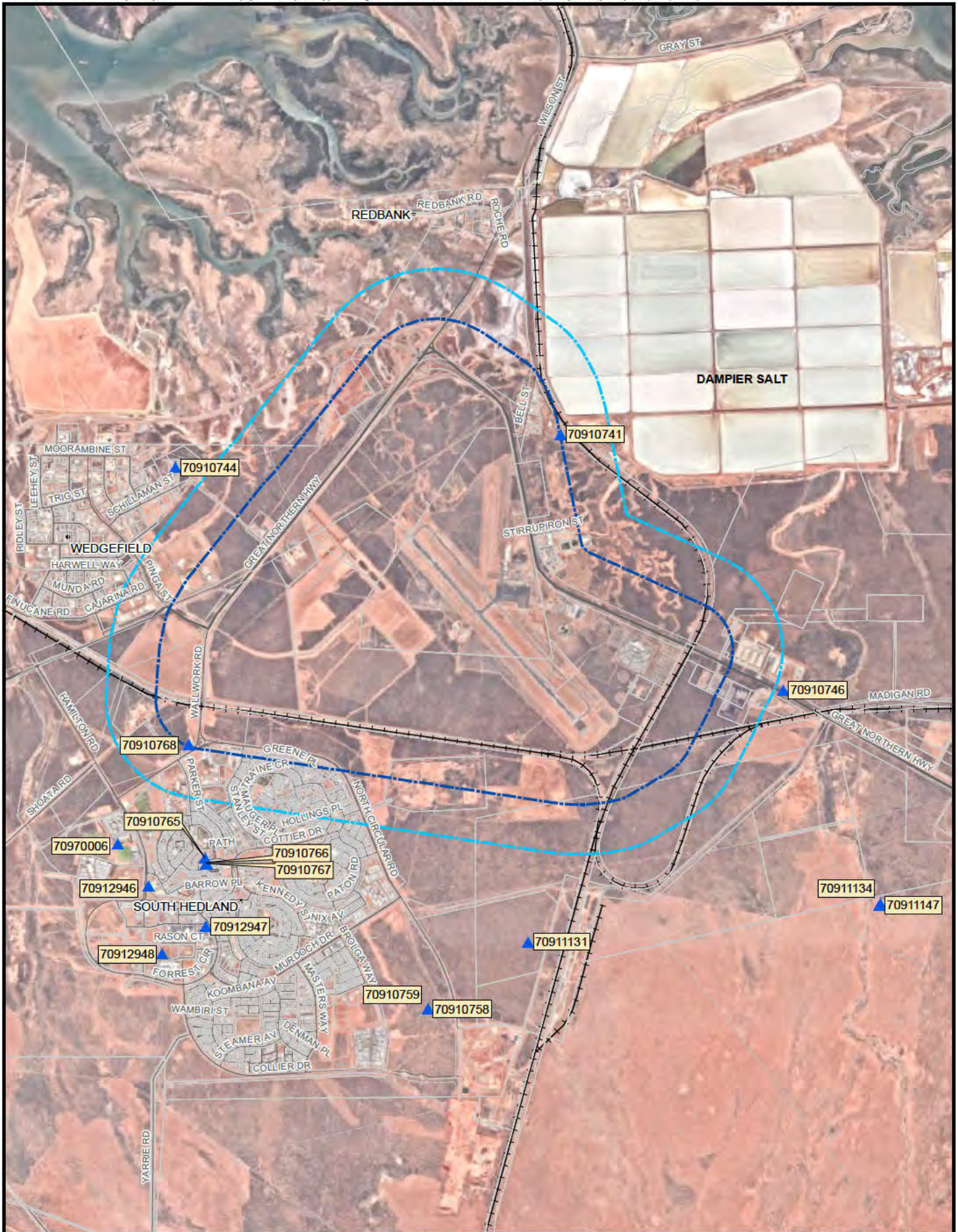
PHOTOGRAPHIC LOG			
Site Name: Port Hedland Airport		Site Location: Waste water treatment evaporation pond	Project No: 60509115
Plate No. 15	Date: 29/07/2016		
Direction Photo Taken: North east			
Description: The waste water treatment evaporation pond to the north of the terminal area.			
Plate No. 16	Date: 29/07/2016		
Direction Photo Taken: South west			
Description: To the south of the waste water treatment evaporation pond were three stockpiles of soil of unknown origin.			

Appendix C

Bore Information



PROJECT ID60543717 CREATED BYRNM APPROVED BY LAST MODIFIED02 FEB 2018 www.aecom.com DATUM GDA 1994, PROJECTION MGA ZONE 50 0200400600800 metres 1:50,000when printed at A4	LEGEND Licensed Bores Licensed Drawdown Properties 500m Buffer 1km Buffer Data sources: Neemap Imagery (17/04/2016) Base Data: (c) Based on information provided by and with the permission of the Western Australian Land Information Authority trading as Landgate (2016).	Licenced Bores AIRSERVICES AUSTRALIA PRELIMINARY SITE INVESTIGATION AND LIMITED SAMPLING, PORT HEDLAND AIRPORT Appendix C1
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PROJECT ID 60509115 CREATED BY RNM APPROVED BY [Signature] LAST MODIFIED 24 NOV 2016 AECOM www.aecom.com DATUM GDA 1994, PROJECTION MGA ZONE 50 0 200 400 600 800 metres 1:50,000 when printed at A4	LEGEND - Registered Bores - Cadastral Boundary 500m Buffer 1km Buffer - Highway - Major Road - Minor Road - Track - Railways Date sources: Hexmap Imagery (17/04/2016) Base Data: (c) Based on information provided by and with the permission of the Western Australian Land Information Authority trading as Landgate (2016).	Registered Bores AIRSERVICES AUSTRALIA PRELIMINARY SITE INVESTIGATION AT PORT HEDLAND AIRPORT Appendix C2
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Appendix D

Contaminated Sites Information



Your ref: 60509115
Our ref: DMO 9177 & 7830
Enquiries: Registrar
Phone: 1300 762982
Fax:
Email:

[REDACTED]
AECOM
GPO Box B59
Perth WA 6849

Dear Sir/Madam

BASIC SUMMARY OF RECORDS REQUEST

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

- Parcel 65130 = LOT 9007 ON PLAN 40824 as shown on certificate of title 2874/672 known as Port Hedland WA 6721

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 and has shown that there is a portion of a classified site within Parcel 65130. The results related to the classified site are attached for your information.

General information on a Summary of Records and associated request forms is available from DER's website on www.der.wa.gov.au/contaminatedsites or by contacting 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. Basic Summary of Records
Receipt Number DER51793



Contaminated Sites Act 2003 Basic Summary of Records Search Response

Report generated at 01:19:49PM, 02/08/2016

Receipt No: DER51793

ID No: 55165

Search Results

This response relates to a search request received for:

Port Hedland, WA, 6721

Approximate spatial representation of Part of LOT 11 ON PLAN 144237 as shown on certificate of title 1276/142 and

Part of LOT 11 ON PLAN 144237 as shown on certificate of title 1657/119

This parcel belongs to a site that contains 1 parcel(s).

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

Address

Port Hedland, WA, 6721

Approximate spatial representation of Part of LOT 11 ON PLAN 144237 as shown on certificate of title 1276/142 and Part of LOT 11 ON PLAN 144237 as shown on certificate of title 1657/119

Parcel Status

Classification: 18/07/2013 - *Possibly contaminated - investigation required*

Nature and Extent of Contamination:

Hydrocarbons, such as from aviation fuel, are present in soils at a depth of approximately 2 metres below ground level in the central portion of the site.

Restrictions on Use:

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

Reason for Classification:

This site is comprised of a small portion of Lot 11 on Plan 144237 which was historically used as an aviation fuel depot for approximately 35 years, from the 1970s until 2005. The site was reported to the Department of Environment Regulation (DER) as per reporting obligations under section 11 of the 'Contaminated Sites Act 2003' (the Act), which commenced on 1 December 2006. The site classification is based on information submitted to DER by June 2013.

The site was reported following the identification of hydrocarbon-impacted soils during the removal of below ground fuel-related infrastructure in late 2012. The historical use of the site as a fuel storage facility is 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).

Soil validation works undertaken in late 2012 following the removal of underground fuel storage tanks (USTs) identified hydrocarbons, such as from aviation fuel, at concentrations exceeding Ecological Investigation Levels, as published in 'Assessment Levels for Soil, Sediment and Water' (Department of Environment and Conservation, 2010). The impacted soil was identified at a depth of approximately 2 metres below ground level, at the base of the excavation. Significant concentrations of hydrocarbons were also identified in excavated soils which were temporarily stockpiled onsite prior to off-site disposal to an appropriate landfill facility.

Additional soil investigations in areas identified as potentially contaminated due to their historical use,

Disclaimer

This Summary of Records has been prepared by Department of Environment Regulation (DER) as a requirement of the Contaminated Sites Act 2003. DER 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 DER, 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 01:19:50PM, 02/08/2016

such as the triple interceptor trap and pump shelter, did not identify any contaminants of concern exceeding relevant ecological or human health screening risk criteria.

Based on the concentrations of hydrocarbons identified in the excavated soils, and the identification of hydrocarbons in soil at the base of the excavation, groundwater investigations are required to ensure that hydrocarbons have not migrated to impact groundwater. DER understands that groundwater investigations are scheduled to be undertaken in spring 2013.

Given the absence of sensitive ecological receptors in close proximity to the site, and the depth of the residual impact, an intermediate risk assessment has indicated that the residual soil impacts present on site do not pose an unacceptable risk to the environment or environmental values. However, groundwater investigations are required to ensure that potential groundwater impacts do not pose a risk to human health, the environment or any environmental value.

As the site has only been partially investigated, a comment cannot be made on the suitability of the site as a whole for continued commercial/industrial land use.

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'.

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

DER, in consultation with the Department of Health, has classified this site based on the information available to DER 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 DER, 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, DER recommends that analytical testing should be carried out to determine whether the groundwater is suitable for its intended use.

Action Required:

Groundwater investigations are required to confirm the current contamination status of groundwater beneath the site. Investigations should meet the standards outlined in the DER's Contaminated Sites Management Series of guidelines.

Certificate of Title Memorial

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 Regulation.

Current Regulatory Notice Issued

Type of Regulatory Notice: *Nil*

Date Issued: *Nil*

General

No other information relating to this parcel.

Disclaimer

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Airservices Australia
GPO Box 367
Canberra ACT 2601

Dear Sir/Madam

This letter is the formal notice of classification of a known or suspected contaminated site in which you have an interest. This constitutes the notice the Department of Environment Regulation (DER) is legally obliged to give under the *Contaminated Sites Act 2003* (the Act), which came into effect on 1 December 2006.

The Act was set up 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.

This notice explains why the site has been classified, what restrictions, if any, have been placed on the use of the site and how you can appeal the classification. In some cases, this notice may include other lots which also form part of the classified site, in addition to the lot in which you have an interest.

If, after reading this letter, you have any further queries, please contact DER on 1300 762 982 (Contaminated Sites Information Line).

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 DER as a known or suspected contaminated site and has been classified under the Act:

- LOT 435 ON PLAN 404824 as shown on certificate of title 2874/668 known as Port Hedland WA 6721

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 (contact details sourced from the current certificate of title);
- (b) occupier of the site;
- (c) relevant public authority;
- (d) person who, 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 who, in the CEO's opinion, may be responsible for remediation of a site classified as *contaminated – remediation required*.

Site Classification

Category of site classification: Possibly contaminated - investigation required

Date of site classification: 24/02/2016

Reasons for classification: This site was reported to the Department of Environment Regulation (DER) as per reporting obligations under section 11 of the 'Contaminated Sites Act 2003' (the Act), which commenced on 1 December 2006. The site has been classified under section 13 of the Act based on information submitted to DER by December 2015.

This site (Lot 435) is located within the 'Kingsford Business Park' development located to the south-west of the Port Hedland International Airport. Lot 435 was formerly used for airport related activities, including a fire-fighting training ground and storage of petroleum hydrocarbons and aqueous film-forming foams (AFFF). These are land uses that have the potential to cause contamination, as specified in the guideline 'Assessment and management of contaminated sites' (DER, 2014).

This site was reported, along with other land parcels within the Kingsford Business Park, following a preliminary site investigation in early 2012 which identified suspected soil contamination by fragments of asbestos-containing material (ACM) and hydrocarbons (such as from kerosene).

Detailed site investigations were undertaken across this site in four phases between March 2012 and March 2013. During the course of these investigations, further historical information became available relating to the remnant infrastructure located along the north-eastern boundary of Lot 435. This area, known as 'Zone D' was found to have historically been used as 'drill grounds' for fire-fighting training from the 1960s until 2003. Limited site investigations were found to have been undertaken in 1996 and 2003 which identified significant concentrations of petroleum hydrocarbons in soil and groundwater within Zone D.

Soil investigations in 2012 and 2013 identified fragments of ACM across surface soils in the north-eastern corner of the site. The investigations also found metals (such as zinc, copper and lead), the organochlorine pesticide 'chlordane', and petroleum hydrocarbons (such as from kerosene or aviation fuel) at concentrations exceeding Ecological Investigation Levels (EILs), as published in 'Assessment Levels for Soil, Sediment and Water' (Department of Environment and Conservation [DEC], 2010). The concentrations of lead reported in soil also exceeded Health-based Investigations Levels (HILs) for medium to high-density residential sites (DEC, 2010) in two locations. EILs and HILs were the relevant assessment criteria at the time the investigations were undertaken.

In two locations the concentrations of petroleum hydrocarbons in soil also exceeded the relevant soil Health Screening Levels for direct contact for intrusive maintenance workers, as published in 'Health screening levels for petroleum hydrocarbons in soil and groundwater' (Friebel and Nadebaum, Co-operative Research Centre for Contamination Assessment and Remediation of the Environment (CRC CARE), 2011).

In 2013 a soil investigation was undertaken across Zone D to assess the presence of polyfluorinated compounds (PFCs) associated with fire-fighting foams. These investigations found that PFCs (such as perfluorooctane sulphonate and perfluoro-octanoic acid) were present in soil across Zone D. The concentrations of PFCs detected exceeded site specific criteria adopted for the site investigation.

With the exception of ACM, the soil impacts identified within Lot 435 were confined to Zone D. It is understood that the ACM impacts outside of Zone D have been subject to remediation and validation works. However, at the time of classification, reports documenting these works have not been submitted to DER.

Groundwater investigations, primarily targeting the area of identified chemical soil contamination in Zone D, were undertaken between 2012 and 2014. Petroleum hydrocarbons, such as from kerosene or aviation fuel, were identified in groundwater adjacent to the main fire-fighting training pad, and the former above-ground fuel storage tank. The concentrations of hydrocarbons reported exceeded assessment levels for non-potable use of groundwater, as published in 'Assessment and management of contaminated sites' (DER, 2014).

Hydrocarbon concentrations also exceeded the relevant groundwater Health Screening Levels for vapour intrusion on high density residential land in the 'National Environment Protection (Assessment of Site Contamination) Measure 1999' (the NEPM). These are considered relevant criteria given that at the time the investigations were undertaken the site was proposed to be developed into a transient worker accommodation camp.

The 2013 groundwater monitoring event found that PFCs were present in groundwater across Zone D. The 2014 groundwater monitoring event involved the installation of a number of additional monitoring wells to delineate the lateral and vertical extent of the PFC-impacted groundwater. These investigations confirmed that the plume was generally limited to Zone D and did not extend beyond the broader development area. However, PFCs were detected in groundwater at locations beyond the down-hydraulic (northern) boundary of Lot 435. The concentrations of PFCs reported in groundwater within Zone D greatly exceeded site specific criteria adopted for the site investigation.

In early 2015 an interim management plan was developed to manage potential risks posed by substances at Lot 435 as part of the ongoing development of adjacent land. However, at the time of classification, it is not clear if the management measures outlined in the plan (e.g. access control via fencing) have been implemented.

It is noted that the contamination investigations and risk assessment works undertaken to date have been overseen by an accredited contaminated sites auditor voluntarily engaged by the site developer. However, a voluntary auditor's report documenting the auditor's findings is yet to be submitted to DER.

DER is also aware that an additional groundwater monitoring event and plume stability assessment has been undertaken at the site, and a risk assessment and updated site management plan have been prepared for the site. However, at the time of classification, reports documenting these works have not been submitted to DER.

DER understands that the site remains vacant and undeveloped. Based on the currently available information, DER is unable to comment on the suitability of the site for the proposed transient worker accommodation camp.

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

When further information relating to the contamination status of the site (such as a risk assessment and management plan) is submitted to DER, this will be reviewed, and the site may be re-classified.

DER, in consultation with the Department of Health, has classified this site based on the information available to DER 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 DER, and as such, the usefulness of this information may be limited.

Action Required:

A risk assessment is required to determine the potential risk to human health, the environment or any environmental value, and should include an assessment of all potential receptors. The risk assessment should be carried out in accordance with guidance in the 'National Environment Protection (Assessment of Site Contamination) Measure 1999' and DER's 'Contaminated Sites Guidelines'.

The voluntary auditor's report currently being prepared should be finalised and submitted to DER along with all other outstanding reports and documents by 25 March 2016.

General Information

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

Information relating to the classification of the site is also available by submitting a request for a summary of records (using Form 2) to: Department of Environment Regulation, Locked Bag 33, Cloisters Square, Perth WA 6850. A fee of \$30 currently applies for a Basic Summary of Records. Forms are available from www.der.wa.gov.au/contaminatedsites.

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

Memorials

In accordance with section 58(1) of the Act, DER will lodge a memorial with the Registrar of Landgate, recording the classification against the site's Certificate(s) of Title 2874/668. Parcel(s) without a registration number or certificate of title will not have a memorial lodged against them until a certificate of title has been created. Once complete, confirmation of the lodgement of the memorial(s) will be forwarded to the following people:

- (a) each owner,
- (b) Western Australian Planning Commission;
- (c) CEO of the Department of Health;
- (d) Local Government Authority;
- (e) 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 DER 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 DER as to the suitability of the proposed development.

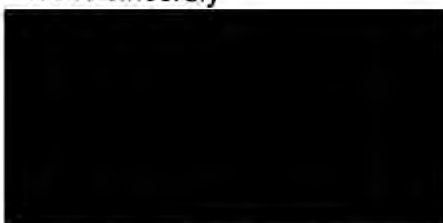
Appealing the Site Classification

All site classifications given by DER are appealable. However, only certain people can lodge a valid appeal. The people who can lodge a valid appeal varies, depending on the classification category, as detailed in Fact sheet 4 - Site classifications and appeals. Appeals need to be lodged in writing with the Contaminated Sites Committee at Forrest Centre, Level 22, 221 St Georges Terrace, Perth WA 6000, within **30 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. An appeal fee (currently \$45) applies.

To find out more about the appeal process, see the Contaminated Sites Committee website at www.consitescommittee.wa.gov.au or contact the office of the Committee on (08) 6467 5201.

For further information on all aspects of site classification, please refer to Fact sheet 4 - Site classifications and appeals and *Site Classification Scheme 2006* (guideline) which are available from DER's website www.der.wa.gov.au/contaminatedsites or by contacting the Registrar on 1300 762 982.

Yours sincerely



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

25/02/2016

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

ATTACHMENT A – Nature and Extent and Restrictions on Use

- LOT 435 ON PLAN 404824

Nature and Extent: Polyfluorinated compounds (such as from fire-fighting foams), metals (such as lead, copper and zinc), fragments of asbestos-containing materials and hydrocarbons (such as kerosene or aviation fuel) are present in soils within the north-eastern portion of the site.

Polyfluorinated compounds (such as from fire-fighting foams) and hydrocarbons (such as kerosene or aviation fuel) are present in groundwater within the north-eastern portion of the site and extend beyond the site boundary beneath the recently constructed road reserve.

Restriction on Use: Due to the nature and extent of groundwater contamination identified to date, the abstraction of groundwater for any purpose other than analytical testing or remediation is not recommended.

Due to the nature and extent of soil and groundwater contamination identified at the site, DER recommends that the site be managed in accordance with 'Interim Contamination Management Plan, Airport Precinct 3, Port Hedland, WA' (Aurora Environmental, January 2015).

DMO 9593 - LOT 435, Port Hedland



LEGEND

- ✓ Road Centrelines
- Cadastre
- Perth Metropolitan Area Central 15cm Orthomosaic - Landgate 2014
- Local Government Authorities
- Port Hedland South Hedland 15cm Orthomosaic - Landgate 2004

* Project Data. This data has not been quality assured. Please contact map author for details.



0 200 m

Scale 1:7593

(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: 24/02/2016 2:54:44 PM

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

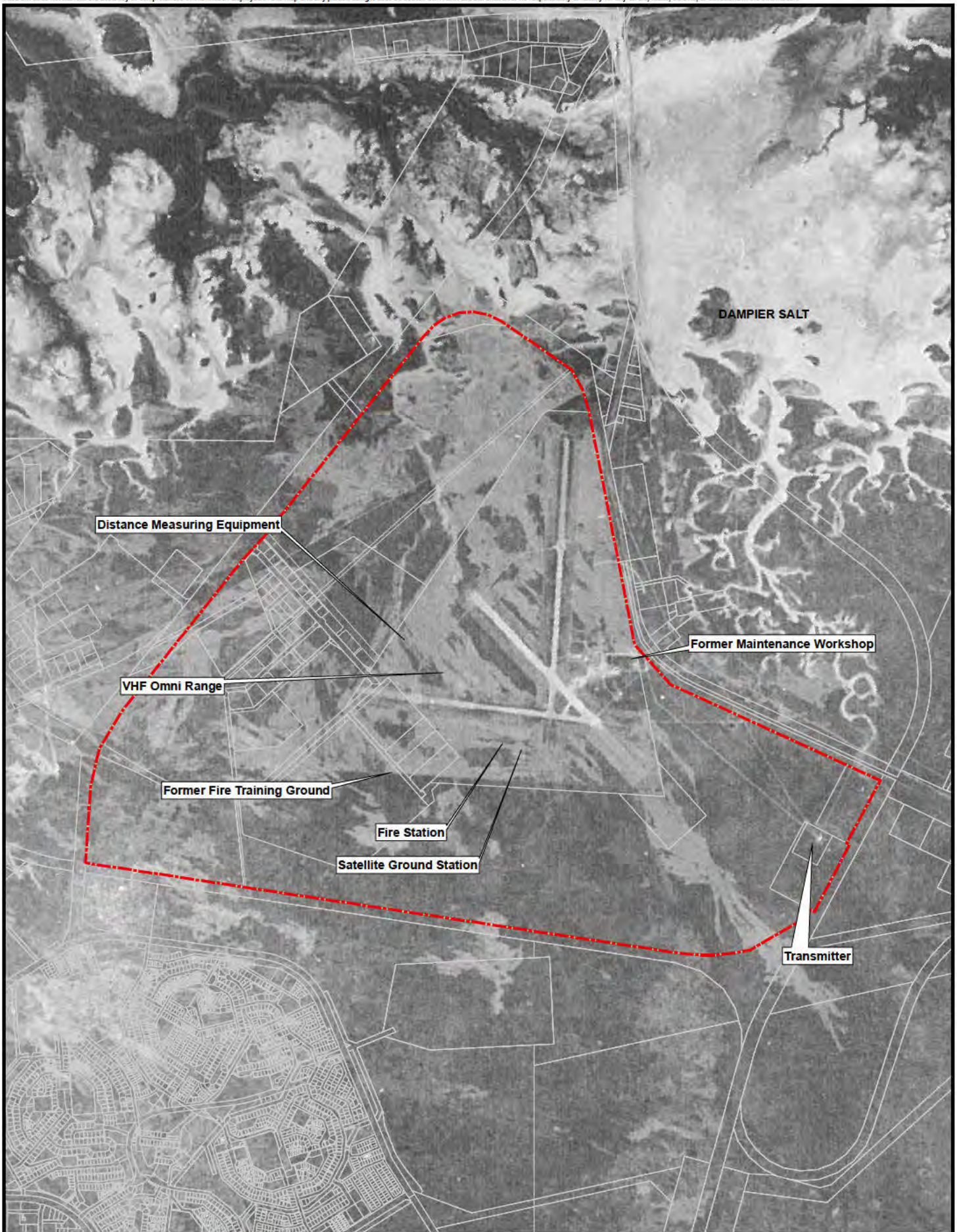


Government of Western Australia
Department of Environment Regulation

WA Crown Copyright 2002

Appendix E

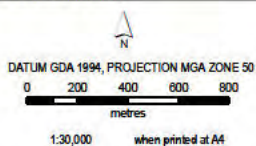
Aerial Photographs



PROJECT ID 60509115
 CREATED BY RNM
 APPROVED BY [Signature]
 LAST MODIFIED 24 NOV 2016



LEGEND
 Airport Estate Boundary
 Cadastral Boundary



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

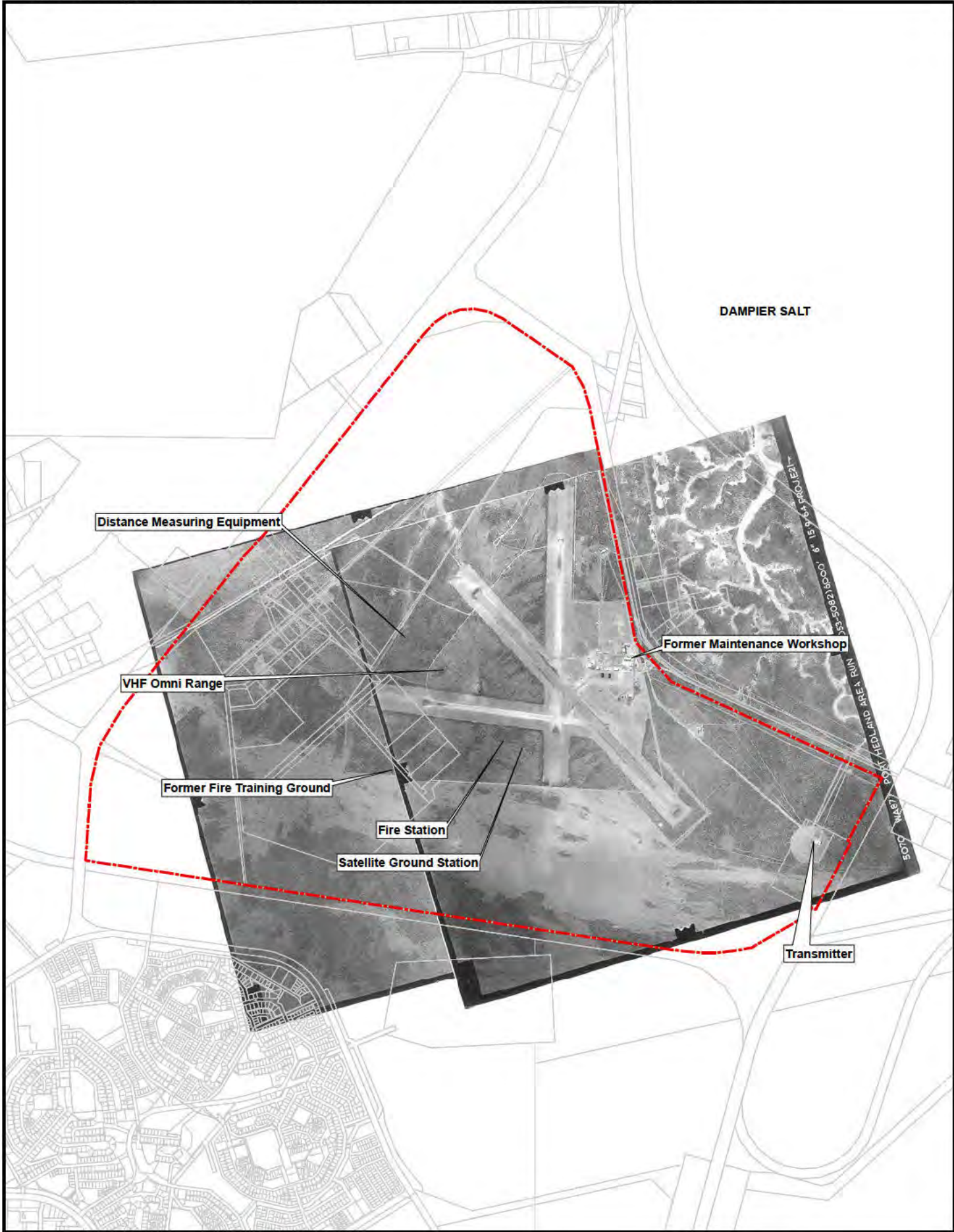
Historical Aerials
 19/06/1949

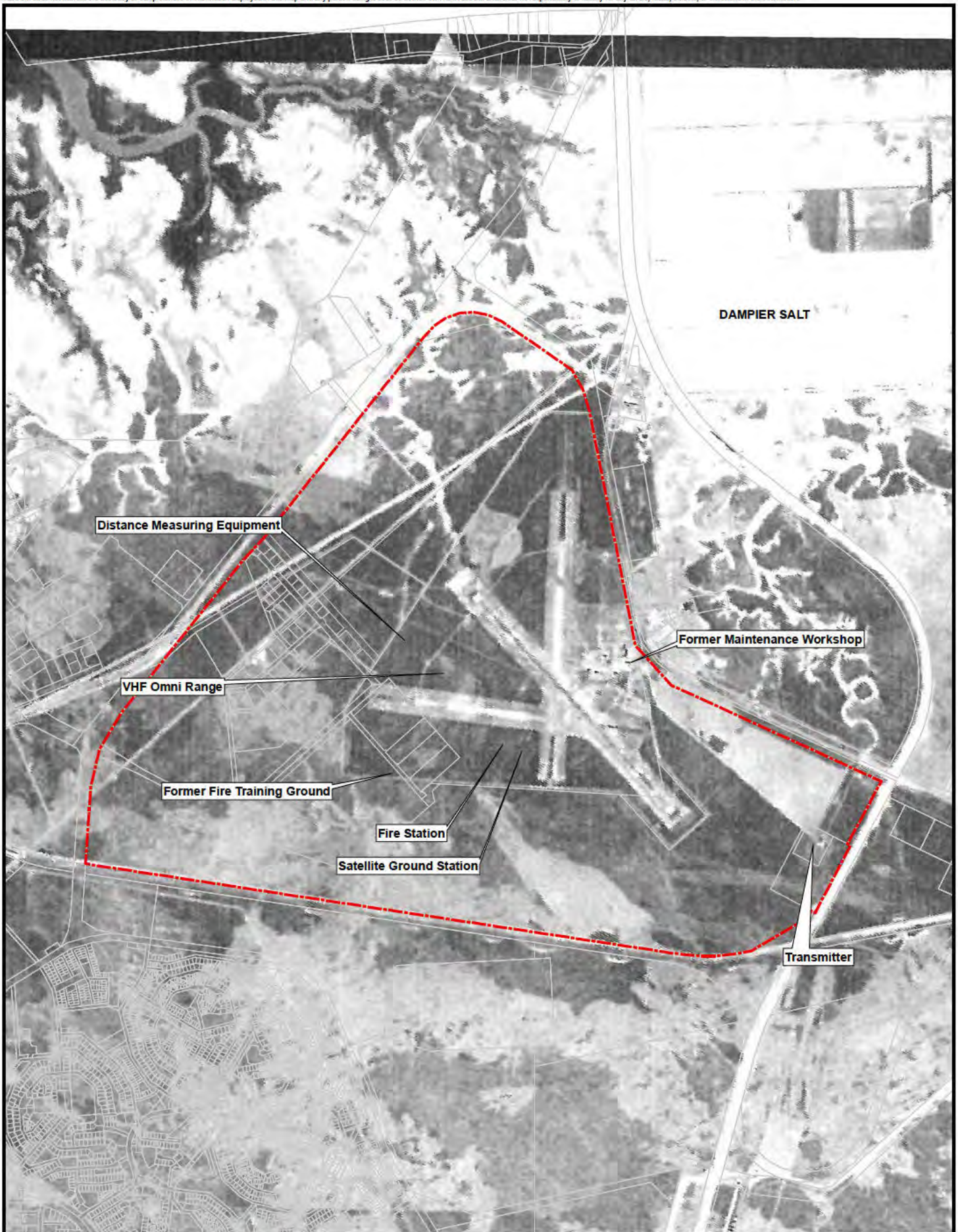
AIRSERVICES AUSTRALIA

**PRELIMINARY SITE INVESTIGATION
 AT PORT HEDLAND AIRPORT**

Appendix

E1





PROJECT ID 60509115
 CREATED BY RNM
 APPROVED BY [Signature]
 LAST MODIFIED 24 NOV 2016

AECOM
 www.aecom.com

LEGEND
 Airport Estate Boundary
 Cadastral Boundary

DATUM GDA 1994, PROJECTION MGA ZONE 50
 0 200 400 600 800
 metres
 1:30,000 when printed at A4

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

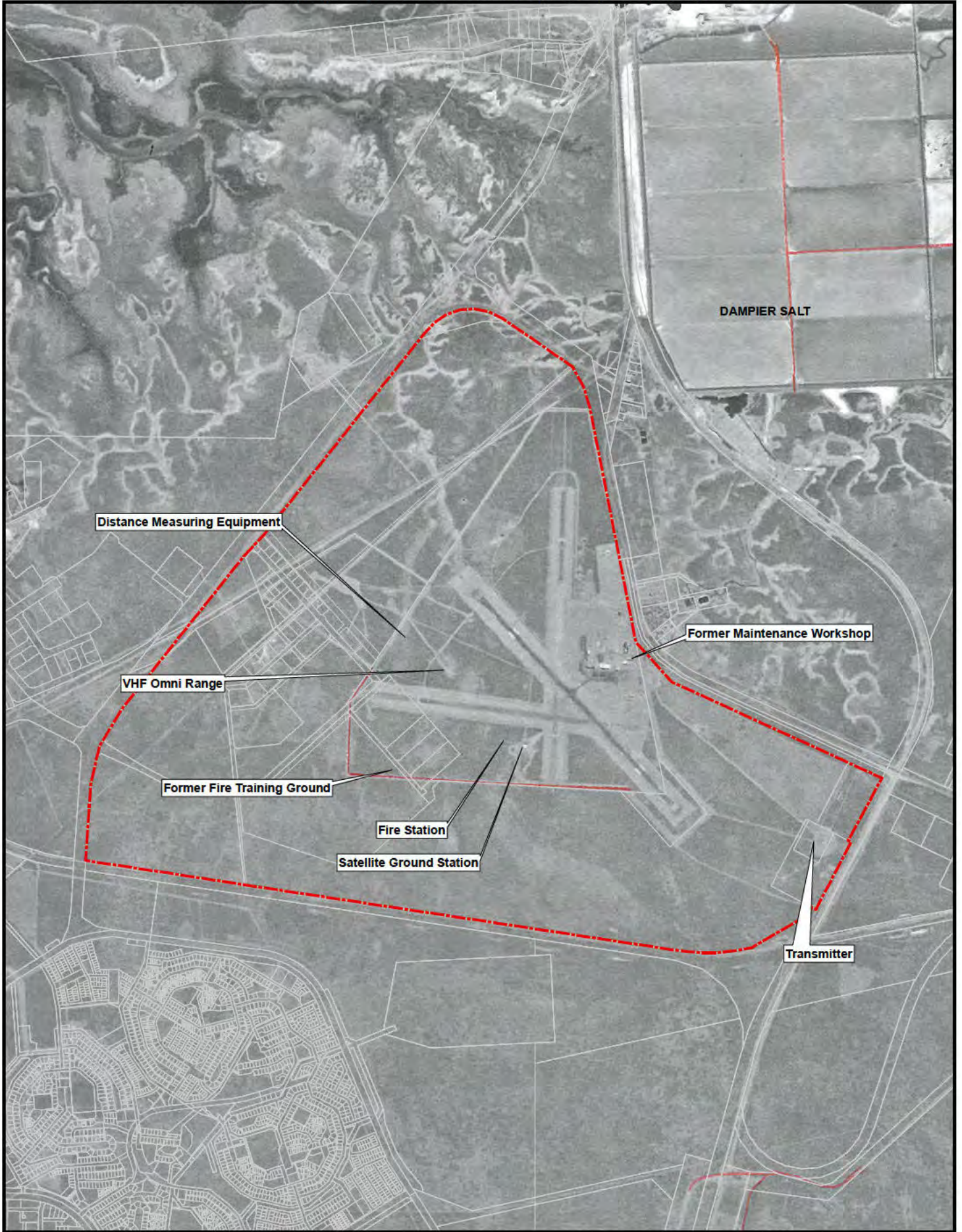
Historical Aerials
 16/05/1968

AIRSERVICES AUSTRALIA

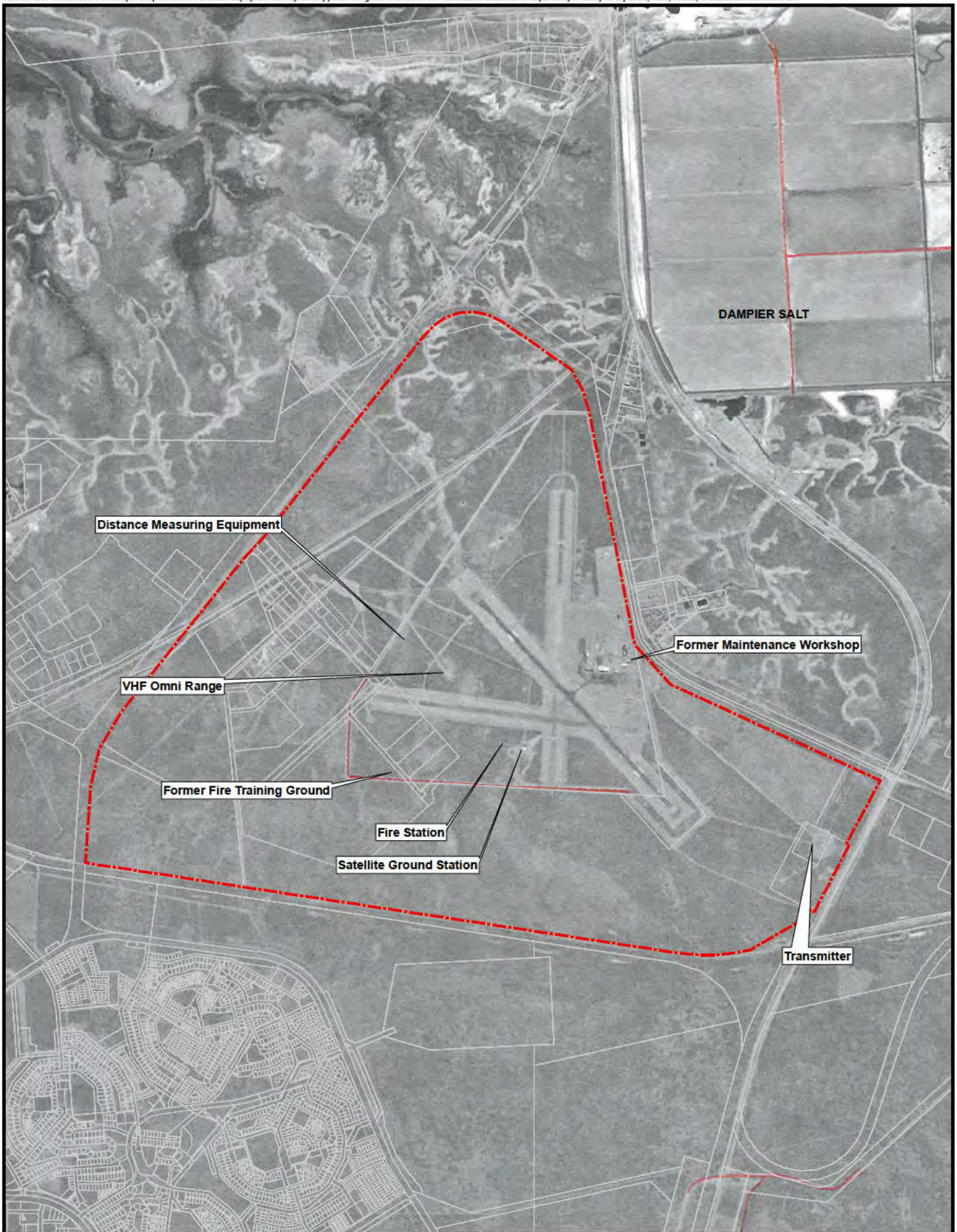
**PRELIMINARY SITE INVESTIGATION
 AT PORT HEDLAND AIRPORT**

Appendix

E3



PROJECT ID 60509115 CREATED BY RNM APPROVED BY [Signature] LAST MODIFIED 24 NOV 2016 AECOM www.aecom.com DATUM GDA 1994, PROJECTION MGA ZONE 50 0 200 400 600 800 metres 1:30,000 when printed at A4	LEGEND --- Airport Estate Boundary --- Cadastral 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 (2016).	Historical Aerials 13/09/1971 AIRSERVICES AUSTRALIA PRELIMINARY SITE INVESTIGATION AT PORT HEDLAND AIRPORT Appendix E4
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PROJECT ID 60509115
CREATED BY RNM
APPROVED BY [Signature]
LAST MODIFIED 24 NOV 2016

AECOM
www.aecom.com

LEGEND
[Red dashed line] Airport Estate Boundary
[Thin black line] Cadastral Boundary

DATUM GDA 1994, PROJECTION MGA ZONE 50
0 200 400 600 800
metres
1:30,000 when printed at A4

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 (2016).

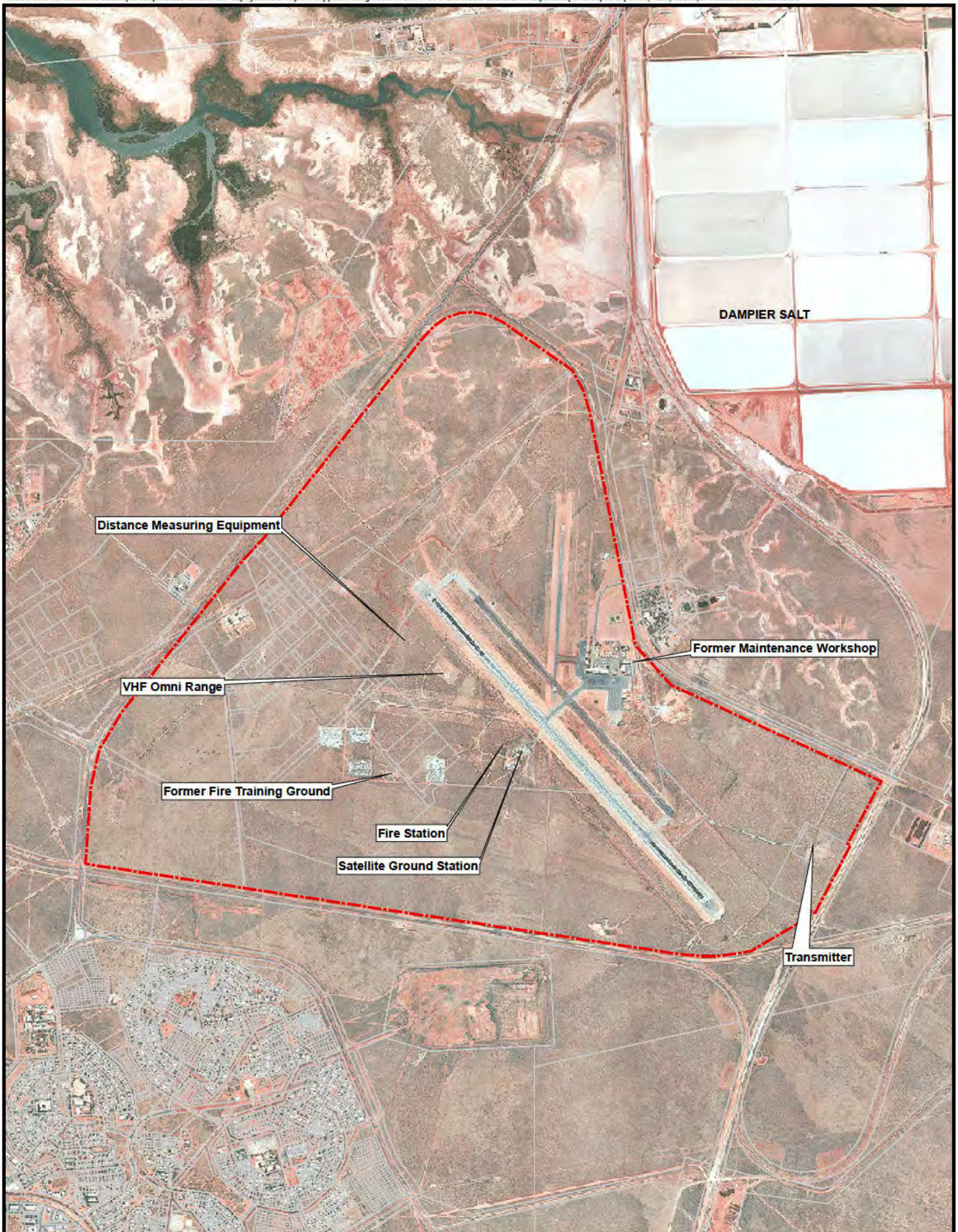
Historical Aerials
05/07/1980

AIRSERVICES AUSTRALIA

**PRELIMINARY SITE INVESTIGATION
AT PORT HEDLAND AIRPORT**

Appendix

E5



PROJECT ID 60509115
 CREATED BY RNM
 APPROVED BY [Signature]
 LAST MODIFIED 24 NOV 2016

AECOM
 www.aecom.com

LEGEND
 Airport Estate Boundary
 Cadastral Boundary

DATUM GDA 1994, PROJECTION MGA ZONE 50
 0 200 400 600 800
 metres
 1:30,000 when printed at A4

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

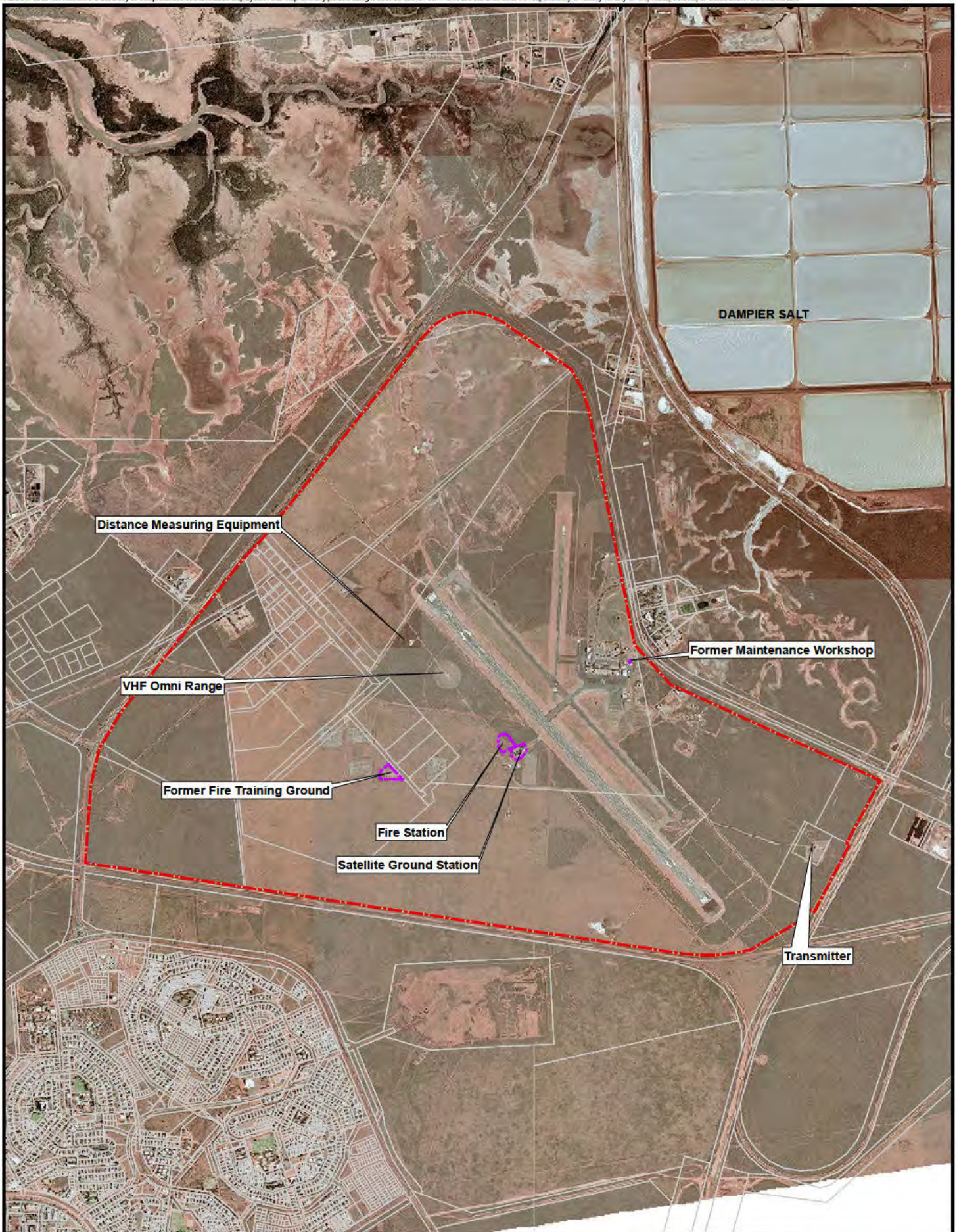
Historical Aerials
 06/06/1995

AIRSERVICES AUSTRALIA

**PRELIMINARY SITE INVESTIGATION
 AT PORT HEDLAND AIRPORT**

Appendix

E6



PROJECT ID 60509115
 CREATED BY RNM
 APPROVED BY [Signature]
 LAST MODIFIED 24 NOV 2016

AECOM
 www.aecom.com

LEGEND
 Airport Estate Boundary
 Cadastral Boundary

DATUM GDA 1994, PROJECTION MGA ZONE 50
 0 200 400 600 800
 metres
 1:30,000 when printed at A4

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 (2016).

Historical Aerials
 20/10/2001

AIRSERVICES AUSTRALIA

**PRELIMINARY SITE INVESTIGATION
 AT PORT HEDLAND AIRPORT**

Appendix

E7



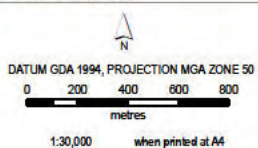
PROJECT ID 60509115 CREATED BY RNM APPROVED BY [Signature] LAST MODIFIED 24 NOV 2016 AECOM www.aecom.com DATUM GDA 1994, PROJECTION MGA ZONE 50 0 200 400 600 800 metres 1:30,000 when printed at A4	LEGEND --- Airport Estate Boundary --- Cadastral Boundary Data sources: Landgate Imagery Base Data: (c) Based on information provided by and with the permission of the Western Australian Land Information Authority trading as Landgate (2016).	Historical Aerials 19/11/2009 AIRSERVICES AUSTRALIA PRELIMINARY SITE INVESTIGATION AT PORT HEDLAND AIRPORT Appendix E8
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PROJECT ID 60509115
 CREATED BY RNM
 APPROVED BY [Signature]
 LAST MODIFIED 24 NOV 2016

AECOM
 www.aecom.com

LEGEND
 Airport Estate Boundary
 Cadastral 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 (2016).

Historical Aerials
 27/08/2015

AIRSERVICES AUSTRALIA

**PRELIMINARY SITE INVESTIGATION
 AT PORT HEDLAND AIRPORT**

Appendix

E9



PROJECT ID 60509115
 CREATED BY RNM
 APPROVED BY [Signature]
 LAST MODIFIED 24 NOV 2016

AECOM
 www.aecom.com

LEGEND
 Airport Estate Boundary
 Cadastral Boundary

DATUM GDA 1994, PROJECTION MGA ZONE 50
 0 200 400 600 800
 metres
 1:30,000 when printed at A4

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

Historical Aerials
 17/04/2016

AIRSERVICES AUSTRALIA

**PRELIMINARY SITE INVESTIGATION
 AT PORT HEDLAND AIRPORT**

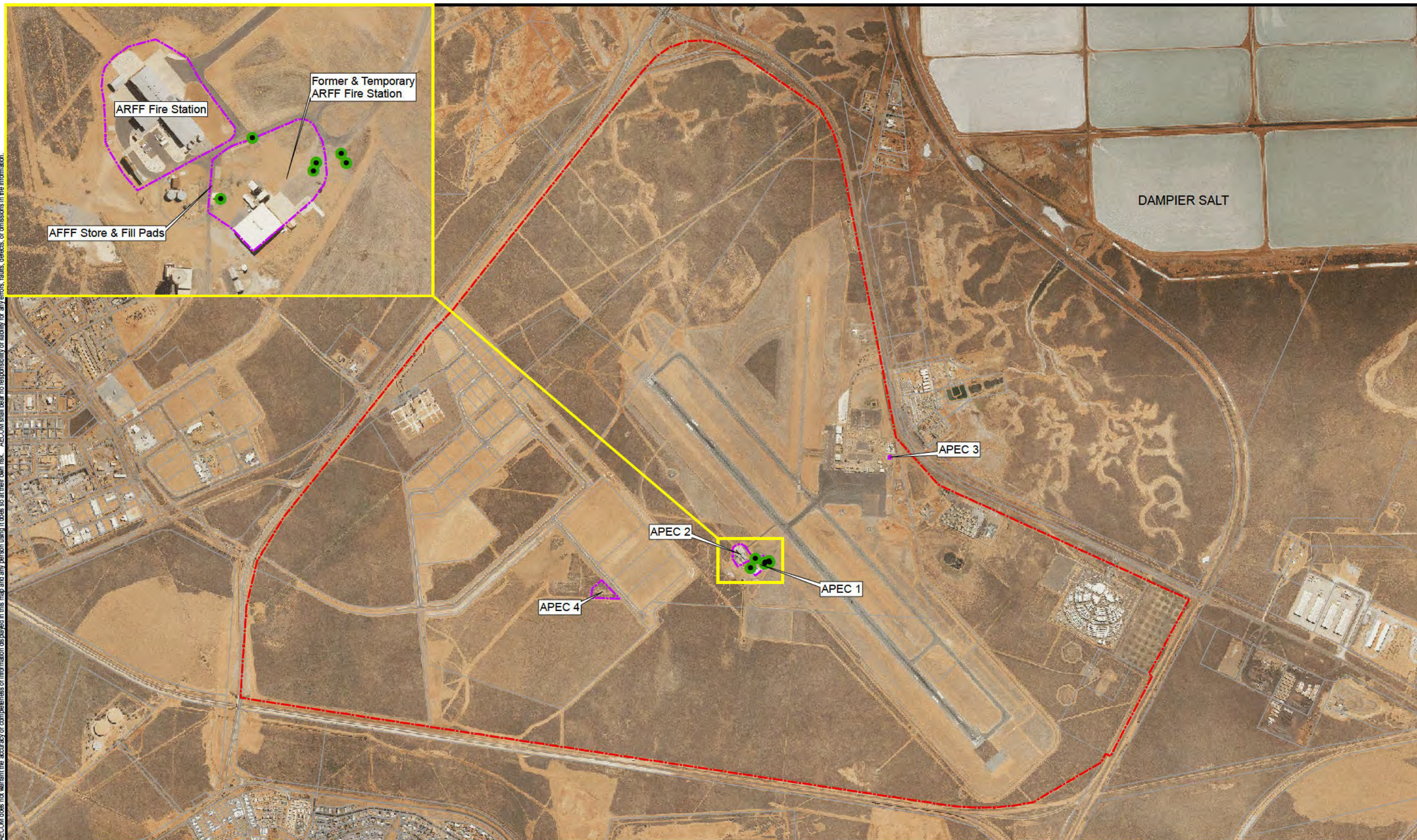
Appendix

E10

Appendix F

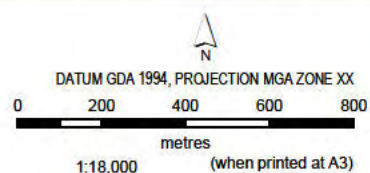
Historical Site Sampling

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.



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AECOM
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LEGEND

- Sampling Locations
- PFOS or PFOA Detected in Soil
- Areas of Potential Concern
- Airport Estate Boundary
- Cadastral Boundary

Historical PFOS and PFOA Impacts in Soil

AIRSERVICES AUSTRALIA

PRELIMINARY SITE INVESTIGATION AT
PORT HEDLAND AIRPORT

Appendix

F-1

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

Appendix G

Incident Reports

ARFF Incident Detail Report

Air Services Australia

PORT HEDLAND

Incident No:

10

ARFF Incident Details for Fuel Spillage

04/11/1997

Incident Site: BAY 1 MAIN APRON

Number of Lives Saved: 0

Origin of Call: IC from Tower

Number of Deaths: 0

Company:

Number of Injuries: 0

Est Damage Value: \$0

Est Facility Value: \$0

Incident Times (UTC)

Call Time: 04/11/1997 00:54:38

Arrival Time: 04/11/1997 00:56:47

End Time: 04/11/1997 00:58:00

Dispatch Time: 04/11/1997 00:55:39

Control Time: 04/11/1997 00:58:00

Return Time: 04/11/1997 01:24:25

Materials Used

DCP Used: 0.00 kg

Foam Used: 10 litres

WaterUsed: 500 litres

Other Used:

Vehicles Involved

Vehicle Code	Quantity	Vehicle Code	Quantity	Vehicle Code	Quantity
ULFV 6	1				

Staff in Attendance

Team Leader:

FSM:

Other Staff:

Actions Taken

RFFS turned out took up tail on position aircraft. Observed staff working on a fuel vent valve on the port side main plane mid wing area. A small amount of fuel was flowing out of the valve and being caught in a bucket. A small amount of fuel was spilling onto the ground. 2 Fuel trucks removed from area. On speaking to the crew I ascertained that no passengers were on boardthere were three cabin crew who remained on Board. One (1) Linetwo(2) lengths with [REDACTED] run out and RFFS stood by. Valve repairedddd & fuel spill covered with foam. RFFS stoodby while aircraft loaded & departed. Slix-it appliedscrubbed with broomremaining fuel washed away using water through monitor.

Appendix H

Subsurface Utility
Clearance Report &
Survey Data

REPORT DOCUMENT

Subsurface Utility
Clearance Report
Port Hedland
21665-04 REV0
Aecom

14th June 2017

Job Number	Client
21655-04	AECOM
Site Address	Port Hedland 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

Limited utility plans provided and blind searching reduced the risk only, due to this factor we would suggest any works are undertaken with extreme caution.

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 12461811

Phone: 1100
www.1100.com.au

Caller Details

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: Not Supplied
Working on Behalf of: Other
Enquiry Date: 13/06/2017 Start Date: 14/06/2017 End Date: 14/07/2017
Address: Great Northern Highway Port Hedland WA 6721
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 by 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
61884728	Horizon Power	0863101601	NOTIFIED
61884726	Telstra, WA	1800653935	NOTIFIED
61884727	Water Corporation WA	0894248115	NOTIFIED

WAL 08 1071 07 89 1002

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



Job No 12461814

Phone: 1100
www.1100.com.au

Caller Details

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: Not Supplied
Working on Behalf of: Other
Enquiry Date: 13/06/2017 Start Date: 14/06/2017 End Date: 14/07/2017
Address: Great Northern Highway Port Hedland WA 6721
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: 12461811 -

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.
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Asset Owner Details

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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
61884742	Horizon Power	0863101601	NOTIFIED
61884740	Telstra, WA	1800653935	NOTIFIED
61884741	Water Corporation WA	0894248115	NOTIFIED

WAL 08 1071 07 89 1002

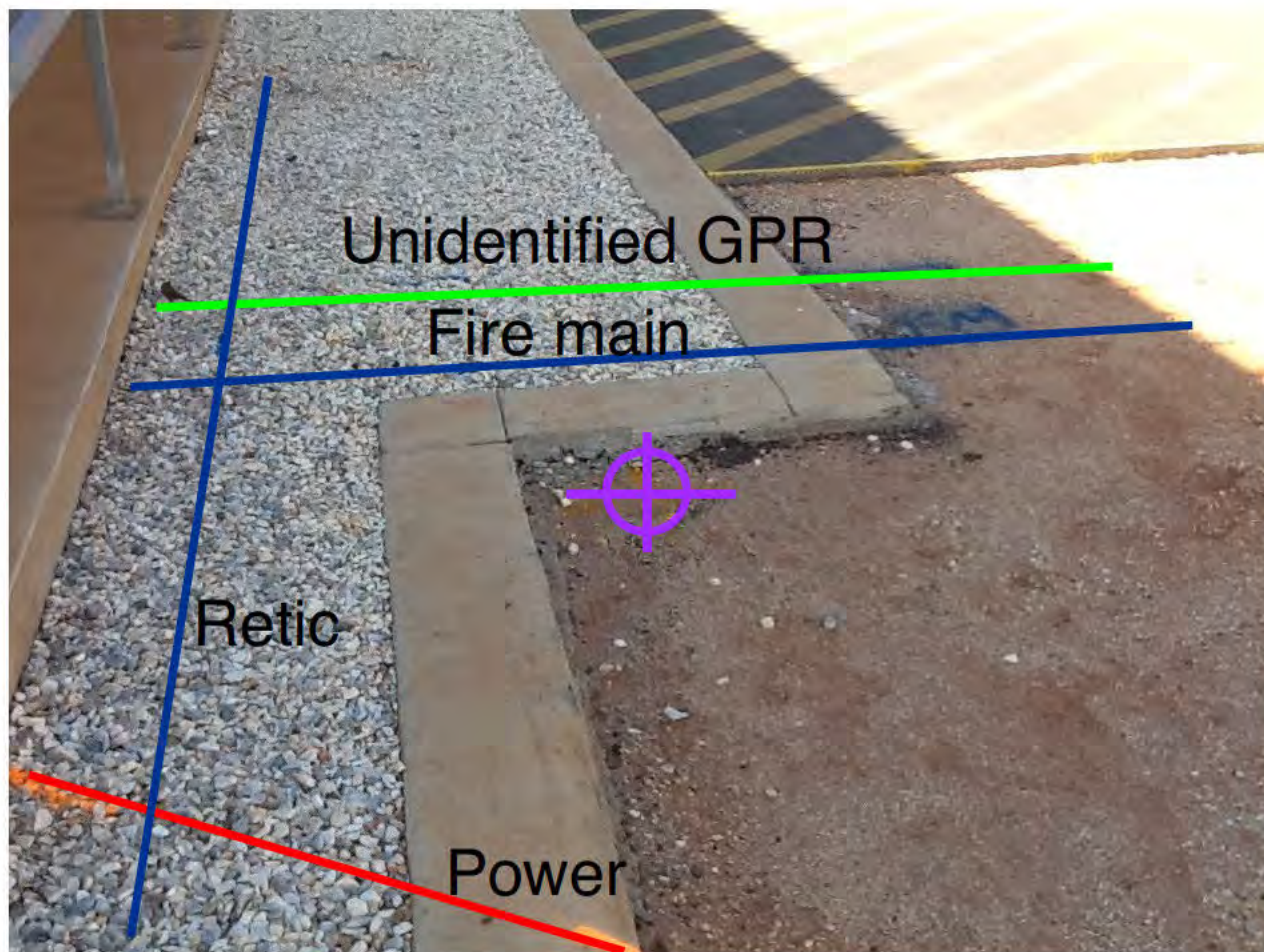
Lodge Your Free Enquiry Online – 24 Hours a Day, Seven Days a Week

Reviewed By	Enquiry Date	Other site drawings
	11-Jun-2017	additional PDFs

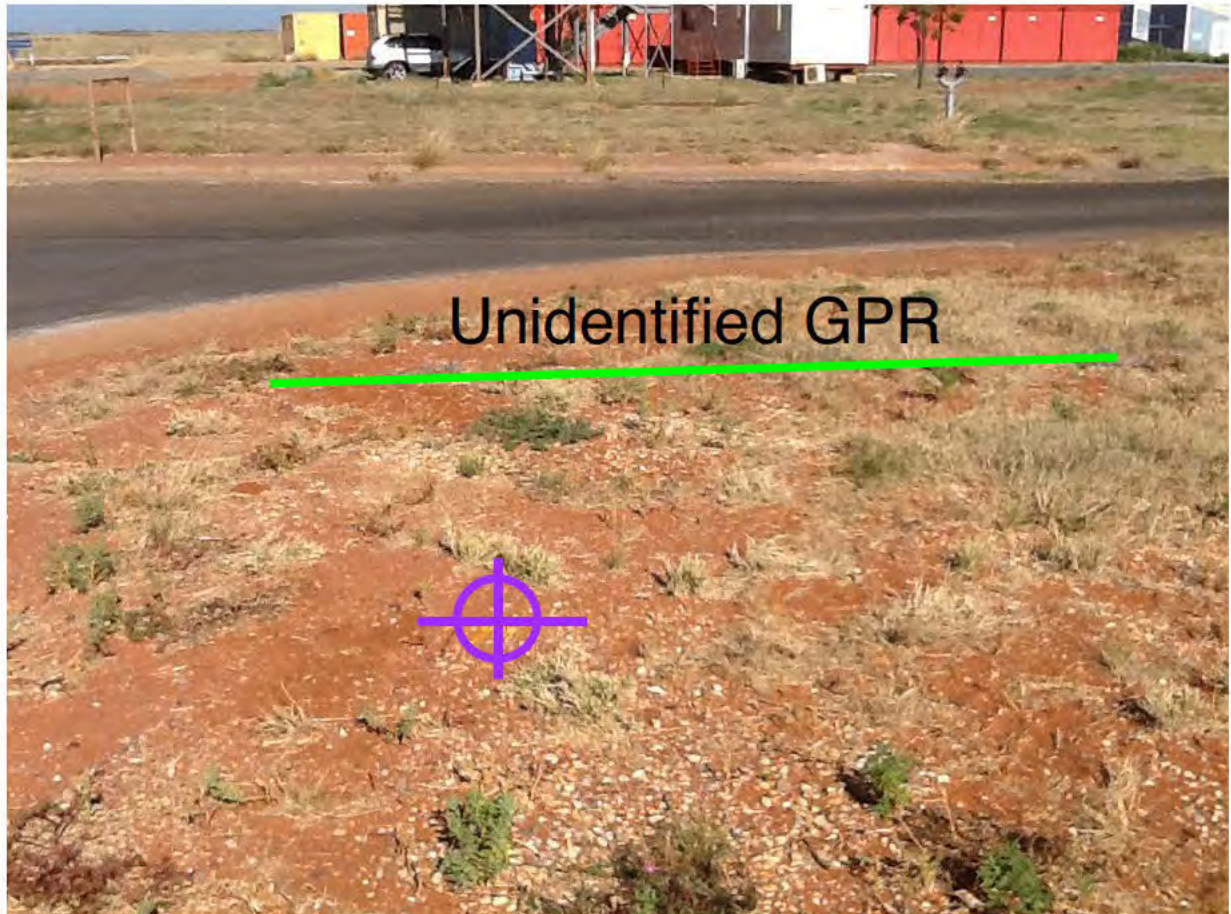
Subsurface Locating Photos



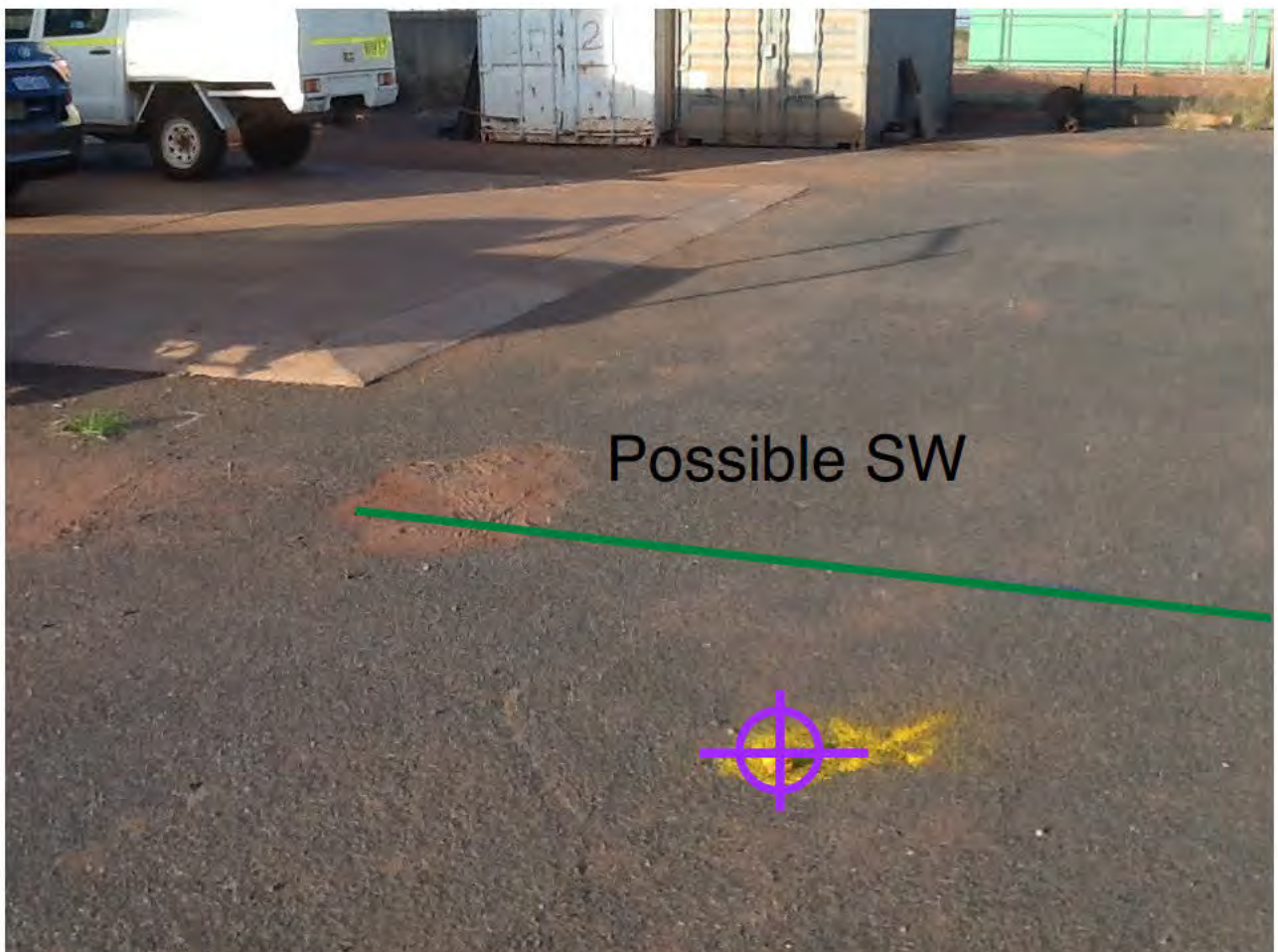
Subsurface Locating Photos



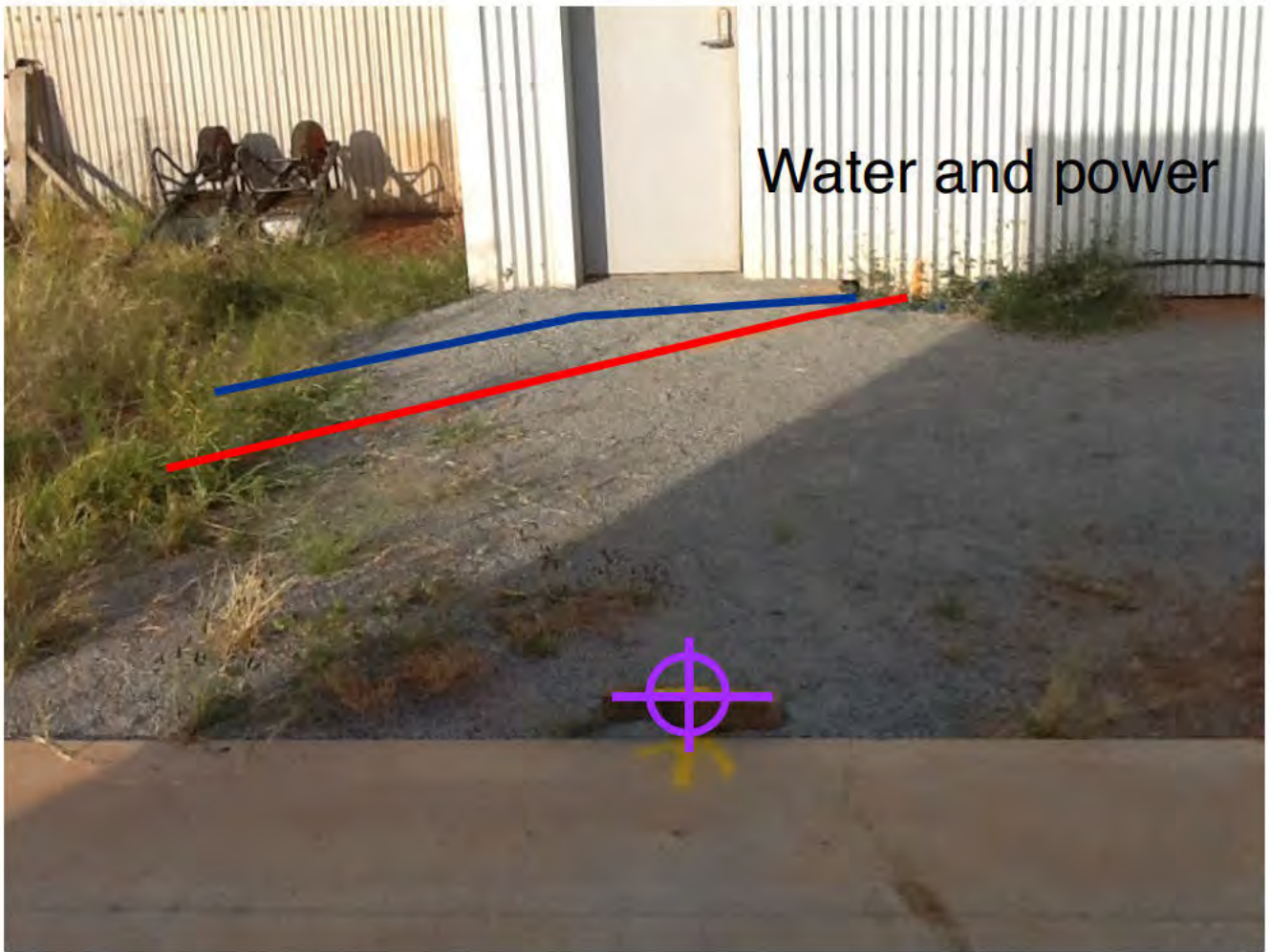
Subsurface Locating Photos



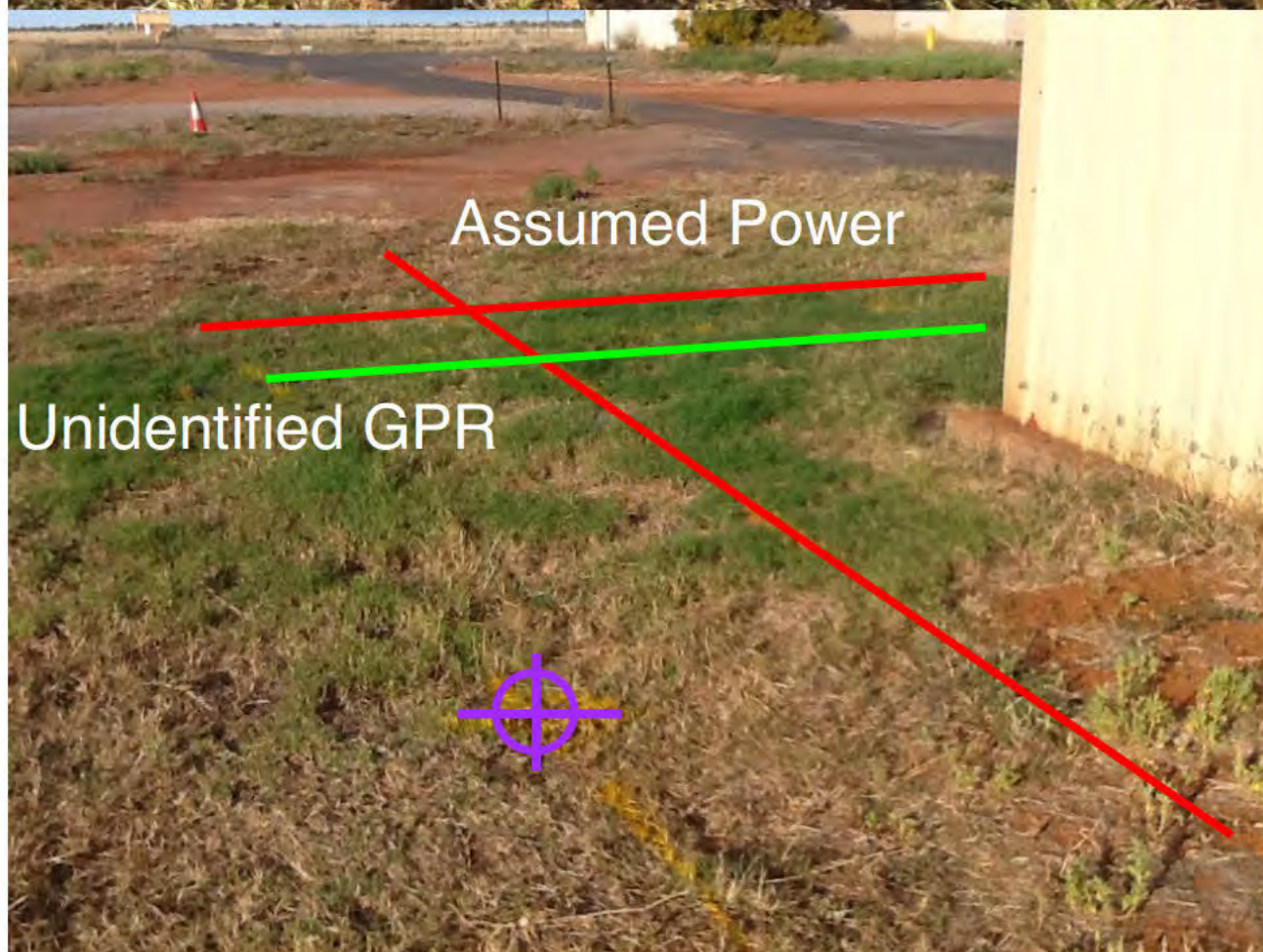
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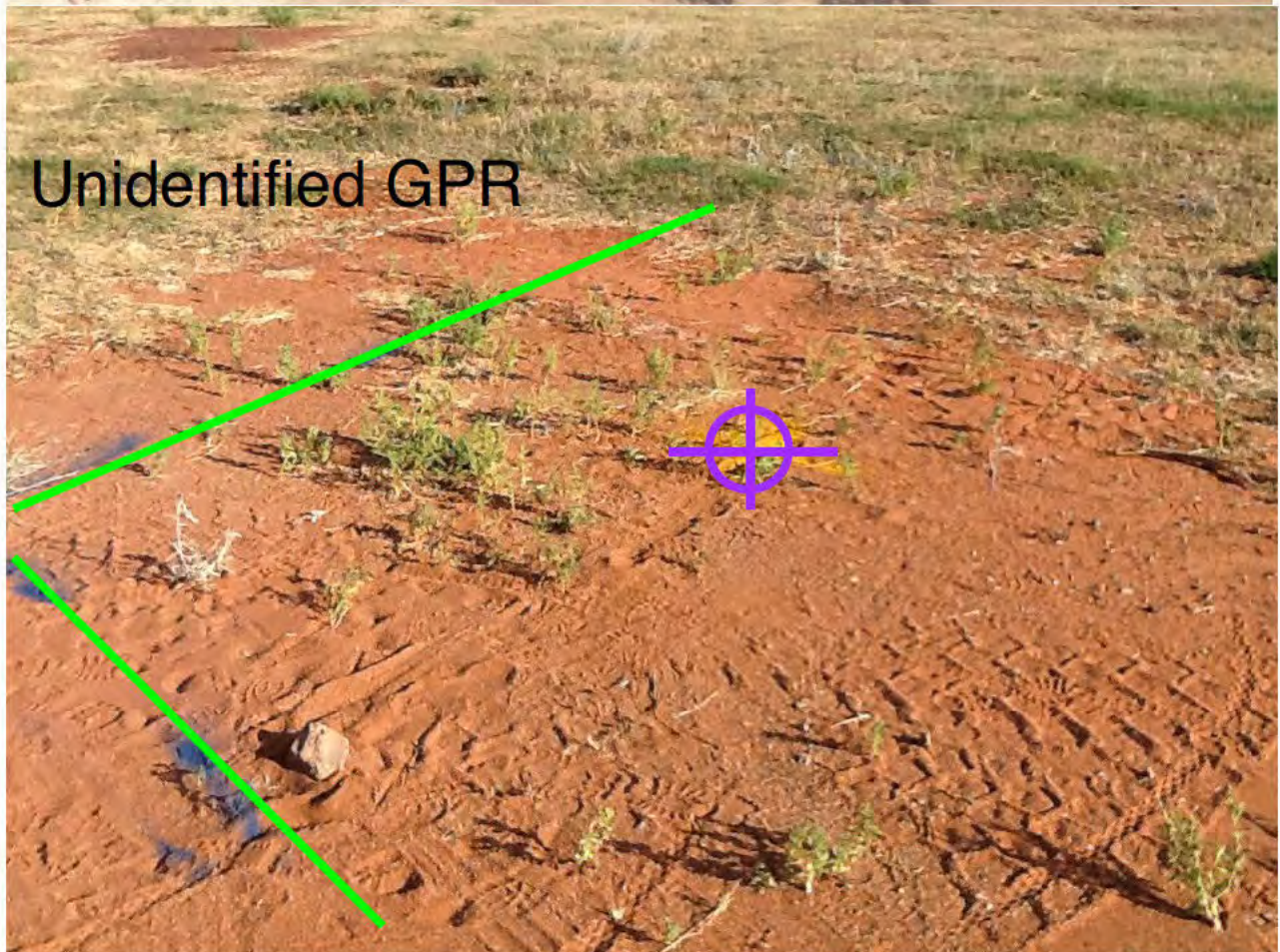
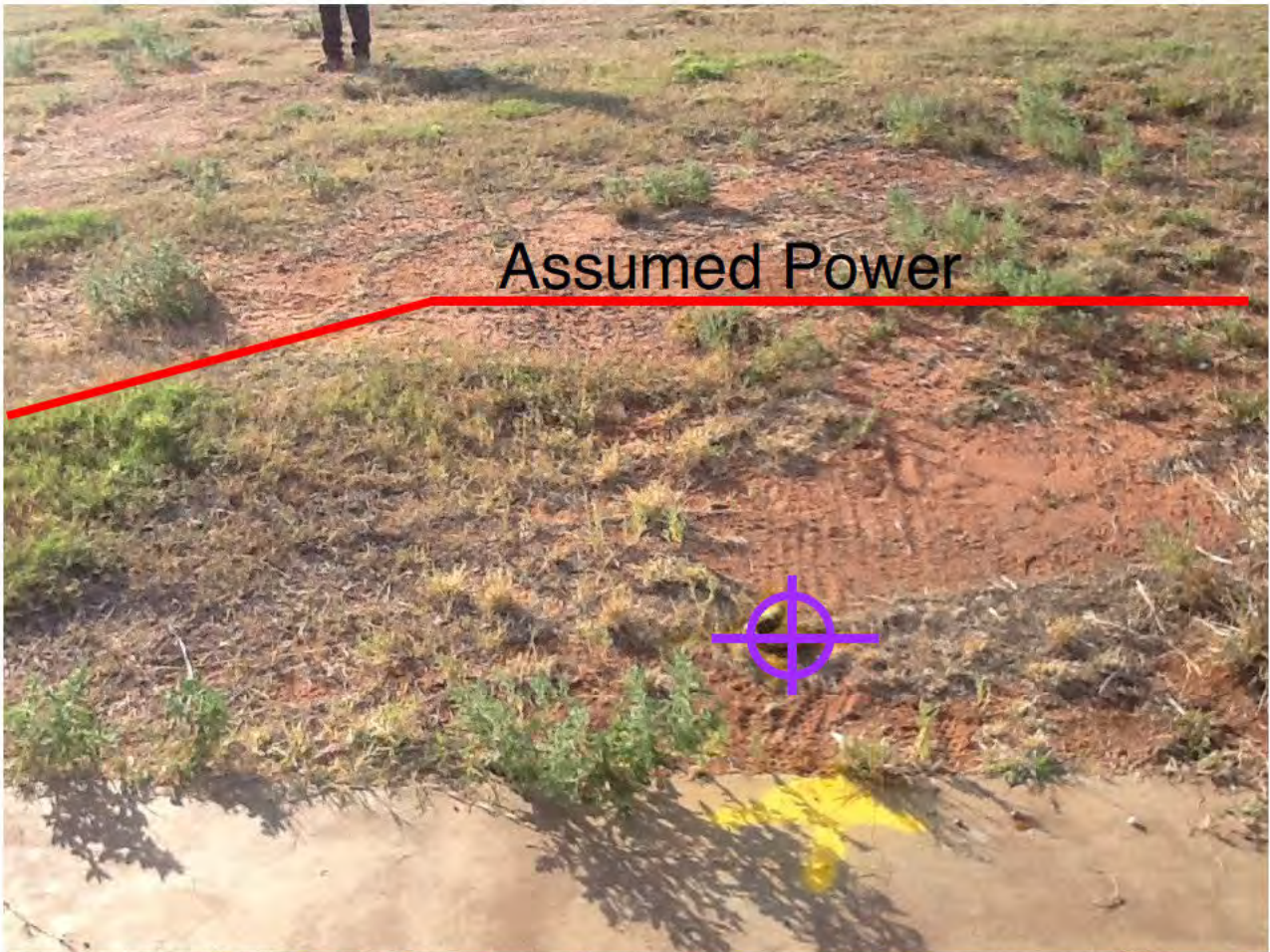
Subsurface Locating Photos



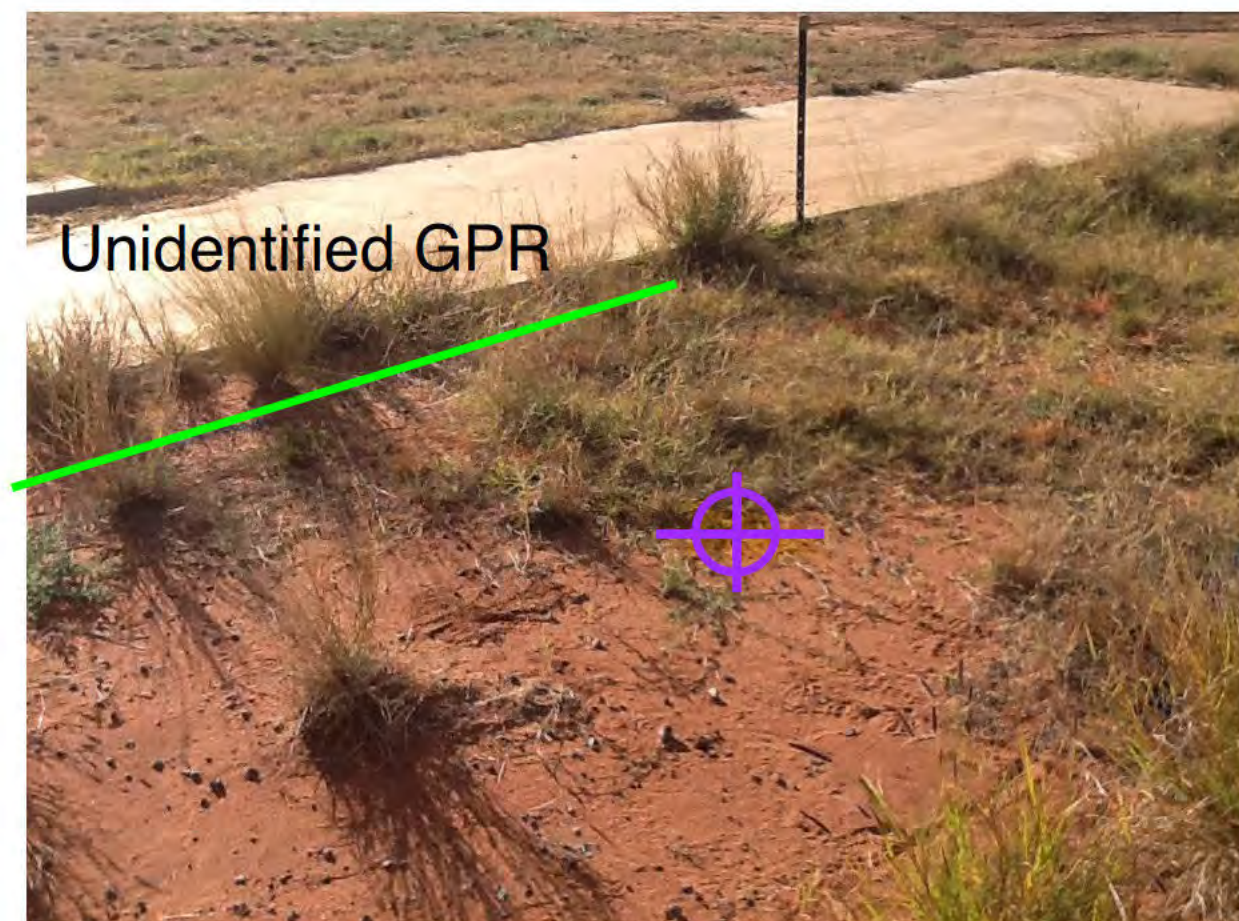
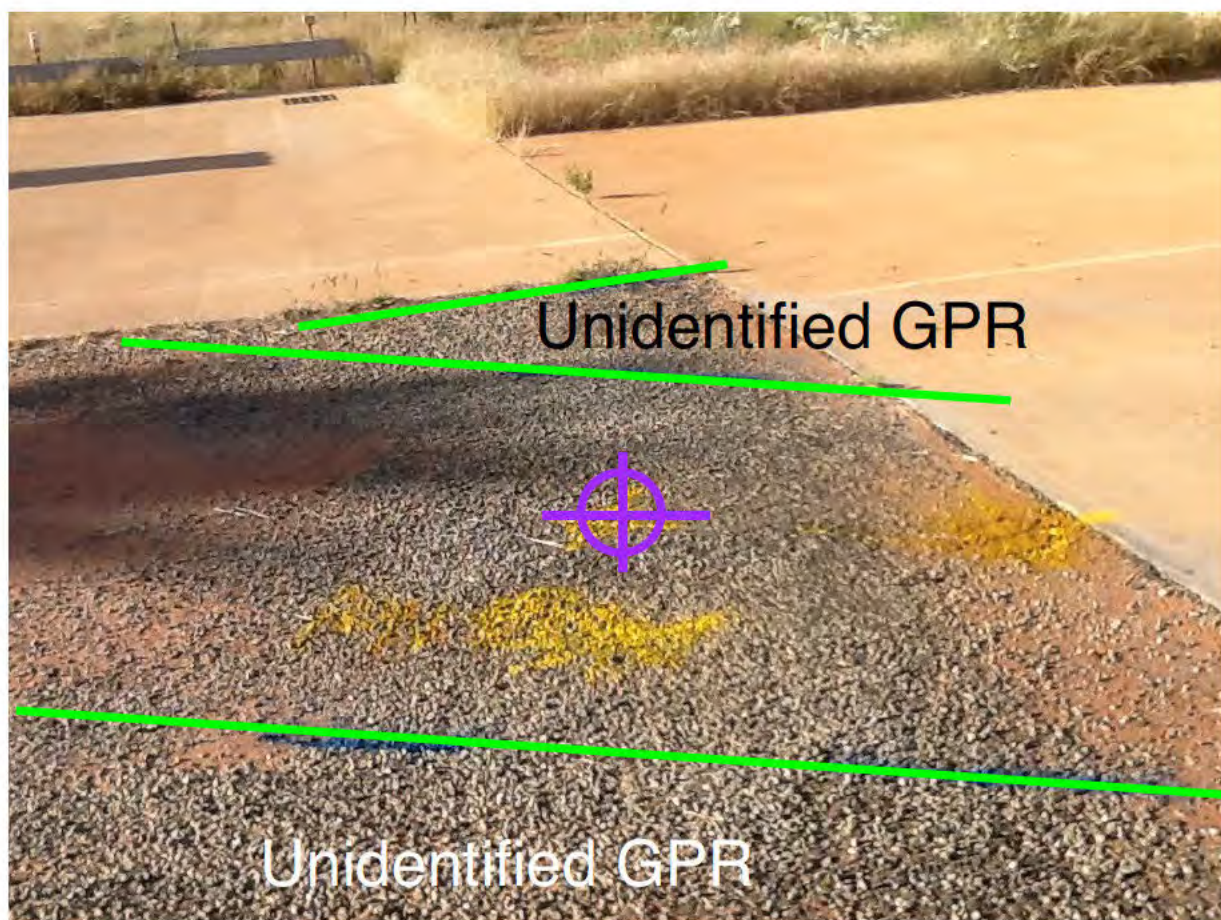
Subsurface Locating Photos



Subsurface Locating Photos



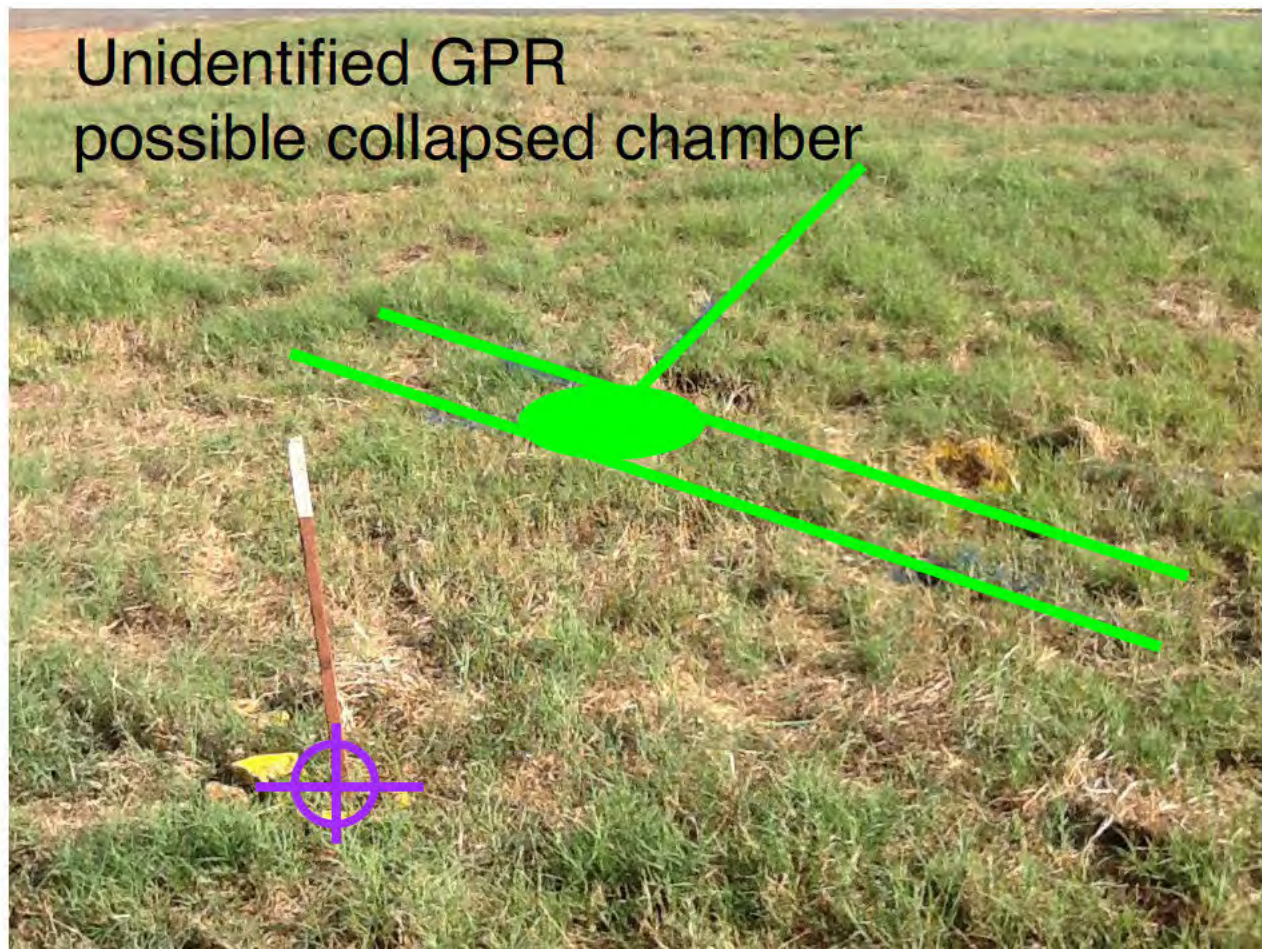
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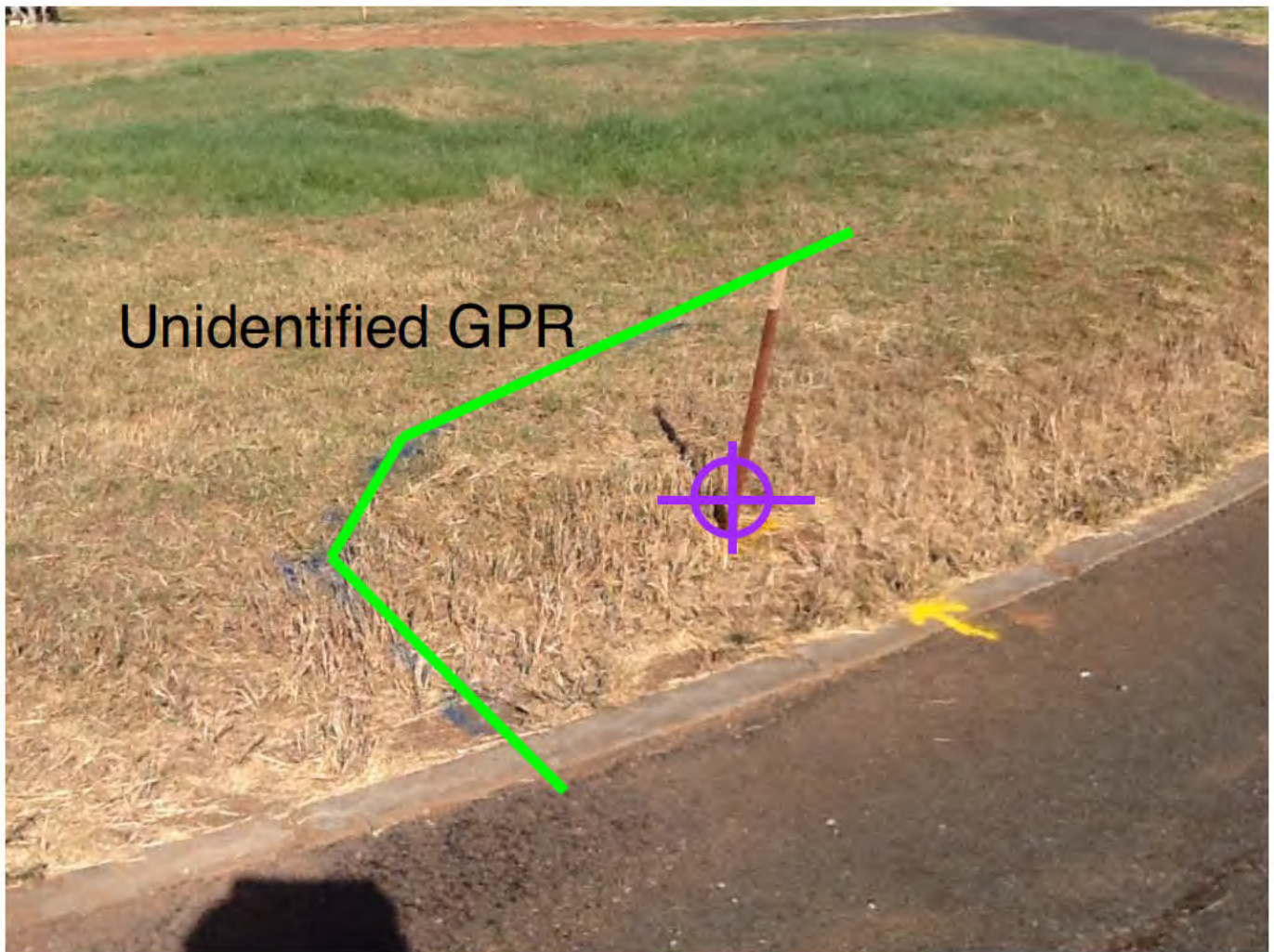
Subsurface Locating Photos



Subsurface Locating Photos



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
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T 08 9317 0600

F 08 9317 0611

mail@Veris.com.au

Veris.com.au

The logo for 'veris' is displayed in a red, lowercase, sans-serif font. It is contained within a red-outlined rectangular box that has a diagonal cut-off at the bottom-left corner.

Document: 21655-S1
Surveyed: SR and NT
Date: 28/06/2017
Method: RTK and DL

POINT I.D.	EASTING	NORTHING	GROUND R.L	TOP OF PVC PIPE
MW01	669671.64	7745369.83	8.25	8.199
MW02	669679.25	7745441.95	7.86	8.427
MW03	669735.15	7745340.47	8.11	8.041
MW04	669732.74	7745248.07	8.53	8.514
MW05	669787.16	7745278.63	7.86	8.393
MW06	669823.93	7745309.50	7.97	7.948
MW07	669855.14	7745355.82	7.94	7.901
MW08	669819.84	7745378.46	7.79	7.745
MW09	669755.93	7745321.88	7.99	7.976
MW10	669759.44	7745372.10	8.21	8.135
MW11	669715.85	7745432.27	8.22	8.112
MW12	669676.99	7745355.18	7.90	7.832
MW13	669684.98	7745367.87	8.37	8.299
MW14	669699.17	7745370.30	8.21	8.123
MW15	669711.73	7745356.62	8.25	8.225
TBM2	669745.26	7745250.80	8.047	-
TBM3	669777.78	7745369.87	8.026	-

All levels are in metres and relate to RRM H63426 (RL 6.163m) Horizontal accuracy of monitoring wells is $\pm 50\text{mm}$ and Vertical accuracy is $\pm 2\text{mm}$

MW22	670448.58	7745840.31	6.59	6.553
MW23	670463.42	7745861.43	6.68	6.639
MW3A	670448.94	7745858.25	6.67	6.645
MW3B	670472.34	7745881.26	6.74	6.639
MW3C	670457.75	7745889.22	6.77	6.740
TBM1	670483.63	7745853.95	6.765	-

All levels are in metres and relate to BM DG13 (RL 8.621) Horizontal accuracy of monitoring wells is $\pm 50\text{mm}$ and Vertical accuracy is $\pm 2\text{mm}$

Appendix I

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

Melbourne Head Office
Sydney S14 Lvl 2
Perth Unit 6
Brisbane Unit 17

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AES

ACTIVE ENVIRONMENTAL SOLUTIONS

Calibration Report

Multi-Parameter Water Quality Instrument



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

Melbourne Head Office
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Perth Unit 6
Brisbane Unit 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

Melbourne Head Office

2 Merchant Avenue

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Appendix J

Bore Logs

MONITORING WELL MW06

AECOM, Level 6, 3 Forrest Place,
PERTH, WA, 6000

Phone 61 8 6208 0000

Fax 61 8 6208 0999

Project Reference: **PSI with Limited Investigation at Port Hedland Airport**

Client: **Airservices Australia**

Drilling Contractor: **South Western Drilling (SWD)**

Project No.: **60543717**

Location: **Port Hedland International Airport Western Australia**

PSI with Limited Investigation at Port Hedland Airport

Logged By: **[REDACTED]**

Bore Size: **150 mm**

Relative Level: **m TOC**

Checked By: **[REDACTED]**

Total Depth: **4.00 m**

Coordinates: **7745309.50 mN**

Date Started: **17-6-17**

Casing Size: **50 mm**

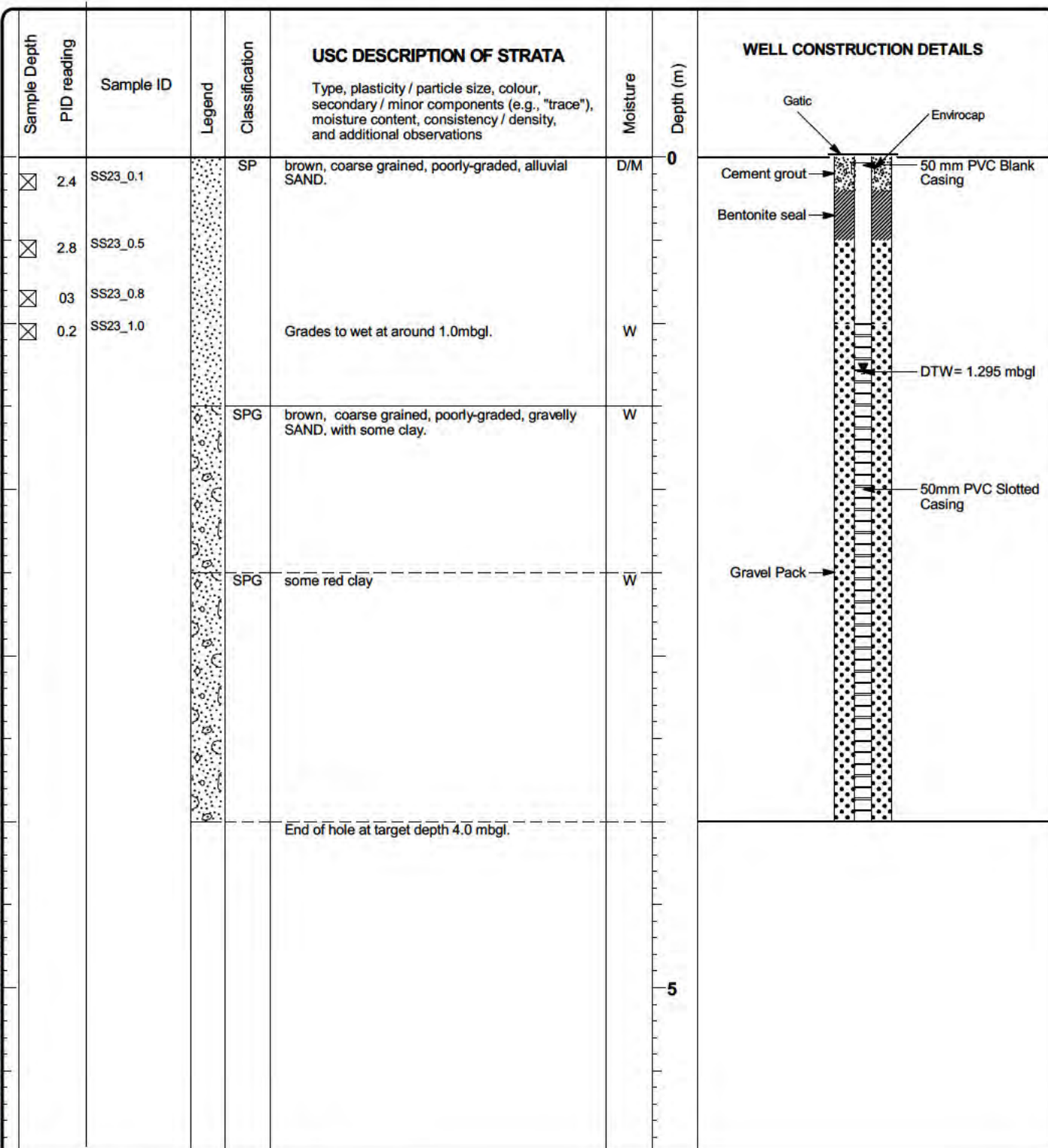
669823.93 mE

Drill Model: **Geoprobe 7822DT** Drill Type: **Hand Auger/Push Tube/Hollow Stem Auger**

Date Finished: **17-6-17**

Permit No: **N/A**

Drill Fluid: **None**



Remarks: SB23 converted to MW06
Bore Location: South east of Former Fire Station (FFS)

MONITORING WELL MW07

AECOM, Level 6, 3 Forrest Place,
PERTH, WA, 6000

Phone 61 8 6208 0000
Fax 61 8 6208 0999

Drilling Contractor: **South Western Drilling (SWD)**

Logged By: [REDACTED]

Checked By: [REDACTED]

Date Started: **17-6-17**

Date Finished: **17-6-17**

Bore Size: **150 mm**

Total Depth: **4.00 m**

Casing Size: **mm**

Project Reference: **PSI with Limited Investigation at Port Hedland Airport**

Project No.: **60543717**

Relative Level: **m TOC**

Coordinates: **7745355.82 mN**

669855.14 mE

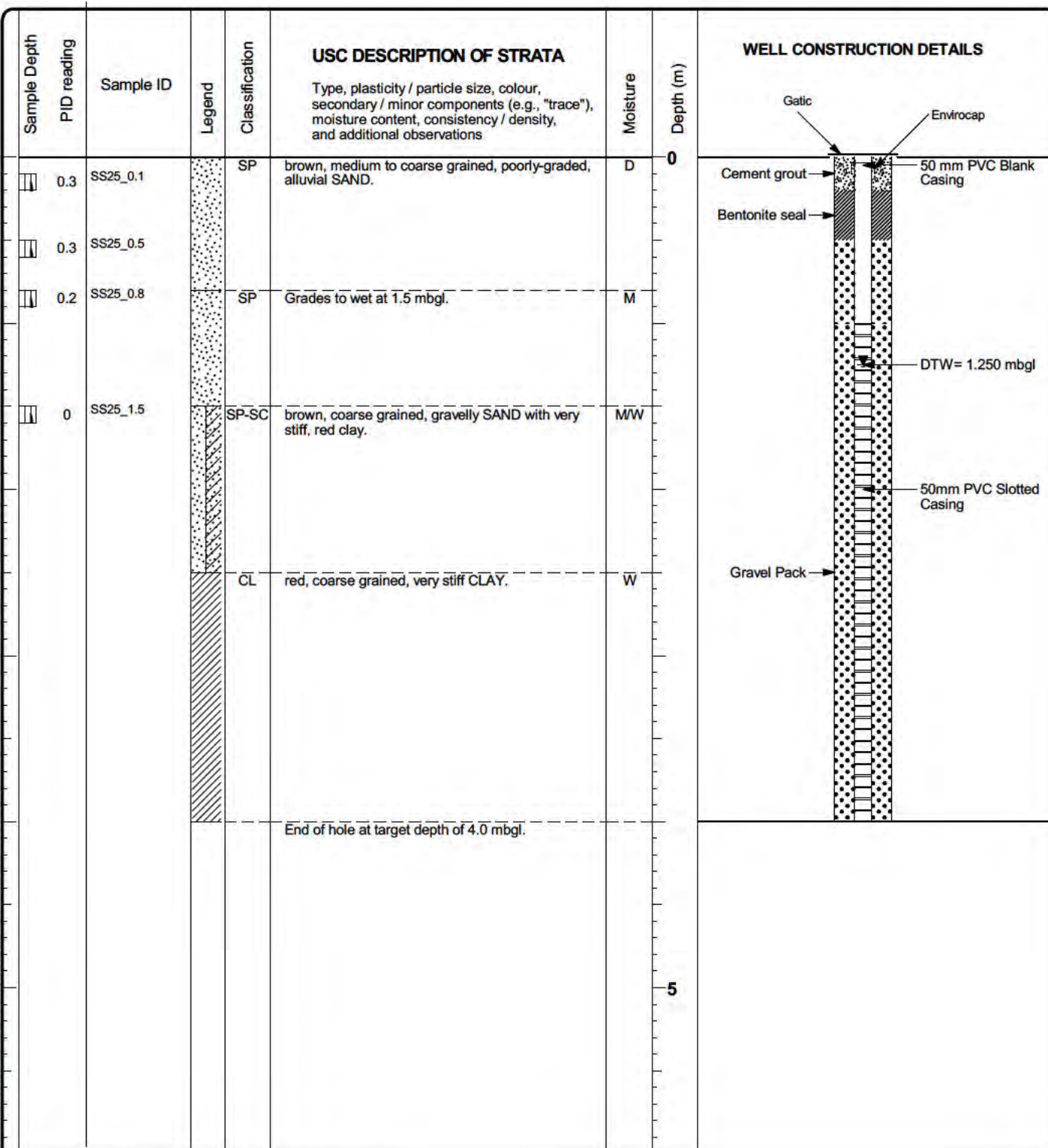
Permit No: **N/A**

Client: **Airservices Australia**

Location: **Port Hedland International Airport
Western Australia
PSI with Limited Investigation at Port Hedland Airport**

Drill Model: **Geoprobe 7822DT** Drill Type: **Hand Auger/Push Tube/Hollow Stem Auger**

Drill Fluid: **None**



Remarks: SB25 Converted to MW07
Bore Location: East of Former Fire Station (FFS)

MONITORING WELL MW08

AECOM, Level 6, 3 Forrest Place,
PERTH, WA, 6000

Phone 61 8 6208 0000
Fax 61 8 6208 0999

Drilling Contractor: **South Western Drilling (SWD)**

Logged By: XXXXXXXXXX

Checked By: XXXXXXXXXX

Date Started: **17-6-17**

Date Finished: **17-6-17**

Bore Size: **150 mm**

Total Depth: **4.00 m**

Casing Size: **50 mm**

Project Reference: **PSI with Limited Investigation at Port Hedland Airport**

Project No.: **60543717**

Relative Level: **m TOC**

Coordinates: **7745378.46 mN**

669819.84 mE

Permit No: **N/A**

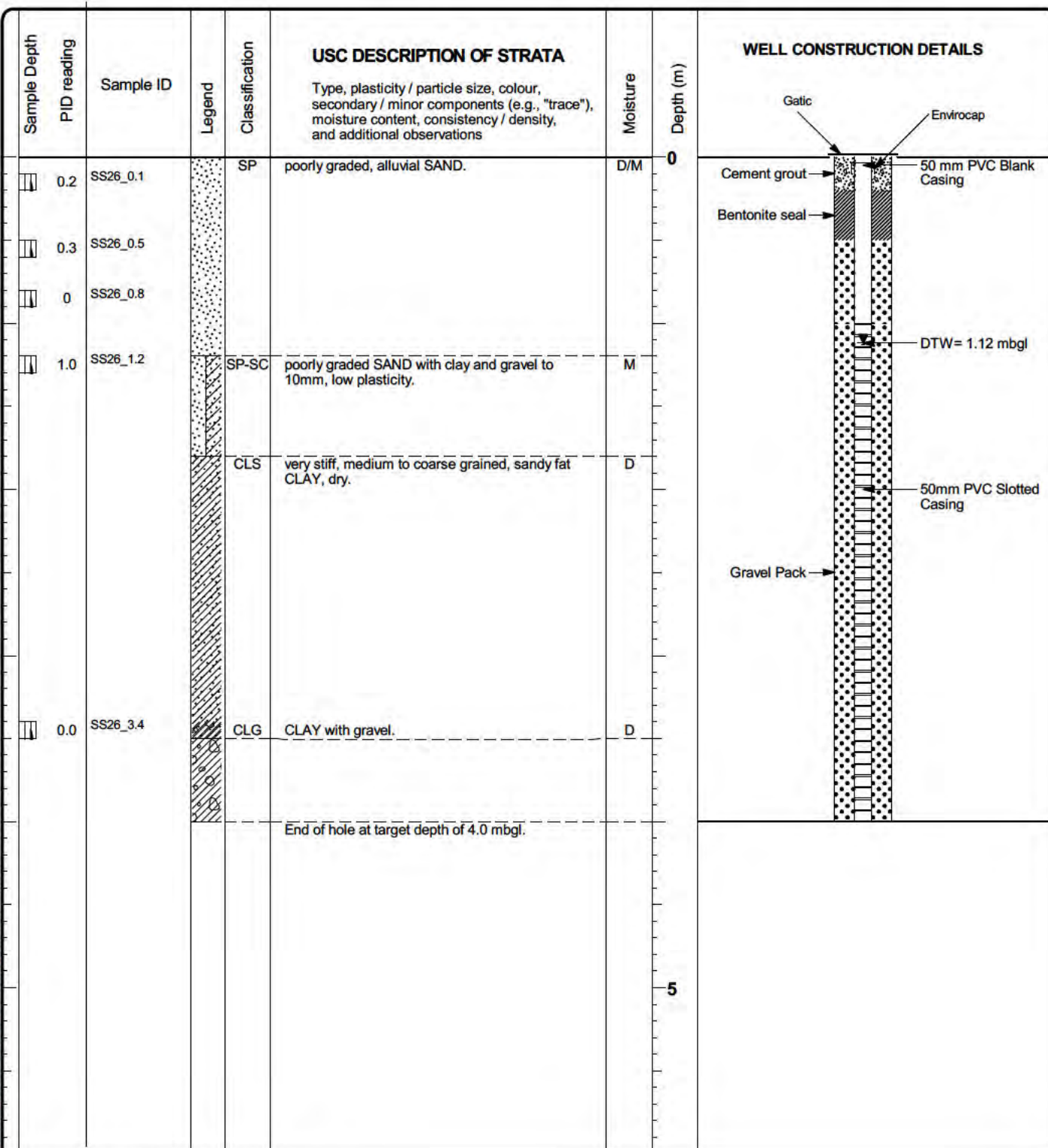
Client: **Airservices Australia**

Location: **Port Hedland International Airport
Western Australia**

PSI with Limited Investigation at Port Hedland Airport

Drill Model: **Geoprobe 7822DT** Drill Type: **Hand Auger/Push Tube/Hollow Stem Auger**

Drill Fluid: **None**



Remarks: SB26 converted to MW08
Bore Location: Former Fire Station (FFS)

MONITORING WELL MW09

AECOM, Level 6, 3 Forrest Place,
PERTH, WA, 6000

Phone 61 8 6208 0000
Fax 61 8 6208 0999

Project Reference: **PSI with Limited
Investigation at Port
Hedland Airport**

Client: **Airservices Australia**

Drilling Contractor: **South Western Drilling (SWD)**

Project No.: **60543717**

Location: **Port Hedland International Airport
Western Australia**

**PSI with Limited Investigation at Port
Hedland Airport**

Logged By: **[REDACTED]**

Bore Size: **150 mm**

Relative Level: **m TOC**

Checked By: **[REDACTED]**

Total Depth: **4.00 m**

Coordinates: **7745321.88 mN**

Date Started: **17-6-17**

Casing Size: **50 mm**

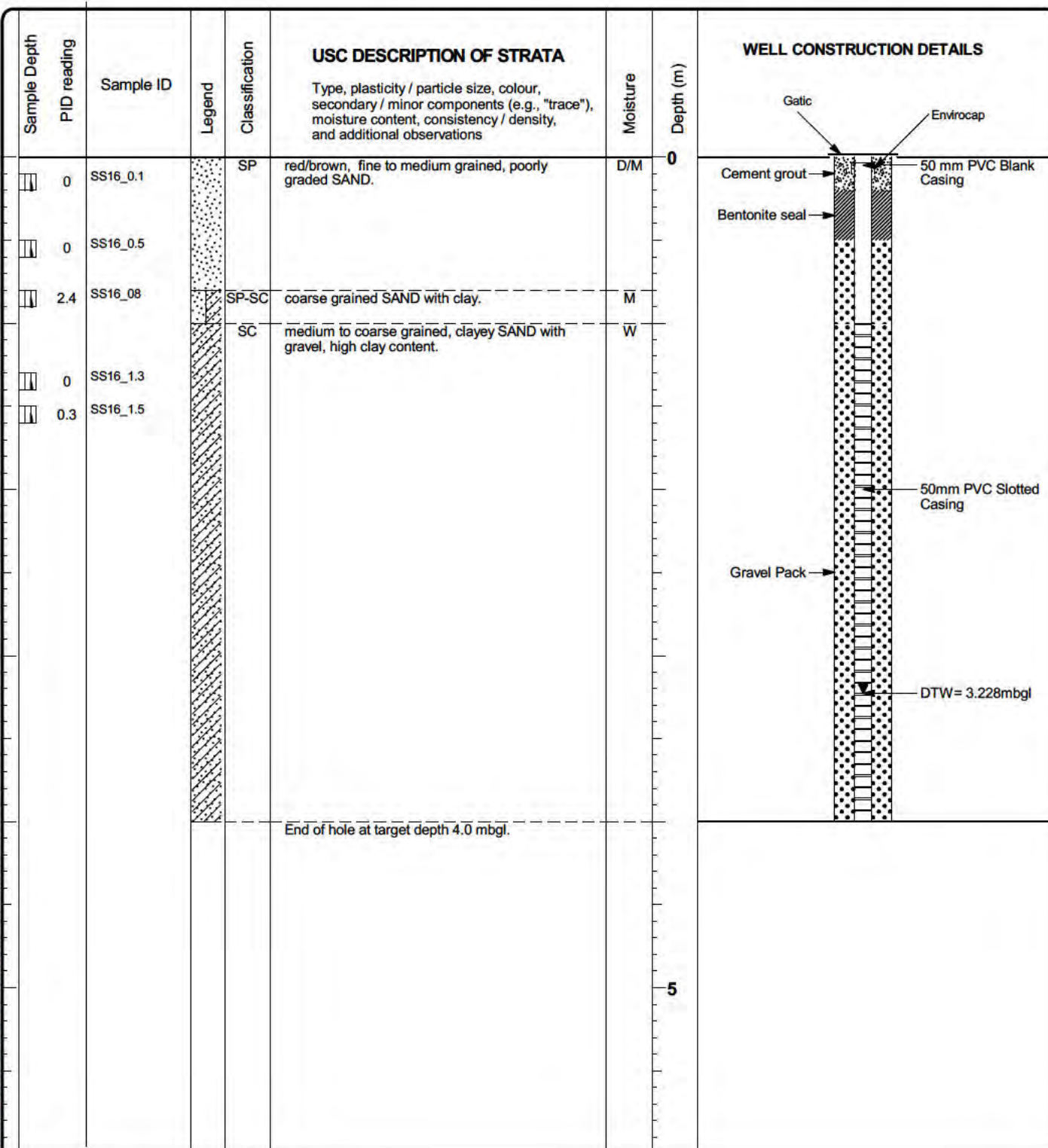
669755.93 mE

Drill Model: **Geoprobe 7822DT** Drill Type: **Hand Auger/Push
Tube/Hollow Stem Auger**

Date Finished: **17-6-17**

Permit No: **N/A**

Drill Fluid: **None**



Remarks: SB16 converted to MW09
Bore Location: Former Fire Station (FFS)

MONITORING WELL MW10

AECOM, Level 6, 3 Forrest Place,
PERTH, WA, 6000

Phone 61 8 6208 0000
Fax 61 8 6208 0999

Drilling Contractor: **South Western Drilling (SWD)**

Logged By: [REDACTED]

Checked By: [REDACTED]

Date Started: **17-6-17**

Date Finished: **17-6-17**

Bore Size: **150 mm**

Total Depth: **4.00 m**

Casing Size: **50 mm**

Project Reference: **PSI with Limited Investigation at Port Hedland Airport**

Project No.: **60543717**

Relative Level: **m TOC**

Coordinates: **7745372.10 mN**

669759.44 mE

Permit No: **N/A**

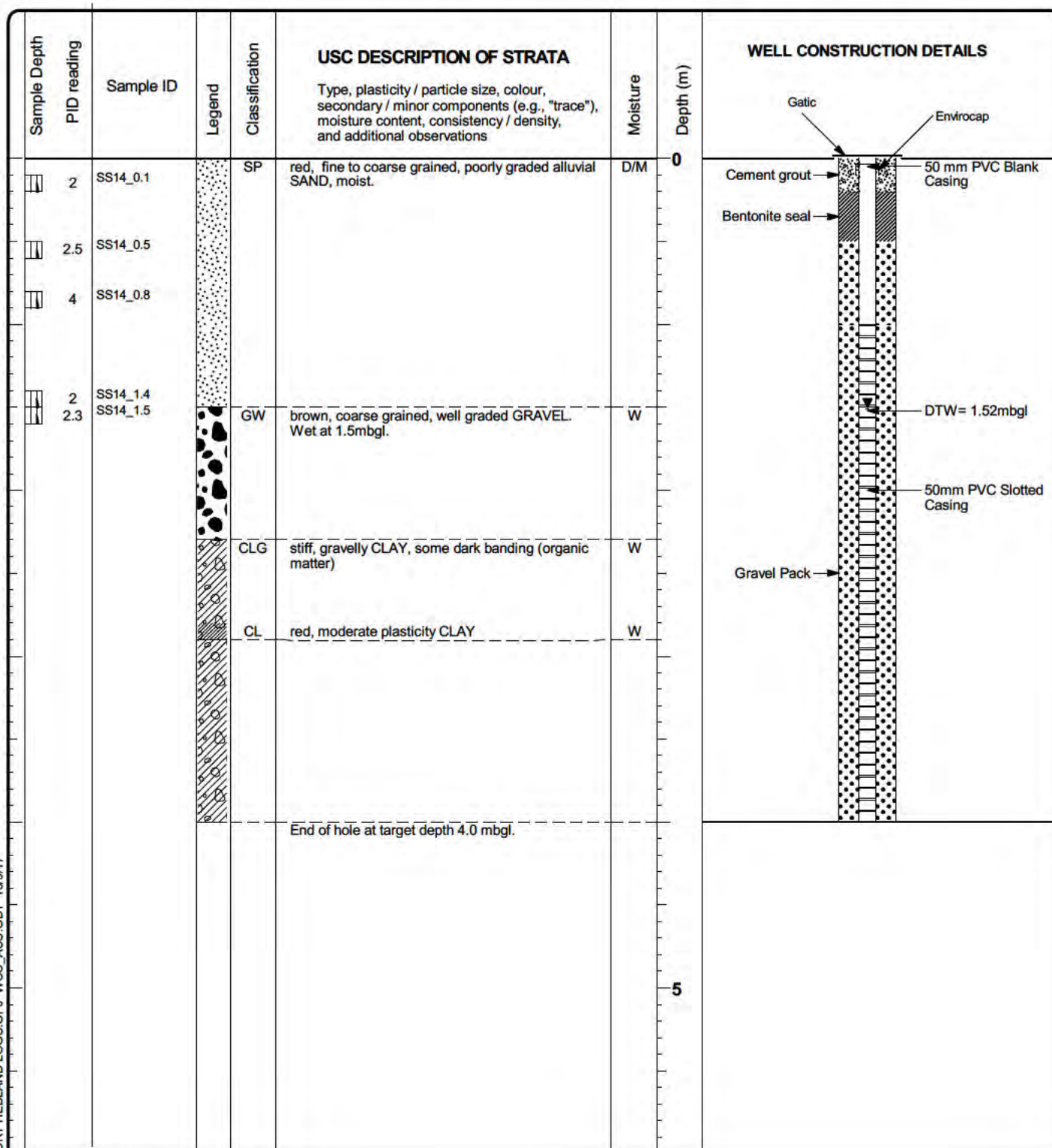
Client: **Airservices Australia**

Location: **Port Hedland International Airport Western Australia**

PSI with Limited Investigation at Port Hedland Airport

Drill Model: **Geoprobe 7822DT** Drill Type: **Hand Auger/Push Tube/Hollow Stem Auger**

Drill Fluid: **None**



Remarks: SB14 converted to MW10
Bore Location: Former Fire Station (FFS)

MONITORING WELL MW11

AECOM, Level 6, 3 Forrest Place,
PERTH, WA, 6000

Phone 61 8 6208 0000
Fax 61 8 6208 0999

Drilling Contractor: **South Western Drilling (SWD)**

Logged By: XXXXXXXXXX

Checked By: XXXXXXXXXX

Date Started: **17-6-17**

Date Finished: **17-6-17**

Bore Size: **150 mm**

Total Depth: **4.00 m**

Casing Size: **50 mm**

Project Reference: **PSI with Limited Investigation at Port Hedland Airport**

Project No.: **60543717**

Relative Level: **m TOC**

Coordinates: **7745432.27 mN**

669715.85 mE

Permit No: **N/A**

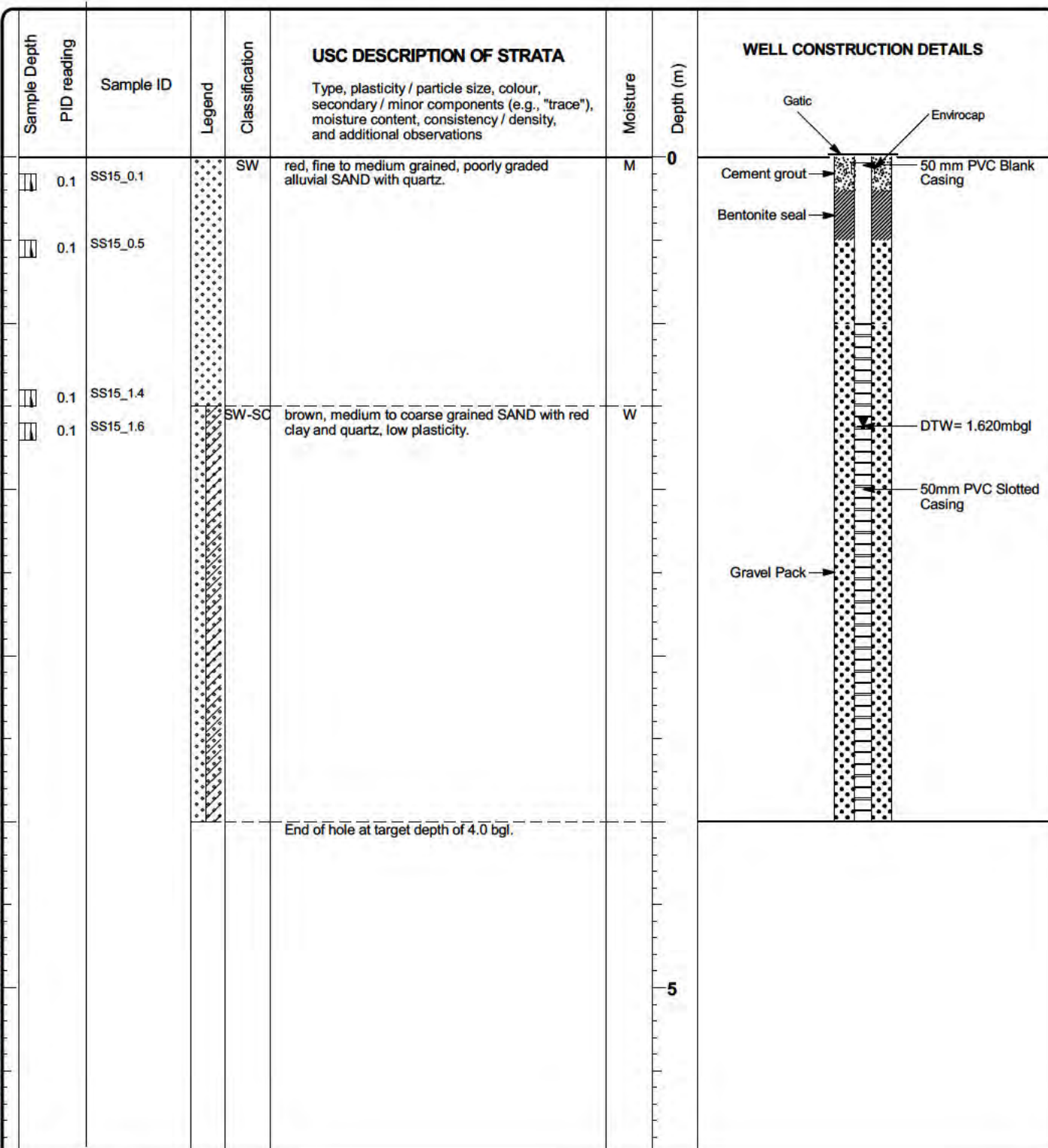
Client: **Airservices Australia**

Location: **Port Hedland International Airport
Western Australia**

PSI with Limited Investigation at Port Hedland Airport

Drill Model: **Geoprobe 7822DT** Drill Type: **Hand Auger/Push Tube/Hollow Stem Auger**

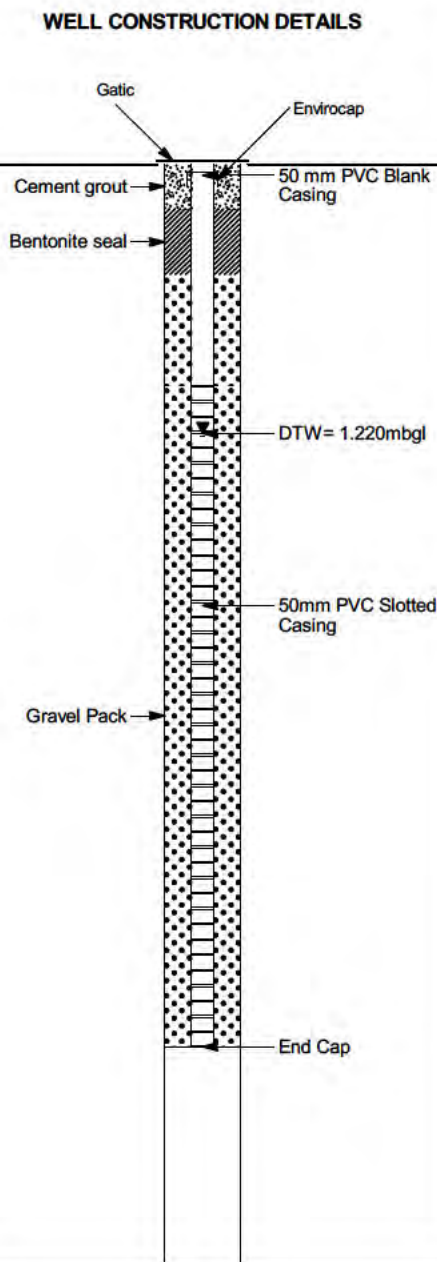
Drill Fluid: **None**



Remarks: SB15 converted to MW11
Bore Location: Fire Station (FS)

Permit No: N/A

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)
				SW	red/orange, medium to coarse grained, alluvial SAND with quartz.	D/M	0
	2.8	SS13_0.8					
	3.0	SS13_1.5		SW-SC	brown, medium to coarse grained SAND with globules of low plasticity clay (up to 100mm) and quartz. Wet at 1.2 mbgl	M/W W	
	0.2	SS13_3.3					
	0.2	SS13_3.5		CLG	gravelly CLAY.	W	
					End of hole at target depth of 5.0 mbgl.		5



Remarks: SB13 converted to MW12
Bore Location: Fire Station (FS)

MONITORING WELL MW13

AECOM, Level 6, 3 Forrest Place,
PERTH, WA, 6000

Phone 61 8 6208 0000
Fax 61 8 6208 0999

Drilling Contractor: **South Western Drilling (SWD)**

Logged By: XXXXXXXXXX

Checked By: XXXXXXXXXX

Date Started: **16-6-17**

Date Finished: **16-6-17**

Bore Size: **150 mm**

Total Depth: **5.00 m**

Casing Size: **50 mm**

Project Reference: **PSI with Limited Investigation at Port Hedland Airport**

Project No.: **60543717**

Relative Level: **m TOC**

Coordinates: **7745367.87 mN**

669684.98 mE

Permit No: **N/A**

Client: **Airservices Australia**

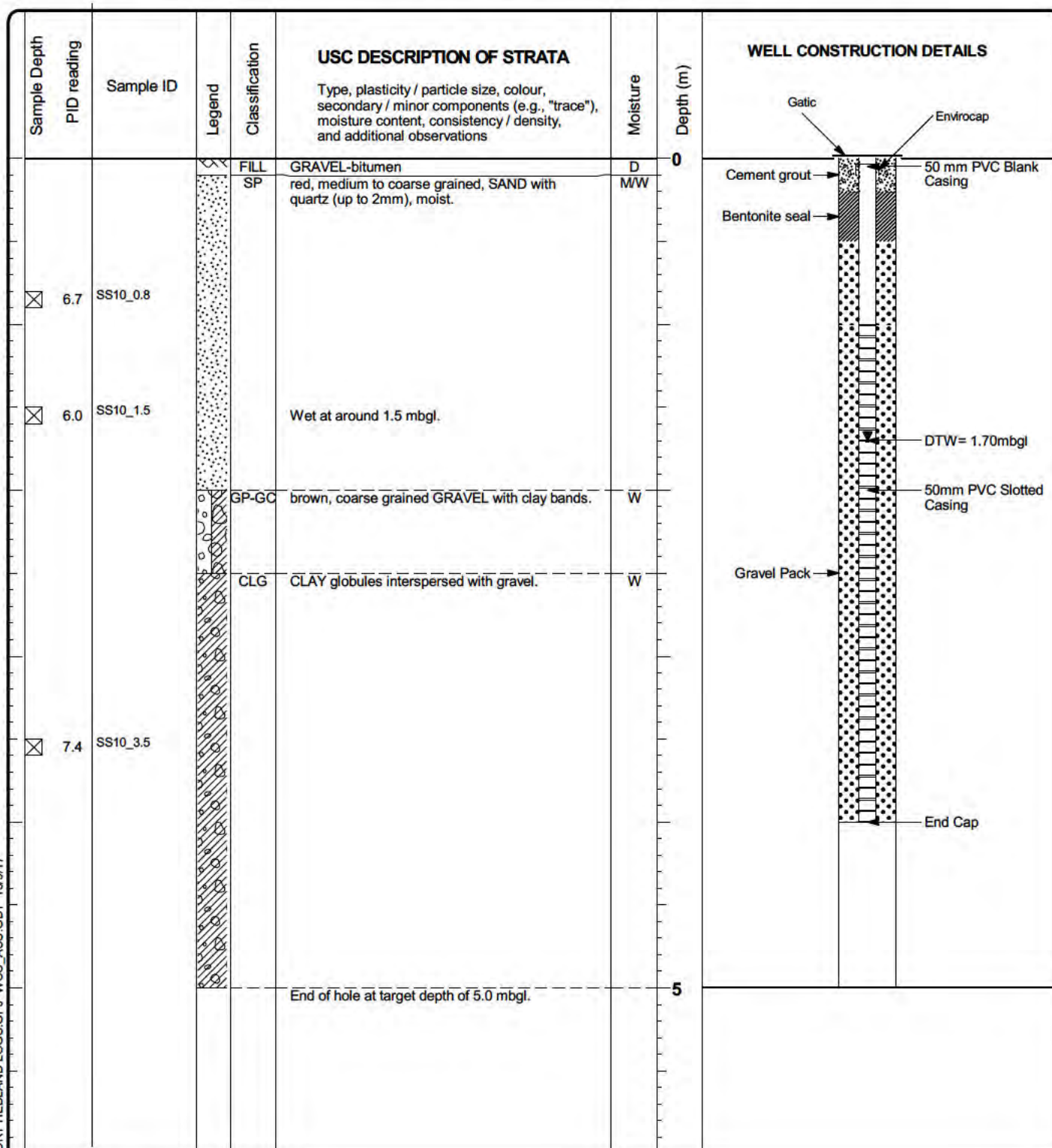
Location: **Port Hedland International Airport Western Australia**

PSI with Limited Investigation at Port Hedland Airport

Drill Model: **Geoprobe 7822DT** Drill Type: **Hand Auger/Push Tube/Hollow Stem Auger**

Drill Fluid: **None**

WELL_MELB_2_ASA_PORT_HEDLAND_LOGS.GPJ WCC_AUS.GDT 13/9/17



Remarks: SB10 converted to MW13
Bore Location: Fire Station (FS)

MONITORING WELL MW14

AECOM, Level 6, 3 Forrest Place,
PERTH, WA, 6000

Phone 61 8 6208 0000
Fax 61 8 6208 0999

Project Reference: **PSI with Limited Investigation at Port Hedland Airport**

Client: **Airservices Australia**

Drilling Contractor: **South Western Drilling (SWD)**

Project No.: **60543717**

Location: **Port Hedland International Airport
Western Australia**

PSI with Limited Investigation at Port Hedland Airport

Logged By: **[REDACTED]**

Bore Size: **150 mm**

Relative Level: **m TOC**

Checked By: **[REDACTED]**

Total Depth: **5.50 m**

Coordinates: **7745370.30 mN**

Date Started: **16-6-17**

Casing Size: **50 mm**

669699.17 mE

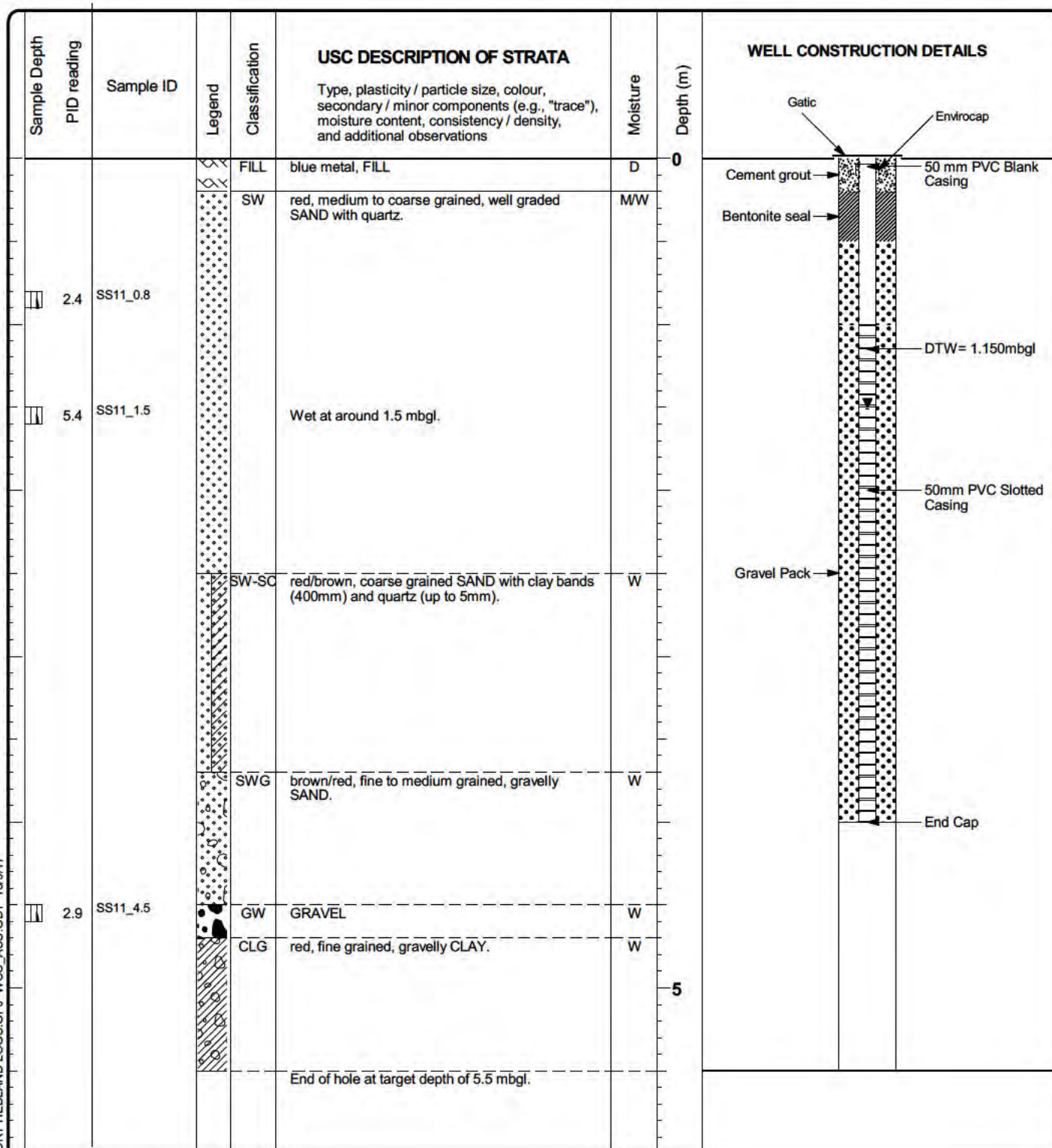
Drill Model: **Geoprobe 7822DT** Drill Type: **Hand Auger/Push Tube**

Date Finished: **16-6-17**

Permit No: **N/A**

Drill Fluid: **None**

WELL_MELB_2_ASA_PORT_HEDLAND_LOGS.GPJ WCC_AUS.GDT 13/9/17



Remarks: SB11 converted to MW14
Bore Location: Fire Station (FS)

MONITORING WELL MW15

AECOM, Level 6, 3 Forrest Place,
PERTH, WA, 6000

Phone 61 8 6208 0000

Fax 61 8 6208 0999

Project Reference: **PSI with Limited Investigation at Port Hedland Airport**

Client: **Airservices Australia**

Drilling Contractor: **South Western Drilling (SWD)**

Project No.: **60543717**

Location: **Port Hedland International Airport
Western Australia**

PSI with Limited Investigation at Port Hedland Airport

Logged By: **[REDACTED]**

Bore Size: **150 mm**

Relative Level: **m TOC**

Checked By: **[REDACTED]**

Total Depth: **5.50 m**

Coordinates: **7745356.62 mN**

Date Started: **16-6-17**

Casing Size: **50 mm**

669711.73 mE

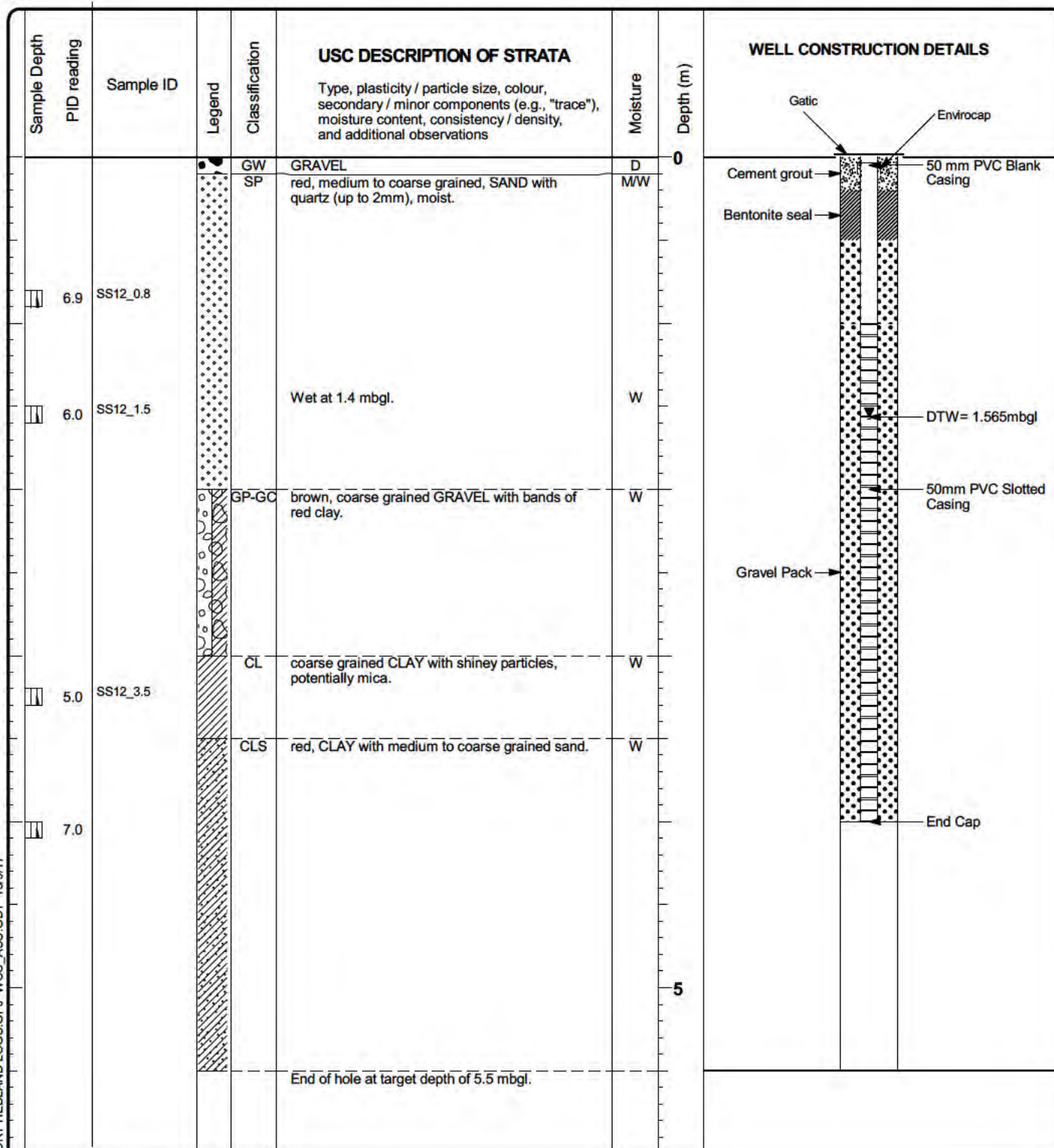
Drill Model: **Geoprobe 7822DT** Drill Type: **Hand Auger/Push Tube**

Date Finished: **16-6-17**

Permit No: **N/A**

Drill Fluid: **None**

WELL_MELB_2_ASA_PORT_HEDLAND_LOGS.GPJ WCC_AUS.GDT 13/9/17



Remarks: SB12 converted to MW15
Bore Location: Fire Station (FS)

MONITORING WELL MW3A

AECOM, Level 6, 3 Forrest Place,
PERTH, WA, 6000

Phone 61 8 6208 0000
Fax 61 8 6208 0999

Project Reference: **PSI with Limited
Investigation at Port
Hedland Airport**

Client: **Airservices Australia**

Drilling Contractor: **South Western Drilling (SWD)**

Project No.: **60543717**

Location: **Port Hedland International Airport
Western Australia**

**PSI with Limited Investigation at Port
Hedland Airport**

Logged By: **[REDACTED]**

Bore Size: **150 mm**

Relative Level: **m TOC**

Checked By: **[REDACTED]**

Total Depth: **3.50 m**

Coordinates: **7745858.25 mN**

Date Started: **19-6-17**

Casing Size: **50 mm**

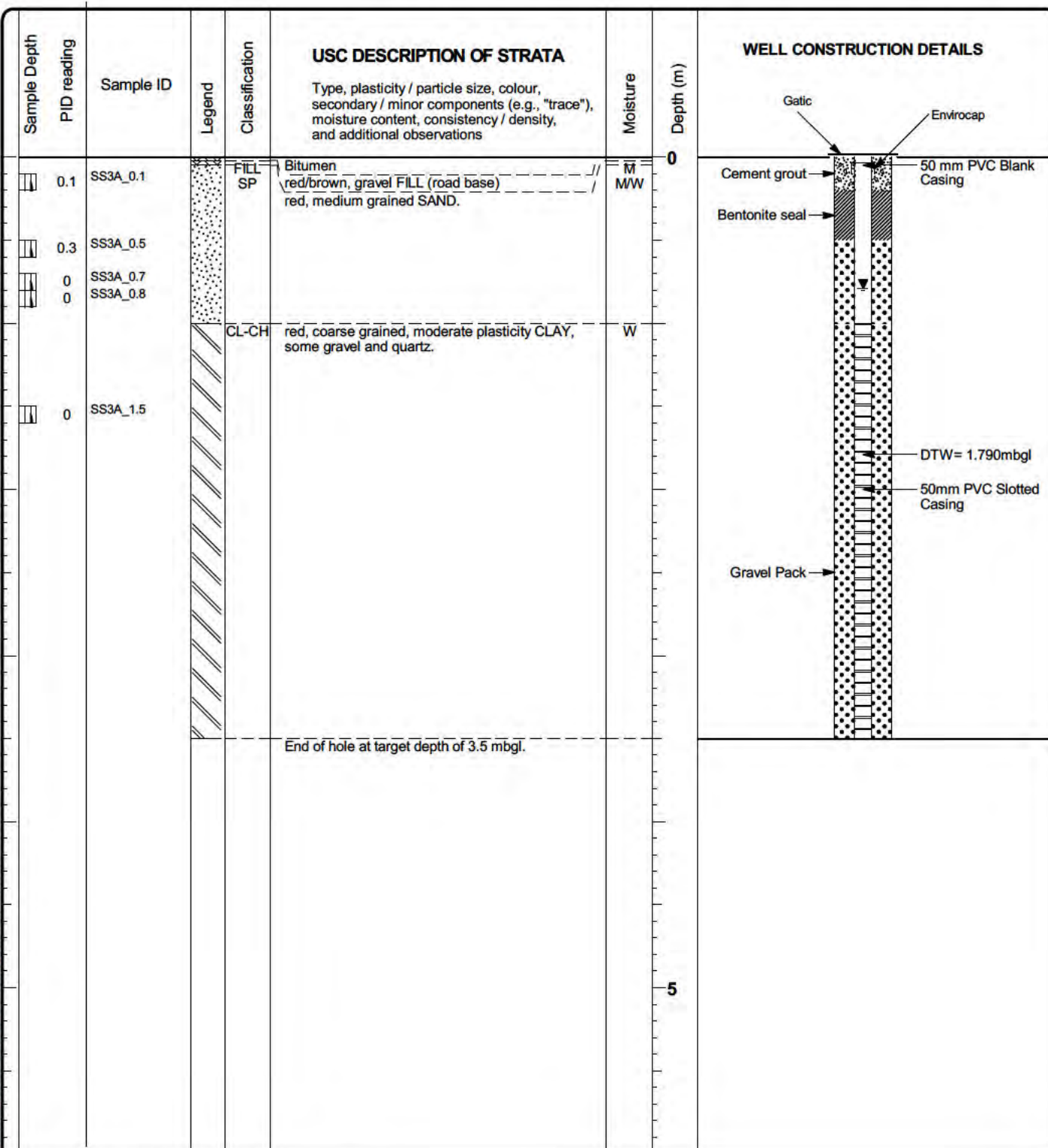
670448.94 mE

Drill Model: **Geoprobe 7822DT** Drill Type: **Hand Auger/Push Tube**

Date Finished: **19-6-17**

Permit No: **N/A**

Drill Fluid: **None**



Remarks: SB3A converted to MW3A
Bore Location: Former Workshop (FWKSP)

MONITORING WELL MW3B

AECOM, Level 6, 3 Forrest Place,
PERTH, WA, 6000

Phone 61 8 6208 0000
Fax 61 8 6208 0999

Drilling Contractor: **South Western Drilling (SWD)**

Logged By: XXXXXXXXXX

Checked By: XXXXXXXXXX

Date Started: **19-6-17**

Date Finished: **19-6-17**

Bore Size: **150 mm**

Total Depth: **3.50 m**

Casing Size: **50 mm**

Project Reference: **PSI with Limited Investigation at Port Hedland Airport**

Project No.: **60543717**

Relative Level: **m TOC**

Coordinates: **7745881.26 mN**

670472.34 mE

Permit No: **N/A**

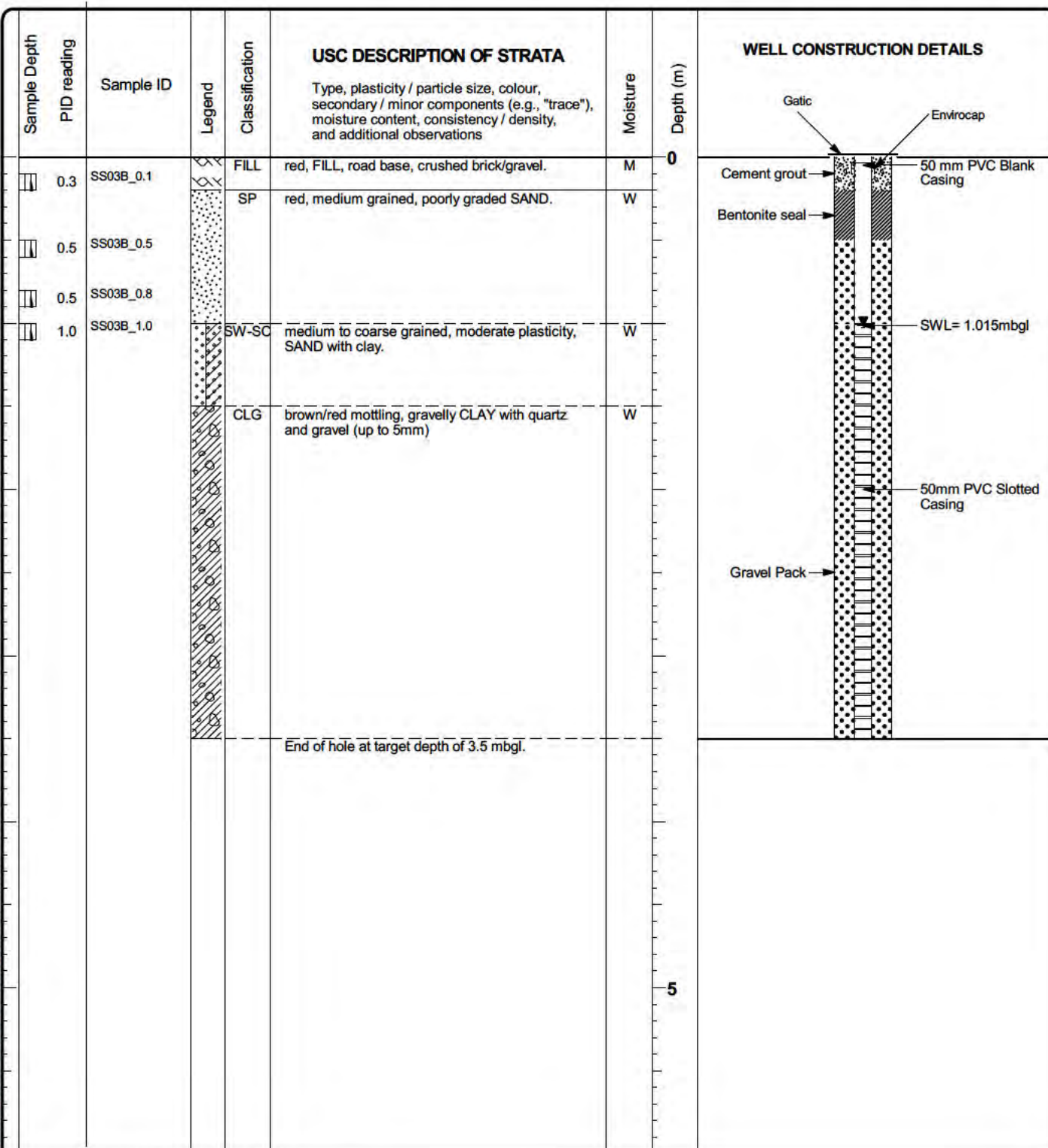
Client: **Airservices Australia**

Location: **Port Hedland International Airport
Western Australia**

PSI with Limited Investigation at Port Hedland Airport

Drill Model: **Geoprobe 7822DT** Drill Type: **Hand Auger/Push Tube**

Drill Fluid: **None**



Remarks: SB3B converted to MW3B
Bore Location: Former Workshop (FWKSP)

MONITORING WELL MW3C

AECOM, Level 6, 3 Forrest Place,
PERTH, WA, 6000

Phone 61 8 6208 0000

Fax 61 8 6208 0999

Project Reference: **PSI with Limited Investigation at Port Hedland Airport**

Client: **Airservices Australia**

Drilling Contractor: **South Western Drilling (SWD)**

Project No.: **60543717**

Location: **Port Hedland International Airport Western Australia**

PSI with Limited Investigation at Port Hedland Airport

Logged By: **[REDACTED]**

Bore Size: **150 mm**

Relative Level: **m TOC**

Checked By: **[REDACTED]**

Total Depth: **3.50 m**

Coordinates: **670457.75 mN**

Date Started: **19-6-17**

Casing Size: **50 mm**

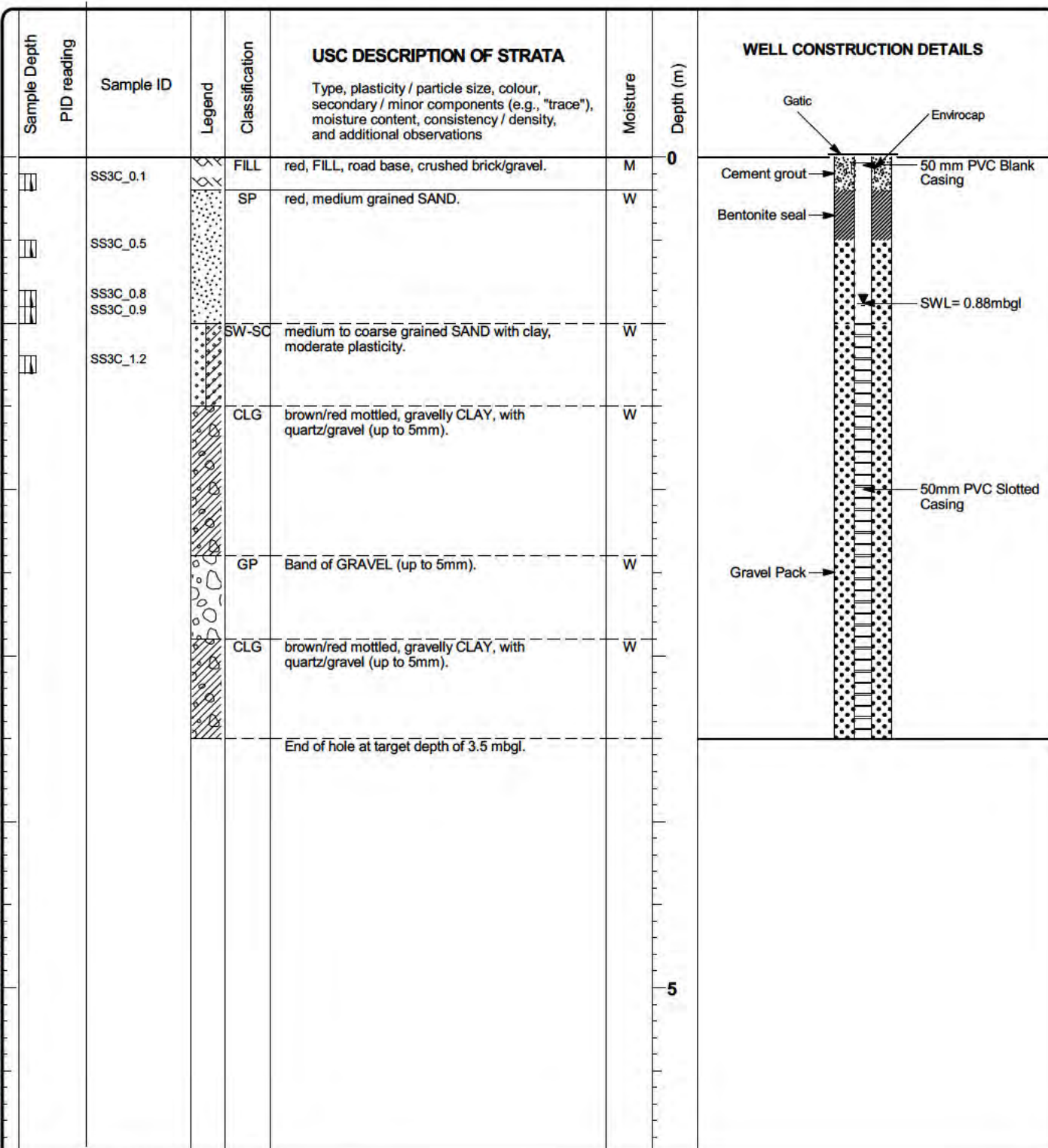
7745889.22 mE

Drill Model: **Geoprobe 7822DT** Drill Type: **Hand Auger/Push Tube**

Date Finished: **19-6-17**

Permit No: **N/A**

Drill Fluid: **None**



Remarks: SB3C converted to MW3C
Bore Location: Former Workshop (FWKSP)

SOIL BOREHOLE SB17

AECOM Lvl 6, 3 Forrest Place
Perth WA 6000Phone 08-9326 0100
Fax 08-9326 0296Project Reference: **PSI with Limited
Investigation at
Port Hedland
Airport**Client: **Airservices Australia**Drilling Contractor: **South Western Drilling (SWD)**Project No.: **60543717**Location: **Port Hedland International Airport
Western Australia**Logged By: **[REDACTED]**Bore Size: **150 mm**Relative Level: **mRL**Drill Type: **Hand Auger/Push Tube**Checked By: **[REDACTED]**Total Depth: **5.50 m**Coordinates: **7745337.40 mN**Drill Model: **Geoprobe 7822DT**Date Started: **18-6-17**Casing Size: **50 mm**

669757.09 mE

Drill Fluid: **None**Date Finished: **18-6-17**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		SP	medium to coarse grained, SAND.	D/M			0.8	SS17_0.1
													4.3	SS17_0.5
													4.3	SS17_0.8
						1								
									Wet at 1.4 mbgl.	W				
								SW-SC	coarse grained SAND with clay.	W			5.0	SS17_1.5
						2								
								GW-GC	brown, GRAVEL with some clay and quartz (up to 4mm).	W			5.3	SS17_2.5
								SW-SC	coarse grained SAND with stiff lumps of clay.	W				
						3								
						4								
						5								
									End of hole at target depth of 5.5 mbgl.					

Remarks: Bore Location: Former Fire Station (FFS)
Note: hole collapsing where wet, second push-tube caught in the gravel

SOIL BOREHOLE SB18

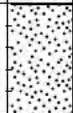
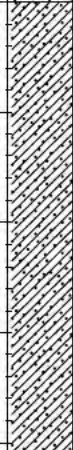
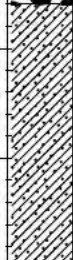
AECOM Lvl 6, 3 Forrest Place
Perth WA 6000Phone 08-9326 0100
Fax 08-9326 0296Project Reference: **PSI with Limited
Investigation at
Port Hedland
Airport**Client: **Airservices Australia**Drilling Contractor: **South Western Drilling (SWD)**Project No.: **60543717**Location: **Port Hedland International Airport
Western Australia**Logged By: XXXXXXXXXXBore Size: **150 mm**Relative Level: **mRL**Drill Type: **Hand Auger/Push Tube**Checked By: XXXXXXXXXXTotal Depth: **4.00 m**Coordinates: **7745356.22 mN**Drill Model: **Geoprobe 7822DT**Date Started: **18-6-17**Casing Size: **50 mm****669768.32 mE**Drill Fluid: **None**Date Finished: **18-6-17**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	loose, medium grained, gravelly SAND.	D/M			
						0.5						4.8	SS18_0.5
						1.0						4.6	SS18_0.8
						1.4			Wet at 1.4 mbgl.			5.0	SS18_1.4
						2.0		GWS	loose sandy GRAVEL, with clay.	W			
						2.5						2.0	SS18_2.5
						3.0		GWS	Increased clay content.	W			
						4.0			End of hole at target depth of 4.0mbgl.				
						5.0							

Bore Location: Former Fire Station (FFS)

SOIL BOREHOLE SB19

AECOM Lvl 6, 3 Forrest Place
Perth WA 6000Phone 08-9326 0100
Fax 08-9326 0296Project Reference: **PSI with Limited
Investigation at
Port Hedland
Airport**Client: **Airservices Australia**Drilling Contractor: **South Western Drilling (SWD)**Project No.: **60543717**Location: **Port Hedland International Airport
Western Australia**Logged By: **[REDACTED]**Bore Size: **150 mm**Relative Level: **mRL**Drill Type: **Hand Auger/Push Tube**Checked By: **[REDACTED]**Total Depth: **4.00 m**Coordinates: **7745342.74 mN**Drill Model: **Geoprobe 7822DT**Date Started: **18-6-17**Casing Size: **50 mm****669778.87 mE**Drill Fluid: **None**Date Finished: **18-6-17**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		SP	brown, medium grained SAND.	M			 0	SS19_0.1
						1		CLS	red, medium grained, low plasticity, clayey SAND.	MW			 0	SS19_0.5
													 0	SS19_0.8
													 0	SS19_1.2
													 0	SS19_1.5
						2								
						3		GW	Band of GRAVEL up to 1cm.	W				
								CLS	red, medium grained, low plasticity, clayey SAND.	W				
						4			End of hole at target depth of 4.0 mbgl.					
						5								

Bore Location: Former Fire Station (FFS)

SOIL BOREHOLE SB20

AECOM Lvl 6, 3 Forrest Place
Perth WA 6000Phone 08-9326 0100
Fax 08-9326 0296Project Reference: **PSI with Limited
Investigation at
Port Hedland
Airport**Client: **Airservices Australia**Drilling Contractor: **South Western Drilling (SWD)**Project No.: **60543717**Location: **Port Hedland International Airport
Western Australia**Logged By: **[REDACTED]**Bore Size: **150 mm**Relative Level: **mRL**Drill Type: **Hand Auger/Push Tube**Checked By: **[REDACTED]**Total Depth: **4.00 m**Coordinates: **7745359.61 mN**Drill Model: **Geoprobe 7822DT**Date Started: **18-6-17**Casing Size: **50 mm****669808.32 mE**Drill Fluid: **None**Date Finished: **18-6-17**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		TOPS	Grass	D				
								SP	red, coarse grained, poorly graded alluvial SAND, homogenous.	M			0.3	SS20_0.1
													3	SS20_0.5
													2.8	SS20_0.8
						1		GP-GC	Band of gravel with clay, up to 5mm.	W			1.0	SS20_1.2
								CLS	coarse grained sand with CLAY, with some gravel.	W				
						2								
						3								
						4			End of hole at target depth of 4.0 mbgl.					
						5								

Bore Location: Former Fire Station (FFS)

SOIL BOREHOLE SB21

AECOM Lvl 6, 3 Forrest Place
Perth WA 6000Phone 08-9326 0100
Fax 08-9326 0296Project Reference: **PSI with Limited
Investigation at
Port Hedland
Airport**Client: **Airservices Australia**Drilling Contractor: **South Western Drilling (SWD)**Project No.: **60543717**Location: **Port Hedland International Airport
Western Australia**Logged By: **[REDACTED]**Bore Size: **150 mm**Relative Level: **mRL**Drill Type: **Hand Auger/Push Tube**Checked By: **[REDACTED]**Total Depth: **4.00 m**Coordinates: **7745343.96 mN**Drill Model: **Geoprobe 7822DT**Date Started: **18-6-17**Casing Size: **50 mm****669813.22 mE**Drill Fluid: **None**Date Finished: **18-6-17**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		TOPS SP	Grass. loose, brown, medium grained SAND, homogenous.	D M			0.2	SS21_0.1
													2	SS21_0.5
													4	SS21_0.8
						1		SP-SC	coarse grained SAND with clay.	W			3	SS21_1.1
						2		SP-SC	Increased clay content.	W			0	SS21_2.5
						3								
						4			End of hole at target depth of 4.0 mbgl.					
						5								

Bore Location: Former Fire Station (FFS)

SOIL BOREHOLE SB22

AECOM Lvl 6, 3 Forrest Place
Perth WA 6000Phone 08-9326 0100
Fax 08-9326 0296Project Reference: **PSI with Limited
Investigation at
Port Hedland
Airport**Client: **Airservices Australia**Drilling Contractor: **South Western Drilling (SWD)**Project No.: **60543717**Location: **Port Hedland International Airport
Western Australia**Logged By: **[REDACTED]**Bore Size: **150 mm**Relative Level: **mRL**Drill Type: **Hand Auger/Push Tube**Checked By: **[REDACTED]**Total Depth: **4.00 m**Coordinates: **7745318.12 mN**Drill Model: **Geoprobe 7822DT**Date Started: **18-6-17**Casing Size: **50 mm****669810.45 mE**Drill Fluid: **None**Date Finished: **18-6-17**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		FILL SP	FILL, bitumen, 40mm. red, medium grained, poorly graded SAND. Wet at 1.3 mbgl	D D/M			1.0	SS22_0.1
													2.6	SS22_0.5
													3.8	SS22_0.8
						1		SP	red, coarse grained, poorly graded SAND.	W			0	SS22_1.3
								GP	coarse grained, poorly graded GRAVEL.	W			0	SS22_1.6
								CL	red, CLAY with brown banding.	W				
						2								
						3								
						4			End of hole at target depth of 4.0 mbgl.					
						5								

Bore Location: Former Fire Station (FFS)

Drill Type: **Hand Auger/Push Tube**
Drill Model: **Geoprobe 7822DT**
Drill Fluid: **None**

Bore Location: east of Former Fire Station (FFS)

Drill Type: **Hand Auger/Push Tube**
Drill Model: **Geoprobe 7822DT**
Drill Fluid: **None**

Bore Location: Former Workshop (FWKSP)

Appendix K

Field Groundwater Purging Data

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 with 'ND' (Not Detected) in the relevant column.

MEASUREMENT EQUIPMENT		NOTES/COMMENTS	
Make & Model:	SOLINIST INTERFACE PROBE	Supplier:	AE.S
Serial No.:		Calibration Report Provided?	✓

Approval and Distribution

Distribution: Project Central File

Project Manager Signature _____ Date _____

FIELDWORK QUALITY MANUAL

FQM-5.14-F1 - NAPL AND GROUNDWATER LEVEL GAUGING RECORD

Approval and Distribution	
	Project Manager Signature _____ Date _____

FGM-5.05-F1 - GROUNDWATER SAMPLING AND PURGING RECORD

Bore ID:

Project Name:		AirServices Australia - Port Hedland International Airport GME		Project Number:		PM Name:		Sample Date:		26-C-17	
Client:		AirServices Australia		Project Location:		Port Hedland International Airport		Fieldwork Staff:		MM06	
GENERAL BORE INFORMATION											
Date of GW Level:		26-6-17		Bore Radius (mm):		Chem Kit Serial No.: 14310920		DECONTAMINATION		HYDRASLEEVE INFO	
Depth to GW (m-pvc):		1.353		Screen Interval (m):		Chem Kit Model: 451 PRO PWS		☒ Decontaminated		☒ Low Flow: Pump rate:	
Bore Depth (m-pvc):		3.93		Casing Radius (mm): 50mm		Corrected Redox: Y / 20		☒ Dedicated		Intake depth: 1.90m	
Depth to Product (m-pvc):		---		Cover Type (gauge stick up):		(The correction to apply is probe dependent)		☒ Disposable		☒ Bailor	
Product Thickness (m):		---		Bore Locked (YES/NO):		Parameter method: T1 Downhole		☒ Other (specify)		☒ Peristaltic Pump	
Calculated bore volume (L):		# purge volumes removed:		Total purged volume (L):		☒ Retrieved		☒ Other (specify)		Sampling Start Time:	
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		
1002	0.25	1.44	50%	3.27	5838	6.72	83.1	27.4	TRANSPARENT, LIGHT YELLOW-BROWN, ODOURLESS		
1004	0.50	1.495	50%	2.56	5773	6.84	89.3	27.3	"		
1006	0.90	1.510	30%	2.37	5749	6.87	92.6	26.6	"		
1004	1.05	1.530	30%	1.88	5791	6.91	95.1	27.2	"		
1010	1.45	1.555	30%	1.41	5730	7.00	95.3	27.5	"		
1012	1.90	1.575	30%	1.12	5760	7.03	97.6	27.6	"		
1014	2.20	1.590	30%	0.91	5837	7.04	99.4	27.5	"		
1016	2.56	1.610	30%	0.73	5880	7.03	100.6	27.5	"		
		DTW = 1.58m		END OF SAMPLING		10.24					
ANALYTES SAMPLED FOR:											
Field Filtered:		Unfiltered:		± 10%		± 3%		± 0.05		± 10 mV	
Acceptable Parameter Range:		BOTTLES COLLECTED		QA/QC INFORMATION		FIELD COMMENTS		± 10% turbidity (if using a turbidity meter)			
2 AMBER		2 PURPLE VIALS		2 GREEN PFCOS		1 X EXTRA AMBER		Bore volume calculation, bore condition, fate of tubing, redox correction etc.			
2 GREEN PFCOS						1 X EXTRA AMBER					
Project Manager Signature											
Date											
Distribution: Project Central File											
Checker Name and Signature											
Date											

FQM-5.05-F1 - GROUNDWATER SAMPLING AND PURGING RECORD

Bore ID:

Project Name:		AirServices Australia - Port Hedland International Airport GME		Project Number:		PM Name:		Sample Date:		26-6-17	
Client:		AirServices Australia		Project Location:		Port Hedland International Airport		Fieldwork Staff:		MM05	
GENERAL BORE INFORMATION											
Date of GW Level:		26-6-17		Bore Radius (mm):		Chem Kti Serial No.: 143101920		DECONTAMINATION		SAMPLING METHOD:	
Depth to GW (m-pvc):		1.745		Screen Interval (m):		Chem Kti Model: 451 PRO PLUS		☒ Decontaminated		☒ Low Flow: Pump rate:	
Bore Depth (m-pvc):		4.42		Casing Radius (mm):		Corrected Redox: Y / N		☒ Dedicated		Intake depth: 2.3m	
Depth to Product (m-pvc):		—		Cover Type (gall/stick up):		(The correction to apply is probe dependent)		☒ Disposable		☒ Bailor	
Product Thickness (m):		—		Bore Locked (YES/NO):		Parameter method:		☐ Downhole		☒ Peristaltic Pump	
				Key Type (if applicable):				☒ Retrieved		☐ Other (Specify)	
Calculated bore volume (L):		# purge volumes removed:		Total purged volume (L):				☐ Other (Specify)		Sampling Start Time:	
HYDRASLEEVE INFO											
Monitoring sequence followed (number in order):				Hydrasleeve Size:				Hydrasleeve Type:			
Sampling Depth (m-pvc):				Sampling Depth (m-pvc):				Hydrasleeve Install time:			
Hydrasleeve in Parameters				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		
1035	0.10	1.90	30%	3.82	522.4	7.09	128.3	26.7	LIGHT BROWN-YELLOW, ODOURLESS, MOD TURBIDITY		
1037	0.40	1.945	25%	3.14	521.1	7.07	129.7	26.7			
1039	0.50	1.97	25%	3.05	518.8	7.07	129.2	26.8			
1041	0.70	1.99	25%	2.93	518.1	7.10	128.5	27.2			
1043	1.00	2.00	25%	2.73	517.9	7.09	128.5	27.2			
1045	1.25	2.01	25%	2.80	518.1	7.09	128.5	27.3			
1047	1.50	2.02	25%	2.88	516.7	7.07	129.4	27.5			
1053	2.00	2.02	25%	2.88	516.7	7.07	129.4	27.5			
1055	2.25	2.02	25%	2.88	516.7	7.07	129.4	27.5			
1057	2.50	2.02	25%	2.88	516.7	7.07	129.4	27.5			
ANALYTES SAMPLED FOR:											
Unfiltered:		1 AMBER		BOTTLES COLLECTED		± 10%		± 3%		± 0.05	
		1 CLEAN RTOS									
		2 PURPLE VIAL									
FIELD COMMENTS											
Bore volume calculation, bore condition, fate of tubing, redox correction etc.											
Project Manager Signature											
Date											
Distribution: Project Central File											
Checker Name and Signature											
Date											

FGM 5.05-F1 - GROUNDWATER SAMPLING AND PURGING RECORD

Bore ID:

Project Name:		AirServices Australia - Port Hedland International Airport GME		Project Number:		PM Name:		Sample Date:		26-6-17	
Client:		AirServices Australia		Project Location:		Port Hedland International Airport Fieldwork Staff:				MWD4	
GENERAL BORE INFORMATION											
Date of GW Level:		26-6-17		Bore Radius (mm):		Chem Kit Serial No.: 143101926		DECONTAMINATION		HYDRASLEEVE INFO	
Depth to GW (m-pvc):		5.95		Screen Interval (m):		Chem Kit Model: 451100 AUS		☒ Decontaminated		☒ Low Flow: Pump rate:	
Bore Depth (m-pvc):		5.95		Casing Radius (mm):		Corrected Redox: Y / N		☒ Dedicated		Intake depth: 2.4	
Depth to Product (m-pvc):		---		Cover Type (gate/slick up):		(The correction to apply is probe dependent)		☒ Disposable		☒ Baler	
Product Thickness (m):		---		Bore Locked (YES/NO):		Parameter method:		☒ Downhole		☒ Peristaltic Pump	
				Key Type (if applicable):				☒ Other (specify)		☒ Waterra	
Calculated bore volume (L):		# purge volumes removed:		Total purged volume (L):				☒ Retrieved		Sampling Start Time:	
WATER QUALITY PARAMETERS											
Time	Cumulative Vol. Removed (L)	SWL (m-pvc)	Pump Rate	DO (logm or mg/L)	E.C. (mS/cm or uS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity		
1106	0.05	1.96	307.	3.95	775	7.57	135.1	28.7	LIGHT BROWN, SILTY/MOD TURBIDITY, ODOURLESS		
1108	0.20	1.99	307.	3.58	684	7.41	131.0	28.3	YELLOW-BROWN, SILTY/HIGH TURBIDITY, ODOURLESS		
1110	0.50	2.035	307.	2.485	647	7.33	146.3	28.4			
1112	1.00	2.055	"	3.31	646	7.32	148.5	28.7			
1114	1.20	2.07	"	3.20	641	7.31	150.1	28.7			
1116	1.50	2.09	"	3.08	632	7.25	152.9	28.5			
1118	2.00	2.11	"	3.09	631	7.24	153.5	28.7			
1123		2.275									
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:		2x PURPLE VIALS		1x AMBER		1x GREEN PDS		Bore volume calculation, bore condition, fate of tubing, redox correction etc.	
Fieldwork Site:											
Project Manager Signature		Date		Distribution: Project Central File		Checker Name and Signature		Date			

FGM-5.05-F1 - GROUNDWATER SAMPLING AND PURGING RECORD

Bore ID:

Project Name: AirServices Australia - Port Hedland International Airport GME

Project Number:

PM Name:

Sample Date:

26-6-17

Client: AirServices Australia

Project Location:

Port Hedland International Airport Fieldwork Staff:

MMD9

GENERAL BORE INFORMATION

PARAMETER INFO

DECONTAMINATION

SAMPLING METHOD

HYDRASLEEVE INFO

Date of GW Level: 26-6-17 Bore Radius (mm): Bore Radius (mm): Chem Kit Serial No.: 140109220

Depth to GW (m-pvc): 1.345 Screen Interval (m): Chem Kit Model: 451 PPD PLUS

Bore Depth (m-pvc): 3.99 Casing Radius (mm): 50 Corrected Redox: Y / N

Depth to Product (m-pvc): Cover Type (gauge/stick up): (The correction to apply is probe dependent)

Product Thickness (m): Bore Locked (YES/NO) Parameter method: T Downhole T Retrieved

Calculated bore volume (L): # purge volumes removed: Total purged volume (L):

Monitoring sequence followed (number in order):

Hydrasleeve Size: Hydrasleeve Type: Sampling Depth (m-pvc): Hydrasleeve Install time: Sampling Start Time: Hydrasleeve in Parameters

Low Flow: Pump rate: Intake depth: 1.85

Bailer Hydrasleeve Peristaltic Pump T Waterra Other (specify)

Other (specify)

Odour, Colour, Turbidity

LIGHT YELLOW-BROWN, OBOULESS, MOD TURBIDITY

Time Cumulative Vol. Removed (L) SWL (m-pvc) Pump Rate (lpm or mgl) DO (mg/L or mg/L) E.C. (mS/cm or uS/cm) pH Redox (mV) Temp °C

11.39 0.05 1.445 30% 1.83 1423 7.02 151.6 27.7

11.41 0.15 1.52 30% 1.32 1414 7.04 144.2 27.8

11.43 0.50 1.54 30% 1.00 1401 7.04 139.6 27.9

11.45 0.90 1.59 25% 1.04 1286 7.04 128.2 27.6

11.47 1.10 1.62 25% 1.32 1239 7.06 94.7 27.6

11.49 1.50 1.65 25% 1.17 1205 7.04 47.8 27.7

11.51 1.60 1.725 25% 0.98 1197 7.07 -5.2 27.9

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: 1 x AUBER 1 x REG PFCOS 2 PURPLE VIALS

Field and Distribution

Bore volume calculation, bore condition, fate of tubing, redox correction etc.

Project Manager Signature Date Distribution: Project Central File

Checker Name and Signature Date

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FGM-5.05-F1 - GROUNDWATER SAMPLING AND PURGING RECORD

Bore ID:

Project Name: AirServices Australia - Port Hedland International Airport GME

Project Number:

Sample Date:

20-6-17

Client: AirServices Australia

Project Location:

Port Hedland International Airport, Fieldwork Staff:

MAN03

GENERAL BORE INFORMATION

PARAMETER INFO.

DECONTAMINATION

SAMPLING METHOD:

HYDRASLEEVE INFO.

Date of GW Level:

20-6-17

Bore Radius (mm):

Chem Kit Serial No.: 143101920

☒ Decontaminated

Low Flow: Pump rate:

Intake depth: 1.9m

Hydrasleeve Size:

Monitoring sequence followed (number in order):

Depth to GW (m-pvc):

1.411

Screen Interval (m):

Chem Kit Model: 451 PEO PWS

☒ Dedicated

Corrected Redox: Y / N

☒ Disposable

Bailer

Hydrasleeve

Sampling Depth (m-pvc):

Gauging

Bore Depth (m-pvc):

4.04

Casing Radius (mm):

50

Cover Type (gauge stick up):

(The correction to apply is probe dependent)

☐ Other (specify)

Peristaltic Pump

Hydrasleeve Install time:

Hydrasleeve in

Hydrasleeve out

Depth to Product (m-pvc):

Cover Type (gauge stick up):

Parameter method:

☐ Downhole

☐ Retrieved

Other (specify)

Other (specify)

Sampling Start Time:

Parameters

Product Thickness (m):

Bore Locked (YES/NO):

Key Type (if applicable):

Total purged volume (L):

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 uS/cm)

pH

Redox (mV)

Temp °C

Odour, Colour, Turbidity

1313

0.30

1.538

30%

1.79

1814

7.57

110.2

28.8

LIGHT YELLOW, MOD TURBIDITY, ODOURLESS, FEELING

1315

0.80

1.538

25%

1.48

1817

7.54

108.4

28.4

"

1317

0.60

1.58

25%

1.42

1813

7.52

107.0

28.1

"

1319

0.90

1.57

25%

1.60

1800

7.52

105.0

28.4

"

1322

1.10

1.595

25%

1.54

1783

7.55

104.6

28.9

"

1324

1.40

1.515

25%

1.35

1757

7.51

103.1

28.5

"

1326

1.50

1.62

25%

1.52

1737

7.47

102.5

28.6

GREY/BLACK, MOD TURBIDITY, ODOURLESS, FEELING

1331

1.61

DTW @

END OF SAMPLING.

"

"

"

"

"

ANALYTES SAMPLED FOR:

Unfiltered:

2. PUDGE VIALS

1. AMBER

1. GREY PDS

100A01 - FB

100A02 - RUNSE

Acceptable Parameter Range:

± 10% ± 3% ± 0.05 ± 10 mV ± 0.2 °C

ANALYTES SAMPLED FOR:

Unfiltered:

2. PUDGE VIALS

1. AMBER

1. GREY PDS

100A01 - FB

100A02 - RUNSE

Acceptable Parameter Range:

± 10% ± 3% ± 0.05 ± 10 mV ± 0.2 °C

ANALYTES SAMPLED FOR:

Unfiltered:

2. PUDGE VIALS

1. AMBER

1. GREY PDS

100A01 - FB

100A02 - RUNSE

Acceptable Parameter Range:

± 10% ± 3% ± 0.05 ± 10 mV ± 0.2 °C

ANALYTES SAMPLED FOR:

Unfiltered:

2. PUDGE VIALS

1. AMBER

1. GREY PDS

100A01 - FB

100A02 - RUNSE

Acceptable Parameter Range:

± 10% ± 3% ± 0.05 ± 10 mV ± 0.2 °C

ANALYTES SAMPLED FOR:

Unfiltered:

2. PUDGE VIALS

1. AMBER

1. GREY PDS

100A01 - FB

100A02 - RUNSE

Acceptable Parameter Range:

± 10% ± 3% ± 0.05 ± 10 mV ± 0.2 °C

ANALYTES SAMPLED FOR:

Unfiltered:

2. PUDGE VIALS

1. AMBER

1. GREY PDS

100A01 - FB

100A02 - RUNSE

Acceptable Parameter Range:

± 10% ± 3% ± 0.05 ± 10 mV ± 0.2 °C

ANALYTES SAMPLED FOR:

Unfiltered:

2. PUDGE VIALS

1. AMBER

1. GREY PDS

100A01 - FB

100A02 - RUNSE

Acceptable Parameter Range:

± 10% ± 3% ± 0.05 ± 10 mV ± 0.2 °C

ANALYTES SAMPLED FOR:

Unfiltered:

2. PUDGE VIALS

1. AMBER

1. GREY PDS

100A01 - FB

100A02 - RUNSE

Acceptable Parameter Range:

± 10% ± 3% ± 0.05 ± 10 mV ± 0.2 °C

ANALYTES SAMPLED FOR:

Unfiltered:

2. PUDGE VIALS

1. AMBER

1. GREY PDS

100A01 - FB

100A02 - RUNSE

Acceptable Parameter Range:

± 10% ± 3% ± 0.05 ± 10 mV ± 0.2 °C

ANALYTES SAMPLED FOR:

Unfiltered:

2. PUDGE VIALS

1. AMBER

1. GREY PDS

100A01 - FB

100A02 - RUNSE

Acceptable Parameter Range:

± 10% ± 3% ± 0.05 ± 10 mV ± 0.2 °C

ANALYTES SAMPLED FOR:

Unfiltered:

2. PUDGE VIALS

1. AMBER

1. GREY PDS

100A01 - FB

100A02 - RUNSE

Acceptable Parameter Range:

± 10% ± 3% ± 0.05 ± 10 mV ± 0.2 °C

ANALYTES SAMPLED FOR:

Unfiltered:

2. PUDGE VIALS

1. AMBER

1. GREY PDS

100A01 - FB

100A02 - RUNSE

Acceptable Parameter Range:

± 10% ± 3% ± 0.05 ± 10 mV ± 0.2 °C

ANALYTES SAMPLED FOR:

Unfiltered:

2. PUDGE VIALS

1. AMBER

1. GREY PDS

100A01 - FB

100A02 - RUNSE

Acceptable Parameter Range:

± 10% ± 3% ± 0.05 ± 10 mV ± 0.2 °C

ANALYTES SAMPLED FOR:

Unfiltered:

2. PUDGE VIALS

1. AMBER

1. GREY PDS

100A01 - FB

100A02 - RUNSE

Acceptable Parameter Range:

± 10% ± 3% ± 0.05 ± 10 mV ± 0.2 °C

ANALYTES SAMPLED FOR:

Unfiltered:

2. PUDGE VIALS

1. AMBER

1. GREY PDS

100A01 - FB

FQM-5-05-F1 - GROUNDWATER SAMPLING AND PURGING RECORD

Bore ID:

Project Name: AirServices Australia - Port Hedland International Airport GME

Project Number:

PM Name:

Sample Date:

26-6-17

Client: AirServices Australia

Project Location:

Port Hedland International Airport Fieldwork Staff:

GENERAL BORE INFORMATION

PARAMETER INFO

DECONTAMINATION

SAMPLING METHOD

HYDRASLEEVE INFO

Monitoring sequence followed (number in order):

Date of GW Level: 26-6-17

Bore Radius (mm):

Screen Interval (m):

Casing Radius (mm):

Cover Type (gate/stick up):

Corrected Redox: Y / N

(The correction to apply is probe dependent)

Parameter method: ☐ Downhole ☒ Retrieved

Total purged volume (L):

purge volumes removed:

Chem Kit Serial No.: 1431019 20

Chem Kit Model: 981 PPD PLUS

Decontaminated ☒ Dedicated ☐ Disposable ☐

Other (specify):

Low Flow: Pump rate:

Intake depth: 2.1

Hydrasleeve Type: ☐ Baller ☐ Peristaltic Pump ☐ Waterra

Hydrasleeve Size:

Hydrasleeve Type:

Sampling Depth (m-pvc):

Hydrasleeve Install Time:

Sampling Start Time:

Gauging

Hydrasleeve in

Hydrasleeve out

Parameters

Depth to Product (m-pvc): 1.558

Depth to Product (m-pvc): 3.99

Product Thickness (m):

Key Type (if applicable):

Calculated bore volume (L):

purge volumes removed:

Chem Kit Serial No.: 1431019 20

Chem Kit Model: 981 PPD PLUS

Decontaminated ☒ Dedicated ☐ Disposable ☐

Other (specify):

Low Flow: Pump rate:

Intake depth: 2.1

Hydrasleeve Type: ☐ Baller ☐ Peristaltic Pump ☐ Waterra

Hydrasleeve Size:

Hydrasleeve Type:

Sampling Depth (m-pvc):

Hydrasleeve Install Time:

Sampling Start Time:

Gauging

Hydrasleeve in

Hydrasleeve out

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

WATER QUALITY PARAMETERS

1354 0.16 1.60 30% 2.62 1365 7.48 100.9 30.1

1356 0.20 1.635 30% 2.23 1165 7.45 102.2 30.2

1358 0.50 1.66 30% 2.08 1034 7.41 102.6 30.0

1400 0.65 1.68 30% 2.13 955 7.38 101.9 30.1

1402 1.00 1.695 30% 2.14 975 7.37 101.3 30.2

1404 1.40 1.71 30% 2.24 893 7.33 102.2 29.8

1406 1.50 1.72 30% 2.21 882 7.32 102.3 28.7

0.7M ± 1.68m @ 1414

ODORLESS, NO TURBIDITY, LIGHT BROWN

"

"

"

"

"

"

"

"

"

"

ANALYTES SAMPLED FOR:

Unfiltered:

2 AMBER

2 RUPALE VALS

2 GREN DFOS

1x EXTRA AMBER

1x EXTRA DFOS

Acceptable Parameter Range: ± 10% ± 5% ± 0.05 ± 10 mV ± 0.2 °C

± 10% turbidity (if using a turbidity meter)

FIELD COMMENTS

Bore volume calculation, bore condition, fate of tubing, redox correction etc.

Fieldwork

Project Manager Signature

Date

Distribution: Project Central File

Checker Name and Signature

Date

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FGM-5.05-F1 - GROUNDWATER SAMPLING AND PURGING RECORD

Bore ID:

Project Name:		AirServices Australia - Port Hedland International Airport GME		Project Number:		PM Name:		Sample Date:	
Client:		AirServices Australia		Project Location:		Port Hedland International Airport Fieldwork Staff:		26-6-17	
GENERAL BORE INFORMATION									
Date of GW Level:		26-6-17		Bore Radius (mm):		Chem Kit Serial No.:		DECONTAMINATION	
Depth to GW (m-pvc):		1.17		Screen Interval (m):		Chem Kit Model:		☒ Decontaminated	
Bore Depth (m-pvc):		3.98		Casing Radius (mm):		Corrected Redox: Y / N		☒ Dedicated	
Depth to Product (m-pvc):		—		Cover Type (gate/slick up):		(The correction to apply is probe dependent)		☒ Disposable	
Product Thickness (m):		—		Bore Locked (YES/NO):		Parameter method:		☐ Downhole	
Calculated bore volume (L):		# purge volumes removed:		Total purged volume (L):		☒ Retrieved		☐ Other (specify)	
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
1428	0.20	1.27	30%	0.30	316	6.74	123.6	30.1	PALE YELLOW, OPOULESS, LOW TURBIDITY
1431	0.70	1.305	25%	0.28	3093	6.78	115.5	29.9	
1433	0.95	1.322	25%	0.22	3085	6.78	112.0	29.8	
1435	1.10	1.352	25%	0.22	3062	6.82	106.9	30.0	
1437	1.50	1.384	25%	0.20	3045	6.85	102.8	30.0	
1439	1.60	1.385	25%	0.21	3032	6.83	101.1	30.1	
DTW = 1.414 @ END OF SAMPLING @ 1446									
ANALYTES SAMPLED FOR:									
Field Filtered:		Unfiltered:	Acceptable Parameter Range:		± 10%	± 3%	± 0.05	± 10 mV	± 0.2 °C
BOTTLES COLLECTED		CAVOC INFORMATION		FIELD COMMENTS		Bore volume calculation, bore condition, fate of tubing, redox correction etc.			
1 AMBER		1 GREY PLOS		2 PURPLE VIAL					
File:		Project Manager Signature		Date		Distribution: Project Central File		Checker Name and Signature	

FIELDWORK QUALITY MANUAL

FQM-5.05-F1 – GROUNDWATER SAMPLING AND PIRGING RECORD

Bore ID:

Project Name:		AirServices Australia - Port Hedland International Airport GME		Project Number:		60543717		PM Name:		[REDACTED]		Sample Date:		27-6-17					
Client:		AirServices Australia		Project Location:		Port Hedland International Airport		Fieldwork Staff:		[REDACTED]		[REDACTED]		[REDACTED]					
GENERAL BORE INFORMATION																			
Date of GW Level:				27-6-17				Bore Radius (mm):				14010920							
Depth to GW (m-pvc):				0.83				Screen Interval (m):				451 PRO PLUS							
Bore Depth (m-pvc):				3.87				Casing Radius (mm):				50							
Depth to Product (m-pvc):				---				Cover Type (Galv Stick up):				(The correction to apply is probe dependent)							
Product Thickness (m):				---				Bore Locked (YES/NO):				Parameter method:							
Calculated bore volume (L):				# purge volumes removed:				Total purged volume (L):				[REDACTED]							
PARAMETER INFO																			
Chem Kit Serial No.:				14010920				Decontamination:				[REDACTED]							
Chem Kit Model:				451 PRO PLUS				Dedicated:				[REDACTED]							
Corrected Redox:				Y / N				Disposable:				[REDACTED]							
Parameter method:				[REDACTED]				Other (specify):				[REDACTED]							
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	
0646		0.10		0.985		30%		4.18		4382		7.72		114.9		24.4		[REDACTED]	
0648		0.40		1.03		20%		3.40		4405		7.57		117.7		23.5		[REDACTED]	
0650		0.55		1.06		30%		3.17		4387		7.47		118.6		22.9		[REDACTED]	
0652		0.65		1.08		30%		2.96		4370		7.42		119.6		22.9		[REDACTED]	
0654		0.95		1.11		30%		3.15		4387		7.28		120.9		21.3		[REDACTED]	
0656		1.10		1.16		30%		2.87		4332		7.40		121.5		22.6		[REDACTED]	
0658		1.40		1.205		30%		2.69		4238		7.46		122.2		23.3		[REDACTED]	
0700		1.50		1.235		30%		2.59		4171		7.46		122.8		23.5		[REDACTED]	
0702		1.70		1.265		30%		2.62		4089		7.45		123.2		23.7		[REDACTED]	
DTW = 1.31m etc		[REDACTED]		[REDACTED]		[REDACTED]		[REDACTED]		[REDACTED]		[REDACTED]		[REDACTED]		[REDACTED]		[REDACTED]	
ANALYTES SAMPLED FOR:																			
Field Filtered:		Unfiltered:		2		PURE VIALS		1		GREY PPG		1		AMBER		[REDACTED]		[REDACTED]	
BOTTLES COLLECTED																			
Acceptable Parameter Range:																			
± 10%		± 3%		± 0.05		± 10 mV		± 0.2 °C		± 10% turbidity (if using a turbidity meter)		FIELD COMMENTS		Bore volume calculation, bore condition, fate of tubing, redox correction etc.		[REDACTED]		[REDACTED]	
CAMC INFORMATION																			
Distribution																			
Fieldwork																			
Project Manager Signature																			
Date																			
Distribution: Project Central File																			
Checker Name and Signature																			
Date																			

FGM-5.05-F1 - GROUNDWATER SAMPLING AND PURGING RECORD

Bore ID:

Project Name: AirServices Australia - Port Hedland International Airport GME		Project Number: 60543717		PM Name:		Sample Date: 27-6-17			
Client: AirServices Australia		Project Location: Port Hedland International Airport		Fieldwork Staff:		MW3A			
GENERAL BORE INFORMATION									
Date of GW Level: 27-6-17		Bore Radius (mm):		Chem Kit Serial No.: 140101920		DECONTAMINATION			
Depth to GW (m-pvc): 0.40		Screen Interval (m):		Chem Kit Model: 451 RDS RUS		☒ Decontaminated			
Bore Depth (m-pvc): 3.51		Casing Radius (mm): 50		Corrected Redox: Y / N		☒ Dedicated			
Depth to Product (m-pvc):		Cover Type (gate/stick up):		(The correction to apply is probe dependent)		☐ Disposable			
Product Thickness (m):		Bore Locked (YES/NO):		Parameter method:		☐ Other (specify)			
Calculated bore volume (L):		Key Type (if applicable):		☒ Downhole		☐ Other (specify)			
# purge volumes removed:		Total purged volume (L):		☒ Retrieved		☐ Other (specify)			
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
0714	0.20	0.81	30%	2.11	3236	7.67	118.1	22.9	NO TURBIDITY/TRANSPARENT, ODOURLESS, COLOURLESS
0716	0.40	0.83	30%	1.65	3182	7.36	116.8	22.2	"
0718	0.50	0.81	30%	1.33	3179	7.40	114.9	22.4	"
0720	0.80	0.815	30%	1.03	3176	7.42	113.2	22.6	"
0722	1.00	0.815	30%	0.79	3171	7.41	111.4	22.6	"
0724	1.45	0.82	30%	0.61	3167	7.43	108.9	23.0	"
0726	1.55	0.815	30%	0.55	3154	7.42	107.6	23.1	"
0728	1.90	0.815	30%	0.53	3150	7.43	104.5	23.2	"
— DTW = 0.81m BTOC @ END OF SAMPLING @ 0736									
ANALYTES SAMPLED FOR:									
Acceptable Parameter Range: ± 10% ± 3% ± 0.05 ± 10 mV ± 0.2 °C ± 10% turbidity (if using a turbidity meter)									
BOTTLES COLLECTED									
Field Filtered: Unfiltered: 6 ANAL VIALS 3 AMBER 3 GREY PDS									
QA/QC INFORMATION									
WQA03 - DUPLICATE WQA04 - TRIPLICATE WQA05 - FB									
FIELD COMMENTS									
Bore volume calculation, bore condition, fate of tubing, redox correction etc.									
Project Manager Signature _____ Date _____ Distribution: Project Central File									
Checker Name and Signature _____ Date _____									

FIELDWORK QUALITY MANUAL

FQM-5.05-F1 – GROUNDWATER SAMPLING AND PURGING RECORD

Project Name:		AirServices Australia - Port Hedland International Airport GME		Project Number:		60543717		PM Name:				Sample Date:		27-6-17			
Client:		AirServices Australia		Project Location:		Port Hedland International Airport		Fieldwork Staff:									
GENERAL BORE INFORMATION						PARAMETER INFO.						DECONTAMINATION					
Date of GW Level:						27-6-17						Bore Radius (mm):					
Depth to GW (m-pvc):						0.680						Screen Interval (m):					
Bore Depth (m-pvc):						5.5						Casing Radius (mm):					
Depth to Product (m-pvc):						50						Cover Type (gully/stick up):					
Product Thickness (m):												Bore Locked (YES/NO):					
Key Type (if applicable):												Parameter method:					
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. (µS/cm or kS/cm)		pH		Redox (mV)		Temp °C	
0754		0.10		30%		2.48		4856		7.70		67.7		25.8		NO TURBIDITY / TRANSPARENT, ODORLESS, LIGHT BROWN → COLOURLESS	
0756		0.20		0.735		30%		1.68		5017		7.51		0.2		26.4	
0758		0.50		0.735		30%		1.23		5053		7.44		-21.7		26.5	
0900		0.90		0.745		40%		0.81		5105		7.43		-37.2		27.6	
0802		1.30		0.75		40%		0.51		5137		7.41		-55.9		27.3	
0804		1.60		0.755		40%		0.37		5126		7.37		-63.2		27.6	
0806		2.00		0.755		40%		0.32		5129		7.39		-78.9		28.0	
0808		2.50		0.755		40%		0.28		5135		7.38		-96.7		28.1	
- DTCW		0.73		0.815		0.28		END OF SAMPLING									
ANALYTES SAMPLED FOR:																	
Acceptable Parameter Range:																	
Field Filtered:																	
Unfiltered:																	
BOTTLES COLLECTED																	
QA/QC INFORMATION																	
FIELD COMMENTS																	
Bore volume calculation, bore condition, fate of tubing, redox correction etc:																	
Project Manager Signature																	
Date																	
Distribution: Project Central File																	
Checker Name and Signature																	
Date																	

FGM-5.05-F1 - GROUNDWATER SAMPLING AND PURGING RECORD

Bore ID:

Project Name: AirServices Australia - Port Hedland International Airport GME		Project Number: 60543171		PM Name:		Sample Date: 27.6.17			
Client: AirServices Australia		Project Location: Port Hedland International Airport		Fieldwork Staff:		MW38			
GENERAL BORE INFORMATION									
Date of GW Level: 27.6.17		Bore Radius (mm):		Chem Kit Serial No: 140101920		PARAMETER INFO:			
Depth to GW (m-pvc): 1.015		Screen Interval (m):		Chem Kit Model: 451 PRO PLUS		DECONTAMINATION			
Bore Depth (m-pvc): 3.57		Casing Radius (mm): 50		Corrected Redox: Y / NO		☒ Decontaminated ☒ Dedicated ☒ Disposable ☐ Other (specify)			
Depth to Product (m-pvc):		Cover Type (gate/lock up):		(The correction to apply is probe dependent)		☐ Bailler ☐ Peristaltic Pump ☐ Other (specify)			
Product Thickness (m):		Bore Locked (YES/NO):		Parameter method: ☐ Downhole ☒ Retrieved		☐ Intake depth: 1.5 ☐ Hydrasleeve ☐ Sampling Depth (m-pvc): ☐ Hydrasleeve Installation: ☐ Sampling Start Time:			
Calculated bore volume (L):		# purge volumes removed:		Total purged volume (L):		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 µS/cm)	pH	Redox (mV)	Temp °C	Odour, Colour, Turbidity
0823	0.05	1.910	45/	2.58	5688	7.19	-12.8	25.4	NO TURBIDITY / TRANSPARENT, ODORLESS, COLORLESS
0826	0.45	1.125	45/	0.98	5631	7.03	33.2	25.4	"
0828	0.90	1.155	45/	0.63	5555	6.98	-7.4	25.2	"
0836	1.40	1.17	45/	0.49	5434	6.97	-23.7	25.3	"
0832	1.55	1.19	45/	0.47	5355	6.96	-35.1	25.4	"
0834	2.00	1.195	45/	0.48	5320	6.95	-36.3	25.4	"
ANALYTES SAMPLED FOR:								± 10% turbidity (if using a turbidity meter)	
BOTTLES COLLECTED								± 10% turbidity (if using a turbidity meter)	
Field Filtered:								± 10% turbidity (if using a turbidity meter)	
Unfiltered:								± 10% turbidity (if using a turbidity meter)	
2 PURPLE VIALS								± 10% turbidity (if using a turbidity meter)	
1 AMBER								± 10% turbidity (if using a turbidity meter)	
1 GREEN PFDOS								± 10% turbidity (if using a turbidity meter)	
and Distribution								± 10% turbidity (if using a turbidity meter)	
F								± 10% turbidity (if using a turbidity meter)	
Project Manager Signature								Date	
Distribution: Project Central File								Date	
Checker Name and Signature								Date	

FGM-5.05-F1 - GROUNDWATER SAMPLING AND PURGING RECORD

Bore ID:

Project Name:		AirServices Australia - Port Hedland International Airport GME		Project Number:		60543PT1		PM Name:		[REDACTED]		Sample Date:		27-6-17					
Client:		AirServices Australia		Project Location:		Port Hedland International Airport		Fieldwork Staff:		[REDACTED]		[REDACTED]		MW3C					
GENERAL BORE INFORMATION																			
Date of GW Level:				27-6-17				Bore Radius (mm):				14101920							
Depth to GW (m-pvc):				0.885				Screen Interval (m):				451 PPG PUS							
Bore Depth (m-pvc):				3.52				Casing Radius (mm):				50							
Depth to Product (m-pvc):				[REDACTED]				Cover Type (gally/stick up):				[REDACTED]							
Product Thickness (m):				[REDACTED]				Bore Locked (YES/NO):				[REDACTED]							
Key Type (if applicable):				[REDACTED]				Parameter method:				[REDACTED]							
Calculated bore volume (L):				[REDACTED]				# purge volumes removed:				Total purged volume (L):							
PARAMETER INFO																			
Chem Kit Serial No.:				14101920				Decontamination:				[REDACTED]							
Chem Kit Model:				451 PPG PUS				Dedicated:				[REDACTED]							
Corrected Redox:				Y / (N)				Disposible:				[REDACTED]							
(The correction to apply is probe dependant)				[REDACTED]				Other (specify):				[REDACTED]							
Parameter method:				[REDACTED]				Other (specify):				[REDACTED]							
[REDACTED]				[REDACTED]				Other (specify):				[REDACTED]							
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	
0857		0.05		0.895		30%		2.32		873C		7.25		-89.9		25.2		TRANSPARENT, COLOURLESS, ODOURLESS	
0859		0.40		0.965		30%		1.37		8944		7.09		-99.5		25.1		"	
0901		0.50		0.98		30%		0.95		8961		7.04		-102.7		25.0		"	
0903		1.00		1.005		30%		0.50		8927		7.02		-100.4		25.4		"	
0906		1.50		1.027		30%		0.35		8939		6.99		-100.4		25.3		"	
0908		1.65		1.037		30%		0.32		8901		6.99		-99.4		25.4		"	
0910		2.00		1.049		30%		0.30		8868		6.99		-94.4		25.5		"	
[REDACTED]		[REDACTED]		[REDACTED]		[REDACTED]		[REDACTED]		[REDACTED]		[REDACTED]		[REDACTED]		[REDACTED]		[REDACTED]	
Acceptable Parameter Range:																			
DO		± 10%		E.C.		± 3%		pH		± 0.05		Redox		± 10 mV		Temp °C		± 10% turbidity (if using a turbidity meter)	
ANALYTES SAMPLED FOR:																			
Field Filtered:		Unfiltered:		2		ANALYSES		BOTTLES COLLECTED		QA/QC INFORMATION		FIELD COMMENTS							
[REDACTED]		[REDACTED]		1		AMBER		[REDACTED]		[REDACTED]		[REDACTED]							
[REDACTED]		[REDACTED]		1		CAREY PPOS		[REDACTED]		[REDACTED]		[REDACTED]							
Bore volume calculation, bore condition, fate of tubing, redox correction etc.																			
Project Manager Signature																			
Date																			
Distribution: Project Central File																			
Checker Name and Signature																			
Date																			

FIELDWORK QUALITY MANUAL

FQM-5.05-F1 – GROUNDWATER SAMPLING AND PURGING RECORD

Bore ID:

GENERAL INFORMATION		PARAMETER INFO.		DECONTAMINATION		SAMPLING METHOD:		HYDRASLEEVE INFO.	
Date of GW Level:	27-6-17	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):	1.618	Screen Interval (m):	Chem Kit Model: 481 PRO PLUS	☒ Dedicated	Intake depth: 2.2m	Hydrasleeve Type:			
Bore Depth (m-pvc):	3.98	Casing Radius (mm):		☒ Disposable					
Depth to Product (m-pvc):	—	Cover Type (gaskets/buck up):	Corrected Redox: Y / ND	☐ Disposable	☐ Bailor	Sampling Depth (m-pvc):	Gauging		
Product Thickness (m):	—	Bore Locked (YES/NO):	(The correction to apply) is probe dependent)	☐ Other (specify)	☐ Peristaltic Pump	Hydrasleeve Install time:	Hydrasleeve in		
		Key Type (if applicable):	Parameter method:	☐ Downhole	☐ Other (specify)	Sampling Start Time:	Hydrasleeve out		
Calculated bore volume (L):		# purge volumes removed:	☒ Retrieved				Parameters		
		Total purged volume (L):							

WATER QUALITY PARAMETERS

	Removed (L)	(m-prec)	Pump Rate	DO (ppm or mg/L)	E.C. (ms/cm or μ S/cm)	pH	Redox (mv)	Temp °C	Odour, Colour, Turbidity
11.12	0.20	1.686	30%	4.02	1160	7.36	99.5	28.6	MOD TURBIDITY, ODDORLESS, LIGHT BROWN-YELLOW
11.14	0.50	1.681	30%	3.54	1009	6.91	104.0	28.1	
11.16	0.60	1.685	30%	3.22	969	6.71	105.8	28.2	
11.18	1.00	1.687	30%	2.55	954	6.57	107.0	28.2	
11.20	1.20	1.688	30%	2.17	951	6.52	107.0	28.2	
11.22	1.60	1.688	30%	1.88	948	6.46	106.1	28.4	
11.24	2.00	1.690	30%	1.76	939	6.44	107.6	28.5	
	DTGW = 1.685 m20C			11.28					

Acceptable Parameter Range:	
ANALYTES SAMPLED FOR:	

	0%
--	----

%

0.05

 $\pm 10 \text{ mV}$ $\pm 0.2^{\circ}\text{C}$

± 10% turbidity (if using a turbidity meter)

Unfiltered:	
Filtered:	

BOTTLES COLLECTED

GAV/QC INFORMATION

FIELD COMMENTS

Bore volume calculation, bore condition, fate of tubing, redox correction etc.

Project Manager Signature

Date _____

Distribution: Project Central File

Checker Name and Signature

Date _____

FQM 5.05-F1 - GROUNDWATER SAMPLING AND PURGING RECORD

Bore ID:

Project Name:		AirServices Australia - Port Hedland International Airport GME		Project Number:		60543717		PM Name:		[REDACTED]		Sample Date:		27-C-17					
Client:		AirServices Australia		Project Location:		Port Hedland International Airport Fieldwork Staff:													
GENERAL BORE INFORMATION																			
Date of GW Level: 27-C-17				Bore Radius (mm):				Chem Kit Serial No.: 143161920				PARAMETER INFO.							
Depth to GW (m-pvc): 1.560				Screen Interval (m):				Chem Kit Model: 451 PDS PWS				DECONTAMINATION							
Bore Depth (m-pvc): 4.00				Casing Radius (mm): 50				Corrected Redox: Y / CN				☒ Decontaminated							
Depth to Product (m-pvc):				Cover Type (gauge/stick up):				(The correction to apply is probe dependent)				☒ Dedicated							
Product Thickness (m):				Bore Locked (YES/NO):				Parameter method:				☐ Disposable							
				Key Type (if applicable):				☐ Downhole				☐ Other (specify)							
Calculated bore volume (L):				# purge volumes removed:				Total purged volume (L):				☒ Retrieved							
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	
11.48		0.15		1.695		30%		3.04		3843		6.62		127.2		28.6		MED TURBIDITY, COLOURLESS, LIGHT BROWN	
11.50		0.50		1.684		30%		1.34		3780		6.71		114.2		28.3		"	
11.52		0.95		1.680		30%		1.09		3793		6.76		107.3		28.4		"	
11.54		1.10		1.680		30%		1.14		3795		6.79		103.3		28.6		"	
11.56		1.50		1.685		30%		1.11		3754		6.80		98.5		28.4		"	
11.58		2.00		1.685		30%		1.11		3710		6.80		95.1		28.5		HIGHTURBIDITY, RED-BROWN, COLOURLESS	
				PTG W = 1.620		PTG @ 2.05 @ 12.04													
ANALYTES SAMPLED FOR:																			
Field Filtered:		Unfiltered:		C		PURPLE WALS		BOTTLES COLLECTED		± 10%		± 3%		± 0.05		± 10 mV		± 0.2 °C	
				3		AMBERS													
				3		GREEN PDS													
QA/QC INFORMATION																			
WQA07 - DUPLICATE WQA08 - TRIPLICATE																			
FIELD COMMENTS																			
Bore volume calculation, bore condition, fate of tubing, redox correction etc.																			
Project Manager Signature				Date				Distribution: Project Central File				Checker Name and Signature				Date			

Bore volume calculation, bore condition, fate of tubing, redox correction etc.

Project Name:		AirServices Australia - Port Hedland International Airport GME		Project Number:		60548717		PM Name:				Sample Date:		27-6-17	
Client:		AirServices Australia		Project Location:		Port Hedland International Airport		Fieldwork Staff:							
GENERAL BORE INFORMATION						PARAMETER INFO.						DECONTAMINATION			
Date of GW Level: 27-6-17						Bore Radius (mm):						☒ Decontaminated			
Depth to GW (m-pvc): 1655						Screen Interval (m):						☒ Dedicated			
Bore Depth (m-pvc): 5.79						Casing Radius (mm): 50						☒ Disposable			
Depth to Product (m-pvc):						Cover Type (Radio/stick up):						☐ Baller			
Product Thickness (m):						Bore Locked (YES/NO):						☐ Peristaltic Pump			
Calculated bore volume (L):						Key Type (if applicable):						☐ Waterra			
# purge volumes removed:						Parameter method:						☐ Other (specify)			
Total purged volume (L):						☒ Downhole						☐ Other (specify)			
☒ Retrieved															
WATER QUALITY PARAMETERS														HYDRASLEEVE INFO.	
Time														Monitoring sequence followed (number in order):	
Cumulative Vol. Removed (L)														Hydrasleeve Size:	
SWL (m-pvc)														Hydrasleeve Type:	
Pump Rate														Sampling Depth (m-pvc):	
DO (ppm or mg/L)														Gauging	
E.C. (mS/cm or µS/cm)														Hydrasleeve in	
pH														Hydrasleeve out	
Redox (mV)														Parameters	
Temp °C															
Odour, Colour, Turbidity															
MOD-HIGH TURBIDITY, RED/ROTON, ODDORLESS															
1333 0.05 1.683 80% 1.86 1484 7.11 101.9 29.4															
1335 0.40 1.690 30% 1.07 1487 7.15 96.7 29.1															
1337 0.50 1.690 30% 0.95 1487 7.15 93.8 29.0															
1339 1.00 1.688 30% 0.88 1489 7.19 90.2 29.2															
1341 1.20 1.688 30% 0.81 1490 7.19 87.8 29.2															
1343 1.85 1.690 30% 0.80 1490 7.18 85.2 29.0															
1345 2.00 1.690 30% 0.84 1495 7.18 83.9 29.0															
DTGW = 1.630 MBTQC(2) B50(6) EOS															
Acceptable Parameter Range:															
ANALYTES SAMPLED FOR:															
BOTTLES COLLECTED															
QA/QC INFORMATION															
Field Filtered:															
Unfiltered:															
2 PURPLE VIALS															
1 GREEN DROS															
1 AMBER															
and Distribution															
Project Manager Signature															
Date															
Distribution: Project Central File															
Checker Name and Signature															
Date															
Bore volume calculation, bore condition, fate of tubing, redox correction etc.															

FOM-5-05-F1 - GROUNDWATER SAMPLING AND PURGING RECORD

Bore ID:

Project Name: AirServices Australia - Port Hedland International Airport GME

Project Number:

G0548717

PM Name:

Sample Date:

27-G-17

Client: AirServices Australia

Project Location:

Port Hedland International Airport Fieldwork Staff:

GENERAL BORE INFORMATION

Date of GW Level: 27-G-17

Depth to GW (m-pvc): 1.725

Bore Depth (m-pvc): 4.801

Depth to Product (m-pvc):

Product Thickness (m):

Calculated bore volume (L):

purge volumes removed:

Total purged volume (L):

Bore Radius (mm):

Screen Interval (m):

Casing Radius (mm):

Cover Type (gate/stick up):

Bore Locked (YES/NO):

Key Type (if applicable):

PARAMETER INFO

Chem Kit Serial No.: 14561920

Chem Kit Model: US PRO PLUS

Corrected Redox: Y / (N)

(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: 2.2

☐ 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 μ S/cm)

pH

Redox (mV)

Temp °C

Odour, Colour, Turbidity

1410

0.25

1.915

30%

0.42

5048

6.99

123.4

30.1

TRANSPARENT, COLOURLESS, ODOURLESS

1412

0.50

1.916

30%

0.36

4971

7.01

114.4

29.9

"

1414

1.00

1.995

30%

0.38

4641

7.02

106.4

29.9

"

1416

1.20

2.003

30%

0.40

4327

6.97

101.7

29.8

"

1419

1.50

2.0450

30%

0.31

4456

6.97

97.0

29.8

"

1420

2.00

2.105

30%

0.30

4554

6.98

92.6

29.8

"

1422

2.20

2.135

30%

0.31

4714

6.97

89.3

30.0

BROWN/RED ODOURLESS, HIGH TURBIDITY

ANALYTES SAMPLED FOR:

Unfiltered:

2 PURPLE VIALS

1 ANBERL

1 CAE44705

BOTTLES COLLECTED

± 10%

± 3%

± 0.05

± 10 mV

± 0.2 °C

QA/QC INFORMATION

FIELD COMMENTS

Bore volume calculation, bore condition, fate of tubing, redox correction etc.

Project Manager Signature

Date

Distribution: Project Central File

Checker Name and Signature

Date

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FQM-5.05-F1 – GROUNDWATER SAMPLING AND PURGING RECORD

TGM-3.03-F1 - GROUNDWATER SAMPLING AND PURGING RECORD					
Project Name:		AirServices Australia - Port Hedland International Airport GME		Bore ID:	
Project Number:		GOS43717			
Client:		AirServices Australia			
Project Location:		Port Hedland International Airport			
GENERAL BORE INFORMATION					
Date of GW Level:	27-6-17	Bore Radius (mm):		PARAMETER INFO.	
Depth to GW (m-pvc):	2115	Screen Interval (m):			
Bore Depth (m-pvc):		Casing Radius (mm):	80		
Depth to Product (m-pvc):		Cover Type (cable/stick up):			
Product Thickness (m):		Bore Locked (YES/NO):			
		Key Type (if applicable):			
Calculated bore volume (L):		# purge volumes removed:			
DECONTAMINATION					
Chem Kit Serial No.:	141019220	Corrected Redox:	Y / N		
Chem Kit Model:	45 PRO PLUS	(The correction to supply is probe dependent)			
☒ Decontaminated		☒ Dedicated			
☒ Disposable		☐ Other (specify)			
☐ Low Flow Pump rate:		☐ Baller			
☒ Intake depth: 2.70		☐ Hydrasleeve			
☐ Waterra		☐ Peristaltic Pump			
☐ Other (specify)		☐ Sampling Start Time:			
HYDRASLEEVE INFO.					
Hydrasleeve Size:		Sampling Depth (m-pvc):		Monitoring sequence followed (number in order):	
Hydrasleeve Type:		Hydrasleeve Insulat time:		Gauging	
Sampling Depth (m-pvc):		Hydrasleeve out Parameters			

[illegible]

Bore volume calculation, bore condition, fate of tubing, redox correction etc.

FIELD COMMENTS

$\pm 10\%$ turbidity (if using a turbidity meter)

FQM-5.05-F1 – GROUNDWATER SAMPLING AND PURGING RECORD

Bore ID:

MM11

GENERAL BORE INFORMATION

PARAMETER INFO				DECONTAMINATION		SAMPLING METHOD		HYDRASLEEVE INFO	
Date of GW Level:	27-6-17	Bore Radius (mm):		☒ Decontaminated	☒ Low Flow: Pump rate:	Hydrasleeve Size:	Monitoring sequence followed (number in order):		
Depth to GW (m-pvc):	1.66	Screen Interval (m):		☒ Dedicated	Intake depth:	Hydrasleeve Type:			
Bore Depth (m-pvc):	3.99	Casing Radius (mm):	50	☒ Disposable	☐ Bailor	☐ Hydrasleeve	Gauging		
Depth to Product (m-pvc):	—	Cover Type (gauge stick up):		☒ Other (specify)	☒ Peristaltic Pump	☐ Waterra			Hydrasleeve in
Product Thickness (m):	—	Bore Locked (YES/NO):			☐ Other (specify)		Hydrasleeve out		
Key Type (if applicable):		Parameter method:	☐ Downhole ☒ Retrieved				Parameters		
Calculated bore volume (L):		# purge volumes removed:		Total purged volume (L):					

WATER QUALITY PARAMETERS

Time	Cumulative Vol. Removed (L)	SW (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
1523	0.10	1.68	55%	2.51	1604	7.72	74.1	29.3	HIGH TURBIDITY, ODOORLESS, RED-BROWN
1526	0.40	1.695	55%	1.79	1948	7.41	84.3	29.1	
1528	0.60	1.725	55%	1.68	1941	7.41	83.0	29.0	
1530	0.85	1.705	55%	1.48	1956	7.36	82.8	28.9	
1532	1.05	1.71	55%	1.61	1977	7.33	83.7	28.5	" "
1534	1.40	1.74	55%	2.03	1913	7.35	84.1	29.0	
1536	1.60	1.76	55%	1.70	2113	7.34	85.8	29.3	
1538	2.00		75%	1.60	2370	7.34	85.5	29.4	
	OTCW =	1.70	mgDC	@ 6000	545				ODOR/COLORLESS, HIGH TURBIDITY, ODOORLESS

Acceptable Parameter Range:		±10%	±5%	±0.05	±10 mV	±0.2 °C	±10% turbidity (if using a turbidity meter)
ANALYTES SAMPLED FOR:							
BOTTLES COLLECTED							
QA/QC INFORMATION							
Field Filtered:	Unfiltered:	FIELD COMMENTS					

					Bore volume calculation, bore condition, fate of tubing, redox correction etc.
✓	FURPLE VIALS				
✓	AUTBERL				
✓	GREY PFDOS				

[illegible]

Project Manager Signature	Date	Client Representative Signature	Date

FGM-5.05-F1 - GROUNDWATER SAMPLING AND PURGING RECORD

Bore ID:

Project Name: AirServices Australia - Port Hedland International Airport GME

Client: AirServices Australia

Project Number:

60543717

PM Name:

Sample Date:

27-6-17

Project Location: Port Hedland International Airport

Fieldwork Staff:

GENERAL BORE INFORMATION

MW07

Date of GW Level: 27-6-17

Depth to GW (m-pvc): 1.335

Bore Depth (m-pvc): 3.99

Depth to Product (m-pvc):

Product Thickness (m):

Calculated bore volume (L):

purge volumes removed:

Total purged volume (L):

Key Type (if applicable):

Parameter method:

Retrieved

Other (specify):

Other (specify):

Other (specify):

Other (specify):

Other (specify):

Other (specify):

Other (specify):

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Other (specify):

Other (specify):

Other (specify):

MW07

Hydrasleeve Size:

Hydrasleeve Type:

Sampling Depth (m-pvc):

Hydrasleeve Install Date:

Sampling Start Time:

Hydrasleeve in order:

Hydrasleeve in order:

Hydrasleeve in order:

Hydrasleeve in order:

Hydrasleeve in order:

Hydrasleeve in order:

Hydrasleeve in order:

Hydrasleeve in order:

Hydrasleeve in order:

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Hydrasleeve in order:

Hydrasleeve in order:

Hydrasleeve in order:

Hydrasleeve in order:

Hydrasleeve in order:

Hydrasleeve in order:

ANALYTES SAMPLED FOR:

Unfiltered:

6 PURPLE VIALS

4 AMBER

4 AMBER

4 AMBER

4 AMBER

4 AMBER

4 AMBER

4 AMBER

4 AMBER

4 AMBER

4 AMBER

4 AMBER

4 AMBER

4 AMBER

4 AMBER

4 AMBER

Acceptable Parameter Range:

± 10%

± 3%

± 0.05

± 10 mV

± 0.2 °C

± 10% turbidity (if using a turbidity meter)

FIELD COMMENTS

Bore volume calculation, bore condition, fate of tubing, redox correction etc.

MAJOR WAIRIO 1X EXTRA AMBER 1X EXTRA AMBER PROS

MAJOR WAIRIO 1X EXTRA AMBER 1X EXTRA AMBER PROS

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ANALYTES SAMPLED FOR:

Unfiltered:

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Unfiltered:

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ANALYTES SAMPLED FOR:

Unfiltered:

6 PURPLE VIALS

4 AMBER

Appendix L

Field Quality Control Data

Table L1. Field QA/QC Data - Soil Samples

			SS17_0.5							SS18_0.1							SS19_0.5						
SDG		EP1706611	EP1706611		551304				EP1706611	EP1706611		551304				EP1706611	EP1706611		551304				
Field ID		SS17_0.5_180617	SSQA012_180617	RPD	SSQA012_180617	RPD			SS18_0.1_180617	SSQA018_180617	RPD	SSQA019_180617 (SS18_0.5)	RPD			SS19_0.5_180617	SSQA020_180617	RPD	SSQA021_180617 (SS19_0.5)	RPD			
Sample Type		Primary	Duplicate		Triplicate				Primary	Duplicate		Triplicate				Primary	Duplicate		Triplicate				
Smiple Date		18/06/2017	18/06/2017		18/06/2017				18/06/2017	18/06/2017		18/06/2017				18/06/2017	18/06/2017		18/06/2017				
Analyte G	Analyte	Unit	LOR																				
Per- and Polyfluoroalkyl Subst	Sum of PFAS	mg/kg	0.0002	0.11	0.116	5	-	-	5.73	9.63	51%	-	-	-	-	0.673	0.68	1%	-	-	-	-	
	Sum of PFAS (WA DER List)	mg/kg	0.0002	0.106	0.114	7	-	-	4.97	9.47	62%	-	-	-	-	0.618	0.644	4%	-	-	-	-	
	Sum of PFHxS and PFOS	mg/kg	0.0002	0.104	0.112	7	-	-	4.72	9.17	64%	-	-	-	-	0.614	0.621	1%	-	-	-	-	
	10:2 FTS	mg/kg	0.0005 : 0.005 (Interlab)	<0.0005	<0.0005	-	<0.005	0	0.0019	<0.0005	-	<0.005	-	-	-	<0.0005	<0.0005	-	<0.005	-	-	-	
	N-Methyl perfluorooctane sulfonate	mg/kg	0.0002 : 0.01 (Interlab)	<0.0002	<0.0002	-	<0.01	0	<0.0005	<0.0005	-	<0.01	-	-	-	<0.0002	<0.0002	-	<0.01	-	-	-	
	PFPeS	mg/kg	0.0002 : 0.005 (Interlab)	0.0002	0.0002	0%	<0.005	0	<0.0005	<0.0005	-	<0.005	-	-	-	<0.0002	0.0002	-	<0.005	-	-	-	
	PFHpS	mg/kg	0.0002 : 0.005 (Interlab)	0.0004	0.0002	67%	<0.005	0	0.0008	<0.0005	-	<0.005	-	-	-	0.0009	0.003	108%	<0.005	-	-	-	
	PFHxS	mg/kg	0.0002 : 0.005 (Interlab)	0.0016	0.0015	6	<0.005	0	0.0037	0.0009	122%	0.0061	49%	-	-	0.002	0.0082	122%	<0.005	-	-	-	
	N-Ethyl perfluorooctane sulfonate	mg/kg	0.0002 : 0.01 (Interlab)	<0.0002	<0.0002	-	<0.01	0	<0.0005	<0.0005	-	<0.01	-	-	-	<0.0002	<0.0002	-	<0.01	-	-	-	
	6:2 FTS	mg/kg	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	-	<0.01	0	<0.0005	<0.0005	-	<0.01	-	-	-	<0.0005	<0.0005	-	<0.01	-	-	-	
Surfactants	PFOA	mg/kg	0.0002 : 0.005 (Interlab)	0.0009	0.0008	12%	<0.005	0	0.0055	0.0015	114%	<0.005	-	-	-	0.0034	0.0211	144%	<0.005	-	-	-	
	PFOS	mg/kg	0.0002 : 0.005 (Interlab)	0.102	0.11	8%	0.066	8%	4.72	9.17	64%	9.5	67%	-	-	0.612	0.613	0%	0.51	18%			
	4:2 FTS	mg/kg	0.0005 : 0.005 (Interlab)	<0.0005	<0.0005	-	<0.005	0	<0.0005	<0.0005	-	<0.005	-	-	-	<0.0005	<0.0005	-	<0.005	-	-	-	
Organic	PFBA	mg/kg	0.001 : 0.005 (Interlab)	<0.001	<0.001	-	<0.005	0	<0.001	<0.001	-	<0.005	-	-	-	<0.001	<0.001	-	<0.005	-	-	-	
	PFPeA	mg/kg	0.0002 : 0.005 (Interlab)	<0.0002	<0.0002	-	<0.005	0	<0.0005	<0.0005	-	<0.005	-	-	-	<0.0002	<0.0002	-	<0.005	-	-	-	
	8:2 FTS	mg/kg	0.0005 : 0.005 (Interlab)	0.0009	0.0006	40%	<0.005	0	0.234	0.3	25%	0.052	127%	-	-	<0.0005	<0.0005	-	<0.005	-	-	-	
Perfluorinated Compounds (PFCs)	N-Me-FOSA	mg/kg	0.0005 : 0.005 (Interlab)	<0.0005	<0.0005	-	<0.005	0	0.0126	<0.0012	-	<0.005	-	-	-	<0.0005	<0.0005	-	<0.005	-	-	-	
	N-Me-FOSE	mg/kg	0.0005 : 0.005 (Interlab)	<0.0005	<0.0005	-	<0.005	0	<0.0012	<0.0012	-	<0.005	-	-	-	<0.0005	<0.0005	-	<0.005	-	-	-	
	FOSA	mg/kg	0.0002 : 0.005 (Interlab)	0.0003	0.0003	0%	<0.005	0	0.513	0.0987	135%	0.063	156%	-	-	0.0066	0.0058	13%	<0.005	-	-	-	
	PFBS	mg/kg	0.0002 : 0.005 (Interlab)	<0.0002	<0.0002	-	<0.005	0	<0.0005	<0.0005	-	<0.005	-	-	-	<0.0002	<0.0002	-	<0.005	-	-	-	
	PFDS	mg/kg	0.0002 : 0.005 (Interlab)	0.0014	0.0011	24%	<0.005	0	0.216	0.0408	136%	0.021	165%	-	-	0.0445	0.0252	55%	0.015	99%			
	PFTeDA	mg/kg	0.0005 : 0.005 (Interlab)	<0.0005	<0.0005	-	<0.005	0	<0.0012	<0.0012	-	<0.005	-	-	-	<0.0005	<0.0005	-	<0.005	-	-	-	
	PFTrDA	mg/kg	0.0002 : 0.005 (Interlab)	<0.0002	<0.0002	-	<0.005	0	<0.0005	<0.0005	-	<0.005	-	-	-	<0.0002	<0.0002	-	<0.005	-	-	-	
	N-Et-FOSA	mg/kg	0.0005 : 0.005 (Interlab)	<0.0005	<0.0005	-	<0.005	0	<0.0012	<0.0012	-	<0.005	-	-	-	<0.0005	<0.0005	-	<0.005	-	-	-	
	PFDoA	mg/kg	0.0002 : 0.005 (Interlab)	0.0005	0.0004	22%	<0.005	0	0.0195	0.0144	30%	<0.005	-	-	-	0.0016	0.0011	37%	<0.005	-	-	-	
	PFHpA	mg/kg	0.0002 : 0.005 (Interlab)	<0.0002	<0.0002	-	<0.005	0	0.0008	0.0007	13%	<0.005	-	-	-	<0.0002	0.0003	-	<0.005	-	-	-	
	PFHxA	mg/kg	0.0002 : 0.005 (Interlab)	0.0008	0.0007	13%	<0.005	0	0.0023	0.0013	56%	<0.005	-	-	-	0.0002	0.0011	138%	<0.005	-	-	-	
	N-Et-FOSE	mg/kg	0.0005 : 0.005 (Interlab)	<0.0005	<0.0005	-	<0.005	0	<0.0012	<0.0012	-	<0.005	-	-	-	<0.0005	<0.0005	-	<0.005	-	-	-	
	PFDoA	mg/kg	0.0002 : 0.005 (Interlab)	<0.0002	<0.0002	-	<0.005	0	<0.0005	<0.0005	-	<0.005	-	-	-	0.0002	<0.0002	-	<0.005	-	-	-	
	PFNA	mg/kg	0.0002 : 0.005 (Interlab)	0.0007	0.0006	15%	<0.005	0	<0.0005	<0.0005	-	<0.005	-	-	-	0.0008	0.0008	0%	<0.005	-	-	-	
	PFUnA	mg/kg	0.0002 : 0.005 (Interlab)	<0.0002	<0.0002	-	<0.005	0	0.0034	0.0009	116%	<0.005	-	-	-	0.0009	0.0004	77%	<0.005	-	-	-	

Legend

*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

mg/kg = milligrams per kilogram

Table L2. Field QA/QC Data - Sediment Samples

SDG	EP1707075	EP1707075	RPD	EP1707075	RPD
Sample	SED01_280617	SEDQA01_280617		SEDQA02_280617	
Sample Type	Primary	Duplicate		Triplicate	
Sample Date	28/06/2017	28/06/2017		28/06/2017	

Analyte Group	Analyte	Unit	LOR					
Per- and Polyfluoroalkyl Subst	Sum of PFAS	mg/kg	0.0002	-	-	-	-	-
	Sum of PFAS (WA DER List)	mg/kg	0.0002	0.023	0.0349	41%	0.0302	27%
	Sum of PFHxS and PFOS	mg/kg	0.0002	0.0219	0.0337	42%	0.0291	28%
	10:2 FTS	mg/kg	0.0005 : 0.005 (Interlab)	<0.0005	<0.0005	0	<0.0005	0
	N-Methyl perfluorooctane sulfonamidoacetic acid (M	mg/kg	0.0002 : 0.01 (Interlab)	-	-	-	-	-
	PFPeS	mg/kg	0.0002 : 0.005 (Interlab)	-	-	-	-	-
	PFHpS	mg/kg	0.0002 : 0.005 (Interlab)	-	-	-	-	-
	PFHxS	mg/kg	0.0002 : 0.005 (Interlab)	0.0045	0.0048	6%	0.0045	0
Surfactants	N-Ethyl perfluorooctane	mg/kg	0.0002 : 0.01 (Interlab)	-	-	-	-	-
	6:2 FTS	mg/kg	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	-	<0.0005	-
	PFOA	mg/kg	0.0002 : 0.005 (Interlab)	<0.0002	0.0002	-	0.0002	-
Organic	PFOS	mg/kg	0.0002 : 0.005 (Interlab)	0.0174	0.0289	50%	0.0246	34%
	4:2 FTS	mg/kg	0.0005 : 0.005 (Interlab)	<0.0005	<0.0005	-	<0.0005	-
	PFBA	mg/kg	0.001 : 0.005 (Interlab)	<0.001	<0.001	-	<0.001	-
Perfluorinated Compounds (PFCs)	PFPeA	mg/kg	0.0002 : 0.005 (Interlab)	<0.0002	<0.0002	-	<0.0002	-
	8:2 FTS	mg/kg	0.0005 : 0.005 (Interlab)	<0.0005	<0.0005	-	<0.0005	-
	N-Me-FOSA	mg/kg	0.0005 : 0.005 (Interlab)	-	-	-	-	-
	N-Me-FOSE	mg/kg	0.0005 : 0.005 (Interlab)	-	-	-	-	-
	FOSA	mg/kg	0.0002 : 0.005 (Interlab)	-	-	-	-	-
	PFBS	mg/kg	0.0002 : 0.005 (Interlab)	0.0005	0.0004	22%	0.0003	50%
	PFDS	mg/kg	0.0002 : 0.005 (Interlab)	-	-	-	-	-
	PFTeDA	mg/kg	0.0005 : 0.005 (Interlab)	-	-	-	-	-
	PFTrDA	mg/kg	0.0002 : 0.005 (Interlab)	-	-	-	-	-
	N-Et-FOSA	mg/kg	0.0005 : 0.005 (Interlab)	-	-	-	-	-
	PFDoA	mg/kg	0.0002 : 0.005 (Interlab)	-	-	-	-	-
	PFHpA	mg/kg	0.0002 : 0.005 (Interlab)	<0.0002	<0.0002	-	<0.0002	-
	PFHxA	mg/kg	0.0002 : 0.005 (Interlab)	0.0006	0.0006	0%	0.0006	0%
	N-Et-FOSE	mg/kg	0.0005 : 0.005 (Interlab)	-	-	-	-	-
	PFDoA	mg/kg	0.0002 : 0.005 (Interlab)	-	-	-	-	-
	PFNA	mg/kg	0.0002 : 0.005 (Interlab)	-	-	-	-	-
	PFUnA	mg/kg	0.0002 : 0.005 (Interlab)	-	-	-	-	-

Legend
*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
mg/kg = milligrams per kilogram

Table L3. Field QA/QC Data - PFAS Water Samples

				MW3A					MW14					MW07				
SDG		EP1707075	EP1707075	RPD		552887	RPD		EP1707075	EP1707075		552887	RPD		EP1707075	EP1707075		552887
Field ID		MW3A 270617	WQA03 270717			WQA010 270617			MW014 270617	WQA07 270617		QA08 2706			MW07 270617	WQA09 270617		QA04 2706
Sample Type		Primary	Duplicate			Triplicate			Priamry	Duplicate		Triplicate			Primary	Duplicate		Triplicate
Sample Date		27/06/2017	27/06/2017			27/06/2017			27/06/2017	27/06/2017		27/06/2017			27/06/2017	27/06/2017		27/06/2017

Analyte	Analyte	Units	LOR															
Per- and Polyfluoroalkyl Subst	Sum of PFAS (WA DER List)	µg/L	0.01	252	205	20.6%	-	-	4970	4050	20.4%	-	-	7140	6420	11	-	-
	Sum of PFHxS and PFOS	µg/L	0.01	199	163	19.9%	-	-	4610	3690	22.2%	-	-	5600	4920	13	-	-
	10:2 FTS	µg/L	0.05 : 0.01 (Interlab)	<0.1	<0.05	-	<0.2	-	<0.1	<0.05	-	<5	-	<1	<0.05	0	<5	-
	PFHxS	µg/L	0.02 : 0.01 (Interlab)	85.9	60.4	34.9%	39	101.1%	2490	1860	29.0%	1400	75.8%	2190	2070	6	1600	40.2%
Surfactants	6:2 FTS	µg/L	0.05	<0.1	0.1	-	<0.2	-	0.1	0.12	18.2%	<5	-	<1	0.2	0	<5	-
	PFOA	µg/L	0.01	4.2	3.2	29.5%	2.1	87.5%	144	126	13.3%	80	73.1%	153	118	26	92	62.8%
	PFOS	µg/L	0.01	113.0	103.0	9.3%	67	65.0%	2120	1830	14.7%	1300	62.5%	3410	2850	18	2300	51.8%
	4:2 FTS	ng/L	50 : 10 (Interlab)	<100	<50	-	<200	-	<100	<50	-	<5000	-	<1000	<50	0	<5000	-
Organic	PFBA	mg/L	0.0001 : 5e-005 (Interlab)	0.0038	0.0025	41.3%	0.0016	2.1%	0.0113	0.0256	78	0.0061	0.03%	0.0422	0.0567	29	0.046	0.1%
	PFPeA	ng/L	20 : 10 (Interlab)	4740.0	4170.0	12.8%	3700	33.0%	15500	26400	52	14000	10.7%	122000	132000	8	98000	27.3%
	8:2 FTS	µg/L	0.05 : 0.01 (Interlab)	<0.1	<0.05	-	<0.2	-	<0.1	<0.05	-	<5	-	<1	0.06	0	<5	-
Perfluorinated Compounds (PFCs)	PFBS	µg/L	0.02 : 0.01 (Interlab)	12.9	11.5	11.5%	6.9	76.4%	52.3	53.5	2.3%	30	65.7%	316	328	4	200	54.7%
	PFHpA	µg/L	0.02 : 0.01 (Interlab)	1.85	1.42	26.3%	1.1	64.8%	17.3	13.4	25.4%	17	2.5%	68.7	57.8	17	48	43.2%
	PFHxA	µg/L	0.02 : 0.01 (Interlab)	25.5	19.1	28.7%	17	54.9%	122	116	5.0%	89	40.4%	839	804	4	690	25.5%

*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 L4. Field QA/QC Data - Hydrocarbon Water Samples

				MW3A					MW14					MW07				
SDG	EP1707075	EP1707075	RPD	552887	RPD	EP1707075	EP1707075	RPD	552887	RPD	EP1707075	EP1707075	RPD	552887	RPD	EP1707075	EP1707075	RPD
Field ID	MW3A 270617	WQA03 270717		WQA04 270617		MW014 270617	WQA07 270617		QA08 2706		MW07 270617	WQA09 270617		WQA010 270617		MW07 270617	WQA09 270617	
Sample Type	Primary	Duplicate		Triplicate		Primary	Duplicate		Triplicate		Primary	Duplicate		Triplicate		Primary	Duplicate	
Smample Date	27/06/2017	27/06/2017		27/06/2017		27/06/2017	27/06/2017		27/06/2017		27/06/2017	27/06/2017		27/06/2017		27/06/2017	27/06/2017	
Analyte	Analyte	Units	LOR															
Total Recoverable Hydrocarbons	C6-C10 fraction	µg/L	20	<20	<20	-	<20	-	<20	<20	-	<20	-	<20	<20	-	<20	-
	C6-C10 fraction (minus BTEX)(F1)	µg/L	20	<20	<20	-	<20	-	<20	<20	-	<20	-	<20	<20	-	<20	-
	>C10-C16 fraction	µg/L	100 : 50 (Interlab)	<100	<100	-	<50	-	<100	<100	-	<50	-	<100	<100	-	<50	-
	>C10-C16 (minus Naphthalene)(F2)	µg/L	100 : 50 (Interlab)	<100	<100	-	<50	-	<100	<100	-	<50	-	<100	<100	-	<50	-
	>C16-C34 fraction	µg/L	100	180	160	11.8%	<100	-	<100	<100	-	<100	-	<100	<100	-	<100	-
	>C34-C40 fraction	µg/L	100	<100	<100	-	<100	-	<100	<100	-	<100	-	<100	<100	-	<100	-
	>C10-C40 fraction (sum)	µg/L	100	180	160	11.8%			<100	<100	-			<100	<100	-		
BTEXN	Benzene	µg/L	1	<1	<1	-	<1	-	<1	<1	-	<1	-	<1	<1	-	<1	-
	Toluene	µg/L	2 : 1 (Interlab)	<2	<2	-	<1	-	<2	<2	-	<1	-	<2	<2	-	<1	-
	Ethylbenzene	µg/L	2 : 1 (Interlab)	<2	<2	-	<1	-	<2	<2	-	<1	-	<2	<2	-	<1	-
	m&p-Xylene	µg/L	2	<2	<2	-	<2	-	<2	<2	-	<2	-	<2	<2	-	<2	-
	o-Xylene	µg/L	2 : 1 (Interlab)	<2	<2	-	<1	-	<2	<2	-	<1	-	<2	<2	-	<1	-
	Total Xylenes	µg/L	2 : 3 (Interlab)	<2	<2	-	<3	-	<2	<2	-	<3	-	<2	<2	-	<3	-
	Total BTEX	µg/L	1	<1	<1	-			<1	<1	-			<1	<1	-		
	Naphthalene (VOC)	µg/L	5 : 10 (Interlab)	<5	<5	-	<10	-	<5	<5	-	<10	-	<5	<5	-	<10	-

*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 L5. Field QA/QC Data - PFAS Rinsate Samples

Port Hedland Airport
Preliminary Site Investigation and Limited Sampling
Airservices Australia

SDG	EP1707075	EP1707075	EP1707075	EP1707075
Sample ID	WQA01 260617	WQA05 270617	WQA02 260617	WQA06 270617
Sample Date	26/06/2017	27/06/2017	26/06/2017	27/06/2017
Sample Type	Field Blank	Field Blank	Rinsate	Rinsate

Analyte Group	Analyte	Units	LOR				
Organic	4:2 FTS	ng/L	50	<50	<50	<50	<50
	PFBA	mg/L	0.0001	<0.0001	<0.0001	<0.0001	<0.0001
	PFPeA	ng/L	20	<20	<20	<20	<20
Per- and Polyfluoroalkyl Subst	Sum of PFAS (WA DER List)	µg/L	0.01	<0.01	<0.01	4.27	0.03
	Sum of PFHxS and PFOS	µg/L	0.01	<0.01	<0.01	4.24	0.03
	10:2 FTS	µg/L	0.05	<0.05	<0.05	<0.05	<0.05
	PFHxS	µg/L	0.02	<0.02	<0.02	0.06	<0.02
Perfluorinated Compounds (PFCs)	8:2 FTS	µg/L	0.05	<0.05	<0.05	<0.05	<0.05
	PFBS	µg/L	0.02	<0.02	<0.02	<0.02	<0.02
	PFHpA	µg/L	0.02	<0.02	<0.02	<0.02	<0.02
	PFHxA	µg/L	0.02	<0.02	<0.02	0.03	<0.02
Surfactants	6:2 FTS	µg/L	0.05	<0.05	<0.05	<0.05	<0.05
	PFOA	µg/L	0.01	<0.01	<0.01	<0.01	<0.01
	PFOS	µg/L	0.01	<0.01	<0.01	4.18	0.03

Table L6. Field QA/QC Data - Hydrocarbon Rinsate Samples

Port Hedland Airport
Preliminary Site Investigation and Limited Sampling
Airservices Australia

SDG	EP1707075	EP1707075	EP1707075	EP1707075
Smample ID	WQA01_260617	WQA05_270617	WQA02_260617	WQA06_270617
Sample Date	26/06/2017	27/06/2017	26/06/2017	27/06/2017
Sample Type	Field Blank	Field Blank	Rinsate	Rinsate

Analyte Group	Analyte	Units	LOR				
BTEXN	Benzene	µg/L	1	<1	<1	<1	<1
	Toluene	µg/L	2	<2	<2	<2	<2
	Ethylbenzene	µg/L	2	<2	<2	<2	<2
	m&p-Xylene	µg/L	2	<2	<2	<2	<2
	o-Xylene	µg/L	2	<2	<2	<2	<2
	Total Xylenes	µg/L	2	<2	<2	<2	<2
	Total BTEX	µg/L	1	<1	<1	<1	<1
	Naphthalene (VOC)	µg/L	5	<5	<5	<5	<5
TRH	C6-C10 fraction	µg/L	20	<20	<20	<20	<20
	C6-C10 fraction (minus BTEX)(F1)	µg/L	20	<20	<20	<20	<20
	>C10-C16 fraction	µg/L	100	<100	<100	<100	<100
	>C10-C16 (minus Naphthalene)(F2)	µg/L	100	<100	<100	<100	<100
	>C16-C34 fraction	µg/L	100	<100	<100	<100	<100
	>C34-C40 fraction	µg/L	100	<100	<100	<100	<100
	>C10-C40 fraction (sum)	µg/L	100	<100	<100	<100	<100

Appendix M

Laboratory
Documentation

CERTIFICATE OF ANALYSIS

Work Order : **EP1707075**
Client : **AECOM Australia Pty Ltd**
Contact : [REDACTED]
[REDACTED]
Telephone : [REDACTED]
Project : **60543717 Port Hedland Airport Limited Investigation**
Order number : **60543717**
C-O-C number : [REDACTED]
Sampler : [REDACTED]
Site : [REDACTED]
Quote number : **EP/541/17**
No. of samples received : **39**
No. of samples analysed : **39**

Page : **1 of 21**
Laboratory : **Environmental Division Perth**
Contact : [REDACTED]
Telephone : [REDACTED]
Date Samples Received : **03-Jul-2017 15:12**
Date Analysis Commenced : **05-Jul-2017**
Issue Date : **13-Jul-2017 13:33**



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





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 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 to high conductivity . LOR values have been adjusted accordingly.



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SED01_280617	SED02_280617	SED03_280617	SED04_280617	SEDQA01_280617
Client sampling date / time					28-Jun-2017 00:00	28-Jun-2017 00:00	28-Jun-2017 00:00	28-Jun-2017 00:00	28-Jun-2017 00:00
Compound	CAS Number	LOR	Unit		EP1707075-029	EP1707075-030	EP1707075-031	EP1707075-033	EP1707075-036
					Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1	%		14.4	12.9	15.9	30.8	12.9
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		0.0005	0.0016	0.0029	0.0020	0.0004
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg		0.0045	0.0261	0.0641	0.0294	0.0048
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg		0.0174	0.134	0.329	0.265	0.0289
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg		<0.001	<0.001	<0.001	<0.001	<0.001



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SED01_280617	SED02_280617	SED03_280617	SED04_280617	SEDQA01_280617
Client sampling date / time					28-Jun-2017 00:00	28-Jun-2017 00:00	28-Jun-2017 00:00	28-Jun-2017 00:00	28-Jun-2017 00:00
Compound	CAS Number	LOR	Unit		EP1707075-029	EP1707075-030	EP1707075-031	EP1707075-033	EP1707075-036
				Result	Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	0.0006	0.0036	0.0078	0.0046	0.0006	0.0006
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0005	0.0018	<0.0005	<0.0002	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.0024	0.0088	0.0039	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	<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	<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	<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	<0.0005
EP231P: PFAS Sums									
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	0.0219	0.160	0.393	0.294	0.0337	0.0337
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	0.0230	0.168	0.414	0.305	0.0349	0.0349
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	0.2	%	85.6	79.6	88.6	76.6	93.3	93.3
Toluene-D8	2037-26-5	0.2	%	89.7	78.3	88.9	89.4	94.1	94.1
4-Bromofluorobenzene	460-00-4	0.2	%	93.4	82.6	92.6	96.8	98.9	98.9
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%	105	101	90.1	94.3	91.0	91.0



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SEDQA02_280617	TBS289_280617	----	----	----
Client sampling date / time					28-Jun-2017 00:00	08-Jun-2017 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EP1707075-037	EP1707075-039	-----	-----	-----
				Result	Result		----	----	----
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1	%		14.1	3.4	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<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	<10	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<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	<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		0.0003	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg		0.0045	----	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg		0.0246	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg		<0.001	----	----	----	----



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SEDQA02_280617	TBS289_280617	----	----	----
Client sampling date / time					28-Jun-2017 00:00	08-Jun-2017 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EP1707075-037	EP1707075-039	-----	-----	-----
				Result	Result		----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg		0.0006	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg		0.0002	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	----	----	----	----
EP231P: PFAS Sums									
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		0.0291	----	----	----	----
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		0.0302	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	0.2	%		90.1	97.3	----	----	----
Toluene-D8	2037-26-5	0.2	%		87.2	95.2	----	----	----
4-Bromofluorobenzene	460-00-4	0.2	%		92.7	91.9	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		117	----	----	----	----



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Client sample ID

				MW06_260617	MW05_260617	MW04_260617	MW09_260617	MW03_260617
Client sampling date / time				26-Jun-2017 00:00	26-Jun-2017 00:00	26-Jun-2017 00:00	26-Jun-2017 00:00	26-Jun-2017 00:00
Compound	CAS Number	LOR	Unit	EP1707075-001	EP1707075-002	EP1707075-003	EP1707075-004	EP1707075-005
				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	<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	81.3	118	5.81	42.9	83.0
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	1090	979	182	490	990
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	512	1630	152	300	28800
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	11.6	14.2	1.0	8.5	86.0
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	19.8	30.0	1.06	29.1	<10.0
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	169	184	12.4	136	370



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MW06_260617	MW05_260617	MW04_260617	MW09_260617	MW03_260617
Client sampling date / time					26-Jun-2017 00:00	26-Jun-2017 00:00	26-Jun-2017 00:00	26-Jun-2017 00:00	26-Jun-2017 00:00
Compound	CAS Number	LOR	Unit		EP1707075-001	EP1707075-002	EP1707075-003	EP1707075-004	EP1707075-005
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		12.3	14.7	2.96	17.0	23.0
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		36.0	47.9	7.28	68.6	97.0
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.10	<1.00	<0.10	<0.10	<10.0
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.10	<1.00	0.19	0.82	<10.0
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.10	<1.00	<0.10	0.12	<10.0
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.10	<1.00	<0.10	<0.10	<10.0
EP231P: PFAS Sums									
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		1600	2610	334	790	29800
Sum of PFAS (WA DER List)	----	0.01	µg/L		1930	3020	365	1090	30400
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%		95.8	92.0	83.4	97.5	108
Toluene-D8	2037-26-5	2	%		119	120	105	112	101
4-Bromofluorobenzene	460-00-4	2	%		116	126	116	126	126
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		115	110	120	125	123



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Client sample ID

				MW010_260617	MW08_260617	A1-MW23_270617	MW3A_270617	A1-MW22_270617
Client sampling date / time				26-Jun-2017 00:00	26-Jun-2017 00:00	27-Jun-2017 00:00	27-Jun-2017 00:00	27-Jun-2017 00:00
Compound	CAS Number	LOR	Unit	EP1707075-006	EP1707075-007	EP1707075-008	EP1707075-009	EP1707075-010
				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	100
C15 - C28 Fraction	----	100	µg/L	<100	<100	<100	160	300
C29 - C36 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	<50	160	400
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	180
>C16 - C34 Fraction	----	100	µg/L	<100	<100	<100	180	240
>C34 - C40 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	<100	<100	180	420
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	<100	<100	<100	180
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	74.6	24.0	24.3	12.9	0.68
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	924	579	217	85.9	5.08
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	2740	437	540	113	6.40
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	37.6	5.4	7.2	3.8	<0.2
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	79.9	12.7	12.5	4.74	<0.05
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	584	91.8	76.6	25.5	0.42



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MW010_260617	MW08_260617	A1-MW23_270617	MW3A_270617	A1-MW22_270617
Client sampling date / time					26-Jun-2017 00:00	26-Jun-2017 00:00	27-Jun-2017 00:00	27-Jun-2017 00:00	27-Jun-2017 00:00
Compound	CAS Number	LOR	Unit		EP1707075-006	EP1707075-007	EP1707075-008	EP1707075-009	EP1707075-010
				Result	Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		72.6	9.21	8.11	1.85	0.06
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		132	36.1	19.8	4.24	0.16
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<1.00	<0.10	<0.10	<0.10	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		1.60	0.66	0.11	<0.10	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<1.00	<0.10	<0.10	<0.10	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<1.00	<0.10	<0.10	<0.10	<0.05
EP231P: PFAS Sums									
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		3660	1020	757	199	11.5
Sum of PFAS (WA DER List)	----	0.01	µg/L		4650	1200	906	252	12.8
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%		83.9	98.4	79.6	104	91.0
Toluene-D8	2037-26-5	2	%		106	103	99.7	113	101
4-Bromofluorobenzene	460-00-4	2	%		108	114	112	121	116
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		122	119	123	127	107



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Client sample ID

				MW3B_270617	MW3C_270617	MW015_270617	MW014_270617	MW012_270617
Client sampling date / time				27-Jun-2017 00:00	27-Jun-2017 00:00	27-Jun-2017 00:00	27-Jun-2017 00:00	27-Jun-2017 00:00
Compound	CAS Number	LOR	Unit	EP1707075-011	EP1707075-012	EP1707075-013	EP1707075-014	EP1707075-015
				Result	Result	Result	Result	Result
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	----	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L	<50	----	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L	290	----	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L	100	----	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L	390	----	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	----	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	----	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L	<100	----	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L	350	----	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L	<100	----	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L	350	----	<100	<100	<100
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	----	<100	<100	<100
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	----	<1	<1	<1
Toluene	108-88-3	2	µg/L	<2	----	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L	<2	----	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	----	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L	<2	----	<2	<2	<2
^ Total Xylenes	1330-20-7	2	µg/L	<2	----	<2	<2	<2
^ Sum of BTEX	----	1	µg/L	<1	----	<1	<1	<1
Naphthalene	91-20-3	5	µg/L	<5	----	<5	<5	<5
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	134	15.3	1.30	52.3	1.14
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	983	133	68.2	2490	12.6
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	696	68.3	7180	2120	101
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	18.8	2.5	<5.0	11.3	1.5
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	40.4	3.54	<1.00	15.5	1.19
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	242	27.0	10.2	122	2.29



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MW3B_270617	MW3C_270617	MW015_270617	MW014_270617	MW012_270617
Client sampling date / time					27-Jun-2017 00:00	27-Jun-2017 00:00	27-Jun-2017 00:00	27-Jun-2017 00:00	27-Jun-2017 00:00
Compound	CAS Number	LOR	Unit		EP1707075-011	EP1707075-012	EP1707075-013	EP1707075-014	EP1707075-015
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		23.4	2.72	<1.00	17.3	0.22
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		60.3	6.09	10.4	144	0.99
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.10	<0.10	<1.00	<0.10	<0.10
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.10	<0.10	<1.00	0.10	<0.10
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.10	<0.10	<1.00	<0.10	<0.10
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.10	<0.10	<1.00	<0.10	<0.10
EP231P: PFAS Sums									
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		1680	201	7250	4610	114
Sum of PFAS (WA DER List)	----	0.01	µg/L		2200	258	7270	4970	121
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%		83.9	----	79.3	83.5	82.3
Toluene-D8	2037-26-5	2	%		108	----	93.0	101	99.8
4-Bromofluorobenzene	460-00-4	2	%		107	----	106	116	105
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		120	126	113	114	105



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Client sample ID

				MW01_270617	MW013_270617	MW02_270617	MW011_270617	MW07_270617
Client sampling date / time				27-Jun-2017 00:00	27-Jun-2017 00:00	27-Jun-2017 00:00	27-Jun-2017 00:00	27-Jun-2017 00:00
Compound	CAS Number	LOR	Unit	EP1707075-016	EP1707075-017	EP1707075-018	EP1707075-019	EP1707075-020
				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	70	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L	<100	390	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	460	<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	160	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L	<100	330	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	490	<100	<100	<100
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	160	<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	2.52	47.4	5.04	5.36	316
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	80.1	2330	53.6	69.3	2190
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	548	1350	1.45	1.70	3410
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.5	7.7	<0.2	<0.5	42.2
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.61	13.1	1.04	0.92	122
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	5.80	89.1	7.54	8.04	839



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MW01_270617	MW013_270617	MW02_270617	MW011_270617	MW07_270617
Client sampling date / time					27-Jun-2017 00:00	27-Jun-2017 00:00	27-Jun-2017 00:00	27-Jun-2017 00:00	27-Jun-2017 00:00
Compound	CAS Number	LOR	Unit		EP1707075-016	EP1707075-017	EP1707075-018	EP1707075-019	EP1707075-020
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		0.97	12.4	0.77	1.09	68.7
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		8.22	131	1.50	2.01	153
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.10	<0.10	<0.05	<0.10	<1.00
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.10	0.13	<0.05	<0.10	<1.00
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.10	<0.10	<0.05	<0.10	<1.00
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.10	<0.10	<0.05	<0.10	<1.00
EP231P: PFAS Sums									
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		628	3680	55.0	71.0	5600
Sum of PFAS (WA DER List)	----	0.01	µg/L		646	3980	70.9	88.4	7140
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%		80.7	104	98.5	89.1	99.2
Toluene-D8	2037-26-5	2	%		94.2	86.2	105	92.9	112
4-Bromofluorobenzene	460-00-4	2	%		109	110	115	112	110
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		111	112	92.4	122	110



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Client sample ID

				WQA01_260617	WQA02_260617	WQA03_270717	WQA05_270617	WQA06_270617
Client sampling date / time				26-Jun-2017 00:00	26-Jun-2017 00:00	27-Jun-2017 00:00	27-Jun-2017 00:00	27-Jun-2017 00:00
Compound	CAS Number	LOR	Unit	EP1707075-021	EP1707075-022	EP1707075-023	EP1707075-024	EP1707075-025
				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	160	<100	<100
C29 - C36 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	160	<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	160	<100	<100
>C34 - C40 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	<100	160	<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	<0.02	<0.02	11.5	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.06	60.4	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	4.18	103	<0.01	0.03
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	2.5	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	4.17	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.03	19.1	<0.02	<0.02



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	WQA01_260617	WQA02_260617	WQA03_270717	WQA05_270617	WQA06_270617
Client sampling date / time					26-Jun-2017 00:00	26-Jun-2017 00:00	27-Jun-2017 00:00	27-Jun-2017 00:00	27-Jun-2017 00:00
Compound	CAS Number	LOR	Unit		EP1707075-021	EP1707075-022	EP1707075-023	EP1707075-024	EP1707075-025
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	1.42	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	3.15	<0.01	<0.01
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	0.06	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	4.24	163	<0.01	0.03
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	4.27	205	<0.01	0.03
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%		78.5	103	107	89.6	89.3
Toluene-D8	2037-26-5	2	%		116	91.3	86.5	101	92.6
4-Bromofluorobenzene	460-00-4	2	%		102	120	115	108	104
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		97.2	96.5	90.4	98.5	96.3



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Client sample ID

				WQA07_270617	WQA09_270617	SED01_280617	SED04_280617	SEDQA01_280617
Client sampling date / time				27-Jun-2017 00:00	27-Jun-2017 00:00	28-Jun-2017 00:00	28-Jun-2017 00:00	28-Jun-2017 00:00
Compound	CAS Number	LOR	Unit	EP1707075-026	EP1707075-027	EP1707075-028	EP1707075-032	EP1707075-034
				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	53.5	328	3.08	<0.02	2.91
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	1860	2070	11.4	0.06	12.5
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	1830	2850	12.5	0.09	12.6
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	25.6	56.7	0.4	<0.1	0.4
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	26.4	132	1.05	<0.02	0.99
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	116	804	5.25	<0.02	5.04



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	WQA07_270617	WQA09_270617	SED01_280617	SED04_280617	SEDQA01_280617
Client sampling date / time					27-Jun-2017 00:00	27-Jun-2017 00:00	28-Jun-2017 00:00	28-Jun-2017 00:00	28-Jun-2017 00:00
Compound	CAS Number	LOR	Unit		EP1707075-026	EP1707075-027	EP1707075-028	EP1707075-032	EP1707075-034
				Result	Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		13.4	57.8	0.73	<0.02	0.67
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		126	118	0.93	<0.01	0.88
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		0.12	0.20	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	0.06	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		3690	4920	23.9	0.15	25.1
Sum of PFAS (WA DER List)	----	0.01	µg/L		4050	6420	35.3	0.15	36.0
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%		88.7	95.4	96.7	102	97.3
Toluene-D8	2037-26-5	2	%		95.6	99.6	82.8	110	93.5
4-Bromofluorobenzene	460-00-4	2	%		107	128	106	129	110
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		69.9	74.5	87.7	94.2	85.0



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SEDQA02_280617	WQA01_280617	----	----	----
Client sampling date / time					28-Jun-2017 00:00	28-Jun-2017 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EP1707075-035	EP1707075-038	-----	-----	-----
					Result	Result	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	----	----	----
C10 - C14 Fraction	----	50	µg/L		<50	<50	----	----	----
C15 - C28 Fraction	----	100	µg/L		<100	<100	----	----	----
C29 - C36 Fraction	----	50	µg/L		<50	<50	----	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	----	----	----
>C10 - C16 Fraction	----	100	µg/L		<100	<100	----	----	----
>C16 - C34 Fraction	----	100	µg/L		<100	<100	----	----	----
>C34 - C40 Fraction	----	100	µg/L		<100	<100	----	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	----	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	----	----	----
Toluene	108-88-3	2	µg/L		<2	<2	----	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	<2	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	----	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	<2	----	----	----
^ Total Xylenes	1330-20-7	2	µg/L		<2	<2	----	----	----
^ Sum of BTEX	----	1	µg/L		<1	<1	----	----	----
Naphthalene	91-20-3	5	µg/L		<5	<5	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		2.92	<0.02	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		13.1	0.02	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		12.8	0.03	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		0.4	<0.1	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		0.99	<0.02	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		5.03	<0.02	----	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SEDQA02_280617	WQA01_280617	----	----	----
Client sampling date / time					28-Jun-2017 00:00	28-Jun-2017 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EP1707075-035	EP1707075-038	-----	-----	-----
				Result	Result		----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		0.70	<0.02	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		0.90	<0.01	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	----	----	----
EP231P: PFAS Sums									
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		25.9	0.05	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		36.8	0.05	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%		97.4	91.9	----	----	----
Toluene-D8	2037-26-5	2	%		94.6	100	----	----	----
4-Bromofluorobenzene	460-00-4	2	%		102	107	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		90.3	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

CERTIFICATE OF ANALYSIS

Work Order : EP1707075
Client : AECOM Australia Pty Ltd
Contact : [REDACTED]
Address : [REDACTED]
Telephone : ----
Project : 60543717 Port Hedland Airport Limited Investigation
Order number : 60543717
C-O-C number : ----
Sampler : [REDACTED]
Site : ----
Quote number : EP/541/17
No. of samples received : 39
No. of samples analysed : 39

Page : 1 of 21
Laboratory : Environmental Division Perth
Contact : [REDACTED]
Address : [REDACTED]
Telephone : [REDACTED]
Date Samples Received : 03-Jul-2017 15:12
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.

Signatories	Position	Accreditation Category
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]



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 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 to high conductivity . LOR values have been adjusted accordingly.



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SED01_280617	SED02_280617	SED03_280617	SED04_280617	SEDQA01_280617
Client sampling date / time					28-Jun-2017 00:00	28-Jun-2017 00:00	28-Jun-2017 00:00	28-Jun-2017 00:00	28-Jun-2017 00:00
Compound	CAS Number	LOR	Unit		EP1707075-029	EP1707075-030	EP1707075-031	EP1707075-033	EP1707075-036
					Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1	%		14.4	12.9	15.9	30.8	12.9
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		0.0005	0.0016	0.0029	0.0020	0.0004
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg		0.0045	0.0261	0.0641	0.0294	0.0048
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg		0.0174	0.134	0.329	0.265	0.0289
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg		<0.001	<0.001	<0.001	<0.001	<0.001



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SED01_280617	SED02_280617	SED03_280617	SED04_280617	SEDQA01_280617
Client sampling date / time					28-Jun-2017 00:00	28-Jun-2017 00:00	28-Jun-2017 00:00	28-Jun-2017 00:00	28-Jun-2017 00:00
Compound	CAS Number	LOR	Unit		EP1707075-029	EP1707075-030	EP1707075-031	EP1707075-033	EP1707075-036
				Result	Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	0.0006	0.0036	0.0078	0.0046	0.0006	0.0006
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0005	0.0018	<0.0005	<0.0002	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.0024	0.0088	0.0039	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	<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	<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	<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	<0.0005
EP231P: PFAS Sums									
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	0.0219	0.160	0.393	0.294	0.0337	0.0337
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	0.0230	0.168	0.414	0.305	0.0349	0.0349
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	0.2	%	85.6	79.6	88.6	76.6	93.3	93.3
Toluene-D8	2037-26-5	0.2	%	89.7	78.3	88.9	89.4	94.1	94.1
4-Bromofluorobenzene	460-00-4	0.2	%	93.4	82.6	92.6	96.8	98.9	98.9
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%	105	101	90.1	94.3	91.0	91.0



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SEDQA02_280617	TBS289_280617	----	----	----
Client sampling date / time					28-Jun-2017 00:00	08-Jun-2017 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EP1707075-037	EP1707075-039	-----	-----	-----
				Result	Result		----	----	----
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1	%		14.1	3.4	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<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	<10	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<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	<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		0.0003	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg		0.0045	----	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg		0.0246	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg		<0.001	----	----	----	----



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SEDQA02_280617	TBS289_280617	----	----	----
Client sampling date / time					28-Jun-2017 00:00	08-Jun-2017 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EP1707075-037	EP1707075-039	-----	-----	-----
				Result	Result		----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg		0.0006	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg		<0.0002	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg		0.0002	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	----	----	----	----
EP231P: PFAS Sums									
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		0.0291	----	----	----	----
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		0.0302	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	0.2	%		90.1	97.3	----	----	----
Toluene-D8	2037-26-5	0.2	%		87.2	95.2	----	----	----
4-Bromofluorobenzene	460-00-4	0.2	%		92.7	91.9	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		117	----	----	----	----



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Client sample ID

				MW06_260617	MW05_260617	MW04_260617	MW09_260617	MW03_260617
Client sampling date / time				26-Jun-2017 00:00	26-Jun-2017 00:00	26-Jun-2017 00:00	26-Jun-2017 00:00	26-Jun-2017 00:00
Compound	CAS Number	LOR	Unit	EP1707075-001	EP1707075-002	EP1707075-003	EP1707075-004	EP1707075-005
				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	<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	81.3	118	5.81	42.9	83.0
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	1090	979	182	490	990
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	512	1630	152	300	28800
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	11.6	14.2	1.0	8.5	86.0
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	19.8	30.0	1.06	29.1	<10.0
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	169	184	12.4	136	370



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MW06_260617	MW05_260617	MW04_260617	MW09_260617	MW03_260617
Client sampling date / time					26-Jun-2017 00:00	26-Jun-2017 00:00	26-Jun-2017 00:00	26-Jun-2017 00:00	26-Jun-2017 00:00
Compound	CAS Number	LOR	Unit		EP1707075-001	EP1707075-002	EP1707075-003	EP1707075-004	EP1707075-005
				Result	Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		12.3	14.7	2.96	17.0	23.0
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		36.0	47.9	7.28	68.6	97.0
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.10	<1.00	<0.10	<0.10	<10.0
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.10	<1.00	0.19	0.82	<10.0
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.10	<1.00	<0.10	0.12	<10.0
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.10	<1.00	<0.10	<0.10	<10.0
EP231P: PFAS Sums									
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		1600	2610	334	790	29800
Sum of PFAS (WA DER List)	----	0.01	µg/L		1930	3020	365	1090	30400
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%		95.8	92.0	83.4	97.5	108
Toluene-D8	2037-26-5	2	%		119	120	105	112	101
4-Bromofluorobenzene	460-00-4	2	%		116	126	116	126	126
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		115	110	120	125	123



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Client sample ID

				MW010_260617	MW08_260617	A1-MW23_270617	MW3A_270617	A1-MW22_270617
Client sampling date / time				26-Jun-2017 00:00	26-Jun-2017 00:00	27-Jun-2017 00:00	27-Jun-2017 00:00	27-Jun-2017 00:00
Compound	CAS Number	LOR	Unit	EP1707075-006	EP1707075-007	EP1707075-008	EP1707075-009	EP1707075-010
				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	100
C15 - C28 Fraction	----	100	µg/L	<100	<100	<100	160	300
C29 - C36 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	<50	160	400
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	180
>C16 - C34 Fraction	----	100	µg/L	<100	<100	<100	180	240
>C34 - C40 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	<100	<100	180	420
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	<100	<100	<100	180
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	74.6	24.0	24.3	12.9	0.68
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	924	579	217	85.9	5.08
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	2740	437	540	113	6.40
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	37.6	5.4	7.2	3.8	<0.2
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	79.9	12.7	12.5	4.74	<0.05
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	584	91.8	76.6	25.5	0.42



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MW010_260617	MW08_260617	A1-MW23_270617	MW3A_270617	A1-MW22_270617
Client sampling date / time					26-Jun-2017 00:00	26-Jun-2017 00:00	27-Jun-2017 00:00	27-Jun-2017 00:00	27-Jun-2017 00:00
Compound	CAS Number	LOR	Unit		EP1707075-006	EP1707075-007	EP1707075-008	EP1707075-009	EP1707075-010
				Result	Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		72.6	9.21	8.11	1.85	0.06
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		132	36.1	19.8	4.24	0.16
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<1.00	<0.10	<0.10	<0.10	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		1.60	0.66	0.11	<0.10	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<1.00	<0.10	<0.10	<0.10	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<1.00	<0.10	<0.10	<0.10	<0.05
EP231P: PFAS Sums									
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		3660	1020	757	199	11.5
Sum of PFAS (WA DER List)	----	0.01	µg/L		4650	1200	906	252	12.8
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%		83.9	98.4	79.6	104	91.0
Toluene-D8	2037-26-5	2	%		106	103	99.7	113	101
4-Bromofluorobenzene	460-00-4	2	%		108	114	112	121	116
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		122	119	123	127	107



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Client sample ID

				MW3B_270617	MW3C_270617	MW015_270617	MW014_270617	MW012_270617
Client sampling date / time				27-Jun-2017 00:00	27-Jun-2017 00:00	27-Jun-2017 00:00	27-Jun-2017 00:00	27-Jun-2017 00:00
Compound	CAS Number	LOR	Unit	EP1707075-011	EP1707075-012	EP1707075-013	EP1707075-014	EP1707075-015
				Result	Result	Result	Result	Result
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	----	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L	<50	----	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L	290	----	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L	100	----	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L	390	----	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	----	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	----	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L	<100	----	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L	350	----	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L	<100	----	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L	350	----	<100	<100	<100
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	----	<100	<100	<100
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	----	<1	<1	<1
Toluene	108-88-3	2	µg/L	<2	----	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L	<2	----	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	----	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L	<2	----	<2	<2	<2
^ Total Xylenes	1330-20-7	2	µg/L	<2	----	<2	<2	<2
^ Sum of BTEX	----	1	µg/L	<1	----	<1	<1	<1
Naphthalene	91-20-3	5	µg/L	<5	----	<5	<5	<5
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	134	15.3	1.30	52.3	1.14
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	983	133	68.2	2490	12.6
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	696	68.3	7180	2120	101
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	18.8	2.5	<5.0	11.3	1.5
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	40.4	3.54	<1.00	15.5	1.19
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	242	27.0	10.2	122	2.29



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MW3B_270617	MW3C_270617	MW015_270617	MW014_270617	MW012_270617
Client sampling date / time					27-Jun-2017 00:00	27-Jun-2017 00:00	27-Jun-2017 00:00	27-Jun-2017 00:00	27-Jun-2017 00:00
Compound	CAS Number	LOR	Unit		EP1707075-011	EP1707075-012	EP1707075-013	EP1707075-014	EP1707075-015
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		23.4	2.72	<1.00	17.3	0.22
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		60.3	6.09	10.4	144	0.99
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.10	<0.10	<1.00	<0.10	<0.10
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.10	<0.10	<1.00	0.10	<0.10
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.10	<0.10	<1.00	<0.10	<0.10
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.10	<0.10	<1.00	<0.10	<0.10
EP231P: PFAS Sums									
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		1680	201	7250	4610	114
Sum of PFAS (WA DER List)	----	0.01	µg/L		2200	258	7270	4970	121
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%		83.9	----	79.3	83.5	82.3
Toluene-D8	2037-26-5	2	%		108	----	93.0	101	99.8
4-Bromofluorobenzene	460-00-4	2	%		107	----	106	116	105
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		120	126	113	114	105



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Client sample ID

				MW01_270617	MW013_270617	MW02_270617	MW011_270617	MW07_270617
Client sampling date / time				27-Jun-2017 00:00	27-Jun-2017 00:00	27-Jun-2017 00:00	27-Jun-2017 00:00	27-Jun-2017 00:00
Compound	CAS Number	LOR	Unit	EP1707075-016	EP1707075-017	EP1707075-018	EP1707075-019	EP1707075-020
				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	70	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L	<100	390	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	460	<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	160	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L	<100	330	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	490	<100	<100	<100
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	160	<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	2.52	47.4	5.04	5.36	316
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	80.1	2330	53.6	69.3	2190
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	548	1350	1.45	1.70	3410
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.5	7.7	<0.2	<0.5	42.2
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.61	13.1	1.04	0.92	122
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	5.80	89.1	7.54	8.04	839



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MW01_270617	MW013_270617	MW02_270617	MW011_270617	MW07_270617
Client sampling date / time					27-Jun-2017 00:00	27-Jun-2017 00:00	27-Jun-2017 00:00	27-Jun-2017 00:00	27-Jun-2017 00:00
Compound	CAS Number	LOR	Unit		EP1707075-016	EP1707075-017	EP1707075-018	EP1707075-019	EP1707075-020
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		0.97	12.4	0.77	1.09	68.7
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		8.22	131	1.50	2.01	153
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.10	<0.10	<0.05	<0.10	<1.00
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.10	0.13	<0.05	<0.10	<1.00
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.10	<0.10	<0.05	<0.10	<1.00
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.10	<0.10	<0.05	<0.10	<1.00
EP231P: PFAS Sums									
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		628	3680	55.0	71.0	5600
Sum of PFAS (WA DER List)	----	0.01	µg/L		646	3980	70.9	88.4	7140
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%		80.7	104	98.5	89.1	99.2
Toluene-D8	2037-26-5	2	%		94.2	86.2	105	92.9	112
4-Bromofluorobenzene	460-00-4	2	%		109	110	115	112	110
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		111	112	92.4	122	110



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Client sample ID

				WQA01_260617	WQA02_260617	WQA03_270717	WQA05_270617	WQA06_270617
Client sampling date / time				26-Jun-2017 00:00	26-Jun-2017 00:00	27-Jun-2017 00:00	27-Jun-2017 00:00	27-Jun-2017 00:00
Compound	CAS Number	LOR	Unit	EP1707075-021	EP1707075-022	EP1707075-023	EP1707075-024	EP1707075-025
				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	160	<100	<100
C29 - C36 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	160	<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	160	<100	<100
>C34 - C40 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	<100	160	<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	<0.02	<0.02	11.5	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.06	60.4	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	4.18	103	<0.01	0.03
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	2.5	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	4.17	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.03	19.1	<0.02	<0.02



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	WQA01_260617	WQA02_260617	WQA03_270717	WQA05_270617	WQA06_270617
Client sampling date / time					26-Jun-2017 00:00	26-Jun-2017 00:00	27-Jun-2017 00:00	27-Jun-2017 00:00	27-Jun-2017 00:00
Compound	CAS Number	LOR	Unit		EP1707075-021	EP1707075-022	EP1707075-023	EP1707075-024	EP1707075-025
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	1.42	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	3.15	<0.01	<0.01
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	0.06	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	4.24	163	<0.01	0.03
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	4.27	205	<0.01	0.03
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%		78.5	103	107	89.6	89.3
Toluene-D8	2037-26-5	2	%		116	91.3	86.5	101	92.6
4-Bromofluorobenzene	460-00-4	2	%		102	120	115	108	104
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		97.2	96.5	90.4	98.5	96.3



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Client sample ID

				WQA07_270617	WQA09_270617	SED01_280617	SED04_280617	SEDQA01_280617
Client sampling date / time				27-Jun-2017 00:00	27-Jun-2017 00:00	28-Jun-2017 00:00	28-Jun-2017 00:00	28-Jun-2017 00:00
Compound	CAS Number	LOR	Unit	EP1707075-026	EP1707075-027	EP1707075-028	EP1707075-032	EP1707075-034
				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	53.5	328	3.08	<0.02	2.91
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	1860	2070	11.4	0.06	12.5
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	1830	2850	12.5	0.09	12.6
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	25.6	56.7	0.4	<0.1	0.4
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	26.4	132	1.05	<0.02	0.99
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	116	804	5.25	<0.02	5.04



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	WQA07_270617	WQA09_270617	SED01_280617	SED04_280617	SEDQA01_280617
Client sampling date / time					27-Jun-2017 00:00	27-Jun-2017 00:00	28-Jun-2017 00:00	28-Jun-2017 00:00	28-Jun-2017 00:00
Compound	CAS Number	LOR	Unit		EP1707075-026	EP1707075-027	EP1707075-028	EP1707075-032	EP1707075-034
				Result	Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		13.4	57.8	0.73	<0.02	0.67
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		126	118	0.93	<0.01	0.88
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		0.12	0.20	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	0.06	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		3690	4920	23.9	0.15	25.1
Sum of PFAS (WA DER List)	----	0.01	µg/L		4050	6420	35.3	0.15	36.0
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%		88.7	95.4	96.7	102	97.3
Toluene-D8	2037-26-5	2	%		95.6	99.6	82.8	110	93.5
4-Bromofluorobenzene	460-00-4	2	%		107	128	106	129	110
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		69.9	74.5	87.7	94.2	85.0



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SEDQA02_280617	WQA01_280617	----	----	----
Client sampling date / time					28-Jun-2017 00:00	28-Jun-2017 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EP1707075-035	EP1707075-038	-----	-----	-----
					Result	Result	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	----	----	----
C10 - C14 Fraction	----	50	µg/L		<50	<50	----	----	----
C15 - C28 Fraction	----	100	µg/L		<100	<100	----	----	----
C29 - C36 Fraction	----	50	µg/L		<50	<50	----	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	----	----	----
>C10 - C16 Fraction	----	100	µg/L		<100	<100	----	----	----
>C16 - C34 Fraction	----	100	µg/L		<100	<100	----	----	----
>C34 - C40 Fraction	----	100	µg/L		<100	<100	----	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	----	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	----	----	----
Toluene	108-88-3	2	µg/L		<2	<2	----	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	<2	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	----	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	<2	----	----	----
^ Total Xylenes	1330-20-7	2	µg/L		<2	<2	----	----	----
^ Sum of BTEX	----	1	µg/L		<1	<1	----	----	----
Naphthalene	91-20-3	5	µg/L		<5	<5	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		2.92	<0.02	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		13.1	0.02	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		12.8	0.03	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		0.4	<0.1	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		0.99	<0.02	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		5.03	<0.02	----	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SEDQA02_280617	WQA01_280617	----	----	----
Client sampling date / time					28-Jun-2017 00:00	28-Jun-2017 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EP1707075-035	EP1707075-038	-----	-----	-----
				Result	Result		----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		0.70	<0.02	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		0.90	<0.01	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	----	----	----
EP231P: PFAS Sums									
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		25.9	0.05	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		36.8	0.05	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%		97.4	91.9	----	----	----
Toluene-D8	2037-26-5	2	%		94.6	100	----	----	----
4-Bromofluorobenzene	460-00-4	2	%		102	107	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		90.3	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

QUALITY CONTROL REPORT

Work Order : **EP1707075**

Page : 1 of 16

Client : **AECOM Australia Pty Ltd**

Contact : [REDACTED]

Address : [REDACTED]

Telephone : [REDACTED]

Project : 60543717 Port Hedland Airport Limited Investigation

Order number : 60543717

C-O-C number : [REDACTED]

Sampler : [REDACTED]

Site : [REDACTED]

Quote number : EP/541/17

No. of samples received : 39

No. of samples analysed : 39

Laboratory : Environmental Division Perth

Contact : [REDACTED]

Address : [REDACTED]

Telephone : [REDACTED]

Date Samples Received : 03-Jul-2017

Date Analysis Commenced : 05-Jul-2017

Issue Date : 13-Jul-2017



Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]



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	Anonymous	EA055: Moisture Content	----	1	%	9.8	9.0	9.00	No Limit
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 984406)									
EP1707075-031	SED03_280617	EA055: Moisture Content	----	1	%	15.9	15.7	1.43	0% - 50%
EP1707076-031	Anonymous	EA055: Moisture Content	----	1	%	23.2	23.7	2.30	0% - 20%
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	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	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	Anonymous	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: 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	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	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



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 Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 981441) - continued									
EP1707076-025	Anonymous	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	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	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
EP080: BTEXN (QC Lot: 981504)									
EP1707039-016	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
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: 982304)									
EP1707075-029	SED01_280617	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	0.0005	0.0005	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: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0174	0.0163	6.77	0% - 20%
EP1707076-028	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	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: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0034	0.0037	10.2	0% - 50%
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 982304)									
EP1707075-029	SED01_280617	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



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									
EP1707075-029	SED01_280617	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.00	No Limit
EP1707076-028	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: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 982304)									
EP1707075-029	SED01_280617	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
EP1707076-028	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 (%)
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 979851)									
EP1707075-001	MW06_260617	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
EP1707075-009	MW3A_270617	EP071: C15 - C28 Fraction	----	100	µg/L	160	180	10.9	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: 982084)									
EP1707075-001	MW06_260617	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP1707075-011	MW3B_270617	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 982086)									
EP1707075-024	WQA05_270617	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP1707076-022	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 982102)									
EP1707066-003	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	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 (%)
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 982102) - continued									
EM1708745-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	30	30	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 979851)									
EP1707075-001	MW06_260617	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
EP1707075-009	MW3A_270617	EP071: >C10 - C16 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C16 - C34 Fraction	----	100	µg/L	180	200	6.95	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: 982084)									
EP1707075-001	MW06_260617	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP1707075-011	MW3B_270617	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	WQA05_270617	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP1707076-022	Anonymous	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: 982102)									
EP1707066-003	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	30	30	0.00	No Limit
EM1708745-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	40	40	0.00	No Limit
EP080: BTEXN (QC Lot: 982084)									
EP1707075-001	MW06_260617	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
EP1707075-011	MW3B_270617	EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
		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	WQA05_270617	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



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 (%)
EP080: BTEXN (QC Lot: 982086) - continued									
EP1707075-024	WQA05_270617	EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EP1707076-022	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
EP080: BTEXN (QC Lot: 982102)									
EP1707066-003	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	3	3	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	8	8	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EM1708745-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3	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: 982336)									
EP1707075-001	MW06_260617	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	512	511	0.235	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	81.3	80.3	1.26	0% - 20%
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	1090	1020	6.70	0% - 20%
EP1707075-011	MW3B_270617	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	696	727	4.37	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	134	136	2.07	0% - 20%
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	983	961	2.26	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 982339)									
EP1707075-021	WQA01_260617	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: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP1707075-035	SEDQA02_280617	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	12.8	11.5	10.4	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	2.92	2.99	2.30	0% - 20%
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	13.1	12.7	3.49	0% - 20%
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 982336)									
EP1707075-001	MW06_260617	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	36.0	34.7	3.67	0% - 20%
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	19.8	19.5	1.68	0% - 20%



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: 982336) - continued									
EP1707075-001	MW06_260617	EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	169	162	4.05	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	12.3	11.9	3.31	0% - 20%
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	11.6	12.8	9.85	0% - 20%
EP1707075-011	MW3B_270617	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	60.3	59.3	1.72	0% - 20%
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	40.4	40.4	0.00	0% - 20%
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	242	242	0.00	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	23.4	23.7	1.32	0% - 20%
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	18.8	19.0	1.22	0% - 20%
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 982339)									
EP1707075-021	WQA01_260617	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: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
EP1707075-035	SEDQA02_280617	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.90	0.90	0.00	0% - 20%
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.99	1.01	1.80	0% - 20%
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	5.03	5.18	3.11	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.70	0.76	7.55	0% - 20%
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	0.4	0.3	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 982336)									
EP1707075-001	MW06_260617	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.10	<0.10	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.10	<0.10	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.10	<0.10	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.10	<0.10	0.00	No Limit
EP1707075-011	MW3B_270617	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.10	<0.10	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.10	<0.10	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.10	<0.10	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.10	<0.10	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 982339)									
EP1707075-021	WQA01_260617	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit

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 Work Order : EP1707075
 Client : AECOM Australia Pty Ltd
 Project : 60543717 Port Hedland Airport Limited Investigation



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: 982339) - continued									
EP1707075-021	WQA01_260617	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
EP1707075-035	SEDQA02_280617	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



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: 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: 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	0.5	mg/kg	<0.5	4 mg/kg	98.6	74	122
	106-42-3							
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
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: 982304)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	93.8	57	121



Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
						LCS	Low	High
Method: Compound	CAS Number	LOR	Unit	Result				
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 982304) - continued								
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	115	52	126
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	92.1	55	127
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
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 (%)	Recovery Limits (%)	
						LCS	Low	High
Method: Compound	CAS Number	LOR	Unit	Result				
EP080/071: Total Petroleum Hydrocarbons (QCLot: 979851)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	400 µg/L	74.1	35	95
EP071: C15 - C28 Fraction	----	100	µg/L	<100	400 µg/L	107	34	111
EP071: C29 - C36 Fraction	----	50	µg/L	<50	400 µg/L	84.0	34	105
EP080/071: Total Petroleum Hydrocarbons (QCLot: 979852)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	400 µg/L	45.1	35	95
EP071: C15 - C28 Fraction	----	100	µg/L	<100	400 µg/L	50.9	34	111
EP071: C29 - C36 Fraction	----	50	µg/L	<50	400 µg/L	67.8	34	105
EP080/071: Total Petroleum Hydrocarbons (QCLot: 982084)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	360 µg/L	94.6	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 Petroleum Hydrocarbons (QCLot: 982102)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	360 µg/L	108	67	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 979851)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	400 µg/L	83.1	37	99
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	600 µg/L	101	35	108
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	200 µg/L	56.6	11	117
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 979852)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	400 µg/L	50.4	37	99
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	600 µg/L	56.4	35	108



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
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 979852) - continued								
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	200 µg/L	82.2	11	117
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 982084)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	450 µg/L	93.0	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
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 982102)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	450 µg/L	106	65	125
EP080: BTEXN (QCLot: 982084)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	97.0	76	120
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	111	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	102	72	130
	106-42-3							
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	103	78	128
EP080: Naphthalene	91-20-3	5	µg/L	<5	5 µg/L	96.6	71	129
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
EP080: BTEXN (QCLot: 982102)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	111	76	120
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	116	76	124
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	115	72	124
EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	40 µg/L	114	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	94.0	71	129
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 982336)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.5 µg/L	102	70	130
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.5 µg/L	112	70	130
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.5 µg/L	115	70	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 982339)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.5 µg/L	108	70	130
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.5 µg/L	100	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				
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 982339) - continued								
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.5 µg/L	96.8	70	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 982336)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	2.5 µg/L	103	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	104	70	130
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.5 µg/L	110	70	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.5 µg/L	104	70	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 982339)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	2.5 µg/L	93.5	70	130
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.5 µg/L	109	70	130
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.5 µg/L	102	70	130
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.5 µg/L	96.6	70	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.5 µg/L	99.6	70	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 982336)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.5 µg/L	105	70	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.5 µg/L	103	70	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.5 µg/L	103	70	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.5 µg/L	116	70	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 982339)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.5 µg/L	97.6	70	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.5 µg/L	82.8	70	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.5 µg/L	82.8	70	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.5 µg/L	79.6	70	130

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **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: 980755)							
EP1707109-002	Anonymous	EP080: C6 - C9 Fraction	----	24 mg/kg	84 5	69	135
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



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: 981504)							
EP1707039-016	Anonymous	EP080: C6 - C9 Fraction	----	32.5 mg/kg	106	70	130
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	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: 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	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	SED01_280617	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	89.5	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	85.8	50	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	# Not Determined	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 982304)							
EP1707075-029	SED01_280617	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
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 982304)							
EP1707075-029	SED01_280617	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**

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: 979851)							
EP1707075-006	MW010_260617	EP071: C10 - C14 Fraction	----	400 µg/L	73.6	45	122
		EP071: C15 - C28 Fraction	----	400 µg/L	106	55	143
		EP071: C29 - C36 Fraction	----	400 µg/L	82.4	54	128
EP080/071: Total Petroleum Hydrocarbons (QCLot: 979852)							
EP1707075-020	MW07_270617	EP071: C10 - C14 Fraction	----	400 µg/L	90 8	45	122
		EP071: C15 - C28 Fraction	----	400 µg/L	98.4	55	143
		EP071: C29 - C36 Fraction	----	400 µg/L	80 0	54	128
EP080/071: Total Petroleum Hydrocarbons (QCLot: 982084)							
EP1707075-002	MW05_260617	EP080: C6 - C9 Fraction	----	280 µg/L	101	43	125
EP080/071: Total Petroleum Hydrocarbons (QCLot: 982086)							
EP1707075-025	WQA06_270617	EP080: C6 - C9 Fraction	----	280 µg/L	87.1	43	125
EP080/071: Total Petroleum Hydrocarbons (QCLot: 982102)							
EP1707051-021	Anonymous	EP080: C6 - C9 Fraction	----	280 µg/L	87.4	43	125
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 979851)							
EP1707075-006	MW010_260617	EP071: >C10 - C16 Fraction	----	400 µg/L	80 5	45	122
		EP071: >C16 - C34 Fraction	----	600 µg/L	101	55	143
		EP071: >C34 - C40 Fraction	----	200 µg/L	57.7	54	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 979852)							
EP1707075-020	MW07_270617	EP071: >C10 - C16 Fraction	----	400 µg/L	95.1	45	122
		EP071: >C16 - C34 Fraction	----	600 µg/L	97 3	55	143
		EP071: >C34 - C40 Fraction	----	200 µg/L	63 5	54	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 982084)							
EP1707075-002	MW05_260617	EP080: C6 - C10 Fraction	C6_C10	330 µg/L	101	44	122
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 982086)							
EP1707075-025	WQA06_270617	EP080: C6 - C10 Fraction	C6_C10	330 µg/L	89 9	44	122
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 982102)							
EP1707051-021	Anonymous	EP080: C6 - C10 Fraction	C6_C10	330 µg/L	85.7	44	122
EP080: BTEXN (QCLot: 982084)							
EP1707075-002	MW05_260617	EP080: Benzene	71-43-2	20 µg/L	111	68	130
		EP080: Toluene	108-88-3	20 µg/L	122	72	132
EP080: BTEXN (QCLot: 982086)							
EP1707075-025	WQA06_270617	EP080: Benzene	71-43-2	20 µg/L	107	68	130
		EP080: Toluene	108-88-3	20 µg/L	105	72	132
EP080: BTEXN (QCLot: 982102)							
EP1707051-021	Anonymous	EP080: Benzene	71-43-2	20 µg/L	105	68	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
EP080: BTEXN (QCLot: 982102) - continued							
EP1707051-021	Anonymous	EP080: Toluene	108-88-3	20 µg/L	107	72	132
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 982336)							
EP1707075-001	MW06_260617	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	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: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.5 µg/L	# Not Determined	50	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 982339)							
EP1707075-021	WQA01_260617	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.5 µg/L	129	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.5 µg/L	126	50	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.5 µg/L	124	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 982336)							
EP1707075-001	MW06_260617	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	2.5 µg/L	# Not Determined	50	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.5 µg/L	# Not Determined	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.5 µg/L	# Not Determined	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.5 µg/L	# Not Determined	50	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.5 µg/L	# Not Determined	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 982339)							
EP1707075-021	WQA01_260617	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	2.5 µg/L	105	50	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.5 µg/L	126	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	117	50	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.5 µg/L	120	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 982336)							
EP1707075-001	MW06_260617	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.5 µg/L	109	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.5 µg/L	121	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.5 µg/L	117	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.5 µg/L	86.4	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 982339)							
EP1707075-021	WQA01_260617	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.5 µg/L	125	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.5 µg/L	98.2	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
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 982339) - continued							
EP1707075-021	WQA01_260617	EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.5 µg/L	103	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.5 µg/L	98.8	50	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EP1707075	Page	: 1 of 15
Client	: AECOM Australia Pty Ltd	Laboratory	: Environmental Division Perth
Contact	: [REDACTED]	Telephone	: [REDACTED]
Project	: [REDACTED]	Date Samples Received	: 03-Jul-2017
Site	: [REDACTED]	Issue Date	: 13-Jul-2017
Sampler	: [REDACTED]	No. of samples received	: 39
Order number	: 60543717	No. of samples analysed	: 39

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 D	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EP231A: Perfluoroalkyl Sulfonic Acids	EP1707075--029	SED01_280617	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 D	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EP231A: Perfluoroalkyl Sulfonic Acids	EP1707075--001	MW06_260617	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	EP1707075--001	MW06_260617	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	EP1707075--001	MW06_260617	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	EP1707075--001	MW06_260617	Perfluorobutanoic acid (PFBA)	375-22-4	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EP231B: Perfluoroalkyl Carboxylic Acids	EP1707075--001	MW06_260617	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	EP1707075--001	MW06_260617	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	EP1707075--001	MW06_260617	Perfluoroheptanoic acid (PFHpA)	375-85-9	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EP231B: Perfluoroalkyl Carboxylic Acids	EP1707075--001	MW06_260617	Perfluorooctanoic acid (PFOA)	335-67-1	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

Outliers : Analysis Holding Time Compliance

Matrix: **SOIL**

Method	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA055: Moisture Content (Dried @ 105-110°C)						
Soil Glass Jar - Unpreserved						
TBS289_280617	----	----	----	05-Jul-2017	22-Jun-2017	13



Matrix: **SOIL**

Method	Extraction / Preparation			Analysis		
Container / Client Sample D(s)	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EP080/071: Total Petroleum Hydrocarbons						
Soil Glass Jar - Unpreserved TBS289_280617	05-Jul-2017	22-Jun-2017	13	05-Jul-2017	22-Jun-2017	13
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions						
Soil Glass Jar - Unpreserved TBS289_280617	05-Jul-2017	22-Jun-2017	13	05-Jul-2017	22-Jun-2017	13
EP080: BTEXN						
Soil Glass Jar - Unpreserved TBS289_280617	05-Jul-2017	22-Jun-2017	13	05-Jul-2017	22-Jun-2017	13

Matrix: **WATER**

Method	Extraction / Preparation			Analysis		
Container / Client Sample D(s)	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EP080/071: Total Petroleum Hydrocarbons						
Amber Glass Bottle - Unpreserved MW06_260617, MW04_260617, MW03_260617, MW08_260617, WQA02_260617 MW05_260617, MW09_260617, MW010_260617, WQA01_260617	05-Jul-2017	03-Jul-2017	2	----	----	----
Amber Glass Bottle - Unpreserved MW07_270617, WQA05_270617, WQA07_270617 WQA03_270717, WQA06_270617, WQA09_270617	05-Jul-2017	04-Jul-2017	1	----	----	----
Amber Glass Bottle - Unpreserved A1-MW23_270617, A1-MW22_270617, MW015_270617, MW012_270617, MW013_270617, MW011_270617 MW3A_270617, MW3B_270617, MW014_270617, MW01_270617, MW02_270617	05-Jul-2017	04-Jul-2017	1	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions						
Amber Glass Bottle - Unpreserved MW06_260617, MW04_260617, MW03_260617, MW08_260617, WQA02_260617 MW05_260617, MW09_260617, MW010_260617, WQA01_260617	05-Jul-2017	03-Jul-2017	2	----	----	----



Matrix: **WATER**

Method		Extraction / Preparation			Analysis		
Container / Client Sample D(s)		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Analysis Holding Time							
Amber Glass Bottle - Unpreserved							
MW07_270617,	WQA03_270717,	05-Jul-2017	04-Jul-2017	1	----	----	----
WQA05_270617,	WQA06_270617,						
WQA07_270617,	WQA09_270617						
Amber Glass Bottle - Unpreserved							
A1-MW23_270617,	MW3A_270617,	05-Jul-2017	04-Jul-2017	1	----	----	----
A1-MW22_270617,	MW3B_270617,						
MW015_270617,	MW014_270617,						
MW012_270617,	MW01_270617,						
MW013_270617,	MW02_270617,						
MW011_270617							

Outliers : Frequency of Quality Control Samples

Matrix: **SOIL**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
TRH Volatiles/BTEX	1	19	5.26	10.00	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
TRH - Semivolatile Fraction	2	40	5.00	10.00	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



Matrix: **SOIL**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content (Dried @ 105-110°C)							
Soil Glass Jar - Unpreserved (EA055) TBS289_280617	08-Jun-2017	----	----	----	05-Jul-2017	22-Jun-2017	✖
Soil Glass Jar - Unpreserved (EA055) SED01_280617, SED02_280617, SED03_280617, SED04_280617, SEDQA01_280617, SEDQA02_280617	28-Jun-2017	----	----	----	07-Jul-2017	12-Jul-2017	✔
EP080/071: Total Petroleum Hydrocarbons							
Soil Glass Jar - Unpreserved (EP080) TBS289_280617	08-Jun-2017	05-Jul-2017	22-Jun-2017	✖	05-Jul-2017	22-Jun-2017	✖
Soil Glass Jar - Unpreserved (EP080) SED01_280617, SED02_280617, SED03_280617, SED04_280617, SEDQA01_280617, SEDQA02_280617	28-Jun-2017	05-Jul-2017	12-Jul-2017	✔	06-Jul-2017	12-Jul-2017	✔
Soil Glass Jar - Unpreserved (EP071) SED01_280617, SED02_280617, SED03_280617, SED04_280617, SEDQA01_280617, SEDQA02_280617	28-Jun-2017	06-Jul-2017	12-Jul-2017	✔	07-Jul-2017	15-Aug-2017	✔
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Soil Glass Jar - Unpreserved (EP080) TBS289_280617	08-Jun-2017	05-Jul-2017	22-Jun-2017	✖	05-Jul-2017	22-Jun-2017	✖
Soil Glass Jar - Unpreserved (EP080) SED01_280617, SED02_280617, SED03_280617, SED04_280617, SEDQA01_280617, SEDQA02_280617	28-Jun-2017	05-Jul-2017	12-Jul-2017	✔	06-Jul-2017	12-Jul-2017	✔
Soil Glass Jar - Unpreserved (EP071) SED01_280617, SED02_280617, SED03_280617, SED04_280617, SEDQA01_280617, SEDQA02_280617	28-Jun-2017	06-Jul-2017	12-Jul-2017	✔	07-Jul-2017	15-Aug-2017	✔
EP080: BTEXN							
Soil Glass Jar - Unpreserved (EP080) TBS289_280617	08-Jun-2017	05-Jul-2017	22-Jun-2017	✖	05-Jul-2017	22-Jun-2017	✖
Soil Glass Jar - Unpreserved (EP080) SED01_280617, SED02_280617, SED03_280617, SED04_280617, SEDQA01_280617, SEDQA02_280617	28-Jun-2017	05-Jul-2017	12-Jul-2017	✔	06-Jul-2017	12-Jul-2017	✔
EP231A: Perfluoroalkyl Sulfonic Acids							
Soil Glass Jar - Unpreserved (EP231X) SED01_280617, SED02_280617, SED03_280617, SED04_280617, SEDQA01_280617, SEDQA02_280617	28-Jun-2017	10-Jul-2017	25-Dec-2017	✔	10-Jul-2017	19-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								
Soil Glass Jar - Unpreserved (EP231X)		28-Jun-2017	10-Jul-2017	25-Dec-2017	✓	10-Jul-2017	19-Aug-2017	✓
SED01_280617,	SED02_280617,							
SED03_280617,	SED04_280617,							
SEDQA01_280617,	SEDQA02_280617							
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
Soil Glass Jar - Unpreserved (EP231X)		28-Jun-2017	10-Jul-2017	25-Dec-2017	✓	10-Jul-2017	19-Aug-2017	✓
SED01_280617,	SED02_280617,							
SED03_280617,	SED04_280617,							
SEDQA01_280617,	SEDQA02_280617							
EP231P: PFAS Sums								
Soil Glass Jar - Unpreserved (EP231X)		28-Jun-2017	10-Jul-2017	25-Dec-2017	✓	10-Jul-2017	19-Aug-2017	✓
SED01_280617,	SED02_280617,							
SED03_280617,	SED04_280617,							
SEDQA01_280617,	SEDQA02_280617							

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
EP080/071: Total Petroleum Hydrocarbons								
Amber Glass Bottle - Unpreserved (EP071)								
MW06_260617, MW04_260617, MW03_260617, MW08_260617, WQA02_260617	MW05_260617, MW09_260617, MW010_260617, WQA01_260617,	26-Jun-2017	05-Jul-2017	03-Jul-2017	✖	10-Jul-2017	14-Aug-2017	✔
Amber Glass Bottle - Unpreserved (EP071)								
MW07_270617, WQA05_270617, WQA07_270617,	WQA03_270717, WQA06_270617, WQA09_270617	27-Jun-2017	05-Jul-2017	04-Jul-2017	✖	06-Jul-2017	14-Aug-2017	✔
Amber Glass Bottle - Unpreserved (EP071)								
A1-MW23_270617, A1-MW22_270617, MW015_270617, MW012_270617, MW013_270617, MW011_270617	MW3A_270617, MW3B_270617, MW014_270617, MW01_270617, MW02_270617,	27-Jun-2017	05-Jul-2017	04-Jul-2017	✖	10-Jul-2017	14-Aug-2017	✔
Amber Glass Bottle - Unpreserved (EP071)								
SED01_280617, SEDQA01_280617, WQA01_280617	SED04_280617, SEDQA02_280617,	28-Jun-2017	05-Jul-2017	05-Jul-2017	✔	06-Jul-2017	14-Aug-2017	✔
Amber VOC Vial - Sulfuric Acid (EP080)								
MW06_260617, MW04_260617, MW03_260617, MW08_260617, WQA02_260617	MW05_260617, MW09_260617, MW010_260617, WQA01_260617,	26-Jun-2017	06-Jul-2017	10-Jul-2017	✔	06-Jul-2017	10-Jul-2017	✔
Amber VOC Vial - Sulfuric Acid (EP080)								
A1-MW23_270617, A1-MW22_270617, MW015_270617, MW012_270617, MW013_270617, MW011_270617, WQA03_270717	MW3A_270617, MW3B_270617, MW014_270617, MW01_270617, MW02_270617, MW07_270617,	27-Jun-2017	06-Jul-2017	11-Jul-2017	✔	06-Jul-2017	11-Jul-2017	✔
Amber VOC Vial - Sulfuric Acid (EP080)								
WQA05_270617, WQA07_270617,	WQA06_270617, WQA09_270617	27-Jun-2017	07-Jul-2017	11-Jul-2017	✔	07-Jul-2017	11-Jul-2017	✔
Amber VOC Vial - Sulfuric Acid (EP080)								
SED01_280617, SEDQA01_280617, WQA01_280617	SED04_280617, SEDQA02_280617,	28-Jun-2017	07-Jul-2017	12-Jul-2017	✔	07-Jul-2017	12-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)									
MW06_260617, MW04_260617, MW03_260617, MW08_260617, WQA02_260617	MW05_260617, MW09_260617, MW10_260617, WQA01_260617,	26-Jun-2017	05-Jul-2017	03-Jul-2017	✖		10-Jul-2017	14-Aug-2017	✔
Amber Glass Bottle - Unpreserved (EP071)									
MW07_270617, WQA05_270617, WQA07_270617,	WQA03_270717, WQA06_270617, WQA09_270617	27-Jun-2017	05-Jul-2017	04-Jul-2017	✖		06-Jul-2017	14-Aug-2017	✔
Amber Glass Bottle - Unpreserved (EP071)									
A1-MW23_270617, A1-MW22_270617, MW015_270617, MW012_270617, MW013_270617, MW011_270617	MW3A_270617, MW3B_270617, MW014_270617, MW01_270617, MW02_270617,	27-Jun-2017	05-Jul-2017	04-Jul-2017	✖		10-Jul-2017	14-Aug-2017	✔
Amber Glass Bottle - Unpreserved (EP071)									
SED01_280617, SEDQA01_280617, WQA01_280617	SED04_280617, SEDQA02_280617,	28-Jun-2017	05-Jul-2017	05-Jul-2017	✔		06-Jul-2017	14-Aug-2017	✔
Amber VOC Vial - Sulfuric Acid (EP080)									
MW06_260617, MW04_260617, MW03_260617, MW08_260617, WQA02_260617	MW05_260617, MW09_260617, MW010_260617, WQA01_260617,	26-Jun-2017	06-Jul-2017	10-Jul-2017	✔		06-Jul-2017	10-Jul-2017	✔
Amber VOC Vial - Sulfuric Acid (EP080)									
A1-MW23_270617, A1-MW22_270617, MW015_270617, MW012_270617, MW013_270617, MW011_270617, WQA03_270717	MW3A_270617, MW3B_270617, MW014_270617, MW01_270617, MW02_270617, MW07_270617,	27-Jun-2017	06-Jul-2017	11-Jul-2017	✔		06-Jul-2017	11-Jul-2017	✔
Amber VOC Vial - Sulfuric Acid (EP080)									
WQA05_270617, WQA07_270617,	WQA06_270617, WQA09_270617	27-Jun-2017	07-Jul-2017	11-Jul-2017	✔		07-Jul-2017	11-Jul-2017	✔
Amber VOC Vial - Sulfuric Acid (EP080)									
SED01_280617, SEDQA01_280617, WQA01_280617	SED04_280617, SEDQA02_280617,	28-Jun-2017	07-Jul-2017	12-Jul-2017	✔		07-Jul-2017	12-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) MW06_260617, MW04_260617, MW03_260617, MW08_260617, WQA02_260617	MW05_260617, MW09_260617, MW010_260617, WQA01_260617,	26-Jun-2017	06-Jul-2017	10-Jul-2017	✓	06-Jul-2017	10-Jul-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080) A1-MW23_270617, A1-MW22_270617, MW015_270617, MW012_270617, MW013_270617, MW011_270617, WQA03_270717	MW3A_270617, MW3B_270617, MW014_270617, MW01_270617, MW02_270617, MW07_270617,	27-Jun-2017	06-Jul-2017	11-Jul-2017	✓	06-Jul-2017	11-Jul-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080) WQA05_270617, WQA07_270617,	WQA06_270617, WQA09_270617	27-Jun-2017	07-Jul-2017	11-Jul-2017	✓	07-Jul-2017	11-Jul-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080) SED01_280617, SEDQA01_280617, WQA01_280617	SED04_280617, SEDQA02_280617,	28-Jun-2017	07-Jul-2017	12-Jul-2017	✓	07-Jul-2017	12-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
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE (no PTFE) (EP231X) WQA01_260617,	WQA02_260617	26-Jun-2017	----	----	----	07-Jul-2017	23-Dec-2017	✓
HDPE (no PTFE) (EP231X) MW06_260617, MW04_260617, MW03_260617, MW08_260617	MW05_260617, MW09_260617, MW010_260617,	26-Jun-2017	----	----	----	09-Jul-2017	23-Dec-2017	✓
HDPE (no PTFE) (EP231X) WQA03_270717, WQA06_270617, WQA09_270617	WQA05_270617, WQA07_270617,	27-Jun-2017	----	----	----	07-Jul-2017	24-Dec-2017	✓
HDPE (no PTFE) (EP231X) A1-MW23_270617, A1-MW22_270617, MW3C_270617, MW014_270617, MW01_270617, MW02_270617, MW07_270617	MW3A_270617, MW3B_270617, MW015_270617, MW012_270617, MW013_270617, MW011_270617,	27-Jun-2017	----	----	----	09-Jul-2017	24-Dec-2017	✓
HDPE (no PTFE) (EP231X) SED01_280617, SEDQA01_280617, WQA01_280617	SED04_280617, SEDQA02_280617,	28-Jun-2017	----	----	----	07-Jul-2017	25-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
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE (no PTFE) (EP231X) WQA01_260617,	WQA02_260617	26-Jun-2017	----	----	----	07-Jul-2017	23-Dec-2017	✓
HDPE (no PTFE) (EP231X) MW06_260617, MW04_260617, MW03_260617, MW08_260617	MW05_260617, MW09_260617, MW010_260617,	26-Jun-2017	----	----	----	09-Jul-2017	23-Dec-2017	✓
HDPE (no PTFE) (EP231X) WQA03_270717, WQA06_270617, WQA09_270617	WQA05_270617, WQA07_270617,	27-Jun-2017	----	----	----	07-Jul-2017	24-Dec-2017	✓
HDPE (no PTFE) (EP231X) A1-MW23_270617, A1-MW22_270617, MW3C_270617, MW014_270617, MW01_270617, MW02_270617, MW07_270617	MW3A_270617, MW3B_270617, MW015_270617, MW012_270617, MW013_270617, MW011_270617,	27-Jun-2017	----	----	----	09-Jul-2017	24-Dec-2017	✓
HDPE (no PTFE) (EP231X) SED01_280617, SEDQA01_280617, WQA01_280617	SED04_280617, SEDQA02_280617,	28-Jun-2017	----	----	----	07-Jul-2017	25-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) WQA01_260617,	WQA02_260617	26-Jun-2017	----	----	----	07-Jul-2017	23-Dec-2017	✔
HDPE (no PTFE) (EP231X) MW06_260617, MW04_260617, MW03_260617, MW08_260617	MW05_260617, MW09_260617, MW010_260617,	26-Jun-2017	----	----	----	09-Jul-2017	23-Dec-2017	✔
HDPE (no PTFE) (EP231X) WQA03_270717, WQA06_270617, WQA09_270617	WQA05_270617, WQA07_270617,	27-Jun-2017	----	----	----	07-Jul-2017	24-Dec-2017	✔
HDPE (no PTFE) (EP231X) A1-MW23_270617, A1-MW22_270617, MW3C_270617, MW014_270617, MW01_270617, MW02_270617, MW07_270617	MW3A_270617, MW3B_270617, MW015_270617, MW012_270617, MW013_270617, MW011_270617,	27-Jun-2017	----	----	----	09-Jul-2017	24-Dec-2017	✔
HDPE (no PTFE) (EP231X) SED01_280617, SEDQA01_280617, WQA01_280617	SED04_280617, SEDQA02_280617,	28-Jun-2017	----	----	----	07-Jul-2017	25-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
EP231P: PFAS Sums								
HDPE (no PTFE) (EP231X) WQA01_260617,	WQA02_260617	26-Jun-2017	----	----	----	07-Jul-2017	23-Dec-2017	✓
HDPE (no PTFE) (EP231X) MW06_260617, MW04_260617, MW03_260617, MW08_260617	MW05_260617, MW09_260617, MW010_260617,	26-Jun-2017	----	----	----	09-Jul-2017	23-Dec-2017	✓
HDPE (no PTFE) (EP231X) WQA03_270717, WQA06_270617, WQA09_270617	WQA05_270617, WQA07_270617,	27-Jun-2017	----	----	----	07-Jul-2017	24-Dec-2017	✓
HDPE (no PTFE) (EP231X) A1-MW23_270617, A1-MW22_270617, MW3C_270617, MW014_270617, MW01_270617, MW02_270617, MW07_270617	MW3A_270617, MW3B_270617, MW015_270617, MW012_270617, MW013_270617, MW011_270617,	27-Jun-2017	----	----	----	09-Jul-2017	24-Dec-2017	✓
HDPE (no PTFE) (EP231X) SED01_280617, SEDQA01_280617, WQA01_280617	SED04_280617, SEDQA02_280617,	28-Jun-2017	----	----	----	07-Jul-2017	25-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	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	1	19	5.26	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 & AL QC tandard
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	32	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	40	5.00	10.00	✗	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	6	58	10.34	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	32	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	3	58	5.17	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	32	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	3	58	5.17	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	32	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	3	58	5.17	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 a kane 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-A kane 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.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : EP1707075

Client : AECOM Australia Pty Ltd Contact : [REDACTED] Address : [REDACTED] E-mail : [REDACTED] Telephone : ---- Facsimile : ---- Project : 60543717 Port Hedland Airport Limited Investigation Order number : 60543717 C-O-C number : ---- Site : ---- Sampler : [REDACTED]	Laboratory : Environmental Division Perth Contact : [REDACTED] Address : [REDACTED] E-mail : [REDACTED] Telephone : [REDACTED] Facsimile : [REDACTED] Page : 1 of 4 Quote number : EP2017AECOMAU0004 (EP/541/17) QC Level : NEPM 2013 B3 & ALS QC Standard
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Dates

Date Samples Received : 03-Jul-2017 15:12 Client Requested Due : 12-Jul-2017 Date :	Issue Date : 04-Jul-2017 Scheduled Reporting Date : 12-Jul-2017
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Delivery Details

Mode of Delivery : Carrier No. of coolers/boxes : 7 Receipt Detail :	Security Seal : Intact. Temperature : 10.3 - Ice present No. of samples received / analysed : 39 / 39
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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.

- 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	SOL - EA055-103 Moisture Content	SOL - EP231 (solids) PFAS - Short Suite (12 analytes)	SOL - S-04 TRH/BTEXN	SOL - S-18 TRH(C6-C9)/BTEXN
EP1707075-029	28-Jun-2017 00:00	SED01_280617	✓	✓	✓	
EP1707075-030	28-Jun-2017 00:00	SED02_280617	✓	✓	✓	
EP1707075-031	28-Jun-2017 00:00	SED03_280617	✓	✓	✓	
EP1707075-033	28-Jun-2017 00:00	SED04_280617	✓	✓	✓	
EP1707075-036	28-Jun-2017 00:00	SEDQA01_280617	✓	✓	✓	
EP1707075-037	28-Jun-2017 00:00	SEDQA02_280617	✓	✓	✓	
EP1707075-039	08-Jun-2017 00:00	TBS289_280617	✓			✓

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - EP231 PFAS - Short Suite (12 analytes)	WATER - W-04 TRH/BTEXN
EP1707075-001	26-Jun-2017 00:00	MW06_260617	✓	✓
EP1707075-002	26-Jun-2017 00:00	MW05_260617	✓	✓
EP1707075-003	26-Jun-2017 00:00	MW04_260617	✓	✓
EP1707075-004	26-Jun-2017 00:00	MW09_260617	✓	✓
EP1707075-005	26-Jun-2017 00:00	MW03_260617	✓	✓
EP1707075-006	26-Jun-2017 00:00	MW010_260617	✓	✓
EP1707075-007	26-Jun-2017 00:00	MW08_260617	✓	✓
EP1707075-008	27-Jun-2017 00:00	A1-MW23_270617	✓	✓
EP1707075-009	27-Jun-2017 00:00	MW3A_270617	✓	✓
EP1707075-010	27-Jun-2017 00:00	A1-MW22_270617	✓	✓
EP1707075-011	27-Jun-2017 00:00	MW3B_270617	✓	✓
EP1707075-012	27-Jun-2017 00:00	MW3C_270617	✓	
EP1707075-013	27-Jun-2017 00:00	MW015_270617	✓	✓
EP1707075-014	27-Jun-2017 00:00	MW014_270617	✓	✓
EP1707075-015	27-Jun-2017 00:00	MW012_270617	✓	✓
EP1707075-016	27-Jun-2017 00:00	MW01_270617	✓	✓



			WATER - EP231 PFAS - Short Suite (12 analytes)	WATER - W-04 TRH/BTEXN
EP1707075-017	27-Jun-2017 00:00	MW013_270617	✓	✓
EP1707075-018	27-Jun-2017 00:00	MW02_270617	✓	✓
EP1707075-019	27-Jun-2017 00:00	MW011_270617	✓	✓
EP1707075-020	27-Jun-2017 00:00	MW07_270617	✓	✓
EP1707075-021	26-Jun-2017 00:00	WQA01_260617	✓	✓
EP1707075-022	26-Jun-2017 00:00	WQA02_260617	✓	✓
EP1707075-023	27-Jun-2017 00:00	WQA03_270717	✓	✓
EP1707075-024	27-Jun-2017 00:00	WQA05_270617	✓	✓
EP1707075-025	27-Jun-2017 00:00	WQA06_270617	✓	✓
EP1707075-026	27-Jun-2017 00:00	WQA07_270617	✓	✓
EP1707075-027	27-Jun-2017 00:00	WQA09_270617	✓	✓
EP1707075-028	28-Jun-2017 00:00	SED01_280617	✓	✓
EP1707075-032	28-Jun-2017 00:00	SED04_280617	✓	✓
EP1707075-034	28-Jun-2017 00:00	SEDQA01_280617	✓	✓
EP1707075-035	28-Jun-2017 00:00	SEDQA02_280617	✓	✓
EP1707075-038	28-Jun-2017 00:00	WQA01_280617	✓	✓

Proactive Holding Time Report

The following table summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory

Matrix: SOIL

Evaluation: ✗ = Holding time breach ; ✓ = Within holding time.

Method	Client Sample ID(s)	Container	Due for extraction	Due for analysis	Samples Received		Instructions Received	
					Date	Evaluation	Date	Evaluation
EA055: Moisture Content								
TBS289_280617	Soil Glass Jar - Unpreserved		----	22-Jun-2017	03-Jul-2017	✗	----	----
EP080: TRH Volatiles/BTEX								
TBS289_280617	Soil Glass Jar - Unpreserved		22-Jun-2017	22-Jun-2017	03-Jul-2017	✗	----	----

[illegible]

**AECOM**

TURNAROUND REQUIREMENTS

Standard TAT (List due date)

FOR LABORATORY USE ONLY (Circle)

CLIENT: AECOM Services Pty Ltd.
OFFICE: Level 6, 3 Forrest Place, Perth, WA, 6000

Purchase Order NO.: 60543717

QUOTE NO.: EN / 004 / 10

COUNTRY OF ORIGIN: Australia

COC:

Random Sample Temperature on Receipt:

COC Emailed to ALS? YES

PLEASE FORWARD THE FOLLOWING SAMPLES TO EUROFINS LABORATORIES: WQA04_270617, WQA08_270617, WQA010_270617 for analysis of ER231 (DER recommended PFAS suite)

LAB ID	Area	SAMPLE ID	DATE	TIME	MATRIX	TOTAL BOTTLES	SP21 (Kb or 100mL)	W-4 TPH/THI/CS CAS or 40/100mL plus FL/FL	S-13/ W-15 TPH/THI/CS CAS or 40/100mL plus FL/FL	ON HOLD	Comments
1	APFC 1	MM08 200817	26.08.17		Groundwater	4	X	X			EXTRA AMBER & 1 PLASTIC GREY (PPOS)
2	Preserving - South of APFC 1	MM01 200817	26.08.17		Groundwater	4	X				
3	Preserving - further lower south of APFC 2	MM04 200817	26.08.17		Groundwater	4	X	X			
4	APFC 1	MM03 200817	26.08.17		Groundwater	4	X				
5	Preserving - between APFC 1 & 2	MM010 200817	26.08.17		Groundwater	4	X	X			
6	APFC 2	MM03 200817	26.08.17		Groundwater	6	X	X			EXTRA AMBER & 1 PLASTIC GREY (PPOS)
7	APFC 1	MM03 200817	26.08.17		Groundwater	4	X	X			
8	APFC 3	MM025 270817	27.08.17		Groundwater	4	X	X			
9	APFC 3	MM025 270817	27.08.17		Groundwater	4	X	X			
10	APFC 3	MM025 270817	27.08.17		Groundwater	4	X	X			
11	APFC 3	MM025 270817	27.08.17		Groundwater	4	X	X			
12	APFC 3	MM025 270817	27.08.17		Groundwater	4	X	X			
13	APFC 2	MM014 270817	27.08.17		Groundwater	4	X	X			
14	APFC 2	MM012 270817	27.08.17		Groundwater	4	X	X			
15	APFC 2	MM012 270817	27.08.17		Groundwater	4	X	X			
16	Preserving - APFC 2	MM013 270817	27.08.17		Groundwater	4	X	X			
17	APFC 2	MM013 270817	27.08.17		Groundwater	4	X	X			
18	Preserving - APFC 2	MM013 270817	27.08.17		Groundwater	4	X	X			
19	APFC 2	MM013 270817	27.08.17		Groundwater	4	X	X			
20	APFC 1	MM01 270817	27.08.17		Groundwater	6	X	X			EXTRA AMBER & 1 PLASTIC GREY (PPOS)
21	APFC 1	MM01 270817	26.08.17		Groundwater	4	X	X			
22	APFC 1	MM042 200817	26.08.17		Groundwater	4	X	X			
23	APFC 1	MM042 200817	26.08.17		Groundwater	4	X	X			
24	APFC 1	MM042 200817	26.08.17		Groundwater	4	X	X			
25	APFC 1	MM042 200817	26.08.17		Groundwater	4	X	X			
26	APFC 1	MM042 200817	26.08.17		Groundwater	4	X	X			
27	APFC 1	MM042 200817	26.08.17		Groundwater	4	X	X			
28	APFC 1	MM042 200817	26.08.17		Groundwater	4	X	X			
29	APFC 1	MM042 200817	26.08.17		Groundwater	4	X	X			
30	APFC 1	MM042 200817	26.08.17		Groundwater	4	X	X			
31	APFC 1	MM042 200817	26.08.17		Groundwater	4	X	X			
32	APFC 1	MM042 200817	26.08.17		Groundwater	4	X	X			
33	APFC 1	MM042 200817	26.08.17		Groundwater	4	X	X			
34	APFC 1	MM042 200817	26.08.17		Groundwater	4	X	X			
35	APFC 1	MM042 200817	26.08.17		Groundwater	4	X	X			
36	APFC 1	MM042 200817	26.08.17		Groundwater	4	X	X			
37	APFC 1	MM042 200817	26.08.17		Groundwater	4	X	X			
38	APFC 1	MM042 200817	26.08.17		Groundwater	4	X	X			
39	APFC 1	MM042 200817	26.08.17		Groundwater	4	X	X			
40	APFC 1	MM042 200817	26.08.17		Groundwater	4	X	X			
41	APFC 1	MM042 200817	26.08.17		Groundwater	4	X	X			
42	APFC 1	MM042 200817	26.08.17		Groundwater	4	X	X			
43	APFC 1	MM042 200817	26.08.17		Groundwater	4	X	X			

1-800-828-7651



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 552887-W
Project name PORT HEDLAND AIPORT LIMITED INVESTIGATION
Project ID 60542717.3.3
Rece ved Date Ju 05, 2017

Client Sample ID			WQA04 27061 7	WQA08 27061 7	WQA010 2706 17
Sample Matrix			Water	Water	Water
Eurofins mgt Sample No.			B17-JI03915	B17-JI03916	B17-JI03917
Date Sampled			Jun 27, 2017	Jun 27, 2017	Jun 27, 2017
Test/Reference	LOR	Un t			
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 (Tota)	0.1	mg/L	< 0.1	< 0.1	< 0.1
BTEX					
Benzene	0.001	mg/L	< 0.001	< 0.001	< 0.001
To uene	0.001	mg/L	< 0.001	< 0.001	< 0.001
Ethy benzene	0.001	mg/L	< 0.001	< 0.001	< 0.001
m&p-Xy enes	0.002	mg/L	< 0.002	< 0.002	< 0.002
o-Xy ene	0.001	mg/L	< 0.001	< 0.001	< 0.001
Xy enes - Tota	0.003	mg/L	< 0.003	< 0.003	< 0.003
4-Bromof uorobenzene (surr.)	1	%	100	99	100
Total Recoverable Hydrocarbons - 2013 NEPM Fractions					
Naphtha ene ^{N02}	0.01	mg/L	< 0.01	< 0.01	< 0.01
TRH C6-C10 ess 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 ess Naphtha ene (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	G01
Perf uorobutano c ac d (PFBA)	0.05	ug/L	1.6	6.1	46
Perf uoropentano c ac d (PFPeA)	0.01	ug/L	^{N09} 3.7	^{N09} 14	^{N09} 98
Perf uorohexano c ac d (PFHxA)	0.01	ug/L	^{N09} 17	^{N09} 89	^{N09} 690
Perf uoroheptano c ac d (PFHpA)	0.01	ug/L	^{N09} 1.1	^{N09} 17	^{N09} 48
Perf uorooctano c ac d (PFOA)	0.01	ug/L	^{N09} 2.1	^{N09} 80	^{N09} 92
Perf uorononano c ac d (PFNA)	0.01	ug/L	< 0.2	< 5	< 5
Perf uorodecano c ac d (PFDA)	0.01	ug/L	< 0.2	< 5	< 5
Perf uoroundecano c ac d (PFUnA)	0.01	ug/L	< 0.2	< 5	< 5
Perf uorododecano c ac d (PFDoA)	0.01	ug/L	< 0.2	< 5	< 5
Perf uorotr decano c ac d (PFTTrDA)	0.01	ug/L	< 0.2	< 5	< 5
Perf uorotetradecano c ac d (PFTeDA)	0.01	ug/L	< 0.2	< 5	< 5
13C4-PFBA (surr.)	1	%	70	99	97

Client Sample ID			WQA04 270617	WQA08 270617	WQA010 270617
Sample Matrix			Water	Water	Water
Eurofins mgt Sample No.			B17-JI03915	B17-JI03916	B17-JI03917
Date Sampled			Jun 27, 2017	Jun 27, 2017	Jun 27, 2017
Test/Reference	LOR	Un t			
Perfluoroalkyl carboxylic acids (PFCAs)					
13C5-PFPeA (surr.)	1	%	80	96	94
13C5-PFHxA (surr.)	1	%	86	104	97
13C4-PFHpA (surr.)	1	%	92	106	103
13C8-PFOA (surr.)	1	%	95	105	106
13C5-PFNA (surr.)	1	%	92	104	109
13C6-PFDA (surr.)	1	%	92	103	105
13C2-PFUnDA (surr.)	1	%	104	122	134
13C2-PFDoDA (surr.)	1	%	103	142	154
13C2-PFTeDA (surr.)	1	%	17	130	142
Perfluoroalkane sulfonamides (PFASAs)					
Comments			G01	G01	G01
Perf uorooctane su fonam de (FOSA)	0.05	ug/L	< 0.2	< 5	< 5
N-methy perf uoro-1-octane su fonam de (N-MeFOSA)	0.05	ug/L	< 0.2	< 5	< 5
N-ethy perf uoro-1-octane su fonam de (N-EtFOSA)	0.05	ug/L	< 0.2	< 5	< 5
2-(N-methy perf uoro-1-octane su fonam do)-ethano (N-MeFOSE)	0.05	ug/L	< 0.2	< 5	< 5
2-(N-ethy perf uoro-1-octane su fonam do)-ethano (N-EtFOSE)	0.05	ug/L	< 0.2	< 5	< 5
N-ethy -perf uorooctanesu fonam doacet c ac d (N-EtFOSAA)	0.05	ug/L	< 0.2	< 5	< 5
N-methy -perf uorooctanesu fonam doacet c ac d (N-MeFOSAA)	0.05	ug/L	< 0.2	< 5	< 5
13C8-FOSA (surr.)	1	%	133	125	135
D3-N-MeFOSA (surr.)	1	%	107	123	130
D5-N-EtFOSA (surr.)	1	%	91	131	136
D7-N-MeFOSE (surr.)	1	%	73	124	127
D9-N-EtFOSE (surr.)	1	%	50	142	146
D5-N-EtFOSAA (surr.)	1	%	90	100	107
D3-N-MeFOSAA (surr.)	1	%	95	106	113
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSAAs)					
Comments			G01	G01	G01
Perf uorobutanesu fon c ac d (PFBS)	0.01	ug/L	6.9	30	N09200
Perf uoropentanesu fon c ac d (PFPeS)	0.01	ug/L	N097.6	N0951	N09220
Perf uorohexanesu fon c ac d (PFHxS)	0.01	ug/L	N0939	N091400	N091600
Perf uoroheptanesu fon c ac d (PFHpS)	0.01	ug/L	N091.9	N0954	N0971
Perf uorooctanesu fon c ac d (PFOS) ^{N11}	0.01	ug/L	N0967	N091300	N092300
Perf uorodecanesu fon c ac d (PFDS)	0.01	ug/L	< 0.2	< 5	< 5
13C3-PFBS (surr.)	1	%	105	105	104
18O2-PFHxS (surr.)	1	%	96	90	95
13C8-PFOS (surr.)	1	%	98	101	101
n:2 Fluorotelomer sulfonic acids					
Comments			G01	G01	G01
1H.1H.2H.2H-perf uorohexanesu fon c ac d (4:2 FTS)	0.01	ug/L	< 0.2	< 5	< 5
1H.1H.2H.2H-perf uorooctanesu fon c ac d (6:2 FTS)	0.05	ug/L	< 0.2	< 5	< 5
1H.1H.2H.2H-perf uorodecanesu fon c ac d (8:2 FTS)	0.01	ug/L	< 0.2	< 5	< 5
1H.1H.2H.2H-perf uorododecanesu fon c ac d (10:2 FTS)	0.01	ug/L	< 0.2	< 5	< 5
13C2-4:2 FTS (surr.)	1	%	38	53	36
13C2-6:2 FTS (surr.)	1	%	39	65	52
13C2-8:2 FTS (surr.)	1	%	58	97	90

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported. A recent review of our LMS 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
Tota Recoverable Hydrocarbons - 1999 NEPM Fractions - Method L M-ORG-2010 RH C6-C36	Mebourne	Ju 07, 2017	7 Day
Tota Recoverable Hydrocarbons - 2013 NEPM Fractions - Method RH C6-C40 - L M-ORG-2010	Br sbane	Ju 05, 2017	7 Day
Tota Recoverable Hydrocarbons - 2013 NEPM Fractions - Method RH C6-C40 - L M-ORG-2010	Mebourne	Ju 07, 2017	7 Day
BTEX and Naphthalene BTEX - Method RH C6-C40 - L M-ORG-2010	Br sbane	Ju 05, 2017	14 Day
Per- and Polyfluorinated Alkyl Substances (PFASs) - Trace Perfluorinated carboxylic acids (PFCAs) - Method L M-ORG-2100 Per- and Polyfluorinated Alkyl Substances by LC-MS/MS	Br sbane	Ju 05, 2017	14 Day
Perfluorinated sulfonamides (PFASAs) - Method L M-ORG-2100 Per- and Polyfluorinated Alkyl Substances by LC-MS/MS	Br sbane	Ju 05, 2017	14 Day
Perfluorinated sulfonic acids & Perfluorinated sulfonates (PFSAs) - Method L M-ORG-2100 Per- and Polyfluorinated Alkyl Substances by LC-MS/MS	Br sbane	Ju 05, 2017	14 Day
n:2 Fluorotelomer sulfonic acids - Method L M-ORG-2100 Per- and Polyfluorinated Alkyl Substances by LC-MS/MS	Br sbane	Ju 05, 2017	14 Day

Company Name: AECOM Aust Pty Ltd Perth
Address: Leve 4, 3 Forrest P ace
Perth
WA 6000

Project Name: PORT HEDLAND INTERNATIONAL AIPORT LIMITED INVESTIGATION
Project ID: 60542717.3.3

Order No.:
Report #: 552887
Phone:
Fax:

Received: Ju 5, 2017 9:00 AM
Due: Ju 12, 2017
Priority: 5 Day
Contact Name:

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 2706 17	Jun 27, 2017		Water	B17-J 03915	X	X	X
2	WQA08 2706 17	Jun 27, 2017		Water	B17-J 03916	X	X	X
3	WQA010 270 617	Jun 27, 2017		Water	B17-J 03917	X	X	X
Test Counts						3	3	3

Internal Quality Control Review and Glossary

General

- 1 Laboratory QC results or 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 or matrix spikes or surrogate recoveries except for P-AS 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' or 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 time frame, 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 NO 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 & P-ASs

P-AS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.1 where no positive P-AS 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, dioxaphene & Chlordane are not added to the LCS.
- 4 Organochlorine Pesticide analysis - where reporting Spike data, dioxaphene 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 its 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. Where 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 "N/A" 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	
Ethyl benzene	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 (PFTeDA)	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-methyl perfluoro-1-octane sulfonamide (N-MeFOSA)	ug/L	< 0.05			0.05	Pass	
N-ethyl perfluoro-1-octane sulfonamide (N-EtFOSA)	ug/L	< 0.05			0.05	Pass	
2-(N-methyl perfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	ug/L	< 0.05			0.05	Pass	
2-(N-ethyl perfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	ug/L	< 0.05			0.05	Pass	
N-ethyl -perfluorooctanesulfonamide doacetate (N-EtFOSAA)	ug/L	< 0.05			0.05	Pass	
N-methyl -perfluorooctanesulfonamide doacetate (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	
Perfluorodecane sulfonic 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-perf uorohexanesu fon c ac d (4:2 FTS)	ug/L	< 0.01			0.01	Pass	
1H.1H.2H.2H-perf uorooctanesu fon c ac d (6:2 FTS)	ug/L	< 0.05			0.05	Pass	
1H.1H.2H.2H-perf uorodecanesu fon c ac d (8:2 FTS)	ug/L	< 0.01			0.01	Pass	
1H.1H.2H.2H-perf uorododecanesu fon c ac d (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	%	81			70-130	Pass	
LCS - % Recovery							
BTEX							
Benzene	%	99			70-130	Pass	
To uene	%	101			70-130	Pass	
Ethy benzene	%	96			70-130	Pass	
m&p-Xy enes	%	92			70-130	Pass	
Xy enes - Tota	%	92			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
TRH C6-C10	%	95			70-130	Pass	
TRH >C10-C16	%	92			70-130	Pass	
LCS - % Recovery							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perf uorobutano c ac d (PFBA)	%	105			50-150	Pass	
Perf uoropentano c ac d (PFPeA)	%	96			50-150	Pass	
Perf uorohexano c ac d (PFHxA)	%	102			50-150	Pass	
Perf uoroheptano c ac d (PFHpA)	%	101			50-150	Pass	
Perf uorooctano c ac d (PFOA)	%	100			50-150	Pass	
Perf uorononano c ac d (PFNA)	%	103			50-150	Pass	
Perf uorodecano c ac d (PFDA)	%	103			50-150	Pass	
Perf uoroundecano c ac d (PFUnA)	%	96			50-150	Pass	
Perf uorododecano c ac d (PFDoA)	%	95			50-150	Pass	
Perf uorotr decano c ac d (PFTrDA)	%	64			50-150	Pass	
Perf uorotetradecano c ac d (PFTeDA)	%	95			50-150	Pass	
LCS - % Recovery							
Perfluoroalkane sulfonamides (PFASAs)							
Perf uorooctane su fonam de (FOSA)	%	97			50-150	Pass	
N-methy perf uoro-1-octane su fonam de (N-MeFOSA)	%	97			50-150	Pass	
N-ethy perf uoro-1-octane su fonam de (N-EtFOSA)	%	98			50-150	Pass	
2-(N-methy perf uoro-1-octane su fonam do)-ethano (N-MeFOSE)	%	101			50-150	Pass	
2-(N-ethy perf uoro-1-octane su fonam do)-ethano (N-EtFOSE)	%	87			50-150	Pass	
N-ethy -perf uorooctanesu fonam doacet c ac d (N-EtFOSAA)	%	96			50-150	Pass	
N-methy -perf uorooctanesu fonam doacet c ac d (N-MeFOSAA)	%	93			50-150	Pass	
LCS - % Recovery							
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSAs)							
Perf uorobutanesu fon c ac d (PFBS)	%	104			50-150	Pass	
Perf uoropentanesu fon c ac d (PFPeS)	%	104			50-150	Pass	
Perf uorohexanesu fon c ac d (PFHxS)	%	103			50-150	Pass	
Perf uoroheptanesu fon c ac d (PFHpS)	%	106			50-150	Pass	
Perf uorooctanesu fon c ac d (PFOS)	%	99			50-150	Pass	
Perf uorodecanesu fon c ac d (PFDS)	%	54			50-150	Pass	
LCS - % Recovery							
n:2 Fluorotelomer sulfonic acids							
1H.1H.2H.2H-perf uorohexanesu fon c ac d (4:2 FTS)	%	99			50-150	Pass	

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
1H.1H.2H.2H-perf uorooctanesu fon c ac d (6:2 FTS)			%	86			50-150	Pass	
1H.1H.2H.2H-perf uorodecanesu fon c ac d (8:2 FTS)			%	99			50-150	Pass	
1H.1H.2H.2H-perf uorododecanesu fon c ac d (10:2 FTS)			%	53			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					
Perf uorobutano c ac d (PFBA)	M17-J 03442	NCP	%	97			50-150	Pass	
Perf uoropentano c ac d (PFPeA)	M17-J 03442	NCP	%	95			50-150	Pass	
Perf uorohexano c ac d (PFHxA)	M17-J 03442	NCP	%	95			50-150	Pass	
Perf uoroheptano c ac d (PFHpA)	M17-J 03442	NCP	%	97			50-150	Pass	
Perf uorooctano c ac d (PFOA)	M17-J 03442	NCP	%	97			50-150	Pass	
Perf uorononano c ac d (PFNA)	M17-J 03442	NCP	%	98			50-150	Pass	
Perf uorodecano c ac d (PFDA)	M17-J 03442	NCP	%	104			50-150	Pass	
Perf uoroundecano c ac d (PFUnA)	M17-J 03442	NCP	%	91			50-150	Pass	
Perf uorododecano c ac d (PFDoA)	M17-J 03442	NCP	%	98			50-150	Pass	
Perf uorotridecano c ac d (PFTrDA)	M17-J 03442	NCP	%	76			50-150	Pass	
Perf uorotetradecano c ac d (PFTeDA)	M17-J 03442	NCP	%	95			50-150	Pass	
Spike - % Recovery									
Perfluoroalkane sulfonamides (PFASAs)				Result 1					
Perf uorooctane su fonam de (FOSA)	M17-J 03442	NCP	%	90			50-150	Pass	
N-methy perf uoro-1-octane su fonam de (N-MeFOSA)	M17-J 03442	NCP	%	91			50-150	Pass	
N-ethy perf uoro-1-octane su fonam de (N-EtFOSA)	M17-J 03442	NCP	%	97			50-150	Pass	
2-(N-methy perf uoro-1-octane su fonam do)-ethano (N-MeFOSE)	M17-J 03442	NCP	%	102			50-150	Pass	
2-(N-ethy perf uoro-1-octane su fonam do)-ethano (N-EtFOSE)	M17-J 03442	NCP	%	90			50-150	Pass	
N-ethy - perf uorooctanesu fonam doacet c ac d (N-EtFOSAA)	M17-J 03442	NCP	%	92			50-150	Pass	
N-methy - perf uorooctanesu fonam doacet c ac d (N-MeFOSAA)	M17-J 03442	NCP	%	90			50-150	Pass	
Spike - % Recovery									
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSAs)				Result 1					
Perf uorobutanesu fon c ac d (PFBS)	M17-J 03442	NCP	%	100			50-150	Pass	
Perf uoropentanesu fon c ac d (PFPeS)	M17-J 03442	NCP	%	100			50-150	Pass	
Perf uorohexanesu fon c ac d (PFHxS)	M17-J 03442	NCP	%	96			50-150	Pass	
Perf uoroheptanesu fon c ac d (PFHpS)	M17-J 03442	NCP	%	101			50-150	Pass	
Perf uorooctanesu fon c ac d (PFOS)	M17-J 03442	NCP	%	93			50-150	Pass	
Perf uorodecanesu fon c ac d (PFDS)	M17-J 03442	NCP	%	71			50-150	Pass	
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids				Result 1					
1H.1H.2H.2H-perf uorohexanesu fon c ac d (4:2 FTS)	M17-J 03442	NCP	%	95			50-150	Pass	
1H.1H.2H.2H-perf uorooctanesu fon c ac d (6:2 FTS)	M17-J 03442	NCP	%	91			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	M17-J 03442	NCP	%	87			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTS)	M17-J 03442	NCP	%	68			50-150	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C10-C14	B17-J 03916	CP	%	83			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
TRH >C10-C16	B17-J 03916	CP	%	95			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C6-C9	B17-J 03917	CP	%	82			70-130	Pass	
Spike - % Recovery									
BTEX				Result 1					
Benzene	B17-J 03917	CP	%	92			70-130	Pass	
Toluene	B17-J 03917	CP	%	96			70-130	Pass	
Ethylbenzene	B17-J 03917	CP	%	89			70-130	Pass	
m&p-Xylenes	B17-J 03917	CP	%	86			70-130	Pass	
o-Xylene	B17-J 03917	CP	%	85			70-130	Pass	
Xylenes - Total	B17-J 03917	CP	%	86			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
TRH C6-C10	B17-J 03917	CP	%	83			70-130	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C10-C14	B17-J 03915	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
TRH C15-C28	B17-J 03915	CP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH C29-C36	B17-J 03915	CP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
TRH >C10-C16	B17-J 03915	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
TRH >C16-C34	B17-J 03915	CP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH >C34-C40	B17-J 03915	CP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
Duplicate									
Perfluoroalkyl carboxylic acids (PFCA's)				Result 1	Result 2	RPD			
Perfluorobutanoic acid (PFBA)	B17-J 09265	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	B17-J 09265	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorohexanoic acid (PFHxA)	B17-J 09265	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	B17-J 09265	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	B17-J 09265	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorononanoic acid (PFNA)	B17-J 09265	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorodecanoic acid (PFDA)	B17-J 09265	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnA)	B17-J 09265	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorododecanoic acid (PFDoA)	B17-J 09265	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotridecanoic acid (PFTTrDA)	B17-J 09265	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	B17-J 09265	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	

Duplicate								
Perfluoroalkane sulfonamides (PFASAs)				Resu t 1	Resu t 2	RPD		
Perf uorooctane su fonam de (FOSA)	B17-J 09265	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
N-methy perf uoro-1-octane su fonam de (N-MeFOSA)	B17-J 09265	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
N-ethy perf uoro-1-octane su fonam de (N-EtFOSA)	B17-J 09265	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
2-(N-methy perf uoro-1-octane su fonam do)-ethano (N-MeFOSE)	B17-J 09265	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
2-(N-ethy perf uoro-1-octane su fonam do)-ethano (N-EtFOSE)	B17-J 09265	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
N-ethy - perf uorooctanesu fonam doacet c ac d (N-EtFOSAA)	B17-J 09265	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
N-methy - perf uorooctanesu fonam doacet c ac d (N-MeFOSAA)	B17-J 09265	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
Duplicate								
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSAAs)				Resu t 1	Resu t 2	RPD		
Perf uorobutanesu fon c ac d (PFBS)	B17-J 09265	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perf uoropentanesu fon c ac d (PFPeS)	B17-J 09265	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perf uorohexanesu fon c ac d (PFHxS)	B17-J 09265	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perf uoroheptanesu fon c ac d (PFHpS)	B17-J 09265	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perf uorooctanesu fon c ac d (PFOS)	B17-J 09265	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perf uorodecanesu fon c ac d (PFDS)	B17-J 09265	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Duplicate								
n:2 Fluorotelomer sulfonic acids				Resu t 1	Resu t 2	RPD		
1H.1H.2H.2H-perf uorohexanesu fon c ac d (4:2 FTS)	B17-J 09265	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
1H.1H.2H.2H-perf uorooctanesu fon c ac d (6:2 FTS)	B17-J 09265	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
1H.1H.2H.2H-perf uorodecanesu fon c ac d (8:2 FTS)	B17-J 09265	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
1H.1H.2H.2H-perf uorododecanesu fon c ac d (10:2 FTS)	B17-J 09265	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Duplicate								
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Resu t 1	Resu t 2	RPD		
TRH C6-C9	B17-J 03916	CP	mg/L	< 0.02	< 0.02	<1	30%	Pass
Duplicate								
BTEX				Resu t 1	Resu t 2	RPD		
Benzene	B17-J 03916	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
To uene	B17-J 03916	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Ethy benzene	B17-J 03916	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
m&p-Xy enes	B17-J 03916	CP	mg/L	< 0.002	< 0.002	<1	30%	Pass
o-Xy ene	B17-J 03916	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Xy enes - Tota	B17-J 03916	CP	mg/L	< 0.003	< 0.003	<1	30%	Pass
Duplicate								
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Resu t 1	Resu t 2	RPD		
Naphtha ene	B17-J 03916	CP	mg/L	< 0.01	< 0.01	<1	30%	Pass
TRH C6-C10	B17-J 03916	CP	mg/L	< 0.02	< 0.02	<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).

Authorised By

[Redacted Signature]

[Redacted Signature]

[Redacted Signature]

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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Sample Receipt Advice

Company name: **AECOM Aust Pty Ltd Perth**

Contact name: **[REDACTED]**

Project name: **PORT HEDLAND INTERNATIONAL AIPTORT LIMITED INVESTIGATION**

Project ID: **60542717.3.3**

COC number: **Not provided**

Turn around time: **5 Day**

Date/Time received: **Jul 5, 2017 9:00 AM**

Eurofins | mgt reference: **552887**

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

[REDACTED]

[REDACTED]

[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 2706 17	Jun 27, 2017		Water	B17-J 03915	X	X	X
2	WQA08 2706 17	Jun 27, 2017		Water	B17-J 03916	X	X	X
3	WQA010 270 617	Jun 27, 2017		Water	B17-J 03917	X	X	X
Test Counts						3	3	3



TURNAROUND REQUIREMENTS

ALS QUOTE NO.:

Standard TAT (List due date)

FOR LABORATORY USE ONLY (Circle)

Free ice / frozen ice bricks present upon receipt.
Barrow, Carmela, Temperature on Board:

maintain stable temperature on receipt

COC Emailled to AIS? YES

EDD FORMAT (or default): Esdat

DATE/TIME

PLEASE FORWARD THE FOLLOWING SAMPLES TO EUROFINS LABORATORIES: WQA04_270617, WQA08_270617, WQA010_270617 for analysis of ER231 (DER recommended PFAS suite)

[illegible]

Maths
Qan 5/7/17

# CON		POST CODE
NOTES		
☒ LE	☐ AP	☐ MASS
☐ CN	☐ CR	
☐ ID	☐	

11.6
 01.2
 10.4
10.4

NO SEAL
 ICE
 COURIER

4 JUL 17 11:36
 4 JUL 17 11:36

6.5
 5.3
 6.6
-0.3
5.83

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : EP1706611

Amendment : 1

Client : **AECOM SERVICES PTY LTD**
 Contact : [REDACTED]
 Address : Supplier ID number - 1179447 LEVEL
 6 3 FORREST PLACE
 PERTH WA, AUSTRALIA 6000

Laboratory : Environmental Division Perth
 Contact : [REDACTED]
 Address : 10 Hod Way Malaga WA Australia 6090

E-mail : [REDACTED]
 Telephone : [REDACTED]
 Facsimile : [REDACTED]

E-mail : [REDACTED]
 Telephone : [REDACTED]
 Facsimile : [REDACTED]

Project : 6054717.3.3 Port Hedland
 International Airport – PFAS
 Investigation

Page : 1 of 7

Order number : 6054717.3.3

Quote number : EP2017URSWA0001 (EN/004/16)

C-O-C number : ----

QC Level : NEPM 2013 B3 & ALS QC Standard

Site : ----

Sampler : [REDACTED]

Dates

Date Samples Received : 21-Jun-2017 15:40

Issue Date : 07-Jul-2017

Client Requested Due Date : 14-Jul-2017

Scheduled Reporting Date : **14-Jul-2017**

Delivery Details

Mode of Delivery : Carrier

Security Seal : Not Available

No. of coolers/boxes : 6

Temperature : 3.7 - Ice present

Receipt Detail :

No. of samples received / analysed : 110 / 61

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		
SS14_0.5_170617	- HDPE Soil Jar	- Soil Glass Jar - Unpreserved
SS23_0.5_170617	- HDPE Soil Jar	- Soil Glass Jar - Unpreserved
SS3D_1.3_190617	- HDPE Soil Jar	- Soil Glass Jar - Unpreserved
TRH Volatiles/BTEX : EP080		
SS14_0.5_170617	- HDPE Soil Jar	- Soil Glass Jar - Unpreserved
SS23_0.5_170617	- HDPE Soil Jar	- Soil Glass Jar - Unpreserved
SS3D_1.3_190617	- HDPE Soil Jar	- Soil Glass Jar - Unpreserved

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/BTEX
EP1706611-001	16-Jun-2017 00:00	SS11_0.8_160617		✓	✓	
EP1706611-002	16-Jun-2017 00:00	SS11_1.5_160617		✓	✓	
EP1706611-003	16-Jun-2017 00:00	SS12_0.8_160617		✓	✓	
EP1706611-004	16-Jun-2017 00:00	SS12_1.5_160617		✓	✓	
EP1706611-005	16-Jun-2017 00:00	SS10_0.8_160617		✓	✓	
EP1706611-006	16-Jun-2017 00:00	SS10_1.5_160617		✓	✓	
EP1706611-007	16-Jun-2017 00:00	SS13_0.8_160617		✓	✓	
EP1706611-008	16-Jun-2017 00:00	SS13_1.5_160617		✓	✓	
EP1706611-009	16-Jun-2017 00:00	SS13_3.5_160617	✓			
EP1706611-010	17-Jun-2017 00:00	SS15_0.1_170617		✓	✓	
EP1706611-011	17-Jun-2017 00:00	SS15_0.5_170617		✓		✓
EP1706611-012	17-Jun-2017 00:00	SS15_0.8_170617	✓			
EP1706611-013	17-Jun-2017 00:00	SS15_1.4_170617		✓	✓	
EP1706611-014	17-Jun-2017 00:00	SS15_1.6_170617	✓			
EP1706611-015	17-Jun-2017 00:00	SS14_0.1_170617		✓	✓	
EP1706611-016	17-Jun-2017 00:00	SS14_0.5_170617		✓		✓
EP1706611-017	17-Jun-2017 00:00	SS14_0.8_170617	✓			
EP1706611-018	17-Jun-2017 00:00	SS14_1.4_170617		✓	✓	
EP1706611-019	16-Jun-2017 00:00	SSQA04_160617	✓			
EP1706611-020	17-Jun-2017 00:00	SSQA05_170617	✓			
EP1706611-021	17-Jun-2017 00:00	SSQA09_170617	✓			
EP1706611-022	08-Jun-2017 00:00	TBS292	✓			
EP1706611-023	17-Jun-2017 00:00	SS26_0.1_170617		✓	✓	
EP1706611-024	17-Jun-2017 00:00	SS26_0.5_170617	✓			
EP1706611-025	17-Jun-2017 00:00	SS26_0.8_170617	✓			
EP1706611-026	17-Jun-2017 00:00	SS26_1.2_170617		✓	✓	
EP1706611-027	17-Jun-2017 00:00	SS26_3.4_170617	✓			
EP1706611-028	17-Jun-2017 00:00	SS25_0.1_170617		✓	✓	



			(On Hold) SOIL No analysis requested	SOIL - EA055-103 Moisture Content	SOIL - EP231X (solids) PFAS - Full Suite (28 analytes)	SOIL - S-04 TRH/BTEXN
EP1706611-029	17-Jun-2017 00:00	SS25_0.5_170617		✓		✓
EP1706611-030	17-Jun-2017 00:00	SS25_0.8_170617	✓			
EP1706611-031	17-Jun-2017 00:00	SS25_1.5_170617		✓	✓	✓
EP1706611-032	17-Jun-2017 00:00	SS23_0.1_170617		✓	✓	
EP1706611-033	17-Jun-2017 00:00	SS23_0.5_170617		✓		✓
EP1706611-034	17-Jun-2017 00:00	SS23_0.8_170617	✓			
EP1706611-035	17-Jun-2017 00:00	SS23_1.0_170617		✓	✓	✓
EP1706611-036	17-Jun-2017 00:00	SS16_0.1_170617		✓	✓	
EP1706611-037	17-Jun-2017 00:00	SS16_0.5_170617		✓		✓
EP1706611-038	17-Jun-2017 00:00	SS16_0.8_170617	✓			
EP1706611-039	17-Jun-2017 00:00	SS16_1.3_170617		✓	✓	
EP1706611-040	17-Jun-2017 00:00	SS16_1.5_170617	✓			
EP1706611-041	18-Jun-2017 00:00	SS17_0.1_180617		✓	✓	✓
EP1706611-042	18-Jun-2017 00:00	SS17_0.5_180617		✓	✓	
EP1706611-043	18-Jun-2017 00:00	SS17_0.8_180617	✓			
EP1706611-044	18-Jun-2017 00:00	SS17_1.5_180617		✓	✓	
EP1706611-045	18-Jun-2017 00:00	SS17_2.5_180617	✓			
EP1706611-046	18-Jun-2017 00:00	SS18_0.1_180617		✓	✓	
EP1706611-047	18-Jun-2017 00:00	SS18_0.5_180617		✓	✓	✓
EP1706611-048	18-Jun-2017 00:00	SS18_0.8_180617	✓			
EP1706611-049	18-Jun-2017 00:00	SS18_1.4_180617		✓	✓	
EP1706611-050	18-Jun-2017 00:00	SS18_5.5_180617	✓			
EP1706611-051	18-Jun-2017 00:00	SS19_0.1_180617		✓	✓	
EP1706611-052	18-Jun-2017 00:00	SS19_0.5_180617		✓	✓	
EP1706611-053	18-Jun-2017 00:00	SS19_0.8_180617	✓			
EP1706611-054	18-Jun-2017 00:00	SS19_1.2_180617		✓	✓	
EP1706611-055	18-Jun-2017 00:00	SS19_2.5_180617	✓			
EP1706611-056	18-Jun-2017 00:00	SS21_0.1_180617		✓	✓	
EP1706611-057	18-Jun-2017 00:00	SS21_0.5_180617	✓			
EP1706611-058	18-Jun-2017 00:00	SS21_0.8_180617	✓			
EP1706611-059	18-Jun-2017 00:00	SS21_1.1_180617		✓	✓	
EP1706611-060	18-Jun-2017 00:00	SS21_2.5_180617	✓			
EP1706611-061	18-Jun-2017 00:00	SS20_0.1_180617		✓	✓	
EP1706611-062	18-Jun-2017 00:00	SS20_0.5_180617	✓			
EP1706611-063	18-Jun-2017 00:00	SS20_0.8_180617	✓			
EP1706611-064	18-Jun-2017 00:00	SS20_1.2_180617		✓	✓	
EP1706611-065	18-Jun-2017 00:00	SS24_0.1_180617		✓	✓	✓
EP1706611-066	18-Jun-2017 00:00	SS24_0.5_180617	✓			
EP1706611-067	18-Jun-2017 00:00	SS24_0.8_180617	✓			
EP1706611-068	18-Jun-2017 00:00	SS24_1.3_180617		✓	✓	✓
EP1706611-069	18-Jun-2017 00:00	SS24_1.5_180617	✓			



			(On Hold) SOIL No analysis requested	SOIL - EA055-103 Moisture Content	SOIL - EP231X (solids) PFAS - Full Suite (28 analytes)	SOIL - S-04 TRH/BTEXN
EP1706611-070	18-Jun-2017 00:00	SS24_2.5_180617	✓			
EP1706611-071	18-Jun-2017 00:00	SS22_0.1_180617		✓	✓	
EP1706611-072	18-Jun-2017 00:00	SS22_0.5_180617	✓			
EP1706611-073	18-Jun-2017 00:00	SS22_0.8_180617	✓			
EP1706611-074	18-Jun-2017 00:00	SS22_1.3_180617		✓	✓	✓
EP1706611-075	18-Jun-2017 00:00	SS22_2.5_180617	✓			
EP1706611-076	17-Jun-2017 00:00	SSQA08_170617	✓			
EP1706611-077	18-Jun-2017 00:00	SSQA012_180617		✓	✓	
EP1706611-078	18-Jun-2017 00:00	SSQA014_180617	✓			
EP1706611-079	18-Jun-2017 00:00	SSQA015_180617	✓			
EP1706611-080	18-Jun-2017 00:00	SSQA016_180617	✓			
EP1706611-081	18-Jun-2017 00:00	SSQA017_180617	✓			
EP1706611-082	18-Jun-2017 00:00	SSQA018_180617		✓	✓	
EP1706611-083	18-Jun-2017 00:00	SSQA020_180617		✓	✓	
EP1706611-084	18-Jun-2017 00:00	SSQA022_180617	✓			
EP1706611-085	18-Jun-2017 00:00	SSQA023_180617	✓			
EP1706611-086	19-Jun-2017 00:00	SS3A_0.1_190617		✓	✓	
EP1706611-087	19-Jun-2017 00:00	SS3A_0.5_190617	✓			
EP1706611-088	19-Jun-2017 00:00	SS3A_0.7_190617	✓			
EP1706611-089	19-Jun-2017 00:00	SS3A_0.8_190617		✓	✓	
EP1706611-090	19-Jun-2017 00:00	SS3A_1.5_190617	✓			
EP1706611-091	19-Jun-2017 00:00	SS3B_0.1_190617		✓	✓	
EP1706611-092	19-Jun-2017 00:00	SS3B_0.5_190617	✓			
EP1706611-093	19-Jun-2017 00:00	SS3B_0.8_190617	✓			
EP1706611-094	19-Jun-2017 00:00	SS3B_1.0_190617		✓	✓	
EP1706611-095	19-Jun-2017 00:00	SS3C_0.1_190617		✓	✓	
EP1706611-096	19-Jun-2017 00:00	SS3C_0.5_190617		✓		✓
EP1706611-097	19-Jun-2017 00:00	SS3C_0.8_190617		✓		✓
EP1706611-098	19-Jun-2017 00:00	SS3C_0.9_190617		✓	✓	
EP1706611-099	19-Jun-2017 00:00	SS3C_1.2_190617	✓			
EP1706611-100	19-Jun-2017 00:00	SS3D_0.1_190617		✓	✓	
EP1706611-101	19-Jun-2017 00:00	SS3D_0.5_190617		✓		✓
EP1706611-102	19-Jun-2017 00:00	SS3D_0.8_190617	✓			
EP1706611-103	19-Jun-2017 00:00	SS3D_1.0_190617		✓	✓	
EP1706611-104	19-Jun-2017 00:00	SS3D_1.3_190617		✓		✓
EP1706611-105	08-Jun-2017 00:00	TBS293	✓			
EP1706611-110	17-Jun-2017 00:00	SSQA07_170617	✓			



Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - W-04 TRH/BTEXN
EP1706611-106	16-Jun-2017 00:00	SSQA02_160617	✓	
EP1706611-107	17-Jun-2017 00:00	SSQA06_170617	✓	✓
EP1706611-108	18-Jun-2017 00:00	SSQA010_180617	✓	✓
EP1706611-109	19-Jun-2017 00:00	SSQA024_190617	✓	✓

Proactive Holding Time Report

The following table summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory.

Matrix: **SOIL**

Evaluation: ✗ = Holding time breach ; ✓ = Within holding time.

Method	Client Sample ID(s)	Container	Due for extraction	Due for analysis	Samples Received		Instructions Received	
					Date	Evaluation	Date	Evaluation
EA055: Moisture Content								
SS10_0.8_160617	HDPE Soil Jar		----	30-Jun-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS10_1.5_160617	HDPE Soil Jar		----	30-Jun-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS11_0.8_160617	HDPE Soil Jar		----	30-Jun-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS11_1.5_160617	HDPE Soil Jar		----	30-Jun-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS12_0.8_160617	HDPE Soil Jar		----	30-Jun-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS12_1.5_160617	HDPE Soil Jar		----	30-Jun-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS13_0.8_160617	HDPE Soil Jar		----	30-Jun-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS13_1.5_160617	HDPE Soil Jar		----	30-Jun-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS14_0.1_170617	HDPE Soil Jar		----	01-Jul-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS14_0.5_170617	HDPE Soil Jar		----	01-Jul-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS14_1.4_170617	HDPE Soil Jar		----	01-Jul-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS15_0.1_170617	HDPE Soil Jar		----	01-Jul-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS15_0.5_170617	Soil Glass Jar - Unpreserved		----	01-Jul-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS15_1.4_170617	Soil Glass Jar - Unpreserved		----	01-Jul-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS16_0.1_170617	HDPE Soil Jar		----	01-Jul-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS16_0.5_170617	Soil Glass Jar - Unpreserved		----	01-Jul-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS16_1.3_170617	HDPE Soil Jar		----	01-Jul-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS17_0.1_180617	HDPE Soil Jar		----	02-Jul-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS17_0.5_180617	HDPE Soil Jar		----	02-Jul-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS17_1.5_180617	HDPE Soil Jar		----	02-Jul-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS18_0.1_180617	HDPE Soil Jar		----	02-Jul-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS18_0.5_180617	HDPE Soil Jar		----	02-Jul-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS18_1.4_180617	HDPE Soil Jar		----	02-Jul-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS19_0.1_180617	HDPE Soil Jar		----	02-Jul-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS19_0.5_180617	HDPE Soil Jar		----	02-Jul-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS19_1.2_180617	HDPE Soil Jar		----	02-Jul-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS20_0.1_180617	HDPE Soil Jar		----	02-Jul-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS20_1.2_180617	HDPE Soil Jar		----	02-Jul-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS21_0.1_180617	HDPE Soil Jar		----	02-Jul-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS21_1.1_180617	HDPE Soil Jar		----	02-Jul-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS22_0.1_180617	HDPE Soil Jar		----	02-Jul-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS22_1.3_180617	HDPE Soil Jar		----	02-Jul-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS23_0.1_170617	HDPE Soil Jar		----	01-Jul-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS23_0.5_170617	HDPE Soil Jar		----	01-Jul-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS23_1.0_170617	HDPE Soil Jar		----	01-Jul-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS24_0.1_180617	HDPE Soil Jar		----	02-Jul-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS24_1.3_180617	HDPE Soil Jar		----	02-Jul-2017	21-Jun-2017	✓	06-Jul-2017	✗



SS25_0.1_170617	HDPE Soil Jar	----	01-Jul-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS25_0.5_170617	Soil Glass Jar - Unpreserved	----	01-Jul-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS25_1.5_170617	HDPE Soil Jar	----	01-Jul-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS26_0.1_170617	HDPE Soil Jar	----	01-Jul-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS26_1.2_170617	HDPE Soil Jar	----	01-Jul-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS3A_0.1_190617	HDPE Soil Jar	----	03-Jul-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS3A_0.8_190617	HDPE Soil Jar	----	03-Jul-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS3B_0.1_190617	HDPE Soil Jar	----	03-Jul-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS3B_1.0_190617	HDPE Soil Jar	----	03-Jul-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS3C_0.1_190617	HDPE Soil Jar	----	03-Jul-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS3C_0.5_190617	Soil Glass Jar - Unpreserved	----	03-Jul-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS3C_0.8_190617	Soil Glass Jar - Unpreserved	----	03-Jul-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS3C_0.9_190617	HDPE Soil Jar	----	03-Jul-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS3D_0.1_190617	HDPE Soil Jar	----	03-Jul-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS3D_0.5_190617	Soil Glass Jar - Unpreserved	----	03-Jul-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS3D_1.0_190617	HDPE Soil Jar	----	03-Jul-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS3D_1.3_190617	HDPE Soil Jar	----	03-Jul-2017	21-Jun-2017	✓	06-Jul-2017	✗
SSQA012_180617	HDPE Soil Jar	----	02-Jul-2017	21-Jun-2017	✓	06-Jul-2017	✗
SSQA018_180617	Soil Glass Jar - Unpreserved	----	02-Jul-2017	21-Jun-2017	✓	06-Jul-2017	✗
SSQA020_180617	HDPE Soil Jar	----	02-Jul-2017	21-Jun-2017	✓	06-Jul-2017	✗

EP071: TRH - Semivolatile Fraction

SS14_0.5_170617	HDPE Soil Jar	01-Jul-2017	10-Aug-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS15_0.5_170617	Soil Glass Jar - Unpreserved	01-Jul-2017	10-Aug-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS16_0.5_170617	Soil Glass Jar - Unpreserved	01-Jul-2017	10-Aug-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS17_0.1_180617	Soil Glass Jar - Unpreserved	02-Jul-2017	11-Aug-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS18_0.5_180617	Soil Glass Jar - Unpreserved	02-Jul-2017	11-Aug-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS22_1.3_180617	Soil Glass Jar - Unpreserved	02-Jul-2017	11-Aug-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS23_0.5_170617	HDPE Soil Jar	01-Jul-2017	10-Aug-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS23_1.0_170617	Soil Glass Jar - Unpreserved	01-Jul-2017	10-Aug-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS24_0.1_180617	Soil Glass Jar - Unpreserved	02-Jul-2017	11-Aug-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS24_1.3_180617	Soil Glass Jar - Unpreserved	02-Jul-2017	11-Aug-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS25_0.5_170617	Soil Glass Jar - Unpreserved	01-Jul-2017	10-Aug-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS25_1.5_170617	Soil Glass Jar - Unpreserved	01-Jul-2017	10-Aug-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS3C_0.5_190617	Soil Glass Jar - Unpreserved	03-Jul-2017	12-Aug-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS3C_0.8_190617	Soil Glass Jar - Unpreserved	03-Jul-2017	12-Aug-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS3D_0.5_190617	Soil Glass Jar - Unpreserved	03-Jul-2017	12-Aug-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS3D_1.3_190617	HDPE Soil Jar	03-Jul-2017	12-Aug-2017	21-Jun-2017	✓	06-Jul-2017	✗

EP080: TRH Volatiles/BTEX

SS14_0.5_170617	HDPE Soil Jar	01-Jul-2017	01-Jul-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS15_0.5_170617	Soil Glass Jar - Unpreserved	01-Jul-2017	01-Jul-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS16_0.5_170617	Soil Glass Jar - Unpreserved	01-Jul-2017	01-Jul-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS17_0.1_180617	Soil Glass Jar - Unpreserved	02-Jul-2017	02-Jul-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS18_0.5_180617	Soil Glass Jar - Unpreserved	02-Jul-2017	02-Jul-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS22_1.3_180617	Soil Glass Jar - Unpreserved	02-Jul-2017	02-Jul-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS23_0.5_170617	HDPE Soil Jar	01-Jul-2017	01-Jul-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS23_1.0_170617	Soil Glass Jar - Unpreserved	01-Jul-2017	01-Jul-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS24_0.1_180617	Soil Glass Jar - Unpreserved	02-Jul-2017	02-Jul-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS24_1.3_180617	Soil Glass Jar - Unpreserved	02-Jul-2017	02-Jul-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS25_0.5_170617	Soil Glass Jar - Unpreserved	01-Jul-2017	01-Jul-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS25_1.5_170617	Soil Glass Jar - Unpreserved	01-Jul-2017	01-Jul-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS3C_0.5_190617	Soil Glass Jar - Unpreserved	03-Jul-2017	03-Jul-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS3C_0.8_190617	Soil Glass Jar - Unpreserved	03-Jul-2017	03-Jul-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS3D_0.5_190617	Soil Glass Jar - Unpreserved	03-Jul-2017	03-Jul-2017	21-Jun-2017	✓	06-Jul-2017	✗
SS3D_1.3_190617	HDPE Soil Jar	03-Jul-2017	03-Jul-2017	21-Jun-2017	✓	06-Jul-2017	✗

Matrix: **WATER**

Evaluation: ✗ = Holding time breach ; ✓ = Within holding time.

Method	Container	Due for extraction	Due for analysis	Samples Received		Instructions Received	
				Date	Evaluation	Date	Evaluation
Client Sample ID(s)							
EP071: TRH - Semivolatile Fraction							
SSQA010_180617	Amber Glass Bottle - Unpreserved	25-Jun-2017	04-Aug-2017	21-Jun-2017	✓	06-Jul-2017	✗
SSQA024_190617	Amber Glass Bottle - Unpreserved	26-Jun-2017	05-Aug-2017	21-Jun-2017	✓	06-Jul-2017	✗
SSQA06_170617	Amber Glass Bottle - Unpreserved	24-Jun-2017	03-Aug-2017	21-Jun-2017	✓	06-Jul-2017	✗
EP080: TRH Volatiles/BTEX							
SSQA010_180617	Amber VOC Vial - Sulfuric Acid	02-Jul-2017	02-Jul-2017	21-Jun-2017	✓	06-Jul-2017	✗
SSQA024_190617	Amber VOC Vial - Sulfuric Acid	03-Jul-2017	03-Jul-2017	21-Jun-2017	✓	06-Jul-2017	✗
SSQA06_170617	Amber VOC Vial - Sulfuric Acid	01-Jul-2017	01-Jul-2017	21-Jun-2017	✓	06-Jul-2017	✗

**SAMPLE RECEIPT NOTIFICATION (SRN)****Work Order : EP1706611**

Client : AECOM SERVICES PTY LTD
Contact : [REDACTED]
Address : Supplier ID number - 1179447 LEVEL
6 3 FORREST PLACE
PERTH WA, AUSTRALIA 6000

Laboratory : Environmental Division Perth
Contact : ShukHui Li
Address : 10 Hod Way Malaga WA Australia 6090

E-mail : [REDACTED]
Telephone : [REDACTED]
Facsimile : [REDACTED]

E-mail : [REDACTED]
Telephone : [REDACTED]
Facsimile : [REDACTED]

Project : 6054717.3.3 Port Hedland
International Airport – PFAS
Investigation

Page : 1 of 5

Order number : 6054717.3.3

Quote number : EP2017URSWA0001 (EN/004/16)

C-O-C number : ----

QC Level : NEPM 2013 B3 & ALS QC Standard

Site : ----

Sampler : [REDACTED]

Dates

Date Samples Received : 21-Jun-2017 15:40

Issue Date : 22-Jun-2017

Client Requested Due Date : 30-Jun-2017

Scheduled Reporting Date : **30-Jun-2017**

Delivery Details

Mode of Delivery : Carrier

Security Seal : Not Available

No. of coolers/boxes : 6

Temperature : 3.7 - Ice present

Receipt Detail :

No. of samples received / analysed : 110 / 52

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.

- 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	(On Hold) SO L No analysis requested	SO L - EA055-103 Moisture Content	SO L - EP231X (solids) PFAS - Full Suite (28 analytes)
EP1706611-001	16-Jun-2017 00:00	SS11_0.8_160617		✓	✓
EP1706611-002	16-Jun-2017 00:00	SS11_1.5_160617		✓	✓
EP1706611-003	16-Jun-2017 00:00	SS12_0.8_160617		✓	✓
EP1706611-004	16-Jun-2017 00:00	SS12_1.5_160617		✓	✓
EP1706611-005	16-Jun-2017 00:00	SS10_0.8_160617		✓	✓
EP1706611-006	16-Jun-2017 00:00	SS10_1.5_160617		✓	✓
EP1706611-007	16-Jun-2017 00:00	SS13_0.8_160617		✓	✓
EP1706611-008	16-Jun-2017 00:00	SS13_1.5_160617		✓	✓
EP1706611-009	16-Jun-2017 00:00	SS13_3.5_160617	✓		
EP1706611-010	17-Jun-2017 00:00	SS15_0.1_170617		✓	✓
EP1706611-011	17-Jun-2017 00:00	SS15_0.5_170617	✓		
EP1706611-012	17-Jun-2017 00:00	SS15_0.8_170617	✓		
EP1706611-013	17-Jun-2017 00:00	SS15_1.4_170617		✓	✓
EP1706611-014	17-Jun-2017 00:00	SS15_1.6_170617	✓		
EP1706611-015	17-Jun-2017 00:00	SS14_0.1_170617		✓	✓
EP1706611-016	17-Jun-2017 00:00	SS14_0.5_170617	✓		
EP1706611-017	17-Jun-2017 00:00	SS14_0.8_170617	✓		
EP1706611-018	17-Jun-2017 00:00	SS14_1.4_170617		✓	✓
EP1706611-019	16-Jun-2017 00:00	SSQA04_160617	✓		
EP1706611-020	17-Jun-2017 00:00	SSQA05_170617	✓		
EP1706611-021	17-Jun-2017 00:00	SSQA09_170617	✓		
EP1706611-022	08-Jun-2017 00:00	TBS292	✓		
EP1706611-023	17-Jun-2017 00:00	SS26_0.1_170617		✓	✓
EP1706611-024	17-Jun-2017 00:00	SS26_0.5_170617	✓		
EP1706611-025	17-Jun-2017 00:00	SS26_0.8_170617	✓		
EP1706611-026	17-Jun-2017 00:00	SS26_1.2_170617		✓	✓
EP1706611-027	17-Jun-2017 00:00	SS26_3.4_170617	✓		
EP1706611-028	17-Jun-2017 00:00	SS25_0.1_170617		✓	✓
EP1706611-029	17-Jun-2017 00:00	SS25_0.5_170617	✓		
EP1706611-030	17-Jun-2017 00:00	SS25_0.8_170617	✓		
EP1706611-031	17-Jun-2017 00:00	SS25_1.5_170617		✓	✓
EP1706611-032	17-Jun-2017 00:00	SS23_0.1_170617		✓	✓
EP1706611-033	17-Jun-2017 00:00	SS23_0.5_170617	✓		
EP1706611-034	17-Jun-2017 00:00	SS23_0.8_170617	✓		
EP1706611-035	17-Jun-2017 00:00	SS23_1.0_170617		✓	✓



			(On Hold) SOIL No analysis requested	SOIL - EA055-103 Moisture Content	SOIL - EP231X (solids) PFAS - Full Suite (28 analytes)
EP1706611-036	17-Jun-2017 00:00	SS16_0.1_170617		✓	✓
EP1706611-037	17-Jun-2017 00:00	SS16_0.5_170617	✓		
EP1706611-038	17-Jun-2017 00:00	SS16_0.8_170617	✓		
EP1706611-039	17-Jun-2017 00:00	SS16_1.3_170617		✓	✓
EP1706611-040	17-Jun-2017 00:00	SS16_1.5_170617	✓		
EP1706611-041	18-Jun-2017 00:00	SS17_0.1_180617		✓	✓
EP1706611-042	18-Jun-2017 00:00	SS17_0.5_180617		✓	✓
EP1706611-043	18-Jun-2017 00:00	SS17_0.8_180617	✓		
EP1706611-044	18-Jun-2017 00:00	SS17_1.5_180617		✓	✓
EP1706611-045	18-Jun-2017 00:00	SS17_2.5_180617	✓		
EP1706611-046	18-Jun-2017 00:00	SS18_0.1_180617		✓	✓
EP1706611-047	18-Jun-2017 00:00	SS18_0.5_180617		✓	✓
EP1706611-048	18-Jun-2017 00:00	SS18_0.8_180617	✓		
EP1706611-049	18-Jun-2017 00:00	SS18_1.4_180617		✓	✓
EP1706611-050	18-Jun-2017 00:00	SS18_5.5_180617	✓		
EP1706611-051	18-Jun-2017 00:00	SS19_0.1_180617		✓	✓
EP1706611-052	18-Jun-2017 00:00	SS19_0.5_180617		✓	✓
EP1706611-053	18-Jun-2017 00:00	SS19_0.8_180617	✓		
EP1706611-054	18-Jun-2017 00:00	SS19_1.2_180617		✓	✓
EP1706611-055	18-Jun-2017 00:00	SS19_2.5_180617	✓		
EP1706611-056	18-Jun-2017 00:00	SS21_0.1_180617		✓	✓
EP1706611-057	18-Jun-2017 00:00	SS21_0.5_180617	✓		
EP1706611-058	18-Jun-2017 00:00	SS21_0.8_180617	✓		
EP1706611-059	18-Jun-2017 00:00	SS21_1.1_180617		✓	✓
EP1706611-060	18-Jun-2017 00:00	SS21_2.5_180617	✓		
EP1706611-061	18-Jun-2017 00:00	SS20_0.1_180617		✓	✓
EP1706611-062	18-Jun-2017 00:00	SS20_0.5_180617	✓		
EP1706611-063	18-Jun-2017 00:00	SS20_0.8_180617	✓		
EP1706611-064	18-Jun-2017 00:00	SS20_1.2_180617		✓	✓
EP1706611-065	18-Jun-2017 00:00	SS24_0.1_180617		✓	✓
EP1706611-066	18-Jun-2017 00:00	SS24_0.5_180617	✓		
EP1706611-067	18-Jun-2017 00:00	SS24_0.8_180617	✓		
EP1706611-068	18-Jun-2017 00:00	SS24_1.3_180617		✓	✓
EP1706611-069	18-Jun-2017 00:00	SS24_1.5_180617	✓		
EP1706611-070	18-Jun-2017 00:00	SS24_2.5_180617	✓		
EP1706611-071	18-Jun-2017 00:00	SS22_0.1_180617		✓	✓
EP1706611-072	18-Jun-2017 00:00	SS22_0.5_180617	✓		
EP1706611-073	18-Jun-2017 00:00	SS22_0.8_180617	✓		
EP1706611-074	18-Jun-2017 00:00	SS22_1.3_180617		✓	✓
EP1706611-075	18-Jun-2017 00:00	SS22_2.5_180617	✓		
EP1706611-076	17-Jun-2017 00:00	SSQA08_170617	✓		



			(On Hold) SOIL No analysis requested	SOIL - EA055-103 Moisture Content	SOIL - EP231X (solids) PFAS - Full Suite (28 analytes)
EP1706611-077	18-Jun-2017 00:00	SSQA012_180617		✓	✓
EP1706611-078	18-Jun-2017 00:00	SSQA014_180617	✓		
EP1706611-079	18-Jun-2017 00:00	SSQA015_180617	✓		
EP1706611-080	18-Jun-2017 00:00	SSQA016_180617	✓		
EP1706611-081	18-Jun-2017 00:00	SSQA017_180617	✓		
EP1706611-082	18-Jun-2017 00:00	SSQA018_180617		✓	✓
EP1706611-083	18-Jun-2017 00:00	SSQA020_180617		✓	✓
EP1706611-084	18-Jun-2017 00:00	SSQA022_180617	✓		
EP1706611-085	18-Jun-2017 00:00	SSQA023_180617	✓		
EP1706611-086	19-Jun-2017 00:00	SS3A_0.1_190617		✓	✓
EP1706611-087	19-Jun-2017 00:00	SS3A_0.5_190617	✓		
EP1706611-088	19-Jun-2017 00:00	SS3A_0.7_190617	✓		
EP1706611-089	19-Jun-2017 00:00	SS3A_0.8_190617		✓	✓
EP1706611-090	19-Jun-2017 00:00	SS3A_1.5_190617	✓		
EP1706611-091	19-Jun-2017 00:00	SS3B_0.1_190617		✓	✓
EP1706611-092	19-Jun-2017 00:00	SS3B_0.5_190617	✓		
EP1706611-093	19-Jun-2017 00:00	SS3B_0.8_190617	✓		
EP1706611-094	19-Jun-2017 00:00	SS3B_1.0_190617		✓	✓
EP1706611-095	19-Jun-2017 00:00	SS3C_0.1_190617		✓	✓
EP1706611-096	19-Jun-2017 00:00	SS3C_0.5_190617	✓		
EP1706611-097	19-Jun-2017 00:00	SS3C_0.8_190617	✓		
EP1706611-098	19-Jun-2017 00:00	SS3C_0.9_190617		✓	✓
EP1706611-099	19-Jun-2017 00:00	SS3C_1.2_190617	✓		
EP1706611-100	19-Jun-2017 00:00	SS3D_0.1_190617		✓	✓
EP1706611-101	19-Jun-2017 00:00	SS3D_0.5_190617	✓		
EP1706611-102	19-Jun-2017 00:00	SS3D_0.8_190617	✓		
EP1706611-103	19-Jun-2017 00:00	SS3D_1.0_190617		✓	✓
EP1706611-104	19-Jun-2017 00:00	SS3D_1.3_190617	✓		
EP1706611-105	08-Jun-2017 00:00	TBS293	✓		
EP1706611-110	17-Jun-2017 00:00	SSQA07_170617	✓		

CERTIFICATE OF ANALYSIS

Work Order : **EP1706611**
Client : **AECOM SERVICES PTY LTD**
Contact : [REDACTED]
Address : Supplier ID number - 1179447 LEVEL 6 3 FORREST PLACE
 PERTH WA, AUSTRALIA 6000
Telephone : [REDACTED]
Project : 6054717.3.3 Port Hedland International Airport – PFAS
 Investigation
Order number : 6054717.3.3
C-O-C number : ----
Sampler : [REDACTED]
Site : ----
Quote number : EN/004/16
No. of samples received : 110
No. of samples analysed : 52

Page : 1 of 25
Laboratory : Environmental Division Perth
Contact : [REDACTED]
Address : 10 Hod Way Malaga WA Australia 6090
Telephone : [REDACTED]
Date Samples Received : 21-Jun-2017 15:40
Date Analysis Commenced : 24-Jun-2017
Issue Date : 30-Jun-2017 14:14



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]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]



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 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	SS11_0.8_160617	SS11_1.5_160617	SS12_0.8_160617	SS12_1.5_160617	SS10_0.8_160617
Client sampling date / time					16-Jun-2017 00:00	16-Jun-2017 00:00	16-Jun-2017 00:00	16-Jun-2017 00:00	16-Jun-2017 00:00
Compound	CAS Number	LOR	Unit		EP1706611-001	EP1706611-002	EP1706611-003	EP1706611-004	EP1706611-005
				Result	Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1	%		5.9	17.5	6.2	16.4	4.8
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0011
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.0006	0.0007	<0.0002	<0.0002	0.0088
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.0039	0.0031	<0.0002	<0.0002	0.0059
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.397	0.533	0.913	0.584	0.0925	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0040	<0.0002	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0003	<0.0002	0.0014	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	0.0003	
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.0006	0.0011	<0.0002	0.0024	
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.0002	0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0003	<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	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<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	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<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	0.0055	0.0004	<0.0002	
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SS11_0.8_160617	SS11_1.5_160617	SS12_0.8_160617	SS12_1.5_160617	SS10_0.8_160617
Client sampling date / time					16-Jun-2017 00:00	16-Jun-2017 00:00	16-Jun-2017 00:00	16-Jun-2017 00:00	16-Jun-2017 00:00
Compound	CAS Number	LOR	Unit		EP1706611-001	EP1706611-002	EP1706611-003	EP1706611-004	EP1706611-005
				Result	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	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0005	<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	<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	<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	<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	<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	<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	<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	<0.0005
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg	0.397	0.538	0.928	0.584	0.112	
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	0.397	0.534	0.914	0.584	0.101	
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	0.397	0.534	0.915	0.584	0.105	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%	103	86.3	97.0	86.6	79.3	



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SS10_1.5_160617	SS13_0.8_160617	SS13_1.5_160617	SS15_0.1_170617	SS15_1.4_170617
Client sampling date / time					16-Jun-2017 00:00	16-Jun-2017 00:00	16-Jun-2017 00:00	17-Jun-2017 00:00	17-Jun-2017 00:00
Compound	CAS Number	LOR	Unit		EP1706611-006	EP1706611-007	EP1706611-008	EP1706611-010	EP1706611-013
				Result	Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1	%		9.3	6.2	13.3	3.8	10.5
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg		0.0007	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg		0.0067	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg		0.0083	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg		0.0886	0.0517	0.0582	0.0009	0.0099
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg		<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg		0.0006	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg		0.0056	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg		<0.0002	<0.0002	0.0002	<0.0002	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotridecanoic acid (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		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SS10_1.5_160617	SS13_0.8_160617	SS13_1.5_160617	SS15_0.1_170617	SS15_1.4_170617
Client sampling date / time					16-Jun-2017 00:00	16-Jun-2017 00:00	16-Jun-2017 00:00	17-Jun-2017 00:00	17-Jun-2017 00:00
Compound	CAS Number	LOR	Unit		EP1706611-006	EP1706611-007	EP1706611-008	EP1706611-010	EP1706611-013
				Result	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	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0005	<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	<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	<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	<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	<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	<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	<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	<0.0005
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg	0.110	0.0517	0.0584	0.0009	0.0099	0.0099
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	0.0953	0.0517	0.0582	0.0009	0.0099	0.0099
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	0.102	0.0517	0.0582	0.0009	0.0099	0.0099
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%	123	89.4	89.2	84.1	85.9	



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SS14_0.1_170617	SS14_1.4_170617	SS26_0.1_170617	SS26_1.2_170617	SS25_0.1_170617
Client sampling date / time					17-Jun-2017 00:00	17-Jun-2017 00:00	17-Jun-2017 00:00	17-Jun-2017 00:00	17-Jun-2017 00:00
Compound	CAS Number	LOR	Unit		EP1706611-015	EP1706611-018	EP1706611-023	EP1706611-026	EP1706611-028
				Result	Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1	%		2.4	20.7	2.8	13.6	2.2
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg		<0.0005	0.0046	0.0005	<0.0002	0.0004
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg		<0.0005	0.0082	0.0012	<0.0002	0.0015
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg		<0.0005	0.126	0.0030	0.0003	0.0036
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg		0.0040	0.0022	0.0014	0.0003	0.0004
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg		1.29	0.549	0.117	0.171	0.687
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg		<0.0005	<0.0002	0.0396	0.0015	0.0103
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg		0.003	0.002	<0.001	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg		<0.0005	0.0106	<0.0002	<0.0002	0.0008
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg		0.192	0.115	0.0012	<0.0002	0.0026
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg		0.0209	0.0091	0.0004	<0.0002	0.0003
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg		0.0111	0.0156	0.0017	0.0004	0.0010
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg		<0.0005	<0.0002	0.0003	<0.0002	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg		0.0063	<0.0002	0.0003	0.0002	0.0002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		<0.0005	<0.0002	0.0003	<0.0002	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		0.0007	<0.0002	0.0010	<0.0002	<0.0002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg		<0.0005	<0.0002	0.0004	<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		0.0240	0.0004	0.0080	0.0066	0.0156
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0012	<0.0005	0.0020	0.0009	<0.0005



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SS14_0.1_170617	SS14_1.4_170617	SS26_0.1_170617	SS26_1.2_170617	SS25_0.1_170617
Client sampling date / time					17-Jun-2017 00:00	17-Jun-2017 00:00	17-Jun-2017 00:00	17-Jun-2017 00:00	17-Jun-2017 00:00
Compound	CAS Number	LOR	Unit		EP1706611-015	EP1706611-018	EP1706611-023	EP1706611-026	EP1706611-028
				Result	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	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0012	<0.0005	<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	<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	<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	<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	<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	<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	<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	<0.0005
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg	1.55	0.843	0.178	0.181	0.724	
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	1.29	0.675	0.120	0.171	0.691	
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	1.52	0.832	0.124	0.172	0.696	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%	102	101	95.9	89.4	93.7	



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SS25_1.5_170617	SS23_0.1_170617	SS23_1.0_170617	SS16_0.1_170617	SS16_1.3_170617
Client sampling date / time					17-Jun-2017 00:00	17-Jun-2017 00:00	17-Jun-2017 00:00	17-Jun-2017 00:00	17-Jun-2017 00:00
Compound	CAS Number	LOR	Unit		EP1706611-031	EP1706611-032	EP1706611-035	EP1706611-036	EP1706611-039
				Result	Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1	%		16.8	2.7	12.5	3.3	17.2
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg		0.0023	<0.0002	<0.0002	0.0002	0.0003
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg		0.0061	<0.0002	0.0006	0.0006	0.0004
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg		0.0539	<0.0002	0.0029	0.0049	0.0011
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg		0.0059	0.0002	0.0023	0.0020	0.0006
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg		1.42	0.139	0.0523	1.41	0.373
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg		<0.0002	0.0004	<0.0002	0.0168	0.0019
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg		0.002	<0.001	<0.001	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg		0.0040	<0.0002	<0.0002	0.0004	0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg		0.0208	<0.0002	0.0013	0.0017	0.0009
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg		0.0041	<0.0002	<0.0002	0.0003	0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg		0.0198	<0.0002	0.0013	0.0024	0.0008
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg		0.0003	<0.0002	<0.0002	0.0006	0.0011
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg		0.0003	<0.0002	<0.0002	0.0022	<0.0002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	0.0003	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotridecanoic acid (PFTriDA)	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		0.0012	<0.0002	<0.0002	0.0237	0.0037
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	0.0007	<0.0005



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SS25_1.5_170617	SS23_0.1_170617	SS23_1.0_170617	SS16_0.1_170617	SS16_1.3_170617
Client sampling date / time					17-Jun-2017 00:00	17-Jun-2017 00:00	17-Jun-2017 00:00	17-Jun-2017 00:00	17-Jun-2017 00:00
Compound	CAS Number	LOR	Unit		EP1706611-031	EP1706611-032	EP1706611-035	EP1706611-036	EP1706611-039
				Result	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	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0005	<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	<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	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	0.0003	<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	<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	<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	0.0022	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	<0.0005
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg	1.54	0.140	0.0607	1.47	0.386	
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	1.47	0.139	0.0552	1.41	0.374	
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	1.53	0.139	0.0578	1.42	0.378	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%	82.1	85.5	90.0	84.7	95.1	



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SS17_0.1_180617	SS17_0.5_180617	SS17_1.5_180617	SS18_0.1_180617	SS18_0.5_180617
Client sampling date / time					18-Jun-2017 00:00	18-Jun-2017 00:00	18-Jun-2017 00:00	18-Jun-2017 00:00	18-Jun-2017 00:00
Compound	CAS Number	LOR	Unit		EP1706611-041	EP1706611-042	EP1706611-044	EP1706611-046	EP1706611-047
				Result	Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1	%		1.9	3.4	15.6	6.0	2.1
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg		0.0005	<0.0002	<0.0002	<0.0005	<0.0005
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg		0.0011	0.0002	0.0007	<0.0005	<0.0005
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg		0.0032	0.0016	0.0078	0.0037	0.0031
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg		0.0009	0.0004	0.0024	0.0008	0.0006
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg		0.138	0.102	2.33	4.72	8.80
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg		0.0040	0.0014	0.0015	0.216	0.0660
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg		0.002	<0.001	<0.001	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg		0.0002	<0.0002	0.0005	<0.0005	<0.0005
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg		0.0016	0.0008	0.0036	0.0023	0.0036
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg		0.0003	<0.0002	0.0007	0.0008	0.0013
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg		0.0010	0.0009	0.0047	0.0055	0.0027
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg		0.0002	0.0007	0.0019	<0.0005	<0.0005
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg		0.0017	0.0005	0.0009	0.0195	0.0163
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		0.0004	<0.0002	<0.0002	0.0034	0.0009
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		0.0002	<0.0002	<0.0002	<0.0005	<0.0005
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0005	<0.0005
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0012	<0.0012
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg		0.0038	0.0003	0.0147	0.513	0.165
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	0.0126	0.0021



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SS17_0.1_180617	SS17_0.5_180617	SS17_1.5_180617	SS18_0.1_180617	SS18_0.5_180617
Client sampling date / time					18-Jun-2017 00:00	18-Jun-2017 00:00	18-Jun-2017 00:00	18-Jun-2017 00:00	18-Jun-2017 00:00
Compound	CAS Number	LOR	Unit		EP1706611-041	EP1706611-042	EP1706611-044	EP1706611-046	EP1706611-047
				Result	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	<0.0012	<0.0012
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0012	<0.0012
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0012	<0.0012
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	<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	<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	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	0.0016	0.0009	0.0044	0.234	0.243	0.243
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	0.0007	<0.0005	<0.0005	0.0019	0.0006	0.0006
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg	0.161	0.110	2.37	5.73	9.30	9.30
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	0.141	0.104	2.34	4.72	8.80	8.80
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	0.148	0.106	2.35	4.97	9.05	9.05
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%	96.3	100	94.5	102	114	114



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SS18_1.4_180617	SS19_0.1_180617	SS19_0.5_180617	SS19_1.2_180617	SS21_0.1_180617
Client sampling date / time					18-Jun-2017 00:00	18-Jun-2017 00:00	18-Jun-2017 00:00	18-Jun-2017 00:00	18-Jun-2017 00:00
Compound	CAS Number	LOR	Unit		EP1706611-049	EP1706611-051	EP1706611-052	EP1706611-054	EP1706611-056
				Result	Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1	%		17.3	3.5	3.8	16.8	4.9
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	0.0032	0.0005
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	0.0076	0.0008
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg		0.0042	0.0015	0.0020	0.0704	0.0024
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg		0.0006	0.0006	0.0009	0.0444	0.0003
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg		2.97	0.599	0.612	0.440	0.0399
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg		0.0027	0.0456	0.0445	0.0131	0.0233
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg		<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	0.0059	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg		0.0029	0.0003	0.0002	0.0436	0.0006
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg		0.0003	<0.0002	<0.0002	0.0049	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg		0.0017	0.0022	0.0034	0.0337	0.0006
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg		0.0018	0.0006	0.0008	0.0008	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg		0.0010	0.0016	0.0016	0.0006	0.0002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		<0.0002	0.0011	0.0009	0.0003	0.0005
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		<0.0002	0.0002	0.0002	<0.0002	0.0006
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		0.0176	0.0055	0.0066	0.0071	0.0016
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	SS18_1.4_180617	SS19_0.1_180617	SS19_0.5_180617	SS19_1.2_180617	SS21_0.1_180617
Client sampling date / time					18-Jun-2017 00:00	18-Jun-2017 00:00	18-Jun-2017 00:00	18-Jun-2017 00:00	18-Jun-2017 00:00
Compound	CAS Number	LOR	Unit		EP1706611-049	EP1706611-051	EP1706611-052	EP1706611-054	EP1706611-056
				Result	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	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0005	<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	<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	<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	<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	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	0.0008	<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	0.0044	<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	<0.0005
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg	3.01	0.658	0.673	0.676	0.0713	
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	2.97	0.600	0.614	0.510	0.0423	
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	2.98	0.603	0.618	0.602	0.0440	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%	102	108	94.3	93.0	100	



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SS21_1.1_180617	SS20_0.1_180617	SS20_1.2_180617	SS24_0.1_180617	SS24_1.3_180617
Client sampling date / time					18-Jun-2017 00:00	18-Jun-2017 00:00	18-Jun-2017 00:00	18-Jun-2017 00:00	18-Jun-2017 00:00
Compound	CAS Number	LOR	Unit		EP1706611-059	EP1706611-061	EP1706611-064	EP1706611-065	EP1706611-068
				Result	Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1	%		16.3	1.6	10.8	4.3	11.2
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.0049	0.0080	<0.0002	0.0037	
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.0038	0.0110	0.0004	0.0054	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	0.0006	0.0173	0.0336	0.0030	0.0265	
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	0.0003	0.0034	0.0054	0.0006	0.0050	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.802	2.83	0.522	0.0530	2.12	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	0.0048	0.0104	0.0020	0.0904	0.0256	
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	0.0030	0.0052	<0.0002	0.0040	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	0.0004	0.0114	0.0284	0.0008	0.0184	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.0018	0.0023	0.0002	0.0024	
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	0.0010	0.0095	0.0160	0.0015	0.0159	
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.0008	<0.0002	<0.0002	0.0012	
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.0008	<0.0002	<0.0002	0.0014	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0005	<0.0002	0.0006	0.0005	
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0005	<0.0002	0.0044	<0.0002	
Perfluorotridecanoic acid (PFTriDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0005	<0.0002	0.0004	<0.0002	
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0012	<0.0005	<0.0005	<0.0005	
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	0.0207	0.0047	0.0019	0.0164	0.0138	
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0012	<0.0005	0.0019	<0.0005	



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SS21_1.1_180617	SS20_0.1_180617	SS20_1.2_180617	SS24_0.1_180617	SS24_1.3_180617
Client sampling date / time					18-Jun-2017 00:00	18-Jun-2017 00:00	18-Jun-2017 00:00	18-Jun-2017 00:00	18-Jun-2017 00:00
Compound	CAS Number	LOR	Unit		EP1706611-059	EP1706611-061	EP1706611-064	EP1706611-065	EP1706611-068
				Result	Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0012	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0005	<0.0012	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0012	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0005	<0.0002	0.0029	0.0009	0.0009
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	<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	<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	<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	<0.0005
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg	0.830	2.90	0.636	0.176	2.24	2.24
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	0.803	2.85	0.556	0.0560	2.15	2.15
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	0.804	2.88	0.616	0.0585	2.19	2.19
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%	91.8	91.2	101	94.3	89.3	89.3



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SS22_0.1_180617	SS22_1.3_180617	SSQA012_180617	SSQA018_180617	SSQA020_180617
Client sampling date / time					18-Jun-2017 00:00	18-Jun-2017 00:00	18-Jun-2017 00:00	18-Jun-2017 00:00	18-Jun-2017 00:00
Compound	CAS Number	LOR	Unit		EP1706611-071	EP1706611-074	EP1706611-077	EP1706611-082	EP1706611-083
				Result	Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1	%		4.3	17.6	2.6	2.4	5.0
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg		0.0011	0.0002	<0.0002	<0.0005	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg		0.0019	0.0008	0.0002	<0.0005	0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg		0.0060	0.0092	0.0015	0.0009	0.0082
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg		0.0007	0.0013	0.0002	<0.0005	0.0030
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg		0.0563	0.229	0.110	9.17	0.613
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg		0.0033	0.0004	0.0011	0.0408	0.0252
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		0.0008	<0.0002	<0.0002	<0.0005	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg		0.0037	0.0023	0.0007	0.0013	0.0011
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg		0.0004	0.0004	<0.0002	0.0007	0.0003
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg		0.0013	0.0020	0.0008	0.0015	0.0211
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg		<0.0002	0.0004	0.0006	<0.0005	0.0008
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg		<0.0002	<0.0002	0.0004	0.0144	0.0011
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	0.0009	0.0004
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0005	<0.0002
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0005	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0012	<0.0005
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg		0.0007	<0.0002	0.0003	0.0987	0.0058
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0012	<0.0005



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SS22_0.1_180617	SS22_1.3_180617	SSQA012_180617	SSQA018_180617	SSQA020_180617
Client sampling date / time					18-Jun-2017 00:00	18-Jun-2017 00:00	18-Jun-2017 00:00	18-Jun-2017 00:00	18-Jun-2017 00:00
Compound	CAS Number	LOR	Unit		EP1706611-071	EP1706611-074	EP1706611-077	EP1706611-082	EP1706611-083
				Result	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	<0.0012	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0012	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0012	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<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	<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	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	0.0006	0.300	<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	<0.0005
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg	0.0762	0.246	0.116	9.63	0.680	
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	0.0623	0.238	0.112	9.17	0.621	
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	0.0696	0.243	0.114	9.47	0.644	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%	89.2	99.7	90.4	95.5	96.1	



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SS3A_0.1_190617	SS3A_0.8_190617	SS3B_0.1_190617	SS3B_1.0_190617	SS3C_0.1_190617
Client sampling date / time					19-Jun-2017 00:00	19-Jun-2017 00:00	19-Jun-2017 00:00	19-Jun-2017 00:00	19-Jun-2017 00:00
Compound	CAS Number	LOR	Unit		EP1706611-086	EP1706611-089	EP1706611-091	EP1706611-094	EP1706611-095
					Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1	%		5.5	10.6	8.3	9.8	4.8
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg		0.0017	0.0018	<0.0002	0.0012	0.0007
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg		0.0053	0.0057	<0.0002	0.0023	0.0012
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg		0.0226	0.0237	0.0008	0.0098	0.0098
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg		0.0056	0.0058	<0.0002	0.0030	0.0026
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg		1.92	1.50	0.0399	1.46	0.908
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg		0.0140	0.0136	0.0003	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg		<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg		0.0021	0.0020	<0.0002	0.0007	0.0003
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg		0.0111	0.0117	<0.0002	0.0038	0.0020
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg		0.0009	0.0010	<0.0002	0.0005	0.0003
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg		0.0041	0.0042	<0.0002	0.0079	0.0028
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	0.0003	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg		0.0003	0.0003	<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 (PFTriDA)	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		0.0157	0.0156	0.0003	0.0006	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		0.0006	0.0005	<0.0005	<0.0005	<0.0005



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SS3A_0.1_190617	SS3A_0.8_190617	SS3B_0.1_190617	SS3B_1.0_190617	SS3C_0.1_190617
Client sampling date / time					19-Jun-2017 00:00	19-Jun-2017 00:00	19-Jun-2017 00:00	19-Jun-2017 00:00	19-Jun-2017 00:00
Compound	CAS Number	LOR	Unit		EP1706611-086	EP1706611-089	EP1706611-091	EP1706611-094	EP1706611-095
				Result	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	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0005	<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	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	0.0011	0.0005	<0.0002	<0.0002	<0.0002	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	0.0014	0.0016	<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	<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	<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	<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	<0.0005
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg	2.01	1.59	0.0413	1.49	0.928	
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	1.94	1.52	0.0407	1.47	0.918	
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	1.96	1.54	0.0407	1.48	0.924	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%	90.2	95.0	94.2	96.8	88.9	



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SS3C_0.9_190617	SS3D_0.1_190617	SS3D_1.0_190617	----	----
Client sampling date / time					19-Jun-2017 00:00	19-Jun-2017 00:00	19-Jun-2017 00:00	----	----
Compound	CAS Number	LOR	Unit		EP1706611-098	EP1706611-100	EP1706611-103	-----	-----
					Result	Result	Result	----	----
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1	%		10.0	4.8	9.2	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg		0.0016	<0.0002	<0.0002	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg		0.0038	<0.0002	0.0007	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg		0.0183	0.0016	0.0092	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg		0.0043	0.0002	0.0064	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg		0.206	0.0418	0.619	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg		<0.0002	0.0013	0.0006	----	----
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		0.0006	<0.0002	<0.0002	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg		0.0056	<0.0002	0.0007	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg		0.0011	<0.0002	0.0002	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg		0.0030	0.0003	0.0036	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg		<0.0002	<0.0002	0.0002	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	----	----



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SS3C_0.9_190617	SS3D_0.1_190617	SS3D_1.0_190617	----	----
Client sampling date / time					19-Jun-2017 00:00	19-Jun-2017 00:00	19-Jun-2017 00:00	----	----
Compound	CAS Number	LOR	Unit		EP1706611-098	EP1706611-100	EP1706611-103	-----	-----
				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	----	----
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	----	----
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	0.244	0.0452	0.641	0.641	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	0.224	0.0434	0.628	0.628	----	----
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	0.236	0.0437	0.633	0.633	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%	95.8	95.7	97.6	97.6	----	----



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Client sample ID

				SSQA02_160617	SSQA06_170617	SSQA010_180617	SSQA024_190617	----
Client sampling date / time				16-Jun-2017 00:00	17-Jun-2017 00:00	18-Jun-2017 00:00	19-Jun-2017 00:00	----
Compound	CAS Number	LOR	Unit	EP1706611-106	EP1706611-107	EP1706611-108	EP1706611-109	-----
				Result	Result	Result	Result	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.7	<0.1	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SSQA02_160617	SSQA06_170617	SSQA010_180617	SSQA024_190617	----
Client sampling date / time					16-Jun-2017 00:00	17-Jun-2017 00:00	18-Jun-2017 00:00	19-Jun-2017 00:00	----
Compound	CAS Number	LOR	Unit		EP1706611-106	EP1706611-107	EP1706611-108	EP1706611-109	-----
				Result	Result	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	<0.05	<0.05	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<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	<0.01	<0.01	<0.01	0.70	<0.01	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	----
Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	<0.01	<0.01	0.70	<0.01	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%	98.8	101	95.9	97.7	97.7	----



Surrogate Control Limits

Sub-Matrix: SOIL		Recovery Limits (%)	
Compound	CAS Number	Low	High
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	: EP1706611	Page	: 1 of 20
Client	: AECOM SERVICES PTY LTD	Laboratory	: Environmental Division Perth
Contact	: [REDACTED]	Contact	: [REDACTED]
Address	: Supplier ID number - 1179447 LEVEL 6 3 FORREST PLACE PERTH WA, AUSTRALIA 6000	Address	: 10 Hod Way Malaga WA Australia 6090
Telephone	: [REDACTED]	Telephone	: [REDACTED]
Project	: 6054717.3.3 Port Hedland International Airport – PFAS Investigation	Date Samples Received	: 21-Jun-2017
Order number	: 6054717.3.3	Date Analysis Commenced	: 24-Jun-2017
C-O-C number	: ----	Issue Date	: 30-Jun-2017
Sampler	: [REDACTED]		
Site	: ----		
Quote number	: EN/004/16		
No. of samples received	: 110		
No. of samples analysed	: 52		



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]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]



General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key :
 Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
 CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
 LOR = Limit of reporting
 RPD = Relative Percentage Difference
 # = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 963491)									
EP1706602-023	Anonymous	EA055: Moisture Content	----	1	%	5.6	5.0	10.7	No Limit
EP1706611-001	SS11_0.8_160617	EA055: Moisture Content	----	1	%	5.9	5.8	0.00	No Limit
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 963492)									
EP1706611-013	SS15_1.4_170617	EA055: Moisture Content	----	1	%	10.5	10.4	0.00	0% - 50%
EP1706611-042	SS17_0.5_180617	EA055: Moisture Content	----	1	%	3.4	3.7	7.39	No Limit
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 963493)									
EP1706611-059	SS21_1.1_180617	EA055: Moisture Content	----	1	%	16.3	16.3	0.00	0% - 50%
EP1706611-089	SS3A_0.8_190617	EA055: Moisture Content	----	1	%	10.6	11.3	6.39	0% - 50%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 967662)									
EM1708233-002	Anonymous	EA055: Moisture Content	----	1	%	<1.0	<1.0	0.00	No Limit
ES1715554-077	Anonymous	EA055: Moisture Content	----	1	%	19.9	21.1	5.90	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 963912)									
EP1706611-001	SS11_0.8_160617	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.397	0.376	5.34	0% - 20%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
EP1706611-015	SS14_0.1_170617	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	<0.0005	<0.0005	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	0.0040	0.0047	15.4	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	1.29	1.39	6.88	0% - 20%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	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 (%)
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 963913)									
EP1706611-042	SS17_0.5_180617	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	0.0004	49.6	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	0.0016	0.0012	25.4	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	0.0004	0.0004	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.102	0.114	11.3	0% - 20%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	0.0014	0.0021	38.7	0% - 50%
EP1706611-061	SS20_0.1_180617	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	0.0049	0.0051	4.08	0% - 50%
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	0.0038	0.0042	10.2	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	0.0173	0.0177	2.61	0% - 20%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	0.0034	0.0034	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	2.83	3.02	6.44	0% - 20%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	0.0104	0.0120	14.5	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 963920)									
EP1706611-089	SS3A_0.8_190617	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	0.0018	0.0016	6.56	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	0.0057	0.0048	16.8	0% - 20%
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	0.0237	0.0201	16.3	0% - 20%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	0.0058	0.0051	13.2	0% - 20%
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	1.50	1.49	1.27	0% - 20%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	0.0136	0.0119	13.3	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 968415)									
EB1712881-001	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	0.0005	0.0004	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	0.0003	0.0002	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0328	0.0362	9.66	0% - 20%
		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: 963912)									
EP1706611-001	SS11_0.8_160617	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.00	No Limit
		EP1706611-015	SS14_0.1_170617	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0005	<0.0005
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4			0.0002	mg/kg	0.192	0.195	1.35	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 (%)
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 963912) - continued									
EP1706611-015	SS14_0.1_170617	EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	0.0209	0.0204	1.98	0% - 20%
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	0.0111	0.0131	16.5	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	0.0063	0.0063	0.00	0% - 50%
		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	0.0007	0.0007	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	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	0.003	<0.001	92.4	No Limit
EP231B Perfluoroalkyl Carboxylic Acids (QC Lot 963913)									
EP1706611-042	SS17_0.5_180617	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	0.0008	0.0011	24.6	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.0003	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	0.0009	0.0011	20.3	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	0.0007	0.0006	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	0.0005	0.0007	30.8	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
EP1706611-061	SS20_0.1_180617	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	0.0030	0.0026	14.5	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	0.0114	0.0120	5.64	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	0.0018	0.0020	10.8	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	0.0095	0.0097	2.12	0% - 50%
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	0.0008	0.0008	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	0.0008	0.0010	28.6	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 (PFTTrDA)	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: 963920)									
EP1706611-089	SS3A_0.8_190617	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	0.0020	0.0018	13.4	0% - 50%
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	0.0117	0.0100	15.6	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	0.0010	0.0008	17.3	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335 67 1	0 0002	mg/kg	0 0042	0 0037	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	0.0003	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



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: 963920) - continued									
EP1706611-089	SS3A_0.8_190617	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: 968415)									
EB1712881-001	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	0.0003	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	0.0008	0.0007	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	0.0004	0.0004	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	0.0010	0.0010	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	0.0004	0.0004	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDODA)	307-55-1	0.0002	mg/kg	0.0009	0.0008	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	0.0002	0.0002	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 963912)									
EP1706611-001	SS11_0.8_160617	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
EP1706611-015	SS14_0.1_170617	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	0.0240	0.0279	15.2	0% - 20%
		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



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: 963912) - continued									
EP1706611-015	SS14_0.1_170617	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: 963913)									
EP1706611-042	SS17_0.5_180617	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	0.0003	0.0004	31.0	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
EP1706611-061	SS20_0.1_180617	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	0.0047	0.0047	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: 963920)									
EP1706611-089	SS3A_0.8_190617	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	0.0156	0.0162	3.75	0% - 20%
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	0.0005	0.0006	28.3	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	0.0016	0.0011	30.6	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	0.0005	0.0007	20.2	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



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: 963920) - continued									
EP1706611-089	SS3A_0.8_190617	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: 968415)									
EB1712881-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	0.0019	0.0019	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	0.0017	0.0019	15.2	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	0.0021	0.0023	8.84	0% - 50%
		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: 963912)									
EP1706611-001	SS11_0.8_160617	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
EP1706611-015	SS14_0.1_170617	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 963913)									
EP1706611-042	SS17_0.5_180617	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	0.0009	0.0010	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: 963913) - continued									
EP1706611-042	SS17_0.5_180617	EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
EP1706611-061	SS20_0.1_180617	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 963920)									
EP1706611-089	SS3A_0.8_190617	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 968415)									
EB1712881-001	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	0.0022	0.0027	18.7	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	0.0031	0.0033	7.70	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	0.0022	0.0019	17.3	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: 963890)									
EP1706611-106	SSQA02_160617	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 963890)									
EP1706611-106	SSQA02_160617	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



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: 963890) - continued									
EP1706611-106	SSQA02_160617	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
		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 963890)									
EP1706611-106	SSQA02_160617	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 963890)									
EP1706611-106	SSQA02_160617	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: 963890)									
EP1706611-106	SSQA02_160617	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.00	No Limit



Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **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				
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 963912)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	111	57	121
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	111	55	125
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	119	52	126
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	93.6	54	123
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	90.2	55	127
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	76.1	54	125
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 963913)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	64.7	57	121
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	118	55	125
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	70.5	52	126
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	92.0	54	123
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	96.5	55	127
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	77.1	54	125
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 963920)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	61.7	57	121
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	106	55	125
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	78.6	52	126
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	93.0	54	123
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	110	55	127
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	89.9	54	125
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 968415)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	72.6	57	121
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	67.8	55	125
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	75.0	52	126
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	76.5	54	123
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	89.3	55	127
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	83.8	54	125
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 963912)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	97.5	52	128
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	113	54	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.2	58	127
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	105	57	128
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	112	60	134
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	116	63	130



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: 963912) - continued								
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	89.6	55	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	65.9	62	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	66.0	53	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	62.0	49	129
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	96.8	59	129
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 963913)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	90.5	52	128
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	95.9	54	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.5	58	127
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	115	57	128
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	108	60	134
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	121	63	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	107	55	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	63.1	62	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	62.8	53	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	70.6	49	129
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	90.4	59	129
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 963920)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	104	52	128
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	94.6	54	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	91.8	58	127
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	109	57	128
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	113	60	134
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	93.5	63	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	119	55	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	70.0	62	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	68.4	53	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	66.2	49	129
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	86.4	59	129
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 968415)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	87.1	52	128
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	88.0	54	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	83.6	58	127
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	82.8	57	128
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	90.1	60	134
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	116	63	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	98.6	55	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	97.3	62	130



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: 968415) - continued								
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	81.6	53	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	73.2	49	129
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	96.0	59	129
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 963912)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	58.1	52	132
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	88.9	65	126
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	93.3	64	126
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	89.7	63	124
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	92.3	58	125
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	92.3	61	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	121	55	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 963913)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	68.7	52	132
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	115	65	126
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	92.0	64	126
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	93.4	63	124
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	85.2	58	125
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	97.2	61	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	110	55	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 963920)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	84.5	52	132
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	107	65	126
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	98.9	64	126
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	101	63	124
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	94.8	58	125
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	120	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



Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) LowHigh	
Method: Compound	CAS Number	LOR	Unit	Result				
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 968415)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	81.1	52	132
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	98.4	65	126
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	95.6	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	92.9	58	125
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	96.2	61	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.8	55	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 963912)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	107	54	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	119	61	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	110	62	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	117	60	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 963913)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	103	54	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	117	61	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	118	62	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	101	60	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 963920)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	105	54	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	121	61	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	122	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: 968415)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	74.3	54	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	113	61	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	114	62	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	121	60	130

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result		LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 963890)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.5 µg/L	84.8	70	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.5 µg/L	96.2	70	130
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.5 µg/L	86.8	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				
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 963890) - continued								
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.5 µg/L	89.4	70	130
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.5 µg/L	98.6	70	130
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.5 µg/L	88.6	70	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 963890)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	2.5 µg/L	90.7	70	130
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.5 µg/L	88.4	70	130
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.5 µg/L	85.4	70	130
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.5 µg/L	91.0	70	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.5 µg/L	91.6	70	130
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.5 µg/L	93.6	70	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.5 µg/L	93.4	70	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.5 µg/L	96.8	70	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.5 µg/L	90.8	70	130
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.5 µg/L	114	70	130
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	1.25 µg/L	108	70	124
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 963890)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.5 µg/L	94.6	70	130
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	1.25 µg/L	102	70	130
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	1.25 µg/L	105	70	129
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.05	1.25 µg/L	82.4	70	129
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	1.25 µg/L	83.1	70	126
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.5 µg/L	86.2	70	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.5 µg/L	76.2	70	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 963890)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.5 µg/L	91.8	70	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.5 µg/L	92.0	70	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.5 µg/L	91.2	70	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.5 µg/L	86.6	70	130

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Matrix Spike (MS) Report		
Spike	SpikeRecovery(%)	Recovery Limits (%)



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: 963912)							
EP1706611-001	SS11_0.8_160617	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	89 2	50	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	106	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	54 3	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	91 0	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	93 9	50	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 963913)							
EP1706611-042	SS17_0.5_180617	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	56.4	50	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	91 0	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	85.6	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	77 0	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	79 8	50	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 963920)							
EP1706611-089	SS3A_0.8_190617	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	57.7	50	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	# Not Determined	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	# Not Determined	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	# Not Determined	50	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 968415)							
EB1712881-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	69 0	50	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	56 2	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	70 5	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	71 0	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	111	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 963912)							
EP1706611-001	SS11_0.8_160617	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	94.1	30	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	83.6	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: 963912) - continued							
EP1706611-001	SS11_0.8_160617	EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	72 8	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	101	50	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	96.6	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	84 8	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	112	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	58 8	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	66 0	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	77 2	30	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	56 2	30	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 963913)							
EP1706611-042	SS17_0.5_180617	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	79 3	30	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	86.1	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	88.1	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	94 2	50	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	102	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	130	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	98.1	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	121	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	51.4	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	49 2	30	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	52 3	30	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 963920)							
EP1706611-089	SS3A_0.8_190617	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	98.1	30	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	102	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	71.6	50	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	90 8	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	73 0	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	63.6	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	105	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	77 0	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	59 0	30	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	80.4	30	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 968415)							
EB1712881-001	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	95 5	30	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	77 9	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	70 3	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: 968415) - continued							
EB1712881-001	Anonymous	EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	80 2	50	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	95 8	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	105	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	103	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	106	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	111	30	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	86.7	30	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 963912)							
EP1706611-001	SS11_0.8_160617	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	58 2	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	54 3	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	62.1	30	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.00312 mg/kg	62 0	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	60.1	30	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	68 8	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	103	30	130
		EP231C: Perfluoroalkyl Sulfonamides (QCLot: 963913)					
EP1706611-042	SS17_0.5_180617	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	104	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	120	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	55 5	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	50.6	30	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	114	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	115	30	130
		EP231C: Perfluoroalkyl Sulfonamides (QCLot: 963920)					
EP1706611-089	SS3A_0.8_190617	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	# Not Determined	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	112	30	130

Matrix Spike (MS) Report

Laboratory sample ID		Client sample ID	Method: Compound	CAS Number	Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%) LowHigh	
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 963920) - continued								
EP1706611-089	SS3A_0.8_190617	EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	60.8	30	130	
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.00312 mg/kg	97.8	30	130	
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	56.3	30	130	
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	105	30	130	
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	115	30	130	
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 968415)								
EB1712881-001	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	68.6	30	130	
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	51.5	30	130	
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.00312 mg/kg	107	30	130	
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	95.1	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	124	30	130	
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 963912)								
EP1706611-001	SS11_0.8_160617	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	100	50	130	
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	112	50	130	
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	118	50	130	
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	123	50	130	
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 963913)								
EP1706611-042	SS17_0.5_180617	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	76.2	50	130	
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	111	50	130	
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	80.8	50	130	
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	115	50	130	
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 963920)								
EP1706611-089	SS3A_0.8_190617	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	102	50	130	
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	120	50	130	
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	76.2	50	130	
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	104	50	130	
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 968415)								



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: 968415) - continued							
EB1712881-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	88.6	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	76 0	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	60 0	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	79 3	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: 963890)							
EP1706611-106	SSQA02_160617	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.5 µg/L	97 2	50	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.5 µg/L	106	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.5 µg/L	106	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.5 µg/L	102	50	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.5 µg/L	105	50	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.5 µg/L	100	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 963890)							
EP1706611-106	SSQA02_160617	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	2.5 µg/L	104	50	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.5 µg/L	96 8	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.5 µg/L	99 0	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.5 µg/L	102	50	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.5 µg/L	103	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.5 µg/L	101	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.5 µg/L	96.6	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.5 µg/L	95.4	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.5 µg/L	120	50	130
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.5 µg/L	127	50	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	1.25 µg/L	128	50	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 963890)							
EP1706611-106	SSQA02_160617	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.5 µg/L	111	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	1.25 µg/L	108	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	1.25 µg/L	93 8	50	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	1.25 µg/L	73.7	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	1.25 µg/L	80.6	50	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.5 µg/L	95 2	50	130

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 Work Order : EP1706611
 Client : AECOM SERVICES PTY LTD
 Project : 6054717.3.3 Port Hedland International Airport – PFAS 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: 963890) - continued							
EP1706611-106	SSQA02_160617	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.5 µg/L	88.4	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 963890)							
EP1706611-106	SSQA02_160617	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.5 µg/L	104	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.5 µg/L	113	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.5 µg/L	102	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.5 µg/L	106	50	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EP1706611	Page	: 1 of 12
Client	: AECOM SERVICES PTY LTD	Laboratory	: Environmental Division Perth
Contact	: [REDACTED]	Telephone	: [REDACTED]
Project	: 6054717.3.3 Port Hedland International Airport – PFAS Investigation	Date Samples Received	: 21-Jun-2017
Site	: ----	Issue Date	: 30-Jun-2017
Sampler	: [REDACTED]	No. of samples received	: 110
Order number	: 6054717.3.3	No. of samples analysed	: 52

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO** Method Blank value outliers occur.
- **NO** Duplicate outliers occur.
- **NO** Laboratory Control outliers occur.
- Matrix Spike outliers exist - please see following pages for full details.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- **NO** Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- **NO** Quality Control Sample Frequency Outliers exist.



Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **SOIL**

Compound Group Name	Laboratory Sample D	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EP231A: Perfluoroalkyl Sulfonic Acids	EP1706611--089	SS3A_0.8_190617	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	EP1706611--089	SS3A_0.8_190617	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	EP1706611--089	SS3A_0.8_190617	Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EP231A: Perfluoroalkyl Sulfonic Acids	EP1706611--001	SS11_0.8_160617	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	EP1706611--042	SS17_0.5_180617	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	EP1706611--089	SS3A_0.8_190617	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	EB1712881--001	Anonymous	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	EP1706611--089	SS3A_0.8_190617	Perfluorodecane sulfonic acid (PFDS)	335-77-3	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EP231B: Perfluoroalkyl Carboxylic Acids	EP1706611--089	SS3A_0.8_190617	Perfluorohexanoic acid (PFHxA)	307-24-4	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EP231C: Perfluoroalkyl Sulfonamides	EP1706611--089	SS3A_0.8_190617	Perfluorooctane sulfonamide (FOSA)	754-91-6	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.



Matrix: **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)								
HDPE Soil Jar (EA055) SS11_0.8_160617, SS12_0.8_160617, SS10_0.8_160617, SS13_0.8_160617,	SS11_1.5_160617, SS12_1.5_160617, SS10_1.5_160617, SS13_1.5_160617	16-Jun-2017	----	----	----	24-Jun-2017	30-Jun-2017	✓
HDPE Soil Jar (EA055) SS15_0.1_170617, SS26_0.1_170617, SS25_0.1_170617, SS23_0.1_170617, SS16_0.1_170617,	SS14_0.1_170617, SS26_1.2_170617, SS25_1.5_170617, SS23_1.0_170617, SS16_1.3_170617	17-Jun-2017	----	----	----	24-Jun-2017	01-Jul-2017	✓
HDPE Soil Jar (EA055) SS14_1.4_170617		17-Jun-2017	----	----	----	27-Jun-2017	01-Jul-2017	✓
HDPE Soil Jar (EA055) SS17_0.1_180617, SS17_1.5_180617, SS18_0.5_180617, SS19_0.1_180617, SS19_1.2_180617, SS21_1.1_180617, SS20_1.2_180617, SS24_1.3_180617, SS22_1.3_180617, SSQA020_180617	SS17_0.5_180617, SS18_0.1_180617, SS18_1.4_180617, SS19_0.5_180617, SS21_0.1_180617, SS20_0.1_180617, SS24_0.1_180617, SS22_0.1_180617, SSQA012_180617,	18-Jun-2017	----	----	----	24-Jun-2017	02-Jul-2017	✓
HDPE Soil Jar (EA055) SS3A_0.1_190617, SS3B_0.1_190617, SS3C_0.1_190617, SS3D_0.1_190617,	SS3A_0.8_190617, SS3B_1.0_190617, SS3C_0.9_190617, SS3D_1.0_190617	19-Jun-2017	----	----	----	24-Jun-2017	03-Jul-2017	✓
Soil Glass Jar - Unpreserved (EA055) SS15_1.4_170617		17-Jun-2017	----	----	----	24-Jun-2017	01-Jul-2017	✓
Soil Glass Jar - Unpreserved (EA055) SSQA018_180617		18-Jun-2017	----	----	----	24-Jun-2017	02-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) SS11_0.8_160617, SS12_0.8_160617, SS10_0.8_160617, SS13_0.8_160617,	SS11_1.5_160617, SS12_1.5_160617, SS10_1.5_160617, SS13_1.5_160617	16-Jun-2017	27-Jun-2017	13-Dec-2017	✔	27-Jun-2017	06-Aug-2017	✔
HDPE Soil Jar (EP231X) SS15_0.1_170617, SS26_0.1_170617, SS25_0.1_170617, SS23_0.1_170617, SS16_0.1_170617,	SS14_0.1_170617, SS26_1.2_170617, SS25_1.5_170617, SS23_1.0_170617, SS16_1.3_170617	17-Jun-2017	27-Jun-2017	14-Dec-2017	✔	27-Jun-2017	06-Aug-2017	✔
HDPE Soil Jar (EP231X) SS14_1.4_170617		17-Jun-2017	29-Jun-2017	14-Dec-2017	✔	29-Jun-2017	08-Aug-2017	✔
HDPE Soil Jar (EP231X) SS17_0.1_180617		18-Jun-2017	27-Jun-2017	15-Dec-2017	✔	27-Jun-2017	06-Aug-2017	✔
HDPE Soil Jar (EP231X) SS17_0.5_180617, SS18_0.1_180617, SS18_1.4_180617, SS19_0.5_180617, SS21_0.1_180617, SS20_0.1_180617, SS24_0.1_180617, SS22_0.1_180617, SSQA012_180617,	SS17_1.5_180617, SS18_0.5_180617, SS19_0.1_180617, SS19_1.2_180617, SS21_1.1_180617, SS20_1.2_180617, SS24_1.3_180617, SS22_1.3_180617, SSQA020_180617	18-Jun-2017	28-Jun-2017	15-Dec-2017	✔	28-Jun-2017	07-Aug-2017	✔
HDPE Soil Jar (EP231X) SS3A_0.1_190617, SS3B_0.1_190617, SS3C_0.1_190617, SS3D_0.1_190617,	SS3A_0.8_190617, SS3B_1.0_190617, SS3C_0.9_190617, SS3D_1.0_190617	19-Jun-2017	28-Jun-2017	16-Dec-2017	✔	28-Jun-2017	07-Aug-2017	✔
Soil Glass Jar - Unpreserved (EP231X) SS15_1.4_170617		17-Jun-2017	27-Jun-2017	14-Dec-2017	✔	27-Jun-2017	06-Aug-2017	✔
Soil Glass Jar - Unpreserved (EP231X) SSQA018_180617		18-Jun-2017	28-Jun-2017	15-Dec-2017	✔	28-Jun-2017	07-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) SS11_0.8_160617, SS12_0.8_160617, SS10_0.8_160617, SS13_0.8_160617,	SS11_1.5_160617, SS12_1.5_160617, SS10_1.5_160617, SS13_1.5_160617	16-Jun-2017	27-Jun-2017	13-Dec-2017	✔	27-Jun-2017	06-Aug-2017	✔
HDPE Soil Jar (EP231X) SS15_0.1_170617, SS26_0.1_170617, SS25_0.1_170617, SS23_0.1_170617, SS16_0.1_170617,	SS14_0.1_170617, SS26_1.2_170617, SS25_1.5_170617, SS23_1.0_170617, SS16_1.3_170617	17-Jun-2017	27-Jun-2017	14-Dec-2017	✔	27-Jun-2017	06-Aug-2017	✔
HDPE Soil Jar (EP231X) SS14_1.4_170617		17-Jun-2017	29-Jun-2017	14-Dec-2017	✔	29-Jun-2017	08-Aug-2017	✔
HDPE Soil Jar (EP231X) SS17_0.1_180617		18-Jun-2017	27-Jun-2017	15-Dec-2017	✔	27-Jun-2017	06-Aug-2017	✔
HDPE Soil Jar (EP231X) SS17_0.5_180617, SS18_0.1_180617, SS18_1.4_180617, SS19_0.5_180617, SS21_0.1_180617, SS20_0.1_180617, SS24_0.1_180617, SS22_0.1_180617, SSQA012_180617,	SS17_1.5_180617, SS18_0.5_180617, SS19_0.1_180617, SS19_1.2_180617, SS21_1.1_180617, SS20_1.2_180617, SS24_1.3_180617, SS22_1.3_180617, SSQA020_180617	18-Jun-2017	28-Jun-2017	15-Dec-2017	✔	28-Jun-2017	07-Aug-2017	✔
HDPE Soil Jar (EP231X) SS3A_0.1_190617, SS3B_0.1_190617, SS3C_0.1_190617, SS3D_0.1_190617,	SS3A_0.8_190617, SS3B_1.0_190617, SS3C_0.9_190617, SS3D_1.0_190617	19-Jun-2017	28-Jun-2017	16-Dec-2017	✔	28-Jun-2017	07-Aug-2017	✔
Soil Glass Jar - Unpreserved (EP231X) SS15_1.4_170617		17-Jun-2017	27-Jun-2017	14-Dec-2017	✔	27-Jun-2017	06-Aug-2017	✔
Soil Glass Jar - Unpreserved (EP231X) SSQA018_180617		18-Jun-2017	28-Jun-2017	15-Dec-2017	✔	28-Jun-2017	07-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) SS11_0.8_160617, SS12_0.8_160617, SS10_0.8_160617, SS13_0.8_160617,	SS11_1.5_160617, SS12_1.5_160617, SS10_1.5_160617, SS13_1.5_160617	16-Jun-2017	27-Jun-2017	13-Dec-2017	✔	27-Jun-2017	06-Aug-2017	✔
HDPE Soil Jar (EP231X) SS15_0.1_170617, SS26_0.1_170617, SS25_0.1_170617, SS23_0.1_170617, SS16_0.1_170617,	SS14_0.1_170617, SS26_1.2_170617, SS25_1.5_170617, SS23_1.0_170617, SS16_1.3_170617	17-Jun-2017	27-Jun-2017	14-Dec-2017	✔	27-Jun-2017	06-Aug-2017	✔
HDPE Soil Jar (EP231X) SS14_1.4_170617		17-Jun-2017	29-Jun-2017	14-Dec-2017	✔	29-Jun-2017	08-Aug-2017	✔
HDPE Soil Jar (EP231X) SS17_0.1_180617		18-Jun-2017	27-Jun-2017	15-Dec-2017	✔	27-Jun-2017	06-Aug-2017	✔
HDPE Soil Jar (EP231X) SS17_0.5_180617, SS18_0.1_180617, SS18_1.4_180617, SS19_0.5_180617, SS21_0.1_180617, SS20_0.1_180617, SS24_0.1_180617, SS22_0.1_180617, SSQA012_180617,	SS17_1.5_180617, SS18_0.5_180617, SS19_0.1_180617, SS19_1.2_180617, SS21_1.1_180617, SS20_1.2_180617, SS24_1.3_180617, SS22_1.3_180617, SSQA020_180617	18-Jun-2017	28-Jun-2017	15-Dec-2017	✔	28-Jun-2017	07-Aug-2017	✔
HDPE Soil Jar (EP231X) SS3A_0.1_190617, SS3B_0.1_190617, SS3C_0.1_190617, SS3D_0.1_190617,	SS3A_0.8_190617, SS3B_1.0_190617, SS3C_0.9_190617, SS3D_1.0_190617	19-Jun-2017	28-Jun-2017	16-Dec-2017	✔	28-Jun-2017	07-Aug-2017	✔
Soil Glass Jar - Unpreserved (EP231X) SS15_1.4_170617		17-Jun-2017	27-Jun-2017	14-Dec-2017	✔	27-Jun-2017	06-Aug-2017	✔
Soil Glass Jar - Unpreserved (EP231X) SSQA018_180617		18-Jun-2017	28-Jun-2017	15-Dec-2017	✔	28-Jun-2017	07-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) SS11_0.8_160617, SS12_0.8_160617, SS10_0.8_160617, SS13_0.8_160617,	SS11_1.5_160617, SS12_1.5_160617, SS10_1.5_160617, SS13_1.5_160617	16-Jun-2017	27-Jun-2017	13-Dec-2017	✔	27-Jun-2017	06-Aug-2017	✔
HDPE Soil Jar (EP231X) SS15_0.1_170617, SS26_0.1_170617, SS25_0.1_170617, SS23_0.1_170617, SS16_0.1_170617,	SS14_0.1_170617, SS26_1.2_170617, SS25_1.5_170617, SS23_1.0_170617, SS16_1.3_170617	17-Jun-2017	27-Jun-2017	14-Dec-2017	✔	27-Jun-2017	06-Aug-2017	✔
HDPE Soil Jar (EP231X) SS14_1.4_170617		17-Jun-2017	29-Jun-2017	14-Dec-2017	✔	29-Jun-2017	08-Aug-2017	✔
HDPE Soil Jar (EP231X) SS17_0.1_180617		18-Jun-2017	27-Jun-2017	15-Dec-2017	✔	27-Jun-2017	06-Aug-2017	✔
HDPE Soil Jar (EP231X) SS17_0.5_180617, SS18_0.1_180617, SS18_1.4_180617, SS19_0.5_180617, SS21_0.1_180617, SS20_0.1_180617, SS24_0.1_180617, SS22_0.1_180617, SSQA012_180617,	SS17_1.5_180617, SS18_0.5_180617, SS19_0.1_180617, SS19_1.2_180617, SS21_1.1_180617, SS20_1.2_180617, SS24_1.3_180617, SS22_1.3_180617, SSQA020_180617	18-Jun-2017	28-Jun-2017	15-Dec-2017	✔	28-Jun-2017	07-Aug-2017	✔
HDPE Soil Jar (EP231X) SS3A_0.1_190617, SS3B_0.1_190617, SS3C_0.1_190617, SS3D_0.1_190617,	SS3A_0.8_190617, SS3B_1.0_190617, SS3C_0.9_190617, SS3D_1.0_190617	19-Jun-2017	28-Jun-2017	16-Dec-2017	✔	28-Jun-2017	07-Aug-2017	✔
Soil Glass Jar - Unpreserved (EP231X) SS15_1.4_170617		17-Jun-2017	27-Jun-2017	14-Dec-2017	✔	27-Jun-2017	06-Aug-2017	✔
Soil Glass Jar - Unpreserved (EP231X) SSQA018_180617		18-Jun-2017	28-Jun-2017	15-Dec-2017	✔	28-Jun-2017	07-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) SS11_0.8_160617, SS12_0.8_160617, SS10_0.8_160617, SS13_0.8_160617,	SS11_1.5_160617, SS12_1.5_160617, SS10_1.5_160617, SS13_1.5_160617	16-Jun-2017	27-Jun-2017	13-Dec-2017	✓	27-Jun-2017	06-Aug-2017	✓
HDPE Soil Jar (EP231X) SS15_0.1_170617, SS26_0.1_170617, SS25_0.1_170617, SS23_0.1_170617, SS16_0.1_170617,	SS14_0.1_170617, SS26_1.2_170617, SS25_1.5_170617, SS23_1.0_170617, SS16_1.3_170617	17-Jun-2017	27-Jun-2017	14-Dec-2017	✓	27-Jun-2017	06-Aug-2017	✓
HDPE Soil Jar (EP231X) SS14_1.4_170617		17-Jun-2017	29-Jun-2017	14-Dec-2017	✓	29-Jun-2017	08-Aug-2017	✓
HDPE Soil Jar (EP231X) SS17_0.1_180617		18-Jun-2017	27-Jun-2017	15-Dec-2017	✓	27-Jun-2017	06-Aug-2017	✓
HDPE Soil Jar (EP231X) SS17_0.5_180617, SS18_0.1_180617, SS18_1.4_180617, SS19_0.5_180617, SS21_0.1_180617, SS20_0.1_180617, SS24_0.1_180617, SS22_0.1_180617, SSQA012_180617,	SS17_1.5_180617, SS18_0.5_180617, SS19_0.1_180617, SS19_1.2_180617, SS21_1.1_180617, SS20_1.2_180617, SS24_1.3_180617, SS22_1.3_180617, SSQA020_180617	18-Jun-2017	28-Jun-2017	15-Dec-2017	✓	28-Jun-2017	07-Aug-2017	✓
HDPE Soil Jar (EP231X) SS3A_0.1_190617, SS3B_0.1_190617, SS3C_0.1_190617, SS3D_0.1_190617,	SS3A_0.8_190617, SS3B_1.0_190617, SS3C_0.9_190617, SS3D_1.0_190617	19-Jun-2017	28-Jun-2017	16-Dec-2017	✓	28-Jun-2017	07-Aug-2017	✓
Soil Glass Jar - Unpreserved (EP231X) SS15_1.4_170617		17-Jun-2017	27-Jun-2017	14-Dec-2017	✓	27-Jun-2017	06-Aug-2017	✓
Soil Glass Jar - Unpreserved (EP231X) SSQA018_180617		18-Jun-2017	28-Jun-2017	15-Dec-2017	✓	28-Jun-2017	07-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) SSQA02_160617	16-Jun-2017	----	----	----	26-Jun-2017	13-Dec-2017	✓
HDPE (no PTFE) (EP231X) SSQA06_170617	17-Jun-2017	----	----	----	26-Jun-2017	14-Dec-2017	✓
HDPE (no PTFE) (EP231X) SSQA010_180617	18-Jun-2017	----	----	----	26-Jun-2017	15-Dec-2017	✓
HDPE (no PTFE) (EP231X) SSQA024_190617	19-Jun-2017	----	----	----	26-Jun-2017	16-Dec-2017	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X) SSQA02_160617	16-Jun-2017	----	----	----	26-Jun-2017	13-Dec-2017	✓
HDPE (no PTFE) (EP231X) SSQA06_170617	17-Jun-2017	----	----	----	26-Jun-2017	14-Dec-2017	✓
HDPE (no PTFE) (EP231X) SSQA010_180617	18-Jun-2017	----	----	----	26-Jun-2017	15-Dec-2017	✓
HDPE (no PTFE) (EP231X) SSQA024_190617	19-Jun-2017	----	----	----	26-Jun-2017	16-Dec-2017	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X) SSQA02_160617	16-Jun-2017	----	----	----	26-Jun-2017	13-Dec-2017	✓
HDPE (no PTFE) (EP231X) SSQA06_170617	17-Jun-2017	----	----	----	26-Jun-2017	14-Dec-2017	✓
HDPE (no PTFE) (EP231X) SSQA010_180617	18-Jun-2017	----	----	----	26-Jun-2017	15-Dec-2017	✓
HDPE (no PTFE) (EP231X) SSQA024_190617	19-Jun-2017	----	----	----	26-Jun-2017	16-Dec-2017	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X) SSQA02_160617	16-Jun-2017	----	----	----	26-Jun-2017	13-Dec-2017	✓
HDPE (no PTFE) (EP231X) SSQA06_170617	17-Jun-2017	----	----	----	26-Jun-2017	14-Dec-2017	✓
HDPE (no PTFE) (EP231X) SSQA010_180617	18-Jun-2017	----	----	----	26-Jun-2017	15-Dec-2017	✓
HDPE (no PTFE) (EP231X) SSQA024_190617	19-Jun-2017	----	----	----	26-Jun-2017	16-Dec-2017	✓

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 Work Order : EP1706611
 Client : AECOM SERVICES PTY LTD
 Project : 6054717.3.3 Port Hedland International Airport – PFAS Investigation



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
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X) SSQA02_160617	16-Jun-2017	----	----	----	26-Jun-2017	13-Dec-2017	✓
HDPE (no PTFE) (EP231X) SSQA06_170617	17-Jun-2017	----	----	----	26-Jun-2017	14-Dec-2017	✓
HDPE (no PTFE) (EP231X) SSQA010_180617	18-Jun-2017	----	----	----	26-Jun-2017	15-Dec-2017	✓
HDPE (no PTFE) (EP231X) SSQA024_190617	19-Jun-2017	----	----	----	26-Jun-2017	16-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	8	80	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	6	55	10.91	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	4	55	7.27	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	4	55	7.27	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	4	55	7.27	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	1	5	20.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	5	20.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	5	20.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	5	20.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
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



CON NOTE: TOLL
IPEC 8961560748
(6 ESKYS)

AECOM

CHAIN OF CUSTODY

CLIENT: AECOM Services Pty Ltd.	TURNAROUND REQUIREMENTS: Standard TAT (List due date):	FOR LABORATORY USE ONLY
OFFICE: Level 6, 3 Forrest Place, Perth, WA, 6000	ALS QUOTE NO.:	Custody Seal Intact? ☒ N
PROJECT: Port Hedland International Airport - PFAS Investigation	COUNTRY OF ORIGIN: Australia	Temperature OK? ☒ N
Purchase Order NO.: 60543717.3.3	COC SEQUENCE NUMBER (Circle):	Other comment: 3.7
QUOTE NO.: EN / 004 / 16	COC: 1	RECEIVED BY: SP
	OF: 1	21-6-17
	RELINQUISHED BY: Wesu Ndifia-Barnes	DATE/TIME: 3:40PM
	DATE/TIME:	

COC Entered to ALS? YES

EDD FORMAT (or default): Esdat

PLEASE FORWARD THE FOLLOWING SAMPLES TO EUROFINS LABORATORIES:

SSQA013_180617 (SS17_0.5), SSQA019_180617 (SS18_0.5), SSQA021_180617 (SS19_0.5) for analysis of ER231 (DER recommended PFAS suite)

LAB ID	Area	SAMPLE ID	DATE	TIME	MATRIX	TOTAL BOTTLES	ER231 (DER recommended PFAS suite)	ON HOLD	Comments
1	Diesel Investigation	SS11_0.8_160617	16.06.17		S		X		
2	Diesel Investigation	SS11_1.5_160617	16.06.17		S		X		
3	Diesel Investigation	SS11_4.6_160617	16.06.17		S		X		
4	Diesel Investigation	SS12_0.8_160617	16.06.17		S		X		
5	Diesel Investigation	SS12_1.5_160617	16.06.17		S		X		
6	Diesel Investigation	SS12_3.5_160617	16.06.17		S		X		
7	Diesel Investigation	SS19_0.8_160617	16.06.17		S		X		
8	Diesel Investigation	SS19_1.5_160617	16.06.17		S		X		
9	Diesel Investigation	SS19_3.5_160617	16.06.17		S		X		
10	Diesel Investigation QAQC	SSQA03_160617	16.06.17		S				
11	APEC 2	SS13_0.5_170617	17.06.17		S		X		
12	APEC 2	SS13_1.5_170617	17.06.17		S		X		
13	APEC 2	SS13_3.3_170617	17.06.17		S				
14	APEC 2	SS13_3.5_170617	17.06.17		S				
15	APEC 2	SS15_0.1_170617	17.06.17		S		X		
16	APEC 2	SS15_0.5_170617	17.06.17		S				
17	APEC 2	SS15_0.8_170617	17.06.17		S				
18	APEC 2	SS15_1.4_170617	17.06.17		S		X		
19	APEC 2	SS15_1.6_170617	17.06.17		S				
20	APEC 2	SS14_0.1_170617	17.06.17		S		X		
21	APEC 2	SS14_0.5_170617	17.06.17		S				
22	APEC 2	SS14_0.8_170617	17.06.17		S				
23	APEC 2	SS14_1.4_170617	17.06.17		S				
24	APEC 2	SS14_1.5_170617	17.06.17		S		X		
25	APEC 2	SS14_3.4_170617	17.06.17		S				
26	APEC 2 QAQC	SSQA04_160617	16.06.17		S				
27	APEC 2 QAQC	SSQA05_170617	17.06.17		S				
28	APEC 2 QAQC	SSQA09_170617	17.06.17		S				
29	APEC 2 QAQC	TBS292	05.06.17		S				
30	APEC 1	SS26_0.1_170617	17.06.17		S		X		
31	APEC 1	SS26_0.5_170617	17.06.17		S				
32	APEC 1	SS26_0.8_170617	17.06.17		S				
33	APEC 1	SS26_1.2_170617	17.06.17		S		X		
34	APEC 1	SS26_3.4_170617	17.06.17		S				
35	APEC 1	SS25_0.1_170617	17.06.17		S		X		
36	APEC 1	SS25_0.5_170617	17.06.17		S				
37	APEC 1	SS25_0.8_170617	17.06.17		S				
38	APEC 1	SS25_1.5_170617	17.06.17		S		X		
39	APEC 1	SS23_0.1_170617	17.06.17		S		X		
40	APEC 1	SS23_0.5_170617	17.06.17		S				
41	APEC 1	SS23_0.8_170617	17.06.17		S				
42	APEC 1	SS23_1.0_170617	17.06.17		S		X		
43	APEC 1	SS16_0.1_170617	17.06.17		S		X		
44	APEC 1	SS16_0.5_170617	17.06.17		S				
45	APEC 1	SS16_0.8_170617	17.06.17		S				
46	APEC 1	SS16_1.3_170617	17.06.17		S		X		
47	APEC 1	SS18_1.5_170617	17.06.17		S				
48	APEC 1	SS17_0.1_180617	18.06.17		S		X		
49	APEC 1	SS17_0.5_180617	18.06.17		S		X		

Environmental Division
Perth

Work Order Reference
EP1706611



Telephone : 81-8-9209 7856

43	APEC 1	SS17_0.5_180617	18.06.17	S						
42	APEC 1	SS17_1.5_180617	18.06.17	S						
41	APEC 1	SS17_2.5_180617	18.06.17	S						
40	APEC 1	SS18_0.1_180617	18.06.17	S						
39	APEC 1	SS18_0.5_180617	18.06.17	S						
38	APEC 1	SS18_0.8_180617	18.06.17	S						
37	APEC 1	SS18_1.4_180617	18.06.17	S						
36	APEC 1	SS18_2.5_180617	18.06.17	S						
35	APEC 1	SS18_5.5_180617	18.06.17	S						
34	APEC 1	SS19_0.1_180617	18.06.17	S						
33	APEC 1	SS19_0.5_180617	18.06.17	S						
32	APEC 1	SS19_0.8_180617	18.06.17	S						
31	APEC 1	SS19_1.2_180617	18.06.17	S						
30	APEC 1	SS19_1.6_180617	18.06.17	S						
29	APEC 1	SS19_2.5_180617	18.06.17	S						
28	APEC 1	SS21_0.1_180617	18.06.17	S						
27	APEC 1	SS21_0.5_180617	18.06.17	S						
26	APEC 1	SS21_0.8_180617	18.06.17	S						
25	APEC 1	SS21_1.1_180617	18.06.17	S						
24	APEC 1	SS21_2.5_180617	18.06.17	S						
23	APEC 1	SS20_0.1_180617	18.06.17	S						
22	APEC 1	SS20_0.5_180617	18.06.17	S						
21	APEC 1	SS20_0.8_180617	18.06.17	S						
20	APEC 1	SS20_1.2_180617	18.06.17	S						
19	APEC 1	SS24_0.1_180617	18.06.17	S						
18	APEC 1	SS24_0.5_180617	18.06.17	S						
17	APEC 1	SS24_0.8_180617	18.06.17	S						
16	APEC 1	SS24_1.3_180617	18.06.17	S						
15	APEC 1	SS24_2.5_180617	18.06.17	S						
14	APEC 1	SS24_2.5_180617	18.06.17	S						
13	APEC 1	SS22_0.1_180617	18.06.17	S						
12	APEC 1	SS22_0.5_180617	18.06.17	S						
11	APEC 1	SS22_0.8_180617	18.06.17	S						
10	APEC 1	SS22_1.3_180617	18.06.17	S						
9	APEC 1	SS22_1.6_180617	18.06.17	S						
8	APEC 1	SS22_2.5_180617	18.06.17	S						
7	APEC 1 QAQC	SSQA08_170617	17.06.17	S						
6	APEC 1 QAQC	SSQA012_180617	18.06.17	S						
5	APEC 1 QAQC	SSQA013_180617	18.06.17	S						
4	APEC 1 QAQC	SSQA014_180617	18.06.17	S						
3	APEC 1 QAQC	SSQA015_180617	18.06.17	S						
2	APEC 1 QAQC	SSQA016_180617	18.06.17	S						
1	APEC 1 QAQC	SSQA017_180617	18.06.17	S						
	APEC 1 QAQC	SSQA018_180617	18.06.17	S						
	APEC 1 QAQC	SSQA019_180617	18.06.17	S						
	APEC 1 QAQC	SSQA020_180617	18.06.17	S						
	APEC 1 QAQC	SSQA021_180617	18.06.17	S						
	APEC 1 QAQC	SSQA022_180617	18.06.17	S						
	APEC 1 QAQC	SSQA023_180617	18.06.17	S						
	APEC 3	SS3A_0.1_180617	19.06.17	S						
	APEC 3	SS3A_0.5_180617	19.06.17	S						
	APEC 3	SS3A_0.7_180617	19.06.17	S						
	APEC 3	SS3A_0.8_180617	19.06.17	S						
	APEC 3	SS3A_1.5_180617	19.06.17	S						
	APEC 3	SS3B_0.1_180617	19.06.17	S						
	APEC 3	SS3B_0.5_180617	19.06.17	S						
	APEC 3	SS3B_0.8_180617	19.06.17	S						
	APEC 3	SS3B_1.0_180617	19.06.17	S						
	APEC 3	SS3C_0.1_180617	19.06.17	S						
	APEC 3	SS3C_0.5_180617	19.06.17	S						
	APEC 3	SS3C_0.8_180617	19.06.17	S						
	APEC 3	SS3C_0.9_180617	19.06.17	S						
	APEC 3	SS3C_1.2_180617	19.06.17	S						
	APEC 3	SS3D_0.1_180617	19.06.17	S						
	APEC 3	SS3D_0.5_180617	19.06.17	S						
	APEC 3	SS3D_0.8_180617	19.06.17	S						
	APEC 3	SS3D_1.0_180617	19.06.17	S						
	APEC 3	SS3D_1.3_180617	19.06.17	S						
	APEC 3 QAQC	TBS293	09.06.17	S						
	QAQC	SSQA02_180617	18.06.17	W						
	QAQC	SSQA06_170617	17.06.17	W						
	QAQC	SSQA010_180617	18.06.17	W						
	QAQC	SSQA024_190617	19.06.17	W						
	Cancelled	SSQA07_170617	17.06.17	S						

Sample Receipt Advice

Company name: AECOM Aust Pty Ltd Perth

Contact name: [REDACTED]

Project name: PORT HEDLAND INTERNATIONAL AIPORT_PFAS INVESTIAGTION

Project ID: 60543717.3.3

COC number: Not provided

Turn around time: 5 Day

Date/Time received: Jun 23, 2017 9:00 AM

Eurofins | mgt reference: 551304

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 : 11.1 degrees Celsius.
- ☒ All samples have been received as described on the above COC.
- ☒ COC has been completed correctly.
- ☒ Attempt to chill was evident.
- ☒ Appropriately preserved sample containers have been used.
- ☒ All samples were received in good condition.
- ☒ Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
- ☒ Appropriate sample containers have been used.
- ☒ Some samples have been subcontracted.
- N/A Custody Seals intact (if used).

Contact notes

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

[REDACTED]

[REDACTED]

Company Name: AECOM Aust Pty Ltd Perth
Address: Leve 4, 3 Forrest P ace
Perth
WA 6000

Project Name: PORT HEDLAND INTERNATIONAL AIPORT PFAS INVESTIAGTION
Project ID: 60543717.3.3

Order No.:
Report #: 551304
Phone:
Fax:

Received: Jun 23, 2017 9:00 AM
Due: Jun 30, 2017
Priority: 5 Day
Contact Name:

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	SSQA013 180 617 (SS17 0.5)	Jun 18, 2017		So	B17-Jn22850	X	X
2	SSQA019 180 617 (SS18 0.5)	Jun 18, 2017		So	B17-Jn22851	X	X
3	SSQA021 180 617 (SS19 0.5)	Jun 18, 2017		So	B17-Jn22852	X	X
Test Counts						3	3

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 551304-S
Project name PORT HEDLAND INTERNATIONAL AIPORT PFAS INVESTIAGTION
Project ID 60543717.3.3
Rece ved Date Jun 23, 2017

Client Sample ID			SSQA013 180 617 (SS17 0.5)	SSQA019 180 617 (SS18 0.5)	SSQA021 180 617 (SS19 0.5)
Sample Matrix			Soil	Soil	Soil
Eurofins mgt Sample No.			B17-Jn22850	B17-Jn22851	B17-Jn22852
Date Sampled			Jun 18, 2017	Jun 18, 2017	Jun 18, 2017
Test/Reference	LOR	Un t			
Perfluoroalkyl carboxylic acids (PFCAs)					
Perf uorobutano c ac d (PFBA)	5	ug/kg	< 5	< 5	< 5
Perf uoropentano c ac d (PFPeA)	5	ug/kg	< 5	< 5	< 5
Perf uorohexano c ac d (PFHxA)	5	ug/kg	< 5	< 5	< 5
Perf uoroheptano c ac d (PFHpA)	5	ug/kg	< 5	< 5	< 5
Perf uorooctano c ac d (PFOA)	5	ug/kg	< 5	< 5	< 5
Perf uorononano c ac d (PFNA)	5	ug/kg	< 5	< 5	< 5
Perf uorodecano c ac d (PFDA)	5	ug/kg	< 5	< 5	< 5
Perf uoroundecano c ac d (PFUnA)	5	ug/kg	< 5	< 5	< 5
Perf uorododecano c ac d (PFDoA)	5	ug/kg	< 5	< 5	< 5
Perf uorotr decano c ac d (PFTrDA)	5	ug/kg	< 5	< 5	< 5
Perf uorotetradecano c ac d (PFTeDA)	5	ug/kg	< 5	< 5	< 5
13C4-PFBA (surr.)	1	%	151	152	155
13C5-PFPeA (surr.)	1	%	153	169	164
13C5-PFHxA (surr.)	1	%	164	164	166
13C4-PFHpA (surr.)	1	%	160	155	162
13C8-PFOA (surr.)	1	%	155	154	158
13C5-PFNA (surr.)	1	%	165	162	165
13C6-PFDA (surr.)	1	%	172	161	167
13C2-PFUnDA (surr.)	1	%	173	152	172
13C2-PFDoDA (surr.)	1	%	175	161	171
13C2-PFTeDA (surr.)	1	%	177	161	169
Perfluoroalkane sulfonamides (PFASAs)					
Perf uorooctane su fonam de (FOSA)	5	ug/kg	< 5	^{N09} 63	< 5
N-methy perf uoro-1-octane su fonam de (N-MeFOSA)	5	ug/kg	< 5	< 5	< 5
N-ethy perf uoro-1-octane su fonam de (N-EtFOSA)	5	ug/kg	< 5	< 5	< 5
2-(N-methy perf uoro-1-octane su fonam do)-ethano (N-MeFOSE)	5	ug/kg	< 5	< 5	< 5
2-(N-ethy perf uoro-1-octane su fonam do)-ethano (N-EtFOSE)	5	ug/kg	< 5	< 5	< 5
N-ethy -perf uorooctanesu fonam doacet c ac d (N-EtFOSAA)	10	ug/kg	< 10	< 10	< 10
N-methy -perf uorooctanesu fonam doacet c ac d (N-MeFOSAA)	10	ug/kg	< 10	< 10	< 10
13C8-FOSA (surr.)	1	%	118	115	120
D3-N-MeFOSA (surr.)	1	%	137	138	146
D5-N-EtFOSA (surr.)	1	%	146	151	150

Client Sample ID			SSQA013 180 617 (SS17 0.5)	SSQA019 180 617 (SS18 0.5)	SSQA021 180 617 (SS19 0.5)
Sample Matrix			Soil	Soil	Soil
Eurofins mgt Sample No.			B17-Jn22850	B17-Jn22851	B17-Jn22852
Date Sampled			Jun 18, 2017	Jun 18, 2017	Jun 18, 2017
Test/Reference	LOR	Un t			
Perfluoroalkane sulfonamides (PFASAs)					
D7-N-MeFOSE (surr.)	1	%	134	142	136
D9-N-EtFOSE (surr.)	1	%	131	134	134
D5-N-EtFOSAA (surr.)	1	%	194	174	180
D3-N-MeFOSAA (surr.)	1	%	196	179	194
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSAAs)					
Perf uorobutanesu fon c ac d (PFBS)	5	ug/kg	< 5	< 5	< 5
Perf uoropentanesu fon c ac d (PFPeS)	5	ug/kg	< 5	< 5	< 5
Perf uorohexanesu fon c ac d (PFHxS)	5	ug/kg	< 5	^{NO9} 6.1	< 5
Perf uoroheptanesu fon c ac d (PFHpS)	5	ug/kg	< 5	< 5	< 5
Perf uorooctanesu fon c ac d (PFOS) ^{N11}	5	ug/kg	^{NO9} 66	9500	^{NO9} 510
Perf uorodecanesu fon c ac d (PFDS)	5	ug/kg	< 5	^{NO9} 21	^{NO9} 15
13C3-PFBS (surr.)	1	%	167	166	164
18O2-PFHxS (surr.)	1	%	167	153	163
13C8-PFOS (surr.)	1	%	155	59	118
n:2 Fluorotelomer sulfonic acids					
1H.1H.2H.2H-perf uorohexanesu fon c ac d (4:2 FTS)	5	ug/kg	< 5	< 5	< 5
1H.1H.2H.2H-perf uorooctanesu fon c ac d (6:2 FTS)	10	ug/kg	< 10	< 10	< 10
1H.1H.2H.2H-perf uorodecanesu fon c ac d (8:2 FTS)	5	ug/kg	< 5	52	< 5
1H.1H.2H.2H-perf uorododecanesu fon c ac d (10:2 FTS)	5	ug/kg	< 5	< 5	< 5
13C2-4:2 FTS (surr.)	1	%	154	154	155
13C2-6:2 FTS (surr.)	1	%	152	147	150
13C2-8:2 FTS (surr.)	1	%	186	182	170
% Moisture	1	%	2.4	2.5	4.4

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported. A recent review of our LMS 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)			
Perfluorinated alkyl carboxylic acids (PFCAs)	Brisbane	Jun 24, 2017	180 Day
- Method L M-ORG-2100 Per- and Polyfluorinated Alkyl Substances by LC-MS/MS			
Perfluorinated sulfonamides (PFASAs)	Brisbane	Jun 24, 2017	180 Day
- Method L M-ORG-2100 Per- and Polyfluorinated Alkyl Substances by LC-MS/MS			
Perfluorinated sulfonic acids & Perfluorinated sulfonates (PFSAs)	Brisbane	Jun 24, 2017	180 Day
- Method L M-ORG-2100 Per- and Polyfluorinated Alkyl Substances by LC-MS/MS			
n:2 Fluorotelomer sulfonic acids	Brisbane	Jun 24, 2017	180 Day
- Method L M-ORG-2100 Per- and Polyfluorinated Alkyl Substances by LC-MS/MS			
% Moisture	Brisbane	Jun 23, 2017	14 Day
- Method L M-GEN-7080 Moisture			

Company Name: AECOM Aust Pty Ltd Perth
Address: Leve 4, 3 Forrest P ace
Perth
WA 6000

Project Name: PORT HEDLAND INTERNATIONAL AIPORT PFAS INVESTIAGTION
Project ID: 60543717.3.3

Order No.:
Report #: 551304
Phone: 08 6208 0000
Fax:

Received: Jun 23, 2017 9:00 AM
Due: Jun 30, 2017
Priority: 5 Day
Contact Name: [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	SSQA013 180 617 (SS17 0.5)	Jun 18, 2017		So	B17-Jn22850	X	X
2	SSQA019 180 617 (SS18 0.5)	Jun 18, 2017		So	B17-Jn22851	X	X
3	SSQA021 180 617 (SS19 0.5)	Jun 18, 2017		So	B17-Jn22852	X	X
Test Counts						3	3

Internal Quality Control Review and Glossary

General

- 1 Laboratory QC results or 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 or matrix spikes or surrogate recoveries except for P-AS 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' or 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 time frame, 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 & P-ASs

P-AS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.1 where no positive P-AS 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, dioxaphene & Chlordane are not added to the LCS.
- 4 Organochlorine Pesticide analysis - where reporting Spike data, dioxaphene 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 its 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. Where 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 "N/A" 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)							
Perf uorobutano c ac d (PFBA)	ug/kg	< 5			5	Pass	
Perf uoropentano c ac d (PFPeA)	ug/kg	< 5			5	Pass	
Perf uorohexano c ac d (PFHxA)	ug/kg	< 5			5	Pass	
Perf uoroheptano c ac d (PFHpA)	ug/kg	< 5			5	Pass	
Perf uorooctano c ac d (PFOA)	ug/kg	< 5			5	Pass	
Perf uorononano c ac d (PFNA)	ug/kg	< 5			5	Pass	
Perf uorodecano c ac d (PFDA)	ug/kg	< 5			5	Pass	
Perf uoroundecano c ac d (PFUnA)	ug/kg	< 5			5	Pass	
Perf uorododecano c ac d (PFDaA)	ug/kg	< 5			5	Pass	
Perf uorotr decano c ac d (PFTrDA)	ug/kg	< 5			5	Pass	
Perf uorotetradecano c ac d (PFTeDA)	ug/kg	< 5			5	Pass	
Method Blank							
Perfluoroalkane sulfonamides (PFASAs)							
Perf uorooctane su fonam de (FOSA)	ug/kg	< 5			5	Pass	
N-methy perf uoro-1-octane su fonam de (N-MeFOSA)	ug/kg	< 5			5	Pass	
N-ethy perf uoro-1-octane su fonam de (N-EtFOSA)	ug/kg	< 5			5	Pass	
2-(N-methy perf uoro-1-octane su fonam do)-ethano (N-MeFOSE)	ug/kg	< 5			5	Pass	
2-(N-ethy perf uoro-1-octane su fonam do)-ethano (N-EtFOSE)	ug/kg	< 5			5	Pass	
N-ethy -perf uorooctanesu fonam doacet c ac d (N-EtFOSAA)	ug/kg	< 10			10	Pass	
N-methy -perf uorooctanesu fonam doacet c ac d (N-MeFOSAA)	ug/kg	< 10			10	Pass	
Method Blank							
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFASs)							
Perf uorobutanesu fon c ac d (PFBS)	ug/kg	< 5			5	Pass	
Perf uoropentanesu fon c ac d (PFPeS)	ug/kg	< 5			5	Pass	
Perf uorohexanesu fon c ac d (PFHxS)	ug/kg	< 5			5	Pass	
Perf uoroheptanesu fon c ac d (PFHpS)	ug/kg	< 5			5	Pass	
Perf uorooctanesu fon c ac d (PFOS)	ug/kg	< 5			5	Pass	
Perf uorodecanesu fon c ac d (PFDS)	ug/kg	< 5			5	Pass	
Method Blank							
n:2 Fluorotelomer sulfonic acids							
1H.1H.2H.2H-perf uorohexanesu fon c ac d (4:2 FTS)	ug/kg	< 5			5	Pass	
1H.1H.2H.2H-perf uorooctanesu fon c ac d (6:2 FTS)	ug/kg	< 10			10	Pass	
1H.1H.2H.2H-perf uorodecanesu fon c ac d (8:2 FTS)	ug/kg	< 5			5	Pass	
1H.1H.2H.2H-perf uorododecanesu fon c ac d (10:2 FTS)	ug/kg	< 5			5	Pass	
LCS - % Recovery							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perf uorobutano c ac d (PFBA)	%	106			50-150	Pass	
Perf uoropentano c ac d (PFPeA)	%	109			50-150	Pass	
Perf uorohexano c ac d (PFHxA)	%	110			50-150	Pass	
Perf uoroheptano c ac d (PFHpA)	%	105			50-150	Pass	
Perf uorooctano c ac d (PFOA)	%	110			50-150	Pass	
Perf uorononano c ac d (PFNA)	%	105			50-150	Pass	
Perf uorodecano c ac d (PFDA)	%	114			50-150	Pass	
Perf uoroundecano c ac d (PFUnA)	%	108			50-150	Pass	
Perf uorododecano c ac d (PFDaA)	%	109			50-150	Pass	
Perf uorotr decano c ac d (PFTrDA)	%	99			50-150	Pass	
Perf uorotetradecano c ac d (PFTeDA)	%	110			50-150	Pass	
LCS - % Recovery							
Perfluoroalkane sulfonamides (PFASAs)							

Test				Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Perf uorooctane su fonam de (FOSA)				%	70			50-150	Pass	
N-methy perf uoro-1-octane su fonam de (N-MeFOSA)				%	121			50-150	Pass	
N-ethy perf uoro-1-octane su fonam de (N-EtFOSA)				%	112			50-150	Pass	
2-(N-methy perf uoro-1-octane su fonam do)-ethano (N-MeFOSE)				%	112			50-150	Pass	
2-(N-ethy perf uoro-1-octane su fonam do)-ethano (N-EtFOSE)				%	76			50-150	Pass	
N-ethy -perf uorooctanesu fonam doacet c ac d (N-EtFOSAA)				%	101			50-150	Pass	
N-methy -perf uorooctanesu fonam doacet c ac d (N-MeFOSAA)				%	146			50-150	Pass	
LCS - % Recovery										
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSA's)										
Perf uorobutanesu fon c ac d (PFBS)				%	101			50-150	Pass	
Perf uoropentanesu fon c ac d (PFPeS)				%	111			50-150	Pass	
Perf uorohexanesu fon c ac d (PFHxS)				%	90			50-150	Pass	
Perf uoroheptanesu fon c ac d (PFHpS)				%	92			50-150	Pass	
Perf uorooctanesu fon c ac d (PFOS)				%	91			50-150	Pass	
Perf uorodecanesu fon c ac d (PFDS)				%	100			50-150	Pass	
LCS - % Recovery										
n:2 Fluorotelomer sulfonic acids										
1H.1H.2H.2H-perf uorohexanesu fon c ac d (4:2 FTS)				%	98			50-150	Pass	
1H.1H.2H.2H-perf uorooctanesu fon c ac d (6:2 FTS)				%	115			50-150	Pass	
1H.1H.2H.2H-perf uorodecanesu fon c ac d (8:2 FTS)				%	105			50-150	Pass	
1H.1H.2H.2H-perf uorododecanesu fon c ac d (10:2 FTS)				%	111			50-150	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code	
Spike - % Recovery										
Perfluoroalkyl carboxylic acids (PFCAs)					Resu t 1					
Perf uorobutano c ac d (PFBA)	M17-Jn23163	NCP	%	103			50-150	Pass		
Perf uoropentano c ac d (PFPeA)	M17-Jn23163	NCP	%	105			50-150	Pass		
Perf uorohexano c ac d (PFHxA)	M17-Jn23163	NCP	%	108			50-150	Pass		
Perf uoroheptano c ac d (PFHpA)	M17-Jn23163	NCP	%	107			50-150	Pass		
Perf uorooctano c ac d (PFOA)	M17-Jn23163	NCP	%	109			50-150	Pass		
Perf uorononano c ac d (PFNA)	M17-Jn23163	NCP	%	109			50-150	Pass		
Perf uorodecano c ac d (PFDA)	M17-Jn23163	NCP	%	110			50-150	Pass		
Perf uoroundecano c ac d (PFUnA)	M17-Jn23163	NCP	%	112			50-150	Pass		
Perf uorododecano c ac d (PFDoA)	M17-Jn23163	NCP	%	109			50-150	Pass		
Perf uorotr decano c ac d (PFTrDA)	M17-Jn23163	NCP	%	107			50-150	Pass		
Perf uorotetradecano c ac d (PFTeDA)	M17-Jn23163	NCP	%	105			50-150	Pass		
Spike - % Recovery										
Perfluoroalkane sulfonamides (PFASAs)					Resu t 1					
Perf uorooctane su fonam de (FOSA)	M17-Jn23163	NCP	%	115			50-150	Pass		
N-methy perf uoro-1-octane su fonam de (N-MeFOSA)	M17-Jn23163	NCP	%	107			50-150	Pass		
N-ethy perf uoro-1-octane su fonam de (N-EtFOSA)	M17-Jn23163	NCP	%	110			50-150	Pass		
2-(N-methy perf uoro-1-octane su fonam do)-ethano (N-MeFOSE)	M17-Jn23163	NCP	%	129			50-150	Pass		
2-(N-ethy perf uoro-1-octane su fonam do)-ethano (N-EtFOSE)	M17-Jn23163	NCP	%	79			50-150	Pass		
N-ethy -perf uorooctanesu fonam doacet c ac d (N-EtFOSAA)	M17-Jn23163	NCP	%	99			50-150	Pass		
N-methy -perf uorooctanesu fonam doacet c ac d (N-MeFOSAA)	M17-Jn23163	NCP	%	108			50-150	Pass		
Spike - % Recovery										
Perfluoroalkane sulfonic acids & Perfluoroalkane sulfonates (PFSA's)					Resu t 1					

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Perf uorobutanesu fon c ac d (PFBS)	M17-Jn23163	NCP	%	109			50-150	Pass	
Perf uoropentanesu fon c ac d (PFPeS)	M17-Jn23163	NCP	%	107			50-150	Pass	
Perf uorohexanesu fon c ac d (PFHxS)	M17-Jn23163	NCP	%	106			50-150	Pass	
Perf uoroheptanesu fon c ac d (PFHpS)	M17-Jn23163	NCP	%	105			50-150	Pass	
Perf uorooctanesu fon c ac d (PFOS)	M17-Jn23163	NCP	%	99			50-150	Pass	
Perf uorodecanesu fon c ac d (PFDS)	M17-Jn23163	NCP	%	100			50-150	Pass	
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids				Result 1					
1H.1H.2H.2H-perf uorohexanesu fon c ac d (4:2 FTS)	M17-Jn23163	NCP	%	97			50-150	Pass	
1H.1H.2H.2H-perf uorooctanesu fon c ac d (6:2 FTS)	M17-Jn23163	NCP	%	119			50-150	Pass	
1H.1H.2H.2H-perf uorodecanesu fon c ac d (8:2 FTS)	M17-Jn23163	NCP	%	110			50-150	Pass	
1H.1H.2H.2H-perf uorododecanesu fon c ac d (10:2 FTS)	M17-Jn23163	NCP	%	141			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			
Perf uorobutano c ac d (PFBA)	M17-Jn23162	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perf uoropentano c ac d (PFPeA)	M17-Jn23162	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perf uorohexano c ac d (PFHxA)	M17-Jn23162	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perf uoroheptano c ac d (PFHpA)	M17-Jn23162	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perf uorooctano c ac d (PFOA)	M17-Jn23162	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perf uorononano c ac d (PFNA)	M17-Jn23162	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perf uorodecano c ac d (PFDA)	M17-Jn23162	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perf uoroundecano c ac d (PFUnA)	M17-Jn23162	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perf uorododecano c ac d (PFDoA)	M17-Jn23162	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perf uorotridecano c ac d (PFTrDA)	M17-Jn23162	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perf uorotetradecano c ac d (PFTeDA)	M17-Jn23162	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	B17-Jn27841	NCP	%	20	20	1.0	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	

Authorised By









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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CHAIN OF CUSTODY

CON NOTE: TOLL
IPEC 8961560748
(6 ESKYS)

AECOM

CLIENT: AECOM Services Pty Ltd
OFFICE: Level 8, 3 Forrest Place, Perth, WA, 6000
PROJECT: Port Hedland International Airport - PFAS Investigation
SUBPROJECT: PFAS InvestigationProject Number: 60543717.3.3
QUOTE NO.: ENI 1001.17
EOD FORMAT (or default): EdcatTURNAROUND REQUIREMENTS:
ALS QUOTE NO.:
CONTAINER/CERTIFICATE AVAILABLEStandard TAT (last date date)
COC SEQUENCE NUMBER (each)
COC: 1
OF: 1
RECEIVED BY: SP
DATE/TIME: 21.6.17FOR LABORATORY USE ONLY
Custody Seal Intact? N
Reference/Chain of Custody Intact? N
Other Comment: 3.7
RECEIVED BY: SP
DATE/TIME: 21.6.17PLEASE FORWARD THE FOLLOWING SAMPLES TO EUROFINS LABORATORIES:
SSQA073_180617 (SS17_0.5), SSQA079_180617 (SS18_0.5), SSQA021_180617 (SS19_0.5) for analysis of ER231 (DER recommended PFAS suite)

LAB ID	Area	SAMPLE ID	DATE	TIME	MATRIX	TOTAL BOTTLES	ER231, DER recommended PFAS suite	Oil Hold	Comments
1	Diesel Investigation	SS11_0.5_180617	16.06.17		S		X		
2	Diesel Investigation	SS11_1.5_180617	16.06.17		S		X		
3	Diesel Investigation	SS11_4.5_180617	16.06.17		S		X		
4	Diesel Investigation	SS12_0.5_180617	16.06.17		S		X		
5	Diesel Investigation	SS12_1.5_180617	16.06.17		S		X		
6	Diesel Investigation	SS12_3.5_180617	16.06.17		S		X		
7	Diesel Investigation	SS10_0.5_180617	16.06.17		S		X		
8	Diesel Investigation	SS10_1.5_180617	16.06.17		S		X		
9	Diesel Investigation	SS13_3.5_180617	16.06.17		S		X		
10	Diesel Investigation	SS15_0.1_170617	17.06.17		S		X		
11	Diesel Investigation	SS15_0.5_170617	17.06.17		S		X		
12	Diesel Investigation	SS15_1.4_170617	17.06.17		S		X		
13	Diesel Investigation	SS15_1.8_170617	17.06.17		S		X		
14	Diesel Investigation	SS14_0.1_170617	17.06.17		S		X		
15	Diesel Investigation	SS14_0.5_170617	17.06.17		S		X		
16	Diesel Investigation	SS14_1.4_170617	17.06.17		S		X		
17	Diesel Investigation	SS14_1.5_170617	17.06.17		S		X		
18	Diesel Investigation	SS14_3.4_170617	17.06.17		S		X		
19	Diesel Investigation	SS14_3.5_170617	17.06.17		S		X		
20	Diesel Investigation	SS14_3.5_170617	17.06.17		S		X		
21	Diesel Investigation	SS14_3.5_170617	17.06.17		S		X		
22	Diesel Investigation	SS14_3.5_170617	17.06.17		S		X		
23	Diesel Investigation	SS14_3.5_170617	17.06.17		S		X		
24	Diesel Investigation	SS14_3.5_170617	17.06.17		S		X		
25	Diesel Investigation	SS14_3.5_170617	17.06.17		S		X		
26	Diesel Investigation	SS14_3.5_170617	17.06.17		S		X		
27	Diesel Investigation	SS14_3.5_170617	17.06.17		S		X		
28	Diesel Investigation	SS14_3.5_170617	17.06.17		S		X		
29	Diesel Investigation	SS14_3.5_170617	17.06.17		S		X		
30	Diesel Investigation	SS14_3.5_170617	17.06.17		S		X		
31	Diesel Investigation	SS14_3.5_170617	17.06.17		S		X		
32	Diesel Investigation	SS14_3.5_170617	17.06.17		S		X		
33	Diesel Investigation	SS14_3.5_170617	17.06.17		S		X		
34	Diesel Investigation	SS14_3.5_170617	17.06.17		S		X		
35	Diesel Investigation	SS14_3.5_170617	17.06.17		S		X		
36	Diesel Investigation	SS14_3.5_170617	17.06.17		S		X		
37	Diesel Investigation	SS14_3.5_170617	17.06.17		S		X		
38	Diesel Investigation	SS14_3.5_170617	17.06.17		S		X		
39	Diesel Investigation	SS14_3.5_170617	17.06.17		S		X		
40	Diesel Investigation	SS14_3.5_170617	17.06.17		S		X		
41	Diesel Investigation	SS14_3.5_170617	17.06.17		S		X		
42	Diesel Investigation	SS14_3.5_170617	17.06.17		S		X		

Environmental Division
PerthWork Order Reference
EP17066611

Tel: 08 9447 7855 : 01 8422 7855

☒	☒	☒	☒	# CON NOTES	POST-CODE
AP	CP	CP	ID		MASS

10.8
11.2
11.2
11.06

ran
23/6/17

ALS SEAL
NO ICE
CARRIER
Rech. 22 JUN '17 12:40

16.3
16.5
16.4

-0.0

16.4